WERRIS CREEK COAL MINE

2015-16 ANNUAL REVIEW

Table 1 Annual Review Title Block

Name of Operation	Werris Creek No. 2 Coal Mine
Name of Operator	Werris Creek Coal Pty Limited
Development consent / Project Approval #	Project Approval 10_0059 Modification 2
Name of holder of development consent/project approval	Werris Creek Coal Pty Limited
Mining lease # (Leaseholder)	ML1563 (Creek Resources Pty Ltd & Betalpha Pty Ltd); ML1671, ML1672 (Werris Creek Coal Pty Limited)
Water Licence # (Licence Holder)	WAL29506 (Betalpha Pty Ltd); WAL32224 (Werris Creek Coal Pty Ltd)
MOP Commencement Date	14 January 2016
MOP Completion Date	30 November 2022
Annual Review Commencement Date	1 April 2015
Annual Review Completion Date	31 March 2016
I, Nigel Wood, certify that this audit report is a true and accurate record of the compliance status of Werris Creek Coal Mine for the period 1st April 2015 to 31 March 2016, and that I am authorised to make this statement on behalf of Werris Creek Coal Pty Ltd. Note. a) The Annual Review is an 'environmental audit' for the purposes of section 122B (2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000. b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).	
Name of Authorised Reporting Officer	**Nigel Wood**
Title of Authorised Reporting Officer	**General Manager – Open Cut Operations**
Signature	
Date	/ / .

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1 STATEMENT OF COMPLIANCE

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

Table 2 – Statement of Compliance

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

Any non-compliances during the reporting period are detailed in **Table 4** and ranked according to the compliance status key in **Table 3**. **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 3 – 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 4 – Non-Compliances

Relevant Approval	Cond. #	Condition Description (Summary)	Compliance Status	Comment	Where addressed in Annual Review
PA 10_0059 MOD2	Schedule 2 # 2	The Proponent shall carry out the project: (a) generally in accordance with the EA; (b) in accordance with the statement of commitments; and (c) in accordance with the conditions of this approval.	Non-compliant	Refer following	Throughout AR
	Schedule 3 #13	Blast Management Plan requires a monitoring program to evaluate compliance with the applicable blast criteria	Non-compliant	On the 3rd March 2016, monitoring data from blast #2016-028 was not recorded at "R11" ("Glenara"), as required by the Blast MP. This was due to telecommunications issues and the subsequent corruption of the memory card. The incident was reported to the department on the 31st March 2016	Section 6.2 and Table 26 – Non-compliance
	Schedule 3 #19	Air Quality and Greenhouse Gas Management Plan requires monitoring for PM_{10} at "R98" ("Kyooma") every 6 days.	Non-compliant	A power outage to the HVAS was caused when the previous residents disconnected power to the house. The monitoring station did not run on the 28th July, and 3rd and 9th August 2015 resulting in missing PM_{10} measurements required by the AQGGMP. Advice pertaining to the non-compliance was sent to the DP&E and EPA on the 5th August 2015. This advice indicated results would also be missed in relation to the monitoring on the 9th as well.	Section 6.1 and 11
	Schedule 5 # 4	The PA requires review and if necessary revision of plans within 3 months of: (a) the submission of an annual review under condition 3; (d) any modification to the conditions of this approval Revised documents must be submitted for approval to the Secretary and any other relevant agencies for approval within four weeks of review.	Non-compliant	The Noise Management Plan, Blast Management Plan and the Biodiversity Monitoring Program required revision and submission for approval. An administrative non-compliance has occurred whereby timeframes for completion of the document reviews and subsequent Departmental submission has not been met, specifically for Schedule 5 Condition 4(a): • Blast Management Plan • Biodiversity Monitoring Program Schedule 5, Condition 4 (d): • Noise Management Plan This is first notification of the non-compliance.	Table 26 – Non-compliance

2 INTRODUCTION

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

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

Though primarily covering the period from 1st April 2015 to 31st March 2016 (the reporting period), where relevant the Annual Review provides information on historical aspects of WCC's, longer term trends in environmental monitoring results and provides relevant information on activities to be undertaken during the ensuing reporting period, or beyond.

2.1 PROJECT BACKGROUND

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

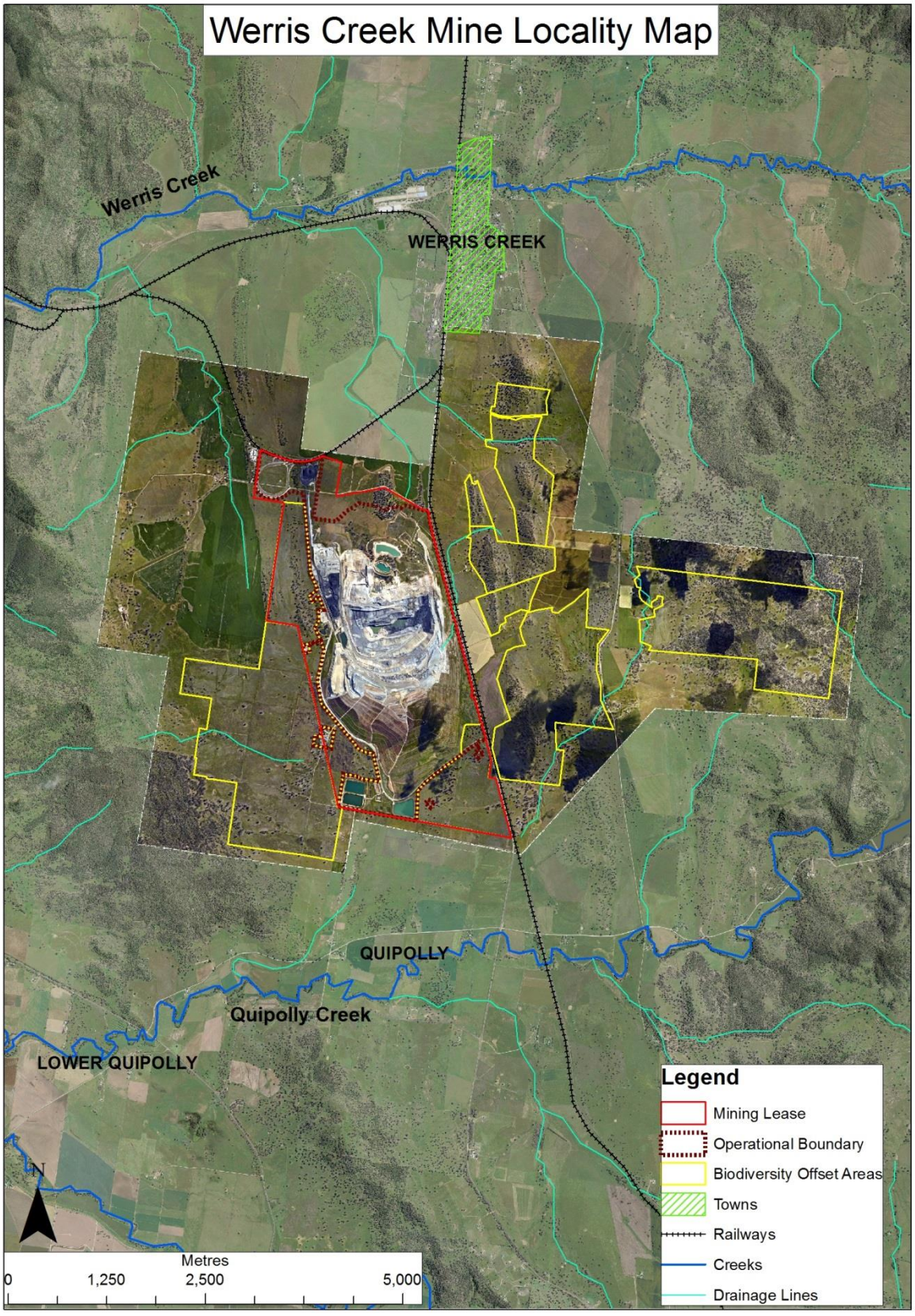
WCC has approval to mine in full the Werris Creek coal measures, which occur as a synclinal (bowl-shaped) formation to the immediate south of Werris Creek. Activities undertaken at WCC include the clearing of vegetation, stripping and relocation of topsoil, followed by the blasting of overburden and interburden material which is subsequently loaded into earthmoving trucks by excavators for hauling to the overburden dumps. Coal excavated from the mining pit is hauled to the Run-Of-Mine (ROM) stockpiles where it is crushed and carted using road trains to the Train Load Out (TLO) facility, for loading on to trains. Small volumes of coal are also transported directly to local domestic customers via public roads. The final stage of the mining process involves the reshaping, topsoiling and seeding of the overburden emplacement to achieve the rehabilitation objectives of WCC.

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 5**.

Table 5 – Key Personnel at WCC

Name	Title	Contact
Mr Lynden Cini	WCC Environmental Officer	02 6763 6018
Mr Rod Hicks	WCC Operations Manager	02 6763 6000

Figure 1 – WCC Locality Map



3 APPROVALS

Table 6 provides a summary of the key current licences, leases and approvals that have been obtained for the operation of WCC.

Table 6 – Licences, Leases and Approvals

Authority	Approval	Number	Issue	Expiry	Comments
Department of Planning and Environment (DP&E)	Project Approval	PA10_0059	25/10/2011	31/12/2032	Life of Mine Project allows northerly continuation for entire coal deposit mining up to 2.5Mtpa and 24 hours 7 days per week.
		PA10_0059 MOD1	30/08/2012	31/12/2032	Modification of Biodiversity Offset Area to allow for augmentation of VWD1 to 250ML.
		PA10_0059 MOD2	3/11/2015	31/12/2032	Modification of overburden emplacement design, enabling of a dry processing plant, and to allow void water for agricultural use.
Department of Primary Industries – Division of Resources and Energy (DRE)	Mining Lease	ML 1563	23/03/2005	23/03/2026	Mining Lease granted for 21 years.
		ML 1671	9/03/2012	9/03/2032	Mining Lease granted for 21 years.
		ML 1672	9/03/2012	9/03/2032	Mining Lease granted for 21 years.
	Mining Operations Plan	None	14/01/2016	30/11/2022	MOP approved on 14th January 2016
Environment Protection Authority	Environment Protection Licence	12290	18/04/2005	Anniversary date: 1/04/2016 Review Date: 14/07/2020	Last variation 6th May 2016
Department of Primary Industries – NSW Office of Water (NOW)	Water Access Licence (Water Management Act 2000)	WAL29506	21/02/2013	Perpetuity	Aquifer – 50ML annual allocation. NOW reference number 90AL822531. Formerly 90BL252588
		WAL32224	19/06/2013	Perpetuity	Aquifer – 211ML annual allocation. NOW reference number 90AL828344. Formerly 90BL255087
	Water Works Approval	90WA822532	21/02/2013	15/01/2025	Linked to WAL29506. Bore. Formerly 90PT982801
		90WA828345	19/06/2013	25/06/2017	Linked to WAL32224. Excavation. Formerly 90PT982872
Commonwealth Department of Sustainability, Environment, Water, Population and Communities	Environment Protection and Biodiversity Conservation Act Approval	2010/5571	21/12/2011	31/12/2032	Authorises impacts on EPBC listed threatened species and communities and listed migratory species
Dam Safety Committee	Prescribed Dams	Werris VWD1 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

The objective of current and future drilling is to develop a more accurate geological model to assist in production scheduling and coal quality control (Coxhead, 2015). The WCC drilling program during the year ending March 2015 achieved a total meterage of 855m (Coxhead, 2015) focussed in front of the highwall. Six open holes were drilled for a total of 855m, including redrills. All boreholes were geologically logged, and geophysically logged if the hole was not blocked. The location of drilling for 2015-2016 is outlined in Figure 2.3. During the next reporting period, eighteen open holes, seven cored holes and 15 fly-ash holes are planned to be drilled for a total of 3,860m. There were no environmental related incidents to the exploration works undertake during the reporting period.

4.2 MINING OPERATIONS

Table 7 presents the production summary for the previous and current reporting periods and the anticipated production schedule for the next reporting period. ROM coal production is summarised by calendar year (this reporting year equates to 2015), to align with PA_0059 conditions. All units are in tonnes unless otherwise stated.

Table 7 – Production Summary

Material	Approved limit	Previous reporting period (actual)	This reporting period (actual)	Next Reporting period (forecast)
Waste Rock / Overburden (bcm)	N/A	16,217,671	13,060,983	13,602,811
ROM Coal (calendar year)	2,500,000 (PA 10_0059)	2,453,744	2,038,766	1,893,014
Coarse reject	N/A	0	0	0
Fine reject	N/A	0	0	0
Saleable Product	5,000,000 (EPL12290)	2,493,457	2,045,807	1,722,586

4.3 COAL HANDLING AND PROCESSING

During the reporting period coal processing operated Monday to Friday 6:00am to 2:00am with the occasional weekend shift. Train loading operations occurred 24 hours per day, 7 days per week dependent on train scheduling. Coal is segregated at the ROM coal stockpile based on the expected ash content of the coal. The higher ash coal products are processed through the fixed plant crusher at an average 420t/hr using a Front End Loader to feed the hopper of the primary crusher (to <150mm) and subsequently processed through the secondary crusher to <50mm size, this being the specification for export quality coal. Low ash coal products are processed by the mobile crushers at an average 240t/hr straight to <50mm product and then screened. Product coal is transported by road trucks from the coal processing area to the product coal stockpile area at the train load out facility via the private coal haul road. The despatch of product coal from WCC is either railed to the Port of Newcastle or by road to domestic customers. Product movements by month for both rail and domestic road haulage can be found on the Whitehaven Coal website. WCC complied with Schedule 2, Conditions 7 and 8, of PA_0059. The maximum quantity of product coal stockpiled on site during the reporting period was 224,465.00 tonnes, which occurred during May 2015 and the total quantity of domestic coal transported from site on public roads was 3,043 tonnes for the period.

4.4 OTHER OPERATIONS

4.4.1 Hours of Operation

Mining operations permitted to be conducted up to 24 hours per day, seven days per week, except for blasting, which is restricted to 9:00am – 5:00pm Monday to Saturday. During the reporting period, mining operations reduced from 24 hours per day, seven days per week, to 20 hours per day (6:00am – 2:00am) 5 days per week (Monday to Friday), with occasional overtime shifts on Saturdays. Other ancillary tasks and maintenance activities continued 24 hours per day, seven days per week.

4.5 NEXT REPORTING PERIOD

4.5.1 Exploration

Exploration drilling will continue to be undertaken at the WCC to further assess the coal reserves within the tenements.

4.5.2 Mine Operations

The mine production rates are planned to continue at much the same level as in the current reporting period, with slightly higher overburden material movements offsetting slightly lower ROM coal production, due to the higher strip ratio, as shown in **Table 7**. Vegetation clearing activities in mining areas over the next reporting period will be conducted in accordance with the approved Biodiversity Management Plan and MOP. Minor changes are to be made to the overburden emplacement layout during the next reporting period to align with the updated design from MOD2, and in accordance with the approved MOP. The northern visual and acoustic bund is planned to be extended during the next reporting period to the limits as described in the Mining Operations Plan, prior to mining through Old Colliery Hill.

4.5.3 Rehabilitation progress

As per MOP commitments, Werris Creek Mine plans to reshape, topsoil and seed 29 hectares of the overburden emplacement in the 2016-17 reporting period. Maintenance works and supplementary planting will continue on existing rehabilitation areas to encourage success.

4.5.4 Other changes

It is expected that void water will be made available for local agricultural purposes during the next reporting period, in accordance with an approved Water Management Plan.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The 2014-2015 Annual Review and subsequent regulatory site inspection identified the following actions. These are addressed within this document and also summarised in **Table 8**.

Table 8 – Actions from the Previous Annual Review (2014)

Action required from Previous Annual Review	Requested By	Action Taken	Where discussed in Annual Review
Draft Site Water Management Plan has been amended to include "coal contact" water as 'contaminated water'. Further consultation is required with DP&E and EPA prior to approval	DP&E	Draft Site Water Management Plan amended and submitted for comment / approval 14th January 2016 to accommodate new requirements under PA 10_0059 MOD2 including provision for irrigation of void water.	7.4.1 Water Management Plan
Biodiversity Monitoring Program and Completion Criteria	DP&E	The revised BOMP has been prepared; now being standardised and aligned with other Whitehaven Biodiversity related Management Plans prior to internal review.	Table 13 – Environmental Performance, Table 25 – Non-compliance
Finalise changes to Blast Management Plan in 2015	DP&E	The updated Blast Management Plan has been drafted and is currently under internal review prior to submission to the Department for approval.	Table 13 – Environmental Performance, Table 25 – Non-compliance
Noise Management Plan to the revised should PA_0059 MOD2 be approved for two changes in overburden emplacement methodology	DP&E	The updated Noise Management Plan has been drafted and is currently under internal review prior to submission to the Department for approval.	Table 13 – Environmental Performance, Table 25 – Non-compliance

6 ENVIRONMENTAL PERFORMANCE

6.1 NOISE

6.1.1 Environmental Management

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

- **Noise Reduction Mine Planning** – visual inspections of the open cut operations and a photographic record kept of excavator loading face locations, truck haul routes and night shift dump locations to determine the risk of noise generation based on forecast weather conditions.
- **Maximum Sound Power Levels** – Annual testing of key mining equipment to ensure consistency with Sound Power Levels modelled in the EA and subsequent modelling.
- **Truck Noise Attenuation** – CAT793XQ trucks are manufactured with noise attenuation fitments included to achieve a sound power level specification of 115dB Lw. CAT 785 haul trucks are fitted with Stage 1 or Stage 2 noise attenuation to deliver measured sound power levels of 117.7dB Lw and 116dB Lw respectively.
- **Enclosed conveyors** – WCC has installed roofing on the conveyor at the Train Load Out to minimise noise generation at this point.

- **Silent Horns** - Silent horns are used by excavator operators during the night period to signal to truck drivers that loading is complete.

During the reporting period a number of mitigation strategies were in place to minimise the effects of noise on the community including:

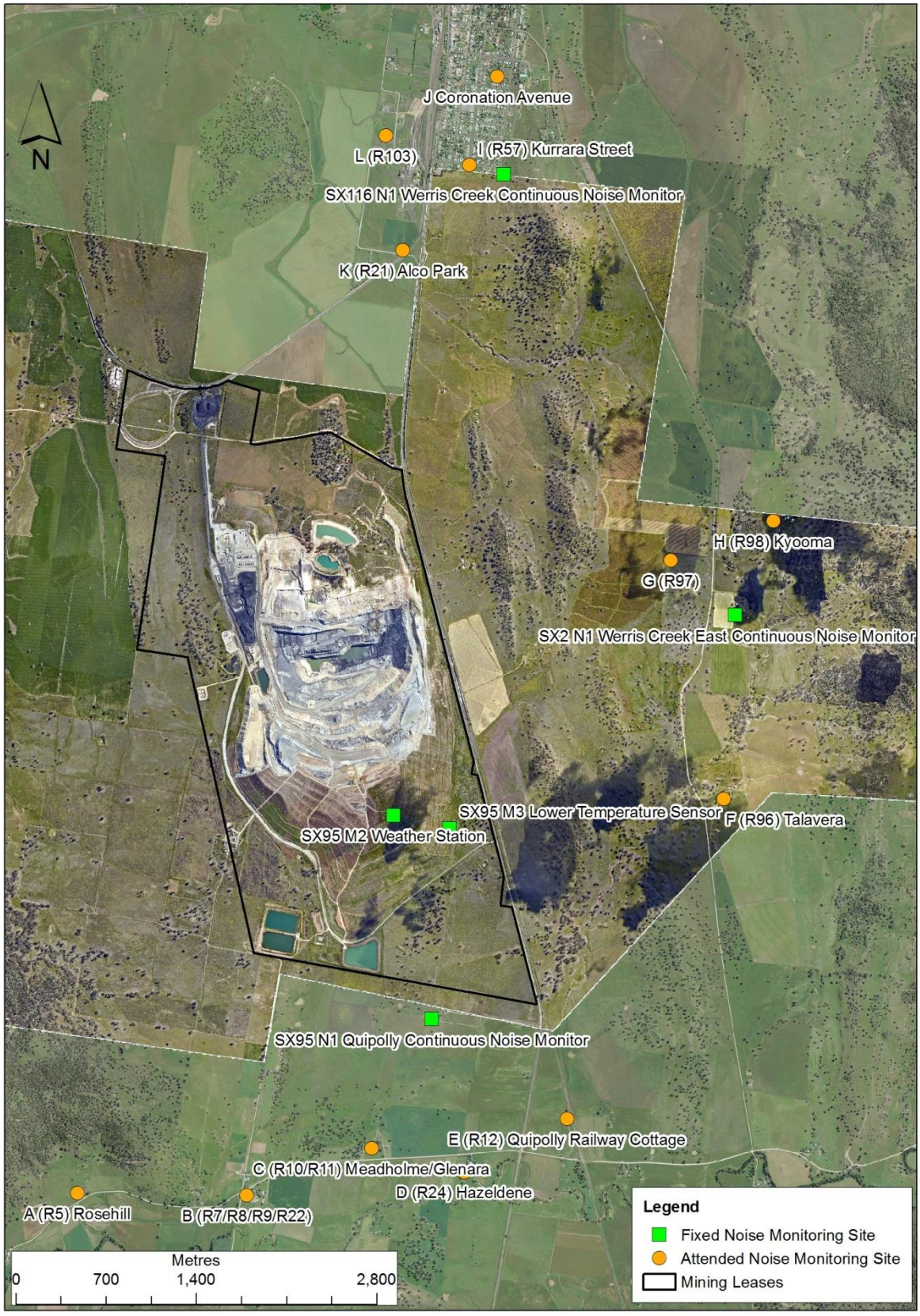
- **Property Acquisitions** - WCC has acquired a number of adjacent properties thorough private negotiations to alleviate any current or future environmental impacts on these residents.
- **Private Agreements** - WCC have actively sought private agreements with those properties identified in the EA as being within the WCC noise management.
- **Acoustic and Visual Amenity Bund** – To minimise the potential for unacceptable noise and/or visual amenity related impacts on the residents of Werris Creek, a Visual Amenity Bund is in place around the eastern boundary of WCC, complementing the natural acoustic barrier of Old Colliery Hill.
- **Mine Infrastructure Area Bund** - In accordance with the commitments of the LOM EA, WCC has constructed a 5 metre high acoustic barrier on the north and eastern boundaries of the MIA to manage potential noise emissions at receivers to the north of WCC from maintenance and coal crushing activities.

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

- **Continuous Noise Monitoring Units** – WCC operated three Continuous Noise Monitoring Units mounted on standard road registered trailers. The Units integrate noise and meteorological monitoring data together with the information available in near real time via a dedicated website, via a configurable daily email data summary report, via configurable SMS alarming, and through a real time audio stream. Their location during the 2015-2016 reporting year is shown in Figure **2**
- **Noise Control Operator** – WCC engaged a Noise Control Operator (NCO) to review real time audio and noise levels of WCC from the Continuous Noise Monitoring Units.
- **Sound Filtering and Interpretation** - A low to mid frequency band pass filter (20 to 630 Hz) is used to isolate the masking effects of extraneous noise sources from birds, insects, and other environmental noise sources. Audio streams allowed the source of impacts to be verified manually in near real time.

Night Time Surface Operations and Dump Locations – Operations planning targets in-pit dumping operations during evening and night-time periods. Where this is not possible, real time noise monitoring undertaken by the NCO was used to drive compliance with noise criteria. The NCO worked with the OCE to ensure overall noise levels related to mining operations remains below 35dB(A) during the evening and night time periods, with the OCE making ongoing modifications to the operation until such time as the impact are reduced to a level below 35dB(A). The OCE suspended the entire operation at times in order to meet noise criteria.

Figure 2 – WCC Noise Monitoring Sites



6.1.2 Environmental Performance

Attended Monitoring

Attended monitoring is undertaken on a monthly basis by an independent consultant and is used to assess compliance with licence and approval limits for mine contributed noise. Attended noise monitoring identified one exceedance of the noise criteria at WCC during the 2015-16 reporting period, at the R57 Kurrara St monitoring site during the evening of the 4th August 2015. On this occasion, the measured Werris Creek Mine noise was 37 dB(A) Leq, exceeding the criteria of 35 dB(A) Leq. It should be noted that while the NSW Industrial Noise Policy specifies that an exceedance of no more than 2 dB(A) above a statutory noise limit specified in a licence condition is not considered a non-compliance, WCC undertook an investigation into this measurement as if it was, with appropriate notifications to the EPA and DP&E. WCC subsequently received a Formal Warning Letter from the EPA in relation to this incident.

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

Annual Sound Power Testing

Sound power level testing of fixed and mobile plant was undertaken in February 2016.

Table 9 - Calculated sound power levels presents all plant assessed during the February testing and identifies three plant items (equipment numbers 526, 847 and 851) returning elevated levels.

Whilst three plant items returned results greater than the 1 dB(A) tolerance, it should be noted that 62% of all plant items monitored recorded 2dB(A) or greater sound power levels below modelled EA levels. This has resulted in an overall balance to noise emission at the site. From a cumulative approach, impacts on noise emissions have been negligible and this is reflected in the attended noise compliance monitoring results for the period. The three plant items identified have undergone significant maintenance adjustments including further planned attenuation measures in an effort to reduce point source sound emissions. WCC has scheduled independent sound power analysis to be undertaken early in the next reporting period to quantify these maintenance adjustments.

Table 9 - Calculated sound power levels

Plant Item		EA SWL dB(A) Leq	dB(A) Leq	Lw dB(lin)
Type	No.			
Haul Truck CAT 785C	608	117	115	125
Haul Truck CAT 785C	609	117	118	125
Haul Truck CAT 785C	612	117	118	125
Haul Truck CAT 785C	613	117	114	125
Haul Truck CAT 785C	614	117	116	123
Haul truck CAT 793XQ	660	115	113	121
Haul truck CAT 793XQ	661	115	113	122
Haul truck CAT 793XQ	662	115	112	121
Haul truck CAT 793XQ	663	115	112	120
Haul truck CAT 793XQ	664	115	112	121
Haul truck CAT 793XQ	665	115	113	122
Haul truck CAT 789C	817	117	114	119

Excavator Hitachi EX1900	542	115	116	122
Excavator Hitachi EX1900	544	115	113	119
Excavator Hitachi EX3600	551	115	116	124
Excavator Hitachi EX5600	570	116	117	126
Grader	854	110	109	117
Grader	856	110	109	114
Water Cart Cat 773D	869	114	111	118
Water Cart Cat 773D	871	114	114	121
Wheel Loader Cat 980G	405	Not modeled	111	121
Drill (Cat 6420)	526	108	**113**	119
Water pump	410	Not modeled	107	122
Dozer Cat D10T	503	116	115	122
Dozer Cat D10T	505	116	113	116
Dozer Cat D11B	847	116	**121**	128
Dozer Cat	849	116	116	123
Dozer Cat D11T	851	116	**118**	125
Dozer Cat D10T	855	116	115	124

Bold = Elevated result

Tolerance of +/- 1 dB(A). (Spectrum 2016)

6.1.3 Proposed Improvement Measures

WCC plans to construct the remainder of the visual and acoustic bund in 2016-17, prior to mining through Old Colliery Hill, to minimise noise impacts on Werris Creek residents.

6.2 BLASTING

6.2.1 Environmental Management

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

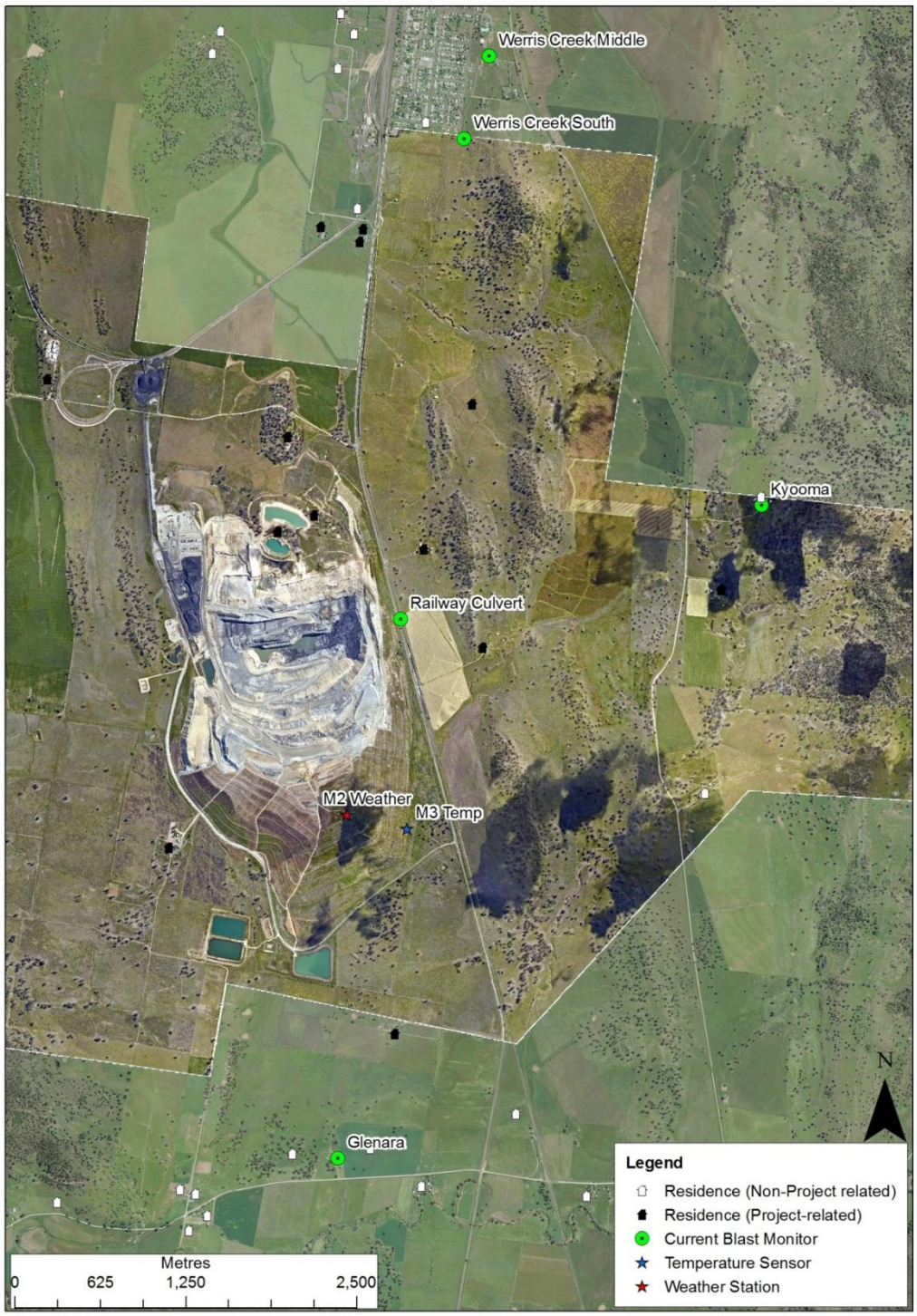
During the reporting period a number of controls were applied to reduce the potential for impacts, including:

- **Buffer Management** - WCC has acquired a number of adjacent properties thorough private negotiation since the commencement of mining to alleviate any current or future environmental impacts on these residents.
- **Blast Design** - Given the environmental and community aspects from the proximity of Werris Creek Road and Werris Creek town to the project, blasts are 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.
- **Pre-Blast Vibration Prediction** – WCC has reduced the blast vibration objective for Werris Creek from 1.0 to 0.8 mm/s during the reporting year to reduce expected impacts on Werris Creek residents from blast vibration.
- **Explosive Product Selection and Loading** – WCC selects the most appropriate explosive product for each blast, considering primarily the temperature of the holes and the presence of water, to reduce the risk of auto-ignition and/or blast fume generation.

- **Stemming Height and Quality** - To ensure the stemming volume is sufficient, the shot-firer dips each hole to confirm that the column height is as per the load sheet. Stemming supply contractors are required to provide quality specifications with respect to fines contained, to minimise the risk of elevated air overpressure from rifling.
- **Initiation Sequence** – A number of initiation strategies are used at various times to minimise vibration and air overpressure impacts including blast decking, sequential initiation, and the optimum orientation of blasts.
- **Sleeping Shots** - The period between blast loading and detonation is minimised to avoid potential deterioration of product. During the 2015-2016 reporting year, this control was effective to the extent that less than 10% of fume producing blasts slept for longer than 5 days, with only one fume-producing blast sleeping longer than 7 days (compared to seven in 2014-2015).
- **Blast Times and Frequency** - 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. During the 2015-2016 reporting year, 90% of blasts at WCC were fired between 10:50am and 2:10pm. A total of 114 Blasts were undertaken during the period, the maximum number of blasts to occur during a month was undertaken during March 2016, with a total of 14. All blasts met PA_0059 MOD 2 conditions regarding blasting times and frequencies in the 2015-16 reporting year.
- **Blast Notification** - Prior to every blast, the Blast Notification Webpage on the Whitehaven Coal website was updated to include the blast date and time, with email and SMS notifications also sent to subscribed persons.
- **Pre-Blast Weather Assessment** – Prior to blast initiation, the weather conditions are verified using the onsite weather station to confirm conditions are suitable for blasting. While there were some exceptions to satisfy safety requirements, blasting was not undertaken when the 5 minute average weather conditions identified that wind direction was directly towards Werris Creek, where wind speeds exceeded 8.9m/s, or where a temperature inversion was present.
- **Road Closures** –Closure of the Werris Creek Road was initiated when proximity of blasts occurred within 200 meters of the road and/or there was a pre-identified risk of wind carried dust from the associated blast.
- **Blast Fume Rating** – The blast fume of every shot was rated according to the AEISG (2011) criteria based on a consensus between the key blasting personnel who observed the shot at its greatest extent. Every blast was filmed in 2015-16 to allow confirmation of fume rating.
- **Structural Inspections** - In response to claims of property damage due to blasting operations, three property investigations were undertaken by a suitably qualified, experienced and independent person approved by DPE during the 2015-2016 reporting year. The inspections did not identify any blasting-related impacts at any of these properties.

Air blast overpressure and ground vibration monitoring are undertaken at four monitoring locations illustrated on **Figure 3**, with vibration and air overpressure also measured adjacent to a railway culvert for blasts within 500 metres of this structure. On the 3rd March 2016, a loss of communications followed by the subsequent corruption of the memory card resulted in an absence of monitoring data at the Glenara blast monitor on this occasion. All other blast monitors were fully operational and indicated the blast remained well within the applicable criteria at these locations. An investigation into this incident was undertaken and a copy provided to the DP&E.

Figure 3 – WCC Blast Monitoring Sites



6.2.2 Environmental Performance

Vibration/ Air Overpressure Performance

There were 114 blasts in the 2015-16 reporting period. All blast events have been within the applicable Airblast Overpressure and Ground Vibration limits set out in PA 10_0059 MOD2.

Table 10 summarises the blasting monitoring results during the period.

Table 10 – Blast Monitoring Summary for 2015-16

Location	Parameter	100 %tile limit	Average	Max	95th %tile limit	>95th %tile	Exceedance
R11 Glenara	Air blast overpressure (dB(Lin Peak))	120	99.6	112.9	115	0%	No
	Vibration (mm/s)	10	0.14	0.50	5	0%	No
R98 Kyooma	Air blast overpressure (dB(Lin Peak))	120	101.3	119.1	115	0.6%	No
	Vibration (mm/s)	10	0.47	2.88	5	0%	No
R62 Werris Creek South	Air blast overpressure (dB(Lin Peak))	120	100.3	112.7	115	0%	No
	Vibration (mm/s)	10	0.36	1.01	5	0%	No
R92 Werris Creek Mid	Air blast overpressure (dB(Lin Peak))	120	99.6	114.2	115	0%	No
	Vibration (mm/s)	10	0.16	0.63	5	0%	No

Fume Performance

As described in **Section 6.2.1,** WCC has implemented a number of preventative measures relating to blast fume events. A significant change has been the reduction in sleep times of shots, with only one fume-producing shot sleeping for longer than seven days in the current reporting period, compared with seven from the previous reporting period. This has led to a significant reduction in the intensity of blast fume events from the previous period, with 97.4% of blast events at level 2 fume or below in 2015-2016, compared with 93.7% from the previous reporting period. While the frequency of blast fume events is largely unchanged (down from 29% to 28%), the intensity of these events is greatly reduced. A summary of blast fume events since 2011 rated by intensity is shown in **Table 11**.

Table 11 – WCC Fume Events Generated from Blasts since 2011

Complaint Issue	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Total Number of Blasts	84	82	90	142	**114**
Number of Blast Fume Events	31	17	13	41	**32**
Fume Level 5	0	0	0	1	**0**
Fume Level 4	1	1	0	1	**0**
Fume Level 3	2	0	0	7	**3**
Fume Level 2	9	6	1	19	**14**
Fume Level 1	19	10	12	13	**15**
Fume Level 0	53	65	77	101	**85**

6.2.3 Proposed Improvement Measures

WCC is continuing to fine tune the pre-blast hazard assessment process and blasting performance generally with the principle objectives of:

- Reducing the perceived impacts within the community;
- Limiting the transport of blast-generated dust across open public roads.

6.3 AIR QUALITY

6.3.1 Environmental Management

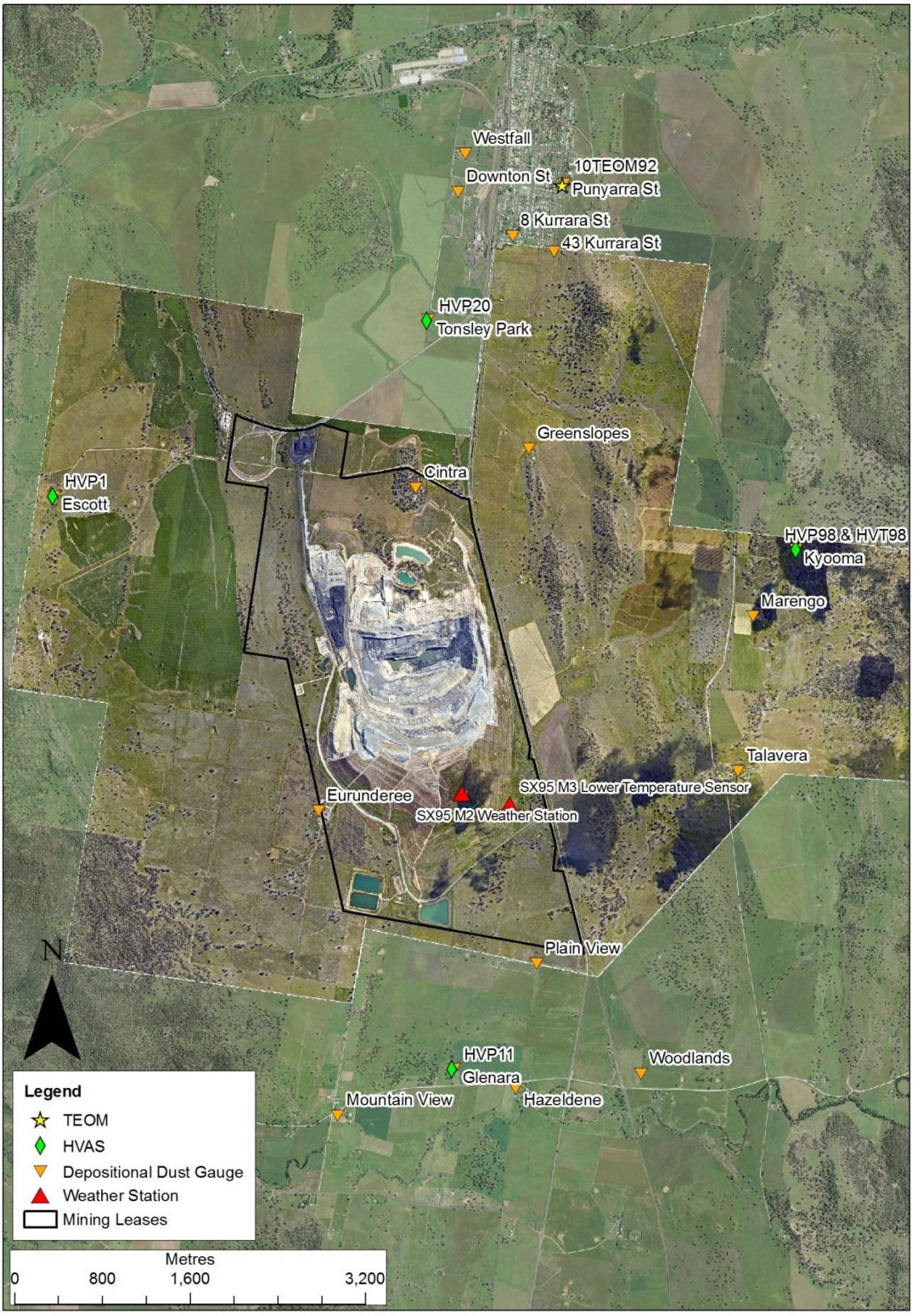
The air quality criterion applicable to WCC is specified in Condition 16, Schedule 3 of PA10_0059 MOD2 and is managed through the implementation of the Air Quality and Greenhouse Gas Management Plan (AQGHGMP) (WCC, 2014) which was approved by DP&E on 29th April 2014. During the reporting period various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

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

The WCC Air Quality Monitoring network is illustrated on **Figure 4** and includes:

- Continuous monitoring of $PM_{2.5}$ and PM_{10} levels at the Werris Creek TEOM;
- PM_{10} levels are measured at four High Volume Air Samplers (HVAS) distributed across neighbouring properties surrounding WCC. The HVAS run for twenty-four hours every six days. Total Suspended Particulate Matter (TSP) is also measured at a separate HVAS unit located at Kyooma;
- A network of 20 dust deposition gauges surrounding WCC, measuring deposited dust and particulates collected monthly; and
- Six depositional dust gauges located in Quirindi to measure deposited dust adjacent to the railway line. The dust gauges are located in a linear fashion on either side of the railway line, in order to determine the contribution of coal dust to the overall figure.

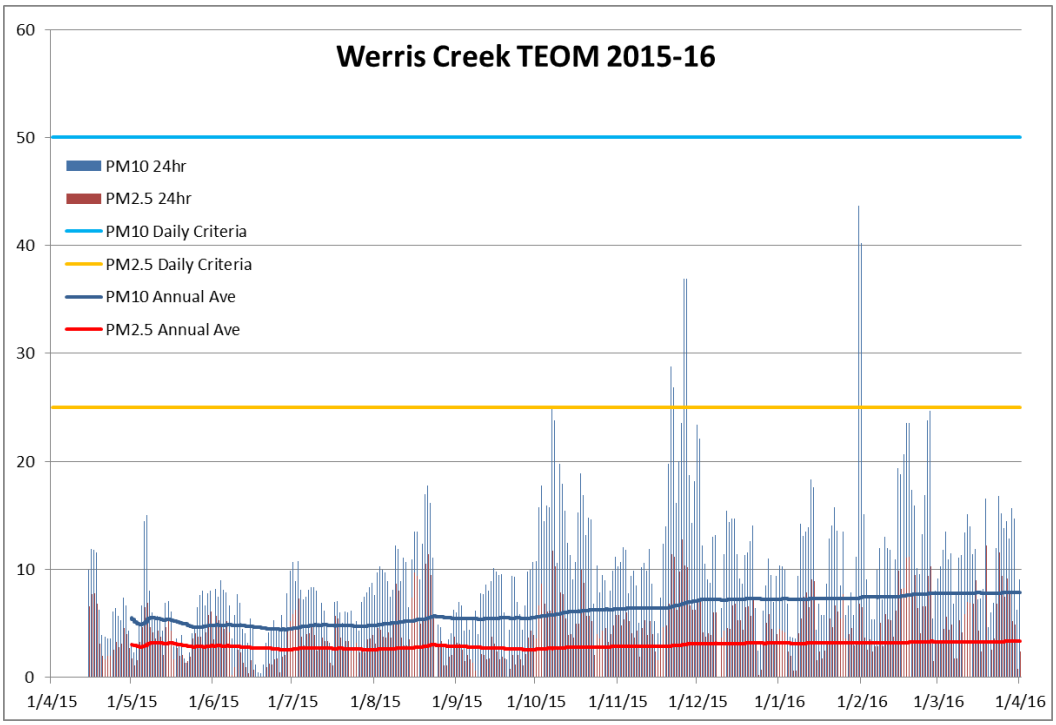
Figure 4 – Werris Creek Mine Air Quality Monitoring Network



6.3.2 Environmental Performance

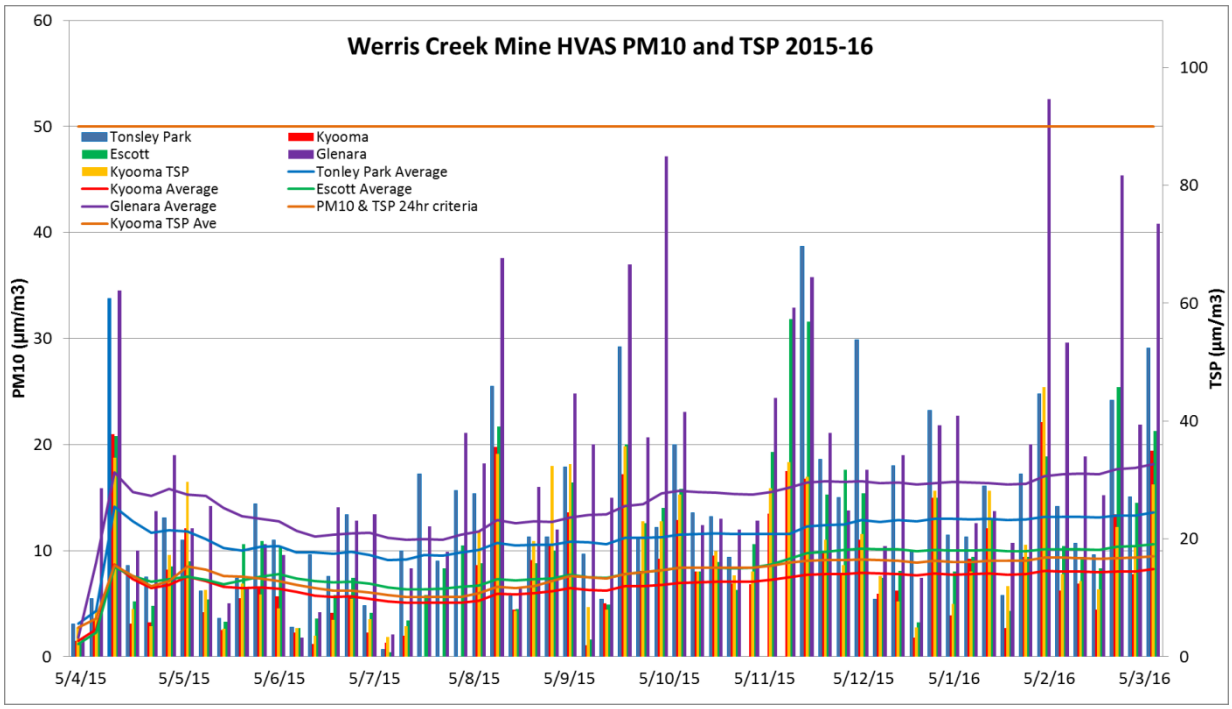
Monitoring conducted at the Werris Creek TEOM indicates the PM_{10} annual average remained well below the applicable criteria of 30 µg/m^3, while the daily maximum PM_{10} criteria of 50 µg/m^3 was not exceeded during the reporting year. Similarly, the $PM_{2.5}$ annual average remained below the applicable criteria of 8 µg/m^3, while the daily maximum $PM_{2.5}$ criteria of 25 µg/m^3 was not exceeded during the reporting year. **Figure 5** below shows continuous results for PM_{10} (24hr) and $PM_{2.5}$ (24hr) for the reporting year, as well as a running annual average throughout the reporting year.

Figure 5 – Werris Creek TEOM summary for 2015-16



Interrogation of the TEOM dataset to assess the impact of WCC on ambient particulate matter showed minimal differences in PM_{10} concentrations when the wind is blowing towards as opposed to away from the Werris Creek monitor. The average PM_{10} concentration when directly downwind of WCC is 8.3 µg/m^3 as compared with 7.9 µg/m^3, well within the monthly variation with no observable trend evident Monitoring conducted across the HVAS PM_{10} network has shown the running annual average PM_{10} concentrations to be well below the criteria of 30 µg/m^3 at all monitoring stations across the network during the reporting year (**Figure 6**). All 24 hour measurements of PM_{10} remained below the daily criteria of 50 µg/m^3 with the exception of one monitoring result at Glenara on the 17th February 2016, with a PM_{10} concentration of 52.6 µg/m^3. Notification regarding this incident was provided to the Department of Planning and Environment on the 4th March 2016, following receipt of the monitoring results. Subsequent investigations demonstrated that WCC was not the cause of the elevated PM_{10} levels on this day, with WCC downwind of the monitor, considering the dominant southerly winds measured throughout the day. All other PM_{10} measurements on this day were well within criteria as shown in **Figure 6**. Total Suspended Particulates (TSP) measured at the Kyooma HVAS met annual criteria of 90 µg/m^3, with all 24 hour measurements of TSP also below this level as shown in **Figure 6**.

Figure 6 – Werris Creek Mine HVAS PM_{10} and TSP results for 2015-16



Analysis of 2015-16 monitoring results from depositional dust gauges shows most monitoring sites met AQGHGMP criteria for each monitoring period, however a number of sites were affected by extraneous dust sources, including contamination with excessive organic matter. Of the three sites with annual average dust measurements over the criteria, two of the sites (Tonsley Park and 8 Kurrara Street) recorded annual depositional dust averages below the criteria once contaminated results were removed. The third site (Railway View), was severely skewed by a single isolated result in January, believed to be attributed to localised dust generation at the property, as no other nearby gauges support this high level of deposited dust. Both Tonsley Park and Railway View are project owned properties.

On investigation of the results at 8 Kurrara Street, the results exceeded the AQGHGMP criteria on four out of the seven samples recorded where no contamination was observed, however on each of these occasions, the dust gauge at Tonsley Park, Cintra and Greenslopes located between WCC and Kurrara Street, recorded depositional dust measurements of less than the average for these sites. As such, the elevated measurements recorded at 8 Kurrara Street on these occasions are not a result of mining operations at WCC. A summary of deposited dust monitoring results can be found in **Table 12** below.

During the reporting period bird deterrent devices were installed on deposited dust gauges in an effort to reduce organic matter contamination of samples. Table 12, outlines results which have been excluded either due to direct contamination of the sample or upon investigation of elevated results, the investigation found that the result was attributed to localised dust sources and not WCC operations. External conditions such as, dry conditions, agricultural activities, organic matter (insects, bird droppings), and fire have influenced results at various localised monitors.

Table 12 – Deposited Dust Summary for 2015-16

EPL# 12290	ID	Property	Annual Average	Average - Excluded	Minimum	Maximum	AQGHGMP Criteria	EA MOD2 Predicted	# Results Excluded
-	DG1	Escott^	0.5	0.6	0.1	1.9	4.0	-	5
-	DG2	Cintra^	2.0	1.7	0.9	3.4	4.0	-	7
-	DG3	Eurunderee^	1.0	1.2	0.3	2.4	4.0	-	6
-	DG5	Railway View^	**5.6**	**7.7**	0.4	**51.1**@	4.0	-	4
-	DG9	Marengo^	0.9	1.0	0.1	1.8	4.0	-	3
#29	DG11	Glenara	0.9	1.0	0.3	1.4	4.0	0.7	4
-	DG14	Greenslopes^	0.6	0.7	<0.1	2.0	4.0	1.3	4
-	DG15	Plain View^	1.3	1.3	0.4	4.0	4.0	0.8	5
-	DG17	Woodlands	3.2	1.6	0.8	**8.3***	4.0	0.7	8
-	DG20	Tonsley Park^	**5.1**	2.3	0.7	**27.6***	4.0	1.1	7
-	DG22	Mountain View	1.4	1.3	0.2	**4.3***	4.0	0.6	5
-	DG24	Hazeldene	2.0	1.4	0.4	**5.1***	4.0	0.7	8
-	DG34	8 Kurrara Street	**4.8**	3.3	0.2	**29.5***	4.0	-	5
-	DG62	Werris Creek South	1.0	0.5	0.1	**7.7***	4.0	-	8
#30	DG92	Werris Creek Centre	0.6	0.4	<0.1	2.7	4.0	-	4
-	DG96	Talavera	0.6	0.7	0.1	1.5	4.0	0.8	6
#28	DG98	Kyooma	0.3	0.3	<0.1	0.8	4.0	0.7	3
-	DG101	Westfall	1.2	1.4	0.4	2.5	4.0	-	8
-	DG103	West Street	0.6	0.9	0.1	1.4	4.0	-	7

^ 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

6.3.3 Proposed Improvement Measures

WCC is planning to undertake 29 hectares of rehabilitation in the next reporting period (2016-17). This process will involve reshaping, topsoiling, and seeding with available grass seed to reduce the surface area exposed to wind erosion.

6.4 BIODIVERSITY

6.4.1 Environmental Management

Biodiversity was managed in accordance with:

- Schedule 3 Conditions 28 of the PA 10_0059;
- EPBC 2010 / 5571 Condition 1; and
- The WCC Biodiversity Offset Management Plan (BOMP) approved by DP&E and Department of the Environment (formerly DSEWPaC) on the 30th August 2013 and 5th August 2013 respectively.

6.4.2 Environmental Performance

Seed Collection

WCC implemented a quarterly seed assessment program designed to identify on a seasonal basis the life cycle stage and development of native plants across the Biodiversity Offset Area to identify what, where, when and how to target appropriate resources to collect seed for future revegetation programs. The format of the quarterly seed assessments are to ensure that timely and prioritised seed collection is implemented with the reporting to include spatial information that can be directly given to seed collection contractors to undertake the required works. Only appropriately experienced seed collection contractors who follow the Flora Bank guidelines are engaged to undertake the seed collection works at WCC.

WCC engaged contractors to collect seed from the Werris Creek Biodiversity Offset Area in November 2015, February and March 2016 resulting in 206kg of Queensland Blue Grass dominated native grass seed; 975g of White Box and Yellow Box tree seed and 106g of native forbs. This seed will be germinated and propagated to supply future year's revegetation requirements.

Revegetation

Additional revegetation and maintenance planting resulting in a combined 4460 trees being planted across the Rehabilitation and BOA in 2015-2016 sourced from a combination of local (WCC Offset) and regional (Liverpool Plains and Tamworth) providence seed. A total of 2500 White Box trees were planted across the entire Eastern and lower Western Rehabilitation between March and May 2015. Planting of 1140 trees (White Box, Yellow Box, Blakely's Red Gum and Rough Bark Apple) was undertaken on the BOAs of Eurunderee Magazine, Railway View Houdini and Marengo's Upper & Lower Black Gully, North & Flat Paddocks between April and July 2015. A further maintenance planting of 560 Yellow Box and Blakely's Red Gum trees was completed on the Western Rehabilitation and 280 trees on Marengo BOA between March and May 2016.

Habitat Augmentation

Approximately 163 items of timber were salvaged from previously cleared areas ahead of mining and transported around to the new Western Rehabilitation area resulting in 67 stags (timber vertically erected to replicate natural dead trees arboreal habitat), 9 coarse woody debris (timber horizontally placed to replicate natural fallen limbs and tree ground level habitat) and 87 logs stockpiled on the rehabilitation for future use.

Weed Management

WCC implemented a quarterly weed inspection program that identifies the spatial location of weeds, determines the status (Weeds of National Significance, noxious and /or environmental), size of infestation and priority for control so that timely and prioritised weed control works can be scheduled quarterly to reflect seasonal conditions and growth stage. The format of the quarterly weed inspections reports include spatial information that can be directly given to weed spraying contractors to undertake the required works. Only appropriately qualified and experienced weed contractors (AQF3 accreditation or higher for use of herbicide) are engaged to undertake the weed control works at WCC.

WCC engaged one weed contractor during 2015-2016 resulting in 1887.3ha being sprayed including Spiny Burr Grass (W4), St John's Wort (W4), Noogoora and Bathurst Burr (W4), Patersons Curse (W4), Johnson Grass (W4), Scotch Thistle (W4) and other environmental broadleaf weeds.

Feral Animal Management

WCC undertook sand pad monitoring in November 2015 which identified that Eastern Grey Kangaroos as high abundance, foxes as medium abundance (same as the previous year) and rabbits, pig, hare, cats and dogs as low or scarce. The results of the annual sand pad monitoring follows the DECCW/CSIRO "The Sand Plot Technique" to rate abundance and determine a population level rank (scare, low, medium and high) for particular species in comparison to standards across NSW eucalypt forests that determine the feral species and frequency of control programs to be implemented by appropriately experienced feral animal management contractors.

WCC implemented quarterly fox control programs across the entire WCC BOA during 2015-2016 with a poisoned bait (1080) take rates of 10.5% in winter 2015, 20.7% in spring 2015 and 11.6% in summer 2016.

Fire Management

During the 2015-16 reporting year, 6 mosaic controlled burns were undertaken across a total area of 124 hectares of BOA. The controlled burns were managed by NSW Rural Fire Service with the fires lit on 14th to 19th July 2015 and 9th to 13th September 2015. Cool burn techniques were used which involves burning on cool days and into the wind which also improves safety during the activity. This technique combusts the organic matter above the ground but does not scorch the ground leaving some ground cover from which the grasses will regenerate from. The timing of the winter burns is after the native grasses have seeded but before the native herbs and forbs germinate and flower. Fire is useful for removing biomass and weeds giving natives a competitive advantage and greater access to resources to improve woodland restoration outcomes. Other management measures implemented during 2015-16 included the maintenance of fire breaks and tracks/access across the BOA.

6.4.3 Proposed Improvement Measures

- New monitoring programs implemented such as quarterly weed inspections and quarterly seed assessments will continue to be implemented into 2016-2017;
- Trial canid ejectors as part of fox control programs to address the steady trend in abundance of foxes and the decreasing bait take rates. The canid ejectors are designed to inject a lethal dose of 1080 when the meat attractant is removed by a force that only a dog or fox can undertake; and
- Areas of WCC BOA that have been subject to control burns without subsequent natural regeneration will have revegetation preparation works undertaken approximately 12 months ahead of the overstorey revegetation program to be implemented in 2017 (the end of 5 year rest period).

6.5 HERITAGE

6.5.1 Environmental Management

The LOM Environmental Assessment determined that the project would not result in any future adverse impacts on Aboriginal cultural heritage. The impact associated with the removal of the remnant features of the former Werris Creek Colliery is considered to be minor, as the historic sites do not meet the NSW Heritage Office (2001) criteria for high significance sites (even at a local level) (Landskape, 2010). WCC previously undertook quarterly inspections of the only known significant Aboriginal heritage item onsite – the "Narrawolga" Axe Grinding Grooves. No previously unknown Aboriginal sites or artefacts were discovered during 2015-2016.

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

to the former underground mine had minimal historical value and will be destroyed in the course of mining. If any previously unknown heritage items related to the former underground mine or are of aboriginal origin are found, WCC will have an archaeologist assess the historical significance of each identified item.

6.5.2 Environmental Performance

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

6.6 WASTE

6.6.1 Environmental Management

WCC continued to engage Enviropacific to provide a total waste management service in 2015-16. This practice has ensured WCC is positioned to adopt industry standard waste management practices and to maintain regulatory compliance with regard to offsite disposal at licenced facilities and on-site storage requirements.

6.6.2 Environmental Performance

Waste generation quantities are tracked as summarised in **Table 13** for the 2015-2016 period. The current reporting period demonstrates the full year of benefits seen from improvements to waste management practices at WCC employed in December 2014. The reduction has been driven by waste minimisation measures such as the introduction of separate recyclable waste and general waste bins as well as educational posters identifying which waste stream aligns with the appropriate bins. These improvements have led to a significant reduction in general waste volumes, while seeing a three-fold increase in recycling.

Table 13 – Quantities of Waste Generated for 2015-2016

2015-2016Waste Stream	Total 2015-2016	2014-2015
Waste Oil (kL)	**168.4**	**182.5**
Scrap Metal (kg)	**99,430**	**80,800**
General Waste (m3)	**1,269**	**1,650**
Co-Mingled Recycling (m3)	**177.1**	**55**
Septic (L)	**10,000**	**13,000**
Cardboard (kg)	**1,300**	**1,325**
Empty IBCs (kg)	**4,020**	**7,200**
Oily Rags (kg)	**16,080**	**6,000**
Hydraulic Hoses (kg)	**15,000**	**1,000**
Batteries (kg)	**3,165**	**2,159**

6.7 ENVIRONMENTAL PERFORMANCE SUMMARY

An environmental performance summary is presented in Table 14 below.

Table 14 - Environmental Performance

Aspect	Approval Criteria / EIS Prediction	Performance during the reporting period	Trend / Key Management Implications	Implemented / proposed management actions
Noise	Refer s6.1	Submission of the Noise Monitoring Plan was not in accordance with Schedule 5, Condition 4(a) & 4(b). All other approval criteria has been met	An administrative non-compliance has occurred whereby timeframes for completion of the document reviews and subsequent Departmental submission has not been met.	A review of site administrative processes will be undertaken to ensure future compliance.
Blasting	Refer s6.2	Submission of the Noise Monitoring Plan was not in accordance with Schedule 5, Condition 4(a) Glenara blast monitor did not record blast vibration and air overpressure.	An administrative non-compliance has occurred whereby timeframes for completion of the document reviews and subsequent Departmental submission has not been met. Communications were lost due to changes with the mobile network in the local area and subsequent corruption of memory card	A review of site administrative processes will be undertaken to ensure future compliance. Blast monitor upgraded with 4-metre directional antenna and key electronics replaced. Regular manual download to clear memory card of any potential corruption.
Air Quality	Refer s6.3	Kyooma HVAS failed to record PM_{10} concentrations on three occasions	Power loss resulting from previous owner disconnecting power on vacating property	Engage with new owners when properties with monitoring equipment are sold
Biodiversity	Refer s6.4	Submission of the Biodiversity Monitoring Program was not in accordance with Schedule 5, Condition 4(a) All other approval criteria has been met	An administrative non-compliance has occurred whereby timeframes for completion of the document reviews and subsequent Departmental submission has not been met.	A review of site administrative processes will be undertaken to ensure future compliance.
Heritage	Refer s6.5	Approval criteria has been met	Nil	Nil

7 WATER MANAGEMENT

7.1 WATER TAKE

WCC currently holds two Water Access Licences, with the water taken under these licences for the 2015-2016 reporting year summarised in **Table 15**.

Table 15 - Water Take 2015-2016 (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	35	0	35

WAL 29506	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah – Oxley Basin Mdb Groundwater Source	50	0	0	0

7.2 SURFACE WATER MANAGEMENT

7.2.1 Environmental Management

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

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

Void Water Management

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

Void water is predominantly used for dust suppression purposes and to control spontaneous combustion which is aggravated in the areas surrounding the workings of the former underground colliery. Water carts engaged in watering haul roads and other areas of the mining excavation are the predominant user of water for dust suppression purposes, with water also used to control dust at conveyor loading points and on coal stockpiles. A small amount of void water is also used for ancillary activities in the workshop, such as washing down equipment. Void water use is monitored and calculated monthly using water meters on key pipelines and water fill points, supplemented by surveyed volumes of water stored in dams and the void on site. This data is used to update the Water Balance Model for site.

Dirty Water Management and Erosion and Sediment Control Measures

During the period, dirty water dams remained in place to capture surface runoff from disturbed areas of WCC, with SB18 constructed on the north eastern perimeter to capture runoff from the planned extension of the visual and acoustic bund. There were no passive overflows of dirty water from the system during the reporting period due to the below average rainfall, however an active release was undertaken from SB9 from the 1st February 2016, following sampling to confirm the quality of the

contained water. This active release, complemented by internal pumping from other sediment basins ensured capacity was maintained in the event of further rainfall.

Various measures were maintained and improved during the reporting period to minimise erosion and sediment transport at WCC. In addition, approximately 27 hectares of new rehabilitation was undertaken predominantly on the south western slope of the overburden emplacement, with contour banks spaced at 20 metre vertical intervals to minimise erosion potential. This area was seeded with a cover crop of oats immediately on completion of soil preparation works, with the later application of native grass seeds following collection from offset areas at WCC, once sufficient rain over the summer months produced a seed supply. Maintenance of existing contour banks occurred on an as needed basis following rainfall, to limit the potential of piping. Regular checks of the dirty water management system were undertaken as required dependent on rainfall.

Contaminated Water Management

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

7.2.2 Environmental Performance

Surface Water Quality

Quarterly sampling of water stored within the clean, dirty and void water dams and within Quipolly and Werris Creeks' (**Figure 7**) was undertaken by WCC. **Table 16** presents the average results recorded at each location for the 2015-2016 reporting year.

Table 16 – Quarterly Surface Water Quality for Dams and Offsite Creeks'

Dam/ Creek	Monitoring Site (EPA No)	Number of Samples	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Oil & Grease (mg/L)
VWD1	16	4	8.65	1085	6.9	<5
VWD2	27	4	8.22	1078	16.4	14.3
VWD3	-	4	8.48	1053	21.8	<5
VWD4	-	4	8.54	1065	10.6	<5
VWD6	-	1*	8.70	948	38.0	<5
SB2	10	0*	Dry	Dry	Dry	Dry
SB9	12	3*	7.98	728	14.8	5
SB10	14	0*	Dry	Dry	Dry	Dry
SD4	-	0*	Dry	Dry	Dry	Dry
SD5	-	0*	Dry	Dry	Dry	Dry
QCU	25	1*	7.89	1420	76	<5
QCD	26	4	8.08	1123	<5	8
WCU	23	0*	Dry	Dry	Dry	Dry
WCD	24	4	8.20	1373	30	6
BGD	-	0*	Dry	Dry	Dry	Dry

* BGD, WCU, SD4, SD5, SB2 and SB10 were dry during each quarterly monitoring period. SB9 was dry during the first quarterly monitoring period. QCU was dry during three of the quarterly monitoring periods. Sampling from VWD6 commenced during period.

The quarterly water quality was generally consistent with the previous reporting period, except for rising electrical conductivity levels measured at the offsite monitoring points. It should also be noted that the 2015-2016 reporting period was characterised by conditions of prolonged rainfall deficit, which has

affected both the electrical conductivity concentrations of these streams as well as the presence of water in sediment dams across site.

During the reporting period, there was one active discharge of dirty water from SB9 into Quipolly Creek, during a period of no flow in Black Gully and upper Quipolly Creek, with only a very small flow present at the downstream monitoring site on Quipolly Creek. Water quality monitoring results and comparison with compliance criteria are shown in **Table 17** and **Table 18**. The results of the monitoring suggest that this dirty water discharge did not have any adverse impact on the quality of Quipolly Creek. Discharge water quality results are consistent with the predicted levels as nominated in the "Werris Creek Coal Mine Life of Mine Environmental Assessment" (R.W. Corkery and Co Pty Limited, 2010) in that WCC would not impact on the pH, suspended solids or conductivity of waters discharged from the site.

Table 17 – Discharge Water Quality Results

Discharge Point	EPA ID	pH	Conductivity (µS/cm)	Suspended Solids (mg/L)	Oil & Grease (mg/L)
	EPL 100% Limit	6.5 – 8.5	N/A	50	10
SB9	12	7.1	538	6	9

Table 18 – Quipolly and Werris Creeks' Discharge Receiving Water Quality

Creek	EPA ID	No. Samples	pH	Conductivity (µS/cm)	Suspended Solids (mg/L)	Oil & Grease (mg/L)
Quipolly Upstream (QCU)	25	1	7.1	423	286	140
Quipolly Downstream (QCD)	26	1	8.0	1090	7	10
Werris Upstream (WCU)	23	0	No Discharge			
Werris Downstream (WCD)	24	0	No Discharge			

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

7.3 GROUNDWATER MANAGEMENT

7.3.1 Environmental Management

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

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

WCC currently monitors 39 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 19** and **Figure 8**. Monitoring bores in the Werrie Basalt are separated into those close to WCC and those further away, with select bores in both the Werrie Basalt and Quipolly Alluvium nominated as background monitoring bores, due to their location far upstream from WCC when considering the dominant groundwater flow contours. In addition, six bores also contain logging piezometers, providing a higher resolution water level dataset to enhance the understanding gained from the bimonthly groundwater level sampling of the monitoring network. These piezometers have been placed to target certain zones, including the Werrie Basalt northwest, south and east of WCC, and the upper, middle and lower reaches of the Quipolly Alluvium aquifer in the vicinity of WCC.

Table 19 – WCC Groundwater Monitoring Program

Precinct	Bores
Werrie Basalt near WCC	MW1*, MW2*, MW3, MW4B, MW5, MW6*, MW27, MW36A*, MW36B
Werrie Basalt	MW8#, MW10, MW14, MW17B, MW19A, MW20, MW38A, MW38B, MW38C, MW38E,
Quipolly Alluvium	MW7*, MW12, MW13*, MW13B, MW13D, MW15, MW16, MW17A, MW18A, MW21A, MW22A, MW22B, MW23A, MW23B, MW26B, MW28A#*, MW32,
Others	MW24A, MW29 (both Werrie Basalt in the Black Soil Gully valley) MW34 (minor alluvium associated with Werris Creek)
Monitoring Frequency	**Parameters**
Bimonthly	Standing Water Level
6 Monthly	Total Nitrogen, Nitrate, Total Phosphorus, Reactive Phosphorus, Electrical Conductivity, pH
Annually	Chloride, Sulfate, Alkalinity, Calcium, Magnesium, Sodium, Potassium, Arsenic, Barium, Beryllium, Cadmium, Cobalt, Chromium, Copper, Manganese, Nickel, Lead, Vanadium, Zinc, Mercury, Ammonium, Nitrite, Nitrite+Nitrate, TKN, Anions, Cations, Ion Balance, TPH
# Background monitoring bore * Piezometer installed in bore for all or part of reporting period	

The Water Balance Model for WCC was updated as part of this Annual Review, with this model used to verify model assumptions in relation to groundwater interception in the mining void. A cusum analysis was undertaken on all monitoring bores at the end of the reporting period to assess whether any bores show changes in water level outside of natural variability. Furthermore, five landholders from the Quipolly valley requested investigations into groundwater level changes measured at their bores during the period, which were undertaken as requested. Changes in water level at each of these bores was

determined to be a product of the prolonged rainfall deficit combined with changes to the management of Quipolly Dam.

Figure 8 – Groundwater Monitoring Network

7.3.2 Environmental Performance

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

Table 20 presents the groundwater level monitoring data for the last 12 months in the Werrie Basalt and Quipolly Creek Alluvium aquifers. For Quipolly Creek Alluvium, MW28A and MW23A are representative of upstream and downstream aquifer conditions respectively. For Werrie Basalt, MW5 and MW14 are representative of aquifer conditions either side of the watershed between Quipolly Creek in the south and Werris Creek in the north All groundwater sampling and analyses were undertaken by a NATA accredited laboratory.

Table 20 – Groundwater Monitoring Bore Level Summary – 2015-2016

Bore	May 2015		July 2015		Sep 2015		Nov 2015		Jan 2016		Mar 2016	
	mbgl	%	mbgl	%	mbgl	%	mbgl	%	mbgl	%	mbgl	%
MW1	61.33	-1%	**62.64**	-2%	Dry	-	Dry	-	Dry	-	Dry	-
MW2*	32.59	-2%	33.69	-3%	34.68	-3%	35.92	-3%	37.02	-3%	**43.40**	-15%
MW3	18.35	-1%	18.61	-1%	18.83	-1%	19.04	-1%	19.23	-1%	**19.40**	-1%
MW4B	15.02	-2%	15.53	-3%	15.92	-2%	16.39	-3%	16.63	-1%	**16.81**	-1%
MW5	11.61	-1%	11.87	-2%	12.02	-1%	12.21	-2%	12.39	-1%	**12.55**	-1%
MW6	14.4	-2%	14.72	-2%	14.94	-1%	15.18	-2%	15.38	-1%	**15.44**	0%
MW27*	51.83	-3%	55.04	-6%	**56.02**	-2%	53.33	+5%	54.90	-3%	53.43	+3%
MW36A	22.97	+6%	22.79	+1%	23.54	-3%	24.43	-4%	**24.45**	0%	23.92	+2%
MW36B	22.75	+6%	22.68	0%	23.39	-3%	24.20	-3%	**24.22**	0%	23.69	+2%
MW8*	18.79	-1%	18.95	-1%	19.04	0%	19.37	-2%	19.56	-1%	**19.75**	-1%
MW10	17.29	0%	**17.60**	-2%	17.01	+3%	16.96	0%	16.98	0%	16.72	+2%
MW14	18.35	+5%	17.72	+4%	18.84	-6%	19.98	-6%	20.23	-1%	**20.57**	-2%
MW17B*	12.64	-3%	12.89	-2%	**14.17**	-9%	13.73	+3%	13.90	-1%	13.83	+1%
MW19A*	9.37	-1%	9.49	-1%	8.97	+6%	9.18	-2%	9.36	-2%	**12.32**	-24%
MW20*	21.12	0%	21.26	-1%	21.37	-1%	21.46	0%	21.57	-1%	**21.66**	0%
MW38A					14.58		15.03	-3%	14.92	+1%	**15.12**	-1%
MW38B*					10.05		10.11	-1%	10.20	-1%	**10.25**	0%
MW38C*					21.70		22.75	-5%	**23.50**	-3%	23.27	+1%
MW38E*					10.23		10.38	-1%	10.57	-2%	**10.68**	-1%
MW24A*	15.31	-2%	15.25	0%	15.39	-1%	15.33	0%	15.61	-2%	**15.76**	-1%
MW29*	14.41	-7%	13.57	+6%	**25.93**	-48%	18.57	+40%	15.19	+22%	15.20	0%
MW12*	12.54	-2%	12.92	-3%	13.2	-2%	13.51	-2%	13.70	-1%	**13.93**	-2%
MW13*	6.76	-2%	6.90	-2%	7.06	-2%	7.23	-2%	7.41	-2%	**Dry**	-
MW13B*	5.28	-2%	5.33	-1%	5.41	-1%	5.57	-3%	5.70	-2%	**5.82**	-2%
MW13D*	5.16	0%	5.15	0%	5.25	-2%	5.39	-3%	5.57	-3%	**5.79**	-4%
MW15*	6.28	-2%	6.44	-2%	6.53	-1%	6.47	+1%	6.89	-6%	**7.05**	-2%
MW16*	7.38	-1%	7.63	-3%	7.76	-2%	8.7	-11%	**Dry**	-	Dry	-
MW17A*	6.44	-2%	6.68	-4%	6.82	-2%	6.99	-2%	7.31	-4%	**7.35**	-1%
MW18A*	6.32	-1%	6.54	-3%	6.7	-2%	6.86	-2%	**Dry**	-	Dry	-
MW21A*	10.28	-2%	10.54	-2%	10.75	-2%	10.94	-2%	11.13	-2%	**11.30**	-1%
MW22A*	7.62	-3%	7.77	-2%	**8.92**	-13%	8.19	+9%	Dry	-	Dry	-
MW22B*	7.87	-2%	Dry	-	Dry	-	Dry	-	Dry	-	Dry	-
MW23A*	4.00	+1%	3.97	+1%	4.14	-4%	4.28	-3%	4.38	-2%	**4.53**	-3%
MW23B*	4.22	0%	4.18	+1%	4.22	-1%	**5.19**	-19%	4.38	+18%	4.44	-1%
MW26B*							9.52~		9.63	-1%	**9.75**	-1%
MW28A*	14.45	-1%	14.76	-2%	14.94	-1%	15.37	-3%	15.65	-2%	**15.93**	-2%
MW32*	4.13	+1%	4.25	-3%	4.15	+2%	4.19	-1%	4.22	-1%	**4.30**	-2%
MW34*	**11.93**	-1%	10.98	+9%	10.92	+1%	11.38	-4%	11.52	-1%	11.88	-3%

mbgl – meters below ground level is the distance in meters from top of bore to groundwater surface;

Orange – Change decrease;

Green – change increase or no change;

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

* - Indicates 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. ~ - Requested by landholder to resume bore sampling in December 2015.

MW38 series bores commenced sampling Sep 2015.

The bi-monthly groundwater level monitoring results have showed downward trend in groundwater for 2014-2015 as evidenced by the dominant orange colouring in Table 3.24. However this trend appears strongest in those bores within the Quipolly Alluvium aquifer, and to a lesser extent select bores in the Werrie Basalt closest to WCC. However, some bores close to WCC in the Werrie Basalt (MW36a/b, MW27), as well as other bores further afield in the Werrie Basalt do not have a clear directional trend in this reporting period, particularly with the March 2016 sampling period showing an increase in standing water level in a number of bores across the Werrie Basalt. This may be a delayed effect of the good rainfall experienced in December 2015 and January 2016.

A cumulative sum (cusum) trend analysis was completed for each monitoring bore to assess whether any changes in groundwater are beyond the expected range of values. The cusum analysis identified seven bores exhibiting recent changes to water level outside of the expected variability (MW1, MW2, MW6, MW27, MW12, MW21A, and MW26A). These bores were then compared with observations from background monitoring bores for the Werrie Basalt and Quipolly Alluvium aquifers. Environ (2016) determined that changes exhibited at each of these identified bores was in line with changes observed at the background monitoring bores. Comparison with cumulative residual rainfall for the area indicates that the changes are aligned with the increasing rainfall deficit experienced over the past year. Furthermore, an analysis of spatial trends in groundwater flows indicates that groundwater flow paths are unchanged over the past four years, albeit with a reduced slope on a regional scale in response to the cumulative rainfall deficit. Environ (2016) suggested that the augmentation of Quipolly Dam in 2012 may have also contributed to the reduction in groundwater levels in the Quipolly Alluvium aquifer since this time, with water levels in Quipolly Dam now at their lowest level in over 10 years.

Monitoring of groundwater quality in September 2015 and March 2016 identified pH and EC values in line with past results in all monitoring bores near WCC as described in **Table 20** above. Furthermore, the presence of hydrocarbons was not detected in any of these bores, indicating no potential contamination of groundwater from WCC. All pH and EC results are well within the ANZECC (Agriculture Irrigation and Livestock) criteria within the Quipolly Creek Alluvium and Werrie Basalt aquifer. A number of bores associated with agricultural land have continued to display Total Phosphorus and Total Nitrogen levels above ANZECC Agricultural Irrigation Short and Long Trigger Values. These levels have been consistent since monitoring commenced in 2005 and are a reflection of the agricultural land use and fertiliser inputs than any impacts from mining operations.

7.3.1 Proposed Improvement Measures

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

7.4 SITE WATER BALANCE MODEL VALIDATION

As part of the Annual Review process, WCC has updated the Water Balance Model for 2015-2016 based on observed and calculated inputs and outputs. The WCC Water Balance Model is focused on

accounting for all water entering and leaving the open cut pit to allow a verification of groundwater interception during the reporting year. The key inputs to the water balance model are:

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

The key outputs to the model include:

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

Table 21 – Water Balance Inputs and Outputs.

Source	Estimated Approximate Annual Volume (ML)	Notes
INPUTS TO PIT		
Groundwater	35	Derived from the groundwater model.
Rainfall and Runoff	783	Calculated from water balance model based on rainfall, area and characteristics of catchments areas which report back to the pit.
Water from underground workings	640	Volume of water estimated to flow back into pit from the water pumped into the former underground workings to control spontaneous combustion (as water curtains and sprays). This is metered at the pump and it is estimated that 90% of this volume will return to the pit.
Evaporators	175	Volume of water estimated to flow back into the pit from use of evaporators. This is based on WCC's placement of evaporator sprays on the top of the pit (ie, within the pit catchment) from September 2015. The final volume

Source	Estimated Approximate Annual Volume (ML)	Notes
		returning to the pit is derived from runoff/infiltration/storage calculations in the water balance model.
Change in Storage	26	The difference between the estimated volume of water in the void pit between April 2015 and March 2016, based on surveyed levels and the established relationship between height and pit volume. Over this period this volume had increased so it is credited to pit input.
TOTAL INPUT	**1659**	
OUTPUTS FROM PIT		
Out of Pit Pumping	1570	Volume based on metered pumping April 2015 to March 2016.
Direct Evaporation	25	Estimated volume directly evaporated from the surface of the pit, based on climatic data (from daily evaporation measured at Quirridi post office weather station).
TOTAL OUTPUT	**1595**	
NET WATER	**64**	Difference in input/output – a reflection of the errors in measurement – estimated at up to 10ML/month, and approximations within the models.

The results of the above Water Balance Model were found to correlate well with the hydrogeological model predictions for groundwater inflow for the WCC pit. This process has further validated the groundwater model developed for the LOM project. At the time of the LOM impact assessment, this model benefitted from real time calibration data recorded during the initial mining scenarios and was therefore considered to be a robust representation of the groundwater system.

8 REHABILITATION

The Rehabilitation Objectives for WCC are described in Section 4 of the MOP and are summarised in **Table 22** below, and focus on the restoration of native woodland vegetation, specifically Grassy White Box Woodland. Furthermore, the post mining land use goal for WCC is to also reinstate certain areas of the mine to Class III capable agricultural land, and to ensure rehabilitation and revegetation is self-sustaining. The following subsections describe the rehabilitation activities undertaken at WCC during the 2015-2016 reporting period, and other activities aimed at achieving the Rehabilitation Objectives outlined in the MOP.

Table 22 – Rehabilitation Objectives for WCC

Feature	Objective
Mine site (as a whole)	• Safe, stable and non-polluting; • Constructed landforms sympathetic to natural landforms (including landform micro-relief (as far as practicable); • Final land uses compatible with surrounding land uses; and • Minimise visual impact of final landforms as far as reasonable and feasible.
Woodland areas and other vegetated land	• Establishment of at least 280 hectares of White-Box-Yellow Box-Blakely's Red Gum Woodland EEC; and • Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems that is comprised of: o Local native plant species and o At least 180 hectares of shrubby woodland
Amenity Bunds and Overburden Emplacements	• Early revegetation and planting with local native woodland species; and • Free draining.
Final Void	• Minimise the size and depth of the final void as far as is reasonable and feasible, with its floor a minimum of 5 metres above the predicted long-term groundwater level.
Project Infrastructure	• To be decommissioned and removed, unless the Executive Director, DRE agrees otherwise.
Community	• Minimise the adverse socio-economic effects associated with mine closure

8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

During the 2015-2016 reporting period, mining operations progressed in line with the Mining Operations Plan for WCC, with a small general advancement of the highwall and an acceleration of the western portion of the pit to balance coal quality and strip ratios for the life of mine. 26.7 hectares of rehabilitation to the Ecosystem and Land Use Establishment class was completed in the reporting year, with further maintenance works undertaken across existing rehabilitation areas. Due to the sequencing of overburden dump progression and a 15% reduction in production rate, minimal advancements in the earlier rehabilitation categories (Landform Establishment and Growth Medium Development) were made during the reporting period. All infrastructure continued to be in use during the period, and as such no areas of infrastructure were rehabilitated during the period.

Rehabilitation for the 2015-2016 reporting year focused on the remediation of the upper western part of the overburden emplacement, building on from rehabilitation works of the lower section of this batter in the previous reporting period. Due to the poor availability of native grass seed at the time of topsoil placement, a cover crop was sowed to boost soil stability, and limit erosion and dust generation from the elevated landform. Native grass seed was harvested from the adjacent biodiversity offset areas and sown on the new and existing areas of rehabilitation to boost germination. These areas were harrowed at the same time to encourage seed strike.

Weed control was completed across all areas of rehabilitation during the reporting period to control a number of broadleaf weeds persistent in regeneration areas, as well as to control the growth of spiny burr-grass in two affected areas. Inspections of rehabilitation structures following heavy rainfall identified

that all areas are structurally sound, with only minimal maintenance required. Other initiatives to boost rehabilitation success are described in **Section 6.4** on Biodiversity.

At the completion of the 2015-2016 reporting period, 147.9 ha of rehabilitation has been completed to the Ecosystem and Land Use Establishment class, with a further 18.0 ha completed to the Ecosystem and Land Use Sustainability class. A review of reporting categories has been undertaken as part of the preparation of the 2015-2016 Annual Review to align with the categories outlined in the guideline and the updated Mining Operations Plan for WCC. As such, categories are no longer directly comparable to previous AEMR reports. These updated disturbance categories have been remapped as at the end of the 2014-2015 reporting period for the sake of clarity.

Figure 9 depicts current disturbance categories for WCC as at the end of the 2015-2016 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.

Table 23 – Rehabilitation Status

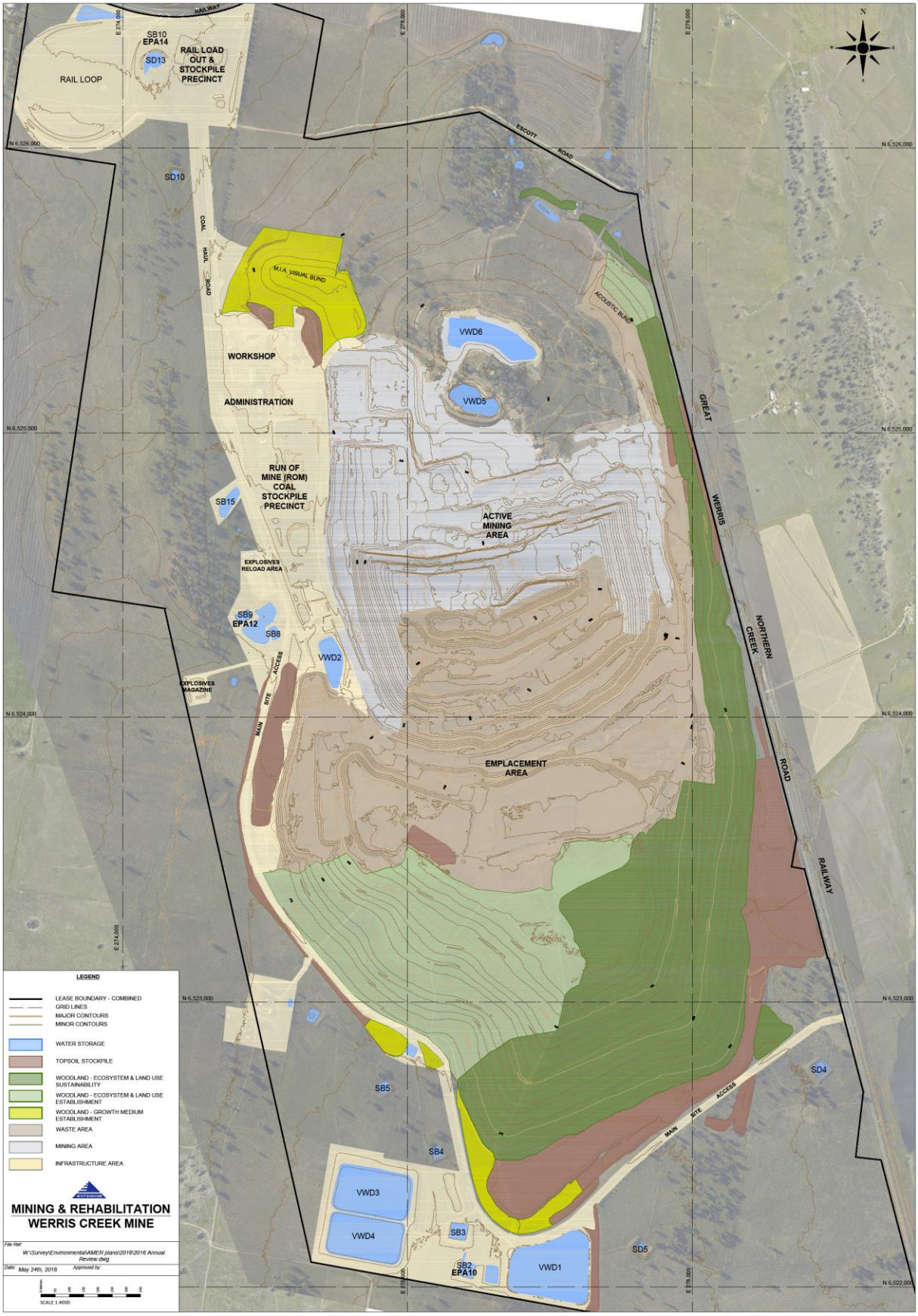
Mine Area Type[1]	Previous Reporting Period (Actual)	This Reporting Period 2015 (Actual)	Next Reporting Period 2016 (Forecast)
	2014-2015 (ha)	2015-2016 (ha)	2016-2017 (ha)
A. Total mine footprint	538	568	580
B. Total active disturbance	354	402	337
C. Land being prepared for rehabilitation	65	18*	91
D. Land under active rehabilitation	119	148	153
E. Completed rehabilitation	0	0	0

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

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

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

Figure 9 – Disturbance Categories March 2016



8.2 REHABILITATION WORKS PROPOSED FOR NEXT REPORTING PERIOD

WCC aims to continue rehabilitation efforts during the 2016-2017 reporting period largely in accordance with the projections under Year 2 of the current MOP. These actions will focus on landform development and growth medium development of the next section of the outer western batter. Works will also focus on progressing the final landform on the top of the overburden emplacement.

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

8.3 KEY ISSUES TO ACHIEVING SUCCESSFUL REHABILITATION

The key issues to achieving successful rehabilitation include:

- Excessive erosion and sedimentation (e.g. Gullying and sedimentation resulting in land stability and vegetation growth issues);
- Weed and feral animal infestation;
- Poor vegetation establishment and growth (including the Box-Gum Woodland EEC/CEEC); and
- Landform stability.

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

9 COMMUNITY

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

9.1 COMMUNITY ENGAGEMENT ACTIVITIES

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

There were four CCC meetings held in the 2015-2016 reporting period. In addition to the CCC, WCC distributed a newsletter to the local communities in May 2015, providing an update on a range of topics including the pending Project Modification, business restructure, and upcoming community meeting. WCC held a community meeting on the 29th July 2015 which was well attended by various members of the local communities, chaired by the State Member of Parliament and focusing on a range of issues including groundwater.

9.2 COMMUNITY CONTRIBUTIONS & INITIATIVES

Whitehaven, 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, with $5.6m in payments to employees and contractors living in the LPSC in FY2015. Furthermore, WHC has contributed $23.4m into the Liverpool Plains community over the last three years, with $4.8m of this paid to 41 local businesses.

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. At the start of the 2015-2016 reporting period, over $186,000 had been directed to support community improvement projects in the shire, with another $77,000 in funds committed to specific projects but as yet unspent. Two projects underway at the commencement of the period include the provision of additional public seating along Single St, Werris Creek, and the construction of a new playground facility in Hoamme Park, Werris Creek. The seating project was completed in autumn 2015, while the Liverpool Plains Shire Council (LPSC) has matched the funding provided by the CEF with the planned completion date for this project of the end of April 2016. The remaining $50,000 (approximately) of the CEF was designated for playground augmentation in the Spring Ridge community following consultation at the November 2015 CCC meeting. Planning is currently underway for this project. Following the completion of these projects, approximately $263,000 will have been contributed for projects in the Werris Creek Township, with a further $20,000 for Quirindi and $50,000 for Spring Ridge.

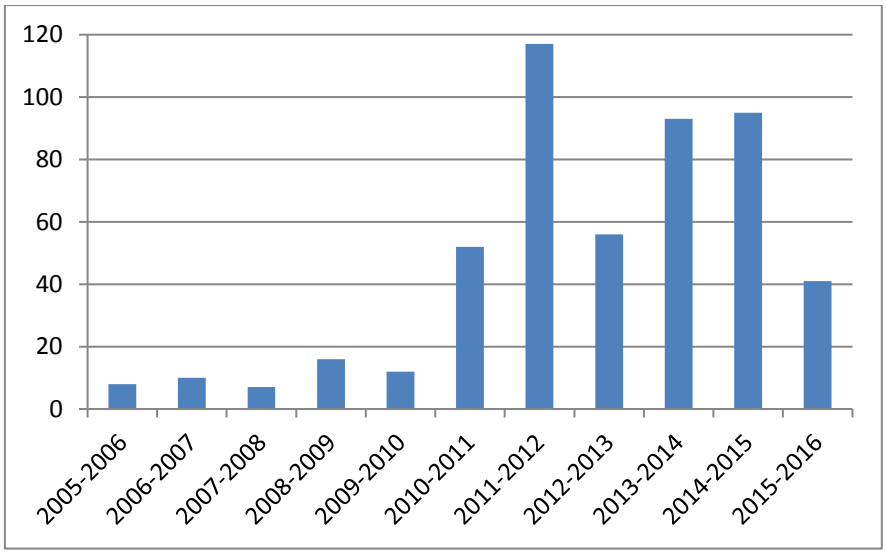
9.3 COMMUNITY COMPLAINTS

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

There were 41 complaints received by WCC for the 2015-2016 period, which was a decrease of over half from the previous year (**Figure 10**) and the lowest number of complaints since 2009-2010. The overall increase in the number of community complaints over previous years has been driven by the increasing number of blasting complaints with 29 of the 41 complaints in the 2015-2016 reporting year related to blasting (

Table 24).

Figure 10 – Total number of complaints received by WCC from 2005 to 2016



Blasting was the dominant cause for complaint in 2015-2016, with 29 blast-related complaints compared with 57 in 2014-2015. This reduction may in part be attributed to a self-imposed reduction in the maximum targeted vibration prediction for the southern end of Werris Creek Township, which was reduced from 1.0mm/s to 0.8mm/s early on in the reporting period.

WCC has endeavoured to address and respond to each complaint appropriately (where possible). In particular, the most common complaints have been in relation to blasting, air quality and groundwater. For specific complaint details and actions taken refer to the Complaint Database for 2015-2016 located on the Whitehaven Coal Website

Table 24 – WCC Complaint Issues from 2011 to 2016

Issue	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Blast - Vibration/Overpressure	68	9	47	47	23
Blast - Dust/Fume	2	1	5	10	6
Blast/Other	1	4	3	2	0
Noise – Train Load Out	17	6	9	2	1
Noise – Mine	15	15	2	2	0
Lights – Mine	10	2	3	0	2
Lights - Train Load Out	3	4	5	0	2
Dust – Mine	7	12	11	21	2
Dust - Train Load Out	-	-	3	0	1
Groundwater Level	-	1	-	6	4
Surface Water	-	1	-	0	0
Site Security	-	-	-	0	0
Trains	1	-	-	0	0
Complaints Line	8	-	-	0	0
Road	1	-	-	2	0
Clearing	-	1	-	0	0
Odour	-	-	5	2	0
Groundwater Contamination	-	-	-	0	0
Heritage	-	-	-	1	0
Number of Issues Raised*	**125**	**56**	**93**	**95**	**41**

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

10 INDEPENDENT AUDITS

There were no Independent Environmental Audits (IEA's) undertaken at WCC during the 2015-2016 reporting period. The next triennial IEA is scheduled for mid-2017.

The most recent IEA was undertaken August 2014. The remaining issues outstanding at the commencement of the reporting period and actions taken during the 2015-2016 reporting period are summarized in **Table 25**.

Table 25 – Status of the Implementation of the IEA Action Plan

Condition	Recommendations	Actions taken
PA 10_0059 MOD2 Schedule 3 Condition 27	SLR recommends that WCC progress consultation with the DP&E in order to close out this condition regarding long term security for the offset area.	WCC solicitor sent modified S88E instruments back to DP&E solicitor on 31st July 2015. WCC requested extension to timing for registration of long term security from the 21st December 2015 to the 21st December 2016. This was granted by the Department on the 21st December 2015.
PA 10_0059 MOD2 Schedule 3 Condition 37	Finalise the construction of the visual bund and revegetate the visual bund.	Clearing and grubbing of footprint of bund completed. Mine planning underway for the construction of the final section of visual bund, utilizing material from the S17/18 east areas.
PA 10_0059 MOD2 Schedule 3 Condition 39	Develop a waste management plan for the site to document the waste management strategy for the site.	Draft Waste and Hydrocarbon Management Plan developed which is currently undergoing internal reviews prior to finalisation.

11 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1 NON-COMPLIANCES

The compliance status of WCC against relevant approvals during the reporting period was assessed in **Section 1** as at the end of the reporting period. There were three reportable non-compliances recorded at WCC during the 2015-2016 reporting period, which are described in **Table 26** below including preventative measures and mitigating actions for each incident.

Table 26 – Non-compliance

Incident Description	Date/Time	Location	Cause	Mitigating Actions	Preventative Actions	Completion status
Schedule 2 Condition 2	Reporting Period	Per below	Per below	Per below	Per below	Per below
Kyooma HVAS failed to record PM_{10} concentrations on three occasions	28/7/2015 3/8/2015 9/8/2015	R98 Kyooma	Power loss resulting from previous owner disconnecting power on vacating property	Reconnection of power was requested from energy supplier at earliest opportunity	Engage with new owners when properties with monitoring equipment are sold	Preventative actions completed
Glenara blast monitor did not record blast vibration and air overpressure	3/3/2016 at 1:13pm	R11 Glenara	Loss of communications due to changes in mobile network in local area and subsequent corruption of memory card	Review of other blast monitors and past performance suggests it is highly unlikely criteria would have been exceeded	Blast monitor upgraded with 4-metre directional antenna and key electronics replaced.	Preventative actions completed
The Noise Management Plan, Blast Management Plan and the Biodiversity Monitoring Program required review and submission for approval within 3 months of submission of the 2014-2015 AEMR and as required under the November 2015 PA 10_0059 MOD2, Schedule 5, Condition 4 (d) timeframes.	2015-2016 reporting year	NA	Administrative systems error has occurred and issuing of the Management Plans within approval timeframes has not been achieved.	Draft documents have been developed and circulated internally for review prior to issue for approval. The lag time associated with revision of the documents has not impacted environmental performance generally or lead to non-compliances at WCC	A review of site processes will be undertaken to ensure future compliance with PA 10_0059 MOD2 Schedule 5, Condition 4 (d).	The management plans will be issued to the Department for approval prior to September 30 2016. Associated preventative actions will also be implemented prior to September 30 2016

In addition to the above, there were two incidents of data exceedance, which on investigation are not attributed to WCC operations:

1. An exceedance of PM_{10} air quality registering 52.6µg/m^3 (criteria of 50µg/m^3) was recorded by the HVAS at Glenara on the 17th February 2016 (**Section 6.3.2**). On investigation it was identified that WCC operations were up wind of this receiver during monitoring period. Advice pertaining to the data exceedance was issued to the Department on the 17th February 2016 and no further action was required.
2. During the reporting period, the annual average deposited dust measurement at 8 Kurrara St has exceeded the criteria of 4g/m^2/month by 0.8g/m^2/month. Review of data has not observed similar trends in exceeding results from monitors located between WCC and the 8 Kurrara st receiver, suggesting a localised dust source has been contributing to results (**Section 6.3.2**). This is the first advice provided in relation to the data exceedance as results are cumulative for

the reporting period. As dust levels are unrelated to WCC operations, no further action has been taken.

11.2 REGULATORY ACTIONS

The following official cautions or warning letters, penalty notices or prosecution proceedings issued to WCC during the reporting period:

- A formal warning letter regarding a noise exceedance recorded during attended noise monitoring at the Kurrara Street (R57) monitoring location on the 4th August 2015 was received from the EPA on the 15th October 2015. Further details on this exceedance have been provided above.

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 include:

- Completion of revision of selected Environmental Management Plans;
- Construction of the final section of the acoustic and visual amenity bund to the northeast of WCC;
- Completion of remaining actions from the IEA;
- Pending approval and suitable conditions, continue progression with regard to void water supply for agricultural purposes; and
- Continued community liaison and engagement with local stakeholder.