

# 2016 Annual Review

Wilpinjong Coal Mine

#### Table 1 Annual Review Title Block

Name of operation	Wilpinjong Coal Mine	
Name of operator	Wilpinjong Coal Pty Limited	
Development consent/project approval #	PA 05-0021	
Name of holder of development consent/project approval	Wilpinjong Coal Pty Limited	
Mining lease #	ML 1573	
Name of holder of mining lease	Wilpinjong Coal Pty Limited	
Water licence #	WAL21499, 20BL173513, 20BL173514, 20BL173515, 20BL173516, 20BL173517, 20BL170147, 20BL170148, 20BL170149, 20BL170150, 20BL170151, 20BL170152, 20BL170153, 20BL170063, 20BL170062, 20BL170061, 20BL170059, 20BL170058.	
Name of holder of water licence Wilpinjong Coal Pty Limited		
MOP start date	26 November 2014	
MOP end date 29 April 2019		
Annual review start date	01 January 2016	
Annual review end date	31 December 2016	

I, Kieren Bennetts, certify that this audit report is a true and accurate record of the compliance status of the Wilpinjong Coal Mine for the period 01 January 2016 to 31 December 2016 and that I am authorised to make this statement on behalf of Wilpinjong Coal Pty Limited.

#### 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	Kieren Bennetts
Title of authorised reporting officer	Environment & Community Manager
Signature of authorised reporting officer	K.B_As.
Date	7 April 2017



This 2016 Annual Review (AR) (this Report) presents a summary of regulatory compliance, environmental performance and community engagement activities for the *review period* from 1 January 2016 to 31 December 2016. This AR has been prepared in accordance with Condition 3, Schedule 5 of Project Approval (05-0021), requiring the preparation of an Annual Review, and the *Annual Review Guideline (October 2015)* issued by the NSW Department of Planning and Environment (DP&E).

Copies of this Report will be provided to the following stakeholders:

- NSW Department of Planning and Environment (DP&E);
- NSW Trade and Investment Division of Resources and Energy (DRE);
- NSW Environment Protection Authority (EPA);
- NSW Department of Primary Industries Division of Water (DPI Water);
- NSW Office of Environment and Heritage (OEH);
- Mid-Western Regional Council (MWRC); and
- the Mine's Community Consultative Committee (CCC);

In addition, a copy will be made publicly available on the Peabody website: <u>http://www.peabodyenergy.com/content/427/australia-mining/new-south-wales/wilpinjong-mine/approvals-plans-and-reports-wilpinjong-mine</u> in accordance with Condition 11(a), Schedule 5 of Project Approval (05-0021).



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# **1.0 STATEMENT OF COMPLIANCE**

# **Table 2 Statement of Compliance**

Were all conditions of the relevant approval(s) complied with?	Yes / No
PA 05-0021	No
ML 1573	No
EL 6169 & 7091	Yes
EPL 12455	No
Water Licences	No

# Table 3 Non-Compliances

Relevant Approval	Condition #	Condition Description	Compliance Status	Comment	Section in AR
PA 05-0021, Sch 3	Con. 37	By the end of December 2015, unless the DG agrees otherwise, make suitable arrangements to protect ECAS and BOA in perpetuity	Non-compliance	Delays in reaching an agreement with National Parks & Wildlife Service (NPWS) for the transfer of land.	Section 11
PA 05-0021, Sch 3	Con. 39	By 31 December 2015, unless otherwise agreed by the DG, lodge a Conservation Bond for BOAs	Non-compliance	Conservation Bond for the BOA's subject to transfer of lands with National Parks & Wildlife Service (NPWS).	Section 11
PA 05-0021, Sch 3	Con. 54	The Proponent shall minimise the visual impacts of the project to the satisfaction of the Director- General.	Non-compliance	No endorsement sought from DP&E Director General (i.e. Secretary).	Section 11
PA 05-0021, Sch 3	Con. 32(d)	A program to assess stream health conditions in Wilpinjong and Cumbo Creek.	Non-compliance	Aquatic monitoring for macro- invertebrates was not completed during 2016.	Section 11



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Relevant Approval	Condition #	Condition Description	Compliance Status	Comment	Section in AR
ML1573	Con. 27(a)	Mining operations must not be carried out otherwise than in accordance with a Mining Operations Plan (MOP) which has been approved by the Director-General Mining of Strip 26E was considered to be included in MOP Amendment		Mining of Strip 26E was considered not to be included in MOP Amendment B.	Section 11
EPL 12455	M2.2	Air Monitoring Requirements for EPL point 11 (DG13)	Non-compliance Total insoluble matter not determined in accordance with AS3580.10.1		Section 11
EPL 12455	03.1 & 2	All operations and activities occurring at the premises must be carried out in a manner to minimise the emission of dustAll trafficable areas, coal storage areas and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition	Non-compliance	Composition of ash, atmospheric conditions at that time and proximity of Keylah Dump to Ulan-Wollar Road.	Section 11
EPL 12455	03.1 & 3.2	All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust and All trafficable areas, coal storage areas and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition	Non-compliance	Excessive dust emissions on haul roads 3 and 4, within and in the vicinity of open cut 7.	Section 11
EPL 12455	M2.2	Air Monitoring Requirements for EPL point 20 (HV4)	Non-compliance	The high volume air sampler (HV4) did not operate due to a power failure.	Section 11
EPL 12455	M2.2	Air Monitoring Requirements for EPL point 13 (HV1) Non-compliance The high volume ai not operate due to		The high volume air sampler (HV1) did not operate due to a power failure.	Section 11
EPL 12455	M2.2	Air Monitoring Requirements for EPL point 25 (TEOM 3)       Non-compliance       General maintenance (inc calibrations) and/or power failure causes.		General maintenance (including calibrations) and/or power failure main causes.	Section 11
EPL 12455	M2.2	Air Monitoring Requirements for EPL point 28 (TEOM 4)	Non-compliance	General maintenance (including calibrations) and/or power failure.	Section 11
EPL 12455	M4.2	Air Monitoring Requirements for EPL point 21 (meteorological station)	Non-compliance	General maintenance (including calibrations) and/or equipment issues	Section 11

# Table 4 Compliance Status Key

Risk Level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental
nigii		consequences, regardless of the likelihood of occurrence



Risk Level	Colour Code	Description
Medium	Non-compliant	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Administrative non- compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)



# **2.0 INTRODUCTION**

#### 2.1 Mining Operations

The Wilpinjong Coal Mine ("the Mine") is owned and operated by Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Ltd (PEA).

The Mine is an existing open cut coal mining operation situated approximately 40 kilometres (km) northeast of Mudgee, near the Village of Wollar, within the Mid-Western Regional Local Government Area, in central New South Wales (NSW) (**Figure 1**). The Mine extracts run-of-mine (ROM) coal that is either processed on site at the Coal Handling and Preparation Plant (CHPP) or bypassed directly to product stockpiles. Product coal is transported by rail on the existing Sandy Hollow Gulgong Railway to local energy generators and to the Port of Newcastle for export.

Project Approval (05-0021) was granted by the Minister for Planning under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) on 1 February 2006, PA05-0021 was most recently modified in August 2016 (Modification 7). The current mining operations at the Wilpinjong Coal Mine are approved to produce 16 Mtpa of ROM coal and rail 12.5<sup>1</sup> Mtpa of product coal.

The approximate extent of the approved open cut and contained infrastructure area at Wilpinjong Coal Mine is shown on **Figure 2**. Major components include open cut pits, an elevated waste rock emplacement in Pit 2, ROM pads/coal stockpiles, water management infrastructure, CHPP, product coal stockpiles and rail and other associated infrastructure areas. Open cut mining targeting the Ulan Coal Seam and Moolarben Coal Member (in Mining Lease 1573) and the handling and processing of ROM coal at the CHPP is currently approved to operate 24 hours per day, seven days per week

# 2.2 Mine Contact Details

Contact details for key personnel responsible for environmental management at the Mine are in Table 5.

Name	Position	Contact Details	
Blair Jackson	General Manager	Email: <u>bjackson@peabodyenergy.com</u>	
Kieren Bennetts Environment & Community Manager		Email: <u>kbennetts@peabodyenergy.com</u>	
Clark Potter Senior Environmental Advisor		Email: cpotter@peabodyenergy.com	
Karin Fogarty	Environmental Advisor	Email: <a href="mailto:kfogarty@peabodyenergy.com">kfogarty@peabodyenergy.com</a>	

# Table 5 Mine Contact Details

The street, postal address and contact telephone numbers for the Mine are as follows:

**Street Address** 1434 Ulan-Wollar Road WOLLAR NSW 2850 Postal Address Locked Bag 2005 MUDGEE NSW 2850 **Phone Number** Ph: (02)6370 2500

<sup>&</sup>lt;sup>1</sup> (MOD 7) Production and railing of 13 Mtpa of product coal in 2016.





**Figure 1 Locality Plan** 







# **3.0 APPROVALS**

**Table 6** presents the current approvals, leases and licences that the Mine operates under.

Relevant Authority	Instrument	Approval/Licence No.	Expiry Date
DP&E	Project Approval	<ul> <li>Project Approval (05-0021)</li> <li>(MOD1) Modified November 2007</li> <li>(MOD 3) Modified August 2010</li> <li>(MOD 4) Modified August 2012</li> <li>(MOD 5) Modified February 2014</li> <li>(MOD 6) Modified November 2014</li> <li>(MOD 7) Modified August 2016</li> </ul>	21 years from commencement of Project Approval (i.e. 2027)
DRE-DTIRIS	Mining Lease	ML 1573	February 2027
	Exploration Licence	EL 6169	28/11/2017
		EL 7091	03/03/2019
	Mine within Wilpinjong B	ML 1573	Endorsed DSC 19 February 2013
	Notification Area		Approved 24 January 2014
	Mining Operations Plan (MOP)	Approved 11 June 2014 MOP Amendment A (21/10/2014) MOP Amendment B (26/11/2014) MOP Amendment C (05/10/2016)	29 April 2019
	Tailings Emplacement	Section 100 – TD1 and TD2 (Approv. No. 07/1226)	February 2006 (Facility decommissioned)
	Tailings Emplacement	Section 100 – TD3 and TD4 (Approv. No. 08/9006)	December 2011 (Facility decommissioned)
	Tailings Emplacement	Section 100 – TD5 (Approv. No. 08/9006)	December 2013 (Facility decommissioned)
	Tailings Emplacement	Section 100 – TD6 (Approv. No. 08/9006)	31 January 2016
	Tailings Emplacement	Section 101 - Decommission TD2 (Approv. No. 09/2396)	29 April 2009 (Facility decommissioned)
	Tailings Emplacement	Section 101 - Decommission TD1 (Approv. No. 09/2396)	28 October 2011 (Facility decommissioned)
EPA	Environment Protection Licence (EPL)	EPL 12425	Until the licence is surrendered, suspended or revoked. The licence is subject to review every 3 years.
	NSW Radiation Control Act 1990 Registration	Licence Number 5061384*	02 January 2016^
WorkCover NSW	Explosives Licence	NSW Explosives Act 2003 Part 3 Licence (Licence Number XSTR200024)	24 March 2018
DPI-Water	Water Licences	Refer to Table 18 in Section 7.1	Refer to Table 18 in Section 7.1

#### Table 6 Mine Approvals, Leases and Licences

Note: Copies of the Project Approval (05-0021), EPL 12425 and ML 1573 are available on the Peabody

website <u>http://www.peabodyenergy.com/content/427/australia-mining/new-south-wales/wilpinjong-mine/approvals-plans-and-reports-wilpinjong-mine</u>. \* Licence number 5061384 consolidated several existing Radiation Registrations into a single licence during 2014. ^ Renewal application submitted.

# 3.1 Ulan Road Strategy (Summary of Actions 2016)

The Ulan Road Strategy defines the program for upgrading and maintenance of Ulan Road between Mudgee and the entrance to the underground surface facilities of Ulan Coal Complex over the next 21 years and was approved by NSW Planning and Environment on 25 May 2013.



The operation of the strategy relies upon the *Funding and Delivery of Ulan Road Upgrade and Maintenance* Deed (the Deed) made between the Mines and Mid-Western Regional Council (Appended, clause 19 extracted). Contributions to the Ulan Road Strategy by the Mines in accordance with the deed are mandatory under project approval consent conditions, as modified over the past 5 years. The strategy also provides for the completion of Noise Attenuation Works at the 18 identified properties along Ulan Road.

#### Noise attenuation works

Noise attenuation works requires agreement with land holder on works to be completed using the *RMS Guidelines* as a guide to types of works and spend limit. Each of the 18 properties was inspected and a range of mitigation measure identified, these measures were then agreed upon in consultation with the property owner and an agreement signed between all parties prior to work commencing:

- 8 properties with works completed;
- 1 property agreement in place works to be completed;
- 5 currently negotiating scope of works with owners;
- 3 properties where owners have declined mitigation works; and
- 1 property on review is actually outside the mitigation zone.

#### Road capital upgrades

All associated works regarding the capital upgrades are to the design agreed under the strategy and managed by MWRC.

#### <u>Ulan Road status</u>

- Construction start date was 1 April 2014;
- Likely Completion date August 2018; and
- Construction is approx. 61% complete.

#### Cope Road status

- Construction start date was 1 July 2014; and
- Construction is all but complete.

#### 3.2 Changes to Approvals

There was one modification to PA05-0021 during the review period i.e. MOD 7 in relation to an increase of production and railing of 13 Mtpa of product coal in 2016 (only).

There were two variations to EPL 12425 during the review period. Licence variation notice 1542895 removed the requirement in the EPL for dust monitoring at three rock shelter sites. Licence variation notice 1547609 allowed a water discharge increase from 5ML/day to 15ML/day from licensed discharge Point 24, commencing after the 31 December 2016, and also included a pollution study and reduction program (PRP) relating to waste from the water treatment process.

There was one amendment to the Mining Operations Plan (MOP) during the review period i.e. MOP Amendment C. MOP Amendment C was sought and approved by the DRE in October 2016 to align with MOD 7. MOP Amendment C also included minor amendments to mining and rehabilitation sequencing, inclusion of additional construction activities and revised completion criteria to align with the Biodiversity Management Plan.

There were changes to water licensing in regards to consolidating the total water entitlements held by the five water licences (i.e. 20BL173513, 20BL173514, 20BL173515, 20BL173516 & 20BL173517) to a gross entitlement of 2021ML/annum (**Section 7.1**). There was one water licence (20BL173973) issued on the 23 December 2016 for Pit 6.



#### **3.3** Wilpinjong Extension Project

The Mine submitted an Environmental Impact Statement (EIS) for the Wilpinjong Extension Project (WEP) on 8 January 2016. The EIS has been prepared to accompany a Development Application made for the WEP, in accordance with Part 4 of the *NSW Environmental Planning and Assessment Act, 1979*.

The EIS was on public exhibition by DP&E from 27 January to 10 March. The Project was referred to the Planning and Assessment Commission (PAC) by DP&E on 3 November 2016. The PAC completed a site visit of the Mine on 28 November 2016. There was a Public Hearing at the Mudgee Town Hall on the 29 November 2016. The PAC review report was issued on the 20 December 2016, with WCPL's responses to the PAC review report submitted to DP&E 14 February 2017. The Project was referred back to the PAC for Determination on the 14 March 2017.

# 3.4 Management Plans

WCPL operates an Environmental Management System to manage compliance and advance continual improvement across the Mine. During the review period all management plans were revised and updated accordingly and submitted for re-approval. A summary of the status of management plans required by PA05-0021 is presented in **Table 7**.

Management Plan	Re-Approval Status
Noise Management Plan (Con.5, Sch 3 of PA05-0021)	Approved, 9 May 2016^
Blast Management Plan (Con.15, Sch 3 of PA05-0021)	Approved, 9 May 2016^
Air Quality Management Plan (Con.20, Sch 3 of PA05-0021)	Approved, 5 April 2016^
Site Water Management Plan (Con.28, Sch 3 of PA05-0021)	Approved, 9 May 2016 <sup>^</sup>
Site Water Balance (Con.30, Sch 3 of PA05-0021)	Approved, 9 May 2016 <sup>^</sup>
Erosion and Sediment Control Plan (Con.31, Sch 3 of PA05-0021)	Approved, 9 May 2016 <sup>^</sup>
Surface Water Management and Monitoring (Con.32, Sch 3 of PA05-0021)	Approved, 9 May 2016 <sup>^</sup>
Groundwater Monitoring (Con.33, Sch 3 of PA05-0021)	Approved, 9 May 2016^
Surface and Groundwater Response Plan (Con.34, Sch 3 of PA05-0021)	Approved, 9 May 2016^
Biodiversity Management Plan (Con.38, Sch 3 of PA05-0021)	Approved, 5 April 2016^
Aboriginal Cultural Heritage Management Plan (Con.48, Sch 3 of PA05-0021)	Approved, 23 March 2016 <sup>^</sup>
Waste Management Plan (Con.57, Sch 3 of PA05-0021)	Approved, 3 August 2015^
Spontaneous Combustion Management Plan (Con.57A, Sch 3 of PA05-0021)	Approved, 9 May 2016^
Rehabilitation Management Plan (within the MOP)	Approved (MOP Amendment C)
Environmental Management Strategy (Con.1, Sch 5 of PA05-0021)	Approved, 20 June 2016^

# **Table 7 Status of Environmental Management Plans**

Notes: ^ Revised and resubmitted as a result of MOD 7 in October 2016, approval granted after 2016 reporting period on the 20/03/2017.

In accordance with Schedule 5, Condition 4 of PA05-0021, WCPL will review and if necessary revise the strategies, plans and programs required under the consent within three months of the submission of this Annual Review to relevant government regulators. In accordance with Schedule 5, Condition 11 of PA05-



0021, relevant management plans have been made available to the public on the Peabody Energy website <u>www.peabodyenergy.com</u>



# **4.0 OPERATIONS SUMMARY**

**Table 8** displays the production summary for 2016, compared to the production for 2015 and the forecast production for 2017.

Material	Approved Limit	Previous Reporting Period (actual)	This Reporting Period (actual)	Next Reporting Period (forecast)
Waste Rock/Overburden	34.1Mbcm	23.4Mbcm	30.2Mbcm	40.6Mbcm <sup>#</sup>
ROM Coal	16 Mtpa	12.52Mt	14.26Mt	15.44Mt
Coarse Reject & Tailings (TFP)*	NA	1.92Mt	1.66Mt	1.81Mt
Fine Tailings	NA	0	0	0
Product Coal	12.5Mtpa^	12.07Mt	12.68Mt^	13.26Mt <sup>#</sup>

#### Table 8 Production Summary

**Notes:** \*Tailings Filter Press<sup>2</sup>, Million tonnes per annum = (Mtpa), Million bank cubic meters = (Mbcm) ^ MOD7 Production and railing of 13 Mtpa of product coal in 2016 (only), <sup>#</sup>Pending approval of Wilpinjong Extension Project.

# 4.1 Other Operational Conditions

At the end of the 2016 review period, open cut mining operations were located in Pit 1, Pit 2, Pit 3, Pit 4, Pit 5 and Pit 7 as identified in Plan 3B of the MOP (**Figure 2**). Open cut mining in Pit 6 will commence in 2017 (**Section 4.2**).

In accordance with Condition 50, Schedule 3 of PA05-0021, WCPL maintains records of the amount of coal transported from the site each year, and the number of coal haulage train movements generated by the Mine on a daily basis.

12.73 Mt of product coal was transported from the Mine via rail during the 2016 Review Period (refer to MOD7 for 2016 limit) and involved an average of approximately four train movements per day to the end of the 2016 (**Appendix 1**).

Train loading is available on a continuous basis, 24 hours a day and 7 days per week, with a maximum of 10 laden coal trains leaving the site per 24 hour period and an average of six train movements per day when calculated over one calendar year (Condition 7, Schedule 2 of PA05-0021).

No overburden material was supplied (or requested) to regional infrastructure projects in the vicinity of the Mine.

Construction activities in the reporting period included Emergency Response Team Shed, Lime Silo at the CHPP and minor alterations to existing administration buildings.

#### 4.2 Next Reporting Period

The proposed mining sequence for the 2017 review period is Pit 1, Pit 2, Pit 3, Pit 4, Pit 5, Pit 6 and Pit 7.

Extraction in Pit 2 East commenced in mid-2016. Extraction in this area is being accelerated to allow for relocation of a new power line, which is required if the Wilpinjong Extension Project (WEP) is approved (Section 3.2).

<sup>&</sup>lt;sup>2</sup> In 2015 the Belt Press Filter (BPF) commenced at the CHPP. The BPF and associated transfer conveyor allows for co-disposal of tailings with coarse reject/overburden and improved recovery of water from tailings.



# **5.0 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW**

A number of actions and improvements were identified by the DP&E from the 2015 Annual Review, for the 2016 Annual Review. These actions and where they are addressed in the 2016 Annual Review are summarised in **Table 9**.

Table 9 Actions Required From Previous Annual Review
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Action required from previous Annual Review	Requested by	Action taken by WCPL	Where addressed in this Annual Review
<b>1. Trends</b> Trends are required to be provided for monitoring data for the life of the project and a graphical representation of trends and comparisons with the previous five (5) years of data are to be provided for all relevant data.	DP&E	Included in the monitoring data review where relevant, trends have been included.	Section 6
<b>2. Compensatory Water Supply</b> Include a section in the report which states whether a compensatory water supply was provided during the reporting period.	DP&E	Included in <b>Section 7</b> of the AR.	Section 7.13
<b>3.Meteorological Monitoring</b> A summary of the meteorological monitoring data is to be provided.	DP&E	A summary meteorological monitoring data for 2016 is provided in <b>Section 6</b> of the AR.	Section 6.1
<b>4. Ulan Road Strategy</b> Include a section in the report which discusses progress against the actions listed in the Ulan Road Strategy.	DP&E	A summary of the Ulan Road Strategy is provided in <b>Section</b> <b>3.1</b> of the AR.	Section 3.1
<b>5. Complaints</b> Include a total annual figure of complaints on the complaints graph (Graph 18).	DP&E	Included in <b>Section 9</b> of the AR.	Section 9
<b>6. Blast Monitoring Results</b> It would be beneficial to include the limit in the header of Table 10 in Appendix 3E.	DRE	Included in <b>Appendix 3E</b> of the AR.	Appendix 3E



# 6.0 ENVIRONMENTAL PERFROMANCE

Environmental management measures undertaken during the 2016 review period have been conducted as required by the MOP (as amended), relevant management plans and monitoring programs developed for the Mine in accordance with PA 05-0021 and EPL12425. The locations of environmental monitoring undertaken throughout the 2016 review period are provided in **Appendix 3**.

# 6.1 Meteorological Monitoring

Local meteorological data for 2016 was recorded by the Mine's meteorological station, which is operated in accordance with Project Approval 05-0021 and EPL 12425. The meteorological station monitors a number of meteorological parameters, including temperature, humidity, rainfall, wind speed and wind direction. The location of the meteorological station and associated tables and graphs are provided in **Appendix 3A**.

The month with the highest total rainfall recorded was September with 167.2mm. The least amount of rainfall was recorded in April with 15.4mm for the month. The total cumulative annual rainfall recorded for the year was 815.6mm, well above the average long-term cumulative annual average rainfall (in the vicinity of the Mine) ranging from 587.7mm to 651.5mm (WEP EA). The total cumulative annual rainfall recorded for 2016 was also well above the on-site weather station's average short-term (i.e. year 2006 to 2015) cumulative annual average rainfall of 649.7mm (WEP EA).

A maximum temperature of 37.9°C (at 2m) was recorded in January. The lowest minimum temperature was -2.4°C (at 2m) recorded in July. The 2016 average minimum of 5.2°C was slightly higher than the short term (i.e. year 2006 to 2015) average minimum of 3.0°C. The 2016 average maximum of 28.2°C was slightly lower than the short term average maximum of 31.7°C. Wind speed recorded during the 2016 review period showed an average monthly wind speed range between 1.6 metres per second (m/s) to 2.8m/s. A maximum wind speed of 20.7m/s was recorded in June.

# 6.2 Air, Blast & Noise Monitoring

#### Air Quality Monitoring

The Mine has developed and implemented an Air Quality Management Plan (AQMP) (**Table 7**). Limits for airborne particulate matter (i.e. dust) are specified in Conditions 17 & 18, Schedule 3 of PA05-0021. During the 2016 review period, the Mine carried out dust monitoring:

- At the locations shown in Figure 3 & Figure 4 (Appendix 3B); and
- At the frequency shown in **Table 10**.

**Table 13** contains the air quality monitoring results, as well as a discussion of the results, for the review period. Further air quality monitoring results for 2016 review period are provided in **Appendix 3B**.

Monitoring Parameter	Monitoring Locations	Frequency
Dust Deposition	DG4, DG5, DG8, DG10^, DG11 & DG15^	Monthly
	DG12, DG13 and DG14 (Aboriginal rock art sites)	Monthly (when mining < 1 km of the site)
High-Volume Air Sampling	HV1, HV4 & HV5	Continuous six day cycle
TSP	HV3^	Continuous six day cycle
TEOM (PM <sub>10</sub> )	TEOM 1^, TEOM 3 & TEOM 4	Continuous (24 hour average)

# Table 10 Summary of Air Quality Monitoring Program



Notes: ^ Data from DG10, DG15, HV3 and TEOM1 is not for compliance but utilised for management purposes only.

#### Spontaneous Combustion

The Mine has developed and implemented a Spontaneous Combustion Management Plan (SCMP) (**Table 7**). WCPL continued the removal of the Keylah Dump in 2016 (**Section 8.2**). There were no odour complaints or reportable incidents as a result of spontaneous combustion in 2016 (**Section 9**). Refer to **Section 6.7** for ambient air monitoring program. WCPL will continue to implement the SCMP in 2017.

#### Blast Monitoring

The Mine has developed and implemented a Blast Management Plan (**Table 7**). Blasting vibration, overpressure limits, the time and frequency of blasting are specified in Conditions 6, 9 and 10, Schedule 3 of PA05-0021 respectively. During the 2016 review period, the Mine monitored the vibration and overpressure (**Table 11**) of each blast at the sites shown in Figure 8 and Figure 9 (**Appendix 3E**). As shown in **Table 14**, the Mine complied with the conditions of PA05-0021 during the 2016 review period. Further blast monitoring results for 2016 review period are provided in **Appendix 3E**.

Table 11 Summary of the Blasting and Vibration Monitoring Program
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Monitoring Parameter	Monitoring Sites	Frequency
Ground vibration	V1, V2 and V3 (Aboriginal rock art sites).	Every blast within 1 km of sites.
	<ul><li>Power poles.</li><li>Railway culverts.</li><li>Railway bridge.</li></ul>	Every blast within 350 m of sites.
Ground vibration and airblast overpressure	Private residences (Wollar School)	All blasts within 3 km of residences.

#### Noise Monitoring

The Mine has developed and implemented a Noise Management Plan (NMP) (**Table 7**). During the 2016 review period a combination of attended and unattended noise monitoring to assess the performance of the Mine against the Noise Criteria. Attended noise monitoring is used for determining compliance against the Noise Criteria whilst unattended or real-time monitoring is primarily utilised as a proactive noise control system; providing noise alerts when predetermined noise levels are triggered so mining operations can be modified to lower the noise impacts on receptors. A summary of the noise monitoring program is presented in **Table 12.** A summary of noise monitoring results is provided in **Table 15.** Further noise monitoring results for 2016 review period, including figures with noise monitoring locations are provided in **Appendix 3F.** 

#### Table 12 Summary Noise Monitoring Program

Location	Site Monitoring Reference#	Parameter	Frequency
St Laurence O'Toole Church	N6	Attended Noise	Monthly
Coonaroo	N13	Attended Noise	Monthly
Tichular N14		Attended Noise	Monthly
Wollar Village	N15	Attended Noise	Monthly
Araluen Rd	N16	Attended Noise	Monthly
Mogo Rd	N17	Attended Noise	Monthly
Barrigan Valley	N18	Attended Noise	Monthly
WCPL Rail Loop -		Meteorology & Inversion	Continuous
Wollar Village SentineX 33		Real-Time Noise - Fixed	Continuous



Location	Site Monitoring Reference#	Parameter	Frequency	
Araluen Rd	SentineX 30	Real-Time Noise - Fixed	Continuous	
Wandoona	SentineX 31	Real-Time Noise - Mobile	Continuous	



Aspect	Approved Criteria	(MOD 6) Predictions	Performance During the Reporting Period	Trend/Key Management Implications	Implemented/proposed Management Actions		
Deposited Dust <sup>c</sup>	4 g/m <sup>2</sup> /month <sup>de</sup> (at residences on privately owned land)	1.2 - 1.3 g/m <sup>2</sup> /month <sup>g</sup>	<ul> <li>Annual average dust deposition results for the reporting period complied with the approved criteria of 4 g/m<sup>2</sup>/month : <ul> <li>DG5 (Ave: 1.34 g/m<sup>2</sup>/month)</li> <li>DG15 (Ave: 1.6 g/m<sup>2</sup>/month)</li> </ul> </li> <li>Dust deposition results for the reporting period were slightly above MOD 6 EA predictions (i.e. at 2015 or Year 10) at relevant private residences nearest to DG5 and DG15.</li> </ul>	<ul> <li>Dust deposition results for the sing period complied with the approved a of 4 g/m<sup>2</sup>/month :</li> <li>DG5 (Ave: 1.34 g/m<sup>2</sup>/month)</li> <li>DG15 (Ave: 1.6 g/m<sup>2</sup>/month)</li> <li>leposition results for the reporting period slightly above MOD 6 EA predictions (i.e. 5 or Year 10) at relevant private nces nearest to DG5 and DG15.</li> <li>Dust deposition results (i.e. DG5 and DG15) at locations nearest to nonmined owned land in the 2016 period were below approved criteria (Graph 1);</li> <li>All other dust depositional sites recorded annual averages below the approved criteria with the exception of DG11 (Graph 1).</li> <li>DG11 is located on mine owned land approvimately 1.7km to the porth</li> </ul>			
TSP	90 μg/m <sup>3 ade</sup>	24.0 – 24.9 μg/m <sup>3 h</sup>	<ul> <li>Annual average results for the reporting period complied with the approved criteria of 90 μg/m<sup>3</sup>:</li> <li>HV3 (Ave: 27.59 μg/m<sup>3</sup>)</li> <li>Annual average TSP results for the reporting period where slightly higher than 2015 results of 22.61μg/m<sup>3</sup>, and slightly higher than MOD 6 EA predictions (i.e. at 2015 or Year 10) at relevant private residences nearest to HV3 (as a likely result of mining operations approaching the TSP monitoring site).</li> </ul>	<ul> <li>approximately 1.7km to the north east of Pit 3. The increasing trend at DG11, as a likely influenced by agricultural activities associated with the pastoral lessee.</li> <li>Annual average dust deposition for the past five years (Graph 2) shows a decreasing trend at DG4 and DG10, with slightly increasing trends at DG5, DG8 and DG15.</li> <li>TSP results at HV3 (Graph 3) for review period were below approved evidence.</li> </ul>	<ul> <li>During the review period the following control measures were implemented in accordance with the MOP and AQMP.</li> <li>Mine managed in response to dust alarms from TEOMs (refer to Section 9);</li> <li>Metrological condition assessed prior to blasting;</li> <li>All active haul roads and traffic areas were watered on an appropriate basis using water carts;</li> <li>Water sprays were utilised on the</li> </ul>		
PM <sub>10</sub>	50 μg/m <sup>3 adf</sup>	-	The maximum <sup>1</sup> 24hour average PM <sub>10</sub> results for the reporting period complied with the approved criteria of 50 μg/m <sup>3</sup> : • TEOM 3 (Max: 34.4 μg/m3) • TEOM 4 (Max: 43.4 μg/m3) <b>Notes:</b> <sup>1</sup> The maximum 24hour average PM <sub>10</sub> was exceeded at TEOM 4 (Max: 51.1 μg/m <sup>3</sup> on the 18 February 2016) however the reported result was excluded <sup>d</sup> due to a bushfire event occurring.	<ul> <li>The annual average TSP results for the past 10 years, indicates a slightly increasing trend (Graph 3), although well below the applicable criteria.</li> <li>Annual average PM<sub>10</sub> results (HVAS and TEOMs) for the 2016 period were below approval criteria (Graph 5 and Graph 7).</li> <li>Annual average PM<sub>10</sub> results for the HVAS indicates a general decreasing</li> </ul>	<ul> <li>RUM coal bins, and recently stripped areas; and</li> <li>WCPL completed dust suppression trials with 3M in December 2016 on light vehicle roads within the Mine. The trial is expected to continue into 2017.</li> <li>In 2016 lost time hours associated with responding to dust management, as a direct response to implementation of dust management strategies, occurred:</li> </ul>		

Table 13 Air Quality Monitoring Environmental Performance



Aspect	Approved Criteria	(MOD 6) Predictions	Performance During the Reporting Period	Trend/Key Management Implications	Implemented/proposed Management Actions
PM 10	30 μg/m <sup>3 ade</sup>	14.2 – 14.7 µg/m <sup>3 i</sup>	Annual average PM <sub>10</sub> results for the reporting period complied with the approved criteria of 30 µg/m <sup>3</sup> and where below MOD 6 EA predictions at relevant private residences: • TEOM 3 (Ave: 10.2µg/m <sup>3</sup> ) • TEOM 4(Ave: 11.3µg/m <sup>3</sup> ) • HV1(Ave: 9.79µg/m <sup>3</sup> ) • HV4(Ave: 11.69µg/m <sup>3</sup> ) • HV4(Ave: 13.95µg/m <sup>3</sup> )	<ul> <li>trend with the exception of HV5.</li> <li>This decreasing trend is also indicated by the TEOMs.</li> <li>HV5 is located on mine owned land adjacent to Araluen Road which is unsealed and generates dust from local traffic. The increasing trend at HV5 is likely influenced by dust from Araluen Road during stable atmospheric conditions (i.e. inversions).</li> <li>In comparison to the 2015 period for annual average PM<sub>10</sub>, the HVAS were slightly lower in 2016.</li> </ul>	<ul> <li>0.01 hrs in Pit 3;</li> <li>0.14 hrs in Pit 4;</li> <li>0.34 hrs in Pit 5;</li> <li>0.16 hrs in Pit 7;</li> <li>0.13 hrs on stockpiles;</li> <li>0.18hrs on Keylah Stockpile.</li> </ul> The Mine rehabilitated approximately 70ha of mine waste rock emplacement areas in 2016. WCPL propose to rehabilitate approximately 135ha of mine overburden areas during 2017.
Notes: g/m <sup>2</sup> /mc other sources); b) 3580.10.1:2003: N dust storms, fire i Assessment) at re Assessment) at re	onth = grams per square I Incremental impact (i.e Methods for Sampling ar ncidents or any other ac Ilevant private residence Ilevant private residence	metre per month. μg/m <sup>3</sup> = m . incremental increase in con Id Analysis of Ambient Air - D tivity agreed by the Director- s. h) Year 10 Predicted Annu s.	icrograms per cubic metre. a) Total impact (i.e. incremer centrations due to the development on its own); c) Depo Petermination of Particulate Matter - Deposited Matter - General. e) Annual Averaging Period. f) 24 Hour Averagin al Average TSP (MOD6 Environmental Assessment) at rel	tal increase in concentrations due to the develop sited dust is to be assessed as insoluble solids as d Gravimetric Method; and d) Excludes extraordinar ng Period. g) Year 10 (i.e. 2015) Predicted Annual A evant private residences. i) Year 10 Predicted Ann	nent plus background concentrations due to all efined by Standards Australia, AS/NZS y events such as bushfires, prescribed burning, werage Dust Deposition (MOD6 Environmental hual AveragePM <sub>10</sub> (MOD6 Environmental



Aspect		Approved Criteria			Performance During the Reporting Period	Trend/Key Management Implications	Implemented/proposed Management Actions
	Location	Air last overpressure (dB(Lin Peak)) <sup>1</sup>	Ground Vibration (mm/s) <sup>2</sup>	Allowable Exceedence	Blast monitoring results for the reporting period complied ( <b>Graph 8</b> ) with the approved criteria of 115dB (<120dB) and 5mm/s (<10mm/s) at privately owned residences: • Wollar Public School - Max, 119 dBL	<ul> <li>There were 19 blasting related community complaints in 2016 when compared to 13 complaints in 2015.</li> <li>In accordance with Condition 13(c), Schedule 3 of Project Approval (05-0021), WCPL co-ordinates the timing of blasting on-site with the timing of blasting at the adjoining</li> </ul>	<ul> <li>In accordance with Condition 4, Schedule 5 of Project Approval (05- 0021), WCPL will review, and if necessary revise, the relevant strategies, plans and programmes within three months of the submission of this Annual Review.</li> </ul>
Open Cut Blasting	dence on ivately ed land <sup>3</sup>	115	5	5% <sup>6</sup>	<ul> <li>Max. 1.95 mm/s</li> <li>Blast monitoring results for the reporting period complied with the approved criteria of 50mm/s at public infrastructure.</li> <li>Blast monitoring results for the reporting period complied with the approved criteria of 50mm/s at tailings dams i.e. requirement to monitor not triggered.</li> <li>Blast monitoring results for the reporting period complied with the approved criteria of 460mm/s at Aboriginal sites:</li> </ul>	<ul> <li>Moolarben Coal Mine and Ulan Coal Mine to minimise the potential cumulative blasting impacts of the three mines.</li> <li>All blasting events during the review period occurred during the approved times of 9.00am to 5.00pm.</li> </ul>	<ul> <li>Coal Mine to ve blasting</li> <li>In accordance with the MOP, the Blast Management Plan and Condition 13(a), Schedule 3 of Project Approval (05-0021), the following control strategies are implemented at the Mine in order to minimise the potential for exceedances of the relevant blasting criteria.</li> <li>As discussed in Section 9.0, all blasting complaints were responded</li> </ul>
	Resid pri own	120	10	0%			
	All Public infrastructure <sup>4</sup>	-	50	0%		<ul> <li>No blasting occurred on a Sunday or on a Public Holiday during the 2016 review period.</li> <li>There was no more than one blast per day (max. of 2 allowed) and an average of 3.85 blasts per week (max. of 5 per week allowed).</li> </ul>	
	Tailings Dams <sup>5</sup>	-	50	-		<ul> <li>There were a total of 200 blasts for the 2016 reporting period.</li> <li>Only 1% of total blasts were above 115dB, no</li> </ul>	<ul> <li>There were a total of 200 blasts for the 2016</li> <li>There were a total of 200 blasts for the 2016</li> <li>There were a total of 200 blasts for the 2016</li> <li>Complaints Management</li> <li>Only 1% of total blasts were above 115dB, no</li> </ul>
	Railway Line	-	100 <sup>7</sup> 200 <sup>8</sup>	-	<ul> <li>Site 152 <ul> <li>Max. 14.68mm/s</li> </ul> </li> <li>Site 153 </li> </ul>	<ul> <li>blasts were above 120dB limit.</li> <li>There were no ground vibrations recorded at Site 152, Site 72 &amp; Site 153 greater than the</li> </ul>	• WCPL has complied with the blasting requirements of PA05-0021 and on this basis will continue to
	- Max. 34.36mm/s - Max. 34.36mm/s • Site 72 - Max. 34.36mm/s - Max. 34.36mm/s - Max. 34.36mm/s	<ul> <li>Max. 34.36mm/s</li> <li>Site 72         <ul> <li>Max. 34.36mm/s</li> </ul> </li> </ul>	<ul> <li>maximum 460mm/s.</li> <li>There were no ground vibrations greater than 50mm/s at the rail line and culverts at Pit 3 and Pit 5.</li> </ul>	<ul> <li>WCPL have reviewed blast processes since the high overpressure recorded at the school to ensure compliance.</li> </ul>			
Notes: <sup>1</sup> dB (Lin Pe	ak) = decibel	linear in peak	$c^2 \text{ mm/s} = \text{mill}$	imetres per s	econd. <sup>3</sup> These criteria do not apply if WCPL has a y	written agreement with the relevant owner to exceed these	e criteria, and has advised the DP&E in writing

#### Table 14 Blast Monitoring Environmental Performance

**Notes:**<sup>1</sup> dB (Lin Peak) = decibel linear in peak. <sup>2</sup> mm/s = millimetres per second. <sup>3</sup>These criteria do not apply if WCPL has a written agreement with the relevant owner to exceed these criteria, and has advised the DP&E in writing of the terms of this agreement. <sup>4</sup>The ground vibration criteria is 50 mm/s or a limit determined by the structural design methodology in AS2187.2-2006, or its latest version, or other alternative limit for public infrastructure, to the satisfaction of the Director-General)).<sup>5</sup> The criterion applies at any point on the dams. A minimum requirement is that monitoring of blast vibration occurs on the crest of TD2N, TD2S, TD2SS and TD6. <sup>6</sup> 5% of the total



Aspect	Approved Criteria	Performance During the Reporting Period	Trend/Key Management Implications	Implemented/proposed Management Actions				
number of blasts over a period of 12 months. <sup>7</sup> When blasting within 350m of railway culverts. <sup>8</sup> When blasting within 100m of railway lines. <sup>9</sup> No specific criteria. Adopted performance indicator when blasting within 1km. <sup>10</sup> No								
specific criteria. Po	specific criteria. Potential for damage when blasting within 1km.							



Aspect	Approved Criteria			а	Performance During the Reporting Period	Trend/Key Management Implications	Implemented/proposed Management Actions
	J Monitoring Locations	Day <sup>2</sup> L <sub>Aeq</sub> 15 Minute	Evening <sup>3</sup> L <sub>Aeq</sub> 15 Minute 35	Night <sup>4</sup> L <sub>Aeq</sub> 15 Minute/ L <sub>A1</sub> , minute 35/45	Attended noise monitoring during 2016 was undertaken monthly during: <ul> <li>18<sup>th</sup> to 19<sup>th</sup> January;</li> <li>10<sup>th</sup> to 11<sup>th</sup> February;</li> <li>2<sup>nd</sup> to 3<sup>rd</sup> March;</li> <li>6<sup>th</sup> to 7<sup>th</sup> April;</li> <li>18<sup>th</sup> to 19<sup>th</sup> May;</li> <li>22<sup>nd</sup> to 23<sup>rd</sup> June;</li> </ul>	<ul> <li>The frequency of attended monitoring was increased to monthly during the 2015 review period.</li> <li>Attended monitoring at these locations indicated that the mine complied with noise consent limits at all private monitoring locations during the 2016 review period, and</li> </ul>	<ul> <li>In accordance with Condition 4, Schedule 5 of Project Approval (05- 0021), WCPL will review, and if necessary revise, the relevant strategies, plans and programmes within three months of the submission of this Annual Review.</li> <li>Continue to implement the Noise</li> </ul>
	N13	36	36	36/45	<ul> <li>14<sup>th</sup> to 15<sup>th</sup> July;</li> <li>4<sup>th</sup> to 5<sup>th</sup> August;</li> </ul>	accordingly did not exceed the noise land acquisition criteria.	Management Plan (NMP) in accordance Condition 7, Schedule 3 of
	N14	35	35	35/45	<ul> <li>7<sup>th</sup> to 8<sup>th</sup> September;</li> </ul>	• It is noted that wind speed and/or	PA05-0021.
Attended	N15	35	35	35/45	<ul> <li>11<sup>th</sup> to 12<sup>th</sup> October;</li> <li>2<sup>nd</sup> to 3<sup>rd</sup> November: and</li> </ul>	conditions result in Project Approval	with responding to noise
Noise	N16	37	37	37/45	• 19 <sup>th</sup> to 20 <sup>th</sup> December.	criteria not always being applicable.	management occurred : – 2.8 brs in Pit 2:
Monitoring	N17	35	35	35/45	Attended monitoring noise levels from WCPL complied	44.88 hours lost time (i.e. lost time	- 14.92 hrs in Pit 3;
	N18	35	35	35/45	with Project Approval and EPL noise limits at all sites during attended noise monitoring undertaken in 2016 (full reports are provided in <b>Appendix 3F</b> ). WCPL did not trigger modifying factor penalties for low frequency noise. None of the measurements occurred during which WCPL was measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further assessments of low frequency noise was required to be undertaken.	<ul> <li>only captured for dig implements such as dozers, excavators and loaders) as a direct result of modifying the operations to remain compliant with relevant noise criteria.</li> <li>There was a significant reduction of noise complaints in 2016. A total of 27 noise complaints in 2016 as opposed to 78 complaints in 2015.</li> <li>Validation report of real time noise monitoring is provided in <b>Appendix</b> <b>3F</b>.</li> </ul>	<ul> <li>5.69 hrs in Pit 4;</li> <li>0.95 hrs in Pit 5;</li> <li>11.32 hrs in Pit 7; and</li> <li>0.92 hrs on Stockpiles.</li> <li>As discussed in Section 9.0, all noise complaints were responded to in accordance with the Complaints Management Procedure.</li> </ul>
Notes: <sup>1</sup> To inte	erpret the l	ocations re	ferred to ir	Table 15; re	fer to Figure in Appendix 3F. $^2$ Day is defined as the period from 7 ar	m to 6 pm Monday to Saturday and 8 am to 6 pm	Sunday and Public Holidays. <sup>3</sup> Evening is defined
as the period 6	pm to 10 p	m. <sup>4</sup> Night	t is defined	as the period	from 10 pm to 7 am Monday to Saturday and 10 pm to 8 am Sunda	ay and Public Holidays. <sup>3</sup> Noise levels to be assess	ed at the most affected point at the boundary of
the Goulburn R	ver Nation	al Park/ Mi	unghorn Ga	p Nature Res	erve.  EPL daytime limit is currently 35dBA(Leq).		

# Table 15 Noise Monitoring Environmental Performance





# Graph 1 - Annual Average Dust Deposition Results 2011 - 2016



2011 to 2016 - Dust Depostion Results (Rolling Averages)

















Graph 6 - TEOM 24hr & Annual Average PM<sub>10</sub> Results 2016









Graph 8 - Blasting Monitoring Results for 2016







# 6.3 Heritage

The Mine has developed and implemented an Aboriginal Cultural Heritage Management Plan (ACHMP) (**Table 7**). Five Cultural Heritage meetings were undertaken in 2016 (inclusive of RAPCC) on 9<sup>th</sup> March, 8<sup>th</sup> June, 14<sup>th</sup> September, 6<sup>th</sup> and 7<sup>th</sup> December. Key heritage and environmental issues that were raised during consultation included summary of mining operations, the WEP, management of Aboriginal heritage including rock shelters and salvage works. During the 2016 review period, a number of archaeological surveys and surface salvage works were carried out within the Project Approval area. For further details of Aboriginal heritage activities undertaken during 2016 refer to **Appendix 4**.

#### 6.4 Biodiversity

A Biodiversity Management Plan (BMP) (**Table 7**) has been prepared and implemented for the Mine. The BMP outlines strategies for the management of flora and fauna, threatened species, rehabilitated areas, regeneration areas, biodiversity offset areas and the Enhancement and Conservation Areas (ECA's).

The objective of biodiversity monitoring is to ensure the Domains (as identified by the MOP) are progressing towards the relevant Completion Criteria and overall mine closure objectives. The biodiversity monitoring includes assessment of native vegetation and habitat complexity, landscape stability and fauna diversity. The BMP facilitates implementation of threatened species management strategies to minimise potential impacts on threatened flora and fauna species.

During 2016, Wilpinjong completed an inspection report on ECA and Regeneration Areas to identify erosion sites for remediation as well as identify waste sites for removal as required by the 3 Year Schedule in the BMP (refer **Appendix 5)**. Monitoring in accordance with the BMP was also completed.

A summary of the 2016 flora and fauna monitoring results are provided below. A summary of the monitoring within rehabilitation areas is provided in **Section 8.2**. For the complete 2016 biodiversity monitoring report, prepared by Ecological Australia (ELA), refer to **Appendix 5**.



The spring 2016 biodiversity monitoring program was undertaken in accordance with the methods and survey techniques prescribed in the BMP and included:

- Vegetation (floristic) monitoring using plot BioMetric<sup>3</sup> assessments (below and in Section 8.2);
- Landscape Stability using Landscape Function Analysis<sup>4</sup> for rehabilitation areas (Section 8.2); and
- Fauna (i.e. birds, ground fauna and micro-bats).

# Fauna Monitoring

Fauna monitoring undertaken during spring 2016 recorded 133 fauna species, comprising six amphibian, 21 mammal (including 14 microchiropteran bat (microbat) species), seven reptile and 99 bird species. Four introduced species were recorded. 12 species listed as vulnerable under TSC Act and/or the EPBC Act were recorded. The most commonly occurring bird species were *Lichenostomus chrysops* (Yellow-faced Honeyeater) and *Philemon corniculatus* (Noisy Friarbird), both being recorded at 20 of the 25 bird monitoring sites. *Chalinolobus morio* (Chocolate Wattled Bat) was the most commonly occurring microbat species, recorded at 10 of the 11 bat monitoring sites.

Whilst survey effort varied across Domains, both fauna species diversity and abundance correlated positively with habitat condition and complexity (vegetation structural diversity, presence of hollows, and presence of fallen logs). This was demonstrated through the high species counts and diversity recorded within BOA, ECA and Reference monitoring sites. Regeneration and Rehabilitation areas did not have such complexity and were often isolated from larger tracts of native vegetation.

Proximity to relatively intact remnants and patch size is likely to have influenced monitoring results, although this was not specifically measured. Several survey sites within ECA and Regeneration areas that contained relatively low habitat features, but were close to Munghorn Gap NR or Goulburn River NP, recorded high bird and microbat richness and/or abundance. In contrast, isolated monitoring sites within Rehabilitation Areas (R6 and R9) that are surrounded by active mine operations had low bird observations, presumably due to lower habitat values in these areas and disturbance caused by mining operations.

#### Limitations

In contrast to the 2015 monitoring period, which was extremely hot, the 2016 monitoring program took place early in spring during an unseasonably wet period for the region, and with much lower temperatures. This could have impacted the fauna surveys in the following ways. In the case of birds, a wet season would likely have increased foraging resource availability, and therefore abundances would potentially be higher, with a possible influx of species from the wider area. However, the time of year would also have meant migratory species such as *Merops ornatus* (Rainbow Bee-eater) and *Scythrops novaehollandiae* (Channel-billed Cuckoo) were not yet present in the region. For the funnel trap/pitfall trap surveys, the cold weather and frequent heavy rainfall decreased success rates due to inactivity of reptiles. In addition to this, funnel traps had to be closed on two occasions for animal welfare reasons, reducing the potential number of total trap nights (survey effort) from 753 to 690.

#### Vegetation Monitoring

A total of 423 flora species were recorded across the Domains and Reference sites during autumn and spring 2016, consisting of 318 native species, 97 exotic species, and eight species unable to be identified as either native or exotic. A full list of all flora species recorded during autumn 2016 and spring 2016 surveys is included in **Appendix 5**.

<sup>&</sup>lt;sup>4</sup> Landscape Function Analysis (LFA) is a rapid and reliable technique used for managing and monitoring of landscape rehabilitation (Tongway & Hindley 2004). The method assesses how biological and physical resources are stored, transported, cycled and lost from a landscape.



<sup>&</sup>lt;sup>3</sup> BioMetric (Gibbons et al 2009) is the model for determining meaningful, quantitative, biodiversity focused Completion Criteria and Interim Performance Targets. BioMetric, a NSW Government endorsed biodiversity assessment method.

Native species richness ranged from four species (A\_100) to 57 species (Ref\_10), with Reference sites, on the whole, containing a higher native species richness compared to sites within Domains. However, a number of sites located within remnant native vegetation within the BOAs and ECAs also recorded a notably high native species richness. These included A\_104 (39 species), B\_100 (38 species), B\_103 (38 species) and C\_102 (51 species).

The native species richness recorded across the Domain sites reduced from spring 2015 to spring 2016, however a similar pattern was seen across the Reference sites over the same time period. Exotic species richness was highest in Rehabilitation sites (14-19 exotic species within each site). The exotic species richness recorded across the Domains reduced from spring 2015 to spring 2016. Three species declared as Noxious Weeds within the MWRC LGA were recorded across 20 sites within the Domains in 2016. These declared noxious weeds and their site locations are presented in **Appendix 5**.

Domain sites monitored in autumn 2016 recorded a high level of achievement relative to their respective IPTs, with a total of 8 sites meeting the targets for all 10 site attribute scores. As is to be expected, BOA sites recorded the highest average site value scores, followed by ECA sites, and then Regeneration and Rehabilitation Area sites recording the lowest average scores. Native over-storey cover and number of hollow-bearing trees were the best performing site attributes, with all sites meeting the respective targets. Native mid-storey cover was the worst performing site attribute with 4 sites failing to meet the IPTs.

# 6.5 Waste Management

The Mine has developed and implemented a Waste Management Plan (WMP) (**Table 7**) to ensure that waste at the Mine is minimised and effectively managed. The WMP was developed, but not limited to, address the relevant requirements of the PA05-0021 and EPL 12425, identify waste streams, waste monitoring and tracking procedures and ensure the generation of waste is minimised and recycling of waste is maximised where practicable. As required by Condition 56, Schedule 3 of PA05-0021, WCPL are required to report on waste management and minimisation (**Table 16**) in the AR to the satisfaction of the Secretary. During the reporting period approximately 86.6% of the total waste removed from the Mine was recycled. The percentage of waste recycled in 2016 was consistent with the previous review period where approximately 82.1% of the waste generated was recycled in 2015. **Appendix 3G** has the complete summary of waste statistics for the 2016 annual review period.

Totals	Jan*	Feb*	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Totals
Total Offsite Waste (T)	21.9	81.7	67.5	54.7	82.8	60.2	93.6	97.5	93.1	66.7	179.9	88.5	885.5
Recycled Waste	19.8	66.1	58.2	44.3	76.1	50.4	85.7	86.1	76.7	52.2	162.4	73.9	765.96
Recycling %	90.3	80.8	86.2	81.0	91.9	83.6	91.5	88.3	82.4	78.2	90.3	83.6	86.60%

 Table 16 Summary of Monthly Waste Statistics for 2016

Notes: \*Waste recorded as a volume by previous supplier

# 6.6 Greenhouse Gas

Greenhouse gas management measures for the Mine are outlined in the AQMP. Diesel and electricity usage was recorded during the 2016 review period, which allows for the calculation of carbon dioxide  $(CO_2)$  equivalent emissions. The primary source (approximately 80%) of greenhouse gas emissions at the Mine is due to the release of carbon dioxide  $(CO_2)$  and methane  $(CH_4)$  during the combustion of diesel fuel during mining operations. Fugitive emissions of  $CH_4$  and  $CO_2$  from the coal seam as the coal is mined and  $CO_2$  released during the use of explosives make up approximately 20% of greenhouse gas emissions at the Mine. Greenhouse gas emission (i.e. Scope 1 & Scope 2) estimates for the 2016 review period is presented in **Table 17**.

# Table 17 Estimated Wilpinjong Coal Mine Greenhouse Gas Emissions



Year	ROM Coal (Mt)	Electricity Consumed (kWh)	Diesel Consumed (kL)	CO2-e Electricity Usage (t)	CO2-e Diesel Usage (t)	CO2-e Fugitive Emissions (t)	Total CO <sub>2</sub> -e Emissions (t)	Total CO <sub>2</sub> -e Emissions (t) Predicted (MOD3)/(MOD5)
2012	14.48	26,328,000	30,202	23,432	80,673	651,633*	755,738	120,978
2013	14.9	32,730,368	39,444.3	29,130	105,360	6702.3**	141,193	120,978
2014	15.4	31,580,001	33,194	27,318	89,049	10,747	127,114	154,395^
2015	12.6	31,713,000	28,325	26,639	75,990	10,046	112,675	148,628^
2016	13.5	31,850,068	30,033	26,754	81,383	11,200	119,337	145,488^

**Notes**:  $kWh = kilowatt hours and kL = kilolitre. * A NSW default factor was used to calculate these values. ** The change in tonnes CO2e estimated for 2013 at Wilpinjong results from moving to Open Cut Emissions Method 2/3 (a measurement of seam gas contents, followed by model development and then emission calculation) in line with ACARP Methodology C20005, from NGER Open Cut Emissions Method 1 (default measurement factors for NSW * ROM tonnes).^ MOD5 predictions.$ 

Greenhouse gas emissions from the Wilpinjong Coal Mine would continue to be monitored and reported annually in accordance with Peabody Energy's obligations under the *Commonwealth Government National Greenhouse and Energy Reporting System*. Peabody Energy and WCPL will also comply with any obligations under the *Commonwealth Clean Energy Act, 2011*.

# 6.7 Ambient Air Quality Monitoring

Condition 16, Schedule 3 of PA05-0021 requires WCPL to ensure that no offensive odours are emitted from the site, as defined under the *Protection of the Environment Operations Act, 1997.* The 2016 ambient air monitoring program, monitors for the following pollutants that can be released during spontaneous combustion events, including Oxides of Nitrogen (NOx), Sulfur Dioxide (SO<sub>2</sub>), Hydrogen Sulfide (H<sub>2</sub>S), Benzene, Toluene and *p*-Xylene. The air quality monitoring station is situated in the Village of Wollar. The results of the 2016 ambient air monitoring program indicate no validated trigger of the above mentioned pollutants. **Appendix 3B** has the monthly ambient air monitoring program reports for 2016.

# 7.0 WATER MANAGEMENT

WCPL have prepared and implemented a Site Water Management Plan (WMP) (**Table 7**). Several key component management plans and programs that support the WMP include the Surface Water Monitoring Program (SWMP), the Groundwater Monitoring Program (GWMP) and Surface Water and Groundwater Response Plan (SGWRP).

#### 7.1 Water Licences

**Table 18** lists the water licences held by WCPL and provides a summary of performance for the 'water year' from 01 July 2015 to 30 June 2016.

Licence Number	Description	Valid to	Entitlement (ML/annum)	Passive Take (ML/annum)	Active Pumping (ML/annum)	TOTAL (ML/annum)			
Licences under the Water Management Act, 2000 (Alluvial Aquifer)									
WAL 21499 <sup>1</sup>	Alluvial Aquifer Licence	Current	474 units <sup>2</sup> -		Nil	-			
	Licences under the <i>Water Act, 1912</i> (Porous Rock Aquifer)								
20BL173517	Pit 1 Licence	10 June 2020			-				
20BL173516	Pit 2 Licence	10 June 2020	2021	1600 <sup>7</sup>	-	16007			
20BL173514	Pit 3 Licence	10 June 2020	2021		-	1000			
20BL173515	Pit 4 Licence	10 June 2020			-				

#### Table 18 Water Take



Licence Number	Description	Valid to	Entitlement (ML/annum)	Passive Take (ML/annum)	Active Pumping (ML/annum)	TOTAL (ML/annum)				
	Licences under the Water Management Act, 2000 (Alluvial Aquifer)									
20BL173513	Pit 5 Licence	10 June 2020			-					
20BL173973	Pit 6 Licence	22 December 2021		Nil <sup>6</sup>	-					
20BL170147	Dewatering	30 March 2021		-	Nil <sup>5</sup>	-				
20BL170148	Dewatering	30 March 2021		-	Nil <sup>5</sup>	-				
20BL170149	Dewatering	30 March 2021		-	Nil <sup>5</sup>	-				
20BL170150	Dewatering	30 March 2021	770	-	Nil <sup>5</sup>	-				
20BL170151	Dewatering	30 March 2021		-	Nil <sup>5</sup>	-				
20BL170152	Dewatering	30 March 2021		-	Nil <sup>5</sup>	-				
20BL170153	Dewatering	30 March 2021		-	Nil <sup>5</sup>	-				
20BL170063	Water Supply Bore (GWs10)	18 December 2016 <sup>3</sup>	110	-	Nil <sup>5</sup>	-				
20BL170062	Water Supply Bore (GWs11)	18 December 2011 <sup>4</sup>	110	-	Nil <sup>5</sup>	-				
20BL170061	Water Supply Bore (GWs12)	18 December 2011 <sup>4</sup>	110	-	Nil <sup>5</sup>	-				
20BL170059	Water Supply Bore (GWs14)	18 December 2016 <sup>3</sup>	110	-	Nil <sup>5</sup>	-				
20BL170058	Water Supply Bore (GWs15)	18 December 2011 <sup>4</sup>	110	-	Nil <sup>5</sup>	-				

**Source:** HydroSimulations (2016) <sup>1</sup> Assigned to the Wollar Creek Water Source. <sup>2</sup> One unit is currently equivalent to 1.0 ML as per the *Available Water Determination Order for Various NSW Unregulated and Alluvial Water Sources (No. 1) 2013.*<sup>3</sup> Under the *Water Management Act 2000* and will convert as of 1 July 2016 in line with the commencement of the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016.*<sup>4</sup> Renewal Application lodged with DPI-Water on the 25 June 2016.<sup>5</sup> Active pumping was not required as the mine was in water surplus during the review period (refer to Water Balance in **Section 7.7**). <sup>6</sup> Pit 6 not developed. <sup>7</sup> Hydrosimulations accounts for gross groundwater inflow i.e. prior to evaporative loss which is approximately 15%.

# 7.2 Estimated Groundwater Take

A predictive water balance model for the 2015/2016 water year was completed by Hatch (**Appendix 3C**). Using OPSIM water balance model, an estimated groundwater inflow of 1,387ML/year was predicted. The model also estimated the Mine will be in water surplus of 476ML for the 2015/2016 water year.

#### 7.3 Water Licence Conditions

**Appendix 3D** contains *Wilpinjong Annual Review Groundwater Analysis* (GW Report 2016) for the period 1 July 2015 to 30 June 2016 (2015/16 Water Year), undertaken by Hydrosimulations.

#### 20BL173513 – 17 Licence Conditions

The GW Report 2017 contains information and analysis reporting against 20BL173513 - 17 Licence Conditions 2, 3, 4 and 8 for the pit extraction. As required by Condition 2, the alluvial water inflow (water budget) for the 2015/16 Water Year is 100ML/a. As required by Condition 3, a figure showing the progression of mining in the last two years, and the extent of alluvium as mapped on the Western Coalfield 1:100000 geological sheet is provided in the GW Report 2016 (Section 6). As required by Condition 4 the assessment of results and compliance is provided in the GW Report 2017. As required by Condition 8, there was no exceedence of the 2021ML/a limit of the combined volume of water extracted (**Table 18 & Appendix 3D**).

#### 20BL170148 – 53 Licence Conditions

The GW Report 2016 contains information and analysis reporting against 20BL170148 - 53 Licence Conditions 7, 9 and 10 for dewatering bores. As required by Condition 7 the assessment of results and compliance is provided in the GW Report 2016 (Section 7). As required by Condition 9 and 10 there was no exceedences of the 110ML/a and 770 ML/a (respectively) of volume/s of water extracted (**Appendix** 



**3D**). There was no groundwater extracted by WCPL from licensed bores 20BL170148 – 53 during the 2015/16 water year.

# 7.4 Water Management System

Water management activities were undertaken during the 2016 review period in accordance with the Mine's water management system outlined in the MOP and the WMP. In summary, water management for the Mine is based on the containment and re-use of mine water as well as the control of sediment laden water that may be potentially carried with runoff from disturbed areas. The mine water management system is shown in schematic form on **Appendix 3C**. The key components of the Mine's water management system are:

- Separation of undisturbed and disturbed area runoff using upslope diversions;
- Collection and re-use of surface runoff from disturbed areas;
- Capture and on-site containment of mine water, comprising groundwater inflows and incident rainfall-runoff to operational areas;
- Re-use of contained mine water for dust suppression over active surfaces (e.g. haul roads).
- Recycling of mine water associated with the CHPP and tailings disposal areas;
- Consumption of contained waters in the Mine water supply system;
- Management of treated sewage effluent in accordance with the OEH's *Environmental Guidelines* for the Utilisation of Treated Effluent;
- Operation of an evaporative spray system on the eastern bank of Pit 2 (West) for 2017; and
- Discharge of treated water via a water treatment facility to Wilpinjong Creek in accordance with EPL 12425.

# 7.5 Erosion and Sediment Control

An Erosion and Sediment Control Plan (ESCP) has been development (**Table 7**) for the Mine. During the 2016 review period water management structures e.g. diversion bunds, were constructed to divert potentially sediment laden water from mining activities in Pit 4 back into the Mine's water management system, whilst also segregating clean water from entering the Mines water management system.

Other activities included routine removal of sediment from sumps, drains and sediment dams located in the Mining Infrastructure Area (MIA) and CHPP. There were no reportable incidents in relation to sediment control in the 2016 review period.

#### 7.6 Surface Water

A summary of the surface water monitoring program is presented in **Table 19**. A summary of the surface water monitoring results is provided in **Table 20**. Further water monitoring results for 2016 review period, including figures with surface water quality monitoring locations are provided in **Appendix 3C**.

Mon	itoring Locations	Frequency	Parameters <sup>1</sup>		
	Licenced Discharge Point No.	Continuous (during discharge)	Volume of water discharged <sup>6</sup> , EC and pH		
	24	Weekly (during discharge)	Oil & Grease and TSS <sup>7</sup>		
Wilniniong		Monthly	Field pH and EC, turbidity <sup>3</sup> , and SO <sub>4</sub>		
Creek	WIL-U, WIL-U2, WIL-PC, WIL- NC, WIL-D and WIL-D2 <sup>2</sup>	Quarterly	Copper, Zinc, Iron, Aluminium, Nickel, Manganese, Barium, Strontium, Lead, Arsenic and Selenium		
	WILGSU and WILGSD (gauging	Continuous	Flow rate, pH, EC and temperature		
	stations) <sup>2</sup>	Monthly	Field pH and EC, turbidity <sup>3</sup> , and SO <sub>4</sub>		

#### **Table 19 Surface Water Monitoring Program**


Mon	itoring Locations	Frequency	Parameters <sup>1</sup>		
		Following significant rainfall events <sup>4</sup>	pH, EC, TDS, TSS and sulphate		
	WC1, WC2, WC3, WC4, WC5, WC6, WC7, WC8 <sup>5</sup>	Annually	Stream health monitoring		
	Forty-nine survey points along Wilpinjong Creek <sup>5</sup>	Annually	Channel stability monitoring (photo-points, description, stability)		
		Monthly	Field pH and EC, turbidity <sup>3</sup> , and SO <sub>4</sub>		
Cumbo Creek	CC1, CC2 and CC3 <sup>2</sup>	Quarterly	Copper, Zinc, Iron, Aluminium, Nickel, Manganese, Barium, Strontium, Lead, Arsenic and Selenium		
	CC3 <sup>2</sup>	Following significant rainfall events <sup>4</sup>	pH, EC, TDS, TSS and sulphate		
		Continuous	Flow rate, pH, EC and temperature		
	CCGSU and CCGSD (gauging station) <sup>2</sup>	monthly	Field pH and EC, turbidity <sup>3</sup> , and SO <sub>4</sub>		
	,	Following significant rainfall events <sup>3</sup>	pH, EC, TDS, TSS and sulphate		
	CC1, CC2 <sup>5</sup>	Annually	Stream health monitoring		
	Nine survey points along Cumbo Creek <sup>5</sup>	Annually	Channel stability monitoring		
		Monthly	Field pH and EC, turbidity, and SO $_4$		
Wollar Creek	WOL 1 and WOL 2 <sup>2</sup>	Quarterly	Copper, Zinc, Iron, Aluminium, Nickel, Manganese, Barium, Strontium, Lead, Arsenic and Selenium		
	WO1, WO2, WO3⁵	Annually	Stream health monitoring		
Slate Gully		Monthly	Field pH and EC, turbidity, and $SO_4$		
Creek	SGC_1 <sup>2</sup>	Quarterly	Copper, Zinc, Iron, Aluminium, Nickel, Manganese, Barium, Strontium, Lead, Arsenic and Selenium		

Notes: 1) Parameters will be analysed provided water samples can be collected. 2) Monitoring locations are illustrated on Figure 1.
 3) Turbidity indicates the potential downstream water quality effects caused by suspended solids. 4) Greater than 20 millimetres (mm) in 24 hours. 5) Monitoring locations are illustrated on Figure 21. 6) Volume to monitored using flow meter and continuous logger. 7) Grab samples.



## Table 20 Surface Water Performance

Location		Approved Criteria	Performance During the Reporting Period	Trend/Key Management Implications	Implemented/proposed Management Actions
Surface Water	<sup>.</sup> Quality N	lonitoring			
Wilpinjong Creek	EC (μS/cm)	If recorded value at the monitoring site is greater than 5,166 μS/cm for 3 consecutive readings at Wilpinjong Creek Downstream Sites*	No sites recorded EC values < 5,166 μS/cm for 3 consecutive readings at downstream sites*. WIL_U: (Max 950 μS/cm ) (Ave 632 μS/cm) WIL_U2: (Max 4420 μS/cm ) (Ave 2140 μS/cm) WIL_PC: (Max 1340 μS/cm ) (Ave 682 μS/cm) *WIL_PC: (Max 1650 μS/cm ) (Ave 560 μS/cm) *WIL_D2: (Max 1840 μS/cm ) (Ave 796.0 μS/cm) *WIL_D: (Max 3030 μS/cm ) (Ave 1189.2 μS/cm) One site (i.e., WIL_NC) recorded NTU values >	A review of surface water data recorded from January 2012 to July 2015 at gauging stations WILGSU and WILGSD in the Wilpinjong Creek was completed by Hydro Simulations in 2015. The review included creek flow, electrical conductivity (EC), pH and rainfall trends. Analysis of continuous surface water flow data showed rainfall trends are playing a significant role in governing flows in Wilpinjong Creek, both	<ul> <li>WCPL will continue to investigate the potential for improvements to the surface water management system over the 2017 review period.</li> <li>In accordance with Condition 4, Schedule 5 of Project Approval (05-0021), WCPL will review and, if necessary, revise the SWMMP<sup>5</sup> and SGWRP within three months of the submission of this Annual Review .</li> </ul>
Creek Sites: WIL_U, WIL_U2, WIL_PC, WIL_NC, WIL_D, WIL_D2	Turbidity (NTU)	If recorded value at the monitoring site is greater than 24 NTU for 3 consecutive readings at Wilpinjong Creek Downstream Sites*	<ul> <li>WIL_NC: (Max 323 NTU) (Ave 34.8 NTU)</li> <li>WIL_D2: (Max 43.5 NTU) (Ave 34.8 NTU)</li> <li>WIL_PC: (Max 64.6 NTU) (Ave 38.8 NTU)</li> <li>*WIL_NC: (Max 201 NTU) (Ave 54.2 NTU)</li> <li>*WIL_D2: (Max 323 NTU) (Ave 43.8)</li> <li>*WIL_D2: (Max 39.4 NTU) (Ave 10 NTU)</li> </ul>	upstream and downstream of the Mine. The HydroSimulations complete report was provided in of the 2015 Annual Review. A review of the surface water data for 2016 at gauging stations WILGSU and WILGSD in the Wilpinjong Creek also identified a similar relationship between surface water flow and prolonged rainfall events ( <b>Appendix 3C</b> ).	Implementation of the revised SWMP and other associated water management plans once approved.
	pH (lower)	If recorded value at the monitoring site is less than 6.9 pH for 3 consecutive readings at Wilpinjong Creek Downstream Sites*	No sites recorded pH values <6.9 pH for 3 consecutive readings at downstream sites*. WIL_U: (Min 6.2 pH ) (Ave 6.94 pH) WIL_U2: (Min 6.5 pH ) (Ave 7.04 pH) WIL_PC: (Min 6.9 pH ) (Ave 7.16 pH) *WIL_PC: (Min 7.1 pH ) (Ave 7.39 pH) *WIL_D2: (Min 6.9 pH) (Ave 7.50 pH) *WIL_D: (Min 6.8 pH) (Ave 7.46 pH)	A review of the NTO readings at WIL_NC suggests that the elevated results in January, February and March 2016 were influenced by isolated rainfall events only producing minor flows at WILGSD ( <b>Appendix 3C</b> ) contributing to higher turbidity results. Analysis of the long-term water quality monitoring data in Wilpinjong Creek, <b>Graphs</b> <b>9</b> – <b>11</b> , displays a declining trend of EC of	

<sup>&</sup>lt;sup>5</sup> As a result of MOD5, the SWMMP, SGWRP and GWMP were reviewed and submitted for approval in 2014.



Location		Approved Criteria	Performance During the Reporting Period	Trend/Key Management Implications	Implemented/proposed Management Actions
	pH (upper)	If recorded value at the monitoring site is greater than 7.7 pH for 3 consecutive readings at Wilpinjong Creek Downstream Sites*	No sites recorded pH values > 7.7 pH for 3 consecutive readings at downstream sites*. WIL_U: (Max 7.4 pH ) (Ave 6.94 pH) WIL_U2: (Max 7.6 pH ) (Ave 7.04 pH) WIL_PC: (Max 7.4 pH ) (Ave 7.16 pH) *WIL_NC: (Max 7.8 pH ) (Ave 7.16 pH) *WIL_D2: (Max 8.1 pH) (Ave 7.5 pH) *WIL_D2: (Max 8.0 pH) (Ave 7.46 pH)	sites downstream from EPL discharge point. As identified by HydroSimulations in 2015, the recent decline in salinity at the downstream gauging station is likely related to the operation of the WTF and discharge of relatively fresh water from that. Salinities recorded in recent years are consistent with those from both early in the life of the Mine and from pre-mining monitoring.	
	EC (μS/cm)	lf recorded value at the monitoring site is greater than 7,510 μS/cm for 3 consecutive readings at Cumbo Creek Downstream Sites*	CC1 did not recorded EC values > 7,510 μS/cm for 3 consecutive readings. *CC1: (Max 4470 μS/cm ) (Ave 2802.9 μS/cm) CC2: (Max 7540 μS/cm ) (Ave 5036.6 μS/cm) CC3: (Max 4860 μS/cm ) (Ave 2771.7 μS/cm)	Analysis of the long-term water quality monitoring data in Cumbo Creek, <b>Graphs 12</b> , also displays a declining trend of EC. A review of the NTU readings at CC1 suggests that the elevated result in January 2016 was influenced by rainfall prior to water	
Cumbo Creek (Downstream)	Turbidity (NTU)	If recorded value at the monitoring site is greater than 77 NTU for 3 consecutive readings at Cumbo Creek Downstream Sites*	CC1 did not record NTU values > 77NTU for 3 consecutive readings. *CC1: (Max 6270 NTU) (Ave 936 NTU) CC2: (Max 26.4 NTU) (Ave 5.0 NTU) CC3: (Max 43.5 NTU) (Ave 21.2 NTU)	sampling. The location of CC1 along the Ulan- Wollar Road is also an important consideration as runoff from the Council unsealed road reports directly to the creek.	
Site: CC1	pH (lower)	If recorded value at the monitoring site is less than 7.5 pH for 3 consecutive readings at Cumbo Creek Downstream Sites*	CC1 did not recorded pH values <7.5 pH for 3 consecutive readings. *CC1: (Min 7.10 pH ) (Ave 7.41 pH) CC2: (Min 7.5 pH ) (Ave 7.84 pH) CC3: (Min 7.4 pH ) (Ave 8.18 pH)		
	pH (upper)	If recorded value at the monitoring site is greater than 8.2 pH for 3 consecutive readings at Cumbo Creek Downstream Sites*	CC1 did not recorded pH values > 8.2 pH for 3 consecutive readings. *CC1: (Max 7.9 pH ) (Ave 7.41 pH) CC2: (Max 8.0 pH ) (Ave 7.84 pH) CC3: (Max 8.4 pH ) (Ave 8.18 pH)		
Notes: • Location	on CC1 turbid	ity readings affected by water runoff fron	n unsealed section of Ulan-Wollar Road.		



SW Monitoring	EC (μS/cm)			рН			SO4 (mg/L)			Turbidity (NTU)		
Point	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
CC1^	170.0	4470.0	2802.9	7.10	7.90	7.41	28.0	1710.0	978.9	4.6	6270.0	936.0
CC2	3020.0	7540.0	5036.3	7.50	8.00	7.84	920.0	2940.0	1738.8	0.5	26.4	5.0
CC3	80.0	4860.0	2771.7	7.40	8.40	8.18	8.0	1920.0	972.5	0.7	126.0	25.1
WIL (U)	520.0	950.0	632.0	6.20	7.40	6.94	13.0	83.0	36.8	5.8	43.5	21.2
WIL (U2)	440.0	4420.0	2140.0	6.50	7.60	7.04	14.0	102.0	34.8	3.3	153.0	34.8
WIL (PC)	260.0	1340.0	682.0	6.90	7.40	7.16	7.0	48.0	28.6	9.7	64.6	38.3
WIL (NC)^	240.0	1650.0	560.8	7.10	7.80	7.39	8.0	265.0	64.5	8.6	201.0	54.2
WIL (D)^	580.0	3030.0	1189.2	6.80	8.00	7.46	12.0	603.0	165.5	1.2	39.4	10.0
WIL (D2)^	390.0	1840.0	796.1	6.90	8.10	7.50	9.0	466.0	159.1	3.9	323.0	43.8
WOL1	780.0	2220.0	1226.3	7.80	8.30	8.11	104.0	475.0	205.8	1.3	11.2	5.0
WOL2	740.0	3160.0	1693.3	7.20	8.00	7.56	97.0	650.0	303.1	0.9	70.7	15.3
SGC_1*	0	0	0	0	0	0	0	0	0	0	0	0

 Table 21 Summary of Surface Water Monitoring Result 2016

Notes: \* Dry, ^Surface Quality Impact Assessment Criteria "applicable" in accordance with the SWMP.

## Table 22 Summary of Surface Water Monitoring Result 2015

SW Monitoring	EC (μS/cm)			рН			SO4 (mg/L)			Turbidity (NTU)		
Point	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
CC1^	120.0	4380.0	2316.3	6.60	7.80	7.31	13.0	1660.0	237.7	3.3	13000.0	3415.4
CC2	350.0	5970.0	3591.4	7.30	7.90	7.67	1400.0	2290.0	1977.8	0.4	20.8	4.7
CC3	150.0	5130.0	2220.0	7.00	8.40	7.93	17.0	2100.0	946.0	1.2	359.0	93.7
WIL (U)	1650.0	7550.0	4306.7	4.80	6.80	5.93	38.0	146.0	99.0	7.4	263.0	77.0
WIL (U2)	790.0	5580.0	3353.8	5.60	7.40	6.71	22.0	118.0	41.9	1.5	158.0	41.9
WIL (PC)	1170.0	6100.0	3256.3	6.80	7.90	7.23	3.0	42.0	16.0	1.8	222.0	90.4
WIL (NC)^	410.0	3960.0	1987.1	6.60	7.80	7.31	4.0	106.0	43.0	1.2	1440.0	284.5
WIL (D)^	340.0	5880.0	2713.0	7.10	8.10	7.67	29.0	607.0	253.2	2.6	363.0	63.1
WIL (D2)^	500.0	6520.0	2457.5	7.50	8.20	7.73	16.0	693.0	148.4	7.5	557.0	113.2
WOL1	160.0	5540.0	2223.0	7.50	8.20	7.96	208.0	956.0	445.8	1.1	61.8	13.3
WOL2	400.0	5550.0	1830.0	7.30	7.80	7.54	262.0	822.0	532.8	0.6	486.0	53.9



SGC_1*	0	0	0	0	0	0	0	0	0	0	0	0

Notes: \* Dry, ^Surface Quality Impact Assessment Criteria "applicable" in accordance with the SWMP.





Graph 9 Longterm Water Quality Results at WIL\_NC









Graph 11 Longterm Water Quality Results at WIL\_D







# 7.7 Site Water Balance

A Site Water Balance (SWB) (**Table 7**) has been prepared for the Mine. A review of the SWB in 2016 by Hatch (**Appendix 3C**) concluded sufficient water was available for the Mine during the 2016 review period (i.e. no external water supply sources were required). A summary review of the site water balance undertaken by Hatch for the 2015/2016 water year is displayed in **Table 23**.

## Table 23 Water Balance 2015/2016

Water Balance Summary 2015/2016	
Inflow: Groundwater into pits	1,387ML
Rainfall and runoff captured	2,325ML
Sub Total	3,712ML
Outflow: Evaporation	654ML
Seepage	-
Discharge for WTF	219ML
Dust suppression on haul roads	993ML
СНРР	1370ML
Sub Total	3,236ML
Change in Volume (Increase in Inventory)	+476ML

# 7.8 Water Treatment Facility

Construction of the Water Treatment Facility (WTF) was completed in June 2012 and approved water releases commenced on 16 June 2012 in accordance with EPL 12425. Under EPL 12425, WCPL are approved to discharge treated water from Licensed Discharge Point 24 (LDP24). For the 2016 reporting period the maximum volume of water discharge shall not exceed 5ML/day. Water quality concentration limits (i.e. 100 percentile concentration limit) for LDP24 include:

- Electrical conductivity (EC) not to exceed 500 μS/cm (continuous monitoring);
- Oil and grease (O&G) not to exceed 10mg/L (grab sample weekly during any discharge);
- pH range of 6.5 to 8.5 (continuous monitoring); and
- Total suspended solids (TSS) not to exceed 50mg/L (grab sample weekly during any discharge).

**Graph 13** presents the daily discharge (in ML/day) from the WTF during the 2016 review period. The total water discharged over the 2016 review period was 262.8ML. WCPL did not exceed the daily volume criteria of 5ML/day. **Graph 14** presents the EC results of the treated water discharged from the WTF during the 2016 review period. WCPL did not exceed the maximum criteria of 500µS/cm for EC. **Graph 15** presents the pH, TSS and O&G results of the treated water discharged from the WTF during the 2016 review period. WCPL did not exceed the pH maximum or minimum criteria (i.e. 6.5 - 8.5pH). WCPL achieved the water quality criteria for TSS and O&G (i.e. 50mg/L and 10mg/L respectively).



## Graph 13 Treated Water Discharged During 2016









Graph 15 Results for pH, TSS & Oil/Grease Discharged During 2016

## 7.9 Stream Health & Channel Stability Monitoring

In accordance with the SWMMP, channel stability monitoring is undertaken along Wilpinjong and Cumbo Creeks on an annual basis. In 2016, the creek bank stability monitoring program in Wilpinjong Creek identified 29 sites assessed as stable to moderately stable, an improvement from 23 sites from the previous year. The remaining 19 sites were assessed as unstable to moderately unstable. Creek stability along Cumbo Creek remains stable for the length of the creek surveyed in 2016. A copy of the 2016 channel stability monitoring report is provided in **Appendix 3C**. The results of the stream health monitoring in Wilpinjong Creek will be provided in the next Annual Review.

## 7.10 Groundwater

A Groundwater Monitoring Program (**Table 7**) has been prepared by WCPL. A summary of the groundwater monitoring program is presented in **Table 24**. A summary of the groundwater monitoring results is provided in **Table 25**. Further groundwater monitoring results for 2016 review period, including figures with groundwater monitoring locations are provided in **Appendix 3D**.



	Monitoring Locations	Frequency	Parameters <sup>1,2</sup>
Open Cut Operations	• Main pit sump(s)	Monthly Quarterly	<ul> <li>Volume of water extracted.</li> <li>pH, EC, TDS, Na, K, Mg, Ca, Cl, HCO<sub>3</sub>, CaCO<sub>3</sub>, SO<sub>4</sub> and</li> </ul>
			Metals (Cu, Zn, Fe, Al, Ni, Mn, Ba, Sr, Pb, As and Se).
Water	• GWs10, GwS11, GWs12, GWs14, GWs15	Monthly	• Water level, field pH and EC.
Supply		(During	Volume of water extracted.
Bores <sup>3</sup>		Extraction)	
Alluvial	• GWa10, GWa11, GWa12, GWa14, GWa15, GWa16,	12 Hr	Water level, Pressure, Temperature
Bores	GWa22, GWa32	(logger)	
	• GWa1, GWa2, GWa3, GWa4, GWa5, GWa6, GWa7⁵,	Monthly	• Water level, temperature field pH and EC.
	GWa8 <sup>5</sup> , GWa9, GWa10, GWa11, GWa12, GWa14,	Quarterly	• TDS, Na, K, Mg, Ca, Cl, HCO <sub>3</sub> , CaCO <sub>3</sub> , SO <sub>4</sub> and Metals
	GWa15, GWa16, GWa22, GWa32, GWa33 <sup>5</sup>		(Cu, Zn, Fe, Al, Ni, Mn, Ba, Sr, Pb, As and Se).
Coal	• GWc10, GWc11, GWc12, GWc14, GWc15, GWc16,	Daily	Water level, Pressure, Temperature
Measures	GWc17, GWc18, GWc22, GWc23, GWc24,	(logger)	
Bores	GWc25, GWc26, GWc27, GWc28, GWc29,		
	GWc30, GWc31, GWc32⁵		
	• GWc1, GWc2, GWc3, GWc4 <sup>5</sup> , GWc5 <sup>5,</sup> GWc10,	Monthly	Water level, temperature, field pH and EC.
	GWc11, GWc12, GWc14, GWc15, GWc16,	Quarterly	• TDS, Na, K, Mg, Ca, Cl, HCO <sub>3</sub> , CaCO <sub>3</sub> , SO <sub>4</sub> and Metals
	GWc17, GWc18, GWc19, GWc20, GWc22,		(Cu, Zn, Fe, Al, Ni, Mn, Ba, Sr, Pb, As and Se).
	GWc23, GWc24, GWc25, GWc26, GWc27,		
	GWc28, GWc29, GWc30, GWc31, GWc33,		
	GWc32 <sup>5</sup> ,GWc345, GWc35		
Landholder b	oores, wells and waterholes <sup>4</sup>	As required	To be determined

Table 24 Groundwater Monitoring Program
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**Notes:** 1) Parameters will be analysed provided sufficient volumes of water can be collected.

2) Na = Sodium, Ca = Calcium, HCO<sub>3</sub> = Bicarbonate, SO<sub>4</sub> = Sulphate, K = Potassium, Mg = Magnesium, Cl = Chloride and Total Fe = Total Iron. 3) Water supply bores not currently in operation

4) Monitoring may be undertaken, as required, in consultation with individual landholders. Parameters to be monitored will be determined following consideration of the landholder's concerns.

5) Regional bore – not expected to be affected by mining.

## 7.11 Groundwater Monitoring Review

A review of groundwater data for the water year 2015-16, as well as historical groundwater data, was undertaken by HydroSimulations for the review period. The groundwater data review included groundwater levels, groundwater quality, comparison of predicted and observed drawdowns, and groundwater take. A summary of the HydroSimulations 2016 review is provided below and in **Table 25**, with the complete report provided in **Appendix 3D**.

#### Groundwater Trigger Level Exceedences

Groundwater level at GWa3 was recorded below the trigger value for the first half of the 2016 monitoring period, with a 'dry' reading for four of these months (April-July) observed. This was followed by groundwater level recovering to above the trigger level for the last five observations of the year (August-December), correlating with an increase in the rainfall trend. Historically, groundwater levels are observed to be below the trigger level from early 2014, through to July 2016 that correlates well with a declining rainfall trend. However, from early 2011, there is a decrease in the magnitude of the groundwater level response to the rainfall trend, possibly indicating a mining effect. This is apparently ongoing, with the recovery observed in late 2016 approximately 1 m below the groundwater level peaks



in response to rainfall pre-2011. It is likely the trigger level was exceeded at GWa3 due to the combination of a mild mining effect and a decrease in average rainfall.



		1.0.1									
Location	Appro	ved Criteri	а	Performan	ce During the Repo	orting Period	Trend/Key Management Implications	Implemented/proposed Management			
								Actions			
Groundwa	ter Monitorin	g (Alluviun	n)								
	Water Levels (mAHD) <sup>6</sup>	EC (μS/cm) <sup>7</sup>	рН <sup>8</sup>	Water Level (mAHD)	EC (µS/cm)	рН	• A review of groundwater data for the water	• WCPL will continue to monitor and evaluate the groundwater system over the 2017			
GWa1	383.9	12,272	7.2	Dry	Dry	Dry	<ul> <li>year 2015-16 as well as historical groundwater data was undertaken by HydroSimulations.</li> <li>A summary of the Hydro Simulations 2016 review is provided in Section 7.11, with the complete report provided in Appendix 3D.</li> </ul>	review period.			
GWa2	370.6	2,280	7.0	Max: 375.4	Max: 1910	Max: 7.0		<ul> <li>In accordance with Condition 4, Schedule 5 of Project Approval (05-0021), WCPL will review and, if necessary, revise the GWMP</li> </ul>			
GWa3	360.3	1,970	7.3	Max: 361.2	Max: 2580	Max: 7.4					
GWa4	353.8	2,596	7.1	Max: 353.7	Max: 3580	Max: 7.2		and SGWRP within three months of the submission of this Annual Review .			
GWa5	372.7	13,926	7.1	Max: 372.5	Max: 14200	Max: 7.6		<ul> <li>Implementation of the revised GWMP and other associated water management plans once approved.</li> </ul>			
GWa6	357.8	6,720	7.6	Max: 360.1	Max: 13600	Max: 7.8	There were Trigger Level exceedances of				
GWa7	343.2	10,126	7.0	Max: 344.9	Max: 10800	Max: 7.8	GWa7. GWa3, GWa4, GWa5 and				
GWa8 <sup>3</sup>	353.1	2,898	7.4	Max: 355.4	Max: 2520	Max: 7.2					
Groundwa	ter Monitorin	g (Coal)		· · ·			<ul> <li>There were Trigger Level exceedances of EC at GWa3, GWa4, GWa6, GWa7, GWc1, GWc3</li> </ul>				
GWc1	-	2,844	7.2	-	Max: 3370	Max: 7.2	and GWc5.				
GWc2	-	1,290	7.7	-	Max: 1290	Max: 7.2	• There were Trigger Level no exceedances of				
GWc3	-	3,304	7.3	-	Max: 4250	Max: 7.0	рН.				
GWc4	-	2,412	7.1	-	Max: 2470	Max: 7.0					
GWc5	-	4,798	7.0	-	Max: 5700	Max: 6.8					
Groundwa	ter Productio	n Bores					]				
GWs10	351.5	-	-				]				
GWs11	353	-	-	As reported in Section	on 7.8, the Mine was in	water surplus for the					
GWs12	338	-	-	production bores du	ring the 2016 review pe	eriod.					
GWs14	328	-	-	]							

#### **Table 25 Groundwater Performance**

<sup>6</sup> Three consecutive monthly exceedences or two consecutive quarterly monitoring events to trigger and investigation.

<sup>7</sup> 80<sup>th</sup> percentile value must be triggered three consecutive monthly monitoring events or two consecutive quarterly monitoring events to trigger and investigation.

<sup>8</sup> 80<sup>th</sup> percentile value must be triggered three consecutive monthly monitoring events or two consecutive quarterly monitoring events to trigger and investigation.



Location	Approved Criteria		a	Performance During the Reporting Period	Trend/Key Management Implications	Implemented/proposed Management Actions
GWs15	324	-	-			
Notes:						



All GWa5 observations during the 2016 monitoring period exceed the groundwater trigger level (Figure B-5). This can be attributed to an ongoing mining effect that possibly began in late 2011. This is indicated by a lack of groundwater level response to an increasing rainfall trend. A definite effect is observed from early 2014 with a drawdown of ~3 m to July 2016. Groundwater level still shows a response to the rainfall trend following early 2014 although the average water level is approximately 2 m lower and shows far greater fluctuations.

As was seen for GWa1, the groundwater trigger level for GWa6 is at an elevation below that at which the bore is observed 'dry' (Figure B-6). As such, this trigger value is not a good measure for determining a mining effect at GWa6. Observations have reported GWa6 as dry following the beginning of nearby Pit 3 extraction. While this correlates with a period of below average rainfall, previous periods of below average rainfall as seen in early observations did not result in 'dry' observations at GWa6. It is likely a slight mining effect is observed at GWa6 that has been enhanced by low rainfall. Groundwater level responds to an increase in the rainfall trend in mid-2016, with the remaining observations all reporting a readable groundwater level.

GWa7 also reports an exceedance of groundwater level triggers at the beginning of the 2016 monitoring period with the bore reporting dry (Figure B-7). However, GWa7 is located over 3 km east of current mining at Wilpinjong, so it is not likely to be directly affected by mining. The decrease in water level correlates with the declining rainfall trend, and the full recovery following the mid-2016 increase in the rainfall trend further confirms this.

## EC Trigger Level Exceedences

Trigger exceedances in EC at alluvial bores occur at GWa3, GWa4, GWa6 and GWa7 (Figures B-3 to B-7), and all follow similar trends despite varying baseline EC levels. As detailed in the above section, these bores reported a declining groundwater level that either correlated with a declining rainfall trend and a mild mining effect (GWa3, GWa4, GWa6) or a declining rainfall trend only (GWa7), with the timing of the decline in groundwater level showing a good match with increases in groundwater EC. This reduction in water level may result in increased groundwater EC as the water table is now being sourced proportionally more from higher salinity Permian sources. Groundwater EC is observed to decline in all these bores with the increase in the rainfall trend in late 2016. They do not require further investigation.

The only possibly anomalous bore is GWa6, at the downstream end of Cumbo Creek, which reports its highest ever EC measurement in the last observation of 2016. However, the explanation for this is likely found in historical trends between groundwater level and EC. Recessions in groundwater level are commonly accompanied by peaks in EC, as observed in: July 2007, March 2008, December 2009, August 2012, July 2013, August 2016 (Figure B-6), The two most recent peaks occurred during and soon after a period of below average rainfall that is likely coupled with an ongoing mining effect. The concentration effect that would occur with increased evapotranspiration (especially in late 2016 following an extended period of the bore being dry) would enhance the EC peaks that are observed following other groundwater level recessions.

Trigger exceedances for coal bores are observed in GWc1, GWc3 and GWc5 (Figures B-9, B-11, B-13), with the exceedances at GWc1 and GWc5 unable to be linked to a Wilpinjong Coal Mine effect. GWc1 is observed to be at a consistent level approximately 500  $\mu$ S/cm above the trigger level for the first half of the 2016 monitoring period. EC then drops to a consistent level approximately 750  $\mu$ S/cm below the trigger level. Both periods occur apparently separate to any mining, groundwater level or climatic influence. GWc5 is located on Wollar Creek, upstream of the confluence of Wilpinjong Creek and 3.5 km from active mining in Pit 7. EC has increased gradually since early 2010, apparently separate to climatic or groundwater level influence and is now relatively stable at approximately 5,500  $\mu$ S/cm.

GWc3 at the downstream end of Cumbo Creek reports the only exceedance that may be attributable to WCM mining. All EC observations during 2016 are above the trigger level and have been since the



beginning of nearby Pit 3 extraction. The observed drawdown of about 8 m may have resulted in groundwater now being sourced from more saline material with EC observations approximately  $4,000 \,\mu$ S/cm for 2016 observations, 700  $\mu$ S/cm above the trigger.

## 7.12 Groundwater Model Verification & Refinement

Previous reporting (HydroSimulations, 2015a; Peabody, 2016) has utilised the HydroSimulations (2013) groundwater model to assess likely impacts of the WIIpinjong Coal Mine and ensure sufficient water licences are purchased prior to a water year. This model was converted from the original numerical groundwater model used by AGE (2005).

A more recent groundwater model has been constructed (HydroSimulations, 2015b) that has been used in this report. As is required by the Groundwater Monitoring Program (Peabody, 2016), HydroSimulations have prepared a report on the new model and presents the results of the model verification (**Appendix 3D**).

## 7.13 Compensatory Water Supply

In accordance with Condition 34(b), Schedule 3, PA05-021, WCPL shall compensate potentially affected landowners with privately owned groundwater bore within the predicted drawdown impact zone identified in the EA. During the 2016 review period this condition was not triggered. There are no privately owned bores within this predicted impacted zone.



# 8.0 REHABILITATION

#### 8.1 Rehabilitation Activities

To minimise the area of disturbance at any one time, rehabilitation occurs progressively at the Mine as ancillary disturbance areas and final mine landforms become available for revegetation. The mine waste rock emplacements behind the advancing open cut are constructed to approximate the pre-mining topography or the final landform approved by PA 05-0021.

Revegetation of completed landforms has been progressively undertaken since 2008 and has included establishing both woodland and mixed woodland/grazing, consistent with the Project's rehabilitation objectives and post-mining land use contained within the MOP 2014-2019.

Disturbance activities associated with land preparation for mining operations took place across the mine with the disturbance footprint totalling 1147.4ha. Actual disturbance is 103.2ha lower than predicted. During 2016, approximately 70 ha of mine was rock emplacement was seeded as shown in Figure 5 and were all seeded in a green manure crop as outlined below as a trial.

As detailed in **Table 26**, as at December 2016, approximately 374ha of completed landforms have been rehabilitated against the proposed cumulative rehabilitation commitments of 374ha as of the 31 December 2016.

Mine Area Type	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
	2015 (na)	2016 (na)	2017 (na)
A. Total mine footprint	2857.34	2857.34	2857.34
B. Total active disturbance	1148.6	1147.4	1256.4
C. Land being prepared for rehabilitation	43	70	135
D. Land under active rehabilitation	304	374	509
E. Completed rehabilitation	0	0	0

#### Table 26 Rehabilitation Status

## 8.2 Rehabilitation Phases

The MOP provides details on the process for rehabilitation strategies implemented on site including monitoring and managing progression towards successful rehabilitation outcomes. In relevance with the rehabilitation phases identified with the MOP, comment on the activities undertaken during 2016 is discussed below.

#### Stage 1: Decommissioning

There were no decommissioning activities undertaken at the Mine in 2016.

Works are scheduled in 2017 for demolition of buildings situated on Peabody Pastoral properties as well as properties within ML1573. Asbestos removal will be undertaken prior to demolition by licensed contractors. All demolition activities will be undertaken in compliance with WCPL *Waste Management Plan –WI-ENV-MNP-0030 Version 1 – January 2016.* 

#### Stage 2: Landform Establishment

All 2016 rehabilitation landforms were designed in accordance with the approved MOP and Wilpinjong Final Technical Standards. All rehabilitation areas were developed with carbonaceous material being progressively placed back in-pit once the coal has been mined before a minimum of 2m of encapsulation using inert material.



Mine waste dumps were constructed using existing mine equipment including truck dumped material before being shaped using the Mine dozer fleet using APS technology to design. Overburden and interburden material was progressively placed back into mined out voids. This included reject material from the CHPP being hauled back into the mine and deposited below the natural surface in the mined-out voids as close to the pit floor as practically possible. Reject material is dispersed throughout the overburden within the mine waste rock emplacements to manage its geochemical characteristics.

Capping of Tailings Dam 3 commenced in 2016 and was completed in February 2017 as shown in Figure 3. The capping Landform development will continue during 2017 with the aim of rehabilitation completed by the end of the year. Landform development was completed on TD4 with rehabilitation activities completed in 2016.



#### Figure 3 Tailings Dam 3 Capping Campaign

Keylah Dump removal continued during 2016 with approximately 130,000m<sup>3</sup> of material left for removal (**Figure 4**). The removal of the dump was undertaken in accordance with the *Keylah Dump Management Plan*. As identified, hot material was placed in identified voids in Pit P5 and Pit P1 in layers of approximately 2.5m (average) thickness.

These layers were then capped with at least 3m of inert material and track rolled prior to the next layer of hot material being placed. This process will continue to be monitored by WCPL's Surveyor and Open Cut Examiner (OCE) (or delegate) until reaching the limit of 5m below the final surface level.

During 2016, these dumps have not reached final landform however the dump locations have been captured in the *Spontaneous Combustion Management Plan* for future reference.

Keylah Dump removal is scheduled to continue during 2017.

# <u>Peabody</u>



3rd December 2015



Figure 4 Progressive Removal of Keylah Dump

All rehabilitated slopes constructed during the reporting period were shaped to no greater than 1:6 (10 degrees or 17%) across areas. The surface of mine waste rock emplacements were constructed to approximate the existing topographic form of the shallow valleys which drain the Mine area. Mine waste rock emplacement surfaces are ripped to a depth of approx. 150mm to ensure the topsoil was bound with the underlying inert material and allow infiltration of water into the constructed landform. During 2016, 70ha of final landform was completed in preparation of topsoil placement, ripping and seeding.

#### Stage 3: Growth Medium Development

Topsoil placement involved utilising dozers to spread to the desired depth, as well as direct placement by scrapers. Topsoil is to be placed on top of the final landform to act as germination medium for vegetation and as a seed source from the natural seed bank present at the time of topsoil stripping.



Topsoil placement shall only proceed once the final landform and major drainage works (i.e. graded banks, drainage channels and rock waterways if required) have been completed. All topsoil was sourced from existing topsoil stockpiles or via direct placement during topsoil stripping activities.

#### Soil Treatment

In consideration for ameliorates required for rehabilitation areas, a specialist agronomist was engaged. Topsoil sampling was undertaken across all proposed rehabilitation area with results indicating the requirement for ameliorates in all areas. Results indicate a deficiency in P, K, CA, B, Cu, Zn, Cl and organic matter. Appropriate recommendations have been received including the application of lime, organic matter and fertiliser.

During 2016, WCPL continued to incorporate feedlot cow manure as a soil amendment into rehabilitation processes. The primary aim was to add organics to the poor soils present and see if green manure establishment, and subsequent vegetation, could be improved through the assistance of providing additional organic carbon levels, nutrient improvement and water retention.

#### Stage 4: Ecosystem Establishment

Species to be planted in the rehabilitated landforms will be a mixture of native and introduced locally successful tree, grass and legume species selected to enhance seed banks stocks contained within topsoil resources. WCPL maintains a native seed inventory which was collected from locally native seed sources carried out by suitably qualified personnel which will be used in rehabilitation activities.

During 2016, all rehabilitation areas have been placed under a green manure crop. The green crops include various combination of legumes (cow peas, clover), sorghum, millet, sudan grass, oats. Combinations and rates are shown in **Table 31** of different species and rates. Details are provided below in the "rehabilitation trials" section.



Figure 5 2016 Seeded Areas (light green areas)



#### Stage 5: Ecosystem Development

Monitoring and maintenance activities are ongoing with the results assessed and used to refine rehabilitation techniques. WCPL has developed measurable, quantitative Completion Criteria that will support the agreed final land use for the Mine. Interim Performance Targets have been developed to ensure that the Mine is progressing towards the Completion Criteria and overall mine closure objectives and are outlined in the *Biodiversity Management Plan* (BMP).

Progress towards the Interim Performance Targets (IPT) will be measured using Landscape Function Analysis (Tongway & Hindley 2004) and the BioMetric methodology (WCPL 2014). During 2016, Wilpinjong undertook monitoring in accordance with the BMP. Results are attached as **Appendix 5**.

The autumn, winter and spring 2016 biodiversity monitoring program was undertaken in accordance with the methods and survey techniques prescribed in the BMP. The biodiversity monitoring program was comprised of the following components:

- Vegetation (floristic) monitoring;
- Landscape stability monitoring using Landscape Function Analysis (LFA); and
- Terrestrial fauna monitoring.

#### Vegetation Monitoring (BioMetric)

Monitoring in autumn 2016 involved the establishment and baseline monitoring of 30 vegetation monitoring sites. In addition, Rehabilitation sites R6 and R9, which had been monitored as part of previous monitoring programs, were also monitored. Monitoring in spring 2016 was the second round of monitoring conducted at the 36 sites previously established in spring 2015. A total of 68 vegetation sites were monitored in 2016, including 25 reference sites.

#### Vegetation Monitoring Recommendation and Conclusions

**Tables 27-30** (below) present the performance of the monitoring sites across each Management Domain (BOAs, ECAs, Regeneration and Rehabilitation Areas) and Reference Sites, in relation to IPTs and Benchmark Targets (respectively) for each Keith Vegetation Class as per the BMP. Vegetation condition scores are based on the autumn 2016 and spring 2016 BioMetric site attribute results.

Surveys conducted in autumn 2016 completed the baseline vegetation monitoring for the WCPL monitoring program, whilst surveys conducted in spring 2016 added to the baseline data collected during spring 2015. A total of 68 sites were surveyed during 2016 across all Management Domains and inclusive of Reference Sites. Management Domain sites surveyed during autumn 2016 demonstrated a high level of achievement for their respective IPTs, with eight sites achieving targets for all 10 site attribute scores. Sites surveyed in Spring 2016 demonstrated more variable results against their relevant IPTs, which is reflective of the increases in IPTs between Year 0 (Baseline) and Year 1.

The results collected at Reference Sites during both autumn and spring 2016, continue to add to the dataset to be used for comparison with vegetation sites within the various Management Domains. The BMP suggests that baseline data collected from Year 0 monitoring at the Reference Sites will be used to develop more relevant, locally based benchmark values against which future monitoring data would be analysed.

ELA recommends that this should occur following a number of years of successive monitoring to account for seasonal variability and assessment of the performance of the reference sites as adequate for this purpose. Whilst this is not in complete compliance with the BMP, ELA recommends this approach to ensure that locally based benchmark values are realistic, comparable and attainable. A comparison of all reference site data is to be included in future monitoring reports, with assessment against the BMP benchmark values which were developed based on theoretical site attribute scores for the specified vegetation types.



#### Landscape Function Analysis

LFA monitoring was undertaken at 22 previously established monitoring sites and one newly established monitoring site. The newly established site (Ref\_13b) was established in spring 2016 to replace the formerly assessed Ref\_13, which had been subject to a National Parks and Wildlife Service (NPWS) hazard reduction burn in autumn 2016 and was therefore no longer considered to be a suitable reference site. In total, LFA assessments were undertaken at 23 monitoring sites: 13 within WCPL Management Domains and 10 reference sites within the NPWS estate.

#### Landscape Function Stability Recommendation and Conclusions

Due to the current monitoring program being established in spring 2015, there is no capacity to compare the results in 2015 and 2016 with previous monitoring results. However, data captured during the previous monitoring season relating to ground cover and erosion can be used as broad references for tracking progression of regeneration and rehabilitation across the Management Domains.

Ground cover in the form of living flora species, litter and rock material has been monitored within ECAs since 2007, Rehabilitation Areas since 2009 and Regeneration Areas (formerly Regrowth Areas) since 2011. This data can be correlated with the LOI data captured in spring 2015 and spring 2016, and both data sets demonstrate consistently high scores since monitoring commenced.

Similarly, low levels of erosion observed throughout previous monitoring seasons (2007-2013) can be correlated with the high SSA Stability scores and the lack of any substantial erosion (as recorded in the erosion SSA assessment) recorded in spring 2015 and spring 2016. Overall these combined data sets demonstrate that consistently stable landforms occur across the WCPL Management Domains.

	Vegetation		Site attributes (% cover)											
Management Domain	Community	Site	Vegetation condition	SVS	NSR	NOC	NMS	NGCG	NGCS	NGCO	EC	NTH	OR	FL (M)
	WSDSF	D_101	MOD-GOOD	46	28	13	1	28	6	32	0	1	1	30
	WSDSF	D_103	MOD-GOOD	39	23	5	28	14	78	0	0	0	1	0
BOA	WSDSF	E_100	MOD-GOOD	53	31	21	0	4	24	8	0	0	1	82
	WSGW	E_105	LOW	21	14	0	0	88	0	4	0	0	0	0
	WSGW	E_106	MOD-GOOD	38	23	0	0	84	0	20	0	0	1	5
	WSGW	A_102	MOD-GOOD	37	16	0	14	56	38	0	2	0	1	0
	WSGW	A_103	MOD-GOOD	48	31	14	0	38	26	6	0	0	0.66	21
ECA	WSDSF	B_103	MOD-GOOD	44	38	24	0	12	8	6	0	0	0	21
	WSGW	B_106	LOW	20	14	0	0	32	0	32	20	0	0	0
	WSDSF	C_101	LOW	14	14	0	0	96	0	1	18	0	0.33	2
	WSGW	R1_100	LOW	15	8	0	0	10	0	0	64	0	1	0
	WSDSF	R3_100	LOW	15	15	0	0	50	0	0	32	0	1	0
	WSGW	R5_100	LOW	17	12	0	0	72	0	0	16	0	0	0
Regeneration Areas	WSGW	R6_101	LOW	8	8	0	0	54	0	0	38	0	0	0
	WSGW	R7_100	LOW	17	5	0	0	2	0	44	46	0	1	0
	WSDSF	R8_100	LOW	7	9	0	0	54	0	0	48	0	0	0
	WSGW	R9_101	LOW	27	29	0	0	62	0	10	28	0	0	0
Rehabilitation Areas	WSDSF	R6	LOW	26	28	0	10.1	42	0	4	20	0	0	0
	WSDSF	R9	LOW	8	12	0	0	2	2	18	74	0	0	0

Table 27 Assessment against Interim Performance Targets (autumn 2016)

SVS = Site Value Score, NSR = Native Plant Species Richness, NOC = Native Over-storey Cover, NMC = Native Mid-storey Cover, NGCG = Native Ground Stratum Cover (grasses), NGCS = Native Ground Stratum Cover (other), EC = Exotic Plant Cover, NTH = Number of Trees with Hollows, OR = Over-storey Regeneration and FL = Total Length of Fallen Logs



Management	Vegetation		Site attributes (% cover)											
Domain	Community	Site	Vegetation condition	SVS	NSR	NOC	NMS	NGCG	NGCS	NGCO	EC	NTH	OR	FL (M)
	WSDSF	D100	MOD-GOOD	63	33	8.3	10.3	4	2	46	0	2	0	65
	WSGW	D102	LOW	33	36	1.7	0	30	2	58	16	0	0	18
BOA	WSDSF	E101	MOD-GOOD	40	33	1.5	11.2	40	0	12	6	0	0.66	0
	WSGW	E102	LOW	7	7	0	0	24	0	0	76	0	0	0
	WSGW	E104	MOD-GOOD	44	17	11	0	40	0	10	10	0	1	36
	WSGW	A100	LOW	10	4	0	0	82	0	0	18	0	0	0
	WSGW	A104	MOD-GOOD	59	39	2.2	14	38	0	6	8	0	1	95
FCA	WSGW	B100	MOD-GOOD	38	38	19	2	8	4	4	22	0	0.33	0
ECA	WSGW	B101	LOW	27	23	0	0	36	0	16	22	0	0	0
	WSDSF	B105	LOW	8	7	0	0	12	0	6	80	0	0	0
	WSGW	C102	MOD-GOOD	55	51	13.5	0.5	0	8	2	0	0	1	30
	WSGW	R1_101	LOW	17	22	0	0	32	0	16	36	0	0	0
	WSGW	R2_101	LOW	15	15	0	0	32	0	0	60	0	0	0
Regeneration	WSGW	R4_100	LOW	9	5	0	0	2	0	44	46	0	0	0
Area	WSDSF	R5_101	LOW	7	9	0	0	54	0	0	48	0	0	0
	WSDSF	R7_101	LOW	26	29	0	0	62	0	10	28	0	1	0
	WSDSF	R9_100	LOW	26	28	0	10.1	42	0	4	20	0	0	0
	WSDSF	R1_C	LOW	16	16	1.1	5.2	0	0	2	86	0	0	0
	WSDSF	R5_C	LOW	8	12	0	0	2	2	18	74	0	0	0
Rehabilitation	WSGW	R8	LOW	8	9	0	0	6	0	12	70	0	0	0
Агеа	WSGW	R10	LOW	16	16	0	0	4	4	1	54	0	0	23
	WSGW	R11	LOW	16	13	0	0	0	0	24	38	0	0	0
	WSDSF	R2_C	LOW	16	21	6.2	2.6	0	4	0	80	0	0	0
	WSDSF	R3_C	LOW	7	14	0	0	0	12	0	84	0	0	0

Table 28 Assessment against Interim Performance Targets (spring 2016)

SVS = Site Value Score, NSR = Native Plant Species Richness, NOC = Native Over-storey Cover, NMC = Native Mid-storey Cover, NGCG = Native Ground Stratum Cover (grasses), NGCS = Native Ground Stratum Cover (

#### Table 29 Reference sites assessment against Benchmark Targets (autumn 2016)

Management	Vegetation	etation munity Site	Site attributes (% cover)											
Domain	Community		Vegetation condition	SVS	NSR	NOC	NMS	NGCG	NGCS	NGCO	EC	NTH	OR	FL (M)
	WSDSF	Ref_13b	MOD-GOOD	56	37	26	0	20	8	22	0	2	0.50	0
	WSDSF	Ref_14	MOD-GOOD	61	32	5	1	2	6	34	0	6	0.80	34
	WSGW	Ref_15	MOD-GOOD	57	21	17	0	34	0	4	0	5	0.00	54
	WSGW	Ref_16	HIGH	71	35	17	0	28	0	4	0	4	0.50	28
	WSGW	Ref_17	HIGH	71	28	14	0	42	0	40	1	7	0.25	68
	WSGW	Ref_18	HIGH	80	32	24	1	46	0	20	0	5	0.50	75
Sites	WSGW	Ref_19	MOD-GOOD	68	20	13	0	46	0	4	1	2	1	28
Olica	WSDSF	Ref_20	MOD-GOOD	57	24	27	1	2	4	2	0	4	0.33	48
	WSDSF	Ref_21	MOD-GOOD	67	20	23	0	30	0	12	0	5	0.50	90
	WSDSF	Ref_22	MOD-GOOD	61	22	34	1	36	0	6	0	2	0.50	175
	WSGW	Ref_23	NO DATA	ND	25	ND	ND	ND	ND	ND	ND	ND	ND	ND
	WSGW	Ref_24	HIGH	93	34	24	5	30	4	4	0	3	0.66	251
	WSGW	Ref_25	MOD-GOOD	68	29	32	1	60	0	48	0	1	0.50	40

SVS = Site Value Score, NSR = Native Plant Species Richness, NOC = Native Over-storey Cover, NMC = Native Mid-storey Cover, NGCG = Native Ground Stratum Cover (grasses), NGCS = Native Ground Stratum Cover (shrubs), NGCO = Native Ground Stratum Cover (other), EC = Exotic Plant Cover, NTH = Number of Trees with Hollows, OR = Over-storey Regeneration and FL = Total Length of Fallen Logs, ND = No Data

#### Table 30 Reference sites assessment against Benchmark Targets (autumn 2016)



Management	Vegetation		Site attributes (% cover)											
Domain	Community	Site	Vegetation condition	SVS	NSR	NOC	NMS	NGCG	NGCS	NGCO	EC	NTH	OR	FL (M)
	WSGW	Ref_1	LOW	28	31	0	0	40	0	10	32	0	0.66	0
	WSDSF	Ref_2	MOD-GOOD	61	37	18.5	3	44	0	26	2	2	0.50	10
	WSDSF	Ref_3	MOD-GOOD	54	42	3.5	0.3	6	12	16	0	3	0	40
	WSGW	Ref_4	MOD-GOOD	61	49	12.5	0	44	0	4	12	5	0	60
	WSDSF	Ref_5	MOD-GOOD	64	53	3.9	17.2	14	4	34	0	1	1	25
Reference	WSDSF	Ref_6	MOD-GOOD	57	36	16.1	19.6	24	10	2	0	0	0.80	33
Sites	WSDSF	Ref_7	MOD-GOOD	67	46	12	13.4	20	20	28	0	6	0	42
	WSGW	Ref_8	HIGH	86	42	11.3	1.8	32	0	48	0	5	1	105
	WSDSF	Ref_9	HIGH	80	53	30.5	6.1	40	10	6	0	1	0.80	35
	WSDSF	Ref_10	MOD-GOOD	66	57	11.4	15.7	28	26	18	8	4	0	77
	WSGW	Ref_11	MOD-GOOD	51	22	14	0	58	2	16	16	2	0.33	20
	WSGW	Ref_12	MOD-GOOD	56	43	9.5	0	54	0	10	8	6	0	100

SVS = Site Value Score, NSR = Native Plant Species Richness, NOC = Native Over-storey Cover, NMC = Native Mid-storey Cover, NGCG = Native Ground Stratum Cover (grasses), NGCS = Native Ground Stratum Cover (other), EC = Exotic Plant Cover, NTH = Number of Trees with Hollows, OR = Over-storey Regeneration and FL = Total Length of Fallen Logs

#### Fauna Monitoring

Winter bird monitoring was conducted at 25 general fauna monitoring sites. The objectives of the bird survey were to determine the presence of two species (*Anthochaera phrygia* (Regent Honeyeater) and *Lathamus discolor* (Swift Parrot)), both listed as either critically endangered or endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Threatened Species Conservation Act 1995* (TSC Act). These species feed on the blossoms of winterflowering eucalypts and lerps. Data for other bird species' distribution were also gathered during the winter bird survey. Winter bird monitoring utilised the bird monitoring methods described in ELA (2016) for the spring 2015 monitoring.

The BMP requires that 26 general fauna monitoring sites should be established to target birds and ground fauna (amphibians, ground mammals and reptiles) within the WCPL Management Domains. However, operational restrictions and poor weather conditions prevented all 26 general fauna monitoring sites from being surveyed. The monitoring program was therefore reduced to 21 general fauna monitoring sites, four sites only targeting birds, and six reference sites targeting microbats. This is consistent with the methods for the 2015 spring monitoring.

Microbat monitoring was undertaken at five general fauna monitoring sites during spring 2016, as required by the BMP. In addition, baseline microbat monitoring was undertaken at six reference sites; spring 2016 represented the first season of microbat monitoring at these six sites.

Opportunistic fauna sightings, including fauna evidence such as scats or tracks, were also recorded across all fauna monitoring sites.

Birds and microbats are common and diverse throughout Australia. Due to the ease of surveying birds and microbats, they are regularly a focus of monitoring surveys and are analysed as an indicator of biodiversity. For this reason, total bird and microbat assemblages, as well as indicator species, were surveyed and analysed during the 2016 spring monitoring.

A suite of indicator bird species were identified and used to assess the habitat quality at each site. Of the two bird indicator analyses carried out, the first analysis examines the richness of indicator species (both derived native grassland (DNG) and woodland/forest) in each DNG site. This was compared with the richness of DNG indicator species, and the richness of woodland/forest indicator species that occurred in each corresponding woodland/forest analogue site.

The second analysis utilised the same methodology and serves the same purpose as the first, but uses indicator species abundance data instead of indicator species richness data. Conducting the same analyses using two different units of measurement helps paint a more holistic picture of the environment we are monitoring. For this reason, both analyses should be interpreted together. This process was repeated with microbats.

Fauna Monitoring Recommendation and Conclusions



Whilst survey effort varied across Management Domains, both fauna species diversity and abundance correlated positively with habitat condition and complexity (vegetation structural diversity, presence of hollows, and presence of fallen logs). This was demonstrated through the high species counts and diversity recorded within BOA, ECA and Reference monitoring sites. Regeneration and Rehabilitation areas did not have such complexity and were often isolated from larger tracts of native vegetation.

Proximity to relatively intact remnants and patch size is likely to have influenced monitoring results, although this was not specifically measured. Several survey sites within ECA and Regeneration areas that contained relatively low habitat features, but were close to Munghorn Gap NR or Goulburn River NP, recorded high bird and microbat richness and/or abundance. In contrast, isolated monitoring sites within Rehabilitation Areas (R6 and R9) that are surrounded by active mine operations had low bird observations, presumably due to lower habitat values in these areas and disturbance caused by mining operations.

The two target species (Swift Parrot and Regent Honeyeater) were not observed at any site.

As these are baseline data, the conclusions that can be drawn are limited and therefore it is recommended that fauna monitoring continue. However, the varying weather conditions of the last two years monitoring highlights limitations of the program, some of which can be addressed. It is clear that timing of both the bird and trapping surveys is a determinant of success. Though this can be difficult to control, an additional method of herpetological survey may assist in increasing trap success during colder months; that is, placing sheets of metal on the ground at monitoring sites several months before spring, which may provide shelter for reptiles and amphibians so that during spring there is a greater chance of them being present.

## 8.3 Other Rehabilitation Activities

#### Exploration

Following the completion of drilling, rehabilitation of exploration site are in accordance with *WI-EXP-PRO-0031 Wilpinjong Exploration Site Rehabilitation Procedure*. Inspections of drill sites are approximately every 6 months until the site has reached a stable state. During 2016, a number of drill sites were inspected for rehabilitation progress. The successful progress of drill site PW1162A rehabilitation is shown in **Figure 6**. Inspections included:

- Return of vegetation;
- Any evidence of weed or pest invasion; and
- Active erosion issues or slumping.

#### Figure 6 Drill Site PW1162A Rehabilitation Progress









#### **Green Manure Trials**

Green manure is a crop grown before being ploughed into the soil when the plant is still 'green'. At WCPL our green crop has included various combination of legumes (cow peas, clover), sorghum, millet, sudan grass, oats. Combinations and rates are shown in **Table 31**.

Species	Rates (kg/ha)
Chicory	4kg
Cowpea	12kg
Sorghum	6kg
Cowpea	12kg
Jap Millet	6kg
Cowpea	12kg
Sorghum	6kg
Cowpea	12kg
Sudan Grass	10kg
Oates	60kg
Clovers	15kg

#### **Table 31 Green Manure Combinations and Rates**

The use of the 'green manure' will provide the following benefits:

- Increased organic matter and soil nutrients;
- Nitrogen fixation;
- Soil cover (erosion, dust etc);
- Improved soil moisture;
- Low cost (reduction in agrochemicals, transportation, labour etc); and
- Weed control.

Below are photos of oats and clover green manure crops in Pit 5 (**Photo 1**) showing the growth of the crops. **Photo 2** shows oats cover crop just turned over by a disc plough with **Photo 3** illustrating the result after drying. After this process, the ground will be work one last time in preparation for the final seed application relevant to the proposed post mine land use. Soil conditions will continually be monitored to gauge the effects of the green manure crops.

Photo 1 Height of Oats

**Photo 2 Turned Oats** 





Photo 3 Dried Green Manure Crop



#### Microbes

WCPL is now investigating the use of microbes within 5 areas which have had green manure crops established. WCPL believes this be a natural beneficial process to assist in breaking down this newly created organic matter leading to building improved soil structure. Initial testing has been completed with results indicating close to low indication of activity. This application activity will be undertaken by the Operational Support Team (OST) with the application via a recently purchased spray unit. Example of results of microbe testing results can be found in **Appendix 5**.

#### 8.4 Land Management Activities

#### Pest and Weed Management

WCPL completed pest management works on WCPL owned properties during 2016 including BOA's, EIS Regeneration and ECA areas. Works included:

- Baiting (Autumn and Spring):
  - Targeting dogs & foxes;
  - Use of 1080 baits;
  - o In conjunction with Wild Dog Association and LLS;
  - 2 x ground programs;



• Kangaroo management within EIS Regeneration, BOA's and ECA-Area B and surrounding WCPL pastoral lands

Inspection undertaken by MWRC in October 2016 of all areas within the mining lease and WCPL owned properties as well as identification through the BMP monitoring program. WMRC noted the following weeds during the inspection, including Serrated Tussock, Blackberry, Sweet Briar, Blue Heliotrope, St John's Wort, Tree of Heaven, Bathurst Burr and African Box Thorn.

WCPL has undertaken extensive weed spraying in response to this inspection using selective herbicides (refer to Figure in **Appendix 7**).



## 9.0 COMMUNITY

A protocol for the management and reporting of community complaints has been developed as a component of the Mine's EMS. In accordance with Condition M6.1 of EPL 12425, a dedicated telephone number (ph: **1300 606 625**) for the provision of comments or complaints is maintained by WCPL. In addition, a separate hotline for blasting information is also maintained by WCPL (ph: **1800 649 783**).

In accordance with Condition M6.2 of EPL 12425, these telephone lines are advertised in local newspapers quarterly, via the Wilpinjong Community Newsletter and on the Peabody website: <u>http://www.peabodyenergy.com/content/405/australia-mining/new-south-wales/wilpinjong-mine</u>

WCPL records and responds to all complaints and maintains a complaints register on its website. The complaints are managed in accordance with the WCPL Complaints Management Procedure. The Complaints Management Procedure outlines WCPL reporting requirements as follows:

- A summary of complaints received is reported monthly on the Peabody website;
- A summary of complaints received and actions taken is presented to the WCPL CCC as part of the operational performance review;
- A summary of complaints received and actions taken is included in the Annual Review and Environmental Management Report and the Annual Return to the EPA.

During the 2016 review period, 48 environmental-related complaints were received by WCPL (**Appendix 6**) as opposed to 130 complaints in 2015. **Graph 16** presents a comparison of the environmental complaints received by WCPL over the period 2006 to 2016.

WCPL received fewer noise related complaints during the 2016 review period than in 2015. There were no odour complaints, however blast related complaints did slightly increase when compared to 2015.



#### Graph 16 Summary of Community Complaints and Issues Raised by Complainants 2006 – 2016





Graph 17 Percentage Breakdown of Community Complaints in 2016

Graph 18 Total Annual Complaints 2006 - 2016



## Community Consultative Committee

In accordance with Condition 5, Schedule 5 of Project Approval (05-0021) the Community Consultative Committee (CCC) (**Table 32**) continued to meet during the 2016 review period. The CCC for the Mine is operated in general accordance with the *Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects* (Department of Planning, 2007). Consistent with the requirements of the CCC Guidelines, the committee is comprised of one independent chairperson, and representatives of the MWRC, WCPL and members of the general community.

Consultation regarding the WEP was undertaken at the CCC meetings in February, August and December 2016<sup>9</sup>. WCPL has undertaken individual consultation with private landholders and lessees that reside in the vicinity of the mine to discuss the ongoing development of the Wilpinjong Coal Mine and the WEP. **Table 33** provides a summary of the CCC meetings held during the 2016 review period.

 $<sup>^{9}</sup>$  Scheduled May 2016 CCC meeting was cancelled following apologies from Community Representatives.



#### Table 32 CCC Members for the 2016

Name	Organisation
John Webb/Max Walker	Mid Western Regional Council (Councillor)
Des Kennedy	Mid Western Regional Council
Lisa Andrews	CCC Independent Chair Person
Colin Bailey	Community Representative
Scott Lillis	Community Representative
Brian McDermott	Community Representative
Bev Smiles	Community Representative and Mudgee District Environmental Group Representative
Bruce Hughes	Community Representative
Kim Peach	Community Representative
David Crust	NSW National Parks and Wildlife Service Representative

#### Table 33 Summary of CCC Meetings in 2016

Date	Key Outcomes
22 February	Environmental monitoring results, WEP update, reviewed complaints since last CCC, discussed incidents, rehabilitation, Keylah Dump update, 2016 exploration program, community donations and management plan update.
16 May	Environmental monitoring results, WEP update, reviewed complaints since last CCC, discussed incidents, rehabilitation, Keylah Dump update, MOD 7 update, community donations and management plan update.
15 August	Environmental monitoring results, WEP update, reviewed complaints since last CCC, discussed incidents, rehabilitation, Keylah Dump update, EPL Licence Variation, community donations and management plan update.
5 December	Environmental monitoring results, WEP update, reviewed complaints since last CCC, discussed incidents, rehabilitation, Keylah Dump update, ACARP Submission, 2016 exploration program, community donations and management plan update.

#### Community Support Program

During the 2016 reporting period, WCPL continued its support of local community groups and sporting associations, schools and charitable organisations (total amount in 2016 was approximately \$120,000.00), including local schools, Community Groups, Charities and sporting groups. More information regarding WCPL's community support program is provided in **Appendix 6**.

#### Have a Chat Meeting

WCPL also provided information newsletter regarding upcoming 'have a chat' sessions, held at the Wollar Store 1st Thursday of the month from 1:30pm to 4:30pm. The initiative aims at providing the community a casual setting to ask questions or raise concerns relation to the Mine's operations. In 2016 two 'have a chat' sessions were held at Gulgong and two were held in Mudgee.

#### Access to Information

Condition 11, Schedule 5 of PA 05-0021 details the requirements for access to information applicable to the Mine, and outlines the documents required by the Project Approval to be made publicly available on the Peabody website <u>www.peabodyenergy.com</u>

#### **Employment Status**



At the end of the 2016 reporting period there were 533 full time equivalent employees at WCPL (i.e. 400 employees and 133 contractors). An increase of 22 full time equivalent employees when compared to the end of the 2015 reporting period.

# **10.0 INDEPENDENT AUDIT**

## 10.1 Independent Environmental Audit

In accordance with Condition 9, Schedule 5 of Project Approval (05-0021), the last Independent Environmental Audit (IEA) was carried out by AECOM Australia and included a team of specialist to review the Mine's performance on the 15 December 2014. The non-compliances identified as a result of the IEA, and responses by WCPL, were provided in the 2014 Annual Review. The next scheduled IEA for the WCPL is late 2017.

## **10.2 EPA Administration Audit**

On the 19 January 2016 the EPA conducted an administration audit for holders of all environmental protection licence holders under the *Protection of the Environment Operations Act 1997* (POEO Act). The findings of the audit concluded three partially compliant requirements with no non-compliances. To address the three partially compliant items, WCPL were required to print out physical copies of EPL12425 and the Pollution Incident Response Management Plan (PIRMP). To address the third partially compliant item WCPL added the word "complaint" to the contact details regarding the community complaint hotline phone number on its webpage:

http://www.peabodyenergy.com/content/405/australia-mining/new-south-wales/wilpinjong-mine

# **11.0 INCIDENTS & NON-COMPLIANCES**

## 11.1 Reportable Incidents

There were two reportable incidents during the 2016 review period, including:

#### Mining out of MOP Approved Area

WCPL determined in August 2016 that mining occurred in an area that was not shown to be mined within the period of the approved Mining Operations Plan (MOP) "B" ('MOP B'), although mining occurred within the Mine's approved disturbance footprint, on land that was being lawfully used for mining activities (i.e. ROM pad) and that would be mined at some future point. The area in question was Strip 26E. Strip 26E comprises an area of about 3.9ha previously utilised for an approved ROM coal stockpile. WCPL approved the Ground Disturbance Permit (GDP) for Strip 26E on 8 June 2016. At that time, it was believed that the land area comprising Strip 26E was shown within MOP B. This incident was reported to NSW Department of Resources and Energy (DRE) on 8 August 2016.

After an investigation by the DRE a Warning Letter and Penalty Notice<sup>10</sup> (for the sum of \$2,500.00) was issued to WCPL on the 17 November 2016. The DRE concluded that mining Strip 26E without identifying it within MOP B was a contravention of Condition 27(a) of ML1573 and an offence under the *Mining Act 1992*. WCPL has now taking steps to prevent a re-occurrence of this incident. This includes digitising the approved MOP plan boundaries so 'inactive layers' are no longer convertible.

## Dust Exceedence

The DP&E and EPA were notified on the 19 February 2016, that  $PM_{10}$  levels had exceeded the 24hr average criterion of  $50ug/m^3$  at TEOM4, with recorded dust levels of  $51.1ug/m^3$ . The cause of the reading was a bushfire (Totness Bushfire) which started on Sunday, 14 February 2016 and continued to

<sup>&</sup>lt;sup>10</sup> Issued under Section 37D of the *Mining Act 1992* 



burn for the following week. The bushfire smoke resulted in dust monitoring equipment (mainly TEOMs and High Volume Air Samplers (HVAS)) recording higher dust levels than usual. The dust levels recorded, as a result of bushfire smoke, were in this instance below the Project Approval criterion. However, in combination with dust from Araluen Lane (arising from low rainfall) and early morning inversions, the bushfire smoke contributed to the dust event.

#### **Excessive Dust Emissions**

During the 2015 Annual Review Report meeting site inspection, 14 June 2016, the Environment Protection Authority (EPA) identified excessive dust emissions on haul roads 3 and 4, within and in the vicinity of open cut 7. While the EPA noted that immediate action was taken by environmental staff upon identification of the dust emissions, the EPA prefers that field based staff identify and take appropriate action in response to excessive dust. A warning letter was issued by the EPA on 20 June 2016 to WCPL in regard to this observation.

WCPL developed and released a toolbox talk (24 June 2016) which was communicated to all employees and relevant contractors to reinforce WCPL's dust management obligations and personal responsibilities of employees and relevant contractors to the management of dust at WCPL.

## 11.2 Non-Compliances

There were a total of twelve non-compliances as identified in **Table 3**, identified during the 2016 review period. Four non-compliances were recorded against the PA05-0021, seven non-compliances were recorded against EPL12425 and one non-compliance against ML1573. A summary of the non-compliances, the cause of the non-compliances and actions to address the non-compliances are provided in **Table 34**.



## **Table 34 Details of Non-Compliances**

Relevant Approval	Date of	Details of Non-Compliance	Cause of Non-Compliance	Action to Address Non-Compliance
PA 05-0021, Sch 3 Condition 37	N/A	By the end of December 2015, unless the DG agrees otherwise, make suitable arrangements to protect ECAS and BOA in perpetuity	Delays in reaching an agreement with National Parks & Wildlife Service (NPWS) for the transfer of the land listed in Table 11 of the Project Approval 05-0021.	Ongoing consultation with NPWS regarding the agreement to transfer of land identified). WCPL requested DP&E (16 <sup>th</sup> December 2015) to grant an extension for Condition 37, Schedule 3 of the Project Approval. WCPL requested DP&E (23rd December 2016) to grant an extension for Condition 37, Schedule 3 of the Project Approval in regards to finalising land transfer arrangements with NPWS. WCPL are seeking to resolve this matter with NPWS in 2017.
PA 05-0021, Sch 3 Condition 39	N/A	By 31 December 2015, unless otherwise agreed by the DG, lodge a Conservation Bond for BOAs	Conservation Bond for the BOA's is based on the commitments of the Biodiversity Management Plan. Although the Biodiversity Management Plan is now approved by DP&E, finalising land transfer arrangements with NPWS is still pending.	Recent consultation with DP&E regarding the requirements of the Conservation Bond and extension to condition. WCPL Requested DP&E (23rd December 2016) to grant an extension re. Conservation Bond as land transfer arrangements with NPWS is still pending. WCPL are seeking to resolve this matter with NPWS and the DP&E in 2017.
PA 05-0021, Sch 3 Condition 54	N/A	The Proponent shall minimise the visual impacts of the project to the satisfaction of the Director- General.	Failure to consult and seek the approval of the DP&E Director – General regarding the minimisation of visual impacts of the project.	Consultation and formal approval from DP&E Director – General entered into WCPL compliance management system for completion in 2016. WCPL to seek satisfaction from the DG in 2017.
PA 05-0021, Sch 3 Condition 32(d)	N/A	Aquatic monitoring for macro- invertebrates was not completed during 2016.	Aquatic monitoring for macro-invertebrates was not completed during 2016 as delays with WCPL coordination of the program and the availability of the preferred supplier to meet the monitoring requirement timeframes.	WCPL have engaged a suitable supplier to undertake the macro-invertebrates study for the next two years. A report stream health monitoring will be provided in the 2017 Annual Review.
ML1573	August 2016	Contravention of condition 27(a) of ML1573. Mining of Strip 26E was not due to be mined in MOP Amendment B.	Strip 26E comprises an area of about 3.9ha previously utilised for an approved ROM coal stockpile. WCPL approved the Ground Disturbance Permit (GDP) for Strip 26E on 8 June 2016. At that time, it was believed that the land area comprising Strip 26E was shown within MOP B. This incident was reported to NSW Department of Resources and Energy	MOP C was prepared and submitted to DRE. WCPL has now taking steps to prevent a re-occurrence of this incident. This includes digitising the approved MOP plan boundaries so 'inactive layers' are no longer convertible.



Relevant Approval	Date of	Details of Non-Compliance	Cause of Non-Compliance	Action to Address Non-Compliance
			(DRE) on 8 August 2016.	
EPL 12455 M2.2 EPL Point 11	28/01/2016	Total insoluble matter not determined in accordance with AS3580.10.1 for dust gauge 13 (DG13).	Total insoluble matter not determined in accordance with AS3580.10.1 as mining operations in Pit 5 south have now advanced to within 5 metres of EPL Point 11 (i.e. DG13).	No adverse effects occurred from this non-compliance. WCPL will lodge with EPA an application to vary EPL and to remove Point 11.
EPL 12455 O3.1 & 2	28/04/2016	During the rehandling of a high ash section of Keylah Dump the ash became airborne and due to atmospheric conditions settled on a 40- 50 metre part of the adjacent Ulan- Wollar Road.	Composition of ash, atmospheric conditions at that time and proximity of Keylah Dump to Ulan-Wollar Road.	Event short-lived. Water truck deployed to clean affected part of Ulan-Wollar Road. No adverse effects were identified from the event. Event communicated to production employees working on Keylah Dump. Keylah Dump Removal Management Plan also reviewed to confirm Plan remained adequate.
EPL 12455 M2.2 EPL Point 20	13/11/2016	One (1) PM10 dust sample was not collected and analysed at monitoring point 20 (HV4).	The high volume air sampler (HV4) did not operate due to a power failure.	No adverse effects occurred from this non-compliance. HV4 checked after every sample date.
EPL 12455 M2.2 EPL Point 13	6/03/2016	One (1) PM10 dust sample was not analysed for monitoring point 13 (HV1).	The high volume air sampler (HV1) did not operate due to possible power failure.	No adverse effects occurred from this non-compliance. HV1 checked after every sample date.
EPL 12455 M2.2 EPL Point 25	Within period 8/03/2016 to 31/12/2016	For the reporting period 1.64% of the continuous PM10 dust monitoring did not occur at monitoring point 25 (TEOM 3).	General maintenance (including calibrations) or power failure main causes.	No adverse effects occurred from this non-compliance. TEOM 3 checked: monthly onsite, remotely each day and as soon as possible when equipment issues identified.
EPL 12455 M2.2 EPL Point 28	Within period 8/03/2016 to 31/12/2016	For the reporting period 0.55% of the continuous PM10 dust monitoring did not occur at monitoring point 28 (TEOM 4).	General maintenance (including calibrations) or power failure main causes.	No adverse effects occurred from this non-compliance. TEOM 4 checked: monthly onsite, remotely each day and as soon as possible when equipment issues identified.
EPL 12455 M4.2 EPL Point 21	Within period 8/03/2016 to 31/12/2016	Continuous monitoring for air temperature, wind speed/direction, lapse rate, rainfall and humidity did not occur for 1.6% of the reporting period	General maintenance (including calibrations) or equipment issues main causes.	No adverse effects occurred from this non-compliance. Meteorological equipment checked remotely each day and as soon as possible when equipment issues identified.





# 12.0 ACTIVITES FOR NEXT REPORTING PERIOD

Activities proposed to be carried out by WCPL at the Mine during the 2017 review period (i.e. 1 January 2017 to 31 December 2017) include the following:

- Progress WEP subject to approval.
- Continued exploration activities in EL 6169 and EL 7091.
- Continued exploration drilling within ML 1573 (including both infill drilling and lower density drilling).
- Continuation of rehabilitation works in completed mined areas.
- Commencement of mining in Pit 6 area.
- Establishment of final surface level of Tailings Dam 3 (TD3).
- Inspection and review of rehabilitation areas to assess maintenance requirements.
- Continued weed and animal pest control across WCPL-owned land.
- Continued stock exclusion in the ECAs to promote regeneration.
- Ongoing demolition of derelict houses, including in-pit disposal of inert building material.
- Continued consultation with surrounding landholders.
- Ongoing CCC meetings, including continued publication of the meeting minutes on the Peabody website.
- Continuation of Wollar "Have-a-chat" sessions on a monthly basis.
- Expand real time surface water flow meter system throughout the mine.
- Undertake geochemical analysis through the geological profile.
- Continue the Spontaneous Combustion Propensity testing regime.
- Undertake tasks outlined within 3-year Schedule of the BMP.
- Make suitable arrangements to protect the Enhancement and Conservation Areas and Biodiversity Offset Areas in Table 11 of Project Approval 05-0021.
- Complete 135ha of rehabilitation in 2017 in accordance with approved Mine Operations Plan.
- Construct pretreatment options for Water Treatment Facility and increase capacity for discharge.

In accordance with Condition 4, Schedule 5 of Project Approval (05-0021), WCPL will review, and if necessary, revise the strategies, plans and programs required under the Project Approval within three months following submission of this Annual Review and Environmental Management Report or as otherwise specified in the Project Approval.


## **13.0 REFERENCES**

- Wilpinjong Coal Mine 2016 Annual Biodiversity Monitoring Report, Eco Logical Australia Pty Ltd (April 2017)
- Wilpinjong & Cumbo Creek Stability Assessment, 2016 Barnson Pty Ltd (March 2017)
- Environmental Noise Monitoring (January 2016 to December 2016), Global Acoustics Pty Ltd
- Ambient Air Quality Monitoring Validate Report/s (January to December 2016), Ecotech Pty Ltd
- Wilpinjong Annual Review Groundwater Analysis HydroSimulations (March 2017)
- Wilpinjong Coal Pty Ltd 2016 Water Balance Model Update Baseline OPSIM Model Setup 31 Mar 2017, Hatch Pty Ltd



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