

Annual Review

Werris Creek Coal Mine

2016

Table 1 - Annual Review Title Block

Name of Operation	Werris Creek No. 2 Coal Mine
Name of Operator	Werris Creek Coal Pty Limited
Development consent / Project Approval #	Project Approval 10_0059 Modification 2
Name of holder of development consent/project approval	Werris Creek Coal Pty Limited
Mining lease # (Leaseholder)	ML1563 (Creek Resources Pty Ltd & Betalpha Pty Ltd); ML1671, ML1672 (Werris Creek Coal Pty Limited)
Water Licence # (Licence Holder)	WAL29506 (Betalpha Pty Ltd); WAL32224 (Werris Creek Coal Pty Ltd)
MOP Commencement Date	14 January 2016
MOP Completion Date	30 November 2022
Annual Review Commencement Date	1 April 2016
Annual Review Completion Date	31 December 2016
<p>I, Nigel Wood, certify that this audit report is a true and accurate record of the compliance status of Werris Creek Coal Mine for the period 1st April 2016 to 31 December 2016, and that I am authorised to make this statement on behalf of Werris Creek Coal Pty Ltd.</p> <p>Note.</p> <p>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.</p> <p>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).</p>	
Name of Authorised Reporting Officer	Nigel Wood
Title of Authorised Reporting Officer	General Manager – Open Cut Operations
Signature	
Date	/ / .

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1 STATEMENT OF COMPLIANCE

This Annual Review has been prepared to provide a summary of the environmental performance of the Werris Creek Coal Mine (WCC) over the reporting period. The compliance status of the WCC against relevant approvals during the reporting period was assessed as at the end of the reporting period (i.e. 31 December 2016) and is summarised in **Table 2**. References to the Environment Protection Licence (EPL) are limited to those that relate to the Project Approval conditions, specifically: Schedule 3 Condition 20(b), 22, 23(a) and Schedule 5 Condition 8(c).

Table 2 – Statement of Compliance

Where all the conditions of the relevant approvals complied with?	Yes/No
Project Approval 10_0059 Modification 2	Yes
Mining Operations Plan (MOP)	Yes
Mining Lease ML 1563	Yes
Mining Lease ML 1671	Yes
Mining Lease ML 1672	Yes
EPL12290	Yes
WAL29506	Yes
WAL32224	Yes

2 INTRODUCTION

This is the twelfth Annual Review produced for the Werris Creek No. 2 Coal Mine (WCC) and has been prepared in accordance with the NSW Department of Planning and Environment's (DPE) Integrated Mining Policy – Annual Review Guideline, October 2015. This document has been prepared to satisfy the following requirements:

- The Annual Review requirements of the DPE under the Project Approval PA 10_0059 (Condition 3 Schedule 5);
- Environmental Management Report requirements of the Division of Resources & Energy (DRE) under the WCC Mining Leases; and
- The routine reporting expectations of DPI Water.

This report covers the short period between 1st April 2016 to 31st December 2016, in order to bring the WCC reporting period to calendar year.

2.1 PROJECT BACKGROUND

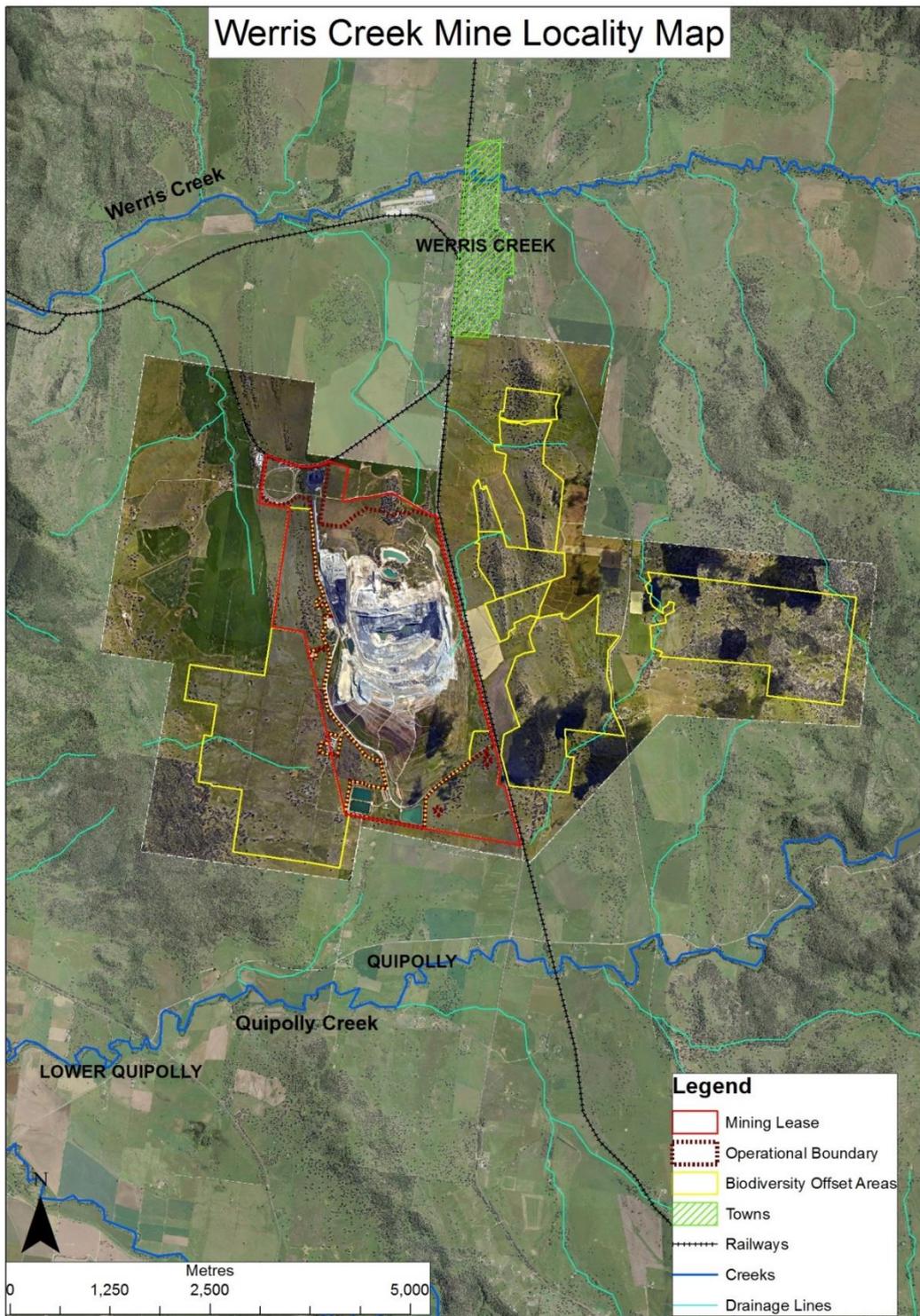
WCC is located approximately 4 km south of Werris Creek and 11 km north-northwest of Quirindi in northwest slopes and plains region of New South Wales (**Figure 1**) and lies within a 910 ha area covered by Mining Lease (ML) 1563, ML1671 and ML1672. The current Project Approval (PA) 10_0059 Modification 2 limits mining until 31st December 2032. The Mining Operations Plan (MOP) covers a 7-year period from the 14th January 2016 to the 30th November 2022. WCC has approval to mine in full the Werris Creek coal measures.

WCC is owned and operated by Werris Creek Coal Pty Limited (WCC), a wholly owned subsidiary of Whitehaven Coal Limited (WHC). The key operational personnel responsible for environmental management at WCC are listed in **Table 3**.

Table 3 – Key Personnel at WCC

Name	Title	Contact
Mr Lynden Cini	WCC Environmental Officer	02 6763 6018
Mr Rod Hicks	WCC Operations Manager	02 6763 6000
Mr Nigel Wood	General Manager – Open Cut Operations	02 6743 4478

Figure 1 – WCC Locality Map



3 APPROVALS

Table 4 provides a summary of the key current licences, leases and approvals that have been obtained for the operation of WCC.

Table 4 – Licences, Leases and Approvals

Authority	Approval	Number	Issue	Expiry	Comments
Department of Planning and Environment (DP&E)	Project Approval	PA10_0059	25/10/2011	31/12/2032	Life of Mine Project allows northerly continuation for entire coal deposit mining up to 2.5Mtpa and 24 hours 7 days per week.
		PA10_0059 MOD1	30/08/2012	31/12/2032	Modification of Biodiversity Offset Area to allow for augmentation of VWD1 to 250ML.
		PA10_0059 MOD2	3/11/2015	31/12/2032	Modification of overburden emplacement design, enabling of a dry processing plant, and to allow void water for agricultural use.
Department of Primary Industries – Division of Resources and Energy (DRE)	Mining Lease	ML 1563	23/03/2005	23/03/2026	Mining Lease granted for 21 years.
		ML 1671	9/03/2012	9/03/2032	Mining Lease granted for 21 years.
		ML 1672	9/03/2012	9/03/2032	Mining Lease granted for 21 years.
	Mining Operations Plan	None	14/01/2016	30/11/2022	MOP approved on 14 th January 2016
Environment Protection Authority	Environment Protection Licence	12290	18/04/2005	Anniversary date: 1/04/2016 Review Date: 14/07/2020	Last variation 6 th May 2016
Department of Primary Industries – Water	Water Access Licence	WAL29506	21/02/2013	Perpetuity	Aquifer – 50ML annual allocation. DPI-Water reference number 90AL822531. Formerly 90BL252588
		WAL32224	19/06/2013	Perpetuity	Aquifer – 211ML annual allocation. DPI-Water reference number 90AL828344. Formerly 90BL255087
	Water Works Approval	90WA822532	21/02/2013	15/01/2025	Linked to WAL29506. Bore. Formerly 90PT982801
		90WA828345	19/06/2013	25/06/2017	Linked to WAL32224. Excavation. Formerly 90PT982872
Commonwealth Department of Sustainability, Environment, Water, Population and Communities	Environment Protection and Biodiversity Conservation Act Approval	2010/5571	21/12/2011	31/12/2032	Authorises impacts on EPBC listed threatened species and communities and listed migratory species
Dam Safety Committee	Prescribed Dams	Werris VWD1	18/10/2012	Perpetuity	Significant Sunny Day and Flood Consequence
		Werris VWD3	13/12/2012	Perpetuity	
		Werris VWD4	13/12/2012	Perpetuity	

4 OPERATIONS SUMMARY

4.1 EXPLORATION ACTIVITIES

The WCC drilling program during the half-year ending December 2016 achieved a total meterage of 2,280m focussed in front of the highwall. Three open holes, four cored holes and fifteen fly-ash holes were drilled for a total of 2,280m, including redrills. All boreholes were geologically logged, and geophysically logged.

4.2 MINING OPERATIONS

Table 5 presents the production summary for the previous and current reporting periods and the anticipated production schedule for the next reporting period. ROM coal production is summarised by calendar year (this reporting period equates to part 2016), to align with PA_0059 conditions. All units are in tonnes unless otherwise stated.

Table 5 – Production Summary

Material	Approved limit	Previous reporting period (actual)	This reporting period (actual)	Next Reporting period (forecast)
Waste Rock / Overburden (bcm)	N/A	13,060,983	12,812,659	12,717,263
ROM Coal (t) (calendar year)	2,500,000 (PA 10_0059)	2,038,766	1,859,793	1,974,975
Coarse reject (t)	N/A	0	0	0
Fine reject (t)	N/A	0	0	0
Saleable Product (t)	5,000,000 (EPL12290)	2,045,807	1,369,269	2,293,270

4.3 COAL HANDLING AND PROCESSING

During the reporting period, coal processing operated Monday to Friday 6:00am to 11:40pm with the occasional weekend shift. Train loading operations occurred 24 hours per day, 7 days per week dependent on train scheduling. Coal is segregated at the ROM coal stockpile based on the expected ash content of the coal. The higher ash coal products are processed through the fixed plant crusher and subsequently processed through the secondary crusher. Low ash coal products are processed by the mobile crushers and then screened.

Product coal is transported by road trucks from the coal processing area to the product coal stockpile area at the train load out facility via the private coal haul road. The despatch of product coal from WCC is either railed to the Port of Newcastle or by road to domestic customers. Product movements by month for both rail and domestic road haulage can be found on the Whitehaven Coal website. WCC complied with Schedule 2, Conditions 7 and 8, of PA_0059. The maximum quantity of product coal stockpiled on site during the reporting period was 134,343 tonnes, which occurred during November 2016 and the total quantity of domestic coal transported from site on public roads was 1,620 tonnes for the period. Domestic coal transport data is available on the WHC website.

4.4 OTHER OPERATIONS

4.4.1 Hours of Operation

Mining operations are permitted to be conducted up to 24 hours per day, seven days per week, except for blasting, which is restricted to 9:00am – 5:00pm Monday to Saturday. During the reporting period, mining operations maintained reduced hours of 20 hours per day (6:00am – 2:00am) 5 days per week

(Monday to Friday), with occasional overtime shifts on Saturdays. Other ancillary tasks and maintenance activities continued 24 hours per day, seven days per week.

4.5 NEXT REPORTING PERIOD

4.5.1 Exploration

Exploration drilling will continue to be undertaken at the WCC to further assess the coal reserves within the tenements. During the next reporting period, fifteen open holes and three cored holes are planned to be drilled for a total of 1,700m, to the north of the current workings.

4.5.2 Mine Operations

The mine production rates are planned to continue at much the same level as in the current reporting period, although the position in the strip and pit allow for more coal tonnes to be mined offset by lower overburden, as shown in **Table 5**. Vegetation clearing activities in mining areas over the next reporting period will be conducted in accordance with the approved Biodiversity Management Plan and MOP.

4.5.3 Rehabilitation progress

As per MOP commitments, Werris Creek Mine plans to reshape, topsoil and seed 29 hectares of the overburden emplacement in the 2017-18 reporting period. Maintenance works and supplementary planting will continue on existing rehabilitation areas to encourage success.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The 2015-2016 Annual Review and subsequent regulatory site inspection identified the following actions. These are addressed within this document and summarised in **Table 6**.

Table 6 – Actions from the Previous Annual Review (2015-2016)

Action required from Previous Annual Review	Requested By	Action Taken	Where discussed in Annual Review
Provide a copy of (or hyperlink to) coal transport data and blast data in future Annual Reviews	DP&E	Coal transport data available on Whitehaven Werris Creek website.	Section 4.3
Provide a report on effectiveness of the waste minimisation and management measures, as required by Schedule 3 Condition 39, in future Annual Reviews.	DP&E	Further detail included on the effectiveness of implemented measures and a comparison against previous data provided.	Section 6.6
Provide dates for discharge events in future Annual Reviews	DP&E	Dates included	Section 7.2.1
Provide a comprehensive review of the monitoring data which includes a comparison of results against monitoring results of previous years and predictions in the EA, and identify any trends with the monitoring data over the life of the project, as required by Schedule 5 Condition 3(b) and 3 (d), in future Annual Reviews.	DP&E	Included in this reporting year.	This document
Provide a copy of (or hyperlink to) the Complaints Register in future Annual Reviews.	DP&E	Available on Whitehaven, Werris Creek website.	Section 9.3

6 ENVIRONMENTAL PERFORMANCE

6.1 NOISE

6.1.1 Environmental Management

During the reporting period various controls were implemented to reduce noise generation including:

- Annual testing of maximum sound power levels;
- Stage 1 or 2 Noise Attenuation fitted on all trucks;
- Use of enclosed conveyors; and
- Use of Silent Horns by excavator operators during the night periods.

WCC have implemented a number of mitigation strategies to minimise the effects of noise on the community, including:

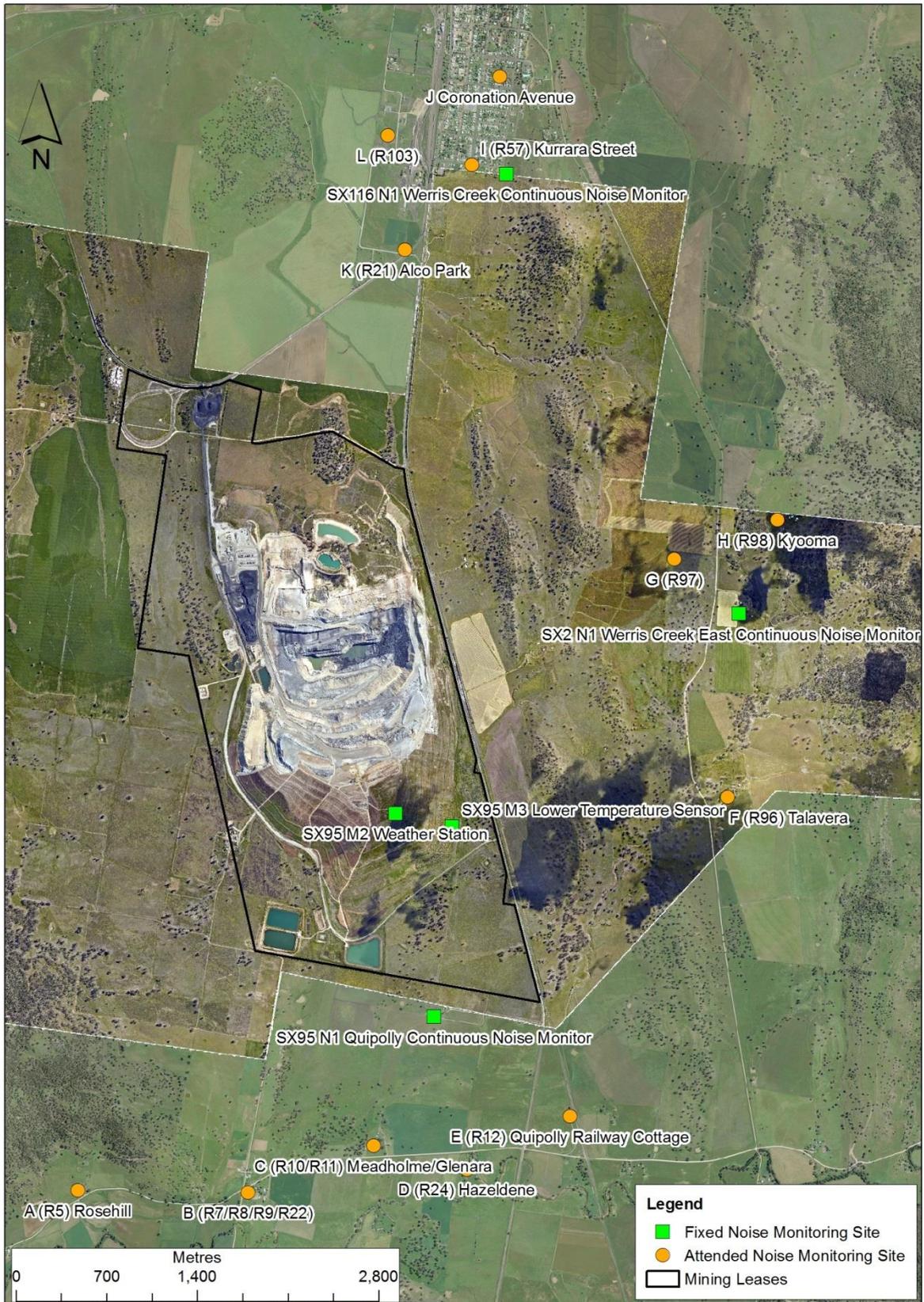
- Property acquisitions;
- Private agreements;
- Installation and maintenance of an acoustic and visual amenity bund; and
- Installation and maintenance of a mine infrastructure area bund.

During the reporting period a number of operational strategies were in place to respond to potential noise impacts from mining operations including:

- Continuous noise monitoring;
- Attended noise monitoring;
- Noise control operators engaged;
- Sound filtering and interpretation to isolate the masking effects of extraneous noise sources from birds, insects, and other environmental noise sources during monitoring.
- Modification of operations, including shutting down plant items, to reduce offsite impacts.
- Night time surface operations and dump locations planned to minimise noise where possible; and

Figure 2 – WCC Noise Monitoring Sites identifies the monitoring locations for both continuous and attended noise monitoring locations.

Figure 2 – WCC Noise Monitoring Sites



6.1.2 Environmental Performance

Attended Monitoring

Attended monitoring is undertaken on a monthly basis by an independent consultant and is used to assess compliance with licence and approval limits for mine contributed noise. Attended noise monitoring identified one exceedance of the noise criteria during the reporting period, at the R98 Kyooma monitoring site during the evening of the 27th September 2016. On this occasion, the measured Werris Creek Mine noise was 39 dB(A) Leq, exceeding the criteria of 38 dB(A) Leq. It should be noted that while the NSW Industrial Noise Policy specifies that an exceedance of no more than 2 dB(A) above a statutory noise limit specified in a licence condition is not considered a non-compliance. WCC undertook an investigation into the incident, with appropriate notifications to the EPA and DP&E. WCC subsequently received formal notification from the DPE advising no enforcement action was proposed.

There was no exceedance of the $L_{A1 (1min)}$ criteria during the reporting period.

Table 7 below shows the historical exceedances from attended noise monitoring over the current and previous two reporting periods.

Table 7 – Historical Attended Noise Monitoring Exceedances

Reporting Period	Date	Location	Criteria (dB(A))	Exceedance (dB(A))
2016	27 Sep 2016	R98 – Kyooma	38	39
2015-2016	No exceedances			
2014-2015	29Sep 2014	R96 – Talavera	37	38

It is noted that an exceedance 2 dB(A) above a statutory noise limit specified in a licence condition is not considered to be a non-compliance as per Section 11.1.3 of the NSW Industrial Noise Policy.

Annual Sound Power Testing

No sound power level testing was undertaken during the reporting period due to it being a short reporting period. Previous testing was undertaken in February 2016.

6.1.3 Proposed Improvement Measures

WCC plans to construct the remainder of the visual and acoustic bund, prior to mining through Old Colliery Hill, to minimise noise impacts on Werris Creek residents.

6.2 BLASTING

6.2.1 Environmental Management

Best practice blast management measures are implemented at WCC to achieve acceptable outcomes in terms of blast overpressure and vibration, fume generation, and dust impacts.

During the reporting period a number of controls were applied to reduce the potential for impacts, including:

- buffer management through acquisition of a number of adjacent properties through private negotiation;

- blasts designed with consideration of the predicted vibration of the shot, geology, ground conditions, explosives selection, initiation sequence/timing, powder factor, history/experience, and the sleeping time of the shot;
- maintenance of the predicted blast vibration objective for Werris Creek of 0.8 mm/s;
- explosive product selection and loading, to reduce the risk of auto-ignition and/or blast fume generation;
- stemming height and quality monitored by, the shot-firer to minimise the risk of elevated air overpressure from rifling;
- initiation sequence strategies are used to minimise vibration and air overpressure impacts;
- sleeping shots minimised to avoid potential deterioration of product;
- WCC aims to fire all blasts in the middle of the day generally between 12:00pm and 2:00pm, when atmospheric mixing is generally highest;
- blast notification prior to every blast;
- pre-blast weather assessment conducted;
- road closures of the Werris Creek Road when proximity of blasts occurred within 200 meters;
- blast fume rating recorded; and
- structural inspections - In response to claims of property damage due to blasting operations.

Air blast overpressure and ground vibration monitoring are undertaken at four monitoring locations illustrated on **Figure 3**, with vibration and air overpressure also measured adjacent to a railway culvert for blasts within 500 metres of this structure. All blast monitors were operational during the period.

Figure 3 – WCC Blast Monitoring Sites



6.2.2 Environmental Performance

Vibration/ Air Overpressure Performance

There were 84 blasts undertaken during the reporting period. All blast events have been within the applicable airblast overpressure and ground vibration limits set out in PA 10_0059 MOD2.

There have been no exceedances of airblast overpressure or ground vibration limits during 2014-2015 and 2015-2016 reporting periods.

6.3 AIR QUALITY

6.3.1 Environmental Management

The air quality criterion applicable to WCC is specified in Condition 16, Schedule 3 of PA10_0059 MOD2 and is managed through the implementation of the Air Quality and Greenhouse Gas Management Plan (AQGHGMP) (WCC, 2014) which was approved by DP&E on 29th April 2014. During the reporting period, various controls were implemented to manage dust including:

- Use of water carts across the site with an additional contractor water cart also utilised during rehabilitation activities;
- Overburden, coal and soil loading activities are not undertaken during periods of adverse weather (high winds or dry conditions), with SMS triggers employed to provide a near-real time operational response;
- Blasting activities restricted to suitable weather conditions and include notification to key stakeholders and residents;
- All personnel are instructed that all vehicles must utilise existing tracks on-site and must be driven to the conditions to minimize trafficable dust generation;
- The extent of disturbed areas (pre-strip clearing and rehabilitation) are minimized to that required for mining operations, with these areas stabilized and revegetated as soon as practicable once no longer required for ongoing operations;
- Water sprays are used on the coal feed hopper, crusher and at all conveyor transfer and discharge points;
- A designated pump and sprinkler installed during the reporting period to minimize dust entrainment off the SAIL stockpile in adverse weather conditions;
- Water Sprinklers added to the TLO to aid in dust suppression;
- Modification of operations, including shutting down plant items, to reduce offsite impacts;
- A depositional dust gauge audit was undertaken to ensure compliance with *AS/NSS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Dust – Gravimetric Method*; and
- Installed bird deterrents were maintained on depositional dust gauges to reduce contamination.

The WCC Air Quality Monitoring network is illustrated on **Figure 4 – Werris Creek Mine Air Quality Monitoring Network** and includes:

- Continuous monitoring of PM_{2.5} and PM₁₀ levels at the Werris Creek TEOM;
- PM₁₀ levels are measured at four High Volume Air Samplers (HVAS) distributed across neighbouring properties surrounding WCC. The HVAS run for twenty-four hours every six days. Total Suspended Particulate Matter (TSP) is also measured at a separate HVAS unit located at Kyooma;
- A network of 20 dust deposition gauges surrounding WCC, measuring deposited dust and particulates collected monthly; and

- Six depositional dust gauges located in Quirindi to measure deposited dust adjacent to the railway line. The dust gauges are located in a linear fashion on either side of the railway line, in order to determine the contribution of coal dust to the overall figure.

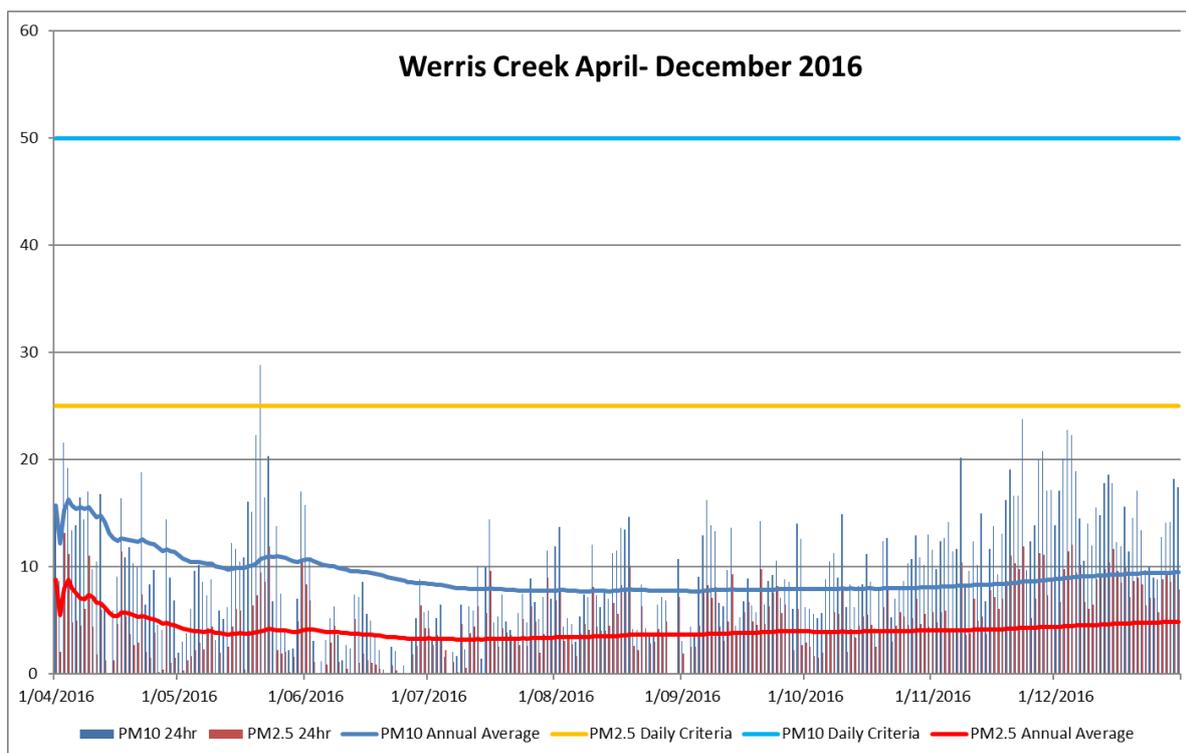
Figure 4 – Werris Creek Mine Air Quality Monitoring Network



6.3.2 Environmental Performance

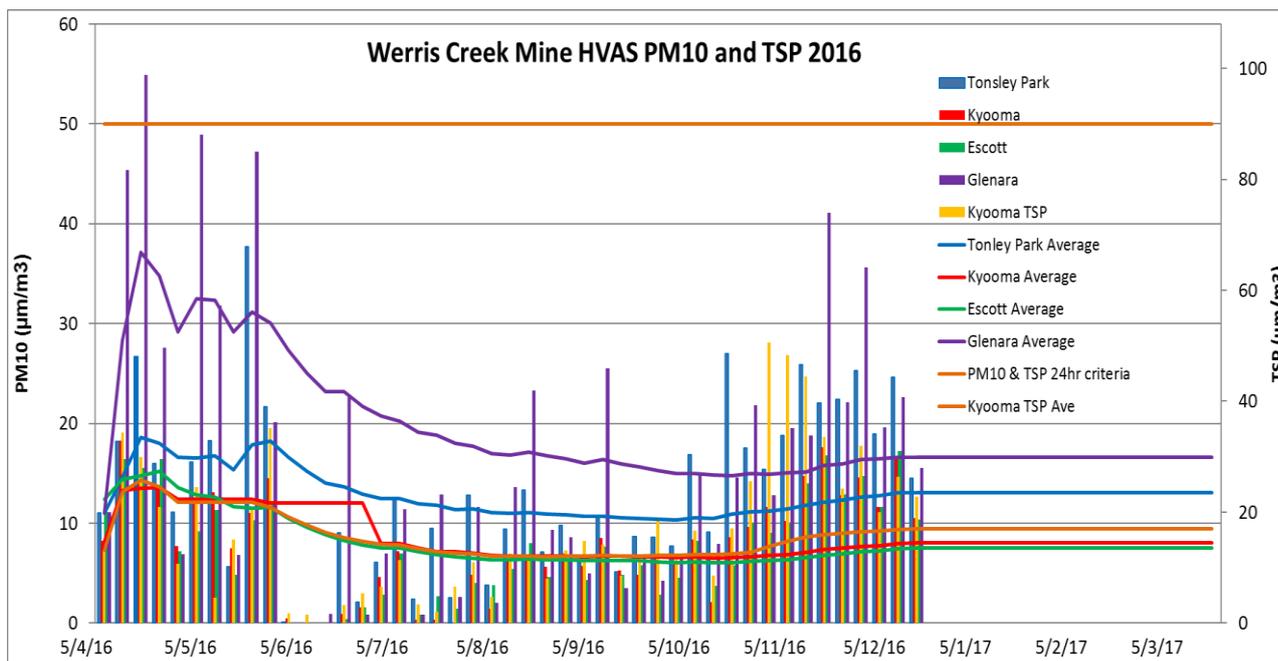
Monitoring conducted at the Werris Creek TEOM indicates the PM₁₀ annual average remained well below the applicable criteria of 30 µg/m³, while the daily maximum PM₁₀ criteria of 50 µg/m³ was not exceeded during the reporting period. Similarly, the daily maximum PM_{2.5} criteria of 25 µg/m³ was not exceeded during the reporting period. **Figure 5** below shows continuous results for PM₁₀ (24hr) and PM_{2.5} (24hr) for the reporting period, as well as a running annual average throughout the reporting year.

Figure 5 – Werris Creek TEOM summary for April – December 2016



Monitoring conducted across the HVAS PM₁₀ network has shown the running annual average PM₁₀ concentrations to be well below the criteria of 30 µg/m³ at all monitoring stations across the network during the reporting period (**Figure 6**). The majority of 24 hour measurements of PM₁₀ remained below the daily criteria of 50 µg/m³ with the exception of one monitoring result at Glenara on the 11th April 2016, with a PM₁₀ concentration of 54.9 µg/m³. Notification regarding this elevated result was provided to the Department of Planning and Environment on the 4th May 2016, following receipt of the monitoring results. Subsequent investigations demonstrated that WCC was not the cause of the elevated PM₁₀ levels on this day, with WCC downwind of the monitor. All other PM₁₀ measurements on this day were within criteria as shown in **Figure 6**.

Figure 6 – Werris Creek Mine HVAS PM₁₀ and TSP results for April – December 2016



A summary of current and historical HVAS and TEOM data can be viewed in **Table 8 – TEOM and HVAS Averages**.

Table 8 – TEOM and HVAS Averages

Location	2014-2015	2015-2016	2016
	µg/m ³		
10TEOM92 – Werris Creek	12.3	7.8	9.3
HVP20 – Tonsley Park	14.9	13.6	13.0
HVP98 – Kyooma	9.3	8.2	7.9
HVP1 – Escott	9.8	10.6	7.5
HVP11 – Glenara	18.4	18.2	16.4

Analysis of April – December 2016 monitoring results from depositional dust gauges shows all monitoring sites met AQGHGMP criteria for each monitoring period, however a number of sites were affected by extraneous dust sources, including contamination with excessive organic matter. Of the five sites with annual average dust measurements over the criteria, all of the sites (Cintra, Marengo, 8 Kurrara St, Werris Creek South and Westfall) recorded annual depositional dust averages below the criteria with and without the contaminated results.

Table 13 outlines results which have been excluded either due to direct contamination of the sample or upon investigation of elevated results, the investigation found that the result was attributed to localised dust sources and not WCC operations. External conditions such as, dry conditions, agricultural activities, organic matter (insects, bird droppings), and fire have influenced results at various localised monitors.

On investigation of the results at the site that exceeded the AQGHGMP criteria, there were no repeated exceedances at any one location. The dust gauges at Marengo, 8 Kurrara St and Werris Creek South recorded high levels of organic contamination, as such the elevated result was not attributed to WCC. It is noted that during the month of July, a property directly to the west and south west of Westfall (DG101),

undertook two days of tree fall and rubbish burning, notifying WCC of these events. The prevailing wind direction over the two days of burning was WSW and NW, with no additional elevated results monitored between the mine and DG101. Therefore, the unusually high analytical results for dust and ash at Westfall during July, were attributed to the burning activities. A summary of deposited dust monitoring results can be found in **Table 9** below.

Table 9 – Deposited Dust Summary for April – Dec 2016

EPL# 12290	ID	Property	Annual Average	Average - Excluded	Minimum	Maximum	AQGHGMP Criteria	EA MOD2 Predicted	# Results Excluded
-	DG1	Escott [^]	0.7	-	0.3	1.2	4.0	-	0
-	DG2	Cintra [^]	2.5	2.3	0.9	4.2*	4.0	-	1
-	DG3	Eurunderee [^]	1.4	-	0.4	2.2	4.0	-	0
-	DG5	Railway View [^]	1.8	-	0.6	3.2	4.0	-	0
-	DG9	Marengo [^]	1.4	0.9	0.6	4.5*	4.0	-	1
#29	DG11	Glenara	1.1	-	0.1	2.0	4.0	0.7	0
-	DG14	Greenslopes [^]	1.1	-	0.2	2.1	4.0	1.3	0
-	DG15	Plain View [^]	0.8	-	0.4	1.4	4.0	0.8	0
-	DG17	Woodlands	0.9	-	0.4	1.8	4.0	0.7	0
-	DG20	Tonsley Park [^]	1.6	-	0.6	3.3	4.0	1.1	0
-	DG22	Mountain View	1.2	-	0.5	2.4	4.0	0.6	0
-	DG24	Hazeldene	0.7	-	0.5	1.2	4.0	0.7	0
-	DG34	8 Kurrara Street	1.4	0.9	0.2	6.1*	4.0	-	1
-	DG62	Werris Creek South	1.7	1.1	0.5	5.6*	4.0	-	1
#30	DG92	Werris Creek Centre	0.6	-	0.3	1.2	4.0	-	0
-	DG96	Talavera ⁺	NS	-	NS	NS	4.0	0.8	0
#28	DG98	Kyooma	0.5	-	0.2	0.8	4.0	0.7	0
-	DG101	Westfall	2.5	1.7	0.3	9.5®	4.0	-	1
-	DG103	West Street	1.3	-	0.8	2.4	4.0	-	0

[^] Properties owned by Werris Creek Coal;

*Sample contaminated with organic matter from non-mining source (i.e. bird droppings and insects)

® Sample contaminated from local dust source non-mining related (i.e. fire, farming activities)

Bold = elevated result

NS = Not Sampled

+ = Dust gauge removed temporarily by landowner

6.4 BIODIVERSITY

6.4.1 Environmental Management

Biodiversity was managed in accordance with:

- Schedule 3 Conditions 28 of the PA 10_0059;
- EPBC 2010 / 5571 Condition 1; and
- The WCC Biodiversity Offset Management Plan (BOMP).

6.4.2 Environmental Performance

Seed Collection

Seed collection continued the progress made over the previous reporting periods. Four routine seed assessments were completed across the WCC BOA in February, May, August and November 2016 to identify on a seasonal basis the life cycle stage and development of native plants to identify what, where, when and how to target appropriate resources to collect seed for future revegetation programs.

As part of the WHC group wide revegetation planning process, a local revegetation provider was engaged in November 2016 with the above listed over storey species collected and sent to a nursery for propagation ahead of the planned autumn 2017 revegetation program. Targeted native understorey species were also collected during the reporting period.

Revegetation

During the reporting period, revegetation ground preparation (backhoe scalping grass from a 90cm x 90cm area and digging a hole to 30cm deep which is three quarters backfilled leaving a small depression/basin to increase infiltration in the loose soil to improve subsoil moisture) was completed over 70ha of the Eurunderee BOA between June and July 2016. This continued the positive trend in revegetation from the previous reporting periods. The over storey planting of the areas with ground prepared for revegetation will occur in 2017.

Weed Management

WHC coordinated routine formal weed monitoring/inspections undertaken across WCC BOAs and rehabilitation areas during April, July, October and December 2016. The priority weeds for control were noted as general broadleaf weeds (noxious and environmental species) in areas proposed for revegetation. WHC implemented a comprehensive weed control program across the WCC BOA including 762ha treated between January, April and December 2016. The record wet weather during winter and early spring resulted in significant areas of broadleaf weed requiring spraying, although this coverage is lower than previous reporting periods of 1887.3ha (2015-2016) and 1030ha (2014-2015).

Feral Animal Management

During the reporting period, WHC implemented a comprehensive feral animal control program across the WCC BOAs with fox baiting and pig trapping undertaken in May (26 fox baits taken and 0 pigs trapped), September (12 out of 116 fox baits taken and no pigs trapped) and November 2016 (24 out of 174 fox baits taken and no pigs trapped). The record wet weather during winter and early spring limited the success of control programs during this period.

Fire Management

WHC maintained and slashed 73km fire breaks across the WCC BOA in November and December 2016.

Offset Security Management

WHC is in the final stages of negotiation with DPE regarding the wording of positive and negative covenants to be registered on individual land titles that make up the WCCM BOA. It is anticipated that this will be concluded and submitted to NSW Land and Property Information for registration during 2017.

Other Management Items

During the reporting period, the following items did not require specific management actions across the WCC BOAs in accordance with the BOMP:

- Infrastructure management

- Soil erosion mitigation works
- Grazing treatment
- Heritage management
- Habitat augmentation

Monitoring Program

During the reporting period, ecological monitoring of the WCC BOAs consisted of annual flora and fauna monitoring which was undertaken in September 2016, while annual winter bird monitoring was completed in August 2016.

6.4.3 Proposed Improvement Measures

- New monitoring programs implemented such as quarterly weed inspections and quarterly seed assessments will continue to be implemented into 2017; and
- Areas of WCC BOA that have been subject to control burns without subsequent natural regeneration will have revegetation preparation works undertaken approximately 12 months ahead of the over storey revegetation program to be implemented in 2017 (the end of 5 year rest period).

6.5 HERITAGE

6.5.1 Environmental Management

The LOM Environmental Assessment determined that the project would not result in any future adverse impacts on Aboriginal cultural heritage. The impact associated with the removal of the remnant features of the former Werris Creek Colliery is considered to be minor, as the historic sites do not meet the NSW Heritage Office (2001) criteria for high significance sites (even at a local level) (Landskape, 2010). WCC previously undertook quarterly inspections of the only known significant Aboriginal heritage item onsite – the “Narrawolga” Axe Grinding Grooves. No previously unknown Aboriginal sites or artefacts were discovered during 2016.

The Heritage Management Plan outlines additional heritage management actions related to items associated with the former underground and these have been completed.

6.5.2 Environmental Performance

As described in the updated Heritage Management Plan, The Narrawolga Axe Grinding Groove Rocks were relocated from the temporary storage facility at WCC to the Willow Tree Visitor Information Centre on 15th April 2015. The relocation project was the culmination of 13 months of planning and included the relocation of ten sandstone boulders with 43 axe grinding grooves originally relocated from the mining footprint at WCC in 2007. The project involved detailed consultation with the Liverpool Plains Shire Council and Nungaroo Local Aboriginal Lands Council, with assistance provided by a geotechnical engineer and archaeologists to minimise the risk of damage to the Groove Rocks and meet regulatory and documentation requirements.

6.6 WASTE

6.6.1 Environmental Management

WCC continued to engage a total waste management service provider during 2016. This practice has ensured WCC is positioned to adopt industry standard waste management practices and to maintain regulatory compliance with regard to offsite disposal at licenced facilities and on-site storage requirements.

6.6.2 Environmental Performance

Waste generation quantities are tracked as summarised in **Table 10** for the April – Dec 2016 period. The current reporting period demonstrates benefits seen from improvements to waste management practices at WCC employed in December 2014. The reduction has been driven by waste minimisation measures such as the introduction of separate recyclable waste and general waste bins as well as educational posters identifying waste streams with appropriate bins. These improvements have led to a significant reduction in general waste volumes, while seeing an ongoing increase in recycling.

Table 10 – Approximate Quantities of Waste Generated for April – December 2016

Waste Stream	2014-2015	2015-2016	2016
Waste Oil (kL)	182.5	168	120
Scrap Metal (kg)	80,800	99,430	59,090
General Waste (m3)	1,650	1,269	852
Co-Mingled Recycling (m3)	55	177	139
Septic (L)	13,000	10,000	0
Cardboard (kg)	1,325	1,300	925
Empty IBCs (kg)	7,200	4,020	1920
Oily Rags (kg)	6,000	16,080	16,320
Hydraulic Hoses (kg)	1,000	15,000	15,000
Batteries (kg)	2,159	3,165	2,042

6.7 ENVIRONMENTAL PERFORMANCE SUMMARY

An environmental performance summary is presented in **Table 11** below.

Table 11 – Environmental Performance

Aspect	Approval Criteria / EIS Prediction	Performance during the reporting period	Trend / Key Management Implications	Implemented / proposed management actions
Noise	Refer s6.1	One exceedance of noise criteria at Kyooma on 27th September 2016	Monthly attended noise monitoring identified at 1dB(A) exceedance	EPA and DPE advised via email on 10 th Oct and formal letter within 7 days. An exceedance of 2 dB (A) above statutory noise limits specified in a licence condition is not considered to be a non-compliance as per Section 11.1.3 of the NSW Industrial Noise Policy.
Blasting	Refer s6.2	Approval criteria has been met	NA	NA
Air Quality	Refer s6.3	Approval criteria has been met	NA	NA
Biodiversity	Refer s6.4	Approval criteria has been met	NA	NA
Heritage	Refer s6.5	Approval criteria has been met	NA	NA

7 WATER MANAGEMENT

7.1 WATER TAKE

WCC currently holds two Water Access Licences, with the water taken under these licences for the 2016 April - Dec reporting year summarised in **Table 12**.

Table 12 - Water Take 2016 April - Dec (ML)

Water Licence #	Water Sharing Plan	Water Source and Management Zone	Entitlement	Passive Take / Inflows	Active Pumping by WCC	Total
WAL 32224	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah – Oxley Basin Mdb Groundwater Source	211	14	0	14
WAL 29506	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah – Oxley Basin Mdb Groundwater Source	50	0	0	0

7.2 SURFACE WATER MANAGEMENT

7.2.1 Environmental Management

The management of surface water aims to prevent surface water pollution both within onsite dams and offsite water courses. The overall water management strategy is to segregate different water streams onsite based on the potential pollutant in each stream.

- Void Water – the void water catchment area is comprised of the active mining area and overburden emplacement which collects both rainfall runoff and groundwater in the base of the open cut void and needs to be dewatered by pumping to the surface to allow mining of the basal coal seam;
- Dirty Water – the dirty water catchment area is comprised of areas previously disturbed by mining such as rehabilitation and soil stockpile areas, with the focus on the reduction of suspended solids and subsequent discharge of treated water;
- Clean Water – the clean water catchment area is undisturbed by mining activities and allowed to flow offsite without active management; and
- Contaminated Water – includes potentially hydrocarbon contaminated water runoff from the workshop and fuel farm areas which is treated through an oil-water separator, as well as water from ablutions which is treated through a septic system onsite.

Void Water Management

Void Water is stored in one of six designated void water dams (VWD's) comprising the void water management system at WCC. VWD's 1, 3 and 4 are long term water storage structures, while VWD's 2, 5, and 6 are temporary structures, designed for the transfer of void water for use around the project. Routine checks and photo-inspections of VWD's 1, 3, 4, 5 and 6 were undertaken throughout the reporting period. An annual inspection of the prescribed dams (VWD's 1, 3 and 4) was undertaken by a structural engineer on the 23rd March 2016 (SLR, 2016) which identified that all prescribed dams were being managed appropriately with no remedial works required.

Void water is predominantly used for dust suppression purposes and to control spontaneous combustion which is aggravated in the areas surrounding the workings of the former underground colliery. Water carts engaged in watering haul roads and other areas of the mining excavation are the predominant user of water for dust suppression purposes, with water also used to control dust at conveyor loading

points and on coal stockpiles. A small amount of void water is also used for ancillary activities in the workshop, such as washing down equipment. Void water use is monitored and calculated monthly using water meters on key pipelines and water fill points, supplemented by surveyed volumes of water stored in dams and the void on site. This data is used to update the Water Balance Model for site.

Dirty Water Management and Erosion and Sediment Control Measures

During the period, dirty water dams remained in place to capture surface runoff from disturbed areas of the mine site. There was one passive overflow of dirty water from SB10 on the 14th September 2016 due to heavy rainfall, subsequent sampling confirmed compliance with water quality parameters. Controlled releases were undertaken from SB9 and SB2 from the 23rd June and 13th September 2016, following sampling to confirm the quality of the contained water. The controlled releases were complemented by internal pumping from upstream sediment basins to ensure capacity was maintained in the event of further rainfall.

Various measures were maintained and improved during the reporting period to minimise erosion and sediment transport at WCC. Maintenance of existing contour banks occurred on an as needed basis following rainfall, to limit the potential of piping. Regular checks of the dirty water management system were undertaken as required dependent on rainfall, and included the desilting and minor earth works of SB11.

Contaminated Water Management

WCC undertook regular maintenance of the key contaminated water infrastructure during the reporting period, with the servicing of both the workshop sump and the oil water separator occurring on a fortnightly basis throughout the reporting period. Sludge from these facilities was relocated to the onsite bioremediation area for treatment of residual hydrocarbons within the material.

7.2.2 Environmental Performance

Surface Water Quality

Quarterly sampling of water stored within the clean, dirty and void water dams and within Quipolly and Werris Creeks' (**Figure 7**) was undertaken by WCC. **Table 13** presents the average results recorded at each location for the 2016 April - Dec reporting period.

Table 13 – Quarterly Surface Water Quality for Dams and Offsite Creeks'

Dam/ Creek	Monitoring Site (EPA No)	Number of Samples	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Oil & Grease (mg/L)
EPL 100% Limit			6.5-8.5	1600	50	10
VWD1	16	3	8.26	1240	2.3	<5
VWD2	27	3	8.20	1100	4.3	<5
VWD3	-	3	8.42	1090	8.3	<5
VWD4	-	3	8.53	1140	15.3	<5
VWD6	-	3	8.31	1067	<5	<5
SB2	10	3	8.12	1822	<5	2.3
SB9	12	1*	7.56	561	12	<5
SB10	14	0*	Dry	Dry	Dry	Dry
SB18	32	1*	TLTS	TLTS	TLTS	TLTS
SD4	-	2*	7.7	208	4.5	<5
SD5	-	1*	7.65	162	<5	<5
QCU	25	1*	7.43	362	11	<5
QCD	26	3	7.93	1030	10	<5

Dam/ Creek	Monitoring Site (EPA No)	Number of Samples	pH	Electrical Conductivity ($\mu\text{S/cm}$)	Total Suspended Solids (mg/L)	Oil & Grease (mg/L)
EPL 100% Limit			6.5-8.5	1600	50	10
WCU	23	2*	8.01	843	5.5	<5
WCD	24	3	8.23	1290	29.3	<5
BGD	-	2*	7.27	202	295	<5

* SB9, SB10 SB18, SD4, SD5, QCU, WCU and BGD were dry during some or all of the quarterly monitoring periods.
TLTS = Too low to sample

Due to the shortened monitoring period, **Table 17** is reporting on approximately three quarters of the number of samples compared to last reporting period. The quarterly water quality was generally consistent with the previous reporting period.

During the reporting period, there were three controlled releases of the dirty water system from SB2 and SB9, (23rd June and 13th September) and one passive release from SB10 on the 14th September 2016. Water quality monitoring results and comparison with compliance criteria are shown in **Table 14** and **Table 15**. The results of the monitoring show that all releases complied with the water quality limits set in the EPL. Discharge water quality results are consistent with the predicted levels as nominated in the "Werris Creek Coal Mine Life of Mine Environmental Assessment" (R.W. Corkery and Co Pty Limited, 2010) in that WCC would not impact on the pH, suspended solids or conductivity of waters discharged from the site.

Total Suspended Solids results of 92.6 mg/l for the passive release show an elevated reading during this event. However, this discharge was due to a rain event of 47.6mm, which exceeded the 5-day rainfall design criteria of 39.2mm which is in compliance with EPL criteria.

Table 14 – Discharge Water Quality Results

Discharge Point	EPA ID	pH	Conductivity (mS/cm)	Suspended Solids (mg/L)	Oil & Grease (mg/L)
	EPL 100% Limit	6.5 – 8.5	N/A	50	10
SB9	12	7.8	0.61	23	<5
SB10	14	7.6	0.19	92.6	<5
SB2	10	7.8	0.61	23	<5

Table 15 – Quipolly and Werris Creeks' Discharge Receiving Water Quality

Creek	EPA ID	No. Samples	pH	Conductivity (mS/cm)	Suspended Solids (mg/L)	Oil & Grease (mg/L)
Quipolly Upstream (QCU)	25	3	7.7	0.21	204	<5
Quipolly Downstream (QCD)	26	5	7.7	0.5	194	<5
Werris Upstream (WCU)	23	2	8.15	0.25	261	<5
Werris Downstream (WCD)	24	2	8	0.3	336	<5

Figure 7 – Offsite and Discharge Water Quality Monitoring Sites at WCC



7.3 GROUNDWATER MANAGEMENT

7.3.1 Environmental Management

The management of groundwater at WCC is undertaken to achieve two goals, namely:

- Monitoring and measuring potential impacts from mining operations on adjacent aquifers and privately owned bores: and
- Dewatering and use of void water (rainfall runoff and groundwater) that is intercepted by mining operations.

WCC currently monitors 38 groundwater bores, located on the mine site and neighbouring properties, to measure potential impacts on groundwater quality and groundwater availability.

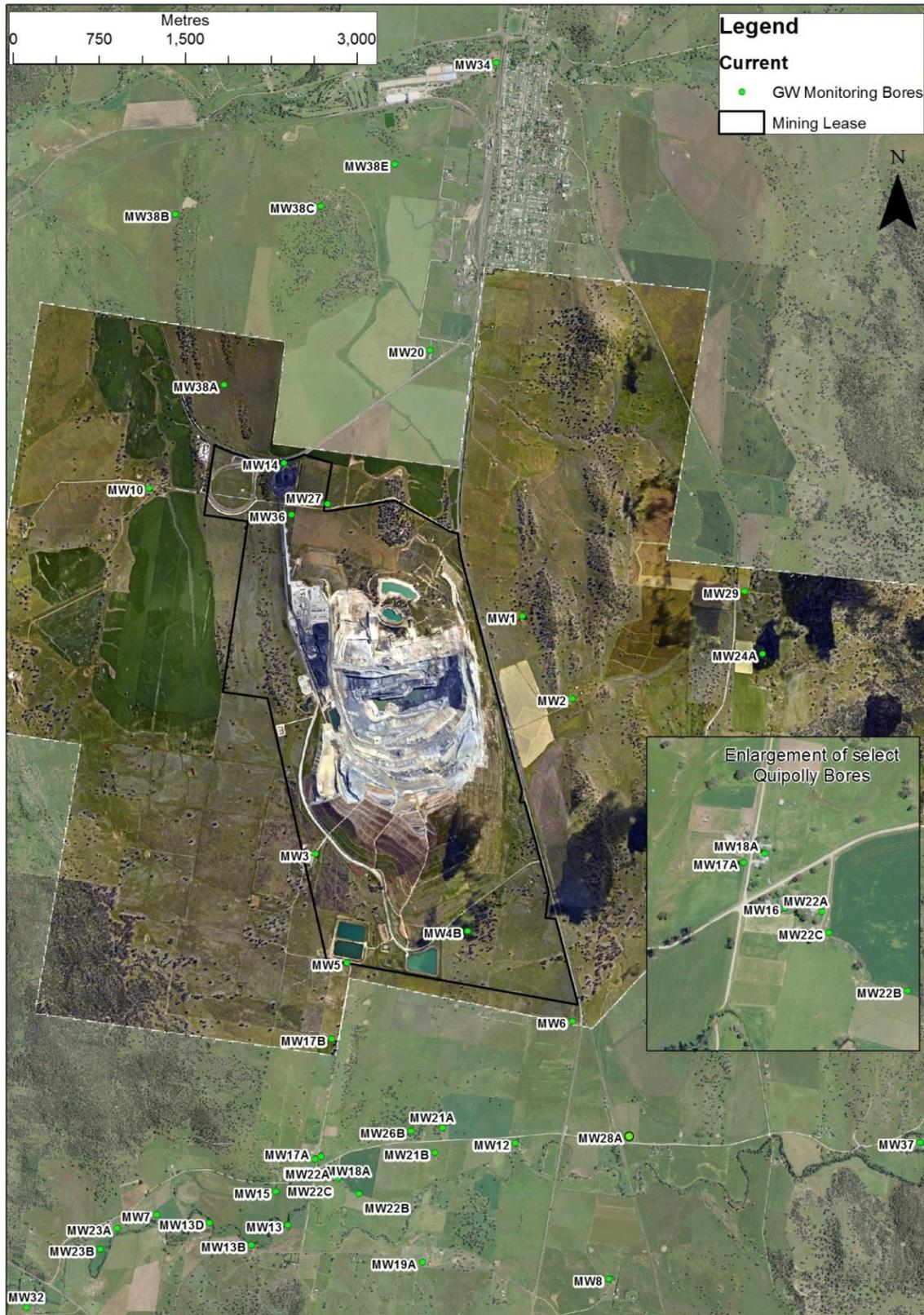
WCC monitors groundwater quality and levels across a range of bores as shown in **Table 16** and **Figure 8**. Monitoring bores in the Werrie Basalt are separated into those close to WCC and those further away, with select bores in both the Werrie Basalt and Quipolly Alluvium nominated as background monitoring bores, due to their location far upstream from WCC when considering the dominant groundwater flow contours. In addition, six bores also contain logging piezometers, providing a higher resolution water level dataset to enhance the understanding gained from the bimonthly groundwater level sampling of the monitoring network. These piezometers have been placed to target certain zones, including the Werrie Basalt northwest, south and east of WCC, and the upper, middle and lower reaches of the Quipolly Alluvium aquifer in the vicinity of WCC.

Table 16 – WCC Groundwater Monitoring Program

Precinct	Bores
Werrie Basalt near WCC	MW1*, MW2*, MW3, MW4B, MW5, MW6*, MW27, MW36A*, MW36B
Werrie Basalt	MW8#, MW10, MW14, MW17B, MW19A, MW20, MW38A, MW38B, MW38C, MW38E,
Quipolly Alluvium	MW7*, MW12, MW13*, MW13B, MW13D, MW15, MW16, MW17A, MW18A, MW21A, MW22A, MW22B, MW23A, MW23B, MW26B, MW28A#*, MW32,
Others	MW24A, MW29 (both Werrie Basalt in the Black Soil Gully valley) MW34 (minor alluvium associated with Werris Creek)
Monitoring Frequency	Parameters
Bimonthly	Standing Water Level
6 Monthly	Total Nitrogen, Nitrate, Total Phosphorus, Reactive Phosphorus, Electrical Conductivity, pH
Annually	Chloride, Sulfate, Alkalinity, Calcium, Magnesium, Sodium, Potassium, Arsenic, Barium, Beryllium, Cadmium, Cobalt, Chromium, Copper, Manganese, Nickel, Lead, Vanadium, Zinc, Mercury, Ammonium, Nitrite, Nitrite+Nitrate, TKN, Anions, Cations, Ion Balance, TPH
# Background monitoring bore	
* Piezometer installed in bore for all or part of reporting period (land owner will not grant access)	

The Water Balance Model for WCC was updated as part of this Annual Review, with this model used to verify model assumptions in relation to groundwater interception in the mining void. A cusum analysis was undertaken on all monitoring bores at the end of the reporting period to assess whether any bores show changes in water level outside of natural variability. Changes in water level at each of these bores was determined to be in response to near average rainfall levels that occurred in late 2016, and the effects of aquifer recharge from dam and creek overflow.

Figure 8 – Groundwater Monitoring Network



7.3.2 Environmental Performance

Performance with respect to groundwater management, the prevention of pollution and the assessment of impacts on groundwater availability to other surrounding users, is assessed through groundwater level and chemistry monitoring. Monitoring focuses on the Werrie Basalt and Quipolly Alluvium aquifers.

Table 17 presents the groundwater level monitoring data for April to December in the Werrie Basalt and Quipolly Creek Alluvium aquifers. For Quipolly Creek Alluvium, MW28A and MW23A are representative of upstream and downstream aquifer conditions respectively. For Werrie Basalt, MW5 and MW14 are representative of aquifer conditions either side of the watershed between Quipolly Creek in the south and Werris Creek in the north. All groundwater sampling and analyses were undertaken by a NATA accredited laboratory.

Table 17 – Groundwater Monitoring Bore Level Summary – April to December 2016

Bore	May 2016		July 2016		Sep 2016		Nov 2016	
	mbgl	%	mbgl	%	mbgl	%	mbgl	%
MW1	Dry		Dry		Dry		Dry	
MW2*	41.87	-7%	40.7	3%	40.77	0%	33.84	10%
MW3	19.61	-1%	19.67	0%	19.68	0%	19.27	1%
MW4B	15.51	6%	15.03	3%	15.64	-4%	15.33	2%
MW5	12.73	-1%	12.82	-1%	12.6	2%	11.96	2%
MW6	15.9	0%	15.92	0%	15.94	0%	16.16	0%
MW27*	52.40	2%	53.76	-3%	55.93	-4%	55.59	1%
MW36A	22.73	3%	21.17	7%	21.14	0%	20.26	-1%
MW36B	22.67	4%	21.14	7%	21.09	0%	20.21	0%
MW8*	19.94	-1%	20.02	0%	19.21	4%	14.38	18%
MW10	16.59	1%	16.43	1%	14.39	14%	13.64	4%
MW14	20.81	-1%	19.71	6%	17.77	11%	16.7	1%
MW17B*	13.71	1%	17.52	-22%	12.76	37%	12.03	5%
MW19A*	10.61	16%	9.72	9%	9.17	6%	9.07	-8%
MW20*	21.88	-1%	21.91	0%	21.81	0%	21.52	1%
MW38A	No access		No access		11.02	37%	11.54	-5%
MW38B*	No access		No access		9.38	9%	9.25	-1%
MW38C*	23.32	0%	23.14	1%	22.10	5%	21.72	1%
MW38E*	No access		No access		9.56	13%	No access	
MW24A*	15.95	-1%	16.06	-1%	15.16	6%	14.02	8%
MW29*	14.88	2%	14.85	0%	13.44	10%	17.82	-34%
MW12*	13.31	5%	14.15	-6%	11.39	24%	8.59	3%
MW13*	Dry		Dry		7.07	5%	5.21	-10%
MW13B*	5.97	-3%	5.84	2%	5.11	14%	3.42	-2%
MW13D*	5.86	-1%	5.49	7%	4.99	10%	4.38	2%
MW15*	Dry		7.82	-8%	5.08	54%	5.05	-3%
MW16*	Dry		Dry		6.61	32%	5.88	7%
MW17A*	7.55	-3%	7.61	-1%	6.41	19%	5.13	10%
MW18A*	Dry		Dry		6.29	9%	4.92	11%
MW21A*	Dry		Dry		10.13	12%	8.72	10%
MW22A*	Dry		Dry		7.40	11%	6.01	8%
MW22B*	Dry		No access		7.00	12%	6.10	8%
MW23A*	4.43	2%	4.32	3%	3.35	29%	3.58	-1%
MW23B*	No access		No access		3.80	15%	3.89	-1%
MW26B*	9.78	0%	10.05	-3%	8.77	15%	7.53	13%
MW28A*	16.24	-1%	16.4	-1%	15.27	7%	7.94	16%
MW32*	4.23	2%	4.15	2%	4.03	3%	3.74	0%
MW34*	No access		11.01	8%	9.36	18%	8.89	2%

mbgl – meters below ground level, the distance from top of bore to groundwater surface.

Bold –lowest recorded groundwater level measured during the reporting period.

Orange – Change decrease

Green – Change increase or no change

* - Bore is used for water extraction unrelated to WCC (i.e. stock and domestic or irrigation).

#¹ – Werrie Basalt in the Black Soil Gully valley to east of Werris Creek Mine.

#² - Werris Creek Alluvium.

The groundwater level monitoring results have shown generally low water levels during May and July which has been representative of the prolonged dry seasons and mirrors the previous Annual Review data set. However, this trend begins to change for the remaining data set with an increase in measured SWL in the majority of bores. This increase occurs post localised flooding and overflow of the Quipolly Creek Dam in September 2016.

A cumulative sum (cusum) trend analysis was completed for each monitoring bore to assess whether any changes in groundwater are beyond the expected range of values. The cusum analysis confirmed that there were no wells in the Quipolly Alluvium that reached the CUSUM trigger level. Although wells MW2, MW4b and MW6 in the Basalt Aquifer and located to the south of the mine reached the trigger level during this reporting period.

This prompted a specific review and evaluation of the causes and possible trends. Environ (2017) determined that despite reaching the trigger level, wells MW4b and MW5 show trends generally consistent with the background well MW8. The trends in MW4b and MW5 diverge slightly from MW8 during the latter half of 2016 when MW8 shows a significant recovery in water level. This may be due to the lower rate of recovery in MW4b and 5 and/or a lag effect. Detailed evaluation identified that these water level fluctuations are consistent with antecedent rainfall conditions.

Data collected over the reporting period from MW2 shows that groundwater levels increased in September 2016, following significant rainfall in the same month. It is considered that the sharp rise post-September 2016, is the result of enhanced local recharge.

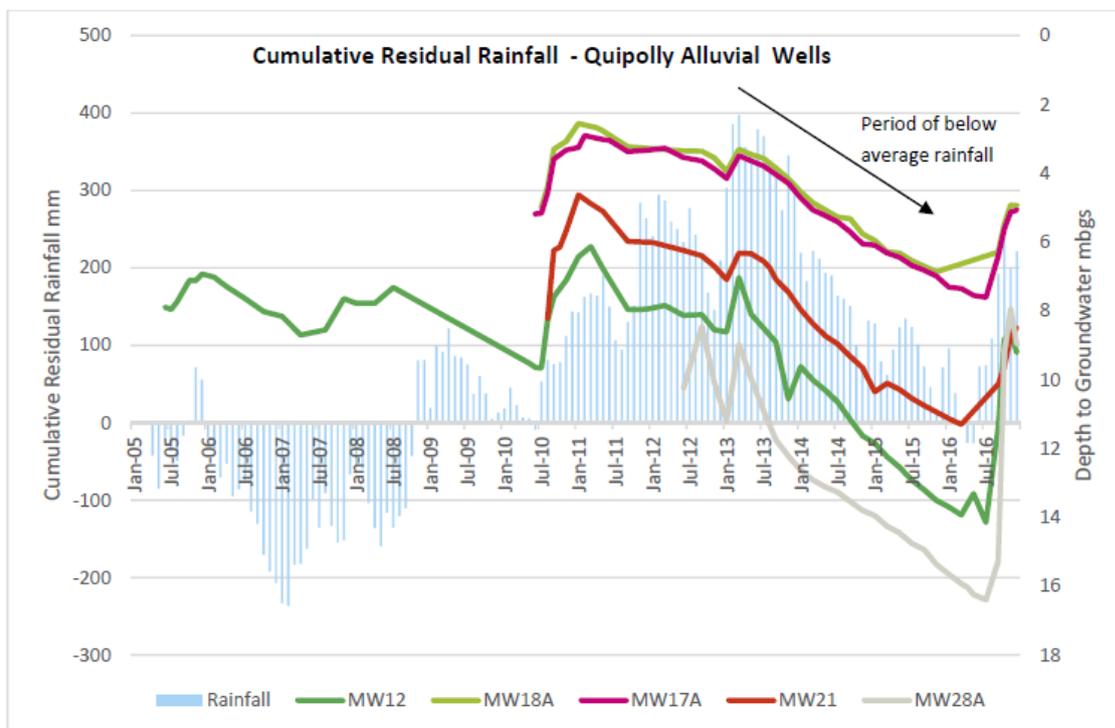
The review of available data by Environ (2017) concludes that groundwater levels are recharging in response to near average rainfall levels that occurred in late 2016. Further to this, groundwater levels in the Quipolly Alluvium monitoring wells show the secondary effects of aquifer recharge from dam overflow and creek flow.

Observations in near-mine wells show water level fluctuations consistent with background monitoring wells, indicating that mine operations are not causing widespread impact on groundwater. Environ (2017) conducted an assessment of groundwater flow directions and rates, which indicated that rates are consistent with pre-mining conditions and show flow to be directed towards the creek systems with consistent hydraulic gradients.

Monitoring of groundwater quality in March 2016 and September 2016 identified pH and EC values in line with past results in all monitoring bores near WCC. All pH results are within the ANZECC (Agriculture Irrigation and Livestock) criteria. Total Phosphorus and Total Nitrogen results are well within or below the ANZECC (Agriculture Irrigation and Livestock) criteria within the ANZECC Agricultural Irrigation Short Trigger Values. A number of bores associated with agricultural land have continued to display Total Phosphorus and Total Nitrogen levels above ANZECC Agricultural Irrigation Short and Long Trigger Values. These levels have been consistent since monitoring commenced in 2005 and are a reflection of the agricultural land use and fertiliser inputs rather than impacts from mining operations.

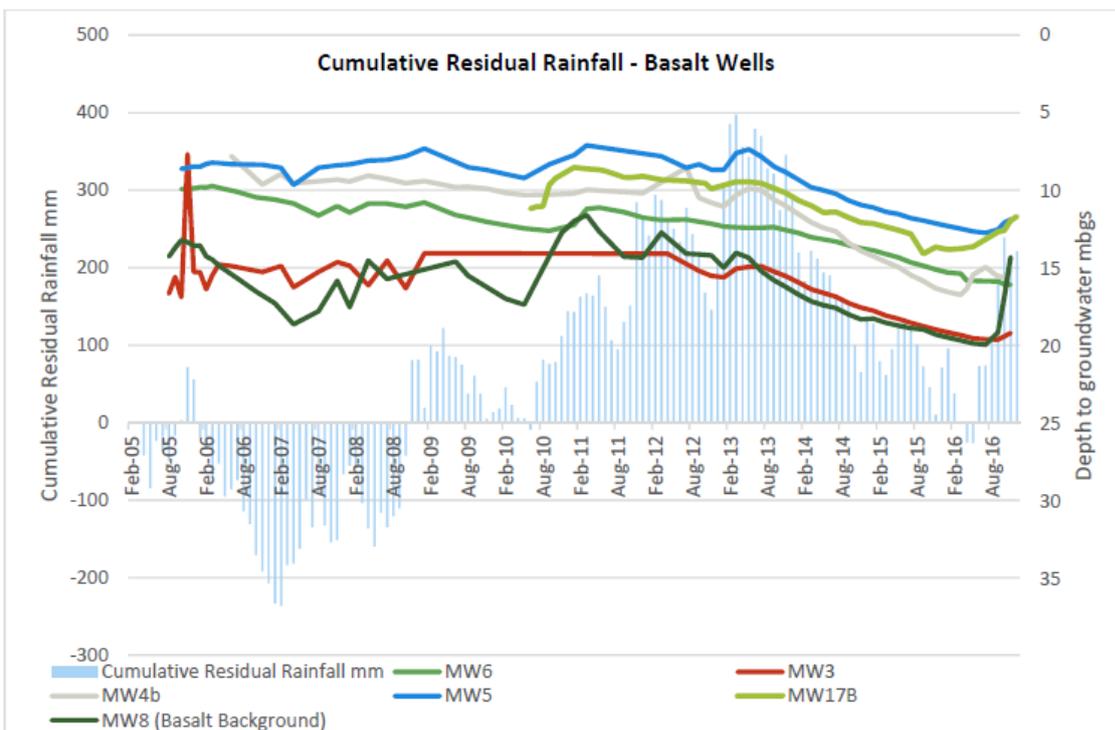
Data from wells monitored within the Quipolly aquifer are graphically presented in the **Figure 9** and show a close correlation between groundwater level and cumulative residual rainfall

Figure 9 – Cumulative residual rainfall and monitoring wells within the Quipolly Alluvium



Wells monitored within the Werrie Basalt are known to be in an area of low permeability overlying clays, resulting in less noticeable recharge due to cumulative rainfall, represented in **Figure 10**.

Figure 10 – Cumulative residual rainfall and groundwater levels in the basalt aquifer south of the mine.



7.3.3 Proposed Improvement Measures

The Groundwater monitoring program described above will continue to be implemented during the next reporting period.

7.4 SITE WATER BALANCE MODEL VALIDATION

As part of the Annual Review process, WCC has updated the Water Balance Model for April – December 2016 based on observed and calculated inputs and outputs (**Table 18**). The WCC Water Balance Model is focused on accounting for all water entering and leaving the open cut pit to allow a verification of groundwater interception during the reporting year. The key inputs to the water balance model are:

- Direct rainfall and runoff – Generally the largest input due to the large pit catchment, this item relates to rainfall that falls directly in the void water catchment. During any rainfall event, runoff is significant due to the large catchment and hard, compacted surfaces.
- Recharge from underground workings – Considerable volumes of water are used to manage spontaneous combustion within the former underground workings at WCC. Sprinklers and other drenching sprays are used to reduce the heating of coal that can lead to underground fires, with the majority of this water returning to and collecting in the void.
- Evaporators recharge – Since September 2015, large evaporator sprays have been installed at WCC to reduce the volume of void water stored on site. A large portion of this water will not evaporate, but instead percolate through the accumulated spoil until it collects in the void.
- Dust Suppression – To minimise the generation of dust from vehicle movements, water is applied directly to haul roads and dumps. Furthermore, water may be applied to excavator loading faces and production drills to minimise the generation of dust at these points.
- Groundwater – Located within the Coal Measures sequence, the enclosed basin contains various small-scale water bearing zones generally associated with the coal seam. In addition, water is also stored in the former workings of the previous underground colliery and is also present in the overburden spoil. A small proportion of groundwater may also be derived from the Werrie Basalt aquifer.

The key outputs to the model include:

- Pit dewatering – Includes all water pumped from the pit during the year, which is the principle pathway for water leaving the void.
- Direct evaporation – Includes the volume of water directly evaporated from the pit and other locations within the void water cycle.

Table 18 – Water Balance Inputs and Outputs.

Source	Estimated Approximate Volume for the Period (ML)	Notes
INPUTS TO PIT		
Groundwater	23	derived from the groundwater model
Rainfall and Runoff	820	calculated from water balance model based on rainfall, area and characteristics of catchments areas which report back to the pit.
Water from underground workings	1.7	volume of water estimated to flow back into pit from the water pumped into the former underground workings to control spontaneous combustion (as water curtains and sprays). This is metered at the pump and it is estimated that 90% of this volume will return to the pit. The pumped water was minimal in this period
Evaporators	383	volume of water estimated to flow back into the pit from use of evaporators. The final volume returning to the pit is derived from runoff/infiltration/storage calculations in the pit water balance model.
TOTAL INPUT	1,228	
OUTPUTS FROM PIT		
Out of Pit Pumping	695	volume based on metered pumping May 2016 to December 2016.
Direct Evaporation	20	Estimated volume directly evaporated from the surface of the pit, based on climatic data (from daily evaporation averages measured at Quirindi post office weather station).
TOTAL OUTPUT	715	
NET WATER	513	Difference in input/output – increase over the period.
Change In Pit Storage	540	Increase in measured Void Storage during the Period
Differential	27	Difference between measured / modelled input and output to the pit and actual measured change in storage. A reflection of the errors in measurement - estimated at up to 10ML/month, and approximations within the models)

The results of the above Water Balance Model were found to correlate well with the hydrogeological model predictions for groundwater inflow for the WCC pit. The groundwater inflow results (23 ML) for the period, and the 2015-2016 reporting period (35 ML) were both less than the estimated predicted inflow of 54 ML, as stated in the WCC Water Management Plan. The increase in stored water is considered to be due to an increased rainfall this year, (later in the year), and a small increased catchment areas reporting to the void. This process has further validated the groundwater model developed for the LOM project. At the time of the LOM impact assessment, this model benefitted from real time calibration data recorded during the initial mining scenarios and was therefore considered to be a robust representation of the groundwater system.

8 REHABILITATION

The Rehabilitation Objectives for WCC are described in Section 4 of the WCC MOP. The post mining land use goal for WCC is to reinstate certain areas of the mine to Class III capable agricultural land, and to ensure rehabilitation and revegetation is self-sustaining.

8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

During the reporting period, mining operations progressed in line with the Mining Operations Plan for WCC, with a small general advancement of the highwall and an acceleration of the western portion of the pit to balance coal quality and strip ratios for the life of mine. Due to the reduced AR reporting period and a reduction in production rates due to increased wet weather through the period, minimal advancements in the earlier rehabilitation categories (Landform Establishment and Growth Medium Development) were made during the reporting period. All infrastructure continued to be in use during the period, and as such no areas of infrastructure were rehabilitated during the period.

Rehabilitation processes for the 2016 reporting year focused on the maintenance of current vegetation areas, this included excavating randomised planting locations (see Section 6.4.2 Environmental Performance, Revegetation) and staking planting holes on the western rehab slopes in preparation for receiving tube stock during 2017. Native grass seed was harvested from the adjacent biodiversity offset areas in preparation for 2017 seeding.

Weed control was completed across all areas of rehabilitation during the reporting period to control a number of broadleaf weeds persistent in regeneration areas. Inspections of rehabilitation structures following heavy rainfall identified that all areas are structurally sound, with only minimal maintenance required. Other initiatives to boost rehabilitation success are described in Section 6.4 Biodiversity.

8.2 REHABILITATION TRIALS

WHC is supporting research into arboreal habitat augmentation of woodland rehabilitation by installing previously cleared timber back on the post mining landform to replicate habitat provided by stag trees that occur naturally in woodland communities. Motion sensor cameras have predominantly captured images of birds at 8 control sites (no stag trees) and 16 treatment sites (augmented stag trees) on the mine rehabilitation area and 16 reference sites (natural stag trees) within the adjacent biodiversity offset area at WCC. This research will continue into the next reporting period.

Table 19 presents a summary of the disturbance classes for the end of the previous reporting period, the end of the current reporting period, and a forecast as at the end of the next reporting period. **Figure 11** identifies the rehabilitation categories as at December 2016.

Table 19 – Rehabilitation Status

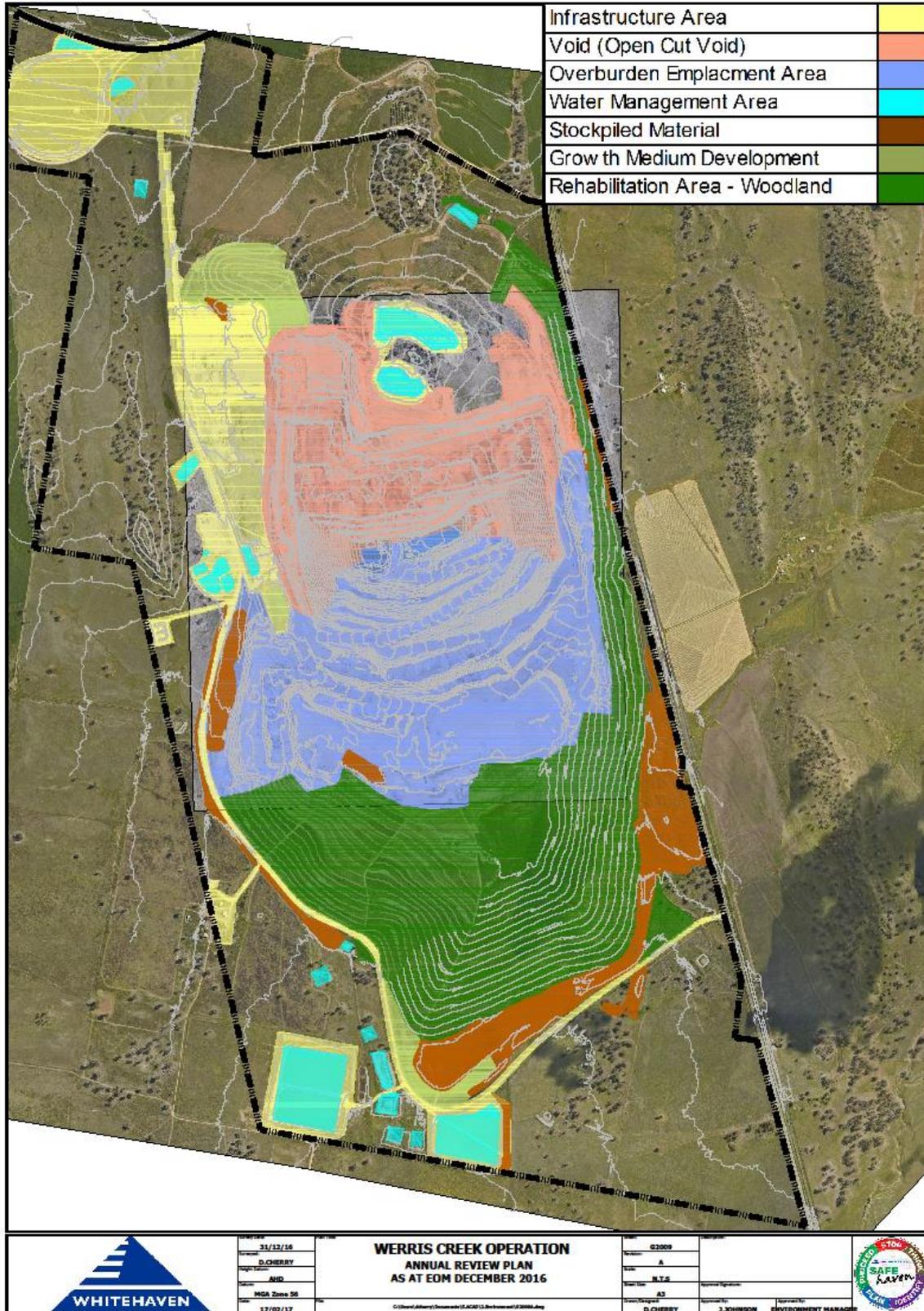
Mine Area Type ¹	Previous Reporting Period (Actual)	This Reporting Period April – Dec 2016 (Actual)	Next Reporting Period 2017 (Forecast)
	2015-2016 (ha)	April – Dec 2016	2017 (ha)
A. Total mine footprint	568	559	584
B. Total active disturbance	402	392	387
C. Land being prepared for rehabilitation	18*	16*	29
D. Land under active rehabilitation	148	151	167
E. Completed rehabilitation	0	0.0	0

¹ Refer Annual Review Guideline (p.11) for description of mine area types.

* Comprises areas seeded with a cover crop only, and those waiting on final native grass seeding

No areas of rehabilitation at WCC have received formal signoff for completion; however, areas under active rehabilitation as listed in item D above are trending well towards completion.

Figure 11 – Rehabilitation Categories December 2016



8.3 REHABILITATION WORKS PROPOSED FOR NEXT REPORTING PERIOD

WCC aims to continue rehabilitation efforts during the 2017 reporting period largely in accordance with the projections under Year 2 of the current MOP. These actions will focus on landform development and growth medium development of the next section of the outer western batter. Works will also focus on the planting of tube stock in the western rehabilitation areas.

In addition to the progression of the rehabilitated landform, WCC will manage the existing areas of rehabilitation to ensure a continued trend towards the rehabilitation objectives described at the start of this section.

8.4 KEY ISSUES TO ACHIEVING SUCCESSFUL REHABILITATION

There are four key issues in achieving successful rehabilitation, including:

- Poor vegetation establishment and growth due to poor soils/lack of nutrient;
- Weed and feral animal infestation;
- Excessive erosion and sedimentation resulting in land stability and vegetation growth issues; and
- Harsh weather conditions limiting growth, i.e. extended periods of drought.

In cases where the performance is sub-optimal, additional management measures will be implemented (e.g. replanting, repairing landform and water management features, application of mulch/fertilisers, feral animal and weed control etc.).

9 COMMUNITY

WCC is located approximately 2.0km south-southwest of the residential area of Werris Creek and 1.5km north of the rural community of Quipolly, and as such works closely with these communities to provide beneficial outcomes resulting from coal mining activities at WCC.

9.1 COMMUNITY ENGAGEMENT ACTIVITIES

WCC uses a variety of community engagement and consultation methods including the WCC Community Consultative Committee (CCC), regular updates to the Whitehaven Coal website, designated community telephone complaints lines, local media updates, local school visits, sponsorship of local community events and groups, and meetings as required with neighbours and a range of stakeholders including government and non-government agencies.

There were three CCC meetings held in the April – Dec 2016 reporting period. These were held on 26th May, 31st August and 30th November 2016.

9.2 COMMUNITY CONTRIBUTIONS & INITIATIVES

WCC, which includes WCC contributes financially to the economy at both state and federal level and to the communities in which we operate. Employees and contractors also add a significant economic contribution to townships in the Liverpool Plains Shire Council (LPSC) through their purchases from local businesses. Whitehaven Coal has contributed over \$850 million to the North West NSW region since 2012. Last financial year Whitehaven paid \$46.2 million in wages and around \$200 million to 600 local businesses and suppliers.

Community Enhancement Fund (CEF)

As part of the Life of Mine Project, WCC established the Community Enhancement Fund (CEF) to provide support for community projects in the Liverpool Plain Shire and in particular the Werris Creek township.

Whitehaven has pledged more than \$1m in payments to the Liverpool Plains Shire Council for community projects. Projects funded to date by Whitehaven in the Liverpool Plains LGA include:

- \$100k for projects at Australian Railway Museum, Werris Creek;
- \$70k for playground improvements in Werris Creek;
- \$65k for skate park, Werris Creek;
- \$50k for projects in villages in Liverpool Plains Shire; and
- \$20k for Royal Theatre, Quirindi.

Whitehaven supported various Liverpool Plains community initiatives in recent years. Projects supported in the last year included:

- NAIDOC Reconciliation Concert; and
- 2016 Quirindi Show.

9.3 COMMUNITY COMPLAINTS

WCC maintains a dedicated community telephone complaints line (02 6768 7001) which is published at the mine entrance, on the Whitehaven Coal website, and in community newsletters. In the event of a complaint or enquiry, details pertaining to the complainant, the complaint and action taken are recorded on the complaints register. The register is available on the Whitehaven website.

Blasting was the dominant cause for complaint in 2016 part year results, with 13 blast-related complaints of the 30 received, compared with 29 during the same reporting period (April – Dec 2015). This reduction may in part be attributed to a self-imposed reduction in the maximum targeted vibration prediction for the southern end of Werris Creek Township, which was reduced from 1.0mm/s to 0.8mm/s during the last reporting period. This is further supported by the reduction in blast related complaints when 2015-16 is compared to earlier reporting periods, as shown in **Table 20**.

For specific complaint details and actions taken, refer to the Complaint Database for 2016 located on the Whitehaven Coal website.

Table 20 – WCC Complaint Items from 2012 to 2016

Issue	2014-2015	2015-2016	2016
Blast - Vibration/Overpressure	47	23	12
Blast - Dust/Fume	10	6	1
Blast/Other	2	0	7
Noise – Train Load Out	2	1	0
Noise – Mine	2	0	1
Lights – Mine	0	2	0
Lights - Train Load Out	0	2	0
Dust – Mine	21	2	4
Dust - Train Load Out	0	1	0
Groundwater Level	6	4	0
Surface Water	0	0	2

Issue	2014-2015	2015-2016	2016
Road	2	0	0
Clearing	0	0	0
Odour	2	0	3
Heritage	1	0	0
Number of Issues Raised*	95	41	30

* Number of complaints does not equal the number of issues raised as one complaint can raised multiple issues

10 INDEPENDENT AUDITS

There were no Independent Environmental Audits (IEA's) undertaken at WCC during the 2016 reporting period. The next triennial IEA is scheduled for mid-2017.

- The most recent IEA was undertaken August 2014. The remaining issues outstanding at the commencement of the reporting period and actions taken during the 2016 reporting period are summarised in **Table 21**.

Table 21 – Status of the Implementation of the IEA Action Plan

Condition	Recommendations	Actions taken
PA 10_0059 MOD2 Schedule 3 Condition 27	SLR recommends that WCC progress consultation with the DP&E in order to close out this condition regarding long term security for the offset area.	WCC solicitor sent modified S88E instruments back to DP&E solicitor on 31st July 2015. WCC requested extension to timing for registration of long term security from the 21 st December 2015 to the 21 st December 2017. This was granted by the Department on the 19 th December 2016.
PA 10_0059 MOD2 Schedule 3 Condition 37	Finalise the construction of the visual bund and revegetate the visual bund.	The eastern visual bund has progressed to a point where by current WCC operations are not in view of the public, reducing potential visual and noise impacts. Finalisation of the visual bund will occur in subsequent reporting periods, pending mining schedule commitments.
PA 10_0059 MOD2 Schedule 3 Condition 39	Develop a waste management plan for the site to document the waste management strategy for the site.	Draft Waste and Hydrocarbon Management Plan developed which is currently undergoing internal reviews prior to finalisation.

11 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1 REPORTABLE INCIDENTS

WCC reported two incidents during the reporting period:

- Dust exceedance on 11th April 2016, refer to section 6.3.2
- Noise exceedance on the 27th September 2016, refer to section 6.1.2.

11.2 NON-COMPLIANCES

The compliance status of WCC against relevant approvals during the reporting period was assessed in Section 1 as at the end of the reporting period. There were no reportable non-compliances recorded at WCC during the reporting period.

11.3 REGULATORY ACTIONS

On the 5th April 2016, WCC received a S240 notice from the Department of Industry, Resources and Energy, regarding coaliferous material identified on the overburden emplacement during an inspection. A response was provided by WCC confirming compliance. No enforcement action was necessary.

12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Activities to be completed in the next reporting period to improve the environmental or community performance of WCC have been included in **Table 22**.

Table 22 – Activities to be completed in the next reporting period

Activity	Timeframe
Completion of review and, if necessary, revision of Environmental Management Plans	In accordance with PA 10_0059
Progression of remaining actions from the IEA	Ongoing
Continued community liaison and engagement with local stakeholders	Ongoing