WERRIS CREEK COAL MINE

2018 ANNUAL REVIEW

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 January 2018
Annual Review Completion Date	31 December 2018
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 January 2018 to 31st December 2018, and that I am authorised to make this statement on behalf of Werris Creek Coal Pty Ltd. 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	**Nigel Wood**
Title of Authorised Reporting Officer	**General Manager – Open Cut Operations**
Signature	NWood
Date	6 / 6 / 2019.

Revision	Comments	Date
0	Submitted for approval	29 March 2019
1	Revised to include DP&E comments	5 June 2019

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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 2018) and is summarised in **Table 1**. 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 1 – Statement of Compliance

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

Any non-compliances during the reporting period are detailed in **Table 3** and ranked according to the compliance status key in **Table 2**. **Section 11** provides further details of any non-compliance and actions undertaken or proposed for the following reporting period to prevent re-occurrence and mitigate any potential adverse effects, as well as other compliance triggers that were investigated.

Table 2 – Compliance Status Key

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

Table 3 – Non-Compliances

Relevant Approval	Cond. #	Condition Description (Summary)	Compliance Status	Comment	Where addressed in Annual Review
PA 10_0059 MOD 2,	Schedule 3, #6	The Proponent shall ensure that blasting on site does not cause exceedances of the criteria in Table 5.	Non-compliant	An exceedance occurred with a blast undertaken on the 4 May 2018 recording an overpressure of greater than 120 dBL at two monitoring locations; Glenara recording 120.4dBL and Kyooma 120.2dBL. WCC undertook an investigation into the incident, with appropriate notifications to the EPA and DP&E.	6.2.2 Environmental Performance
EPL 12290	L5.1	The overpressure level from blasting at the premises must not exceed 120dB (Lin Peak) at any time.	Non-compliant	As per above	6.2.2 Environmental Performance

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 period between 1st January 2018 to 31st December 2018.

2.1 PROJECT BACKGROUND

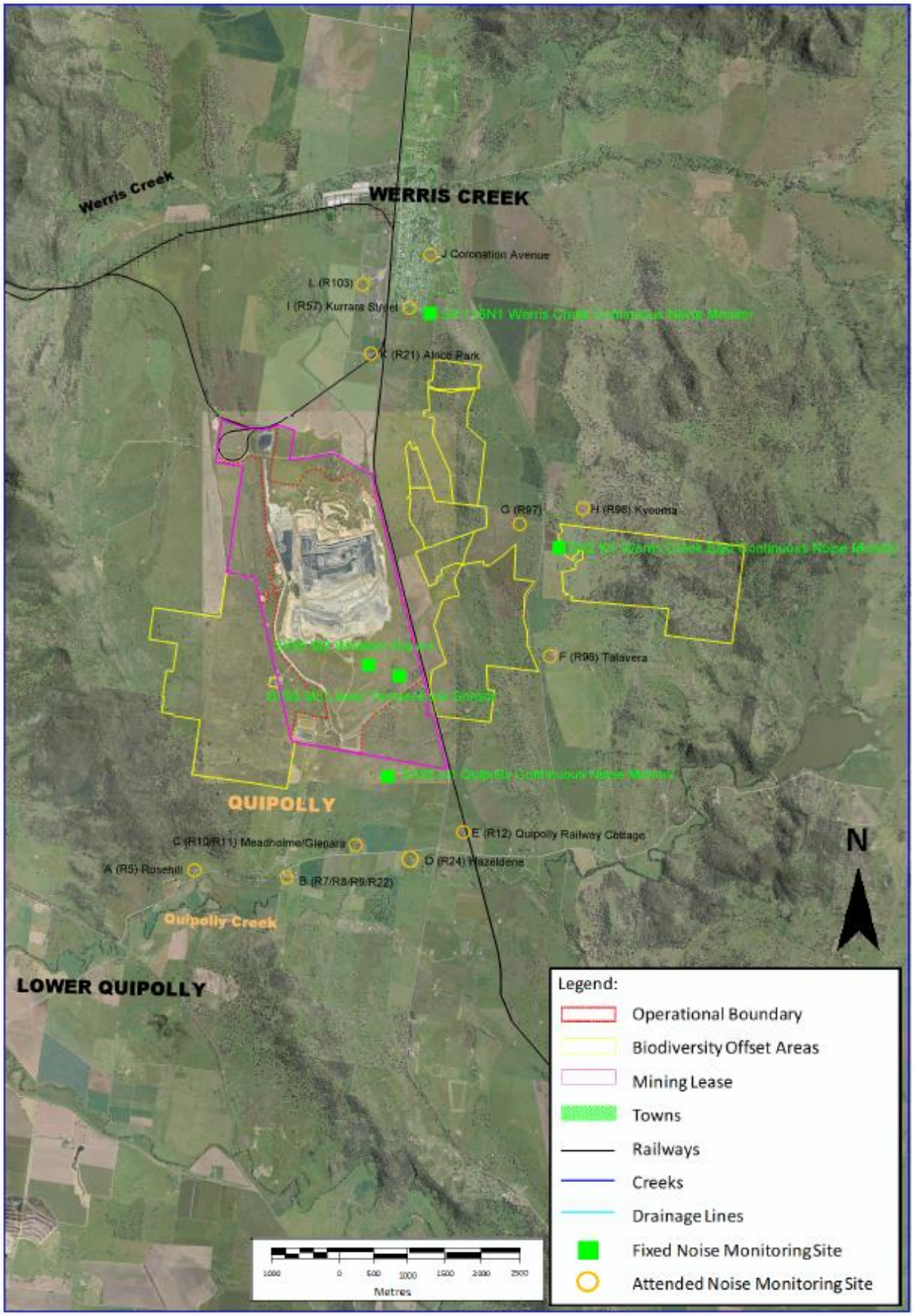
WCC is located approximately 4 km south of Werris Creek and 11 km north-northwest of Quirindi in northwest slopes and plains region of New South Wales (**Figure 1**) and lies within a 910 ha area covered by Mining Lease (ML) 1563, ML1671 and ML1672. The current Project Approval (PA) 10_0059 Modification 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 4**.

Table 4 – Key Personnel at WCC

Name	Title	Contact
Mr Lynden Cini	WCC Environmental Officer	02 6763 6000
Mr Rod Hicks	WCC Operations Manager	02 6763 6000
Mr Nigel Wood	General Manager – Open Cut Operations	02 6741 9300

Figure 1 – WCC Locality Map and Noise Monitoring Sites



3 APPROVALS

Table 5 provides a summary of the key current licences, leases and approvals that have been obtained for the operation of WCC.

Table 5 – 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 14th January 2016
Environment Protection Authority	Environment Protection Licence	12290	18/04/2005	Anniversary date: 1 April Review Date: 14/07/2020	Last variation 6th May 2016
Department of Primary Industries – Water	Water Access Licence (Water Management Act 2000)	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	25/06/2027	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 Werris VWD3 Werris VWD4	18/10/2012 13/12/2012 13/12/2012	Perpetuity Perpetuity Perpetuity	Significant Sunny Day and Flood Consequence

4 OPERATIONS SUMMARY

4.1 EXPLORATION ACTIVITIES

No exploration drilling occurred during this reporting period. Table 6 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 to align with PA_0059 conditions. All units are in tonnes unless otherwise stated.

Table 6 – Production Summary

Material	Approved limit	Previous reporting period (actual)	This reporting period (actual)	Next Reporting period (forecast)
Waste Rock / Overburden (bcm)	N/A	14,254,064	14,274,779	13,239,775
ROM Coal (t) (calendar year)	2,500,000 (PA 10_0059)	1,867,752	1,804,869	1,951,905
Coarse reject (t)	N/A	0	0	0
Fine reject (t)	N/A	0	0	0
Saleable Product (t)	5,000,000 (EPL12290)	1,838,375	1,982,031	2,189,019

4.2 COAL HANDLING AND PROCESSING

During the reporting period, coal processing operated Monday to Friday 6:00am to 2:40am with an 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 transported 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 204,461 tonnes, which occurred during August 2018 and the total quantity of domestic coal transported from site on public roads was 691 tonnes for the period.

4.3 OTHER OPERATIONS

4.3.1 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 20.6 hours per day (6:00am – 2:40am) 5 days per week (Monday to Friday), and a 10.5 hour day shift on both Saturday and Sunday. Other ancillary tasks and maintenance activities continued 24 hours per day, seven days per week.

4.4 NEXT REPORTING PERIOD

4.4.1 Exploration

No exploration drilling has been planned at WCC in the next reporting period, however may be undertaken if required.

4.4.2 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 6**. Vegetation clearing activities in mining areas over the next reporting period will be conducted in accordance with the approved Biodiversity Management Plan and MOP.

4.4.3 Rehabilitation progress

As per MOP commitments, WCC plans to undertake rehabilitation works on 22 hectares of the overburden emplacement in the 2019 reporting period. The focus for the period will be on the finalisation of decommissioned areas, landform development and growth medium development. Maintenance works and supplementary planting will continue on existing rehabilitation areas to encourage success.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

There were no outstanding actions carried over from the previous Annual Review.

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.

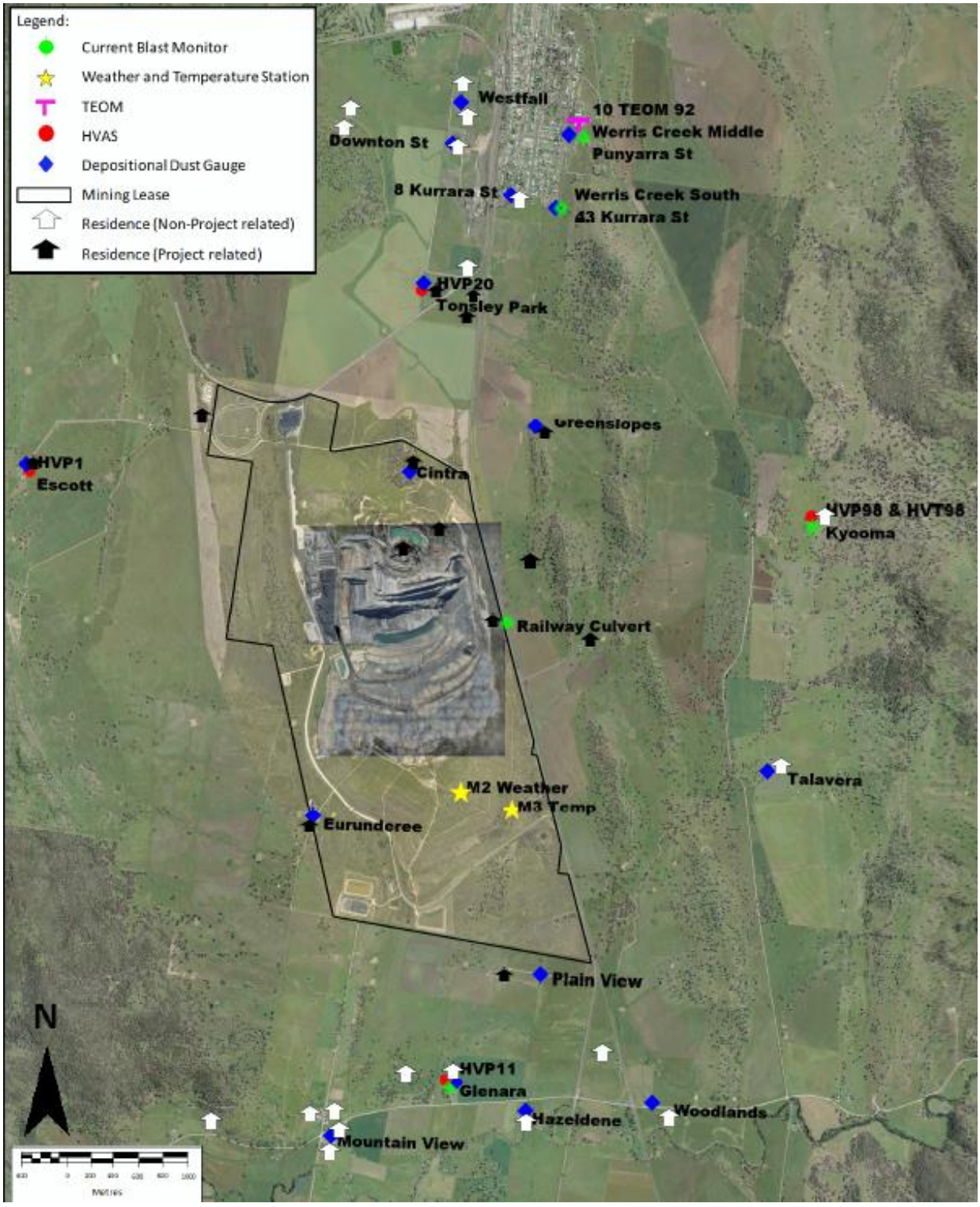
During the reporting period a number of operational strategies were in place to respond to potential noise impacts from mining operations including:

- 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 1 - WCC identifies the monitoring locations for both continuous and attended noise monitoring locations**.**

Figure 2 - Blast Monitoring Sites and Air Quality Monitoring Network



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 no exceedances of the noise criteria during the reporting period. As a comparison to previous years, an exceedance was reported during the 2016 and 2017 reporting periods at R98-Kyooma.

Attended noise monitoring continued generally in accordance with EA predictions.

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 potential 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 thorough 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 in **Figure 2**, 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.

6.2.2 Environmental Performance

An exceedance of Condition 6 Schedule 3 of PA 10_0059 occurred with a blast undertaken on the 4th May 2018, recording an overpressure of greater than 120 dBL at two monitoring locations, Glenara

recording 120.4dBL and Kyooma 120.2dBL. WCC undertook an investigation into the incident, with appropriate notifications to the EPA and DP&E. Upon completion of the investigation, control measures have been implemented to prevent or mitigate against a similar exceedance in the future.

There have been no exceedances of airblast overpressure or ground vibration limits during the previous 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). 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; and
- Installed bird deterrents were maintained on depositional dust gauges to reduce contamination.

The above management measures will continue to be implemented into the next reporting period to continually improve air quality performance.

The WCC Air Quality Monitoring network is illustrated in **Figure 2** and includes:

- Continuous monitoring of $PM_{2.5}$ and PM_{10} levels at the Werris Creek TEOM;
- PM_{10} 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.

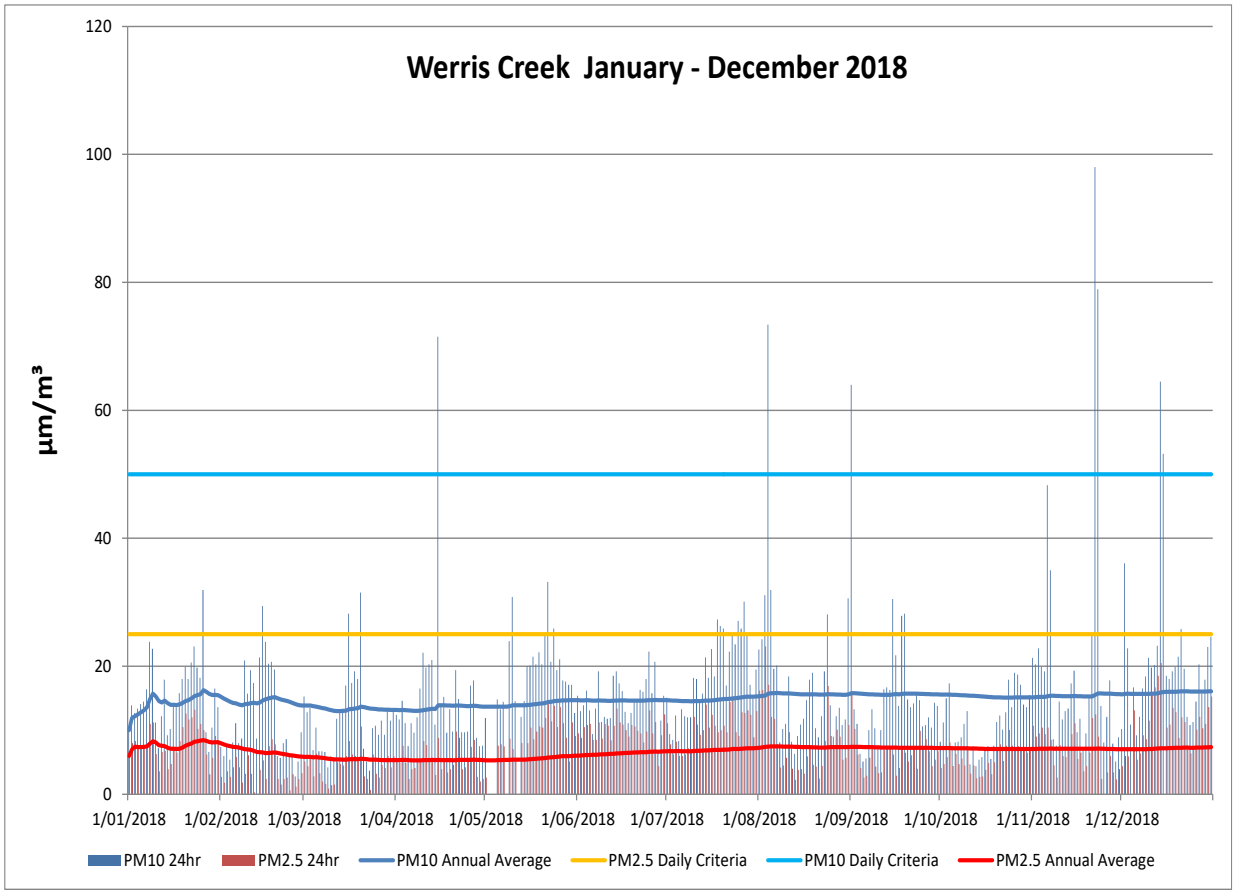
6.3.2 Environmental Performance

Monitoring conducted at the Werris Creek TEOM indicates the PM_{10} annual average remained below the applicable criteria of 30 µg/m^3. The majority of 24 hour measurements of PM_{10} remained below the 24 hour average limit of 50 µg/m^3 with the exception of seven results which exceeded the limit. The elevated results were identified on the following dates during 2018, April 15th, August 4th, September 1st, November 22nd & 23rd, December 14th & 15th.

Notifications regarding the elevated results were provided to the DP&E following receipt of the monitoring results. Subsequent investigations demonstrated WCC was not the cause of the elevated PM_{10} levels on all occasions. Widespread high regional dust alerts were received on all the above-mentioned dates, advising elevated PM_{10} levels were present in the area and operations were located downwind of the TEOM location during monitoring.

Figure 3 below shows continuous results for PM_{10} (24hr) and $PM_{2.5}$ (24hr) for the reporting period, as well as a running annual average throughout the reporting year.

Figure 3 – Werris Creek TEOM summary for January – December 2018



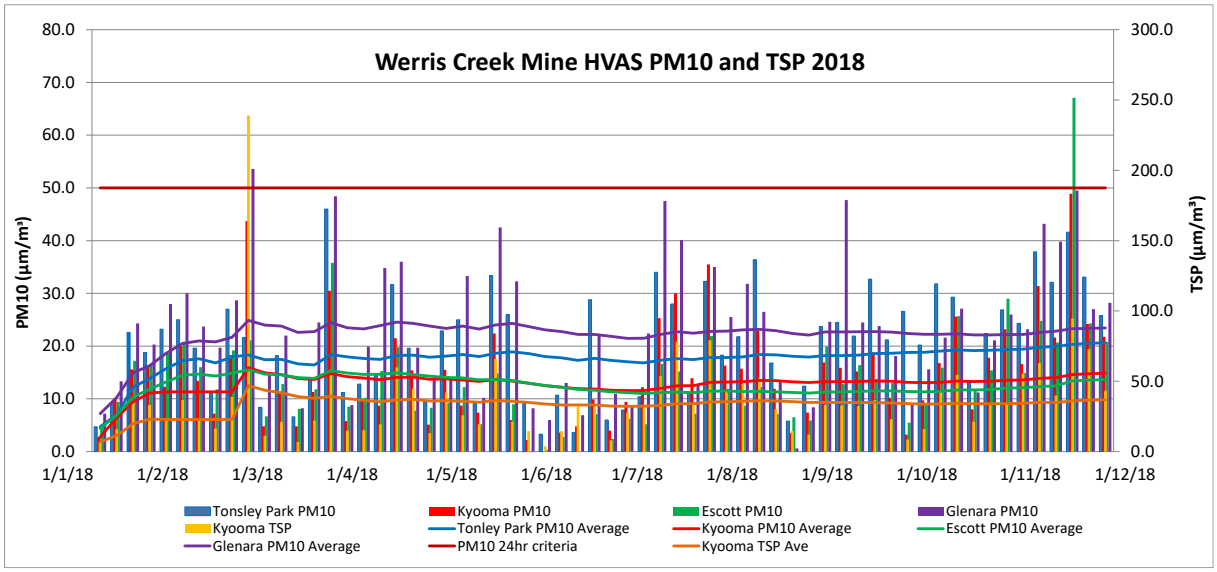
Monitoring conducted across the HVAS PM_{10} network has shown the rolling annual average PM_{10} concentrations to be below the criteria of 30 µg/m^3 at all monitoring stations across the network during the reporting period (**Figure 4** and **Table 7)**. However, results have generally increased when compared to previous years and this is associated with prolonged below average rainfall and drought conditions during the reporting period.

The majority of 24 hour measurements of PM_{10} remained below the daily criteria of 50 µg/m^3 with the exception of two monitoring results at Glenara on the 18th February 2018, (53.6 µg/m^3) and at Escott on the 15th December 2018 (67.1 µg/m^3).

Notifications regarding the elevated results were provided to the DP&E following receipt of the monitoring results. Subsequent investigations demonstrated that WCC was not the cause of the elevated PM_{10} levels on both occasions. On the 18 February 2018, WCC operations were downwind of the monitor at the time of the exceedance with field notes from the day of sampling noting farming activity (ploughing) in the vicinity of the monitor. On the 15 December 2018 widespread high regional dust alerts were in place and WCC operations were downwind of the monitor at the time of monitoring.

All other PM_{10} measurements were within criteria as shown in **Figure 4**.

Figure 4 – Werris Creek Mine HVAS PM_{10} and TSP results for January – December 2018



A summary of current and historical HVAS and TEOM data can be viewed in **Table 7.**

Table 7- TEOM and HVAS Averages

Location	*2016	2017	2018
	µg/m^3		
10TEOM92 – Werris Creek	9.3	10.8	**16.1**
HVP20 – Tonsley Park	13.0	15.0	**20.6**
HVP98 – Kyooma	7.9	8.7	**14.9**
HVP1 – Escott	7.5	9.2	**13.7**
HVP11 – Glenara	16.4	19.1	**23.4**

*Shorter reporting period 1st April – 31st December 2016

Analysis of January – December 2018 monitoring results from depositional dust gauges shows the majority of monitoring sites met compliance criteria, with the exception of DG2 (Cintra) which was above

the annual average criteria for the 2018 reporting period. Located directly north of WCC operations, DG2 is located on a project related property.

Table 8 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.

Of the eight sites with elevated monthly dust measurements, sites (Railway View, Marengo, Tonsley Park, Mountain View, 8 Kurrara Street, Werris Creek South and West Street) recorded annual depositional dust averages below the criteria.

An investigation of the results at dust gauge site DG34 (8 Kurrara street) and DG9 (Marengo) with elevated measurements during the reporting period showed elevated results and low deposited dust levels at nearby gauges, indicating a localised source of dust generation or contamination at both sites, unrelated to activities at WCC.

A summary of deposited dust monitoring results can be found in **Table 8** below.

Table 8 – Deposited Dust Summary for 2018

EPL# 12290	ID	Property	Annual Average	Average - Excluded	Minimum	Maximum	AQGHGMP Criteria	# Results Excluded
-	DG1	Escott^	1.1	-	0.2	2.7	4.0	0
-	DG2	Cintra^	**4.2**	-	2.6	6.7	4.0	0
-	DG3	Eurunderee^	2.0	-	0.9	3.9	4.0	0
-	DG5	Railway View^	2.8	2.6	1.5	4.5@	4.0	1
-	DG9	Marengo^	4.0	1.5	0.4	15@	4.0	5
#29	DG11	Glenara	1.5	-	0.6	2.9	4.0	0
-	DG14	Greenslopes^	1.5	-	0.6	3.9	4.0	0
-	DG15	Plain View^	1.4	-	0.3	3.1	4.0	0
-	DG17	Woodlands	1.5	-	0.3	3.5	4.0	0
-	DG20	Tonsley Park^	2.1	-	0.1	7.2	4.0	0
-	DG22	Mountain View	2.0	1.8	0.5	4.5@	4.0	1
-	DG24	Hazeldene	1.5	-	0.5	3.3	4.0	0
-	DG34	8 Kurrara Street	8.7	1.0	0.4	61.4@	4.0	3
-	DG62	Werris Creek South	2.8	1.0	0.3	22.2@	4.0	1
#30	DG92	Werris Creek Centre	1.1	-	0.3	3.2	4.0	0
-	DG96	Talavera+	NS	-	NS	NS	4.0	0
#28	DG98	Kyooma	1.1	-	0.4	3.0	4.0	0
-	DG101	Westfall	1.5	-	0.1	3.3	4.0	0
-	DG103	West Street	2.0	1.4	0.5	2.0	4.0	2

^ 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

WCCM Biodiversity Offset Management Plan (BOMP) was approved by DPE on 30th August 2013. The WCCM Biodiversity Offset Strategy is required to offset 1317ha of native woodland to achieve a 'like for like or better' biodiversity outcome across five properties (Biodiversity Offset Areas – BOAs) adjacent to the WCCM for the purpose of restoring vegetated corridors across WCC land holdings and Quipolly Creek Catchment linking with sub-regional habitat corridors.

Offset Security Management

During the reporting period, WHC and DP&E signed the *NSW Conveyancing Act 1919* Section 88E Instruments to secure the WCCM BOAs. These instruments were then registered with NSW Land Registry Services on 20th July 2018 and 2nd August 2018, which completed securement of WCC BOAs and finalises compliance with PA 10_0059 Schedule 3 Condition 27 and EPBC Act Approval 2010/5571 Condition 1**.**

Infrastructure Management

During the reporting period, 1.6km of redundant internal fences were deconstructed from the BOAs with the waste disposed of offsite and recycled at the Quirindi Waste Management Facility. A total of 1.7km of new fencing (fauna friendly) was constructed along the perimeter of the Railway View BOA replacing the previous fence. The condition of the BOA fences, gates and signage were maintained to continue restricting unauthorised access and prevent inadvertent livestock grazing. Hazardous material assessments will be undertaken in the next reporting period for redundant and derelict assets/infrastructure (i.e. sheds and cottages) associated with the former agricultural use as part of planning for their demolition and removal.

Seed Management

Routine seed assessments completed. BOAs were impacted by the severe drought conditions that were experienced during 2018. The routine seed assessments aim 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. Because of the drought conditions, additional seed collection opportunities within the BOAs were limited.

As part of the WHC group wide revegetation planning; the onsite collected seed was supplemented with commercially sourced local and regional provident seed by reputable seed collectors. A local revegetation provider was engaged to propagate the seed to produce Box Gum and non-EEC/CEEC Woodland overstorey species seedlings required for the FY18 (completed) and currently being grown for the FY19 revegetation programs for the WCC Rehabilitation and BOAs.

Revegetation Management

The BOMP revegetation strategy focuses on restoration and revegetation of previously cleared derived native grasslands and assisting natural regeneration in better quality woodland areas. During the reporting period, revegetation ground preparation included tractor/excavator augered holes (to a depth >0.3m every 15m) was completed over 104ha collectively for BOAs during April 2018 in preparation for the 2019 revegetation program. During the reporting period, WHC coordinated an overstorey revegetation program in September 2018 across the BOAs with 139ha planted with 5,232 hiko seedlings of *Eucalyptus albens, Eucalyptus blakelyi, Eucalyptus melliodora* and *Angophora floribunda*. Despite the prevailing drought conditions; routine tree watering and maintenance activities post planting have been successful to ensure that over 70% survival had been achieved by the end of the reporting period which is commensurate with the target Box Gum Woodland vegetation structure of the BOAs.

Heritage Management

During the reporting period, two aboriginal heritage and one historical heritage sites were identified during due diligence programs that were undertaken in accordance with the BOMP.

Weed Management

During the reporting period, WHC implemented a comprehensive weed control program across the WCCM BOA including 1196ha treated between January and December 2018 targeting broadleaf weeds and thistles, Johnsons Grass and St Johns Wort. Only appropriately qualified and experienced weed contractors (AQF3 accreditation or higher for use of herbicide) were engaged to undertake weed control works for WHC.

Feral Animals Management

WHC coordinated routine formal feral animal monitoring across the BOAs in February, May, September and November 2018. The adoption of a “monitor, measure and manage” approach to feral animal management will allow WHC to implement adaptive management in response to changes being measured through monitoring in feral animal abundance, specific to the different geographical regions of the WCCM BOAs. Feral animal monitoring utilises the relevant methodologies for specific feral animals generally in accordance with the Ecology and Management of Vertebrate Pests in NSW (NSW DPI, 2018) and The Sandlot Technique (CSIRO and NSW DEC, 2005) so that a range of methods can be used such as cameras traps where practicable and relevant to specific offset areas/properties. During the reporting period, monitoring results indicated that Macropods were in high abundance, the European Red Fox and Feral Pig were in low to medium abundance, Feral Deer and Rabbits/Hares were in low abundance and other species as scarce.

During the reporting period, WHC implemented a comprehensive feral animal control program across the BOAs with fox baiting and pig trapping undertaken in March, June, October and December. Fifty-two foxes were baited during the above campaigns and zero pigs trapped.

Bushfire Management

In accordance with the BOMP, annual fuel load monitoring was undertaken in December 2018 as part of planning and assessment for an ecological burn of the BOAs revegetation areas in Autumn 2019. WHC also completed a 78ha ecological burn of the Eurunderee BOA in April 2018. WHC maintains regular communications throughout the reporting period with both the Liverpool Range RFS teams around planning of WHC BOA ecological burn programs as well as providing WHC emergency contacts.

Monitoring Program

During the reporting period, the ecological monitoring program of the WCC Rehabilitation and BOAs included winter bird surveys that were undertaken in July 2018; annual spring flora monitoring of 34 sites and fauna monitoring of 24 sites both undertaken during October 2018. During the winter bird surveys, five threatened species were recorded (Black Falcon, Brown Treecreeper, Grey-crowned Babbler, Speckled Warbler and a Koala).

Despite the prevailing dry conditions for much of 2018, native plant species richness increased from 5 sites last year to 12 out of the 30 sites meeting or exceeding the performance criteria (native species richness benchmark for relevant biometric vegetation communities i.e. 17 or greater native species). Native overstorey cover increased from 7 sites last year to 9 out of the 34 sites meeting or exceeding the performance criteria (overstorey cover benchmark for relevant biometric vegetation communities i.e. between 6 % and 25 % cover). Native midstorey cover had no change from the previous year with 31 sites out of the 34 sites meeting or exceeding the performance criteria (midstorey cover benchmark for relevant biometric vegetation communities i.e. between 0 % and 5 % cover). Native ground cover increased from 27 sites last year to 30 out of the 34 sites meeting or exceeding the performance criteria (groundcover benchmark for relevant biometric vegetation communities i.e. between 30 % and 40% cover). Diurnal bird survey results for Spring 2018 total species richness was 75 but ranged between 6 and 27 at the 24 sites monitored in 2018; which was an increase from 2017 total diurnal bird species richness of 69. Analysis of anabat data for microbat total species richness was 14 but ranged between 0 and 11 at the 24 sites monitored in 2018; which was consistent with 2017. Herpetofauna survey results for total species richness was 12 but ranged between 0 and 5 at the 24 sites monitored in 2018; which was a decrease from the 2017 total herpetofauna species richness of 13 and sites ranged between 0 and 5.

6.4.3 Proposed Improvement Measures

Monitoring programs such as quarterly weed inspections and quarterly seed assessments will continue to be implemented into the next 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 prior to their relocation in consultation with stakeholders, to the Willow Tree Visitor Information Centre in 2015.

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

No previously unknown sites or artefacts were discovered during the period.

Going forward, heritage management will be focused on items potentially discovered through the mining of the former Werris Creek Colliery, underground workings. Should heritage items be uncovered, processes identified within the Heritage Management Plan will undertake.

6.6 WASTE

6.6.1 Environmental Management

WCC continued to engage a total waste management service provider during 2018. 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 9** for the 2018 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 a general increase in recycling.

Table 9 – Approximate Quantities of Waste Generated for 2018

Waste Stream	^2016	2017	2018
*Waste Oil (kL)	120	103.8	194.4
*Scrap Metal (kg)	59,090	76, 200	33,500
General Waste (m3)	852	1,051	1,456
*Co-Mingled Recycling (m3)	139	159.1	160.94
Septic (L)	0	0	4000
*Empty IBCs (kg)	1920	2020	1980
Hydraulic Hoses (kg)	15,000	34,100	21,110
*Batteries (kg)	2,042	2944	4483

*Recycled waste stream ^Shorter reporting period 1st April – 31st December 2016

6.7 ENVIRONMENTAL PERFORMANCE SUMMARY

An environmental performance summary is presented in **Table 10** below.

Table 10 – Environmental Performance

Aspect	Approval Criteria / EIS Prediction	Performance during the reporting period	Trend / Key Management Implications	Implemented / proposed management actions
Noise	Refer s6.1	Approval criteria has been met	NA	NA
Blasting	Refer s6.2	An exceedance of blast criteria on the 4th May 2018.	A blast overpressure exceedance greater than 120 dBL was recorded at two monitoring locations; Glenara 120.4dBL and Kyooma 120.2dBL.	WCC undertook an investigation into the incident, with appropriate notifications to the EPA and DP&E. The investigation found that a higher than expected overpressure resulting from insufficient blast hole confinement. Upon completion of the investigation, control measures have been implemented to prevent or mitigate against a similar exceedance in the future. These include the erection of “dig fences” to prevent over digging, in the event blasts are located alongside excavation areas. In addition, face profiling will be completed after an

				excavator has left the area and prior to blast loading, to ensure under burden holes have been detected and addressed prior to firing.
Air Quality	Refer s6.3	Two exceedances of dust criteria at Glenara PM10 HVAS on 18rd February 2018 and Escott PM10 on 15th December 2018 Seven exceedances of dust criteria at TEOM on 15th April, 4th August, 1st September, 22nd November, 23rd November, 14th and 15th December 2018	Monthly HVAS sampling identified the daily maximum criteria of 50 µg/m3 was exceeded on two occasions Monthly TEOM sampling identified the daily maximum criteria of 50 µg/m^3 was exceeded on seven occasions	Notifications regarding the elevated results were provided to the Department of Planning and Environment following receipt of the monitoring results. Subsequent investigations demonstrated that WCC was not the cause of the elevated PM10 levels on all occasions.
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 2018 reporting year summarised in **Table 11.**

Table 11 - Water Take 2018 January - December (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	55	0	55
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 watercourses. 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, 6, and 8 are temporary structures, designed for the transfer of void water for use around the project. Construction of an additional storage began during the period, VWD 7 (long-term storage). Routine checks and photo-inspections of VWD's were undertaken throughout the reporting period. An annual inspection of the prescribed dams (VWD's 1, 3 and 4) was undertaken by an external structural engineer which identified that all prescribed dams were being managed appropriately

Void water is predominantly used for dust suppression purposes on site. 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. 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 were no discharge events during the reporting period from these dams.

Various dams were maintained or improved during the reporting period to minimise erosion and sediment transport at WCC. Minor maintenance of existing sediment dams SB13 and SB16 occurred during the period, requiring de-silted, maintenance of flow paths and minor erosion control. Regular checks of the dirty water management system were undertaken as required dependent on rainfall volume.

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 as required throughout the reporting period. Waste from these facilities is 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 5**) was undertaken by WCC. **Table 12** presents the average results recorded at each location for the 2018 reporting period.

Table 12 – Quarterly Surface Water Quality for Dams and Offsite Creeks'

Dam/ Creek	Monitoring Site (EPA No)	Number of Samples	Value	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Oil & Grease (mg/L)
VWD1	16	4	Ave	8.08	1380	23	<5
			Max	8.13	1590	76	<5
VWD2	27	4	Ave	8.08	1210	24	<5
			Max	8.23	1280	94	<5
VWD3	-	4	Ave	7.97	1810	15	<5
			Max	8.16	1990	23	<5
VWD4	-	4	Ave	8.09	2045	28	<5
			Max	8.23	2900	57	<5
SB2	10	0*	Ave	Dry	Dry	Dry	Dry
			Max				
SB9	12	0*	Ave	Dry	Dry	Dry	Dry
			Max				
SB10	14	1*	Ave	7.41	191	168	<5
			Max	7.41	191	168	<5
SB18	32	1*	Ave	7.83	167	251	<5
			Max	7.83	167	251	<5
QCU	25	0*	Ave	Dry	Dry	Dry	Dry
			Max				
QCD	26	4	Ave	8.05	1152	8	<5
			Max	8.18	1270	14	<5
WCU	23	1*	Ave	7.34	156	16	<5
			Max	7.34	156	16	<5
WCD	24	4	Ave	8.17	1282	20	<5
			Max	8.4	1450	27	<5

* Sample location was dry during some or all of the quarterly monitoring periods.

The quarterly water quality shown in **Table 12** was generally consistent with the previous reporting period, with the exception of EC's at VWD3 and VWD4 with an increase of approximately 500 µS/cm observed. This was due to low levels of stored water remaining in the dams for the majority of the period without in-pumping. Evaporation had therefore increased stored EC levels. Water quality monitoring was generally consistent with EA predictions for each analyte, with the exception of EC's at VWD3 and VWD4 as detailed above.

During the 2018 period, 102 ML of void water was utilised for irrigation for agriculture purposes. **Table 13** outlines the water quality results taken prior to discharge. All results were within water quality criteria.

Table 13 – Surface Water Quality for Irrigation discharges in 2018

Dam/ Creek	Monitoring Site (EPA No)		pH	Electrical Conductivity (µS/cm)
EPL 100% Limit			9	2000
VWD1	33	Min Value	8.0	1170
		Max Value	8.9	1547

Figure 5 – Surface Water Monitoring Network

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 43 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 14** and **Figure 6**. 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, ten 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 14 – 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, MW41* and MW43*
Quipolly Alluvium	MW7*, MW12, MW13*, MW13B, MW13D, MW15, MW16, MW17A, MW18A, MW21A, MW22A, MW22B, MW23A, MW23B, MW26B, MW28A#*, MW32, MW40* and MW42*
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
Quarterly^	MW7 - Standing Water Level, Total Nitrogen, Nitrate, Total Phosphorus, Reactive Phosphorus, Electrical Conductivity, pH, 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
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 * Groundwater logger installed in bore for all or part of reporting period (land owner will not grant access) ^Applies to MW7 bore only ≥Applies to MW1, MW2, MW3, MW4B, MW5, MW6 in conjunction with bimontly depth monitoring	

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 statistical 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. To provide further clarity on the interaction between the Quipolly Alluvium Aquifer and the Werris Basalt Aquifer, four additional monitoring wells were installed during the reporting period (two in each aquifer), and fitted with standing water level loggers.

Figure 6 – 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 15 presents the groundwater level monitoring data for January to December in the Werrie Basalt and Quipolly 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 15 – Groundwater Monitoring Bore Level Summary – January to December 2018

Site		January-18		March-18		May-18	
		mbgl	%	**mbgl**	%	**mbgl**	%
Werrie Basalt near WCC	**MW1**	Dry		Dry		Dry	
	MW2	44.87	-1%	**58.97**	-24%	47.51	24%
	MW3	19.41	0%	19.57	-1%	19.68	-1%
	MW4B	16.81	-2%	17.08	-2%	17.37	-2%
	MW5	12.29	-1%	12.48	-2%	12.68	-2%
	MW6	15.83	0%	15.82	0%	16.17	-2%
	MW27*	50.80	-2%	**56.47**	-10%	56.11	1%
	MW36A	**23.54**	1%	20.89	13%	19.77	6%
	MW36B	**23.48**	1%	20.75	13%	19.79	5%
Werrie Basalt	**MW8***	18.28	-3%	18.73	-2%	19.17	-2%
	MW10	13.64	-10%	13.93	-2%	14.18	-2%
	MW14	**18.6**	5%	15.69	19%	14.8	6%
	MW17B*	12.49	2%	13.25	-6%	14.06	-6%
	MW19A*	13.26	-4%	No access		14.15	-6%
	MW20*	21.85	0%	21.85	0%	22.06	-1%
	MW38A	14.57	-2%	14.26	2%	13.44	6%
	MW38B*	9.96	-1%	10.09	-1%	10.22	-1%
	MW38C*	23.16	-2%	23.61	-2%	23.73	-1%
	MW38E*	10.44	-2%	10.75	-3%	10.84	-1%
	MW41	8.75	-3%	9.03	-3%	9.27	-3%
	MW43	7.57	-3%	7.84	-3%	8.06	-3%
#[1]	**MW24A***	15.41	-2%	15.51	-1%	**17.07**	-9%
	MW29*	13.25	-2%	13.49	-2%	15.83	-15%
Quipolly Alluvium	**MW12***	Dry		Dry		Dry	
	MW13*	6.99	-3%	7.27	-4%	**7.79**	-7%
	MW13B*	5.37	-5%	5.65	-5%	5.78	-2%
	MW13D*	5.48	-7%	5.67	-3%	5.68	0%
	MW15*	6.56	-5%	**6.81**	-4%	No access	
	MW16*	**7.61**	-3%	Dry		Dry	
	MW17A*	6.7	-4%	7.02	-5%	7.18	-2%
	MW18A*	6.55	-5%	6.88	-5%	**7.03**	-2%
	MW21A*	10.47	-3%	10.8	-3%	11.07	-2%
	MW22A*	7.80	-4%	**8.47**	-8%	Dry	
	MW22B*	Dry		Dry		Dry	
	MW23A*	4.19	-3%	4.31	-3%	4.39	-2%
	MW23B*	No access		4.36		**4.71**	-7%
	MW26B*	9.05	-1%	9.37	-3%	9.59	-2%
	MW28A*	14.56	-4%	15.17	-4%	15.68	-3%
	MW32*	4.15	-3%	4.2	-1%	4.25	-1%
	MW40	8.78	-2%	9.06	-3%	9.30	-3%
	MW42	7.45	-3%	7.72	-3%	7.95	-3%
#[2]	**MW34***	11.45	-3%	11.67	-2%	**11.95**	-2%

Site		July-18		September-18		November-18	
		mbgl	%	**mbgl**	%	**mbgl**	%
Werrie Basalt near WCC	**MW1**	Dry		Dry		Dry	
	MW2	56.64	-16%	50.1	13%	50.93	-2%
	MW3	19.91	-1%	20.03	-1%	**20.15**	-1%
	MW4B	17.59	-1%	17.78	-1%	**18.03**	-1%
	MW5	12.91	-2%	13.06	-1%	**13.18**	-1%
	MW6	16.17	0%	16.17	0%	**16.24**	0%
	MW27*	54.31	3%	53.98	0%	53.94	0%
	MW36A	20.65	-4%	22.01	-6%	22.7	-3%
	MW36B	20.68	-4%	21.98	-5%	22.68	-3%
Werrie Basalt	**MW8***	19.56	-2%	19.91	-2%	**20.12**	-1%
	MW10	14.48	-2%	14.7	-1%	**14.93**	-2%
	MW14	15.46	-4%	16.87	-8%	17.68	-5%
	MW17B*	**14.17**	-1%	13.85	2%	14.05	-1%
	MW19A*	**14.39**	-2%	14.75	-2%	No access	
	MW20*	22.16	0%	22.25	0%	**23.05**	-3%
	MW38A	13.09	3%	13.30	-1%	13.69	-3%
	MW38B*	**10.27**	0%	10.26	0%	10.26	0%
	MW38C*	**23.91**	-1%	23.44	2%	23.50	0%
	MW38E*	11.14	-3%	11.26	-1%	**11.35**	-1%
	MW41	9.52	-3%	9.71	-2%	**9.87**	-2%
	MW43	8.28	-3%	8.47	-2%	**8.62**	-2%
#[1]	**MW24A***	16.7	2%	16.61	1%	16.24	2%
	MW29*	13.96	13%	14.39	-3%	**30.72**	-53%
Quipolly Alluvium	**MW12***	Dry		Dry		Dry	
	MW13*	Dry		Dry		Dry	
	MW13B*	6.02	-4%	6.13	-2%	**6.26**	-2%
	MW13D*	5.82	-2%	6.18	-6%	**6.54**	-6%
	MW15*	No access		No access		No access	
	MW16*	Dry		Dry		Dry	
	MW17A*	7.43	-3%	8.42	-12%	**8.76**	-4%
	MW18A*	Dry		Dry		Dry	
	MW21A*	**11.34**	-2%	11.55	-2%	Dry	
	MW22A*	Dry		Dry		Dry	
	MW22B*	Dry		Dry		Dry	
	MW23A*	4.42	-1%	4.43	0%	**4.54**	-2%
	MW23B*	No access		4.25	11%	No access	
	MW26B*	9.85	-3%	10.06	-2%	**10.34**	-3%
	MW28A*	16.17	-3%	16.64	-3%	**16.92**	-2%
	MW32*	4.19	1%	4.22	-1%	**4.35**	-3%
	MW40	9.56	-3%	9.74	-2%	**9.90**	-2%
	MW42	8.17	-3%	8.36	-2%	**8.51**	-2%
#[2]	**MW34***	11.55	3%	11.52	0%	11.4	1%

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).

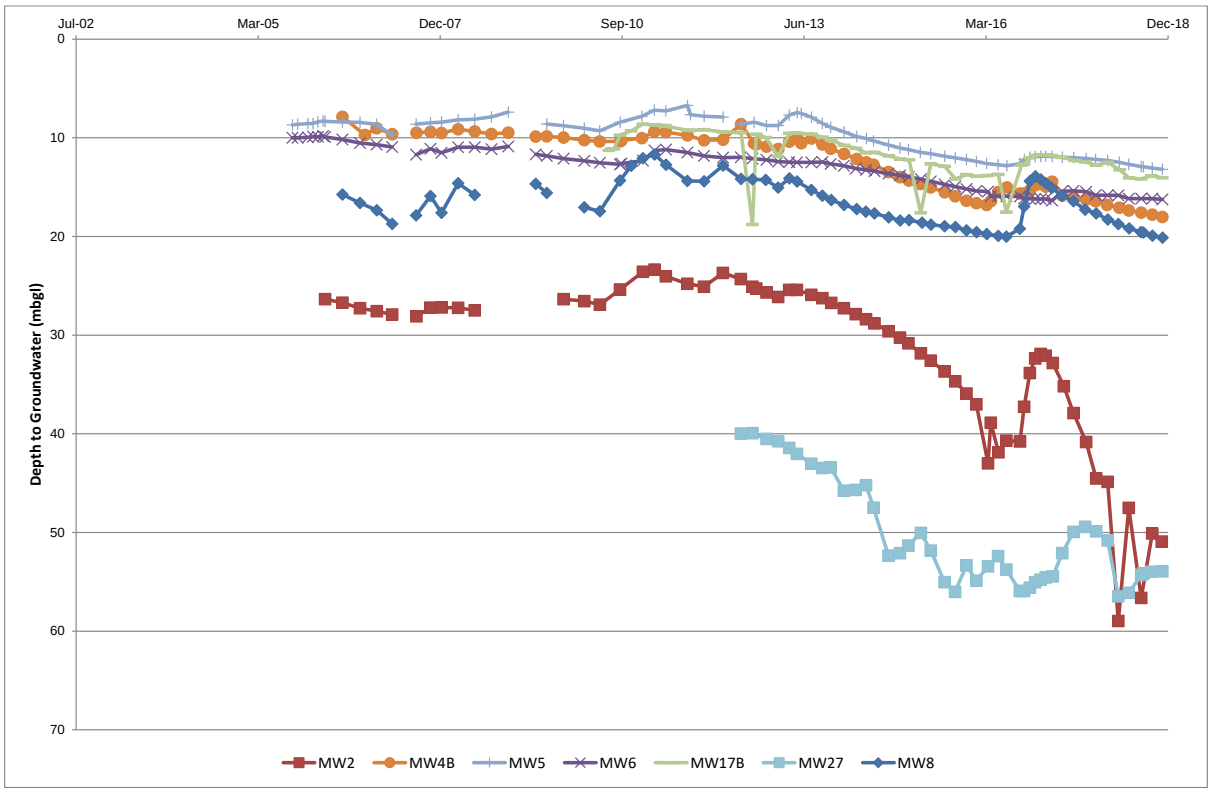
#[1] – Werrie Basalt in the Black Soil Gully valley to east of Werris Creek Mine.

#[2] - Werris Creek Alluvium.

The groundwater level monitoring results have shown generally low water levels throughout 2018, which is representative of the prolonged dry seasons and is representative of general below average rainfall. Cumulative residual rainfall, is graphically presented in **Figure 8** and **Figure 9**.

A specialist groundwater consultant undertook the annual groundwater review for 2018, identifying the following findings. All monitoring wells (MW) were reviewed using a CUSUM statistical analysis. Of the 42 wells reviewed, six were identified as reaching trigger levels, requiring further investigation. These wells were MW 2, 4B, 5, 6, 17B, & 27 and are located within the Werrie Basalt aquifer. No wells located within the Quipolly aquifer trigged the requirement for further investigation. Ramboll (2019) found declining water level trends in the triggered MW were similar to water level trends in the background monitoring well (MW8) and were consistent with residual rainfall patterns which indicate lower than average rainfall for since March 2017. **Figure 7** identifies these findings inclusive of the background monitoring well MW8.

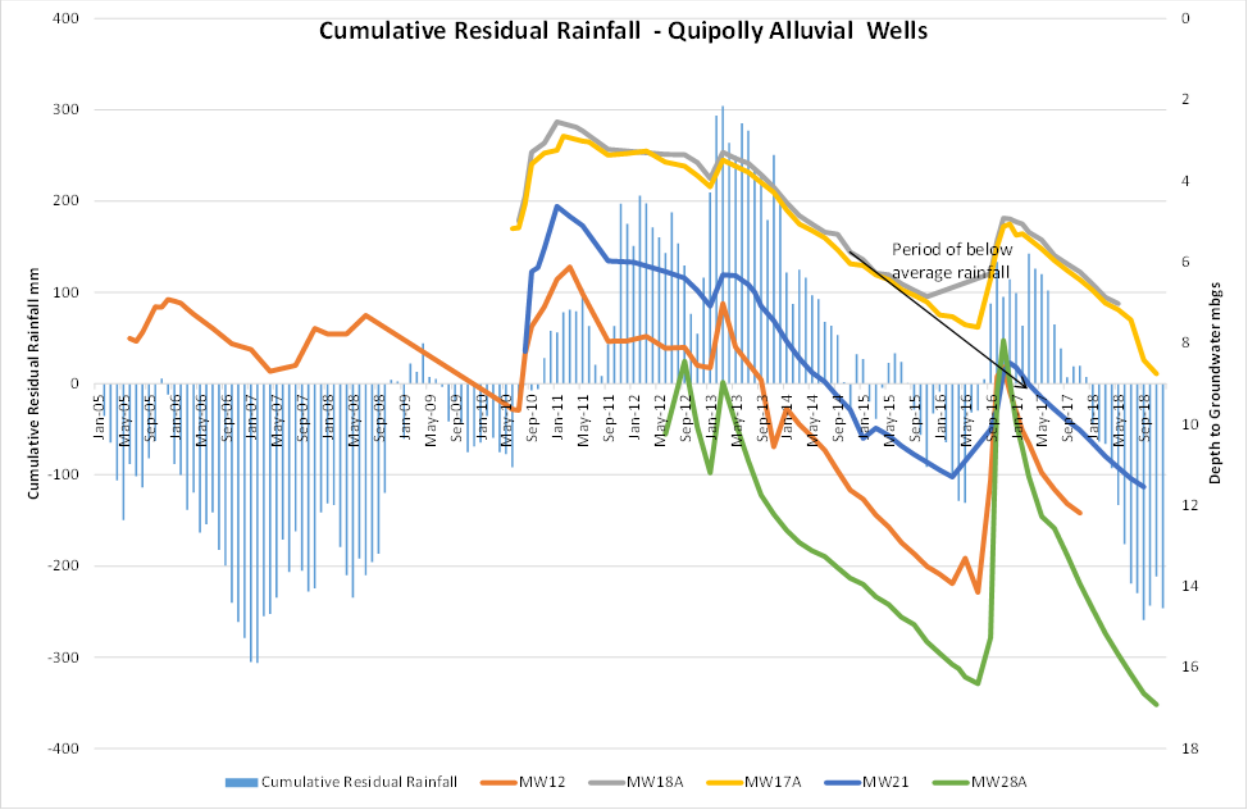
Figure 7 - Comparison of groundwater trends in trigged monitoring wells.



Quipolly Alluvium Aquifer

In aquifer systems that are recharged by rainfall, groundwater levels closely follow the cumulative residual rainfall patterns. The Quipolly alluvial aquifer is a system reliant on rainfall recharge and flooding and it is expected that this correlation would be apparent in wells monitoring the Quipolly alluvium. Groundwater level data from wells within the Quipolly alluvium aquifer system are compared to cumulative residual rainfall and presented in **Figure 8.** Ramboll (2019) have identified a decline in groundwater levels, consistent with the lower than average rainfall shown by the cumulative residual rainfall plot.

Figure 8 – Cumulative residual rainfall and monitoring wells within the Quipolly Alluvium



Groundwater well MW28A, located to the south east of the project site is considered to be up-gradient of any mine influence and representative of fluctuation in the aquifer in response to factors other than mining. The fluctuations observed in MW28A were found to be generally consistent with other Quipolly aquifer wells.

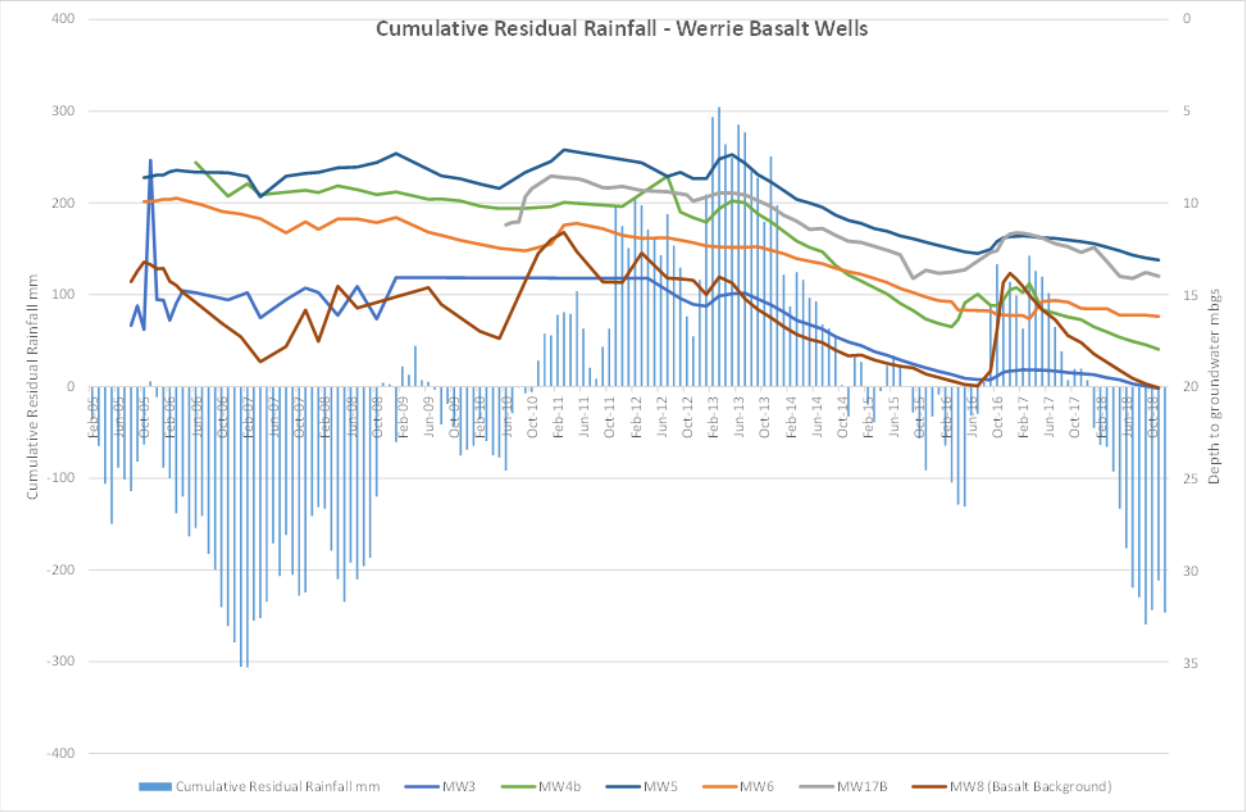
The steep increase in groundwater level within the Quipolly alluvium aquifer in September 2016 was likely attributed to the overflow of Quipolly Dam, upstream of the wells. Quipolly Dam was upgraded by State and Local Government, in early 2013 as part of a program to improve dam safety and increase the storage capacity. The dam overflowed in September 2016 for the first time since augmentation works had been completed.

Werrie Basalt Aquifer

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.

The Werrie Basalt aquifer is regularly monitored on all sides of the mine workings. Monitoring location MW8, located remotely to the south of the site and to the south of Quipolly Creek, is considered a representative background well for comparison of groundwater levels around the south of the site. **Figure 9** presents a comparison of observed groundwater levels in MW8 and Werrie Basalt aquifer monitoring wells, with cumulative residual rainfall. Correlation to cumulative residual rainfall is observed, however MWs directly south of the mine do not demonstrate a response of the same magnitude as the background well MW8. A notable increase in water levels in MW8 in early 2017 was generally a muted response in wells MW4b and MW6 following a lag time.

Figure 9 – Cumulative residual rainfall and groundwater levels in the basalt aquifer.



Ramboll, 2019, 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 southwest with consistent hydraulic gradients.

Ramboll, 2019, undertook a review of water quality data within both the Quipolly and Werrie Aquifers, in line with requirements outlined in **Table 12.**

Groundwater Quality

Monitoring of groundwater quality during the period identified the majority of MW performed within the historical ranges captured during 2004-2010. Outlying results were identified in MW19A, 29, 11 and 13. These stock and domestic bores have shown slight increases in pH and electrical conductivity, with MW11 showing an increase in nitrates and total nitrogen results. A number of bores associated with agricultural land have continued to display generally high total phosphorus and total nitrogen levels. These levels have been consistent with historic monitoring and are a reflection of the agricultural land use and fertiliser inputs rather than impacts from mining operations.

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

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 (**Table 16**)**.** 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 – 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.
- Irrigation – Includes void water tested and approved for offsite irrigation from VWD 1 onto cropping land.
- Direct evaporation – Includes the volume of water directly evaporated from the pit and other locations within the void water cycle.

Table 16– Water Balance Inputs and Outputs.

Source	Estimated Mean Average Volume (ML)	Notes
INPUTS TO PIT		
Rainfall and Runoff	314	Calculated from WBM based on rainfall, area and characteristics of catchments areas which report back to the pit.
Evaporators and Dust Suppression	26	Volume of water estimated to flow back into the pit from use of evaporators and dust suppression. The final volume returning to the pit is derived from runoff/infiltration/storage calculations in WBM.
Water Pumped to Old Workings	279	Volume of water pumped into the old workings for spontaneous combustion control, (assumed to return directly to the pit).
TOTAL INPUT	**619**	
OUTPUTS FROM PIT		
Out of Pit Pumping	168	Metered levels and calculation from measured VWD surveys
Direct Evaporation	14	Estimated volume directly evaporated from the surface of the pit, based on climatic data (BOM).
Groundwater and Underground Workings	14	Pro-rata amount derived from the hydrogeological model.
TOTAL OUTPUT	**196**	
Change in Storage	425	The difference between the estimated volume of water in the pit void between January 2018 and October 2018, based on surveyed levels and the established relationship between height and pit volume. Over this period this volume had increased so must be balanced against inputs and outputs from modelling.
NET WATER (input-output)	**423**	Difference in input/output.

The results of the above Water Balance were found to correlate well with the hydrogeological model and generally compare with predictions made in the Water Management Plan. As was observed in 2017 an increased storage within the void has seen an out flow from the void into the underground workings. Total inputs of 619ML during the 2018 period in comparison to 1070.8ML during 2017 is representative of the below average rainfall and utilisation of retained water stocks held in out of pit, void water dams. These water stocks have been carried over from previous surplus years.

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 White-box Grassy Woodland communities 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. Significant works were undertaken in Landform Establishment (24.9 Ha) and Decommissioning (21.1) during the period. The advancement in these areas was due to the shaping to final landform requirements on both the east and westerns rehabilitation slopes. In addition, subsoil and topsoil applications were undertaken on the eastern facing rehabilitation slope. This additional rehabilitation has advanced the MOP requirements for the period and WCC continue to rehabilitate the final landform in advance of these requirements. 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 2018 reporting year focused on the maintenance and advancement of current vegetation areas, this included the planting of approximately 2500 native tube stock, ongoing maintenance, including mulching existing trees and watering newly planted stock (see Section 6.4.2 Environmental Performance, Revegetation).

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 identified that all areas are structurally sound, with only minimal maintenance required. A description of rehabilitation monitoring and other initiatives to boost rehabilitation success have been 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.

In addition to the above, cardboard tubestock guards have been trialled during plantings undertaken in 2018. This has also been followed up with mulching around tubestock on the western facing rehabilitation slope, prior to spring / summer 2018. Both of these trials have been undertaken in an effort to increase the survival rates of newly planted trees.

Table 17 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 and **Figure 10** identifies the rehabilitation categories as at December 2018.

Table 17 – Rehabilitation Status

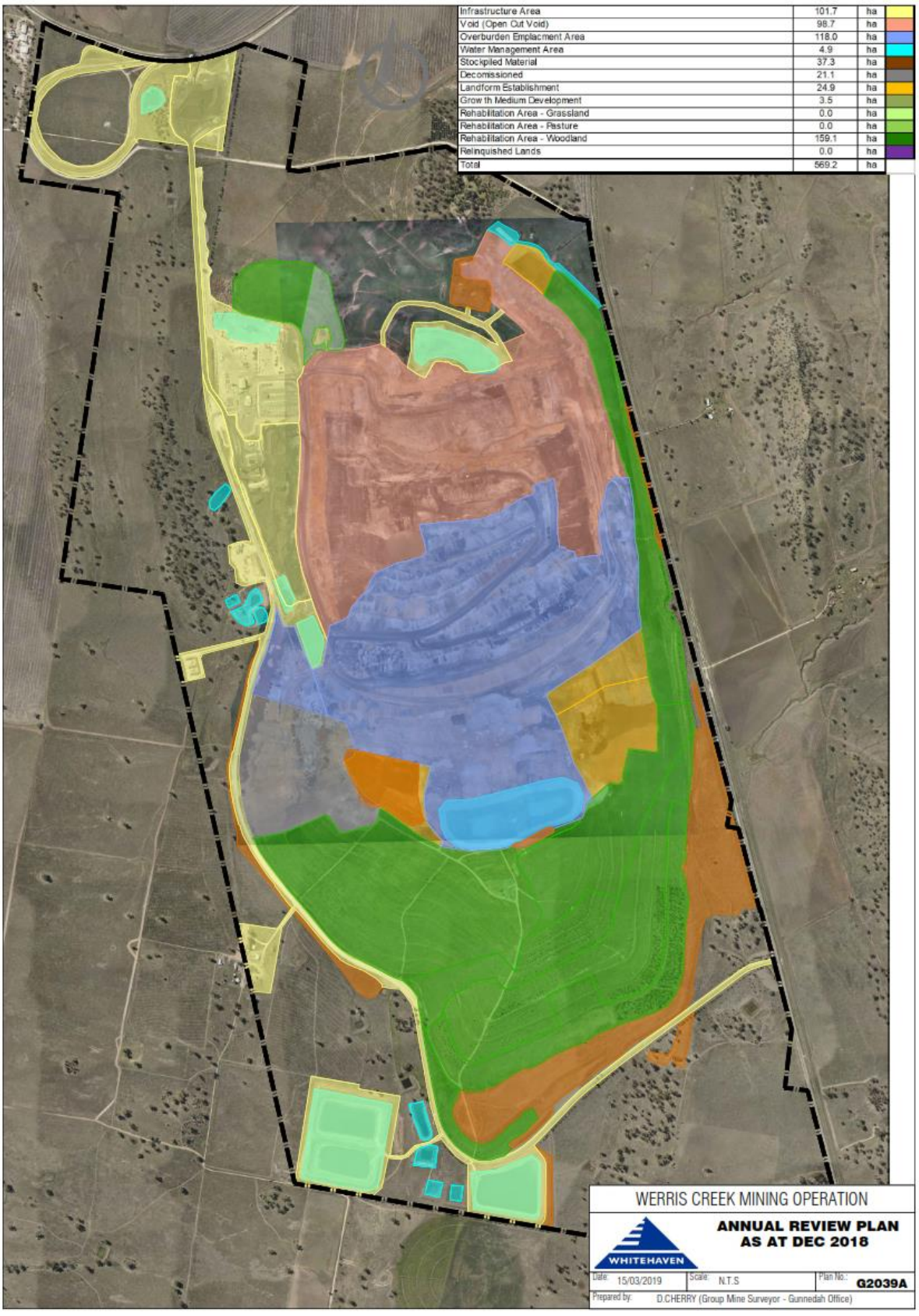
Mine Area Type[1]	Previous Reporting Period 2017	This Reporting Period 2018 (Actual)	Next Reporting Period 2019 (Forecast)
	2017 (ha)	2018 (ha)	2019 (ha)
A. Total mine footprint	556	569	559
B. Total active disturbance	387	361	403
C. Land being prepared for rehabilitation	33	50	25
D. Land under active rehabilitation	151	159	179
E. Completed rehabilitation	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 10 – Rehabilitation Categories December 2018



8.3 REHABILITATION WORKS PROPOSED FOR NEXT REPORTING PERIOD

WCC aims to continue rehabilitation efforts during the 2019 reporting period largely in accordance with the projections under Year 3/4 of the current MOP. These actions will focus on finalisation of decommissioned areas, landform development and growth medium development of the next section of the outer western batter and upper plateau. Works will also continue to focus on the in-fill planting of tube stock on all 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 as previously described.

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 or nutrient;
- Weed and feral animal infestation;
- Excessive erosion and sedimentation resulting in land stability and vegetation growth issues;
- 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 km 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.

In addition there were three CCC meetings held during the reporting period.

9.2 COMMUNITY CONTRIBUTIONS & INITIATIVES

WHC, 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 in excess of $1 billion to the North West NSW region since 2012.

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.

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 2018, with 19 blast-related complaints of the 35 received, compared with 9 during the same reporting period, as shown in **Table 18**.

For specific complaint details and actions taken, refer to the Complaint Database for 2018 located on the Whitehaven Coal website.

Table 18 – WCC Complaints 2018

Issue	^2016	2017	2018
Blast - Vibration/Overpressure	12	9	19
Blast - Dust/Fume	1	1	2
Blast/Other	7	0	0
Noise – Mine	1	3	0
Dust – Mine	4	4	5
Surface Water	2	0	0
Odour	3	7	8
Water- evaporation	0	0	1
Number of Complaints Raised*	**30**	**24**	**35**

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

^Shorter reporting period 1st April – 31st December 2016

10 INDEPENDENT AUDITS

An Independent Environmental Audit (IEA) was undertaken at WCC on the 14th and 15th of June-2017. The full IEA report and Action Plans can be found on the Whitehaven Coal website.

The remaining issues outstanding at the completion of the reporting period are summarised in **Table 19** and **Table 20**, all other actions not listed below have been completed.

Table 19 – Status of the Implementation of the 2014 IEA Action Plan

Condition	Recommendations	Actions taken
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.

Table 20– Status of the Implementation of the 2017 IEA Action Plan

Condition	Recommendations	Actions taken
PA 10_0059 MOD2 Schedule 3 Condition 43	For the next MOP update, send the key sections of the MOP document to these agencies for review/comment.	WCC will ensure appropriate consultation will be undertaken during the next MOP revision.
EPL 12290 M9.1	It is unclear to the auditor as to why the EPL requires 60 minute noise monitoring surveys to assess compliance with the criteria which is LAeq15minute.	WCC will consider applying for modification to EPL 12290.

11 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1 REPORTABLE INCIDENTS

WCC reported ten incidents during the reporting period:

- Blast exceedance on the 4th May 2018, refer to section 6.2.2
- TEOM exceedances on 15th April, 4th August, 1st September, 22nd November, 23rd November, 14th and 15th December 2018, refer to section 6.3.2. Investigations demonstrated that WCC was not the cause of the elevated results.
- HVAS exceedances on 18th February and 15th December 2018, refer to section 6.3.2. Investigations demonstrated that WCC was not the cause of the elevated results.

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. Details on each non-compliance have been identified in Sections 6.2.2 and 6.3.2.

11.3 REGULATORY ACTIONS

WCC did not receive any regulatory actions during the reporting period.

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 21**.

Table 21 – Activities proposed 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