WERRIS CREEK COAL MINE

2022 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 4
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	2nd July 2022 (replaced by Forward Program)
Annual Review Commencement Date	1 January 2022
Annual Review Completion Date	31 December 2022
I, Dean Scott, 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 2022 to 31st December 2022, 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	**Dean Scott**
Title of Authorised Reporting Officer	**General Manager – Open Cut Operations**
Signature	
Date	30 / 3 / 23 .

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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 2022) and is summarised in Table 1.

Table 1 – Statement of Compliance

Were all the conditions of the relevant approvals complied with?	Yes/No
Project Approval 10_0059 Modification 3	Yes
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
EPL 12290	L2.1	For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.	Non-compliant	A discharge sample returned a >50mg/L result for TSS that was inconsistent with the pre-discharge sample result. An investigation was undertaken which identified the exceedance was due to a sampling error and was not representative of the water quality of the dam.	Section 11
EPL 12290	R4.2	A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the monthly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:	Non-compliant	An attended noise monitoring report was inadvertently submitted to the EPA one day late at 31 days post completion of the monitoring.	Section 11

2 INTRODUCTION

This is the sixteenth Annual Review produced for the Werris Creek No. 2 Coal Mine (WCC) and has been prepared in accordance with the NSW Department of Planning, Industry and Environment's (DPIE) 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); and
- The routine reporting expectations of DPE Water.

This report covers the period between 1st January 2022 to 31st December 2022.

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 Rehabilitation Management plan outlines the projected rehabilitation for the next three years.

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 Harry Mills	WCC Environmental Advisor	02 6763 6000
Ms Megan Martin	WCC Environmental Superintendant	02 6763 6000
Mr Murray O'Keefe	WCC Operations Manager	02 6763 6000
Mr Dean Scott	General Manager – Open Cut Operations	02 6741 9300

Figure 1: WCC Site Map

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 Infrastructure & Environment (DPIE)	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 Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Lease	ML 1563	23/03/2005	23/03/2026	Mining Lease granted for 21 years. Varied on 17 October 2022 to include the new standard conditions from *Mining Regulation 2016*, Schedule 8A, Part 2.
		ML 1671	9/03/2012	9/03/2032	Mining Lease granted for 21 years. Varied on 17 October 2022 to include the new standard conditions from *Mining Regulation 2016*, Schedule 8A, Part 2.
		ML 1672	9/03/2012	9/03/2032	Mining Lease granted for 21 years. Varied on 17 October 2022 to include the new standard conditions from *Mining Regulation 2016*, Schedule 8A, Part 2.
	Forward Program	FWP0001127	02/08/2022	31/12/2024	Forward Program replaces MOP
	MOP	-	14/1/2016	2/07/2022	MOP replaced by Forward Program
Environment Protection Authority	Environment Protection Licence	12290	18/04/2005	Anniversary date: 1 April Review Date: 23/06/2024	Varied 2nd September 2022 to update conditions U1 and U2.
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
Australian Department of Agriculture, Water and the Environment	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	Declared 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

There were no exploration activities undertaken in the reporting period.

4.2 MINING OPERATIONS

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	13,994,182	11,912,689	6,380,665*
ROM Coal (t) (calendar year)	2,500,000 (PA 10_0059)	1,491,960	1,545,583	1,376,955*
Coarse reject (t)	N/A	0	0	0
Fine reject (t)	N/A	0	0	0
Saleable Product (t)	5,000,000 (EPL12290)	1,491,960	1,489,931.7	1,500,000*

*Estimate

4.3 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 coal products are processed through the fixed plant crusher and subsequently processed through the secondary crusher.

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 approx. 230,000 tonnes, which occurred during September 2022 and the total quantity of domestic coal transported from site on public roads was 456.45 tonnes for the period.

4.4 OTHER OPERATIONS

4.4.1 Hours of Operation

Mining operations are permitted to be conducted up to 24 hours per day, 7 days per week, except for blasting, which is restricted to 9:00am – 5:00pm Monday to Saturday. During the reporting period, mining operations generally 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. Some extended hour shifts were undertaken periodically via an earlier shift start of 5:00am as and when required to meet production demands. Other ancillary tasks and maintenance activities continued up to 24 hours per day, 7 days per week.

4.5 NEXT REPORTING PERIOD

4.5.1 Exploration

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

4.5.2 Mine Operations

The mine production rates are planned to continue at much the same level as in the current reporting period. No clearing is proposed for the next reporting period.

4.5.3 Rehabilitation progress

Updated site rehabilitation plans and methodologies have been detailed in the Annual Rehabilitation Plan that replaced the MOP in 2022. The continued 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 continue replacing any losses realised during the period of low rainfall between 2017- 2019. It is noted that with the increased rainfall and the end of drought conditions (2020-2022) the existing rehabilitation is expected to respond accordingly to optimal conditions. This opportunity will be utilised to infill plant and respond to these conditions accordingly.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

Table 7 – Actions/Comments to be addressed

The DPE requested consideration of several sections in the 2021 Annual Review. Appendix x includes a table summarising the feedback and the relevant section where this is addressed. "

Action required from Previous AR	Requested by	Action taken	Where discussed
The Resources Regulator (RR) requested the AR includes rehabilitation progress towards completion criteria.	Resources Regulator	The annual rehabilitation monitoring survey undertaken in Nov 2021 included a review and identification of background analogue sites that can be used to determine rehabilitation progression against the relevant analogue sites plant community types (PPT).	Results are documented in section 8.2.
Clearly include a comparison of monitoring results for all environmental aspects (noise, blasting, air quality, biodiversity, heritage and waste) against the relevant predictions in the EA, as required by Schedule 5 condition 3(b) of the approval	DPE	Comparison of monitoring results included in the relevant sections.	Noise: 6.1.2 Blasting: 6.2.2 Air Quality: 6.3.2 Biodiversity: 6.4.2 Heritage: 6.5.2 Waste: 6.6.2
Clearly identify any trends in the monitoring data for all environmental aspects (noise, blasting, air quality, biodiversity, heritage and waste) over the life of the project, as required by Schedule 5 condition 3(d) of the approval	DPE	Trends in monitoring data identified and discussed in the relevant sections.	Noise: 6.1.2 Blasting: 6.2.2 Air Quality: 6.3.2 Biodiversity: 6.4.2 Heritage: 6.5.2 Waste: 6.6.2
Clearly identify any discrepancies between the predicted and actual impacts of the project for all environmental aspects (noise, blasting, air quality, biodiversity, heritage and waste), as required by Schedule 5 condition 3(e) of the approval	DPE	Discussion on variations between the predicted and observed impacts discussed in the relevant sections.	Noise: 6.1.2 Blasting: 6.2.2 Air Quality: 6.3.2 Biodiversity: 6.4.2 Heritage: 6.5.2 Waste: 6.6.2
Identify when the next Independent Environmental Audit is scheduled.	DPE		Section – 10 Independent Audits

6 ENVIRONMENTAL PERFORMANCE

6.1 NOISE

6.1.1 Environmental Management

During the reporting period, the noise mitigation strategies to minimise the effects of noise on the community have been continued as outlined below.

- 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.
- 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 remained 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- identifies the monitoring locations for both continuous and attended noise monitoring locations.

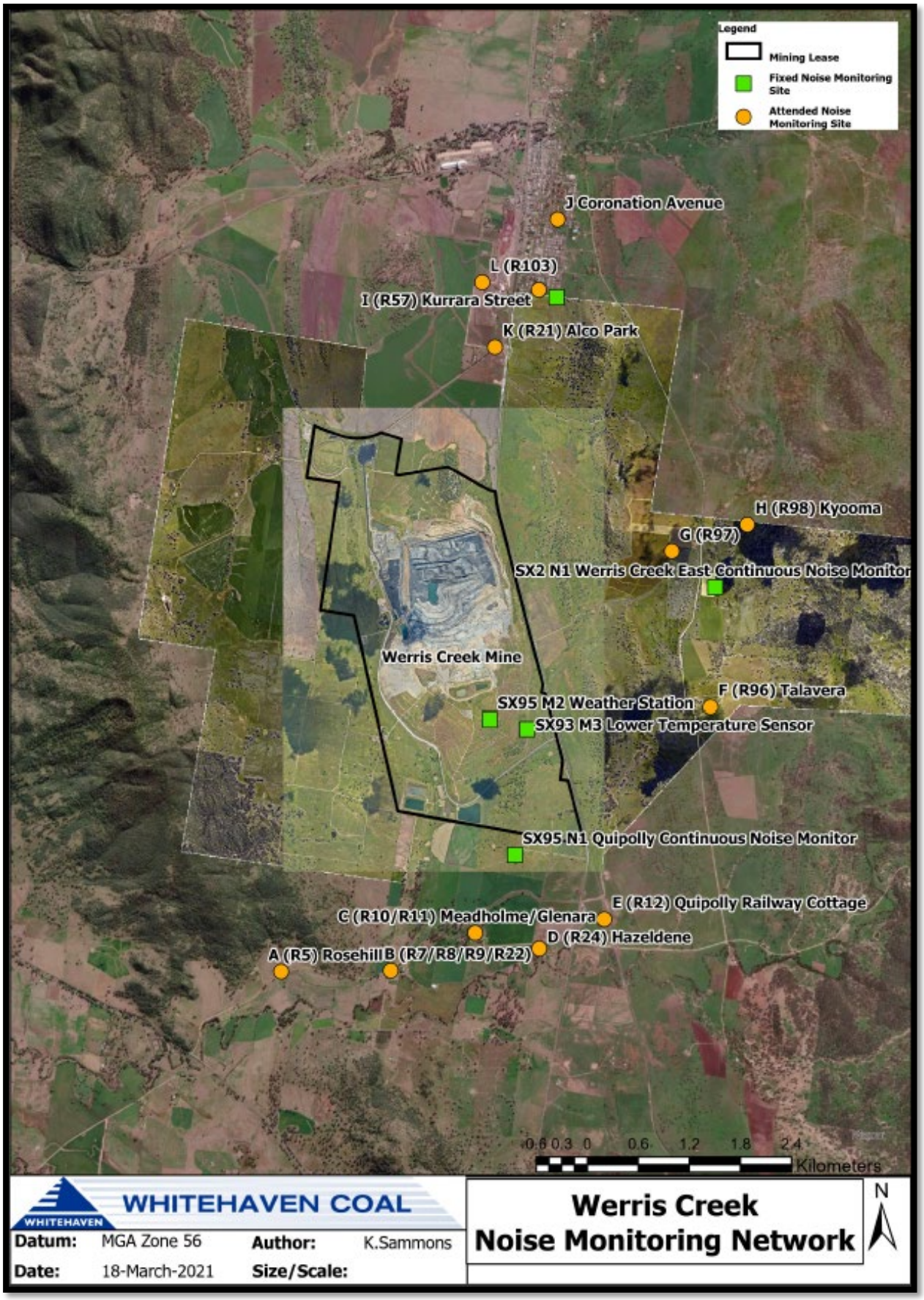

Figure 2: Site Noise Monitoring Locations

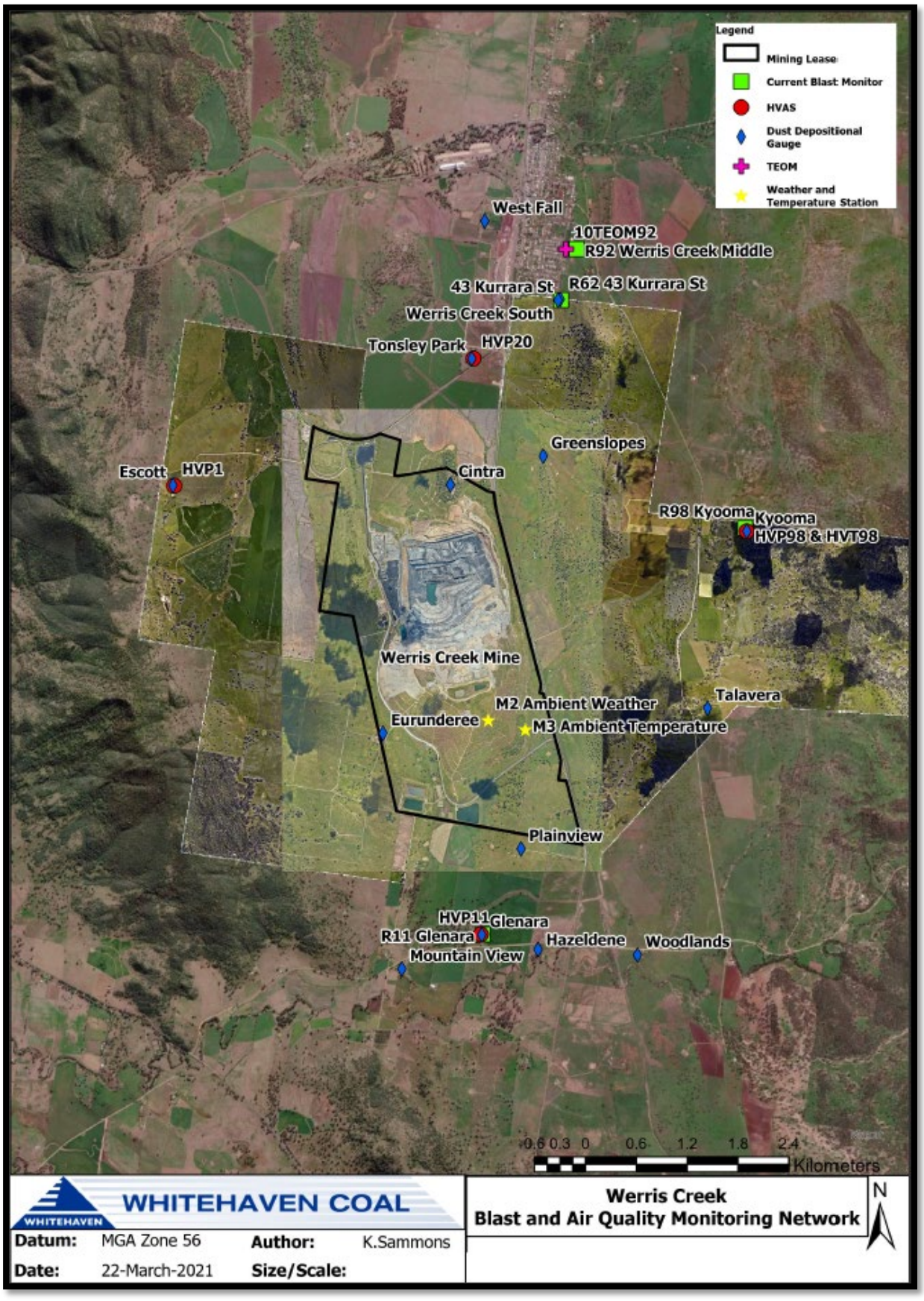

Figure 3: Blast Monitoring Sites and Air Quality Monitoring Network

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 (2022). As a comparison to previous years, no exceedance was reported in 2022.

EA Predictions

Table 8 – Measured WCC Noise Levels vs EA Predictions

Measured WCC noise levels above NVIA Predictions (2022)			
	Day-time dB(A)LAeq,15min	Evening/night-time dB(A)LAeq,15min	Sleep Disturbance dB(A)LA1,1min
G Kyooma	--	--	5[1]
H R97	--	--	5[1]

1. Measured minus predicted level during October 2022

Based on attended noise monitoring conducted by Spectrum Acoustics, the historical noise data for WCC mine throughout the 2018, 2019, 2020, 2021, and 2022 noise monitoring surveys consistently demonstrated trends in which measured noise levels from the site were well below the worst-case EA predictions, respectively, for each receiver location.

Review of monitoring results over the five-year period WCC noise levels remained below the noise criteria, showing trends of very limited variation in measured noise levels from WCC. The majority of levels were inaudible, fewer than 1% were above EA predictions and none exceeded the relevant noise criteria at any receiver in any time period.

6.1.3 Proposed Improvement Measures

N/A

6.2 BLASTING

6.2.1 Environmental Management

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 continued and maintained 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 metres;
- 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 is undertaken at four monitoring locations illustrated in 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 reporting period.

6.2.2 Environmental Performance

There were 72 blast events undertaken during the 2022 reporting period. All blast events were within the applicable air blast overpressure and ground vibration limits set out in PA 10_0059 MOD2.

EA Predictions

As seen in Table 10 the 2022 Average Blasting Parameters has resulted in lower than expected average blast parameters at the lowest MIC level. This shows that the 2022 blasting impact data is lower than the predicted levels in the EA.

Maximum values have not exceeded the criteria of 120dB or 10mm/s. Some maximum values for 2022 show correlation with the 1200 MIC blast predictions (Table 10). The maximum recorded data is consistent with the EA predictions for larger designed blasts.

An analysis of the data in Table 10 shows that the average blasting results are below the EA predictions therefore the monitoring data demonstrates a trend that blasting impacts are consistently below EA predicted levels.

Table 9 – Blasting EA Predictions

EA Predictions	2022 Performance
No exceedances of the maximum blast overpressure limit of 120dB have been predicted at any receiver for the range of blast sizes likely to be required.	No exceedance of 120dB was recorded in the reporting period. This is consistent with the EA predictions.

Table 10 - Predicted Blast Overpressure and Vibration Levels

Receiver		Distance	MIC (kg)						2022 Average Blasting Parameters		2022 Maximum Blasting Parameters	
			400		800		1200					
			OP	PPV	OP	PPV	OP	PPV	OP	PPV	OP	PPV
R20	**"Tonsley Park" [1]**	1740*	111	1.4	113	1.7	115	1.9	101.95	0.50	110.7	1.41
R55	**Pitkin [2]**	2680*	107	0.9	109	1.1	110	1.2	101.95	0.50	110.7	1.41
R14	**WCC Owned Property[&]**	1315*	114	1.8	116	2.3	118	2.6	-	-	-	-
R96	**"Talavera"[3]**	2580*	107	0.9	109	1.1	111	1.3	101.25	0.76	112.5	1.94
R15	**"Glenara Blast Monitor"**	2525*	107	0.9	109	1.1	111	1.3	100.58	0.11	113.3	0.27

*Distances only accurate at time of report (Spectrum 2010)

1Tonsley Park receiver is located approx. 1.2km South West of Werris Creek South Blast Monitor.

2Pitkin Receiver is located on Kurrara Street approx. 300m West of Werris Creek South Blast Monitor.

3Talavera Receiver is located approx. 2.1km South, South West of Kyooma Blast Monitor

[&] R14 was predicted as it was privately owned at the time. This property has since been purchased by WCC

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 maintained and continued 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 minimise trafficable dust generation;
- The extent of disturbed areas (pre-strip clearing and rehabilitation) are minimised to that required for mining operations, with these areas stabilised 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 sprinkler system installed during the reporting period to minimise dust entrainment off the steel Authority India Limited (SAIL) stockpile in adverse weather conditions;
- Water Sprinklers used on the TLO to aid in dust suppression in adverse weather conditions;
- 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 maintained throughout the next reporting period to continually improve air quality performance.

The WCC Air Quality Monitoring network is illustrated in Figure 3 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 dust deposition gauges surrounding WCC, measuring deposited dust and particulates collected monthly.

6.3.2 Environmental Performance

TEOM

Monitoring conducted at the Werris Creek TEOM indicates the PM_{10} annual average remained below the applicable criteria of 30 µg/m^3. The 24-hour measurements of PM_{10} also remained below the 24-hour average limit of 50 µg/m^3.

Figure 4 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.

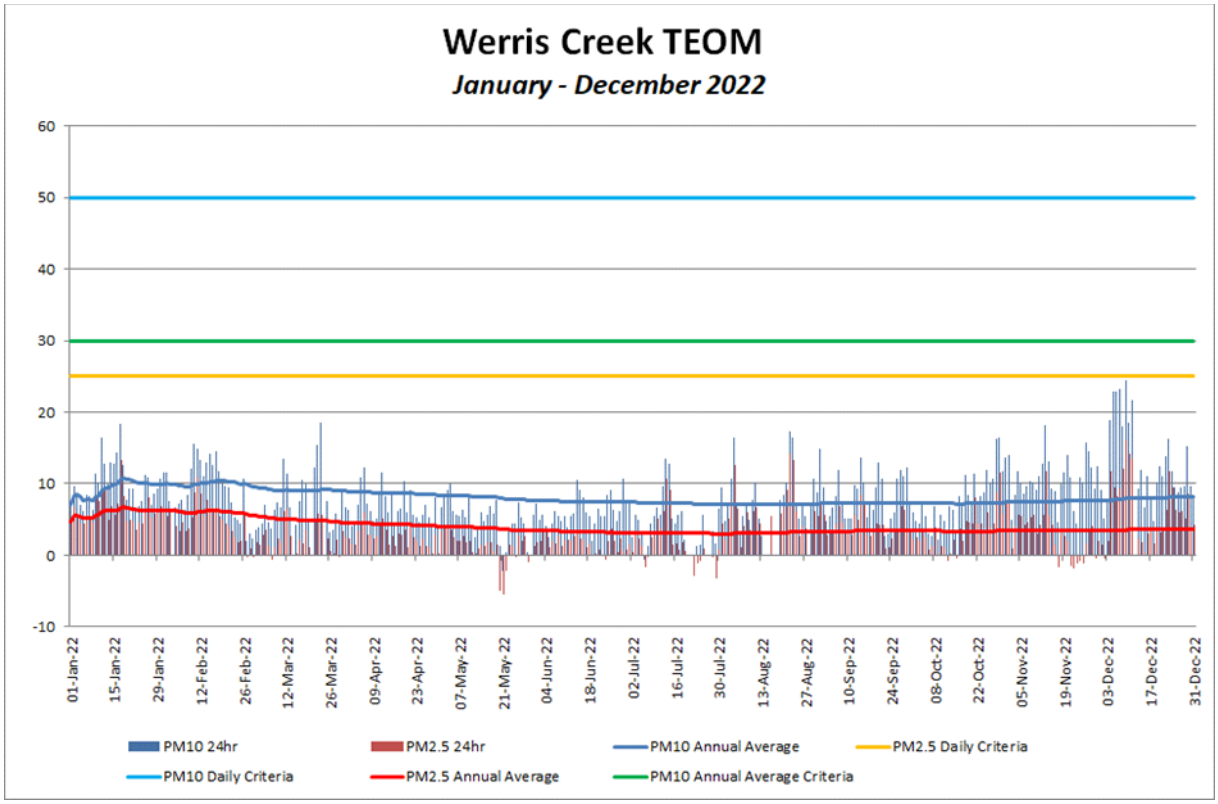

Figure 4: Werris Creek TEOM summary for January – December 2022

HVAS

Monitoring conducted across the HVAS PM10 network has shown the rolling annual average PM10 concentrations to be below the criteria of 30 µg/m3 at all monitoring stations across the network during the reporting period, see Figure 3 and Table 11.All the 24-hour measurements of PM_{10} remained below the daily criteria of 50 µg/m^3 as shown in Figure 5.

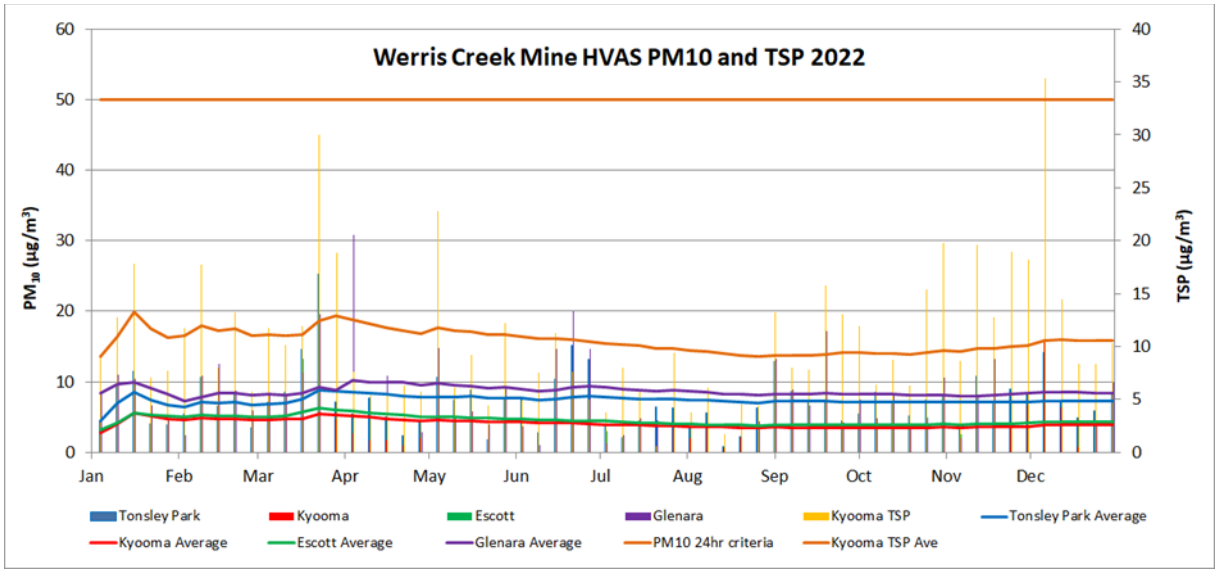

Figure 5: Werris Creek Mine HVAS PM_{10} and TSP results for January – December

A summary of current and historical HVAS and TEOM data is presented in Table 11.

Table 11 - TEOM and HVAS Averages

Location	2019	2020	2021	2022
	µg/m³			
10TEOM92 – Werris Creek	27.0	14.7	9.4	8.1
HVP20 – Tonsley Park	33.0	19.4	10.7	7.3
HVP98 – Kyooma	25.0	10.5	5.6	3.9
HVP1 – Escott	22.0	9.9	6.1	4.4
HVP11 – Glenara	32.3	14.5	8.9	8.4

Deposited Dust

Analysis of January – December 2022 monitoring results from depositional dust gauges shows that all monitoring sites met compliance criteria. DG2 (Cintra) recorded some results that had been contaminated or investigated and identified as non-mining related readings as detailed below.

DG2 (Cintra) had consistently high dust levels through the first half of the year with a slight reduction through the later part of the year. The dust is consistent with the activities of the nearby mining activity immediately adjacent to the dust gauge – DG2 is located within the Mining Lease Boundary. A summary of deposited dust monitoring results is presented in Table 12 below.

Also DG96 (Talavera) has not been sampled since 2017 due to the landholder removing the dust gauge. Therefore, it has been removed from Table 12.

Table 12 – Deposited Dust Summary for 2022

EPL# 12290	ID	Property	Annual Average	Average - Excluded	Minimum	Maximum	AQGHGMP Criteria	# Results Excluded
-	DG1	Escott^	1.1	1.1	0.1	2.5	4.0	0
-	DG2	Cintra^	7.7	**5.1**	2.6	8.5	4.0	7
-	DG3	Eurunderee^	0.9	0.9	0.5	1.5	4.0	0
-	DG5	Railway View^	2.3	2.3	0.7	4.4	4.0	0
-	DG9	Marengo^	1.2	1.2	0.3	2.4	4.0	0
#29	DG11	Glenara	1.1	1.1	0.1	3.5	4.0	0
-	DG14	Greenslopes^	0.9	0.9	0.2	2.1	4.0	0
-	DG15	Plain View^	1.8	1.4	0.5	5.2	4.0	1
-	DG17	Woodlands	2.3	2.1	0.7	6.6	4.0	1
-	DG20	Tonsley Park^	1.6	1.6	0.6	2.4	4.0	0
-	DG22	Mountain View	1.1	1.1	0.4	2.6	4.0	0
-	DG24	Hazeldene	2.0	2.0	0.4	4.1	4.0	0
-	DG34	8 Kurrara Street	0.8	0.8	0.2	1.3	4.0	0
-	DG62	Werris Creek South	1.4	1.2	0.5	3.0	4.0	2
#30	DG92	Werris Creek Centre	0.5	0.5	0.1	1.1	4.0	0
#28	DG98	Kyooma	1.0	1.0	0.1	2.6	4.0	1
-	DG101	Westfall	2.8	1.8	0.4	3.4	4.0	1
-	DG103	West Street	1.9	1.9	0.4	3.9	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

Results Removed = Sample was deemed contaminated or not sampled due to vandalism

EA Predictions

The DDG annual averages have been compared to the EA predictions (Figure 6).

The EA predictions have been made via scenarios whereby scenario two is year 7 of mining production and scenario three is year 15 of mining production. Werris Creek Coal mine is currently operating in year 13 of mining production since the predictions were made (Heggies 2010).

As seen in Figure 6 below the Deposited Dust Gauges (DDG) have displayed a slight increase on some predictions made in the EA (Heggies 2010). This is a maximum variance of 1.6g/m^2/month in scenario 3 which. This shows that the EA predictions are generally correct and some DDGs show an improvement on EA predictions.

It can be shown that PM_{10} and TSP were significantly under the EA predictions in both Scenario 2 and 3 (Figure 6)

As shown in Table 11 the TEOM and HVAS Averages for previous years show a decreasing trend.

DUST DEPOSITION *(g/m^2/month)*

SCENARIO 2 (Year 7)	AQ Assessment* Receptor ID	2022 Annual Average	SCENARIO 2 (Year 7) PREDICTION	Variance from Prediction
DG11 "Glenara"	11	1.1	0.7	0.4
DG14 "Greenslopes"	14	0.9	1.1	-0.2
DG15 "Plain View"	15	1.8	0.9	0.9
DG17 "Woodlands"	17	2.3	0.7	1.6
DG20 "Tonsley Park"	20	1.6	1.2	0.4
DG22 "Mountain View"	9	1.1	0.7	0.4
DG24 "Hazeldene"	24	2.0	0.7	1.3
DG98 "Kyooma"	98	1.0	0.7	0.3

SCENARIO 3 (Year 15)	AQ Assessment* Receptor ID	2022 Annual Average	SCENARIO 3 (Year 15) PREDICTION	Variance from Prediction
DG11 "Glenara"	11	1.1	0.7	0.4
DG14 "Greenslopes"	14	0.9	1.3	-0.4
DG15 "Plain View"	15	1.8	0.8	1.0
DG17 "Woodlands"	17	2.3	0.7	1.6
DG20 "Tonsley Park"	20	1.6	1.1	0.5
DG22 "Mountain View"	9	1.1	0.6	0.5
DG24 "Hazeldene"	24	2.0	0.6	1.4
DG98 "Kyooma"	98	1.0	0.7	0.3

PM_{10} (HVAS) *(µg/m^3)*

SCENARIO 2 (Year 7)	AQ Assessment* Receptor ID	2022 Annual Average	SCENARIO 2 (Year 7) PREDICTION	Variance from Prediction
HVP11 "Glenara"	11	8.4	16.3	-7.9
HVP20 "Tonsley Park"	20	7.3	20.0	-12.7
HVP98 "Kyooma"	98	3.9	16.0	-12.1

SCENARIO 3 (Year 15)	AQ Assessment* Receptor ID	2022 Annual Average	SCENARIO 3 (Year 15) PREDICTION	Variance from Prediction
HVP11 "Glenara"	11	8.4	15.9	-7.5
HVP20 "Tonsley Park"	20	7.3	19.9	-12.6
HVP98 "Kyooma"	98	3.9	15.9	-12.0

TSP (HVAS) *(µg/m^3)*

SCENARIO 2 (Year 7)	AQ Assessment* Receptor ID	2022 Annual Average	SCENARIO 2 (Year 7) PREDICTION	Variance from Prediction
HVT98 "Kyooma"	98	10.6	32.6	-22.0

SCENARIO 3 (Year 15)	AQ Assessment* Receptor ID	2022 Annual Average	SCENARIO 3 (Year 15) PREDICTION	Variance from Prediction
HVT98 "Kyooma"	98	10.6	32.2	-21.6

Figure 6 – Air Quality Data vs EA Predictions

*Air Quality Assessment for Werris Creek Coal Mine Life of Mine Project (Heggies Pty Ltd, December 2010

- **DUST DEPOSITION** - Across all receptors, there was an overall annual average increase of 0.6 g/m2/month above the Predicted level for Year 7 and 0.7 g/m2/month in Year 15
- **PM^{10}** - Across all receptors, there was an overall annual average decrease of 10.9 µg/m3 below Predicted level in Year 7 and 10.7 µg/m3 in Year 15
  TSP - At designated receptor there was an annual average decrease of 22 µg/m3 below Predicted level for Year 7 and 21.6 µg/m3 in Year 15

6.4 GREENHOUSE GAS

6.4.1 Environmental Management

Greenhouse Gas (GHG) emissions at the Werris Creek Mine are managed in accordance with Schedule 3 Conditions 15 of PA 10_0059 and the AQGHGMP. The main sources of GHG emissions considered in the AQGHGMP are:

- Consumption of diesel fuel – Scope 1;
- Release of fugitive emissions from the fracturing of coal seams – Scope 1; and
- Consumption of electricity – Scope 2.

6.4.2 Environmental Performance

GHG emissions are reported through participation in the National Pollutant Inventory (NPI) and as part of the Whitehaven Group in the National Greenhouse and Energy Reporting Scheme (NGERS). The total of Scope 1 and Scope 2 GHG emissions attributed to WCC reported for the NGERS FY2022 reporting year were 47,949 t CO_2-e. The FY2022 EA prediction was 167,140 t CO_2-e.

Fugitive emissions methodology used in FY22 GHG reporting and EA predictions was not comparable. Method 1 was utilised for estimating EA predictions using a default emissions factor and method 2 was used for FY22 GHG data reporting utilising an operations emissions model which was created by a comprehensive gas sampling program to determine site specific emission factors for each coal seam. Fugitive emissions have been reported using method 2 at Werris Creek since 2016.

To allow for a comparison between total and fugitive emissions, emissions have been recalculated using method 1. Method 2 and the running of the emissions model is unable to be retrospectively applied to EA predictions due to limitations in data availability.

The recalculated total emissions using an EA comparable method is 115,167 t CO_2-e which is below EA predictions of 167,140 t CO_2-e for FY22.

Scope 1 emissions

Scope 1 greenhouse gas emissions for the FY2022 NGERS reporting period were 47,051 t CO2-e. The FY2022 EA prediction for Scope 1 emissions was 165,283 CO_2-e.

Scope 2 emissions

Approximately 1,136,532 kWh electricity was purchased by the mine during the FY2022 reporting period equating to 898 t CO_2-e GHG emissions. This is less than the previous reporting period and the FY2022 EA predicted consumption of 1,857 t CO_2-e. From October 2022 WHC offset Scope 2 emissions by purchasing 100% carbon neutral electricity across all sites.

6.5 BIODIVERSITY

6.5.1 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).

6.5.2 Environmental Performance

Werris Creek Coal Mine (WCCM) Biodiversity Offset Management Plan (BOMP) was approved by DPE on 30 August 2013 and WCCM Offset Management Plan was approved by the former DoEE (now DCCEEW) on 4 July 2017. The WCCM Biodiversity Offset Strategy (BOS) is required to offset 1317ha of native woodland to achieve a 'like for like or better' biodiversity outcome across six Offset properties 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.

Weather Summary of WCCM Offset Properties

Regionally central meteorological station to the BOAs is the Gunnedah Pool site (BOM 2023) which has recorded highly variable rainfall over the last 4 years; from driest in 140 years of 237mm in 2019, followed by above average rainfall years in 2020, 2021 and 2022 of 833mm, 990mm and 860mm respectively resulting in major flooding of the Namoi River in October and November 2022. WHC maintains a meteorological station within the WCCM BOA with a summary of weather conditions experienced at the Narrawolga Offset property during the 2022 reporting period being a maximum monthly average temperature of 31°C in January 2022 and a minimum monthly average temperature of 0°C in June 2022. Annual temperature ranges were -3°C to 35°C in 2022. The total annual rainfall in 2022 was 823mm with the maximum in October (140mm) and minimum in June (19mm).

Offset Security Management

The WCCM BOA has previously been secured using NSW Conveyancing Act 1919 Section 88E Instruments which were registered on 20 July 2018 and 2 August 2018 finalising compliance with PA 10_0059 Schedule 3 Condition 27 and EPBC Act Approval 2010/5571 Condition 1 achieving securement of the WCCM BOS.

Infrastructure Management

During the reporting period, existing fencing (fauna friendly) was maintained along the perimeter of WCCM BOA as well as maintenance of signage and gates undertaken as required to continue to restrict unauthorised access and minimise livestock incursion. During the reporting period, 1.84km of redundant internal fencing was deconstructed from Hillview BOA. There are no known remaining derelict assets/infrastructure items to be removed but if any are found, those items will continue to be assessed, removed and remediated as required.

Seed Management

The routine seed assessments on the WCCM BOA aims 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. During the reporting period, no seed collection onsite was undertaken but as part of the WHC group wide revegetation planning; previously collected onsite seed was supplemented with other collected regionally provident seed by reputable seed collectors as well as commercially sourced local seed stock. 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 2022 revegetation program for the WCCM BOA.

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 utilised tractors and skidsteers augering holes (to a depth >0.3m) to relieve compaction, improve permeability and infiltration to increase sub-surface soil moisture for planting as part of the 2022 revegetation program on the Eurunderee, Narrawolga, Railway

View and Greenslopes Offset properties. There was no understorey revegetation carried out during the reporting period due to above average rainfall and vegetation growth preventing ecological burns from being undertaken and thus preventing adequate ground preparation from occurring. The overstorey revegetation program was undertaken between March and June 2022 across the Eurunderee, Railway View and Hillview and Marengo Offset properties with 8125 hiko seedlings of woodland species planted over 117ha of the WCCM BOA. Seasonal conditions, routine tree watering and maintenance activities post planting have been successful to ensure that over 67% survival has been achieved for the WCCM BOA which is commensurate with the target woodland vegetation structure.

Heritage Management

During the reporting period, annual heritage inspections were completed on the 2 known Aboriginal archaeological heritage sites and 1 European historical heritage site within the WCCM BOA. Each site is maintained with 155m of demarcation fencing around the heritage site perimeter and signage to mitigate access and inadvertent disturbance.

Habitat Management

During the reporting period, habitat augmentation was undertaken with 29 nest boxes targeted for Small Gliders and Brown Treecreepers were installed on the Offset Properties of Railway View, Hillview and Marengo during reporting period. This brings the total nest boxes installed on the WCCM BOA to 46.

Weed Management

WHC coordinated routine formal weed monitoring/inspections undertaken across WCCM BOA in February, May, September and December 2022. The priority weeds identified included legacy weeds inherited from previous owner's management regimes such as Johnston's Grass, Prickly Pear and St John's Wort as well as a range of broadleaf weeds within revegetation areas. The weed monitoring/inspections ensure that timely and prioritised weed control is undertaken on a seasonal basis with the information directly given to spraying contractors to identify what, where, when and how to target appropriate resources across the WCCM BOA for weed control. During the reporting period, WHC implemented a weed control program across the WCCM BOA including 302ha treated in January, March, August to December 2022 targeting St Johns Wort, Pattersons Curse, Turnip and other broadleaf weeds and grasses within revegetation areas and along tracks. 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 Animal Management

WHC undertook routine pest animal monitoring across the WCCM BOA in 2022 adopting the "monitor, measure and manage" approach to feral animal management; which 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. Pest animal monitoring primarily utilises remote sensor cameras for pest animals generally in accordance with the NSW DPI Monitoring Techniques for Vertebrate Pests as cameras now provide the best option of detection for the greatest range of species as well as being complemented by pest animal sighting reports. Monitoring demonstrated that certain animals like Eastern Grey Kangaroos can be high, Foxes, Hares and Feral Pigs can be in varying abundance from High to scarce seasonally on some offset properties. Deer and Feral Cats have also been recorded in medium abundance on some offset properties, seasonally with all other feral animal species recorded as scarce to low abundance levels across 2022. The feral animal monitoring ensures that timely and prioritised feral animal control is undertaken on a seasonal basis identifying what, where, when and how to target appropriate resources across the WCCM BOAs for feral

animal management. During the reporting period, WHC implemented a comprehensive feral animal control program across the WCCM BOAs with routine 1080 baiting and canid pest ejectors deployed throughout the year. The 1080 baiting program removed 55 Foxes from 348 baits presented on the WCCM BOA resulting in 16% of the baits presented being taken by target feral animals. Only appropriately qualified and experienced feral animal contractors (appropriate feral animal management qualifications, NSW fire arm licence and pesticide accreditation where relevant) were engaged to undertake feral animal control works for WHC.

Soil & Erosion Management

Annual inspections were undertaken including unsealed fire break tracks and associated drainage structures across the WCCM BOA to review appropriate erosion and sediment control measures required in accordance with the Blue Book (Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004)). Despite the above average rainfall during the reporting period; no locations of targeted additional maintenance was identified out of 9 observations within the WCCM BOA to mitigate further erosion and sedimentation. The remaining tracks/drainage structures are maintained during routine WHC Biodiversity fire break track maintenance program. There are also a number of legacy erosion sites inherited from previous owners management regimes that are subject to a separate annual inspection process and updates to the WHC erosion register made. During the reporting period, monitoring or remediation actions and investigations commensurate to the risk were undertaken for the 5 erosion sites identified within WCCM BOA.

Grazing Management

WCCM BOA has been destocked since 2012 and continued to be destocked and no strategic grazing occurring during the reporting period. There were two instances of stock incursion during the reporting period; with stock on each occasion retrieved and fencing repaired as required.

Bushfire Management

In accordance with the BOMP, annual fuel load monitoring was undertaken between September and November 2022 as part of planning and assessment of bushfire hazard and ecological burn program for 2023; with the results indicating moderate overall fuel loads present. During the reporting period, no bushfires occurred and no ecological burns were undertaken. Other fire management implemented during the reporting period was maintenance carried out as required on 85.9 kilometres of fire tails to a zero fuel barrier standard across the WCCM BOA. WHC maintains regular communications throughout the reporting period with the Liverpool Range Zone RFS team around planning of WHC Biodiversity's ecological burn programs as well as maintaining contact points in case of emergency. WHC maintains a specialist fire fighting contractor for an oncall engagement during the fire season to respond in the event of a bushfire on WHC BOAs and non-mining lands.

Monitoring Program

During the reporting period, the ecological monitoring program of the Werris BOA included winter bird surveys that were undertaken in June/July 2022 and annual spring flora monitoring of 25 plots across four vegetation zones (VZs) undertaken during September and November 2022 while annual fauna monitoring was undertaken between January and October 2022 at 26 spring bird survey sites, 14 microbat echolocation survey sites and 4 passive acoustic recorder sites. During the winter bird surveys, two threatened species (Speckled Warbler and Little Lorikeet) were recorded. During flora monitoring, two VZs (North-west Slopes Dry Sclerophyll Woodlands – Good condition, Western Slopes Grassy

Woodlands – Semi-cleared/Good condition) were recorded as meeting or exceeding completion criteria for all 4 biometrics. Native plant species richness (NPS) completion criteria (native species richness benchmark for relevant biometric vegetation communities) was met or exceeded at 2 out of 4 VZs. Native overstorey cover (NOS) completion criteria (minimum overstorey cover benchmark for relevant biometric vegetation communities) was met or exceeded at 3 out of 4 VZs. Native midstorey cover (NMS) completion criteria (minimum midstorey cover benchmark for relevant biometric vegetation communities) was met or exceeded at all four VZs. Native ground cover grass (NGCG) completion criteria (minimum groundcover benchmark for relevant biometric vegetation communities) was met or exceeded at all 4 VZs. Comparison of individual plot data shows that NPS decreased from 64% of plots last year to 48% of plots meeting or exceeding the completion criteria in 2022. Native overstorey cover (NOS) increased from 64% of plots last year to 72% of plots meeting or exceeding the completion criteria in 2022. Native midstorey cover (NMS) remained consistent with the previous year at 84% of plots meeting or exceeding the completion criteria in 2022. Native ground cover grass (NGCG) increased from 92% of plots last year to 96% of plots meeting or exceeding the completion criteria in 2022. A total of 69 bird species were recorded during standardised spring bird surveys, which was a slight increase from the 2021 species richness of 65. Across the 26 sites, species richness values ranged between 2 to 25 per site. Split by habitat, 48 species of bird were detected in 8 remnant woodland sites (average = 20.1, range 15 to 25), 28 in 10 revegetation sites (average = 11.28; range 6 to 14), and 22 in 8 naturally regenerating sites (average = 8.28; range 2 to 15). Up to 17 species of microbat were positively identified from echolocation recordings across 14 sites including four species listed as threatened under the BC Act with species richness values ranging between 0 and 14 per site. By habitat, 15 species were detected in remnant woodland sites (average 10, range 0 - 14), 15 species naturally regenerating sites (average = 11.25, range 8 - 14) and 14 species in revegetated woodland sites (average 8.75, range 0 - 14).

Proposed Improvement Measures

Monitoring programs such as quarterly weed inspections and quarterly seed assessments will continue to be implemented into the next period to maintain an in depth understanding of changing climatic conditions and site-specific challenges.

EA Predictions/Impacts

Predicted impacts on biodiversity are outlined in the biodiversity impact assessment undertaken by Ecological Australia in 2010 (Ecological 2010). Predicted impacts are quoted below.

- “The LOM Project would result in the removal of approximately 194 ha of native vegetation, comprising approximately 59 ha of woodland vegetation (Class 4) and 135 ha of derived native grasslands (Class 3a and 3b)”
- “Potential edge effects that may be introduced by the LOM Project include weed invasion and fragmentation of existing woodland remnants.”

Werris Creek Coal Mine has continued to operate via within the approved MOP and PA disturbance boundary and has not modified the clearing extent or crest of the pit. Clearing in 2022 consisted of clearing 3.09ha of native vegetation for strip 23 and 24. This formed the completion of clearing at WCC and completion of the 194ha of clearing predicted by Ecological in 2010.

Weed invasion is a high priority maintenance task and has been outlined in section 6.4.2 of this report. With the continual growth progression of offset properties, the site is tracking well to maintain alignment with the EA predictions via weed control and expansion of woodland continuity throughout the local area.

6.6 HERITAGE

6.6.1 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. The mining of the former underground workings were finalised during the first half of 2020. No items of heritage significance were located.

6.6.2 Environmental Performance

No previously unknown sites or artefacts were discovered during the period. This is consistent with the EA Predictive model and the Cultural Heritage Assessment undertaken by Landskape (2010).

EA Predictive Model

Based on the regional archaeological record, the high level of disturbance on the Project Site and the general setting of the Project Site, Landskape (2010) proposed the predictive model of Aboriginal cultural heritage site locations on the Project Site summarised in Table 13.

Table 13 – Heritage EA Predictions

EA Prediction	2022 Performance
Trees scarred or carved by Aboriginal people may occur wherever mature Eucalypt and Cypress Pine trees grow. However, given the extent of vegetation clearance the probability of encountering culturally modified trees is not particularly high.	No previously unknown Scarred Trees were observed in the reporting period. This is consistent with the EA predictions.
Stone artefact scatters and isolated finds of stone artefacts are possible over the entire Project Site, but their density is likely to be low due to the absence of creeks and wetlands on or immediately surrounding the Project Site.	No previously unknown Stone Artefacts were observed in the reporting period. This is consistent with the EA predictions.
Burial sites are unlikely, given that the region's acidic soils are not suited to preserving bone and other organic material.	No previously unknown burial sites were observed in the reporting period. This is consistent with the EA predictions.

Freshwater shell middens will not occur because they are rarely found more than 100m from permanent water sources.	No Freshwater Shell Middens were observed in the reporting period. This is consistent with the EA predictions.
Earthen features including mounds, ovens and hearths, stone arrangements and ceremonial rings are unlikely to be encountered because previous land disturbance such as earthworks associated with past and recent quarrying and mining activities, grading roads and fence lines, and ploughed cultivation during agricultural cropping is likely to have destroyed earthen and stone features (had these site types originally occurred within the Project Site).	No previously unknown mounds, ovens, hearths, stone arrangements or ceremonial rings were observed in the reporting period. This is consistent with the EA predictions.
Some sites dependent upon the presence of rock formations such as rock shelters and rock art sites are also improbable because the sedimentary bedrock in the low hills and ridges of the Project Site does not contain caves or overhangs. The Project Site is not suited to quarrying, although Aboriginal people may have collected pebbles and cobbles from colluvial and alluvial deposits for stone artefact knapping.	No previously unknown rock formations or rock shelters were observed in the reporting period. This is consistent with the EA predictions.
Axe-grinding grooves may occur on sandstone surfaces, and as such outcrops in the Project Site were targeted for particular attention during the survey.	No previously unknown Axe-grinding Grooves were observed in the reporting period. This is consistent with the EA predictions.
Any historical heritage sites in the Project Site were anticipated to most likely relate to early pastoral activities of the last half of the nineteenth century or the first half of the twentieth century and coal mining activities associated with the former Werris Creek Colliery (of 1920s to 1960s). Site types that have the potential to occur include ruins of mine structures, discarded mining and farming machinery and blazed survey marks.	No previously unknown European artefacts or items of interest were observed in the reporting period. This is consistent with the EA predictions.

6.7 WASTE

6.7.1 Environmental Management

WCC continued to engage a total waste management service provider during 2022. This practice has ensured WCC is positioned to maintain regulatory compliance with regard to offsite disposal at licenced facilities and on-site storage requirements.

6.7.2 Environmental Performance

The engaged waste management service provider records waste generation quantities at the point of either disposal or collection. The quantities of each generated waste type have been summarised in Table 14 for the 2022 period. The current reporting period demonstrates benefits in total levels of resource recovery seen from improvements to waste management practices at WCC originally implemented in late 2014. These improvements have led to reduction in general waste volumes, while seeing regular recycling / resource recovery overall 2022 saw improvements in waste tracking via increased accuracy in recording of waste quantities being generated and disposed from site. These waste tracking improvements provide for an enhanced degree of measurability of the success for all resource recovery initiatives undertaken going forward.

Table 14 – Approximate Quantities of Waste Generated in 2022 vs EA Predictions

Waste Stream	2019	2020	2021	2022	EA Estimate/ Predictions	Discrepancy
Waste Oil (kL)	162.3	214.5	212.5	178.9	130	+48.9
Scrap Metal (tons)	33.0	36.5	46.0	52.8	#	+6.8^
General Waste (tons)	*1302 m^3	163.8	138.53	88.17	800m^3	#
Co-Mingled Recycling (tons)	*170m^3	6.25	6.74	7.73	#	+0.99^
Timber (tons)	N/A	6.76	12.6	8.0	#	-4.6^
Liquid Waste – J120 / Septic (L)	4000	22,500	54,100	15,500	10,000#	+5,500
Empty IBCs (tons)	N/A	4.4	0.9	1.0	#	+0.1^
Hydraulic Hoses + Filters (tons)	20.5	17.2	12.3	12.2	#	-0.1^
Batteries (tons)	N/A	4.9	2.2	3.1	#	+0.9^
Tyres (each)	NA	NA	56	52	68	-4$

* Previously recorded / reported as cubic meters (m3) only.
^Discrepancies calculated from previous year instead of EA Prediction.
@Estimate of Septic only not including J120 waste
No estimate/prediction for this waste stream. (Note: all waste streams are removed by a licenced contractor and majority recycled)
$ 145 tyres were disposed of in-pit in accordance with WCC's EPL in 2022. Majority of these tyres were stockpiled from previous years.

EA Prediction

Table 14 documents the variation between the EA predicted waste volumes and the reported waste for 2022. The existing OWS was replaced by an above ground OWS which has lowered the amount of J120 waste to be disposed of in 2022.

The discrepancy in waste oil recycled is due to the change in machinery used onsite in 2022 compared to the EA predictions.
Variations include:

- + 1 x 5600 (560 Ton) Excavator
- + 2 x 87 Ton Excavator
- + 1 x D11 Bulldozer
- + 1 x D10 Bulldozer
- + 2 x Graders
- + 3 x Lighting Plant
- + 1 x Service/fuel cart

As seen in Table 14 some waste streams produced by Werris Creek are not covered in the EA predictions. This shows that WCC is segregating waste effectively and recycling material to individual waste types resulting in reduced overall waste production. Table 14 above shows a trend of increased segregation of co-mingled recycling, scrap metal and timber, correlated to a ~50 ton decrease in general waste.

Based on data shown in Table 14 recyclable waste streams show an increasing trend with a correlated decreasing trend in general waste.

6.8 ENVIRONMENTAL PERFORMANCE SUMMARY

An environmental performance summary is presented in Table 15 below.

Table 15 – 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	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 2022 reporting year summarised in Table 16.

Table 16 - Water Take 2022 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	49	0	49
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 (VWDs) comprising the void water management system at WCC. VWDs 1, 2, 3, 4 and 7 are long term water storage structures, while VWD 8 is a temporary structure, designed for the transfer of void water for use around the project or short term out of pit storage of out of surplus void water. The operational functions of the current VWD2 will be replaced by VWD7 which was constructed in 2018 and is scheduled to be commissioned for full time operational use in 2023. VWD2 will be decommissioned shortly thereafter. This will allow for the northern advancement of the dump formation over the current location of VWD2 in line with the RMP. An annual inspection of the prescribed dams (VWDs 1, 3 and 4) was undertaken by an external structural engineer. The annual inspection 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 was a total of thirty-nine (39) discharge events during the reporting period from these dams. Nine (9) of those events were uncontrolled and thirty (30) were controlled discharge events.

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 transported either offsite (liquid waste to licensed waste facility) or to the onsite bioremediation area (solids) for treatment / disposal of residual hydrocarbons within the material.

7.2.2 Environmental Performance

Surface Water Quality – Routine Quarterly Monitoring

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 17 presents the average results recorded for routine quarterly monitoring at each location for the 2022 reporting period.

The quarterly water quality shown in Table 17 was generally consistent with the previous reporting period, showing a slight decrease in levels for all of the water quality parameters. This was attributed to consistent rainfall for the majority of the reporting period. Water quality monitoring was generally consistent with EA predictions for each analyte.

Table 17 – 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	7.9	1778	7	<5
			Max	8.2	1930	7	<5
VWD2	27	4	Ave	8.0	1648	14	<5
			Max	8.0	2220	14	<5
VWD3	-	4	Ave	8.0	1483	<5	<5
			Max	8.1	1500	<5	<5
VWD4	-	4	Ave	8.0	1648	22	<5
			Max	8.2	1680	22	<5
SB2	10	2*	Ave	8.0	362	33	<5
			Max	8.3	376	51	<5
SB9	12	2*	Ave	7.5	277	33	<5
			Max	7.6	284	38	<5
SB10	14	3*	Ave	7.6	594	31	<5
			Max	7.8	1100	37	<5
SB18	32	3*	Ave	8.1	296	57	<5
			Max	8.4	349	105	<5
QCU	25	4	Ave	7.8	617	11	<5
			Max	8.0	870	14	<5
QCD	26	4	Ave	7.9	747	13	<5
			Max	8.1	871	18	<5
WCU	23	4	Ave	8.2	986	8	<5
			Max	8.3	1130	8	<5
WCD	24	4	Ave	8.3	1074	15	<5
			Max	8.4	1230	22	<5

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

Surface Water Quality – Discharge Monitoring

Sampling of water discharged at the Licensed Discharge Points (LDPs) and Quipolly and Werris Creeks' (Figure 7) was undertaken by WCC during each discharge event (Controlled / Uncontrolled). There was a total of thirty nine (39) discharge events during the reporting period from these dams. Nine (9) of those events were uncontrolled and thirty (30) were controlled discharge events.

Discharge samples taken at EPL12 (SB11) and EPL10 (SB3) on 28th September and 30th September 2022 returned TSS readings above 50mg/L at 117 and 63 mg/L respectively. These readings were inconsistent with compliant <50mg/L preliminary samples from the dam obtained pre-discharge (20 and 9mg/L). An investigation found the discharge samples were affected by a sampling error. In correspondence with the EPA these two samples were deemed as a technical limit exceedance. However, based on a compliant preliminary sample and prompt corrective action undertaken by WCC the EPA did not request any further action. These results will be reported in the EPL 12290 annual return. WCC has reviewed the sampling procedure to avoid a similar error in the future.

Table 18 presents the average results recorded for discharge monitoring at each location for the 2022 reporting period.

Table 18 - Discharge Water Quality for LDP's and Offsite Creeks

Licensed Discharge Point/ Creek	Monitoring Site (EPA No)	Number of Samples	Value	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Oil & Grease (mg/L)
SB2	10	15	Ave	7.7	385	142	<5
			Min	7.0	100	5	<5
			Max	8.0	840	**633**	<5
SB9	12	18	Ave	7.5	388	91	<5
			Min	7.1	220	4	<5
			Max	8.1	780	**410**	<5
SB10	14	18	Ave	7.2	190	52	<5
			Min	6.8	80	9	<5
			Max	7.7	590	**190**	<5
SB18	32	0	Ave				
			Min				
			Max				
QCU	25	16	Ave	7.5	283	35	<5
			Min	6.8	90	2	<5
			Max	7.9	510	135	<5
QCD	26	16	Ave	7.6	355	55	<5
			Min	7.0	160	2	<5
			Max	7.9	780	157	<5
WCU	23	14	Ave	8.0	433	118	<5
			Min	7.1	120	8	<5
			Max	8.2	900	701	<5
WCD	24	14	Ave	8.0	490	334	6
			Min	7.0	130	10	<5
			Max	8.3	980	1390	7

* Sample location was dry during some of the discharge monitoring events.

Bold – indicates results outside criteria due to 5 day rain trigger >39.2mm.

Table 18 shows that all discharges were compliant with EPL 12290 criteria.

Surface Water Quality – Void Water Discharge - Irrigation

During the 2022 period, 26.79 ML of void water was utilised for beneficial reuse through irrigation for agriculture purposes. Table 19 outlines the water quality results taken prior to discharge. All results were within water quality criteria.

Table 19 – Surface Water Quality for Irrigation discharges in 2022

Dam/ Creek	Monitoring Site (EPA No)		pH	Electrical Conductivity (µS/cm)
EPL 100% Limit			9	2000
VWD1	33	Min Value	7.9	1626
		Max Value	8.3	1788

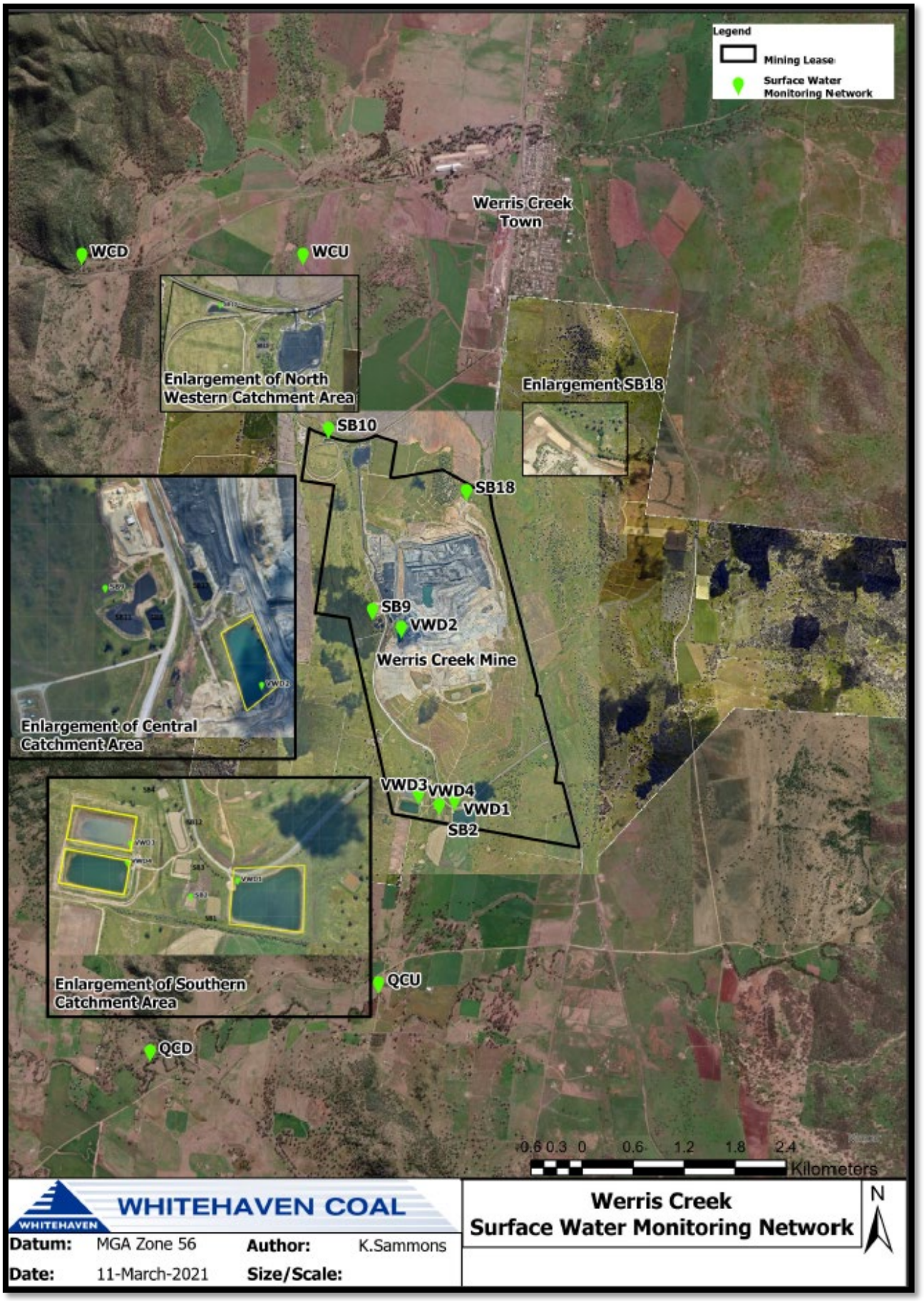

Figure 7 – Surface Monitoring Network

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 42 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 20 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, 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. The groundwater piezometers have been replaced in 2023.

Table 20 – 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
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
# Regional monitoring bore * Groundwater logger installed in bore. +Applies to MW1, MW2, MW3, MW4B, MW5, MW6 in conjunction with bimontly depth monitoring ^ Access to MW7 Is not available due to landholder restricting access for monitotring	

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.

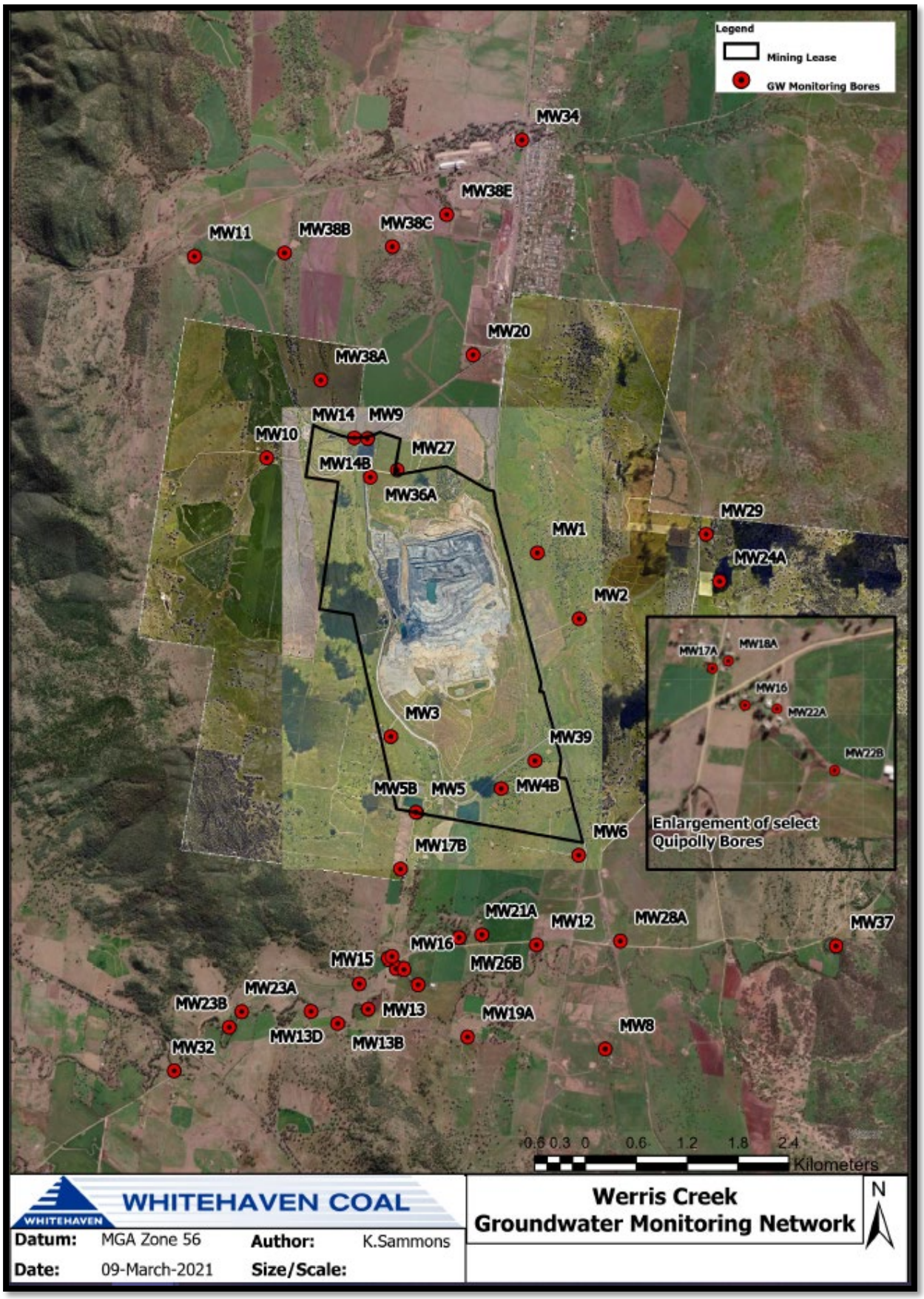

Figure 8: Groundwater Monitoring Network

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, has been assessed through groundwater level and chemistry monitoring. Monitoring focuses on the Werrie Basalt and Quipolly Alluvium aquifers.

Table 21 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 21 – Groundwater Monitoring Bore Level Summary – January to December 2022

	Site	January-22		March-22		May-22		July-22		September-22		November-22	
		mbgl	%	*mbgl*	%	*mbgl*	%	*mbgl*	%	*mbgl*	%	*mbgl*	%
Werrie Basalt near WCC	**MW1**	Dry		Dry		Dry		Dry		Dry		Dry	
	MW2	37.71	15%	33.18	14%	33.46	-1%	34.10	-2%	33.70	1%	32.86	3%
	MW3	18.38	2%	17.60	4%	17.34	1%	17.05	2%	16.68	2%	15.56	7%
	MW4B	17.28	4%	16.56	4%	16.18	2%	15.78	3%	15.57	1%	14.77	5%
	MW5	9.87	10%	9.73	1%	9.62	1%	9.48	1%	8.88	7%	7.70	15%
	MW6	15.47	6%	15.20	2%	14.92	2%	14.73	1%	15.61	-6%	14.37	9%
	MW27*	52.82	5%	52.05	1%	51.84	0%	52.48	-1%	52.07	1%	46.32	12%
	MW36A	17.29	0%	18.35	-6%	18.86	-3%	19.23	-2%	18.74	3%	16.83	11%
	MW36B	17.28	0%	18.33	-6%	18.84	-3%	19.22	-2%	18.72	3%	16.82	11%
Werrie Basalt	**MW8***	10.81	4%	No access		No access		No access		No access		No access	
	MW10	8.53	3%	8.78	-3%	9.19	-4%	9.40	-2%	9.26	2%	8.70	6%
	MW14	13.52	1%	14.39	-6%	14.74	-2%	14.95	-1%	14.84	1%	13.12	13%
	MW17B*	9.15	10%	13.78	-34%	11.30	22%	9.50	19%	8.85	7%	7.83	13%
	MW19A*	Pump over bore		Pump over bore		Pump over bore		Pump over bore		Pump over bore		Pump over bore	
	MW20*	19.41	4%	19.27	1%	18.83	2%	18.92	0%	18.72	1%	17.39	8%
	MW38A	8.91	-4%	9.81	-9%	10.42	-6%	10.93	-5%	10.30	6%	8.97	15%
	MW38B*	8.60	2%	8.74	-2%	8.90	-2%	9.08	-2%	8.94	2%	8.54	5%
	MW38C*	21.29	1%	20.70	3%	20.67	0%	20.64	0%	-	-	Pump over bore	
	MW38E*	No access		No access		10.65	-22%	7.62	40%	7.33	4%	7.03	4%
	MW41	4.57	17%	4.70	-3%	4.94	-4%	5.13	-4%	4.53	13%	3.53	28%
	MW43	4.16	13%	4.35	-4%	4.45	-2%	4.57	-3%	4.15	10%	3.58	16%
#[1]	**MW24A***	12.05	4%	12.14	-1%	12.27	-1%	12.16	1%	11.94	2%	10.72	11%
	MW29*	9.66	6%	10.09	-4%	10.46	-4%	10.57	-1%	9.77	8%	8.89	10%

	Site	January-22		March-22		May-22		July-22		September-22		November-22	
		mbgl	*%*	*mbgl*	*%*	*mbgl*	*%*	*mbgl*	*%*	*mbgl*	*%*	*mbgl*	*%*
Quipolly Alluvium	**MW12***	6.93	1%	8.63	-20%	8.93	-3%	9.06	-1%	6.61	37%	5.98	11%
	MW13*	4.49	-11%	4.76	-6%	4.60	3%	4.61	0%	4.27	8%	4.43	-4%
	MW13B*	3.02	-11%	3.20	-6%	3.18	1%	3.13	2%	2.94	6%	3.14	-6%
	MW13D*	3.94	-7%	4.40	-10%	4.36	1%	4.32	1%	4.17	4%	3.98	5%
	MW15*	No access		No Access		No Access		No Access		No Access		No Access	
	MW16*	3.91	-5%	3.96	-1%	4.04	-2%	4.31	-6%	4.15	4%	3.21	29%
	MW17A*	3.02	13%	3.78	-20%	3.60	5%	3.40	6%	3.10	10%	2.17	43%
	MW18A*	3.18	12%	3.35	-5%	3.42	-2%	3.26	5%	2.95	11%	2.07	43%
	MW21A*	4.63	24%	5.00	-7%	5.47	-9%	5.88	-7%	5.08	16%	3.56	43%
	MW22A*	3.86	-2%	4.22	-9%	4.22	0%	4.43	-5%	4.01	10%	2.97	35%
	MW22B*	3.78	-1%	4.11	-8%	4.28	-4%	4.58	-7%	4.06	13%	3.03	34%
	MW23A*	3.38	-3%	4.02	-16%	3.73	8%	3.64	2%	3.56	2%	3.06	16%
	MW23B*	No Record		No access		No access		3.80	2%	3.75	1%	3.37	11%
	MW26B*	4.16	8%	4.18	0%	4.55	-8%	4.78	-5%	4.39	9%	3.15	39%
	MW28A*	5.12	12%	6.67	-23%	8.33	-20%	9.79	-15%	6.57	49%	4.59	43%
	MW32*	Pump over bore		Pump over bore		Pump over bore		Pump over bore		Pump over bore		Pump over bore	
	MW40	4.58	17%	4.70	-3%	4.91	-4%	5.11	-4%	4.57	12%	3.57	28%
	MW42	4.22	9%	4.26	-1%	4.40	-3%	4.50	-2%	4.13	9%	3.55	16%
#[2]	**MW34***	8.70	3%	8.78	-1%	8.91	-1%	9.11	-2%	8.92	2%	8.83	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 higher water levels throughout the 2022 annual reporting period year with a historically wet year, with over 40% more rainfall than average due to the influence of a La Niña event in the Pacific Ocean. Cumulative rainfall is presented in Figure 9.

A specialist groundwater consultant (SLR, 2023) undertook the annual groundwater review for 2022, identifying the following findings. All monitoring wells (MW) were reviewed using a Cusum statistical analysis. The Cusum assessment analyses the groundwater levels in each bore and analyses if any statistically significant deviation from the mean groundwater level is observed. For this report, it is considered appropriate to analyse each bore based on their own mean and standard deviation in groundwater levels. This is considered appropriate as the seasonal variation of levels at each bore changes dependent on location and geology monitored.

The alluvial bores MW7, MW13, MW16, MW17a, MW18a, and MW21a all failed the Cusum analysis at the end of 2021 (SLR, 2022) but have all showed a groundwater recovery in 2022 and, as of the end of 2022, all have a Cusum value beneath their respective trigger limit.

The Werrie Basalt bores MW5b, MW17b, and MW20 all failed the Cusum analysis at the end of 2021 (SLR, 2022) but have all showed a groundwater recovery in 2022 with a decreasing depth to groundwater trend and, as of the end of 2022, all have a Cusum value beneath their respective trigger limit.

Quipolly Alluvium Aquifer

Groundwater levels within the alluvium closely follow the rainfall patterns; there are two noticeable groundwater level declines from 2013 to 2016 and 2017 to 2019, both correlating with a decline in the CRD and below average rainfall conditions. Similarly, groundwater level increases correlate with periods of high rainfall. Since the start of the 2020 wet year and continuing into 2021, and in 2022 to a lesser extent, there has been an increase in groundwater levels within the alluvium, with all bores reaching above historical maximum, or near maximum, recorded groundwater conditions.

The significant increase in groundwater levels in late September 2016 is coincident with the overflow of Quipolly Dam, located upgradient of these bores, with the bores closest to the dam demonstrating a greater response to this event (SLR, 2021b). The decrease in groundwater levels seen over the first half of 2022 in MW28a and to a lesser extent, MW26b, are attributed to extraction from, or in the vicinity of, these bores.

Groundwater levels show a higher variability in upstream bores along Quipolly Creek. In Figure 9, the furthest upstream monitoring bore MW28a shows the greatest fluctuations in alluvial groundwater levels whilst MW32, the furthest downstream monitoring bore, shows the least. This is thought to be due to the limited catchment for these bores and their proximity to Quipolly Dam releases and runoff from the weathered basalt from the east. This results in greater range of recharge and recession compared to bores further down the alluvial catchment. It is noted that this groundwater regime has not changed since mining began in 2005, with greater groundwater level recovery in 2020 to 2022 still observed in upstream bores.

It is therefore concluded that the main influences on the decline in groundwater levels in the Quipolly Alluvium (2017-2022), and assessed in previous WCCM annual reports (SLR, 2021; Ramboll, 2020), was a result of the climatic conditions as opposed to mining influences, with groundwater levels

recovering over 2021 and into 2022 to their maximum, or near maximum recorded levels.

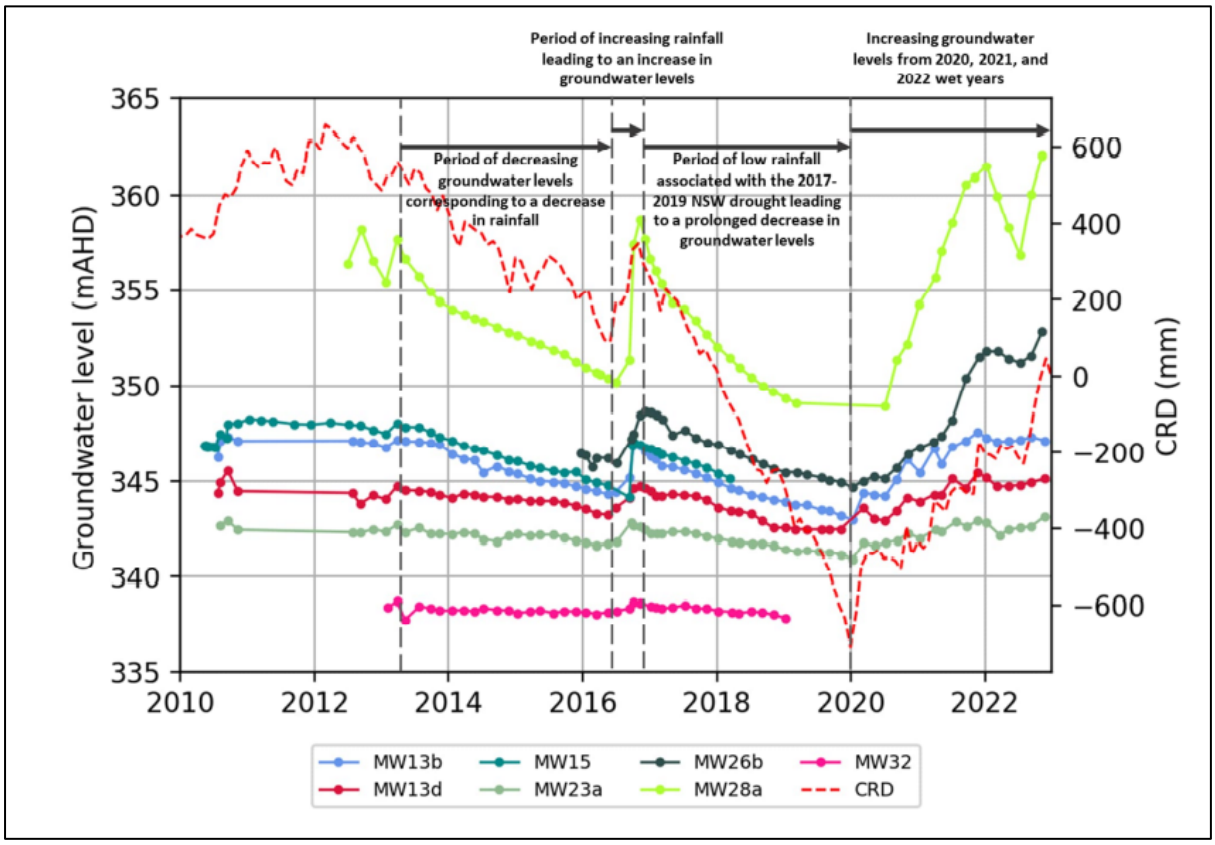

Figure 9: Cumulative residual rainfall and groundwater levels within the Quipolly Alluvium

Werrie Basalt Aquifer

The surface of the Werrie Basalt has weathered to a clay layer that acts as a confining or semi-confining layer to the basalt aquifer. Due to the presence of the overlying weathered basalt layer, the majority of recharge to the basalt aquifer is considered to occur to the west and east of WCCM where clay cover to the basalt may be thinner or absent (SLR, 2021b), and the permeable sandstone ridges of the underlying Temi and Currabubula formations outcrop.

As seen in Figure 10, groundwater levels in the Werrie Basalt bores show a clear response to the cumulative rainfall trend indicating that direct recharge with groundwater level declines observed from 2013 to 2016 and 2017 to 2019, and groundwater recovery in 2016 and 2020 to 2022. Groundwater levels vary more than those in the alluvium, with a greater difference between groundwater peaks and troughs, potentially a result of lower storage in the basalt.

Since 2013 it appears that there has been a more muted response to rainfall events within all near mining bores in Figure 7, which may indicate a potential mining effect on these bores. In addition, groundwater levels within MW8, the furthest bore from WCCM and considered the ‘baseline bore’, shows a greater response to rainfall events in 2020 to 2022, with a recovery of groundwater levels back to above those observed in 2004. In contrast MW4b, the closest bore to mining at WCCM, observes the most pronounced drawdown during the 2017 to 2019 drought with recovered groundwater levels at the end of 2022 are still approximately 7.5 m lower than those recorded in 2004. Despite the above

average rainfall conditions over the last three years, bores MW4b and MW6 still have a component of drawdown that has not recovered to pre-mining conditions.

At the end of 2022, bores MW5 and MW5b, located between MW4b and MW8, show groundwater recovery back to similar levels at the start of mining.

All bores show groundwater levels significantly above the base of mining (at relative level of 214 mAHD) and therefore through this monitoring period these basalt bores still show >100 m higher groundwater levels than in the adjacent mined Coal Measures.

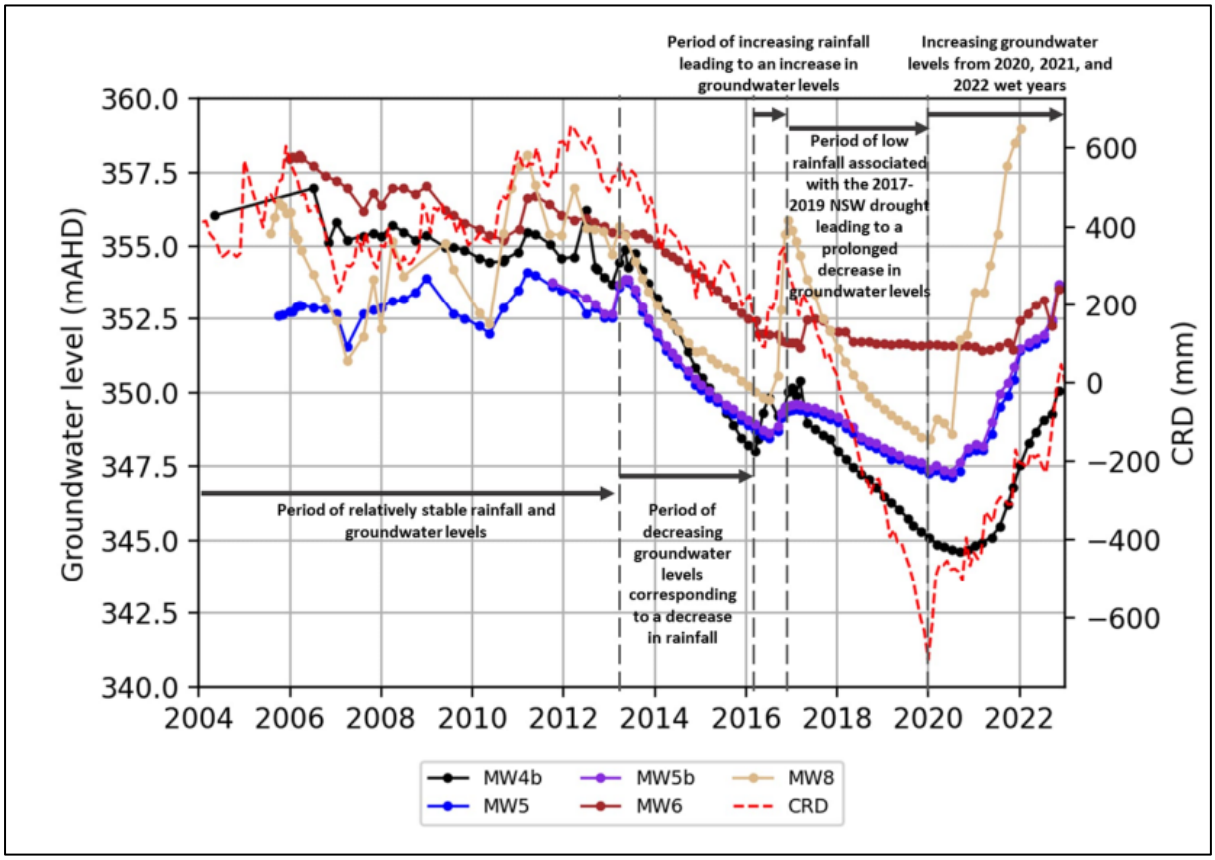

Figure 10: Cumulative residual rainfall and groundwater levels within the Werrie basalt aquifer.

When comparing the 2022 groundwater levels and flow to previous plots from recent years, it is observed that the dominant flow direction and gradients have not changed significantly with groundwater still predominantly moving across the WCCM from the north-east. The 2022 groundwater levels continue to show recovering groundwater levels over time corresponding to the 2022 above average rainfall conditions.

Groundwater Quality

None of the bores that have exceeded the lower water quality limits for any of the water quality parameters are considered significant in the context of this assessment. These lower limit exceedances are overall due to the detection limits of the equipment used, the small differences in most cases from the actual lower limit (for example, 0.9 vs 1.1), and the fact that low levels are usual in groundwater. It is also acknowledged that a reduction in these parameters results in an improvement in water quality, and that a drop below the lower limit is not considered concerning in terms of water quality. Therefore, any values that fall below the lower trigger values have not been discussed in this section.

Electrical conductivity, as a proxy for salinity, is higher in MW13b and MW13d than other alluvial bores, though these are considered to lie within an area of the alluvial aquifer with a higher salinity. No other bore shows prolonged elevated concentrations for any of the other GWMP parameters, and the likely cause for these occasional trigger level exceedances is the surrounding agricultural land use (composed of cereal cropping, improved pastures, and grazing land).

7.3.3 Proposed Improvement Measures

The groundwater monitoring program described above will continue to be implemented during the next reporting period. It is also recommended that for any monitoring bores that are also used as third-party extraction bores, an analysis of groundwater levels is carried out to determine the influence of pumping schedules on the groundwater levels.

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 22). 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.
- Evaporators recharge – Evaporator sprays have been installed at WCC to reduce the volume of void water stored on site. A 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. A small proportion of groundwater may also be derived from the Werrie Basalt aquifer.
- Overburden Dump Seepage – Water from Dam 8 on the overburden dump seeps through and is accumulated in the pit.

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.
- Use of water onsite – Dust suppression, Evaporators, etc.

Table 22 – Water Balance Inputs and Outputs.

Description		Year 2022 (ML/year)
Water Source (Inputs)	Total runoff and direct rain	1,378
	Groundwater (aquifer) inflow[a]	49
	Total Input	**1,427**
Water Losses and Usage (Outputs)	Evaporation (from water storage)	301
	Haul road and ROM pad dust suppression	271.1
	Irrigation loss	26.8
	Evaporator net loss[b]	32.4
	Workshop water use	12.7
	TLO water use	0.4
	Crushing plant water use	0.8
	Sprinkler loss	0
	Pumped sediment dam discharges	191
	Sediment dam spills	340
	Total Output	**1,176**
Water Surplus/Deficit	**Total Input-Total Output**	**251**

[a] This value represents the groundwater inflows from the aquifer and does not include spoil seepage. The derivation of this value is discussed in the following section.
[b] Based on field studies (Minetek, 2017), an average efficiency of 45% was adopted for the evaporators is 45%. Water that is not destroyed is returned the Mine Void.

As presented in, Table 22 once inputs, outputs and the observed change in water in the void have been accounted for, the model reflects a net Increase in water from within the void of 251 ML.

Total inputs of 1,427 ML during the 2022 period in comparison to 1,557ML during 2021 and 1,785ML during 2020 is representative of the sustained above average rainfall experienced at the Werris Creek Coal Mine in recent years and the dramatic increase in rainfall received from 2020 onwards. These water stocks have continued to be carried over from previous surplus years.

8 REHABILITATION

8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

The rehabilitation objectives for WCC is described in Rehabilitation Management Plan. 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.

As discussed in Section 8.2 the rehabilitation monitoring observed that tree species matching closely with Box Gum woodland TEC/EEC canopy assemblages, including *Eucalyptus melliodora, E. blakelyi* and *E. albens*, were frequently observed to be establishing satisfactorily. Monitoring of rehabilitation using the newly established methodology will continue in 2023. Section 8.2.2 discussed rehabilitation progression towards identified Plant Community types (PCT). As the site is progressing towards closure detailed closure criteria is being developed that will be presented in the Rehabilitation Management Plan.

During the reporting period, mining operations progressed generally in line with the final year of the Mining Operations Plan and the 1st year of the Rehabilitation Management Plan. Works were undertaken to progress to final landform and growth medium development (approx. 30.2ha), an additional approx. 21.7ha was progressed to ecosystem establishment in 2022 totalling a net increase of 51.67ha. This includes approx. 30ha due to an under report in 2021. This is generally in alignment with 2022 Rehabilitation Management requirements. WCC will continue to rehabilitate the final landform in line with these requirements. All infrastructure continued to be in use during the period, and as such, no areas of infrastructure were rehabilitated during the period.

2022 rehabilitation works included the planting of approximately 7300 native tube stock coupled with ongoing maintenance and watering. Tube stock was planted on rehabilitation areas and infill planting to replace dieback due to drought and natural conditions.

8.2 REHABILITATION MONITORING

8.2.1 Introduction

A detailed ecological field assessment of rehabilitated areas and analogue sites (Figure 11) was undertaken in October/November 2022. Monitoring was undertaken using the Whitehaven Annual Rehabilitation Monitoring Methodology (WARMM v1.4—Aspect Ecology 2022). Monitoring comprised:

- the establishment of two new ‘best-on-offer’ (DPIE 2020) local analogue woodland sites in Blakely’s Red Gum – Yellow Box grassy tall woodland (Plant Community Type ID 599 in the BioNet Vegetation Classification System);
- one existing woodland analogue site was repeat surveyed;
- twenty repeat established Woodland Domain Sites;
- four new rehabilitation sites that were established; and
- five categorical Rehabilitation Point Assessments across the rehabilitation, aimed at further improving rehabilitation data spatial coverage.

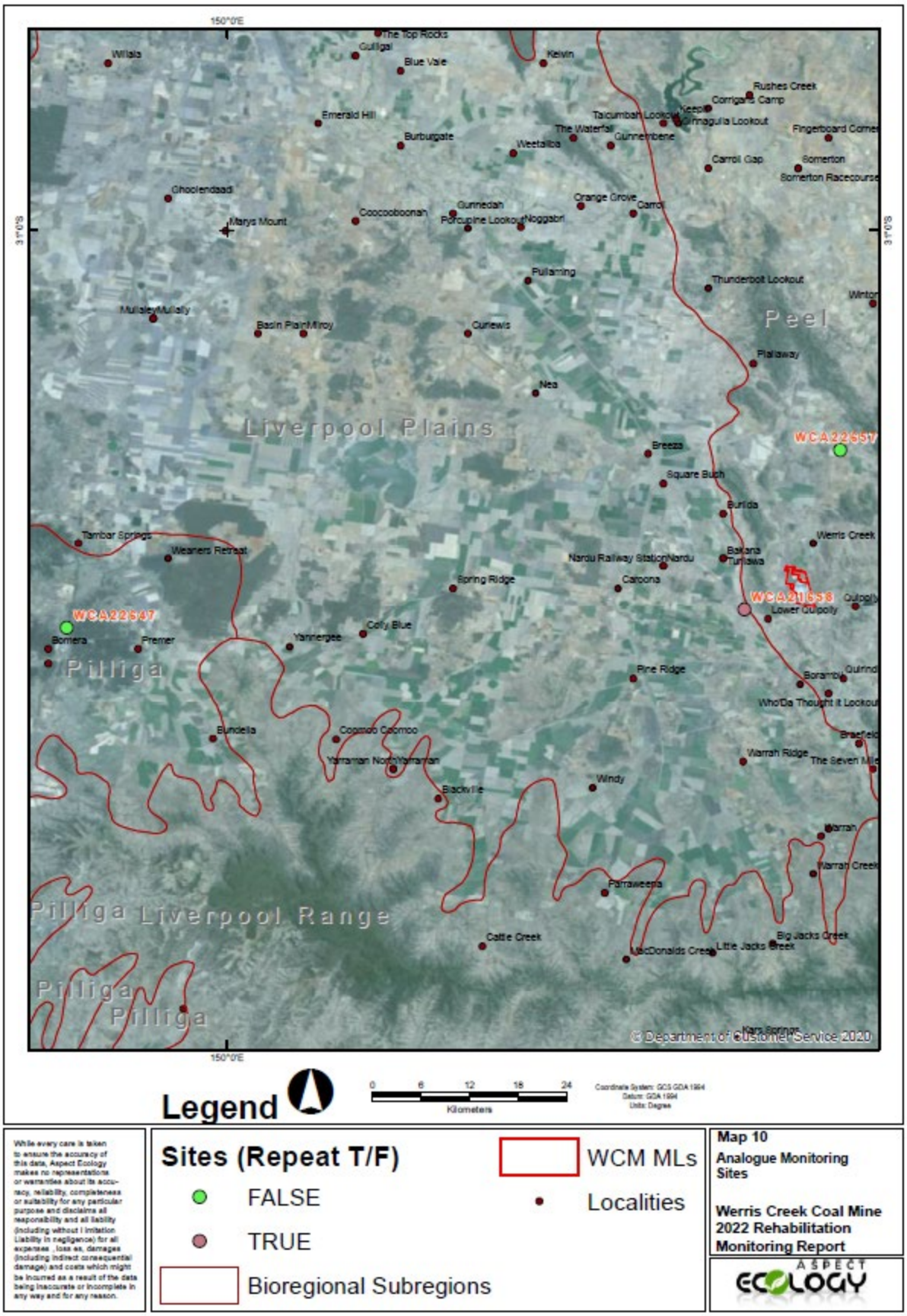

Figure 11: Analogue Monitoring Sites

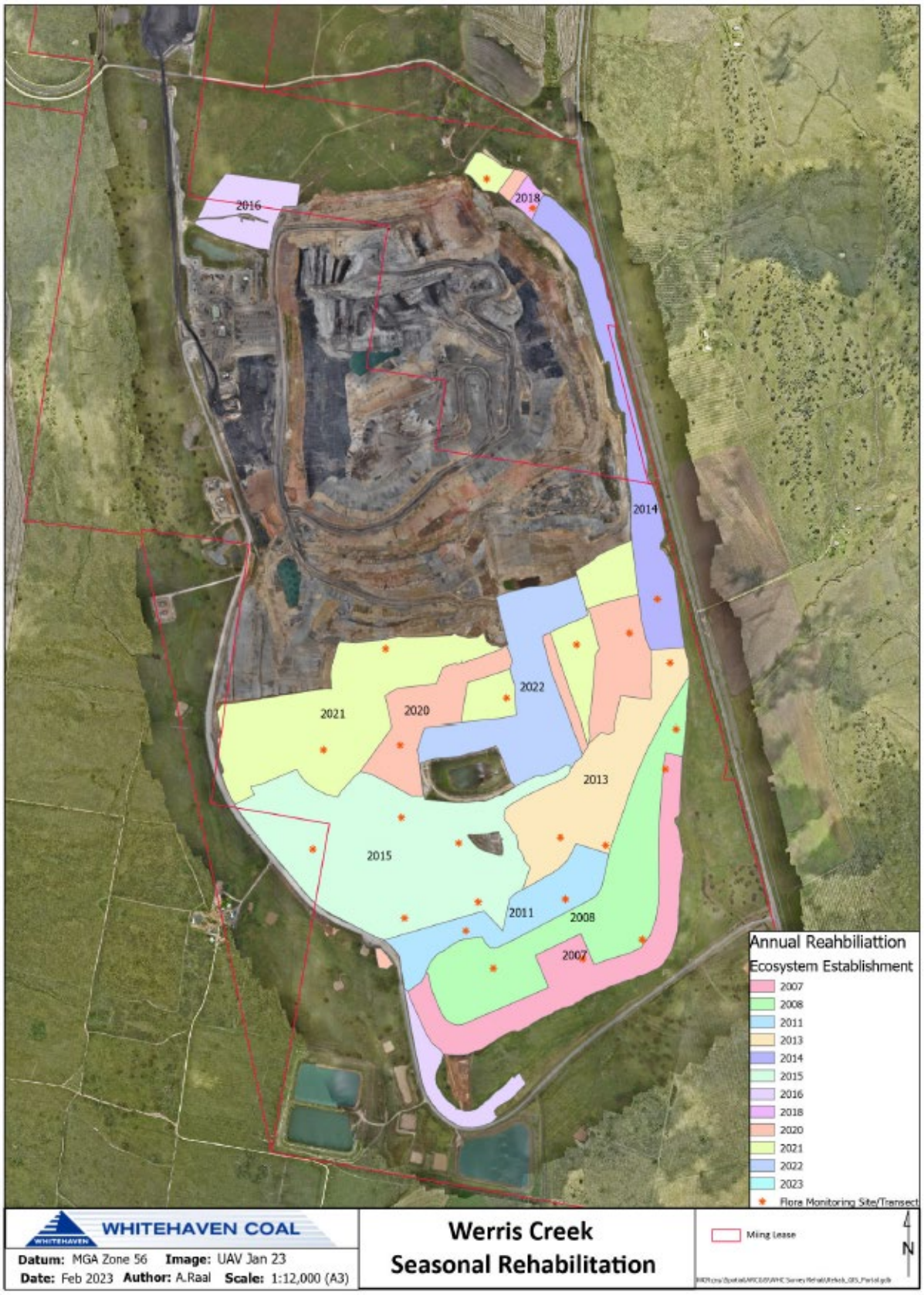

Figure 12: Rehabilitation Monitoring Sites and Rehabilitation Years

8.2.2 Woodland Domain

8.2.3 Groundcover

In general, observations indicate that the rehabilitation frequently exhibits a good diversity of groundcover species, especially native grassland species typical of cracking clay communities.

In analysing the Werris Creek sites, of the total 24 monitored plots only five plots exceeded the minimum coverage value (65.2%). The new 2022 sites had a desirable ground cover rate still lower than expected, ranging from 3.4% to 12.4% (WCR22277, WCR22378, WCR22287 and WCR22297)

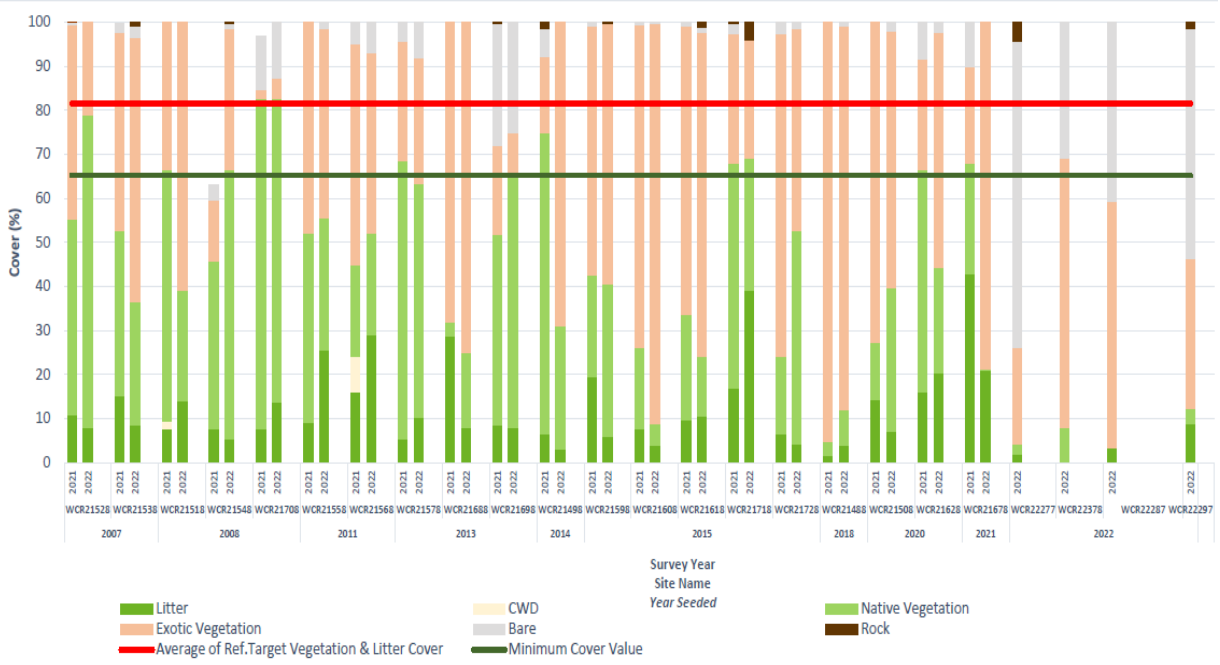

Figure 13: Combined desirable ground cover components (vegetation, leaf litter, and mulch) at Werris Creek Coal Mine rehabilitation sites in 2022. Lines shows average cover observed at analogue sites.

8.2.4 Species Composition

In general, observations indicate that the rehabilitation frequently exhibits a good diversity of groundcover species, especially native grassland species typical of cracking clay communities.

Tree species matching closely with Box Gum woodland TEC/EEC canopy assemblages, including Eucalyptus melliodora, E. blakelyi and E. albens, were frequently observed to be establishing satisfactorily.

Some weeds were observed and are to be controlled as required. Weed Surveys are undertaken annually to track and plan these works.

8.2.5 Tree density

Trees (combined < 2m tall and >2m tall) were present at all sites.15 of the 17 sites seeded prior to 2020 had densities <100 stems/ha (Figure 32). WCR21548 from 2008 rehabilitation had a much higher density of 660 stems/ha. All three sites from 2020–21 had densities >100 stems/ha, apart from WCR21508 (Figure 15).

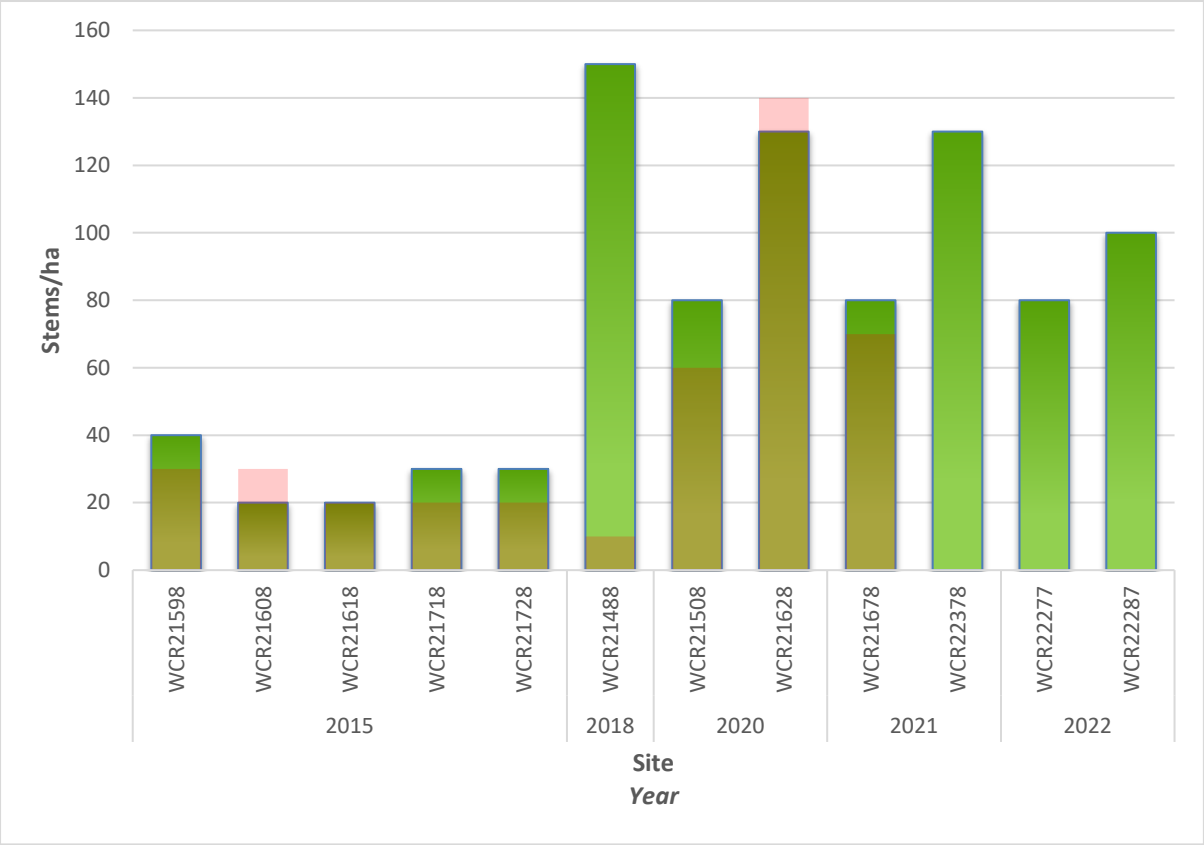

Figure 14: Density of <2m tall trees within rehabilitation sites at Werris Creek in 2021.

8.2.6 Fauna

Fauna habitat consisted primarily of abundant stag tree emplacements featuring perches and hollows, whilst habitat features on the ground were lacking, with very little rock or coarse woody debris. Observed native fauna included Eastern Grey Kangaroos, a Brown Snake, and numerous species of birds, including Noisy miners, Magpies, Pardalotes, Zebra Finches, Galahs, Quails, and Kites. Feral pig scratchings were observed at one site.

8.2.7 Recommendations

The 2022 rehabilitation monitoring report recommendations include:

- Supplemental tubestock plantings be carried out in sites with low seedling survival or insufficient planting density;
- Spot spraying be conducted in areas that require supplemental tubestock planting to facilitate seedling development; and
- Retreatment of some sites in which weeds are dominate and seedling establishment was poor.

8.3 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.

8.4 REHABILITATION WORKS PROPOSED FOR NEXT REPORTING PERIOD

Table 23 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 16 identifies the rehabilitation categories as at December 2022.

Table 23 – Rehabilitation Status

Mine Area Type[1]	Previous Reporting Period 2021	This Reporting Period 2022 (Actual)	Next Reporting Period 2023 (Forecast)
	2021 (ha)	2022 (ha)	2023 (ha)
A. Total mine footprint	593.5	603.2	603.2
B. Total active disturbance	360.3	338.71	301.62
C. Land being prepared for rehabilitation	50.6	30.22	36.24
D. Land under active rehabilitation	182.6	234.27	265.34
E. Completed rehabilitation	0	0	0

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

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.

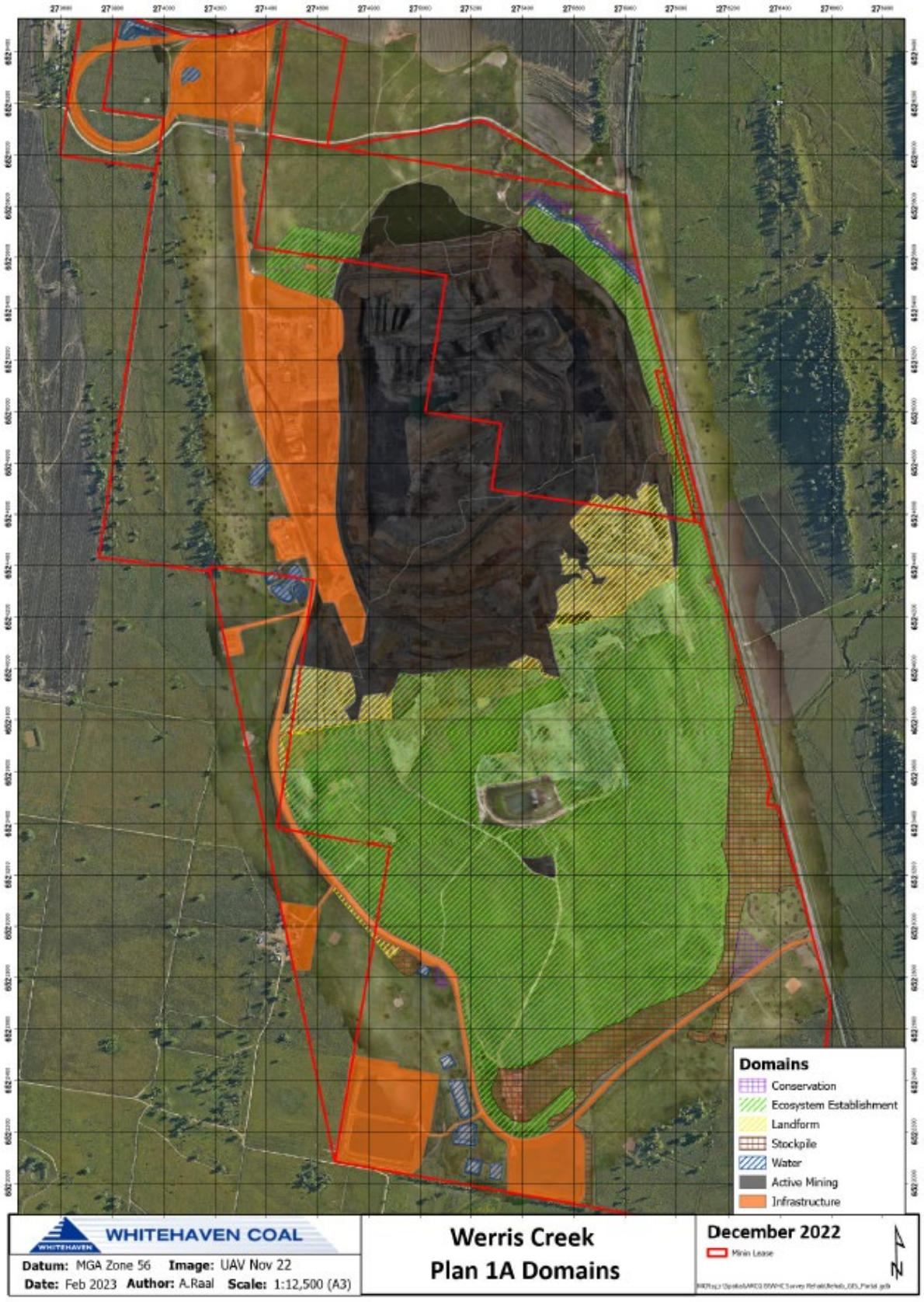

Figure 15: Rehabilitation Status at December 2022

Rehabilitation actions will focus on finalisation of decommissioned areas, landform development and growth medium development of the next section of the outer western batter and northern extents of the upper plateau. Works will also continue to focus on the in-fill planting of tube stock on all rehabilitation areas.

As shown in Table 23 approx. 30ha will be progressed from “under rehabilitation” to “ecosystem establishment” via the spreading of seed and planting of native tube stock in the reporting period.

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. This will include significant focus on infill planting on existing established areas with native tubestock including relevant mid storey species coupled with increased weed management programs to target any emerging weed issues (current or future).

8.5 KEY ISSUES TO ACHIEVING SUCCESSFUL REHABILITATION

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

- Managing weed and feral animal infestation due to increased rainfall;
- Improving landform water management to reduce erosion and sedimentation resulting in instability and vegetation growth issues;
- Wet planting conditions and continuous rainfall

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 (3) CCC meetings held during the 2022 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.

Community contributions are managed in accordance with the Whitehaven Coal Donations and Sponsorship Policy. Whitehaven Coal donated $250,444.65 to local Gunnedah and Regional groups during the reporting period. Groups which received contributions included, but were not limited to the following;

Gunnedah	**Regional**
Gunny Munny	The OBG Co
Gunnedah Show Society	The OBG Co
St Marys College	Currabubula Red Cross
Two Rivers Arts Council	Westpac Rescue Helicopter Service
Legacy	Clontarf Foundation
Rotary Mental Health	Operation Pilgrimage Group
Curlewis Public School	Curlewis Pre-School
Gunnedah South Public School	Liberty Party
Gunnedah High School	West Tigers Rugby League Club
Gunnedah Public School	Clontarf Foundation
Gunnedah Ministers Fraternal	Operation Pilgrimage Group
Gunnedah Water Tower Museum	Special Children's Christmas Party
Gunnedah PCYC	Touch Rugby League
Gunnedah Shire Band Incorporated	St Vincent De Paul Society
The Gunnedah Tennis Club	Pilliga CWA
Firebug Photography	Tamworth Family Support
Black n Blue Boxing	
Gunnedah Show Society	
Gunnedah Eisteddfod Society	
Clontarf Foundation	
Clontarf Foundation	
Gunnedah Can Assist	
Gunnedah Bulldogs Rugby League Club	
Mary Ranken Child Care Centre	
Dorothea Mackellar Poetry Awards	
Gunnedah Junior Rugby League Football Club	
Gunnedah Junior Rugby League Football Club	
Gunnedah High School	
Challenge Community Services	
Rotary Club of Gunnedah West Inc	
Funktionality Event Management	

Gunnedah Baptist Community Preschool
Gunnedah Public School
Carroll Community Bus Incorporated
Gunnedah & district Chamber of Commerce
Winanga-Li Early Learning & care services
Gunnedah Community Carols
Lions Club Gunnedah
Gunnedah District cricket Association & gunnedah junior cricket
Gunnedah South School
Open Opportunities
Gunnedah High School
Gomeroi Roos

9.3 COMMUNITY COMPLAINTS

WCC maintains a dedicated community telephone complaints line (1800 942 836) which is published at the mine entrance and on the Whitehaven Coal website. In the event of a complaint or enquiry, details pertaining to the complainant, the complaint and action taken is recorded in the complaints register. The register is available on the Whitehaven website.

Blasting was the dominant cause for complaints within 2022, with 3 blast-related complaints of the total (4) complaints received. When compared to the 2021 reporting period, there was a decrease in blast-related complaints during 2022. The total number of complaints and respective category of each complaint for the current 2022 reporting period is provided in Table 24. The previous 2017 to 2021 reporting period's data has been provided for comparison.

For specific complaint details and actions taken, refer to the Complaint Database for 2022 located on the Whitehaven Coal website.

Table 24 – WCC Complaints 2022

Issue	2017	2018	2019	2020	2021	2022
Blast - Vibration/Overpressure	9	19	12	5	13	3
Blast - Dust/Fume	1	2	1	0	0	0
Blast/Other	0	0	0	1	0	0
Noise – Mine	3	0	0	0	0	1
Dust – Mine	4	5	3	0	0	0
Surface Water	0	0	0	0	0	0
Odour	7	8	1	0	0	0
Water- evaporation	0	1	0	0	0	0
Other	0	0	0	0	2	0
Number of Complaints Raised*	**24**	**35**	**17**	**6**	**15**	**4**

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

10 INDEPENDENT AUDITS

An Independent Environmental Audit (IEA) was undertaken at WCC on the 11th and 12th of June-2020. The full IEA report and Action Plans can be found on the Whitehaven Coal website.

The next Independent Environmental Audit and Independent Noise Audit is scheduled for 2023.

An action plan was developed to address the 2020 IEA findings. All required actions within the 2020 IEA action plan have been completed and closed out during the 2020 reporting period.

All other actions required by previous IEA action plans have been completed or closed out previously.

11 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1 REPORTABLE INCIDENTS

No reportable incidents occurred during the reporting period.

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 (2022). Further details of any actions undertaken or proposed for non-compliances, including within the following reporting period, are summarised in Table 28.

Table 28 – Non-compliance Details and Proposed Action Plan

Non - Compliance	Date / Location	Cause	Action Plan	Estimated Completion Date
EPL 12290 L2.4	28/09/22 30/09/22	Discharge samples taken at EPL12 and EPL10 on 28th September and 30th September 2022 returned TSS readings above 50mg/L. These readings were inconsistent with compliant <50mg/L preliminary samples obtained pre-discharge and an investigation found these samples were affected by a sampling error. In correspondence with the EPA these two samples were deemed as a technical limit exceedance.	Compliant preliminary sample and prompt corrective action undertaken by WCC the EPA did not request any further action. This result will be reported and discussed in the Annual Return for EPL 12290. The sampling procedure was reviewed to avoid a similar error in future.	Complete
EPL 12290 R4.1	12/12/22	The November 2022 attended noise monitoring report was sent via email to the EPA on the 12th December 2022. The attended noise monitoring was undertaken on the 11th November 2022 which meant that the report was inadvertently sent 31 days after monitoring. This was outside the required 30 day timeframe.	Scheduled action added to WHC compliance system to send noise report to EPA.	Complete

11.3 REGULATORY ACTIONS

During the reporting period no official cautions, warning letters or penalty notices were issued to WCC.

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 .

Table 29 – Activities proposed to be completed in the next reporting period

Activity	Timeframe
Completion of review and, if necessary, revision of Environmental Management Plans – submit to relevant Govt agencies and stakeholders for consultation / sign off as relevant.	In accordance with PA 10_0059
Continued community liaison and engagement with local stakeholders	Ongoing