WERRIS CREEK COAL

ANNUAL ENVIRONMENTAL MANAGEMENT REPORT

2013-2014

Completed Northern Mine Infrastructure Area (MIA) viewed from Truck Loading Bin

Name of Mine:	WERRIS CREEK No. 2 COAL MINE
Mining Titles/Leases (Leaseholder):	Mining Lease 1563 (Creek Resources Pty Ltd & Betalpha Pty Ltd) Mining Lease 1671 (Werris Creek Coal Pty Limited) Mining Lease 1672 (Werris Creek Coal Pty Limited)
MOP Commencement Date: MOP Completion Date:	01 September 2011 31 August 2018
AEMR Commencement Date: AEMR Completion Date:	01 April 2013 31 March 2014
Name of Mine Operators: Name of Coal Plant Operator:	Whitehaven Coal Pty Limited Whitehaven Coal Pty Limited
Reporting Officer:	Andrew Wright
Title:	Environmental Officer – Werris Creek Coal Pty Limited
Signature:	
Date:	

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Available to be downloaded from:
http://www.whitehavencoal.com.au/environment/werris_creek_mine_environmental_management.cfm

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i PURPOSE OF THE REPORT

Werris Creek Coal Pty Limited (WCC) has prepared this report to fulfil the Annual Environmental Management Report (AEMR) requirements of Mining Lease (ML) 1563, 1671 and 1672 (Mining Act 1992) Condition 2 and the Project Approval (PA10_0059) Condition 3 (Schedule 5) for the Werris Creek No. 2 Coal Mine.

This AEMR has been prepared in accordance with the Division of Resources and Energy (formerly Industry and Investment NSW) Director-General's guidelines titled "Environmental Management Guidelines for Industry – Guidelines to the Mining, Rehabilitation and Environmental Management Process", Version 3 dated January 2006, and the provisions within the Project Approval, Condition 3 of Schedule 5 as required for the "Annual Review".

This report provides a detailed review of WCC's environmental management over the annual reporting period 1st April 2013 to 31st March 2014 including performance and forecasts relating to:

- The current Mining Operations Plan (MOP) for the period 1st September 2011 to 31st August 2018;
- PA10_0059 issued by the Acting Deputy Director-General of the Department of Planning on 25th October 2011 and as modified by PA10_0059 MOD1 approved on the 30th August 2012;
- Environmental Protection Licence (EPL) 12290;
- Any other requirements of the Division of Resources and Energy (DRE); Environment Protection Authority (EPA); Office of Environment and Heritage (OEH); NSW Office Of Water (NOW), Liverpool Plains Shire Council (LPSC) and Department of Planning and Infrastructure (DP&I) including other licences and approvals held by WCC;
- Other statutory environmental guidelines and requirements;
- Details of any variations to environmental approvals applicable to the lease area; and
- Where relevant, progress towards final rehabilitation objectives.

ii WERRIS CREEK COAL ENVIRONMENTAL POLICY

WCC has a documented environmental policy a copy of which can be found on the company website: http://www.whitehavencoal.com.au/environment/werris_creek_mine_environmental_management.cfm.

iii REPORT DISTRIBUTION

This AEMR has been submitted to the administrating authority Division of Resources and Energy:

Mr Jonathon Trotter
Regional Environmental Officer
Division of Resources and Energy NSW
PO Box 344
HUNTER REGION MAIL CENTRE NSW 2310
516 High Street, MAITLAND NSW 2320

In addition this document has been distributed to the following government departments:

Senior Planner Att: **Mr Stephen O'Donoghue**
Mining Projects
Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001
23-33 Bridge Street, SYDNEY 2000

General Manager Att: **Mr Robert Hunt**
Liverpool Plains Shire Council
PO Box 152
QUIRINDI NSW 2343

Head, Regional Operations Armidale Att: **Mr Robert O'Hern**
Department of Environment, Climate Change and Water
PO Box 494
ARMIDALE NSW 2350

Industry & Investment NSW – Agriculture Att: **Mr Andrew Scott**
Resource Management Officer
4 Marsden Park Road
TAMWORTH NSW 2340

Department of Primary Industries – Office of Water Att: **Mrs Ruth Burton**
Senior Regulatory Officer
PO Box 3720
PARRAMATTA NSW 2124

Werris Creek Coal Mine **Att:** **Mrs Gae Swain**
Community Consultative Committee Chairman

1. INTRODUCTION

This Annual Environmental Management Report (AEMR) is the ninth document submitted for the Werris Creek No 2 Coal Mine and details the environment and community performance of WCC operations for the 12 month period ending 31st March 2014.

WCC is located approximately 4 km south of Werris Creek and 11 km north-northwest of Quirindi in north west slopes and plains region of New South Wales (**Figure 1.1**) and lies within a 910 ha area covered by Mining Lease (ML) 1563, ML1671 and ML1672.

The current Mining Operations Plan (MOP) covers a 7 year period from the 1st September 2011 to the 31st August 2018.

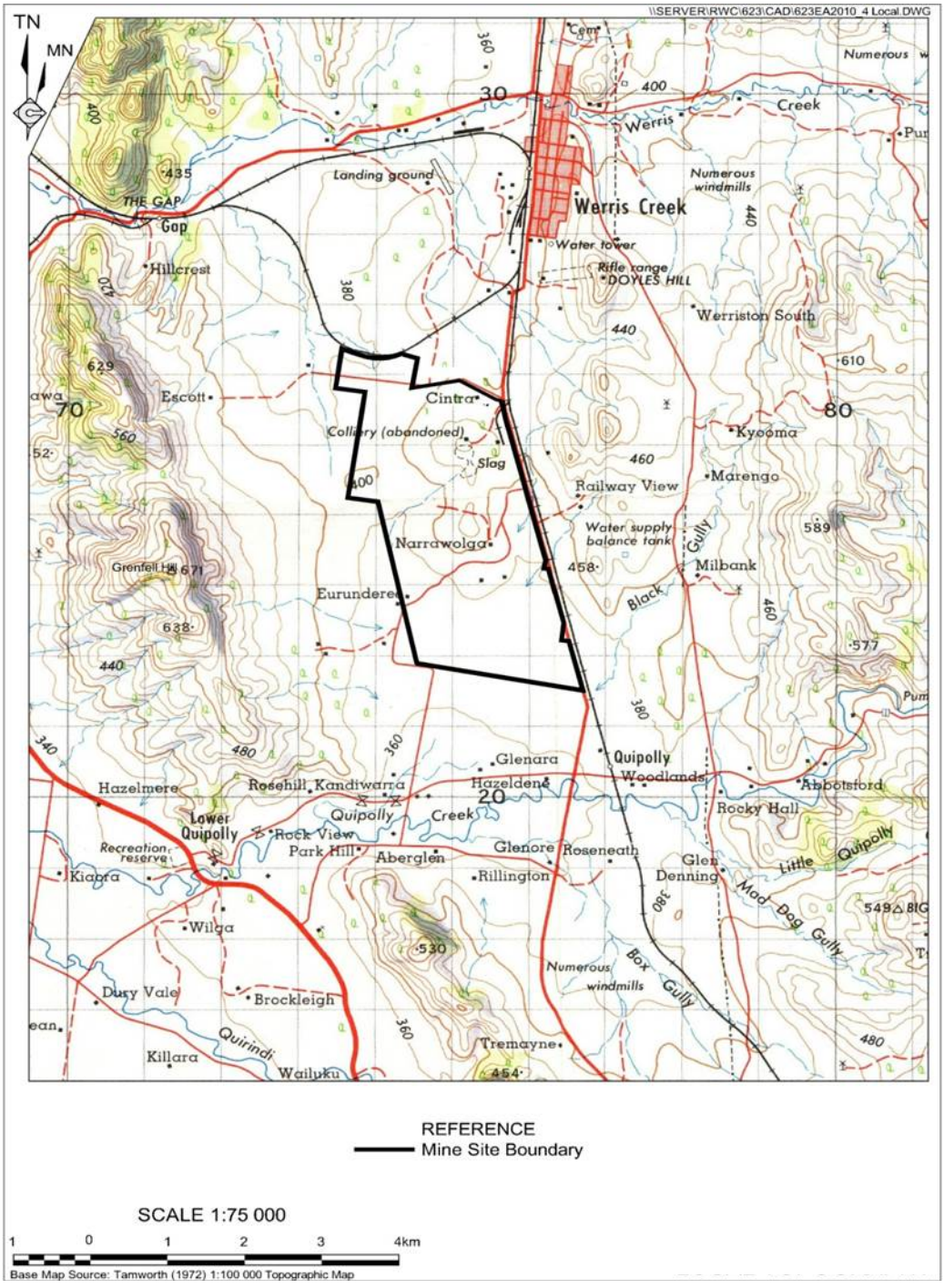


Figure 1.1 WCC Mine Site and Locality

1.1 CONSENT, LEASES AND LICENCES

All applicable consents, leases and licences held by WCC for the 2013-2014 period are identified in **Table 1.1**. A full copy of PA10_0059 is appended in **Appendix 1**, EPL 12290 in **Appendix 2(a)**, ML 1563 in **Appendix 2(b),** ML 1671 in **Appendix 2(c)** and ML 1672 in **Appendix 2(d).**

Table 1.1 Consents, Leases and Licences

Authority	Approval	Number	Issue	Expiry	Comments
Department of Infrastructure, Planning and Natural Resources	Development Consent	DA 172-7-2004	18/02/2005	Notice made for Surrender	A notice was issued for Surrender of DA 172-7-2004 on 25th September 2012.
Department of Planning and Infrastructure (DP&I)	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.
Division of Resources and Energy (DRE)	Exploration Licence	EL 5993	18/09/2002	17/09/2013	Relinquished and consolidated into ML1672
	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	1/09/2011	31/08/2018	MOP approved on 29 November 2011
Department of Primary Industries[1]	Exploration Licence	EL 7422	26/11/2009	25/11/2011	Relinquished and consolidated into ML1672
Environment Protection Authority	Environment Protection Licence	12290	18/04/2005		Last variation 8th January 2014
Department of Primary Industries – NSW Office of Water	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	Perpetuity	Linked to WAL29506. Bore. Formerly 90PT982801
		90WA828345	19/06/2013	Perpetuity	Linked to WAL32224. Excavation. Formerly 90PT982872

Authority	Approval	Number	Issue	Expiry	Comments
Department of Infrastructure, Planning and Natural Resources[2]	Monitoring or Test Water Licence (Water Act 1912)	90BL253367 90BL253363 90BL253360 90BL252589 90BL252590 90BL253361 90BL253503 90BL252587 90BL251769 90BL254903 90BL254902 90BL254901 90BL254899 90BL254900	18/05/2006 18/05/2006 18/05/2006 18/05/2006 18/05/2006 18/05/2006	Perpetuity Expired Expired Perpetuity Perpetuity Expired	
Workcover	Acknowledgement of Notification of Dangerous Goods on Premises	NDG037966	5/12/2013	26/11/2014	3 x 62000L Above Ground Diesel Tanks held by Werris Creek Coal Pty Limited 60,000kg Ammonium Nitrate; 300,000kg Ammonium Nitrate Emulsion; 130000 units Detonator assemblies; 10000kg Boosters and Detonating Cord
	Licence to Store	XSTR200038	5/12/2013	16/12/2018	Licence to Store Explosives Class 5.1AN, 5.1ANE, 1.1D, 1.1B
Liverpool Plains Shire Council	On-Site Sewerage Management System	04/06 05/06 16/13	1/03/2006 1/03/2006 15/05/2013	Perpetuity Perpetuity Perpetuity	2x3000L Septic Tanks & 7x54m absorption trenches at new MIA
	Occupation Certificate	123/2005 88/2005 109/2010	8/02/2007 7/02/2007 12/04/2011	Perpetuity Perpetuity Perpetuity	Original Workshop – now removed Original Office – now removed Explosive Precursor Facility - Orica
	Construction Certificate	109/2010 109-2010-2 104/2005	23/12/2010 27/06/2013 30/05/2005	Perpetuity Perpetuity Perpetuity	Explosive Precursor Facility – Orica New Northern MIA Conveyor gantry, Coal Stockpile Pad
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

[1] Now known as Division of Resources and Energy (DRE) within the Department of Trade, Investment, Regional Infrastructure and Services (DTIRIS); [2] Now known as Department of Planning and Infrastructure – NSW Office of Water (NOW).

1.1.1 Amendments to Consents, Leases and Licences

Table 1.2 summarises the new or modified consents, leases, licences and management plans obtained by WCC during the period.

Table 1.2 Amendments to Approvals and Management Plans during 2013-2014

Date Issued	Title	Details
27th June 2013	Construction Certificate 109/2010-2	Construction Certificate for the new Northern Mine Infrastructure Area
1st May 2013 6th September 2013 8th January 2014	EPL12290	Inclusion of temperature inversion formula in EPL. Update to Pollution Reduction Program for Particulate Matter Control Best Practice. Update to Monitoring Locations for Blasting & Water.
5th December 2013	Notification of Dangerous Goods	Allow for additional Diesel Tank and combine with Explosive Precursor Facility
5th December 2013	Licence to Store	Licence to Store Explosives Class 5.1AN, 5.1ANE, 1.1D, 1.1B
21St February 2013 19th June 2013	WAL29506 & 90WA822532 WAL32224 & 90WA828345	Conversion of Water Act approvals to Water Management Act approvals. WAL32224/90BL255087 approved for groundwater intercepted in pit.

1.2 MINE CONTACTS

The Werris Creek No.2 Coal Mine continued to be managed by Whitehaven Coal under the trading title of Werris Creek Coal Pty Limited (WCC) during the period.

1.2.1 WCC Personnel

All Whitehaven Coal (WHC) management personnel responsible for operational and environmental performance at the WCC mine for this reporting period are listed in **Table 1.3**.

Table 1.3 WHC Management Team at WCC

Name	Title	Contact	Period
Mr Paul Flynn	WHC Managing Director and CEO	02 8507 9700	01/03/2013 – Present
Mr Nigel Wood	WHC General Manager – Open Cut	02 6741 9300	5/03/2012 – Present
Mr Brian Cullen	WHC General Manager – Technical Services	02 6741 9300	11/1/2008 – Present
Mr Eamonn Browne	WCC Operations Manager	02 6763 6000	17/03/2014 – Present
Mr Andrew Wright	WCC Environmental Officer	02 6763 6000	01/02/2010 – Present

1.2.2 Support Personnel

In addition to the personnel identified in **Section 1.2.1**, WCC utilise a range of consultants specialising in a wide variety of environmental fields as and when required. Specialist consultants involved in activities at the mine during the reporting period included:

- Eco Logical Australia (ELA) Pty Ltd;
- ALS/ACIRL Pty Limited;
- ENVIRON Pty Ltd;
- Advitech Pty Limited;
- Novecom Pty Limited;
- Pacific Environment Pty Ltd;
- TME Earthmoving Pty Ltd; and
- Spectrum Acoustics.

1.3 ANNUAL AEMR REVIEW & INSPECTION

An Annual AEMR Inspection and Meeting was held with DRE, DP&I and EPA on 19th February 2014. In correspondence dated 6th March 2014, the DRE reviewed the WCC AEMR for 2012-2013 and found that WCC was in compliance with its environmental requirements of the Mining Lease, MOP and the AEMR. In correspondence dated 4th March 2014, the EPA reiterated issues they have with the management of water runoff from catchments containing coal. **Table 1.4** outlines the actions identified by the DRE and EPA.

Table 1.4 Actions from Annual AEMR Review

Department	Action/Statement	Progress
DRE	Provide DRE with a copy of the Phase 2 Contamination Assessment Report for the former MIA.	Completed 12th March 2014. Contamination Assessments and Remediation Reports submitted.
EPA	The management of stormwater run-off from the rail loop at the premises is currently directed to a sedimentation system. Given the rail loop area contains the coal load out stockpile, the EPA does not consider it appropriate that material other than sediment laden water be directed to the sediment ponds. The EPA considers that the coal stockpile area, and any other area containing coal run-off should be re-directed to structures that meet the EPA contaminated dam design criteria.	Update to SWMP in progress. At meeting with EPA on 28th March 2014, EPA to provide further advice on requirements to manage water from coal catchments.
	Consequently, the EPA considers that the site's Surface Water Management Plan (SWMP) be reviewed to include management options to upgrade the existing system to manage surface water at the premises.	
	The EPA expects that the reviewed SWMP include, but not be limited to, how: a) surface water that has contacted contaminated areas (ie contaminated water) will be prevented from discharging from the premises; b) surface water that has contacted dirty areas (ie dirty water) will be managed; c) clean surface water will be prevented from entering contaminated or dirty water areas within the premises.	
	Note: 1. All dirty water containment structures should be designed using the document "Soils and Construction, Managing Urban Stormwater, Volume 1, 4th edition, Landcom March 2004" as a best practice reference document. The SWMP should consider a minimum design of capture for a 90%ile 5 day rainfall depth (mm).The licensee may use other best management approaches and if this is the case, full details must be provided to the EPA. 2. All contaminated water containment structures should be designed to meet the following requirements: • have a permeability of less than 1x10-9 of one metre of compacted clay or equivalent; • have a capacity to contain a storm with a frequency of a 1 in 20 year, 24 hour duration event (calculated using the Australian Standard – Australian Rainfall and Runoff Criteria).	

1.4 COMPLIANCE REVIEW

Table 1.5 summarises the issues that occurred during the period with compliance against the key environmental approvals of PA10_0059, EPL12290 and Mining Leases (ML1563, ML1671, ML1672) and MOP.

Table 1.5 Summary of Non-Compliance with Key Environmental Approvals 2013-2014

PA10_0059	EPL12290	Mining Leases/MOP
Schedule 3 Condition 1 Noise Criteria – Three night time noise exceedances recorded on Thursday 11th July 2013. Schedule 3 Condition 1 Noise Criteria – One night time noise exceedance recorded on Thursday 19th September 2013. Schedule 3 Condition 27 Due date was December 2012 but email from DP&I dated 13th January 2014 agrees that WCC has me the intent of the condition.	Condition 3 – L4.1 Noise Criteria – Three night time noise exceedances recorded on Thursday 11th July 2013.	None

2. OPERATIONS DURING THE REPORTING PERIOD

The extent of operations at the WCC mine is presented in **Figure 2.1** as representative of the beginning of the period and **Figure 2.2** as representative of the end of the 2013-2014 period.

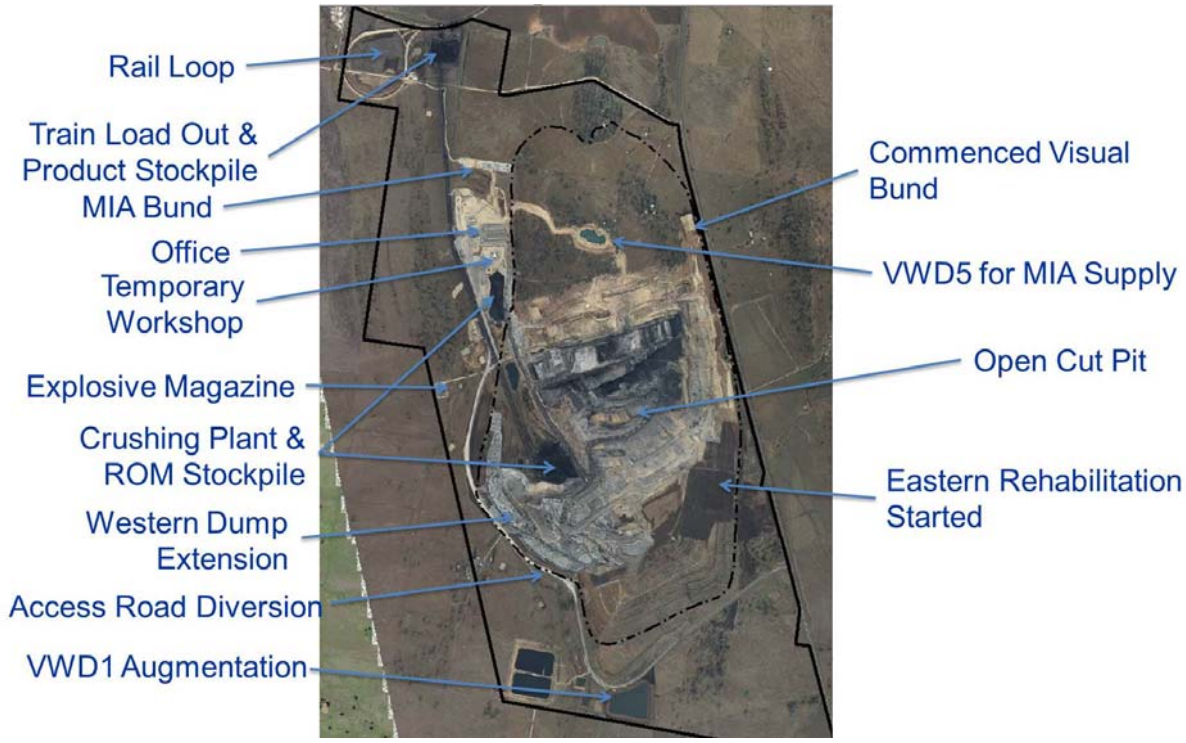


Figure 2.1 Werris Creek Coal Mining Operations as at the start of April 2013 (Aerial June 2013)

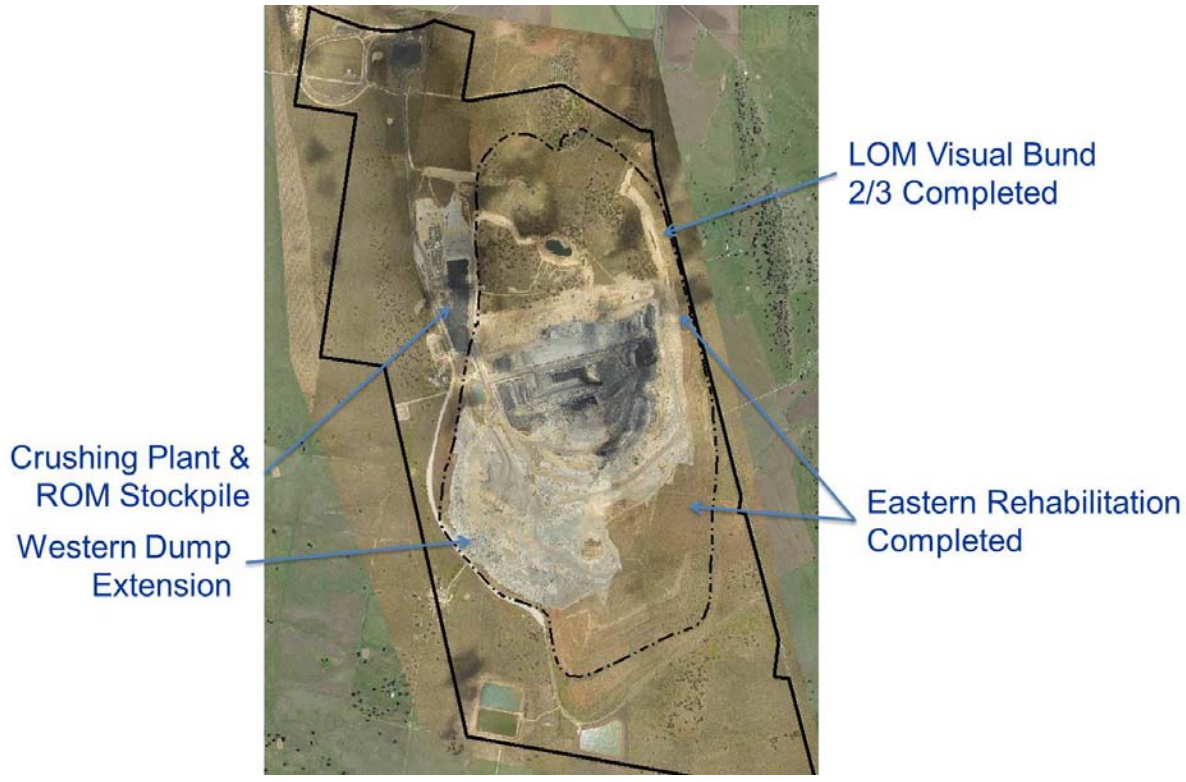


Figure 2.2 Werris Creek Coal as at the end of March 2014 (Aerial December 2013)

2.1 EXPLORATION

2.1.1 WCC Drilling Program

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, 2014) and verify the location of the former underground workings. The WCC drilling program during the year ending March 2014 achieved a total meterage of 2,394m focussed in front of the highwall (Coxhead, 2014). Twelve open holes were drilled for a total of 1,431m, including redrills. Seven partly cored HQ wireline holes were drilled for a total of 963.48m. All boreholes were geologically logged, and geophysically logged if not blocked. Raw coal quality parameters were determined for six of the coal cores. The location of drilling for 2013-2014 is outlined in **Figure 2.3**. During the next reporting period, 20 open holes and six cored holes are planned to be drilled for a total of 2,800m.

2.1.2 WCC Geology

Coxhead (2013) described the geology at WCC Mine as located within the Werrie Basin containing Permian sedimentary and volcanic rocks that unconformably overlie the Middle Cambrian to earliest Permian basement of the Tamworth Belt, Southern New England Orogen. At Werris Creek an outlier of the Early Permian Willow Tree Formation, which is now recognised as a Greta Coal Measures equivalent (Dawson, Coxhead and McMinn, 2006), unconformably overlies the Werrie Basalt.

Two lithostratigraphic units within the Greta Coal Measures (Skeletar Formation and Rowan Formation) and one lithostratigraphic unit from the Maitland Group (Railway View Conglomerate) are recognised in the Werris Creek outlier (**Table 2.1**). The Greta Coal Measures contains at least nine coal seams, with the formal names of coal members chosen to correspond with the earlier alphabetical seam identification. The coal seams range in depth from as little as 10m at subcrop to an estimated 180m in the centre of the basin. Weathering depths range from 10 – 50m. Individual seam thicknesses are up to 8m but are more commonly in the range 3 - 4m. Underlying the coal measures is the Werrie Basalt, a sequence of deeply weathered basaltic lavas, volcaniclastics and palaeosols.

The Werris Creek coal deposit is contained within a closed syncline whose longitudinal axis is oriented NNW-SSE. Dips near subcrop are up to 60^{o}, but flatten towards the centre of the basin. The irregular upper surface of the Werrie Basalt may have affected deposition of the overlying coal measures. A basement high is thought to be responsible for the thinning of G Coal in places, and up to 40m relief is inferred (Dawson et al 2006). A number of small faults with displacements of up to 2m were recorded in the old underground workings. A complex NNW-trending graben structure traverses the open cut mine, with displacements of up to 5m. Faults are also inferred from boreholes. Dykes were also recorded in the old mine, in the open cut and in boreholes.

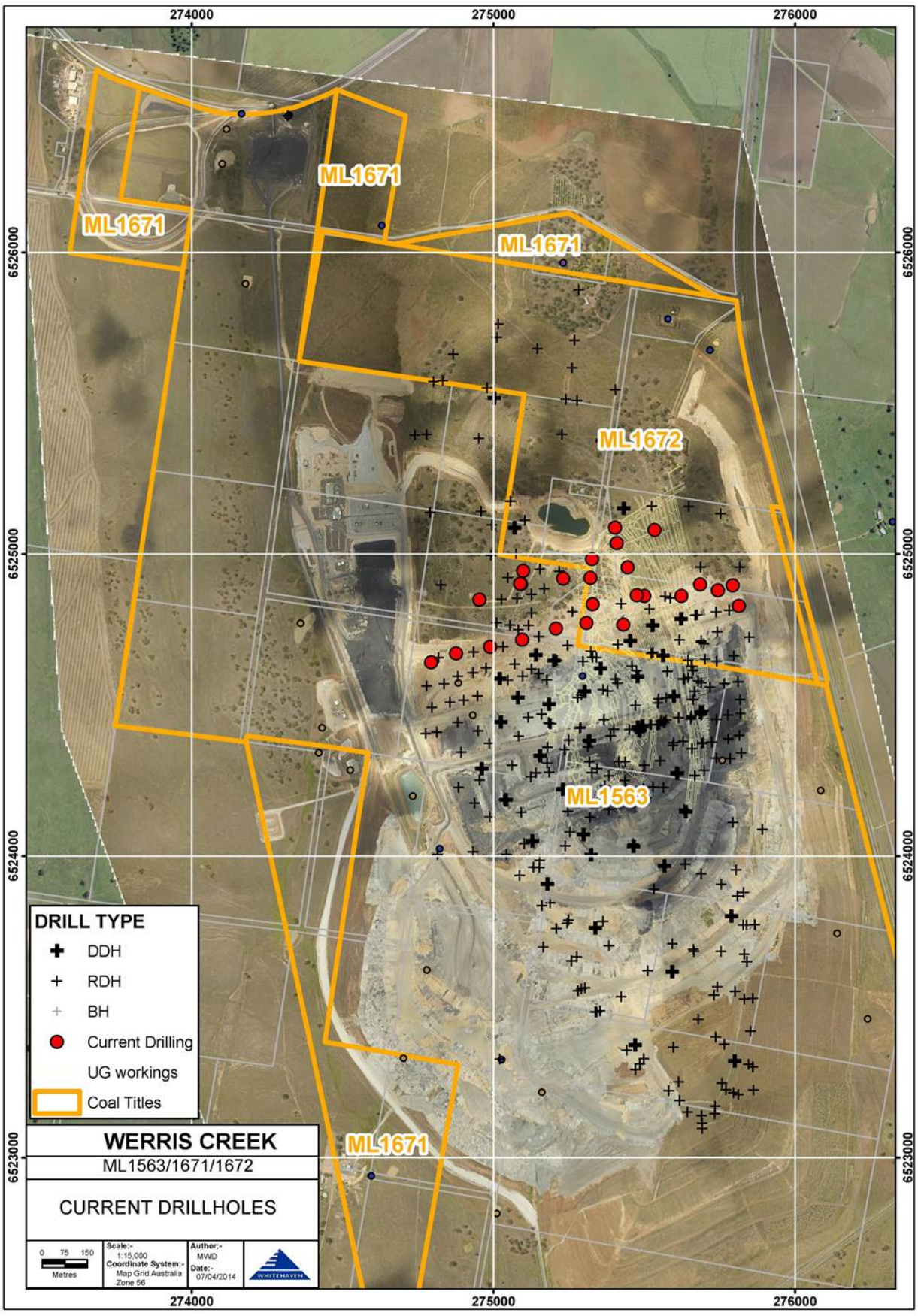


Figure 2.3 Annual Drilling Program for WCC Mine as at the end of March 2014

Table 2.1 Werris Creek Outlier of Greta Coal Measures Proposed Stratigraphic Nomenclature

MAITLAND GROUP	Railway View Conglomerate	Narrawolga Coal Member (formerly Black Seam)
GRETA COAL MEASURES	Rowan Formation	**A**berglen Coal Member
		Britton Coal Member
		Cintra Coal Member
		Doyles Hill Coal Member
		Eurunderee Coal Member
		Friendly Coal Member
		Faithful Coal Member
	Skeletar Formation	**G**lenara Coal Member
WERRIE BASALT		

2.1.3 Resource and Reserve Estimation

The most recent resource statement (Coxhead, 2014) identified the coal resource as 27.9 million tonnes (Mt) (**Table 2.2**).

Table 2.2 Werris Creek Coal Resource Summary

Category	ML 1563 / ML 1671 / ML 1672
Measured	20.9Mt
Indicated	5.3Mt
Inferred	1.7Mt
TOTAL	**27.9Mt**

The most recent reserve statement (Runge Pincock Minarco, 2014) identified a proved and probable reserve of 21.0Mt within ML 1563, ML 1671 and ML 1672 (**Table 2.3**). This reserve excludes the coal removed by the former Werris Creek Colliery.

Table 2.3 Werris Creek Coal Reserve Summary

Category	ML 1563 / ML 1671 / ML 1672
Proved Reserves	16.7Mt
Probable Reserves	4.3Mt
Proved + Probable	**21.0Mt**

2.2 LAND PREPARATION

Land preparation activities undertaken by WCC including vegetation clearing and soil stripping during the reporting period were conducted in accordance with the MOP and the Biodiversity and Offset Management Plan (BOMP).

Surface disturbance throughout the 2013-2014 reporting period decreased from the previous period to the minimum required annual advancement of the open cut pit with all expansion disturbance works completed. A total of 31.1ha of land was disturbed (**Figure 2.4**) during 2013-2014 in February 2014. A total of 133 mature trees, of which 81 were hollow bearing (2.6 hollow bearing tree per hectare) and will be salvaged during the next period.

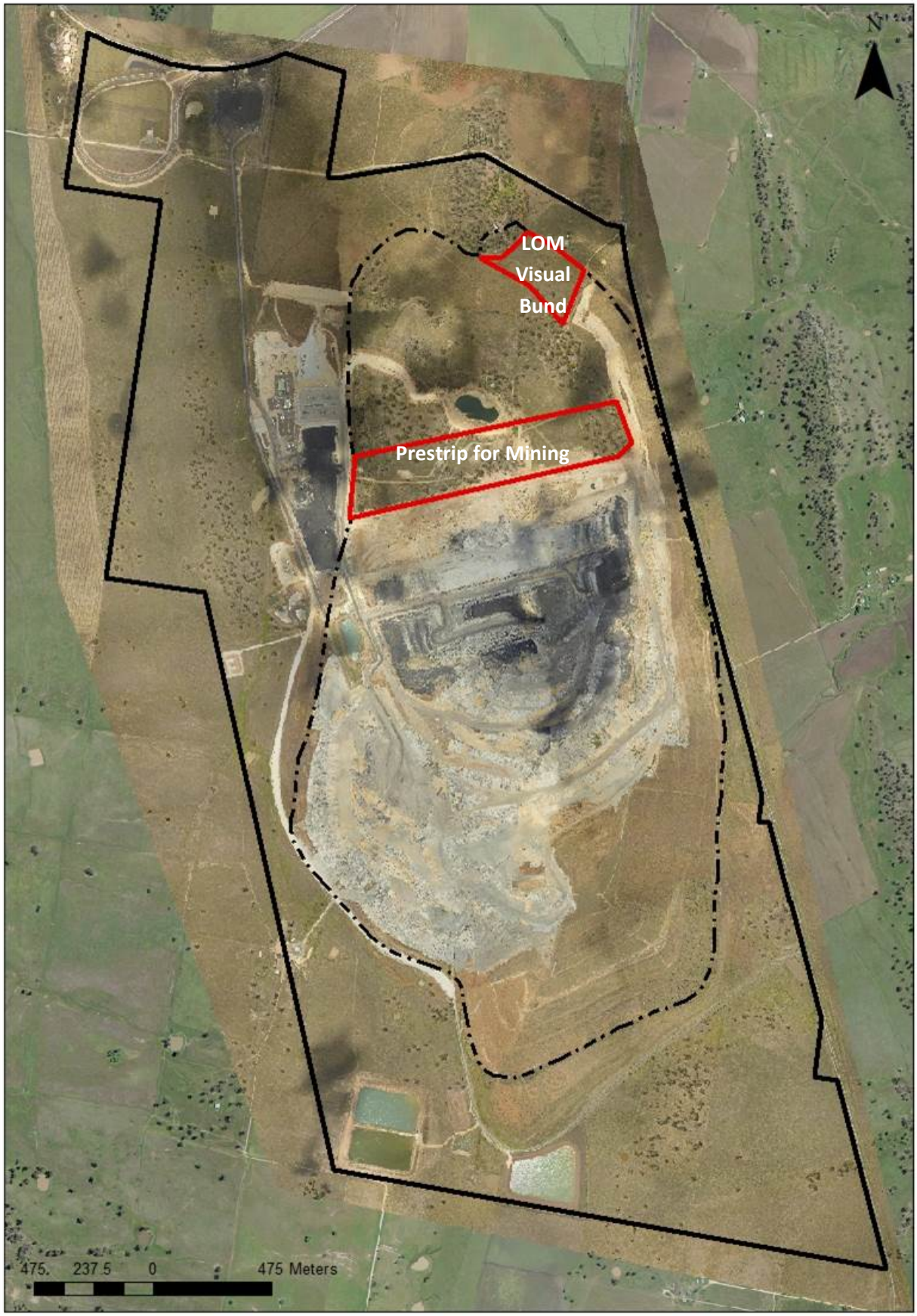


Figure 2.4 Land Disturbance and Vegetation Clearing at WCC Mine for 2013-2014

All vegetation clearing was undertaken following a Pre/During/Post Clearing Inspections by an Ecologist in accordance with Section 3.1 of the MOP and Section 8.1 of the BOMP.

At the end of the reporting period, the total volume of soil stockpiled increased from 1,162,109m^3 to 1,173,105m^3. The majority of soil from the 2013 clearing area was directly used in the 2012-2013 rehabilitation with the remaining 13,405m^3 of soil handled during the period stockpiled (55 & 59) on the RL445m Dump. Because of the expansion of the Western Dump during the period, former stockpiles 4, 37 and 44 were rehandled with 19,360m3 used for the additional rehabilitation of the Visual Bund; with the remainder of the subsoil stockpile 4 transferred to RL445m Dump as stockpile 58. The increase in soil stockpile volumes was due to survey adjustments with the rehandling of old stockpiles and survey of the new stockpiles. **Figure 2.5** displays the locations of the soil stockpile areas as at March 2014.

2.3 CONSTRUCTION

The major construction activity undertaken during the period was the Rail Loop Project (**Figure 2.6**) which included the upgrade of the train loading system. The Rail Loop Project commenced in May 2013 and was completed in August 2013; however the use of the new rail loop did not begin until December 2013 once the testing and commissioning of loop and new automated loading process was complete.

Other construction undertaken during 2013-2014 was to do with the completion of the Mine Infrastructure Area (MIA) relocation that commenced in the previous period. The new northern MIA was completed with the Administration, Workshop and Coal Processing Facilities successfully being relocated and commissioned during the period. The other minor construction activity during the period included rework of the clay lining of Void Water Dam 1 (VWD1) that construction had commenced in the previous period increasing the capacity of 250ML to achieve the permeability standard of $1x10^{-9}$m/s.

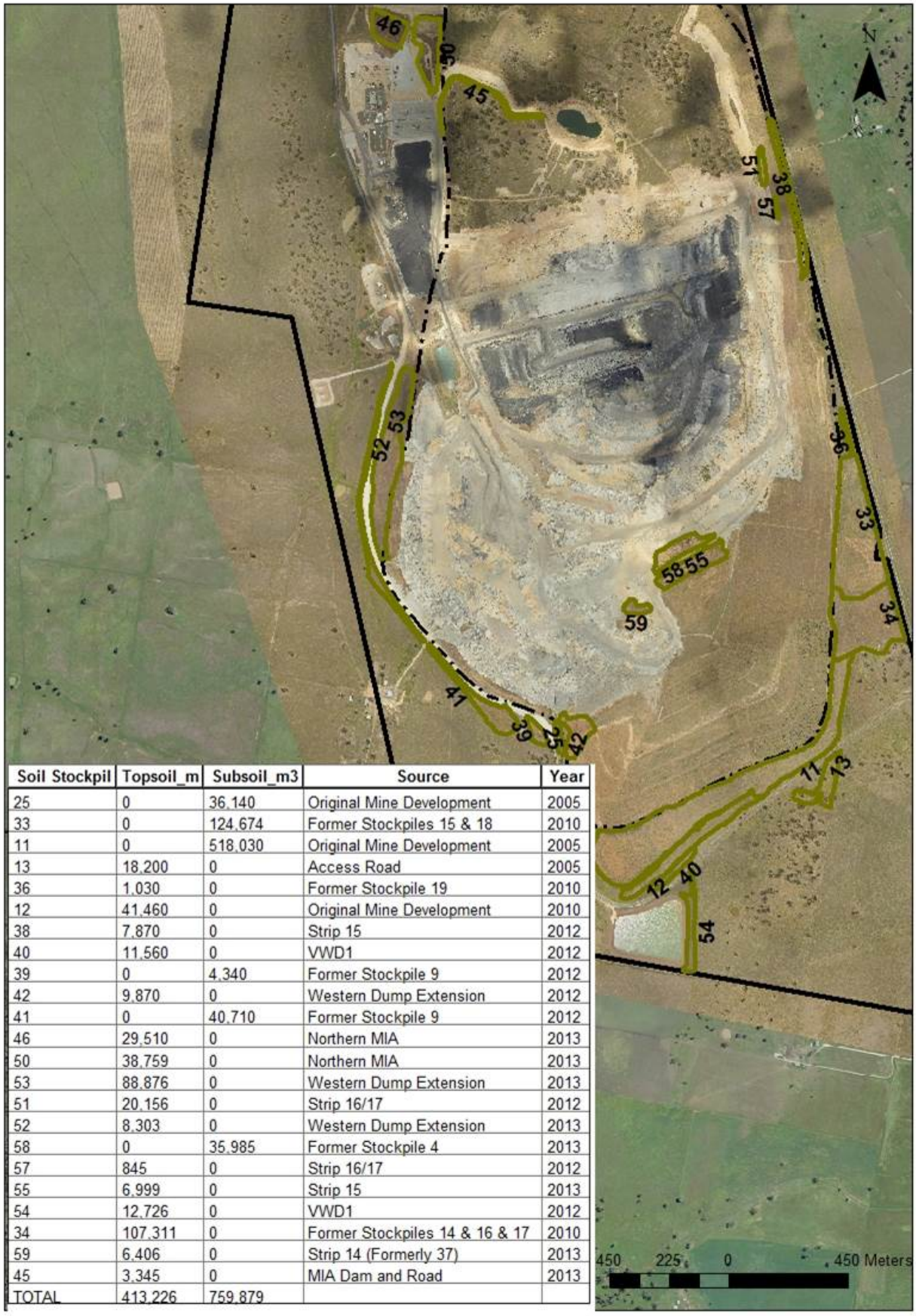
No major construction activity is planned for 2014-2015.

2.4 MINING

During the 2013-2014 reporting period, a total of 16,121,382 bcm of overburden was removed to produce 2,076,806t of ROM coal at an average overburden to coal stripping ratio of 7.8:1 (**Table 2.4**). The production levels attained in 2013-2014 are the highest achieved by WCC since mining commenced in 2005. Compared to the previous period, coal production increased by 613,102t and overburden handled increased by 3,959,187 bcm as mining operations ramped up production levels to achieve budget target of 2.5Mtpa for 2013-2014 (financial period).

Table 2.4 WCC Cumulative Production and Waste Summary since commencement in 2005

	Start of Reporting Period 1st April 2013	At end of Reporting Period 31st March 2014	End of next Reporting Period 31st March 2015
Soil Stripped (m^3)	1,646,798	1,660,203	1,707,000
Soil Used/Spread(m^3)	484,689	504,049	600,000
Waste Rock (bcm)	67,261,806	83,383,188	104,500,000
ROM coal (t)	9,675,741	11,725,547	14,200,000
Product coal (t)	9,675,741	11,725,547	14,200,000



Soil Stockpil	Topsoil_m	Subsoil_m3	Source	Year
25	0	36,140	Original Mine Development	2005
33	0	124,674	Former Stockpiles 15 & 18	2010
11	0	518,030	Original Mine Development	2005
13	18,200	0	Access Road	2005
36	1,030	0	Former Stockpile 19	2010
12	41,460	0	Original Mine Development	2010
38	7,870	0	Strip 15	2012
40	11,560	0	VWD1	2012
39	0	4,340	Former Stockpile 9	2012
42	9,870	0	Western Dump Extension	2012
41	0	40,710	Former Stockpile 9	2012
46	29,510	0	Northern MIA	2013
50	38,759	0	Northern MIA	2013
53	88,876	0	Western Dump Extension	2013
51	20,156	0	Strip 16/17	2012
52	8,303	0	Western Dump Extension	2013
58	0	35,985	Former Stockpile 4	2013
57	845	0	Strip 16/17	2012
55	6,999	0	Strip 15	2013
54	12,726	0	VWD1	2012
34	107,311	0	Former Stockpiles 14 & 16 & 17	2010
59	6,406	0	Strip 14 (Formerly 37)	2013
45	3,345	0	MIA Dam and Road	2013
TOTAL	413,226	759,879		

Figure 2.5 WCC Soil Register and Stockpiles

Figure 2.6 Equipment constructing the loop foundation layer of the Rail Loop Project

2.5 PROCESSING AND PRODUCT COAL TRANSPORT

At the new Northern MIA the new coal processing facility involves the crushing and screening at an average rate of 500t/hr (maximum 650t/hr). PA10_0059 approves processing activities 24 hours per day, 7 days per week if required but during the period coal processing only operated Monday to Friday 7am to 3am and infrequently on Saturdays when overtime was available. The ROM coal for the export market is fed into a Stamler breaker for primary size reduction (to <250mm) and subsequently to a Stamler sizer to reduce the coal to <50mm size, this being the specification for export quality coal. Mobile crushers are used to produce specialist coal products for the local domestic market. The despatch of product coal from WCC is either railed to the Port of Newcastle or by road to domestic customers. The despatch of coal by rail requires the product coal to be transported by road trucks from the coal processing area to the product coal stockpile area and rail load-out facility via the private coal haul road.

Figure 2.7 presents a schematic of coal processed for the reporting period and shows that a total of 2,036,066t coal was processed through the crusher. Domestic coal produced includes 3,451t transported by 135 trucks by road and 157,864t railed offsite by 105 trains. Total coal railed offsite (domestic and export) was 1,889,729t from 438 trains. A total of 32,065t of highly contaminated (i.e. timber & metal) coal from the former underground workings was transported to the Gunnedah CHPP during the period to be processed through the washery to produce a clean saleable coal product.

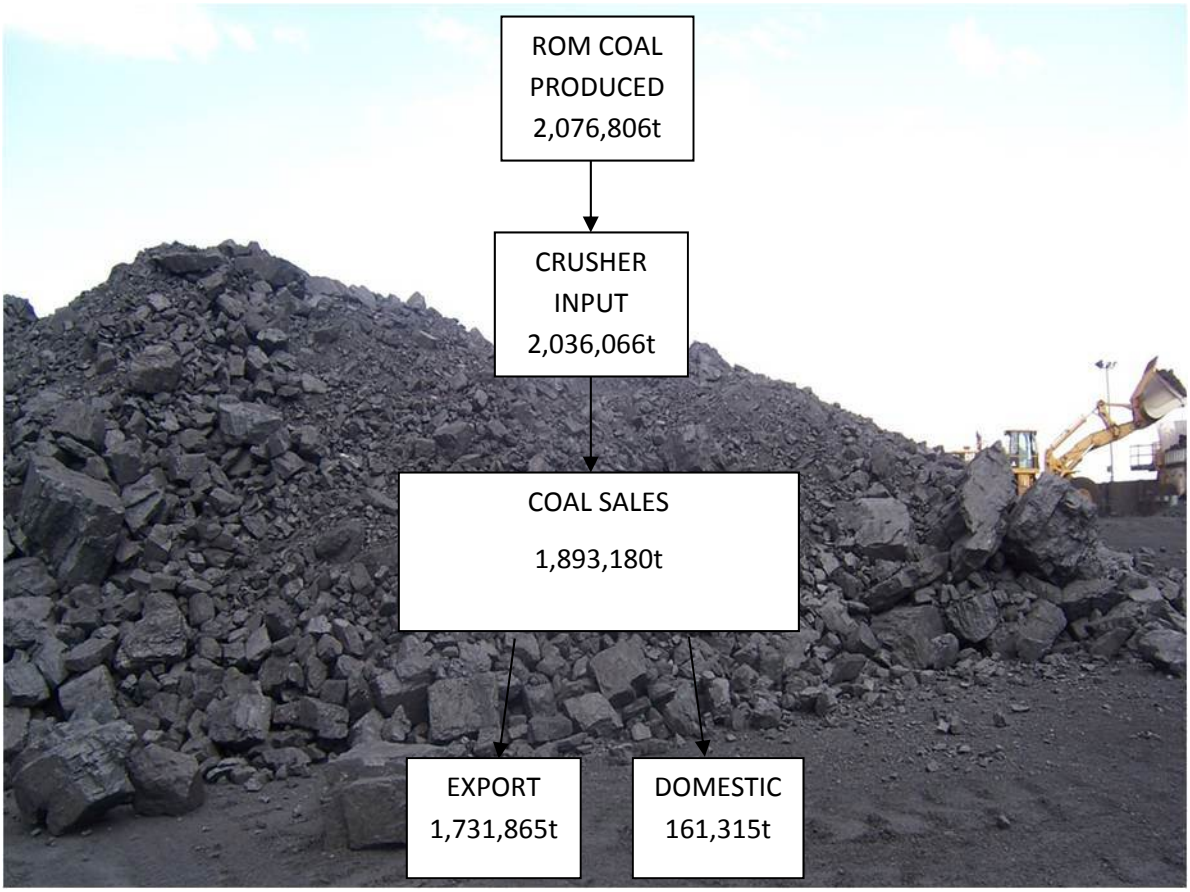


Figure 2.7 Coal Movements and Production Summary for 2013-2014 Period

Note: Difference between crusher input, coal sales and exported volumes, reflects product coal stockpiled at either the processing area or the rail siding prior to the reporting period.

2.6 WASTE MANAGEMENT

2.6.1 Waste Management

Wastes produced from WCC during the period continued to comprise of:

- Production wastes - overburden and interburden from mining activities; and
- Non-production wastes comprising of:
    - general domestic-type wastes from the on-site buildings and routine maintenance consumables;
    - oils and grease; and
    - sewage.

Waste management practices adopted for each of these waste streams during the period included:

General domestic-type wastes

- All non-recyclable general wastes originating from the site office, amenities and ablutions buildings, together with routine maintenance consumables from the daily servicing of equipment are disposed of in mobile garbage bins. Bins are collected regularly and contents placed in large waste storage receptacles positioned adjacent to the workshop building.

Rubbish is then removed by Cleanaway, the licensed waste collection contractor. Waste collection was undertaken on a weekly basis.

- Recyclable paper and cardboard and timber which is deposited in specified recycling bins and are collected by Merinda Aboriginal Corporation for sorting and recycling at their depot.

Ferrous and Non-Ferrous Metals

- All scrap metal is deposited into a scrap metal skip bin and collected by J&B Recycling as required.

Oils and grease

- Within the workshop building, waste oil and grease is collected and pumped to bunded bulk storage tanks by evacuation pumps.
- In case of emergency or breakdown maintenance of equipment within the mine area or on the overburden emplacement, oils and grease can be pumped from this equipment to a tank on the service vehicle using an evacuation pump and then transferred to the self bunded bulk storage tank at the workshop building. All parts and packaging are collected and transferred to the workshop building for disposal or recycling.
- Waste oil, solvent (from parts washer), oil filters, used IBC pods and grease stored in the bunded area at the workshop building are collected by a licensed waste contractor (Northern Lubequip – Tamworth) for recycling, approximately once every month.
- Runoff from the concrete vehicle and equipment wash pad is directed to an oil separator and containment system for subsequent pump out and disposal by the licensed waste contractor, Northern Lubequip.

Waste Batteries and Tyres

- Waste batteries are disposed collected by Whitehaven Coal and donated to Rotary;
- Waste tyres are disposed of by Browns Tyre Service; and
- Large earthmoving mining equipment tyres are buried within the overburden emplacement.

Sewage

- WCC has a biocycle sewage treatment system approved by Liverpool Plains Shire Council that is serviced by a licensed waste collection and disposal contractor (Pumpem' Out Pauls or Gunnedah Trade Waste) as required.

Overburden and Interburden

- All of the overburden and interburden materials are blasted and removed by haul truck for placement in the out-of-pit overburden emplacement area or in the in-pit emplacement area.

Coal Processing Plant Residues

- No wastes are produced from processing the ROM coal through the crushing and screening plant, i.e. all ROM coal is ultimately sold as a product.

2.6.2 Waste Monitoring

Waste disposal data is tracked for general waste, scrap metal and waste oil and **Table 2.5** summarises the data for the 2013-2014 period.

Table 2.5 Quantities of Waste Generated for 2013-2014

2013-2014	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
General Waste (m^3)	90	159	120	156	132	132	162	132	132	159	126	96	1596
Scrap Metal (t)	7.82	-	7.81	-	7.82	-	7.82	-	10.80	-	3.92	13.42	59.32
Waste Oil (kL)	17.0	16.5	21.0	8.0	3.0	16.0	11.8	10.0	16.5	10.0	18.0	19.9	167.7

2.7 COAL STOCKPILES

The Product Coal/Rail Load-out Facility Coal Stockpile is limited to 250,000t coal and the ROM Coal Stockpile is also limited to 200,000t ROM coal. At the end of the March 2014, there was 44,753t of Product coal stored at the Rail Load-out Facility and 9,024t of ROM coal was stored at the ROM and Coal Processing Plant area.

2.8 WATER MANAGEMENT

Surface water management is based on the separation and segregation of void, dirty, clean and waste/contaminated water to ensure each stream is appropriately managed based on how to mitigate the potential pollutants in each stream. The definitions of each water stream category are as follows:

- Void Water – the void water catchment area is comprised of the active mining area and overburden emplacement which collects incidental (direct) rainfall, rainfall runoff from within the open cut pit and groundwater intercepted in the base of the open cut void and needs to be dewatered and pumped to the surface to allow mining of the basal coal seam;
- Dirty Water – the dirty water catchment area is comprised of all areas disturbed by mining which includes the office, workshop and coal plant precinct, rehabilitation and soil stockpile areas, rail load out facility, coal haul road and explosive precursor facility with the focus on treatment of water quality and subsequent discharge;
- Clean Water – the clean water catchment area is undisturbed by mining activities and allowed to flow offsite without active management required. Clean water upslope of the mining area and to the east of Werris Creek Road is diverted around the outside of mining operations; and
- Waste/Contaminated Water – waste water produced by WCC includes the water overflow from oil/water separator and overflow from the septic systems onsite.

The segregation of each water stream is undertaken by diverting clean water away from the active mining (void water) and other disturbed areas (dirty water). Clean water and dirty water is separated and diverted using a series of contours, diversion drains and dams and appropriate erosion and sediment control. Void water is always contained within enclosed pipelines when pumped to the surface and stored within turkeys nest dams segregated from the dirty water system. **Figure 2.8** outlines the void water management system at WCC including the key water management dams and pipelines.

Figure 2.8 WCC Void Water Management System for 2013-2014 Period

2.8.1 Dirty Water Discharges

WCC maintain three licensed discharge points (LDP) 10, 12 and 14 in accordance with EPL 12290, corresponding to dams SB2 (southern), SB9 (mid) and SB10 (northern) respectively. SB2 and SB9 drain towards Quipolly Creek, while SB10 discharges towards Werris Creek.

WCC is permitted to discharge when the dirty water quality is within the criteria specified in EPL 12290, however if a rainfall event greater than 39.2mm occurs in a consecutive 5 day period then the Total Suspended Solids (TSS) limit does not apply. There were four discharge events during this AEMR period which reflects the below average rainfall experienced in the 12 months to the 31st March 2014 (**Table 2.6**) with no wet weather discharges occurring. All controlled discharge events from the dirty water system were in compliance with the conditions of EPL 12290 and PA 10_0059. An estimated 6.8ML of water was discharged during controlled discharge events during the period.

Table 2.6 WCC Discharge Event Summary

Date	Dam	pH	EC (µS/cm)	TSS (mg/L)	O&G (mg/L)	Type	5 Day Rain (mm)	Compliance
25/06/2013	**SB9**	7.95	203	48	<5	Controlled	Not Applicable	Compliant
12/08/2013	**SB2**	8.44	1010	<5	<5	Controlled	Not Applicable	Compliant
21/11/2013	**SB9**	7.70	396	14	<5	Controlled	Not Applicable	Compliant
17/12/2013	**SB9**	7.98	356	11	<5	Controlled	Not Applicable	Compliant
Criteria		**8.5**	**N/A**	**50**	**10**		**39.2**	

2.8.2 Predicted Water Balance

The surface water assessment (GSS Environmental, 2010) that accompanied the LOM Environmental Assessment, included an updated site water balance that summarises the water management for dry (465.5mm), average (683.7mm) and wet (916.8mm) years as segregated water streams. The results for the void water balance and dirty water balance are both presented in **Table 2.7** and **Table 2.8**.

Table 2.7 Predicted Void Water Balance for Year 3 of LOM Project

		Avg Yr (ML)	Dry Yr (ML)	Wet Yr (ML)
Inputs	Rainfall Runoff	191	129	256
	Groundwater Inflow	13	13	13
	Input from Underground	67	67	67
	Total	**271**	**209**	**336**
Outputs	Evaporation	134	134	134
	Dust Suppression and Crushing/Screening Operations	137*	75*	173
	Total	**271**	**209**	**307**
	Excess (+ve) or Deficit (-ve)	**0**	**0**	**+29**

* Note: Site water usage is predicted to be higher for dry (211ML) and average (192ML) rainfall than wet (173ML) years with the predicted shortfall in water demand taken up from excess water available from the dirty water system (**Table 2.8**)

The void water balance shows that during dry and average years, all void water will be consumed on site and there is minimal requirement for any storage. For a wet year there is an excess of void water (29 ML) that would be stored on-site within the multiple void water dams.

The dirty water balance shows that for dry, average and wet years there is an excess of dirty water. If this water cannot be utilised for dust suppression onsite, then it is diverted to sediment basins, which have been constructed as designed to accept and settle the water, before the water is discharged from the licenced discharge points of EPL 12290 (SB2, SB9 and SB10).

Table 2.8 Predicted Dirty Water Balance for Year 3 of LOM Project

		Avg Yr (ML)	Dry Yr (ML)	Wet Yr (ML)
Inputs	Rainfall Runoff	528	345	733
	Total	**528**	**345**	**733**
Outputs	Evaporation	59	59	59
	Dust Suppression and Crushing/Screening Operations	55	136	0
	Total	**114**	**195**	**59**
	Excess (+ve) or Deficit (-ve)	**+414**	**+150**	**+674**

The permissible maximum harvestable rights for WCC has been calculated at 63ML based upon the Project Site Area (908ha) and multiplied by the 'Multiplier Value' of 0.07. The capacity of the existing clean water storage dams (9.1ML) that could be utilised for water supply are within the Maximum Harvestable Right Dam Capacity (MDHRC). Therefore, no licences are required for these existing clean water dams with no additional clean water dams proposed.

2.8.3 Stored Water

There were no changes to surface storage dam capacities during period. The storage (operating) capacity for void water dams (VWD) is 728ML (VWD1 – 250ML, VWD2 – 25ML, VWD3 – 214ML, VWD4 – 145ML and VWD5 – 94ML). The operating capacity of the VWDs is approximately 30cm below the spillway capacity to give an operational freeboard in case of excess pumping or heavy rainfall; or in the case of VWD2 the operating capacity is 10ML below the designed capacity due to seepage issues. WCC mined through the lowest point of the former underground workings during the period resulting in continuous seepage of water previously stored into the open cut pit and is now considered to have negligible water stored underground.

Table 2.9 presents an estimate of the volume of stored water in dams at WCC (**Figure 2.9**) at the beginning and end of the 2013-2014 reporting period. Details for individual storages are presented in **Table 2.10**.

Table 2.9 Summary of WCC Onsite Water Storage in Dams

	Volumes Held (ML)		
	Start of Reporting Period	**At end of Reporting Period**	**Nominal Storage Capacity**
Clean Water (in Storage Dams)	9.0	2.0	9.1
Dirty Water (in Sediment Basins)	36.9	8.5	71.15
Void Water (in Void Water Dams)	591.0	659.2	728.0
Void Water (in pit)	83.0	20.0	Not Applicable

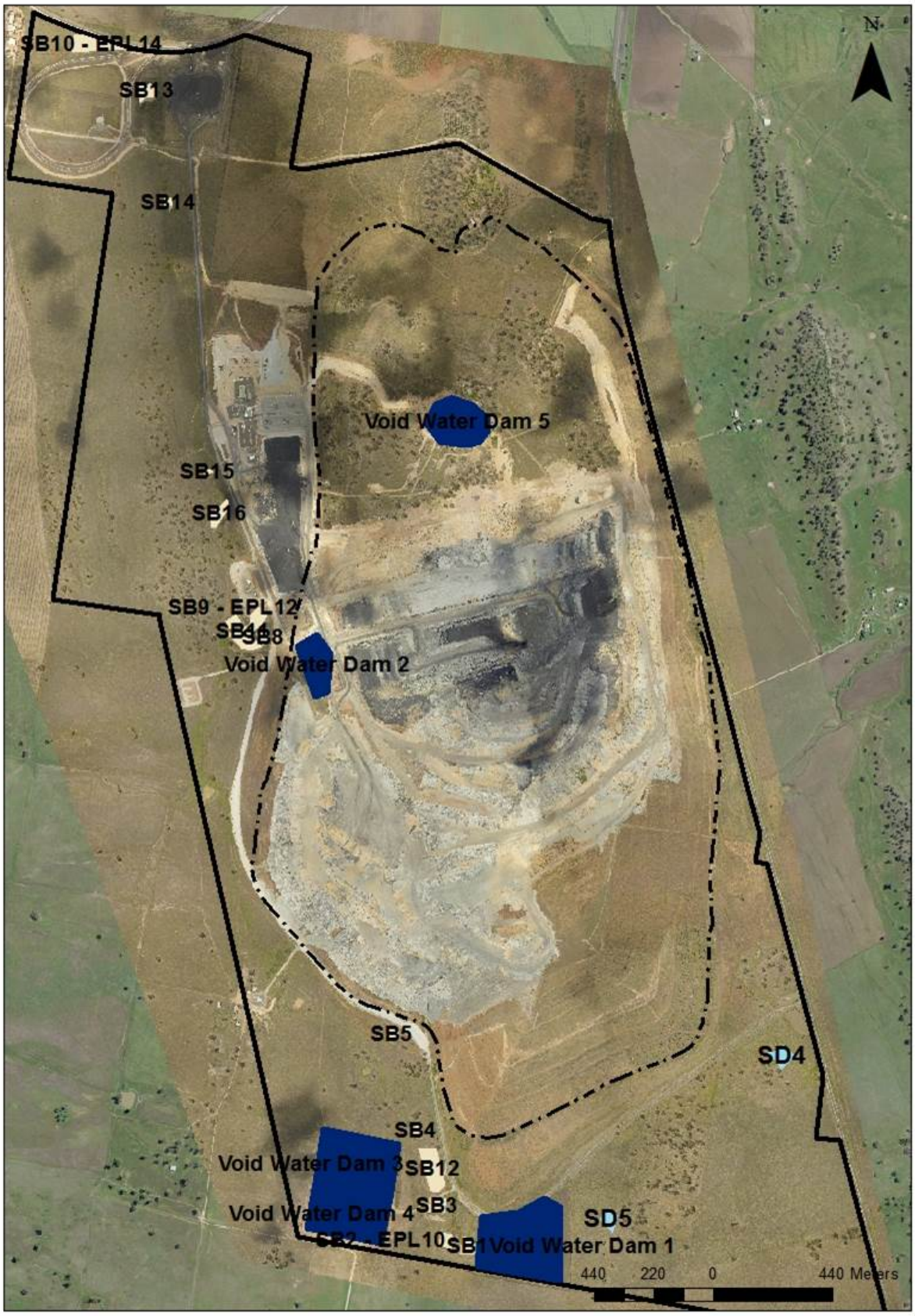


Figure 2.9 Clean, Dirty and Void Water Dams at WCC

Table 2.10 Detail on Individual Clean, Dirty and Void Water Dams Storage Levels

Label	Function	Capacity (ML)	Source of Capacity	Storage @ March 2014 (ML)
Clean Water Storage Dams				
SD4	Clean water capture and use Diversion of Clean water around mine	5.1	Surveyed	1.0
SD5	Clean water capture and use Diversion of Clean water around mine	4.0	Surveyed	1.0
Total Capacity of All Clean Water Dams		**9.1**		**2.0**
Dirty Water Sediment Basins				
SB13	Northern Area – Dirty water capture, treatment and use	3.0	Estimated	1.0
SB14	Northern Area – Dirty water capture, treatment and use	1.9	Surveyed	0.5
SB10	Northern Area – Dirty water capture, treatment and use EPL discharge point (NO. 14)	4.6	Surveyed	0.0
SB11	Middle Area – Dirty water capture, treatment and use	11.0	Surveyed	1.0
SB17	Middle Area –Dirty water capture, treatment and use (BWD)	4.1	Surveyed	0.0
SB15	Middle Area – Dirty water capture, treatment and use	0.45	Estimated	0.0
SB16	Middle Area – Dirty water capture, treatment and use	4.2	Estimated	1.0
SB8	Middle Area – Dirty water capture, treatment and use	3.0	Estimated	1.0
SB9	Middle Area – Dirty water capture, treatment and use EPL discharge point (NO. 12)	4.0	Partially Surveyed	1.0
SB1	Southern Area – Dirty water capture, treatment and use	7.0	Estimated	0.5
SB3	Southern Area – Dirty water capture, treatment and use	6.5	Estimated	1.0
SB4	Southern Area – Dirty water capture, treatment and use	2.5	Estimated	0.5
SB5	Southern Area – Dirty water capture, treatment and use	1.4	Estimated	0.0
SB12	Southern Area – Dirty water capture, treatment and use	9.0	Surveyed	0.0
SB2	Southern area – Dirty water capture, treatment and use EPL discharge point (NO. 10)	8.5	Surveyed	1.0
Total Capacity of All Dirty Water Dams		**71.15**		**8.5**
Void Water Dams				
VWD1	Void water storage	250.0	Surveyed	251.4
VWD2	Void water storage	25.0	Surveyed	25.6
VWD3	Void water storage	214.0	Surveyed	152.7
VWD4	Void water storage	145.0	Surveyed	134.0
VWD5	Void water storage and MIA Water Supply	94.0	Surveyed	69.8
Total Capacity of Void Water Dams		**728.0**		**659.2**

2.8.4 Water Usage and Consumption

Site water usage and consumption is monitored monthly using water meters on key pipelines and survey of VWD storage levels onsite. **Table 2.11** summarises total water inputs and outputs for 2013-2014 reporting period.

Table 2.11 WCC Void Water Usage April 2013 to March 2014

WATER INPUTS				**+1063.1ML**
Void Water	**Total Bore Extraction**		**0.0ML**	
		Groundwater Bore (WAL29506)*	0.0ML	
	Total Pit Dewatering		**889.7ML**	
		Rainfall Interception & Runoff***	327.0ML	
		Groundwater Intercepted (WAL32224)*	32.0ML	
		Other Groundwater (Spoil, Underground)	59.0ML	
		In Pit Water Fill Point	2.6ML	
		Water Pumping In Pit from VWD1	211.3ML	
		Recirculated Water Curtain direct to Pit	257.8ML	
	Other		**173.4ML**	
		Recirculated Water Curtain direct to UG	173.4ML	
WATER OUTPUTS				**-994.9ML**
Void Water	**Total Dust Suppression**		**348.7ML**	
		Haul Roads	339.7ML	
		Crushing Plant**	4.1ML	
		Train Load Out	4.9ML	
	Other		**646.2ML**	
		Workshop**	15.0ML	
		Water Curtain	451.0ML	
		Evaporator	180.2ML	
NET WATER				**+68.2ML**

Note: Evaporation losses have been assumed as final storage levels of dams onsite have been used in estimating water inputs; * Volumes presented for the Water Access Licences (WAL) are for the AEMR reporting period and are not comparable with the NOW annual monitoring period July to June; ** Estimated as not metered the entire period due to relocation of MIA; *** Based on hydrology model for WCC pit by Environ (2014a).

A direct comparison between the water balance for the 2013-2014 period and for 2012-2013 is presented in **Table 2.11** and shows:

- Total void water stored in surface storage dams or in pit increased by 68.2ML from 2012-2013;
- Total water inputs increased by 180.8ML and total water outputs also increased by 228.7ML for 2013-2014 from the previous period;
- Void water was actively recycled in pit during the period via water curtains to manage areas of spontaneous combustion (spon comb) in the former underground workings or other areas of localised spon comb. Water curtains irrigate the void water out above the area of spon comb allowing the void water to infiltrate into the ground or into former workings (**Figure 2.10**). Void water used via water curtains for 2013-2014 increased by 114.1ML. It is believe that the majority of the void water from the water curtain ultimately returns to the pit directly or via the former underground workings except for losses to steam from the void water working on the hot areas;

Figure 2.10 Water Curtain used to mitigate an area of spon comb in pit at WCC

- Rainfall intercepted in pit decreased to 327ML in 2013-2014 (from 498mm rainfall) from 454.1ML (from 794mm rainfall) in 2012-2013. Rainfall intercepted was modelled by Environ (2014e – **Appendix 4b**) report to assist in more accurately calculating groundwater intercepted in pit. Environ (2014a) identified that rainfall intercepted in the previous period was the cause of the excess void water managed in pit as a result of a number of high intensity rainfall events and not from the Werrie Basalt aquifer;
- No groundwater extracted directly from the former underground workings under licence WAL29506 (50ML allocation) because the bore pump was removed by mining and that mining has progressed through the syncline of the underground workings resulting in any water or void water from the water curtain to drain unimpeded into the pit;
- Pit dewatering increased by 61.2ML for 2013-2014 to 889ML pumped out of pit due to the additional water being recirculated in pit via water curtains to manage spon comb as well as from water pumped out of VWD1 to increase the compacted clay lining;
- Environ (2014e – **Appendix 4b**) reviewed the above water usage calculations for WCC and determined through running the groundwater model that a total of 91.0ML of groundwater was sourced from the coal measures aquifer/former underground mine workings (55.0ML), seepage from the Werrie Basalt aquifer (32.0ML) and seepage from the overburden (4.0ML). The Groundwater Impact Assessment assumed that the former underground workings would be pumped dry and any groundwater intercepted in pit would be seepage from the adjacent basalt aquifer worse case predicted to be 50ML/year at the deepest point of the coal deposit. The estimated inflow from the Werrie Basalt aquifer is within that predicted by the

LOM EA and the total groundwater make is within the incidental groundwater licence WAL 32224 allocation of 211ML/year. However, the additional groundwater make from the flooded former underground workings is outside that predicted in the LOM EA resulting in Environ (2014a) revise the groundwater model incorporating the underground as a water source and the void waterbody as a storage finding that for 2013-2014 period that the excess water being managed by WCC in pit is directly from the use of water curtains; and

- Dust suppression use decreased for 2013-2014 by 39.8ML with focus shifting to the Evaporator (180.2ML evaporated for the period) to manage excess void water rather than by road dust suppression (**Figure 2.11**).

Figure 2.11 Location of Dangerous Goods stored at WCC

In summary, WCC for 2013-2014 had to manage 1063ML of void water which is above but consistent with the previous period. At the end of the last period, WCC engaged Environ Pty Ltd to investigate the increased void water managed in pit finding that the source was from high intensity rainfall events and not from the Werrie Basalt (Environ, 2014a). The continue high volume of water pumped around in pit at WCC was due to the recycling of water in pit for spon comb management that drains almost immediately back into the pit because the former underground workings are now entirely up dip of the mine (Environ, 2014e). WCC is not detrimentally impacting on local groundwater levels in the Quipolly Alluvium aquifer (Environ, 2014b&c) as groundwater intercepted by mining operations is within the levels predicted from the Werrie Basalt aquifer in the LOM EA.

2.9 HAZARDOUS MATERIALS MANAGEMENT

WCC holds a Dangerous Goods Notification (NDG 037966) for the storage and use of diesel in mining equipment and for explosives and related accessories for blasting activities as shown on **Figure 2.12**. Four 62,000L diesel tanks each have double skinned bunding to mitigate any spills in accordance with AS1940. Ammonium Nitrate Fuel Oil (ANFO) and emulsion based bulk explosives are temporarily stored at the Precursor Facility to be used in blasting activities with nonel and electronic detonators used for blast initiation stored separately at the Explosive Magazine. The blasting services contract changed from Orica Mining Service Pty Ltd to LDE Pty Ltd on the 1st January 2014; resulting in a modification to how the dangerous goods were stored onsite. At the precursor facility, ammonium nitrate and emulsion are delivered in road trucks directly loading into augers to allow quick filling of the explosive trucks. There are two magazines, one for storage of detonators and the other for boosters. During the period, WCC added the Precursor Facility and the Explosives Magazine to the Dangerous Goods Notification. Materials Safety Data Sheets (MSDS) are available on the internet for all hazardous materials. Additionally, all contractors are required to supply MSDS sheets for any hazardous goods they propose to bring onto the site. Explosives and security sensitive dangerous substances are currently stored in accordance with the Security Plan.

2.10 OTHER INFRASTRUCTURE MANAGEMENT

Whitehaven Coal did not acquire any additional property adjacent to WCC during the reporting period. **Table 2.12** details the properties purchased by the company and the subsequent dates of purchase since mining commenced at WCC. Management of other infrastructure (buildings, roads, generators, pumps etc.) and other facilities not specified elsewhere within this AEMR is undertaken on an as-needs basis or in accordance with statutory requirements in order to maintain them in an operationally efficient and safe condition, and which does not result in environmental impacts.

Table 2.12 Whitehaven Coal Properties adjacent to WCC

Property Name		Purchase Date
R1	"Narrawolga"	1st July 2004*
R1	"Eurunderee"	1st March 2005*
R1	"Hillview"	28th July 2006*
R1	"The Colliery"	14th February 2008
R1	"Railway View"	5th June 2008
R1	"Preston Park"	20th October 2008
R1	"Branga"	20th October 2008
R1	"Escott"	7th November 2009**
R19	"WC Railway Cottage"	23rd September 2009
R2	"Cintra"	31st March 2010
R1	"Marengo"	17th May 2010
R4	O'Donnells Quarry	27th October 2010
R15	"Plain View"	7th February 2011
R18	"WC Railway Cottage"	3rd November 2011
R14	"Greenslopes"	20th December 2011
R100	"Banool"	20th December 2011
R65	"Banool" (Subdivision)	20th December 2011
R20	"Tonsley Park"	2nd November 2012

* Whitehaven Coal acquired 100% ownership on 7th July 2010; ** Zeolight Australia property also become a project related property through the purchase of "Escott".

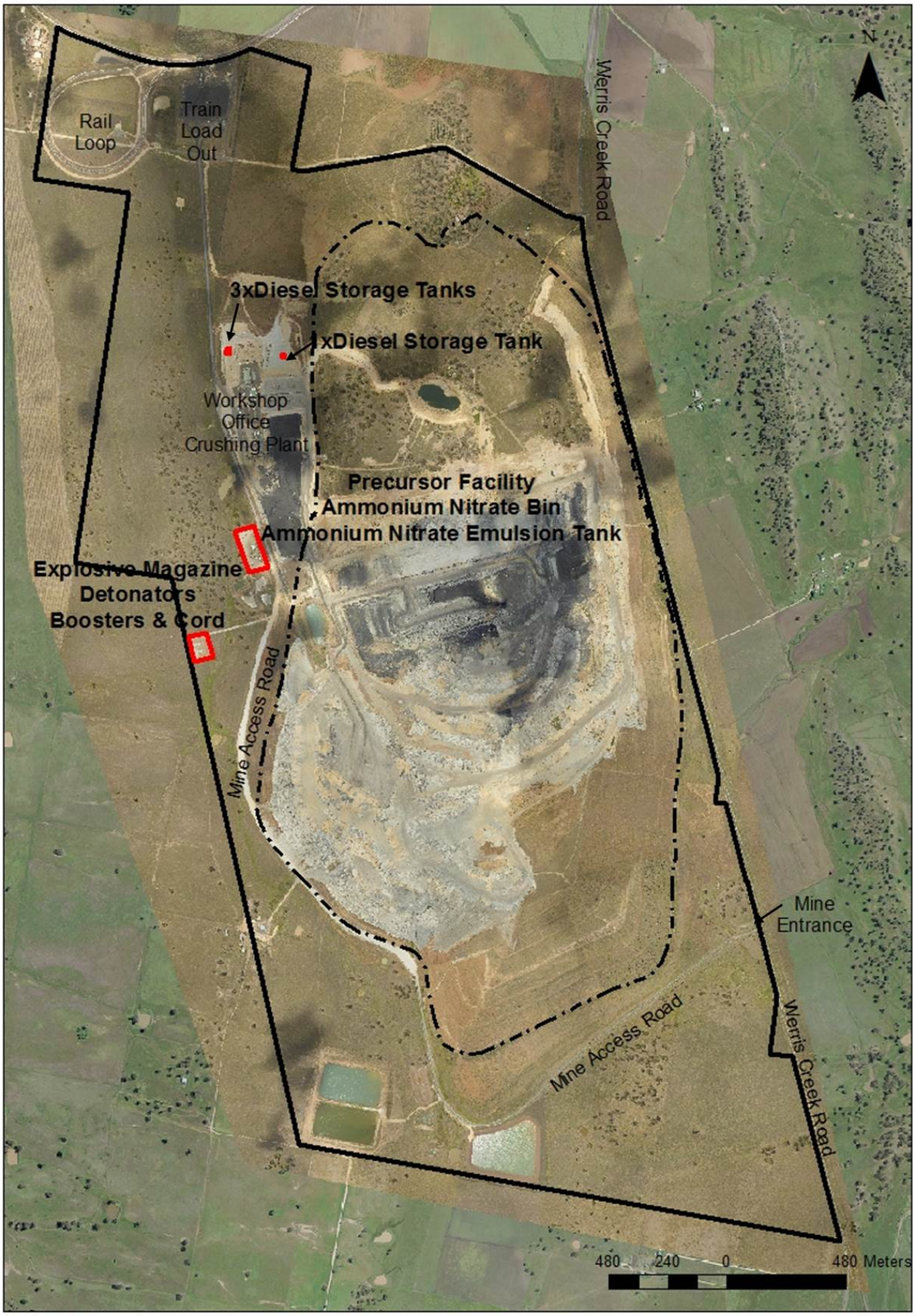


Figure 2.12 Location of Dangerous Goods stored at WCC

3. ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

3.1 AIR QUALITY

3.1.1 Air Quality Criteria and Monitoring Program

The air quality criteria applicable to WCC are specified in Condition 16, Schedule 3 of PA10_0059 and is summarised in **Table 3.1**. The Air Quality and Greenhouse Gas Management Plan (AQGHGMP) (WCC, 2014) was approved by DP&I on 29th April 2014. The assumed background levels prior to the commencement of WCC used in the *"Werris Creek Coal Life of Mine Project Environmental Assessment* (R.W. Corkery & Co. Pty Ltd, 2010) is also outlined in **Table 3.1**.

Table 3.1 Air Quality Impact Assessment Criteria and Background Levels

Pollutant	Averaging Period	AQGHGMP Criteria	Background Level
Total Suspended Particulate (TSP) Matter	Annual	90µg/m^3	30.2µg/m^3 [1]
Particulate Matter < 10 microns (µm) (PM_{10})	Annual	30µg/m^3	Daily Varying
Particulate Matter < 10 microns (µm) (PM_{10})	24 hour	50µg/m^3	15.1µg/m^3 [2]
Particulate Matter < 2.5 microns (µm) ($PM_{2.5}$)	Annual	8µg/m^3	None assumed[3]
Particulate Matter < 2.5 microns (µm) ($PM_{2.5}$)	24 hour	25µg/m^3	None assumed[3]
Deposited Dust	Annual	4g/m^2/month	0.6 g/m^2/month[4]
Deposited Dust (WCC only maximum incremental increase)	Annual	2g/m^2/month	0.6 g/m^2/month[4]

[1] Based on the data set from the DECCW air quality monitoring station in Tamworth.

[2] Based on the data set from the DECCW air quality monitoring station in Tamworth excluding data from any regional dust events

[3] As $PM_{2.5}$ does not have a recognised impact assessment criterion, no $PM_{2.5}$ background concentration was assumed.

[4] Based on annual average at WC1 which was considered the best representation of background levels due to its location.

The Air Quality Monitoring Program undertaken by WCC for 2013-2014 included deposited dust, total suspended particulates (TSP), $PM_{2.5}$ and PM_{10} particulates. A summary of the air quality monitoring network is provided in **Table 3.2** and the locations are shown on **Figure 3.1**. There were no changes to the monitoring network during period.

Table 3.2 Air Quality Monitoring Program

Pollutant	Frequency	Method	Locations
$PM_{2.5}$ & PM_{10}	Continuous	TEOM	"Werris Creek Centre"(2.5TEOM92 & 10TEOM92)
TSP	6 Days	HVAS	"Kyooma" (HVT98)
PM_{10}	6 Days	HVAS	"Kyooma" (HVP98), "Escott" (HVP1), "Glenara" (HVP11), "Tonsley Park" (HVP20)
>PM_{30} (Fallout)	Monthly	Deposited Dust	"Cintra"(DG2), "Railway View"(DG5), "Tonsley Park"(DG20), "Plain View"(DG15), "Marengo"(DG9), "Mountain View"(DG22), "Glenara"(DG11), "Hazeldene"(DG24), "Woodlands"(DG17), "Talavera"(DG96), "Kyooma"(DG98), "Greenslopes"(DG14), Werris Creek South(DG62), Werris Creek Centre(DG92), "Westfall"(DG101), West Street(DG103), "Escott"(DG1), "Eurunderee"(DG3), 8 Kurrara Street(DG34), "Villamagna"(DG106)

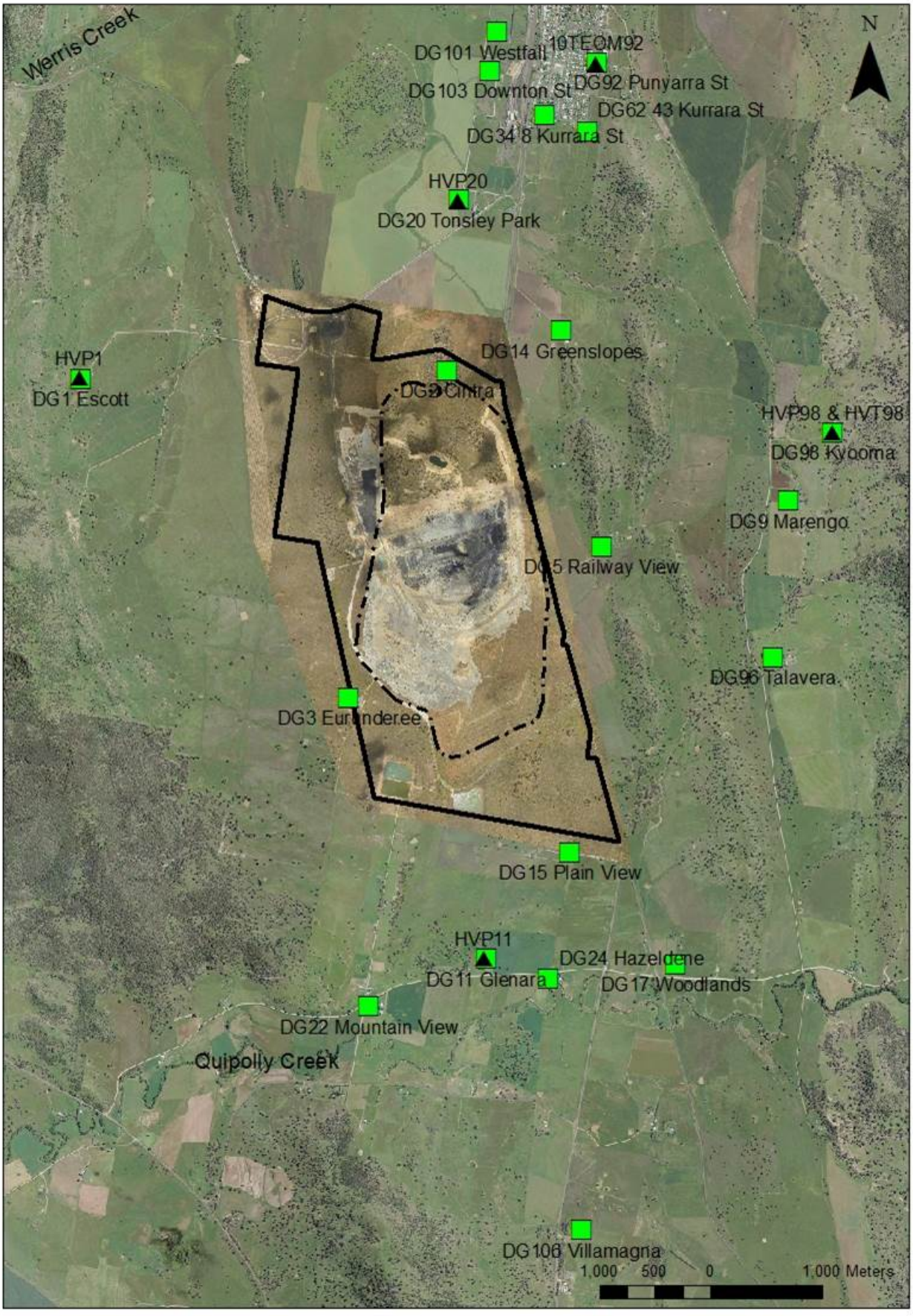


Figure 3.1 Air Quality Monitoring Network for 2013-2014

3.1.2 Control Procedures

As well as aiming to meet the criteria identified above, WCC continues to employ a range of air quality control measures to ensure that activities are carried out in a competent manner in accordance with EPL 12290 Condition O1. WCC utilises water carts as the principle method to minimise air quality impacts from mining and associated activities. Water carts operated during the reporting period included one 50,000L CAT 773 water truck and two 30,000L Volvo articulated water trucks dedicated to the active mining operations area and one 12,000L water cart used at the coal processing and the train load out/product coal stockpile areas. **Table 3.3** compares the water cart water usage for dust suppression since 2008. Overall as the rates of production have increased, so too has the road dust suppression. The decrease in dust suppression this year compared to the previous period was due to an evaporator coming on line reducing the focus on water cart dust suppression as a means to manage excess water in pit.

Table 3.3 Annual Water Cart Road Dust Suppression at WCC

	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Water Cart Dust Suppression (ML)	130.0	154.6	140.3	189.7	388.5	339.7
Monthly Average (ML)	10.8	12.9	11.7	15.8	32.4	28.3
Change to Previous Year (+/-ML)	NA	+24.6	-14.3	+49.4	+198.8	-48.8

The AQGHGMP outlines further management controls to minimize dust generation on-site as follows:-

- Overburden, coal and soil loading activities are not undertaken during periods of adverse weather (high winds or dry conditions). The first adverse weather threshold is triggered at winds greater than 7m/s sending an SMS to the OCE to check for dust generated from mining operations. The second trigger is for winds greater than 9m/s and depending on the exposure of each mining location then operations may be suspended to mitigate dust generation.
- Water sprays are used on the coal feed hopper, crusher and at all conveyor transfer and discharge points.
- 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.
- 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.
- Prior to drilling, water carts are to be used to create a surface crust and minimize the potential for dust lift-off. Drill rigs utilise a combination of curtains, vacuum extraction and spray water on the cuttings to minimise dust generation.
- Blasting will not be undertaken if on a 5 minute average, wind direction occurs between 182° and 204° (direction of Werris Creek township) or for wind speeds greater than 6m/s unless approved by the Operations Manager.

3.1.3 WCC Mine Dust Deposition Monitoring

Dust deposition gauges are undertaken in accordance with *AS/NSS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method*. The dust deposition monitoring requirements for WCC are based on particulate matter that is generated on-site by WCC related activities. Dust deposition results can be influenced by dust sources not from WCC activities and therefore two annual averages are calculated, one with and without the excluded results. Excluded results may include organic matter contamination such as bird droppings, insects, leaves and grass slashing, as well as dust (inorganic) from other sources (non-mining) such as local farmers ploughing paddocks, fires or regional dust storms.

Table 3.4 outlines the annual average deposited dust levels by location for the reporting period. All locations had an annual average below 4.0g/m^2/month except for DG34 (8 Kurrara St) which had a number of significantly high monthly results that were clearly not related to mining operations due to either organic matter or were significantly higher than other nearby dust gauges also within Werris Creek town. All monthly dust deposition results are provided in **Appendix 3(a)**.

Elevated (>4g/m^2/month) and excluded (contaminated) monthly results recorded across the monitoring network over the reporting period are listed as follows:

- April 2013: DG2 result was 4.1g/m^2/month. The DG2 ("Cintra") result is likely to be due to mining operations as the MIA Dam construction is less than 1km from "Cintra" with the predominate wind direction being a southerly and the property is owned by WCC. DG34 result was 13.7g/m^2/month. DG34 (8 Kurrara St) was substantially higher than any of the other six dust deposition gauge results in Werris Creek town or north of the mine, the dust recorded is not representative of WCC operations. DG9 and DG1 dust results were not representative of mining dust levels as organics were greater than 50% of the sample;
- May 2013: DG34 result was 6.2g/m^2/month. DG34 (8 Kurrara St) was substantially higher than any of the other six dust deposition gauge results in Werris Creek town or north of the mine, the dust recorded is not representative of WCC operations. DG9 dust result was not representative of mining dust levels as organics were greater than 50% of the sample;
- June 2013: DG34 result was 54.1g/m^2/month. DG34 (8 Kurrara St) was substantially higher than any of the other six dust deposition gauge results in Werris Creek town or north of the mine, the dust recorded is not representative of WCC operations;
- July 2013: DG62 and DG106 dust results were not representative of mining dust levels as organics were greater than 50% of the sample;
- September 2013: DG1 and DG20 dust results were not representative of mining dust levels as organics were greater than 50% of the sample;
- October 2013: DG1 dust result was not representative of mining dust levels as organics were greater than 50% of the sample;
- November 2013: DG22 result was 6.9g/m^2/month. DG22 ("Mountain View") was substantially higher than any of the other five dust deposition gauge results in Quipolly or south of the mine, the dust recorded is not representative of WCC operations;

Table 3.4 Dust Deposition Monitoring Results April 2013 to March 2014 (g/m^2/month)

EPL 12290 #	ID	Property	Annual Average	Average - Excluded	Minimum	Maximum	AQGHGMP Criteria	LOM EA Predicted Year 3	Number of Results Excluded
-	DG2	Cintra^	2.0	2.0	0.4	4.4	4.0	-	0
-	DG5	Railway View^	1.1	0.9	0.1	2.3	4.0	-	1
#1	DG20	Tonsley Park^	1.4	0.8	0.4	7.8*	4.0	1.1	3
-	DG15	Plain View^	1.8	1.1	0.3	8.8*	4.0	1.0	1
-	DG9	Marengo^	0.8	0.5	0.1	2.5*	4.0	-	4
-	DG22	Mountain View	2.1	1.6	0.5	6.9*	4.0	0.7	1
#29	DG11	Glenara	0.8	0.6	0.1	1.9	4.0	0.8	1
-	DG24	Hazeldene	0.9	0.9	0.3	2.4	4.0	0.8	0
-	DG17	Woodlands	0.8	0.8	0.4	1.8	4.0	0.7	0
-	DG96	Talavera	0.6	0.6	0.2	1.1	4.0	0.8	1
#28	DG98	Kyooma	0.3	0.3	0.1	0.6	4.0	0.7	1
-	DG14	Greenslopes^	0.7	0.7	0.1	2.9	4.0	1.0	1
-	DG62	Werris Creek South	0.5	0.5	0.2	1.4	4.0	-	2
#30	DG92	Werris Creek Centre	0.9	0.8	0.1	3.9	4.0	-	2
-	DG101	Westfall	1.0	1.0	0.4	3.0	4.0	-	0
-	DG103	West Street	0.8	0.8	0.1	1.8	4.0	-	0
-	DG1	Escott^	1.2	0.8	0.2	5.0*	4.0	-	4
-	DG3	Eurunderee^	0.8	0.9	0.2	1.6	4.0	-	1
-	DG34	8 Kurrara Street	**10.9**	0.6	0.2	54.1@	4.0	-	6
-	DG106	Villamagna	1.0	0.9	0.2	3.0*	4.0	-	2

^ Properties owned by Werris Creek Coal;
*Sample contaminated with organic matter from non-mining source (i.e. bird droppings and insects)
@ Sample contaminated from local dust source non-mining related (i.e. fire, farming activities)
Bold = elevated result

- December 2013: DG20 result was 7.8g/m^2/month. The DG20 ("Tonsley Park") result was not representative of mining dust levels as organics were greater than 50% of the sample. DG34 result was 19.6g/m^2/month. DG34 (8 Kurrara St) was substantially higher than any of the other six dust deposition gauge results in Werris Creek town or north of the mine, the dust recorded is not representative of WCC operations;

- January 2014: DG1, DG20 and DG34 dust results were not representative of mining dust levels as organics were greater than 50% of the sample. DG34 (8 Kurrara St) was substantially higher than any of the other six dust deposition gauge results in Werris Creek town or north of the mine, the dust recorded is not representative of WCC operations as organics were greater than 50% of the sample.;

- February 2014: DG2 result was 4.4g/m^2/month. The DG2 ("Cintra") result is likely to be due to mining operations with the predominate wind direction a south-south easterly and is owned by WCC. DG22 result was 4.7g/m^2/month. DG22 ("Mountain View") was substantially higher than any of the other five dust deposition gauge results in Quipolly or south of the mine, the dust recorded is not representative of WCC operations. DG9, DG11 and DG92 dust results were not representative of mining dust levels as organics were greater than 50% of the sample; and

- March 2014: DG15 result was 8.8g/m^2/month. The DG15 ("Plain View") result was not representative of mining dust levels as organics were greater than 50% of the sample. DG3, DG5, DG9, DG96, DG98, DG14, DG62, DG34 and DG92 dust results were not representative of mining dust levels as organics were greater than 50% of the sample.

WCC has undertaken dust deposition monitoring since 2005 and the annual averages since that time are presented in **Table 3.5**. Overall the results for 2013/2014 compared to the previous period are mixed with six locations recording higher results and ten locations with lower results out of the 20 sites monitored. The lower trend of dust deposition results for the period is not consistent with the prevailing weather conditions resulting in below average rainfall recorded for the period. DG2 ("Cintra") is the only location with a clear increasing trend in dust deposition levels which is to be expected given that the distance has decreased to 1km from the main open cut mining area (not including the closer VWD5 and visual bund). The conclusion to draw from the historical results is that the coarse particulate generated by WCC mining operations does not adversely impact on the adjacent properties that dust deposition monitoring is undertaken and are generally well below normal amenity guideline levels.

Table 3.5 Dust Deposition (Excluded) Monitoring Results from 2005 to 2014 (g/m2/month)

ID	Property	Back-ground	LOM EA Predicted Year 3	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	AQGHG MP Criteria
DG1	**Escott^**	0.6	-	0.6	0.8	0.7	0.5	0.7	-	-	0.8	0.8	4.0
DG2	**Cintra^**	0.6	-	1.2	1.4	1.1	1.3	1.6	1.4	1.4	1.5	2.0	4.0
DG3	**Old Colliery/ Eurunderee^**	0.6	-	1.5	2.3	2.9	3.7	2.5	-	-	0.7	0.9	4.0
DG4	**Hill View^**	0.6	-	0.8	0.9	0.7	0.7	1.2	-	-	-	-	4.0
DG5	**Railway View^**	0.6	-	2.0	1.2	0.6	0.7	1.1	1.3	0.9	1.2	0.9	4.0
DG6	**Southern Boundary^**	0.6	-	5.4	9.4	5.1	4.8	2.3	-	-	-	-	4.0
DG20	**Tonsley Park^**	0.6	1.1	1.3	2.3	1.6	0.9	1.3	0.8	0.6	0.9	0.8	4.0
DG15	**Plain View^**	0.6	1.0	-	-	-	-	1.9	0.9	0.9	1.8	1.1	4.0
DG9	**Marengo^**	0.6	-	-	-	-	-	1.5	0.7	0.6	0.8	0.8	4.0
DG22	**Mountain View**	0.6	0.7	-	-	-	-	-	0.9	0.7	1.3	1.6	4.0
DG11	**Glenara**	0.6	0.8	-	-	-	-	-	1.3	1.2	1.6	0.6	4.0
DG24	**Hazeldene**	0.6	0.8	-	-	-	-	-	-	-	0.8	0.9	4.0
DG17	**Woodlands**	0.6	0.7	-	-	-	-	-	-	-	1.5	0.8	4.0
DG96	**Talavera**	0.6	0.8	-	-	-	-	-	-	-	0.7	0.6	4.0
DG98	**Kyooma**	0.6	0.7	-	-	-	-	-	-	-	0.7	0.3	4.0
DG14	**Greenslopes^**	0.6	1.0	-	-	-	-	-	-	-	0.8	0.7	4.0
DG62	**Werris Creek South**	0.6	-	-	-	-	-	-	-	-	0.6	0.5	4.0
DG92	**Werris Creek Centre**	0.6	-	-	-	-	-	-	-	-	0.6	0.8	4.0
DG101	**Westfall**	0.6	-	-	-	-	-	-	-	-	1.2	1.0	4.0
DG103	**West Street**	0.6	-	-	-	-	-	-	-	-	0.9	0.8	4.0
DG1	**Escott^**	0.6	-	-	-	-	-	-	-	-	0.8	0.8	4.0
DG3	**Eurunderee^**	0.6	-	-	-	-	-	-	-	-	0.7	0.9	4.0

DG34	**8 Kurrara Street**	0.6	-	-	-	-	-	-	-	-	1.0	0.6	4.0
DG106	**Villamagna**	0.6	-	-	-	-	-	-	-	-	0.9	0.9	4.0

Note – none of the annual averages in Table 3.4 contain any contaminated results
^ Properties owned by Werris Creek Coal;

3.1.4 Quirindi Train Dust Deposition Monitoring

WCC continued to monitor dust deposition adjacent to the rail line through the township of Quirindi to determine the proportion of coal dust fall out in recognition of concerns raised by government and community relating to uncovered coal wagons. A total of six (6) dust deposition gauges were installed in September 2011 beside the Main Northern Rail line (shown in **Figure 3.2**).

Figure 3.2 Google Earth Map of Dust Deposition Monitoring Locations within Quirindi Township

Three gauges were set up at equal intervals on the eastern and western sides of the railway at nominal distances of 13m, 20m and 30m away from the rail line to determine rates of dust fall out with distance and the eastern and western gauges to compare the influence of road vs rail transport dust deposition rates. Each sample is analysed under a microscope in the laboratory that estimates the proportion of the dust sample from a source material (i.e. dirt, insects, vegetation, coal). The Quirindi train dust deposition monitoring was undertaken in accordance with *AS 3580.10.1-2003* with the locations chosen after reviewing the local topography and proximity to trees, buildings and other fugitive dust sources. Data was collected from the installed gauges (labelled DDW13, DDW20, DDW30 and DDE13, DDE20, DDE30 acknowledging the side of the rail line and distance from the rail line of each) is summarised in **Table 3.6**. Full results from the Quirindi train deposited dust monitoring are provided in **Appendix 3(c)**.

The monitoring continues to indicate that the deposited dust levels adjacent to the Great Northern Rail Line are well below normal amenity guideline levels. As would be expected, the percentage contribution of dust from coal (i.e. coal trains) from this period does demonstrate a clear trend with the highest coal percentage next to the Rail Line and decreases with distance away, both on the eastern and western side.

Table 3.6 Quirindi Train Dust Deposition Monitoring Results 2013-2014

	DDW30	DDW20	DDW13	Train Line	DDE13	DDE20	DDE30	Guideline
Annual Average	1.2	1.4	1.6		1.3	1.2	1.4	4.0
Average Coal %	21.1%	24.5%	43.3%		38.6%	30.5%	10.5%	-
Average Coal g/m^2/month	0.25	0.35	0.69		0.48	0.36	0.15	-
Minimum	0.6	0.5	0.5		0.6	0.4	0.5	-
Maximum	2.0	2.7	3.4		2.9	2.5	3.1	4.0

Note: All results are in the form of Insoluble Matter (g/m^2/month);

3.1.5 TEOM and HVAS Monitoring

WCC operated a TEOM (Tapered Element Oscillating Microbalance) in central Werris Creek adjacent to the Water Treatment Plant (and property R92) to monitor real time dust levels in Werris Creek township. Monitoring of PM10 dust levels in Werris Creek commenced in April 2012 however the PM2.5 component of the TEOM was not operational until September 2012. The TEOM will monitor PM_{10} concentrations in accordance with *AS/NZS 3580.9.8: 2008: Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM10 continuous direct mass method using a tapered element oscillating microbalance analyser*. The TEOM is capable of reporting both PM_{10} and $PM_{2.5}$ data available for analysis and operational response 24 hours a day/7 days per week if required.

Detailed air quality monitoring results for $PM_{2.5}$ and PM_{10} over the last 12 months has been included in **Appendix 3(b)** with **Table 3.7** summarizing the monthly results. The PM_{10} air quality of Werris Creek township would be described as good with the 12 month average well below the annual criteria of 30µg/m^3 and within the predicted PM_{10} annual levels in the LOM Environmental Assessment (the Air Quality Impact Assessment did not predict any air quality impacts on Werris Creek). The maximum the PM_{10} daily dust level during the period was 43.7µg/m^3 (18th October 2014), which is below the daily criteria of 50µg/m^3.

The Werris Creek $PM_{2.5}$ annual average was measured to be 8.1µg/m^3; fractionally above the annual criteria adopted in the AQGHGMP (based on the interim guideline published by NEPM) but did not exceed any air quality criteria outlined in the Project Approval. As presented below in **Table 3.8**, the wind direction from WCC to Werris Creek only occurs 8.7% of the time and therefore $PM_{2.5}$ dust emissions from WCC are not the cause of the elevated annual average. There were three elevated daily $PM_{2.5}$ levels during the period:

- On 7th & 8th November 2013 the maximum $PM_{2.5}$ recorded was 27.6µg/m^3. The wind was a moderate north northwesterly indicating that the dust was an upwind source and not related to mining. While the EPA monitor does not record PM2.5 in Tamworth; the PM10 recorded was 50.0µg/m^3 indicating that there was a regional dust event present across the 7th and 8th November;
- The $PM_{2.5}$ dust level reached 28.0µg/m^3 on the 22nd and 23rd January 2014 due to the Carinya Road bushfire approximately 10km south east of Werris Creek; and
- The $PM_{2.5}$ dust level on 11th February 2014 between 4pm and 7:45pm peaking 25.5µg/m^3 at 6:15pm with the average wind direction being a west south westerly 241o @ 3.8m/s during this period. That wind direction would not propagate dust emissions from WCC towards Werris Creek town.

Table 3.7 $PM_{2.5}$ and PM_{10} Monthly Results monitored by Werris Creek TEOM 2013 to 2014

	PM_{10} (µg/m³)					$PM_{2.5}$ (µg/m³)				
	Min	Mean	Max	Daily Criteria	Annual Criteria	Min	Mean	Max	Daily Criteria	Annual Criteria
April 2013	4.0	12.3	25.7			1.8	6.2	12.7		
May 2013	5.0	11.9	26.8			2.3	6.7	14.0		
June 2013	4.0	9.0	16.7			2.9	6.4	12.2		
July 2013	3.5	9.3	17.7			2.5	6.4	15.2		
August 2013	1.5	9.9	30.3			0.1	5.5	20.0		
September 2013	5.0	15.3	33.7			1.8	8.1	17.8		
October 2013	8.8	16.6	43.7			4.0	8.2	24.5		
November 2013	1.5	15.0	40.5	50	30	1.5	8.7	**27.6**	25	8
December 2013	6.2	14.9	28.4			3.9	8.7	15.5		
January 2014	7.1	17.7	37.9			3.5	11.0	**28.0**		
February 2014	9.9	19.1	37.5			5.5	12.4	**25.5**		
March 2014	7.2	13.5	27.3			4.2	9.5	18.9		
ANNUAL MEAN	13.7					**8.1**				
PREDICTED DAILY	25.1					Background + 10				
PREDICTED ANNUAL	15.1					Background + 2				

Bold = elevated result

Further analysis of the Werris Creek TEOM PM10 results was undertaken based two wind directions (wind towards Werris Creek between 182° and 204° and wind not towards Werris Creek) and for various wind speeds. **Table 3.8** presents the results of the wind direction analysis showing no significant difference in dust levels (within 2.5 microns) when winds are blowing from WCC to Werris Creek or not. While the annual average for winds towards Werris Creek was marginally higher, this only occurs 8.7% of the time demonstrating that WCC has a negligible impact on Werris Creek dust levels.

Table 3.8 Analysis of Wind Direction for Werris Creek TEOM PM_{10} during 2013 to 2014

	Wind towards WC 182° to 204° All windspeeds		Wind away from WC Not 182° to 204° All windspeeds	
	µg/m³	% of time	µg/m³	% of time
April 2013	11.7	14.3%	11.9	85.7%
May 2013	13.4	11.3%	10.9	88.7%
June 2013	11.5	7.3%	8.4	92.7%
July 2013	11.4	8.3%	10.0	91.7%
August 2013	9.4	3.5%	9.8	96.5%
September 2013	14.4	9.2%	15.1	90.8%
October 2013	14.4	9.6%	16.1	90.4%
November 2013	12.8	5.8%	14.2	94.2%
December 2013	16.7	8.9%	14.3	91.1%
January 2014	19.4	8.3%	16.9	91.7%
February 2014	19.2	7.8%	18.0	92.2%
March 2014	13.1	9.5%	13.4	90.5%
ANNUAL AVERAGE	**14.0**	**8.7%**	**13.2**	**91.3%**

High Volume Air Samplers (HVAS) sample collection, changeover and maintenance is undertaken by a specialist contractor (and NATA accredited), Australian Laboratory Services (ALS) based in Gunnedah. The HVAS will monitor TSP and PM_{10} concentrations over a six day continuous cycle in accordance with *AS/NZS 3580.9.3:2003 Methods for sampling and analysis of ambient air – Determination of*

suspended particulate matter – Total suspended particulate matter (TSP) – High volume sampler gravimetric method and *AS/NZS 3580.9.6:2003 Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM_{10} high volume sampler with size-selective inlet – Gravimetric method*.

Detailed air quality monitoring results as measured by the HVAS for TSP and PM_{10} over the last 12 months has been included in **Appendix 3(b)** with **Table 3.9** summarizing the monthly results. The HVAS monitors are located north/east/south/west around WCC to measure dust emissions representative of mining operations regardless of the prevailing wind direction. Consistent with the good PM_{10} air quality measured in Werris Creek during the reporting period with all four PM_{10} and one TSP HVAS averaged below the relevant annual criteria. There was one elevated result recorded on the 30th September 2014 at HVP11 "Glenara" recording 56.4µg/m^3. The wind was a moderate north-north westerly with the upwind (unaffected by WCC) HVAS at Tonsley Park recording 22.6µg/m3, consistent with the EPA monitor in Tamworth recording 20.5µg/m3 while the Werris Creek TEOM recorded 13.6µg/m^3 on 30th September. Being conservative and assuming the upwind dust contribution on the 30th September was 13.6µg/m^3, then the worst case WCC dust contribution to Glenara was 42.8µg/m^3 and in compliance with the daily (24 hour incremental) criteria of 50µg/m^3 in PA10_0059. In is unknown what local or agricultural contribution occurred on 30th September 2013.

Table 3.9 TSP and PM_{10} Monthly Average as monitored by HVAS 2013 to 2014

Period	PM_{10} (µg/m^3)						TSP (µg/m^3)	
	HVP1	HVP20	HVP11	HVP98	Daily Criteria	Annual Criteria	HVT98	Annual Criteria
	Escott	Tonsley Park	Glenara	Kyooma			Kyooma	
April 2013	8.7	14.6	17.8	7.2	**50**	**30**	12.5	**90**
May 2013	9.5	15.4	17.6	11.8			35.8	
June 2013	4.0	7.7	5.6	3.4			6.4	
July 2013	5.7	11.9	5.5	3.8			6.7	
August 2013	7.5	13.5	12.6	8.6			14.1	
September 2013	14.3	21.4	25.2	14.0			26.5	
October 2013	17.0	27.2	34.9	15.9			26.7	
November 2013	8.5	12.5	14.8	6.8			15.7	
December 2013	12.1	17.1	16.9	12.1			22.8	
January 2014	17.0	21.4	24.0	12.8			26.7	
February 2014	13.2	15.8	18.8	12.8			25.0	
March 2014	8.6	13.5	16.5	7.5			13.2	
MEAN	10.6	16.1	17.6	9.8			19.9	
MINIMUM	1.7	1.3	1.3	1.1			3.2	
MAXIMUM	36.2	41.1	**56.4**	32.4			75.5	
PREDICTED DAILY	-	41.8	37.8	32.6			-	
PREDICTED ANNUAL	-	19.4	16.7	16.0			32.8	

Bold = elevated result

WCC has undertaken PM_{10} dust monitoring since 2005 and the annual averages since that time are presented in **Table 3.10** including the former HVAS monitoring locations. Comparing annual averages since 2005, there is an increasing trend of PM_{10} dust levels at "Tonsley Park" while "Escott/Eurunderee" dust levels are now declining after peaking in 2010. The central Werris Creek and "Glenara" sites recorded annual averages higher than the previous period.

Table 3.10 PM10 Dust Monitoring Annual Averages since 2005 (µg/m^3)

ID	Property	Back-ground	LOM EA Predicted	2005/ 2006	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	Annual Criteria
10TEOM92	**Werris Creek Centre**	15.1	-	-	-	-	-	-	-	-	13.0	13.7	**30**
HVP11	**Glenara**	15.1	16.7	-	-	-	-	-	-	-	13.4	17.6	**30**
HVP98	**Kyooma**	15.1	16.0	-	-	-	-	-	-	-	11.6	9.8	**30**
HVP1	**Escott/Eurunderee**	15.1	-	13.5	15.4	16.8	16.9	17.7	12.2	11.7	11.9	10.6	**30**
HVP20	**Tonsley Park**	15.1	19.4	12.1	11.4	12.1	12.1	16.4	11.2	14.0	13.7	16.1	**30**
-	**Cintra**	15.1	-	-	-	-	-	19.2	13.7	16.9	-	-	**30**
-	**Railway View**	15.1	-	11.0	11.5	12.1	11.8	15.0	12.2	17.9	-	-	**30**
-	**Old Colliery**	15.1	-	10.5	13.5	16.0	13.6	-	-	-	-	-	**30**

The drivers for the higher dust levels is thought to be related to the drier conditions experienced during the period due to below average rainfall however increased dust emissions from WCC is also expected as production rates and area of disturbance increase while distances to neighbouring properties/Werris Creek decrease over time. Except for "Glenara", the other monitoring locations annual average dust levels for 2013-2014 were below the predicted levels in the LOM EA for Year 3 (Scenario 1). Actual dust levels for "Glenara" being higher than predicted is not considered to be significant with the drier and dustier conditions and localized agricultural activities affecting the air quality more than dust generated from mining operations. During the period, all PM10 HVAS achieved 100% capture in accordance with requirements of EPL 12290 Condition 5 M2.2. The HVAS unit not conditioned under EPL 12290 includes the HVAS TSP at "Kyooma" which experienced faults resulting in samples on 20th and 26th June 2013 being missed, with the unit subsequently being swapped out and sent away for repairs.

3.1.6 Review of Dust Complaints and AQGHG Annual Review

A summary of dust complaints received by WCC since operations commenced in 2005 is presented in **Table 3.11**. Dust related complaints have also increased since 2010 believed to be due to the increase in scale of mining operations and as a consequence of operations moving closer to the town of Werris Creek. Most dust complaints (particularly from Werris Creek residents) are related to general dust fallout issues (cleaning outdoor tables etc.) rather than specific events. These complaints are addressed by taking a sample of dust, water from rainwater tank and reviewing the real time PM_{10} data. The microscopic analysis of dust usually finds that if there is any coal - it is trace with dirt (from any source), vegetation and algae the predominant constituents of the dust with the drinking water quality usually found to be within ANZECC guidelines. As summarised above, real time monitoring of PM_{10} in Werris Creek indicates that the air quality would be classified as good despite bushfire events. A number of odour complaints were recorded during the period that may have been related to spontaneous combustion. The coal associated with the former underground workings has a high propensity for self heating and spontaneous combustion which can occur when the former underground workings are being mined. These instances are managed by the use of water curtains to suppress hot areas plus uncovering and mining the workings quickly and dosing any hot coal immediately. Smaller areas of spontaneous combustion can occur in the dumps or coal stockpiles but are attended to as soon as practicable. Now that the western dump expansion is complete, active dumping in pit will minimise the time that carbonaceous waste rock is exposed to the air to prevent spontaneous combustion in the dumps from becoming excessive.

Table 3.11 Air Quality related Complaints since 2005

Complaint Issue	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Dust – Mine	1	2	0	3	0	5	7	12	11
Dust – Rail Load Out	0	0	0	1	0	0	0	0	3
Odour	0	0	0	0	0	0	0	0	5
All Complaints (including Air Quality)	**8**	**10**	**7**	**16**	**12**	**52**	**117**	**56**	**93**

WCC performance against the Environmental Management System air quality related objectives and targets developed from the AQGHGMP for the period 1st April 2013 to 31st March 2014 is outlined in **Table 3.12**. WCC achieved three out of the five targets set for air quality related objectives. Dust complaints marginally increased in 2013-2014 compared to 2012-2013; which despite the missing the target, the increase in dust complaints was in line with the prevailing dry conditions and increased dust levels as measured in Werris Creek town unrelated to WCC operations with the majority of dust complaints a function of the communities perception and weather conditions that WCC cannot manage. Real time PM_{10} dust monitoring confirmed, as predicted in the Environmental Assessment, that Werris Creek has good air quality even during the extended dry period during the reporting period.

Table 3.12 Dust Objectives and Targets 2013-2014

Activity	Objective	Indicator	Actual 2013-2014	Target 2013-2014	Actual 2012-2013	Actual 2011-2012
Dust	Complaint	# Complaints	**14**	**12**	12	7
		# Complainants	**9**	**7**	11	7
	Trafficable Dust	# Exceedances	**0**	**0**	0	0
	Overburden Emplacement	# Exceedances	**0**	**0**	0	0
	Dust Criteria	# Exceedances	**0**	**0**	0	0

Red – Exceeded Full Year Target

As required by PA 10_0059 Schedule 5 Condition 3, WCC as part of this Annual Environmental Management Report undertakes an annual review of its air quality management for 2013-2014. **Table 3.13** summarises the air quality annual review from the discussion above.

Table 3.13 AQGHG Annual Review 2013-2014

Annual Review	Discussion
Monitoring Results	• Criteria HVAS PM_{10} measured at "Glenara" was above criteria but not an exceedance when the upstream wind dust level is taken into account. The daily PM2.5 was measured above criteria on a number of occasions during the period at Werris Creek due to prevailing ambient conditions or bushfires and not due to mining operations • Previous Year As expected due to the prevailing dry conditions, dust emissions have increased from the 2012-2013 period. • EA Predictions Dust monitoring results are generally within the predictions outlined in Environmental Assessment. Four dust deposition gauges ("Plain View", "Mountain View", "Hazeldene" and "Woodlands") and one HVAS PM10 ("Glenara") recorded annual averages slightly above the levels predicted in

Annual Review	Discussion
	the LOM Environmental Assessment due to the drier and dustier ambient conditions during 2013-2014.
Complaints	• This Year Majority of dust complaints are related to community perception and weather events rather than specific dust events. • Previous Year Air quality complaints increased from the previous year driven by increasing community awareness of WCC operations and alleged spontaneous combustion odour.
Compliance	• Criteria and other A number of elevated dust monitoring results were recorded however there were no exceedance of the criteria outlined in AQGHGMP because the levels were not representative of WCC operations. • Objectives & Targets WCC achieved three out of the five targets set for air quality related objectives – WCC did not achieve a reduction in complaints from 2012-2013.
Data Trends & Predicted Impacts	Monitoring indicates that dust levels have increased since 2005 as expected, however dust levels are generally below those predicted in the Environmental Assessment and below the relevant air quality criteria.
Improvement Actions	For 2014-2015, there are five air quality improvement projects: • Continue Wheel Generated Dust Pollution Reduction Program • Continue Adverse Weather Dust Pollution Reduction Program • Continue SAIL Coal Train Dust Mitigation • Completion of Visual Amenity Bund along Werris Creek Road • Install Real Time Air Quality Monitoring Camera
Management Plan Review	All management strategies and actions were implemented during 2013-2014.
Management Plan Revision	No update required.

3.1.7 Greenhouse Gas (GHG)

Diesel combustion during the reporting period significantly increased by 37% to 20,417,614L due to the increased intensity of operations to ramp up in production towards the 2.5Mtpa coal target as well as the use of generators to supply power during the MIA relocation. Assuming an energy content of Automotive Diesel Oil (diesel) of 38.6 MJ/L and "National Greenhouse Accounts (NGA) Factors" June 2009, the estimated direct Scope 1 GHG emissions from diesel combustion since 2005 are outline in **Table 3.14**.

Table 3.14 GHG Emissions from Diesel Combustion at WCC

	Diesel Fuel Usage kL	Emission Factor t $CO_{2\text{-}e}$/kL	CO_2 Equivalent Tonnes
2005-2006	5,590	2.7	15,093
2006-2007	5,855	2.7	15,809
2007-2008	7,566	2.7	20,428.
2008-2009	6,838	2.7	18,427
2009-2010	9,030	2.7	24,382
2010-2011	12,009	2.7	32,820
2011-2012	13,549	2.7	36,582
2012-2013	12,908	2.7	34,854
2013-2014	20,418	2.7	55,129

Due to the relocation of the MIA, the main electricity supply to the workshop, crushing plant and administration was terminated between April and December 2013 with generators used to supply power. The "National Greenhouse Accounts (NGA) Factors" June 2009 and a Scope 2 (indirect) emission factor of 0.89 kg CO_2 – equivalents / kWh, the estimated GHG emissions from electricity usage since 2005 is presented **Table 3.15**.

Table 3.15 GHG Emissions from Electricity Consumption at WCC

	Electricity kWh	Emission Factor kg $CO_{2\text{-}e}$/kWh	CO_2 Equivalent Tonnes
2005-2006	300,400	0.94	282.0
2006-2007	754,195	1.068	805.5
2007-2008	948,697	1.06	1,005.6
2008-2009	904,030	0.89	804.6
2009-2010	1,019,149	0.89	907.4
2010-2011	1,506,725	0.89	1,341.0
2011-2012	1,302,197	0.89	1,158.9
2012-2013	1,303,860	0.89	1,160.4
2013-2014	287,375	0.89	255.8

During the Reporting Period, a total of 9,660 tonnes of explosives were used at WCC. Assuming a conversion factor of 0.1778 kg CO_2 – equivalents / kWh, the estimated GHG emissions from explosion combustion in blasting since 2005 is presented **Table 3.16**.

Table 3.16 GHG Emissions from Explosives Combustion at WCC

	Explosive t	Emission Factor kg $CO_{2\text{-}e}$/t	CO_2 Equivalent Tonnes
2005-2006	2,335	0.1637	382.4
2006-2007	3,943	0.1637	645.5
2007-2008	4,442	0.1637	727.2
2008-2009	3,889	0.1778	691.5
2009-2010	6,702	0.1778	1191.6
2010-2011	7,402	0.1778	1316.1
2011-2012	10,140	0.1778	1802.9
2012-2013	7,537	0.1778	1340.1
2013-2014	9,660	0.1778	1717.6

The total GHG emissions for WCC increased 34.5% for 2013-2014 due to increased diesel consumption however the emission intensity remained consistent with previous years. **Table 3.17** presents the total CO_2 equivalent GHG emissions and emissions per unit of production levels since 2005.

Table 3.17 Total GHG Emissions and Emissions per Production Unit by WCC since 2005

	CO_2 Equivalent Tonnes	Total Production BCM	CO_2 Emission per Production BCM
2005-2006	15,757	4,577,326	0.0034
2006-2007	17,260	7,287,924	0.0024
2007-2008	22,161	7,301,296	0.0030
2008-2009	20,423	7,198,677	0.0028
2009-2010	26,481	9,283,707	0.0029
2010-2011	35,477	10,958,235	0.0032
2011-2012	39,544	12,803,395	0.0031
2012-2013	37,354	13,023,197	0.0029
2013-2014	57,102	18,613,549	0.0031

The *"Werris Creek Coal Mine Life of Mine Project"* (R.W. Corkery & Co. Pty Ltd, 2010) estimated the Scope 1 and Scope 2 GHG emissions from Diesel Consumption (operations), Explosives and Purchased Electricity would equate to approximately 54,640 CO_2-e tonnes that would be emitted by WCC at an extraction rate of 2.5Mtpa of coal. The 2013-2014 GHG emissions are generally in line with the prediction despite the one off MIA relocation leading to increased generator/diesel use.

3.2 SURFACE WATER (INCLUDING EROSION AND SEDIMENT CONTROL)

3.2.1 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. Segregation of water into the clean, dirty, void and waste/contaminated water streams is also discussed in **Section 2.8**. Potential pollutants of surface waters at WCC include erosion and sedimentation and acid/alkaline water (dirty water), acid/alkaline and saline water (void water) and hydrocarbons and/or nutrients (contaminated water).

Methods for the management of erosion and sediment control at WCC are presented in the LOM MOP and in the draft Site Water Management Plan (SWMP, 2013) and include:

- The segregation of water from clean, dirty or void water catchments and retention of this water as required for pollution control and on-site for dust suppression;
- Sediment Basins (SBs) within the dirty water system are used to collect water and allow sufficient time to enable the settlement of suspended solids prior to discharge;
- Three SBs are licenced discharge points (as per EPL 12290) designed to retain water generated by run-off from a 39.2mm rain event over a 5 day period before overflowing (wet weather discharge) and are to be maintained in a drawn down state. Flocculants are also used where necessary to further clarify the water prior to undertaking a controlled discharge;
- Revegetation of soil stockpiles, areas shaped to their final landform and areas no longer required for mining-related purposes;
- Installation of upslope protective earthworks such as contour banks or straw bale protection; and
- Installation of contour banks and lined waterways on the final landform following soil application.

Excessively alkaline (common) or acid waters which may accumulate in the SBs of the licenced discharge points, are treated to ensure that the pH of the discharge waters are maintained within the limits nominated by EPL 12290 (between 6.5 and 8.5) to avoid impacting on off-site water quality.

Saline water within the void water system is managed by preferentially using this water for dust suppression on-site and storing the remainder within void water storage dams. Because Void Water Dams 1, 3 & 4 are prescribed dams by the NSW Dam Safety Committee, they have been designed for zero discharge; impermeable ($<1x10^{-9}$m/s); an operating freeboard of 0.3m (marked with dam full level sign) and 0.5m diameter pipe spillway capable of managing a 1 in 10,000 year 5 day storm event. Water collected within the dirty water system which cannot be easily treated to achieve the

EPL nominated criteria for pH or suspended solids prior to discharge is also used for dust suppression or transferred to the void water system as a last resort.

The primary source for contaminated water is at the workshop which drains to the wash pad sump and is treated by a ceptor (under/over flow oil-water separator). Any oil and sediment is collected by a vacuum truck and treated at the bioremediation area, while the water drains to the dirty water system.

The WCC surface water monitoring program is summarised in **Table 3.18**, **Figure 3.3** and **Figure 3.4**.

Table 3.18 Surface Water Analysis for Licensed Water Storages

Monitoring Site	Monitoring Frequency	Parameters
Dirty Water Dams Licensed Discharge Points SB2 (EPA 10) SB9 (EPA 12) SB10 (EPA 14)	Quarterly & As soon as practicable after any overflow off-site commences and in any case not more than 12 hours after any overflow off-site commencing	Water quality including, but not limited to, Total Suspended Solids Oil & Grease pH Electrical Conductivity Total Phosphorus Reactive Phosphorus Total Nitrogen Nitrate Nitrogen
Receiving Waters – upstream and downstream WCU (Werris Creek) WCD (Werris Creek) QCU (Quipolly Creek) QCD (Quipolly Creek)	Quarterly & Within 12 hours after any overflow off-site from a sediment dam(s) on the premises occurring.	
Void Water Dams VWD1, VWD2, VWD3 & VWD4	Quarterly	
Clean and Water Dams SD4 &SD5 Offsite Stream BGD (Black Gully)	Quarterly	

3.2.2 Performance

Quarterly sampling of the water stored within the clean, dirty and void water dams (not including discharge water quality - **Figure 3.3**) and within Quipolly and Werris Creeks' (**Figure 3.4**) was undertaken by WCC. The detailed monitoring results are included in **Appendix 4(a)**. **Table 3.19** presents the annual average results recorded at each location.

Table 3.19 Quarterly Surface Water for Clean, Dirty & Void Water Dams and Offsite Creeks'

Dam/ Creek	Monitoring Site (EPA No)	Number of Samples	pH	Conductivity (µS/cm)	Suspended Solids (mg/L)	Grease & Oil (mg/L)
VWD1	16	2*	8.51	1040	22	<5
VWD2	27	4	8.24	983	12	<5
VWD3	-	4	8.41	1123	21	<5
VWD4	-	4	8.46	1040	16	<5
SB2	10	4	8.61	1256	27	<5
SB9	12	4	8.21	345	52	<5
SB10	14	2*	7.79	184	614	<5
SD4	-	4	8.42	285	90	<5
SD5	-	4	8.36	337	30	<5
QCU	25	4	7.71	477	60	<5
QCD	26	4	7.97	942	18	<5

Dam/ Creek	Monitoring Site (EPA No)	Number of Samples	pH	Conductivity (µS/cm)	Suspended Solids (mg/L)	Grease & Oil (mg/L)
WCU	23	1*	7.97	427	<5	<5
WCD	24	4	8.35	1340	18	<5
BGD	-	2*	8.01	479	91	<5

* SB10 and VWD1 were under construction during two quarterly sampling periods. BGD and WCU were dry during two and three quarterly sampling periods respectively.

During the period SB5 and SB6 were removed because of the western dump expansion. SB10 was reconstructed, SB11 and SB12 were constructed and SD dams were converted to SB as part of the MIA relocation.

The quarterly water quality was generally consistent with the previous reporting period, except for SB2 and SB10 which recorded elevated pH, EC and TSS levels due to the dry conditions concentrating through evaporation the remaining water into small pools. Missed quarterly water samples for the period were because SB10 and VWD1 were under construction, while the other dams and creeks were dry at the time of sampling.

Licensed discharge points SB2, SB9 and SB10 discharge water quality monitoring results and comparison with compliance criteria is discussed in **Section 2.8.1**. During the reporting period there were four offsite discharges in accordance with EPL12290 with the results of sampling in Quipolly Creek and Werris Creek presented in **Table 3.20.** The results of the monitoring following discharge events illustrate that dirty water from WCC does not have an adverse impact upon surface water quality within Quipolly Creek with no discharges occurring to Werris Creek during the period. The general trend of increasing electrical conductivity and pH from upstream to downstream is unrelated to WCC discharge events as the differences are often well over the water quality results sampled at the licenced discharge dams and reflect the natural conditions of the catchment and predominantly agricultural land use of the area. All dirty water discharged was from controlled discharges during the reporting period totalling 6.84ML compared to the estimated average Quipolly Creek flow rate of 46ML per day (RCA, 2010). Therefore WCC discharges are only a minor contribution to the Quipolly Creek stream flow. These 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 3.20 Quipolly and Werris Creeks' Discharge Receiving Water Quality

Creek	EPA ID	No. Samples		pH	Conductivity (µS/cm)	Suspended Solids (mg/L)	Grease & Oil (mg/L)
Quipolly Upstream	25	4	Minimum	7.65	454	5	<5
			Average	7.85	476	26	<5
			Maximum	8.08	499	58	<5
Quipolly Downstream	26	4	Minimum	7.92	827	8	<5
			Average	8.08	876	18	<5
			Maximum	8.32	942	25	<5
Werris Upstream	23	0	Minimum	-	-	-	-
			Average	-	-	-	-
			Maximum	-	-	-	-
Werris Downstream	24	0	Minimum	-	-	-	-
			Average	-	-	-	-
			Maximum	-	-	-	-

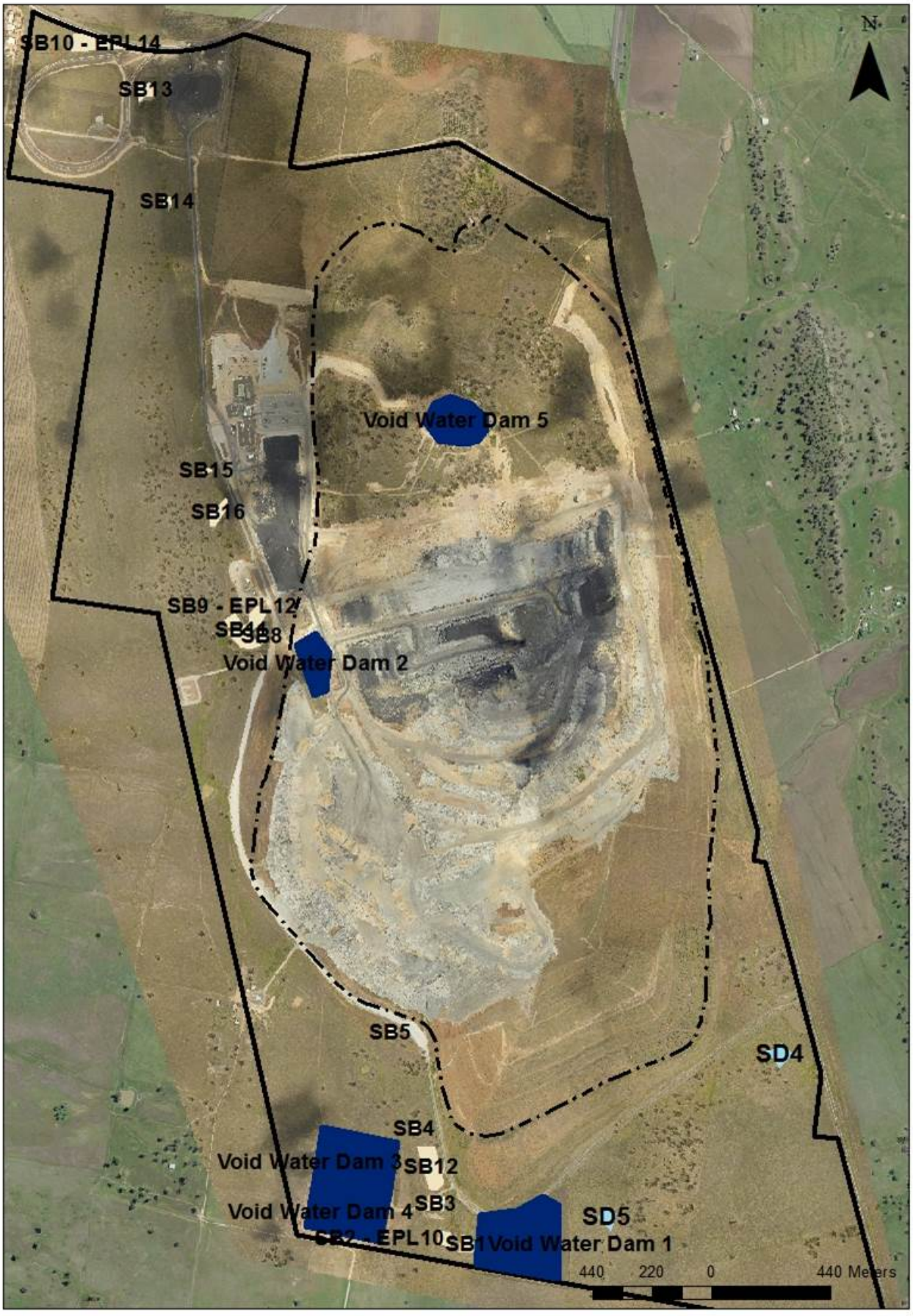


Figure 3.3 Clean, Dirty and Void Water Dams onsite at WCC

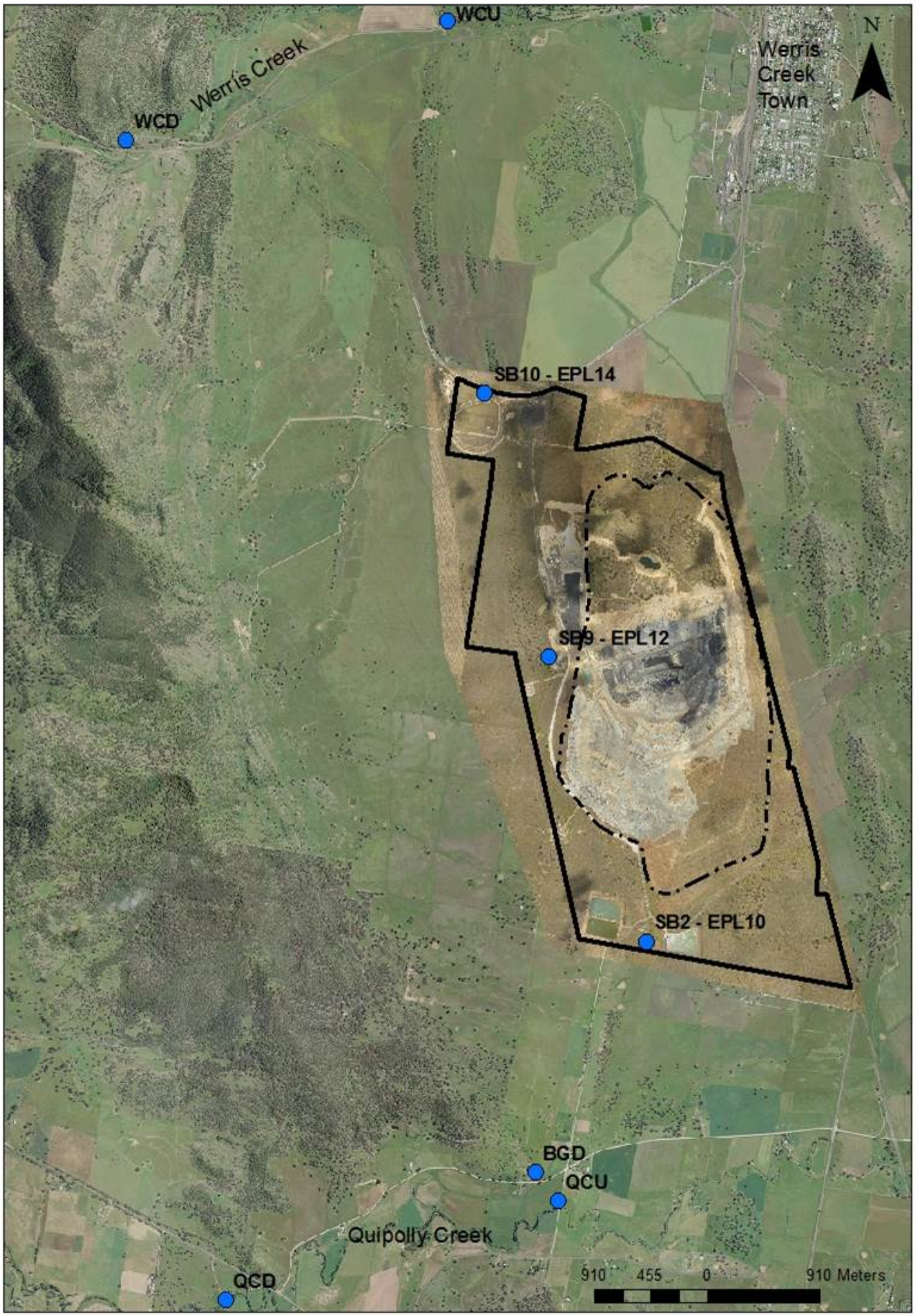


Figure 3.4 EPL12290 Licence Discharge Points and Offsite Creek Water Monitoring Locations

3.3 GROUNDWATER

3.3.1 Management

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

- monitoring and measuring potential impacts from mining operations on adjacent aquifers and privately owned bores: and
- dewatering groundwater that is intercepted by mining operations as part of the void water system.

WCC currently monitors groundwater in 41 bores and piezometers[1], on the mine site as well as on neighbouring properties, to measure potential impacts on aquifer groundwater quality and groundwater availability. Sources of potential contamination by mining operations to groundwater quality could include hydrocarbon spills and leaks, or changes to pH and EC due to acid rock drainage. **Figure 3.5** displays the conceptual groundwater system at WCC and the interaction between the four identified aquifers, i.e. the outlier of Greta Coal Measures, Werrie Basalt and Quipolly Creek Alluvium aquifers, and the underlying basement strata (Temi Formation).

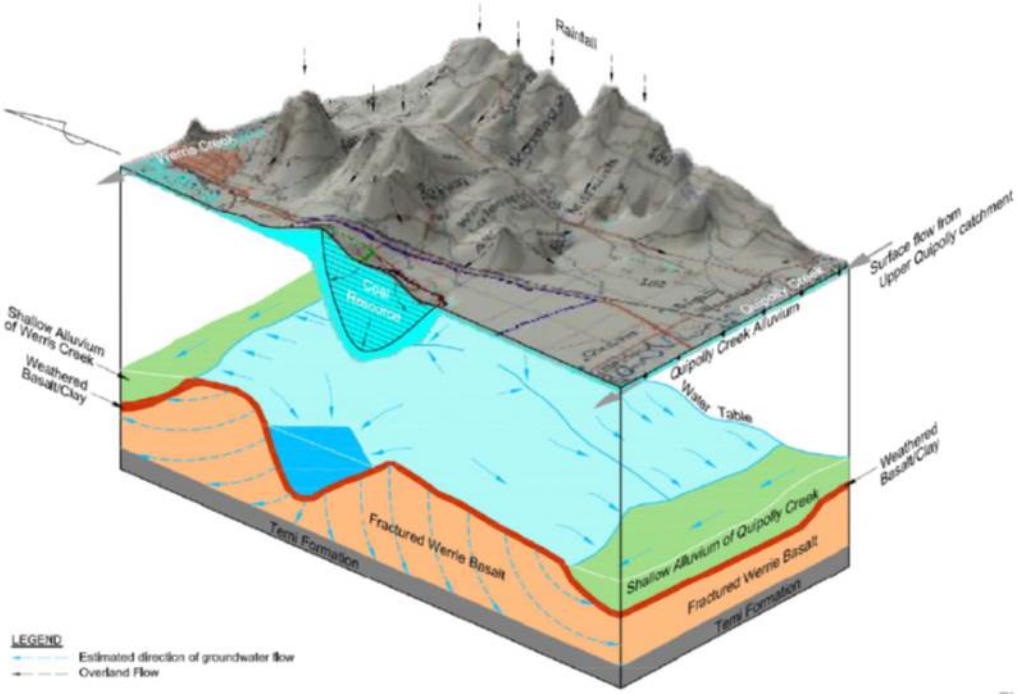


Figure 3.5 Conceptual Hydrogeological Model at WCC (taken from RCA, 2010)

Table 3.21 identifies these three aquifers along with the bores and piezometers monitored within each. The groundwater monitoring program currently implemented by WCC is summarised in **Table 3.22**. **Figure 3.6** illustrates the locations of the bores and piezometers that are monitored including the six piezometers licenced under EPL 12290 (MW1 to MW6 corresponding to EPL ID 17 to 22).

[1] A piezometer is a bore specifically designed to allow for water sampling and monitoring.

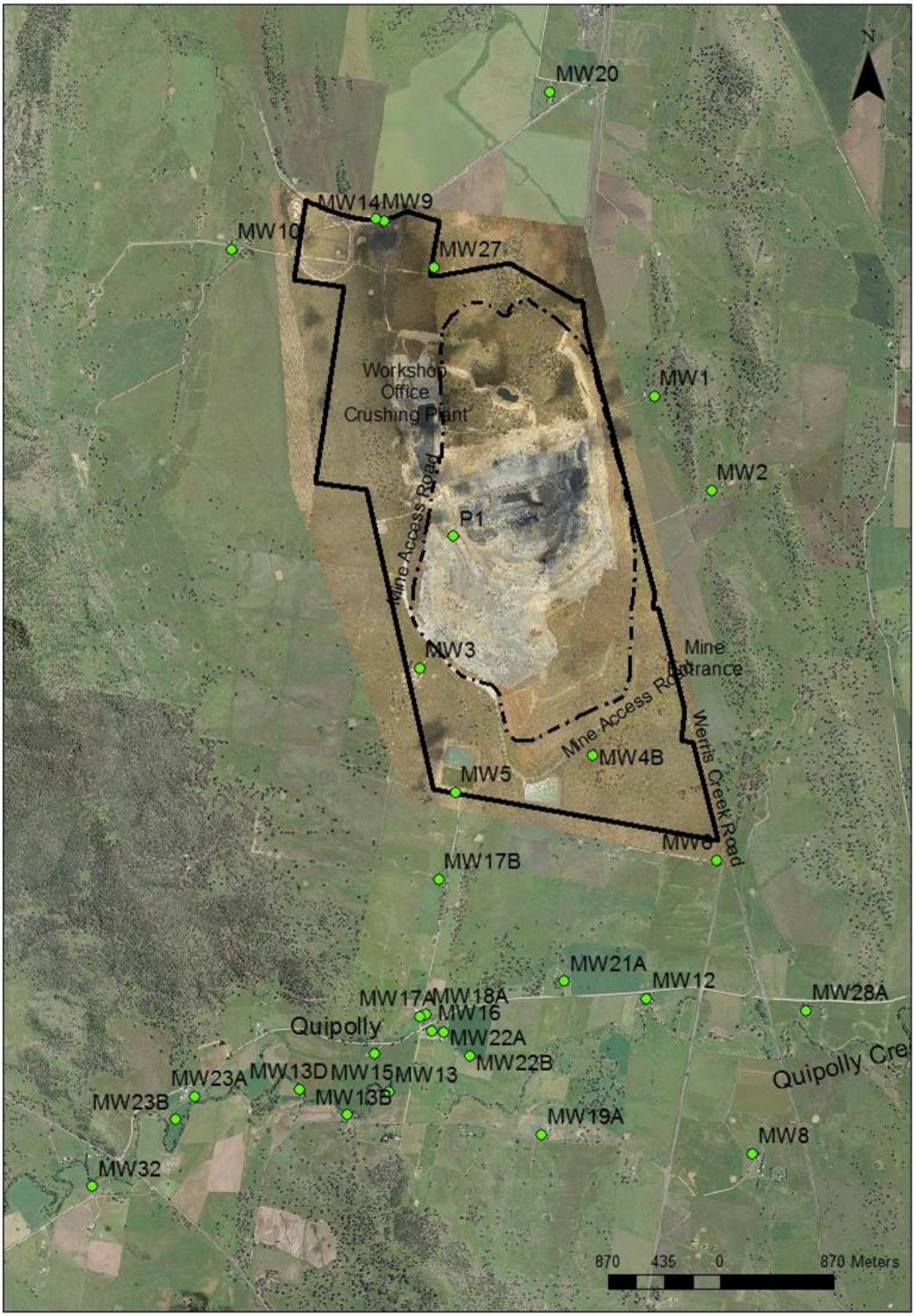


Figure 3.6 WCC Groundwater Monitoring Locations for 2013-2014

Table 3.21 Aquifer Monitoring Locations

Aquifer	Bore/Piezometer
Werrie Basalt	MW1, MW2, MW3, MW4B, MW5, MW5B, MW6, MW8, MW9, MW10, MW14, MW14B, MW17B, MW19A, MW20, MW24A, MW25A, MW25B, MW27,
Quipolly Creek Alluvium*	MW7, MW7B, MW12, MW13, MW13B, MW13D, MW15, MW16, MW17A, MW18A, MW18B, MW21A, MW21B, MW22A, MW22B, MW23A, MW23B, MW28A, MW32
Currabubula Formation**	MW11

* Includes bores and piezometers in Black Gully, tributary of Quipolly Creek; ** Apart of the Temi Formation

Table 3.22 Groundwater Monitoring Program

Parameters	Frequency	Bore/Piezometers
Standing Water Level	Bimonthly	MW1, MW 2, MW 3, MW4B, MW 5, MW6, MW7, MW7B, MW8, MW9, MW10, MW12, MW13, MW13B, MW13D, MW14, MW15, MW16, MW17A, P1, P2, UG Bore, MW18A, MW18B, MW19A, MW20, MW21A, MW21B, MW22A, MW22B, MW23A, MW23B, MW24A, MW25A, MW25B, MW27, MW28A, MW32, P1
Total Nitrogen Nitrate Nitrogen Total Phosphorus Reactive Phosphorus Electrical Conductivity pH	6 Monthly	MW1, MW2, MW3, MW4B, MW 5, MW6
Chloride, Sulfate, Hydroxide Alkalinity, Carbonate Alkalinity, Bicarbonate Alkalinity, Total 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	Annually	MW1, MW 2, MW 3, MW4B, MW 5, MW6, MW7, MW7B, MW8, MW9, MW10, MW12, MW13, MW13B, MW13D, MW14, MW15, MW16, MW17A, P1, P2, UG Bore, MW18A, MW18B, MW19A, MW20, MW21A, MW21B, MW22A, MW22B, MW23A, MW23B, MW24A, MW25A, MW25B, MW27, MW28A, MW32

WCC received approval from NOW and DP&I in 2005 for the Groundwater Contingency Plan which outlines the following trigger levels in **Table 3.23** which are regularly compared with actual monitoring results during the reporting period.

Table 3.23 Groundwater Trigger Levels

Parameter	Measure	Benchmark	Trigger Level
Standing Water Level	Saturated Thickness	Natural Conditions	15% Reduction
Chemistry	EC	Natural Conditions	15% Increase
	pH	Natural Conditions	15% Increase or Decrease

3.3.2 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

Creek Alluvium aquifers given that these two aquifers have the greatest potential for impact on the environment and neighbouring bore water users.

Table 3.24 presents the groundwater level monitoring data for the last 12 months in the Werrie Basalt and Quipolly Creek Alluvium aquifers. For Quipolly Creek Alluvium, MW12 and MW7 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 respectively. **Appendix 4(c)** presents detailed groundwater monitoring data since 2005 including the 2013-2014 period. All groundwater sampling and analyses were undertaken by a NATA accredited laboratory.

Table 3.24 Werrie Basalt and Quipolly Creek Alluvium Aquifer Groundwater Levels for 2013-2014

	Site	May 2013		July 2013		Sep 2013		Nov 2013		Jan 2014		Mar 2014		Annual Average	Longterm Average	Record Lowest
		mbgl	%	mbgl	%	mbgl	%	mbgl	%	mbgl	%	mbgl	%			
Werrie Basalt Near WCC	MW1	54.22	0%	54.06	0%	54.90	-2%	55.34	-1%	55.94	-1%	**56.42**	-1%	55.15	52.06	**56.42**
	MW2	25.42	0%	25.91	-2%	26.25	-1%	26.73	-2%	27.27	-2%	27.87	-2%	26.58	26.00	31.30
	MW3	15.01	1%	14.97	0%	15.30	-2%	15.61	-2%	16.01	-2%	16.45	-3%	15.05	15.39	16.95
	MW4B	9.95	4%	10.07	5%	10.66	-6%	11.10	-4%	11.62	-4%	**12.14**	-4%	11.03	10.01	**12.14**
	MW5	7.44	3%	7.91	-5%	8.53	-7%	8.93	-4%	9.40	-5%	**9.88**	-5%	8.70	8.37	**9.88**
	MW6	12.49	0%	7.48	-5%	12.45	0%	12.64	-2%	12.83	-1%	**13.10**	-2%	12.67	11.50	**13.10**
	P1	34.65	-8%	34.05	2%	35.40	-4%	36.07	-2%	36.37	-1%	**36.63**	-1%	35.53	28.09	**36.63**
	MW27	42.04	-3%	43.03	-2%	43.46	-1%	43.41	0%	**45.76**	-5%	45.68	0%	43.90	42.36	**45.76**
Werrie Basalt	MW8	14.42	-2%	15.28	-6%	15.86	-4%	16.31	-3%	16.8	-3%	17.22	-2%	15.98	14.97	18.71
	MW10	17.10	1%	17.01	1%	16.93	0%	16.92	0%	16.95	0%	16.99	0%	16.98	17.53	20.00
	MW14	16.96	-1%	17.39	-2%	17.55	-1%	17.74	-1%	17.78	0%	**18.12**	-2%	17.59	16.14	**18.12**
	MW17B	9.53	0%	9.63	-1%	9.94	-3%	10.26	-3%	10.74	-4%	11.07	-3%	10.20	9.84	11.89
	MW19A	6.03	14%	5.73	5%	5.82	-2%	5.93	-2%	6.04	-2%	e8.18	-	6.29	6.08	7.23
	MW20	19.46	0%	19.51	0%	19.71	-1%	19.83	-1%	19.99	-1%	**20.17**	-1%	19.78	19.14	**20.17**
Quipolly Alluvium	MW7	-	-	-	-	-	-	-	-	-	-	4.60	-9%	4.60	4.40	4.83
	MW12	8.10	-13%	-	-	8.91	-9%	e10.56	-	9.62	-7%	**10.01**	-4%	9.51	7.99	**10.01**
	MW13	4.52	-3%	4.6	-2%	4.63	-1%	e5.97	-	5.34	-13%	5.59	-4%	5.11	4.96	5.77
	MW13B	3.18	-2%	3.19	0%	3.26	-2%	3.35	-3%	3.85	-13%	**4.12**	-7%	3.49	3.37	**4.12**
	MW13D	4.58	-5%	4.61	-1%	4.69	-2%	4.82	-3%	5.00	-4%	4.76	5%	4.74	4.66	5.30
	MW15	4.10	-4%	4.13	-1%	4.39	-6%	4.64	-5%	4.82	-4%	5.10	-5%	4.53	4.54	5.19
	MW16	4.56	-4%	4.65	-2%	4.93	-6%	5.49	-10%	5.51	0%	5.97	-8%	5.19	4.76	6.10
	MW17A	3.64	-4%	3.79	-4%	4.04	-6%	4.29	-6%	4.72	-9%	5.07	-7%	4.26	3.84	5.18
	MW18A	3.45	-4%	3.57	-3%	3.85	-7%	4.16	-7%	4.54	-8%	4.86	-7%	4.07	3.63	4.99
	MW21A	6.34	0%	6.56	-3%	7.10	-5%	7.45	-5%	7.96	-6%	8.38	-5%	7.22	6.53	9.32
	MW22A	4.62	-3%	4.77	-3%	5.07	-6%	5.35	-5%	5.74	-7%	**6.09**	-6%	5.27	4.74	**6.09**
	MW22B	4.89	-5%	4.93	-1%	5.33	-8%	5.57	-4%	5.96	-7%	**6.32**	-6%	5.50	4.92	**6.32**
	MW23A	3.86	-10%	3.64	6%	3.95	-8%	3.93	1%	**3.96**	-1%	3.87	2%	3.87	3.75	**3.96**
	MW23B	4.10	-1%	4.23	-3%	4.70	-10%	4.18	12%	4.24	-1%	4.26	0%	4.29	4.23	4.75
	MW28A	9.97	-5%	10.91	-9%	11.75	-7%	12.22	-4%	12.62	-3%	**12.92**	-2%	11.73	10.85	**12.92**
	MW32	4.12	-11%	3.92	5%	4.02	-2%	4.13	-3%	4.14	0%	4.10	1%	4.16	4.07	4.62

mbgl – meters below ground level is the distance in meters from top of bore to groundwater surface; Red – Greater than 15% change/potential compliance issue; Orange – Change decrease; Green – change increase or no change; **Bold** – record lowest groundwater level measured during the reporting period; e – recording error, usually from pump running at the time of monitoring.

The bi-monthly groundwater level monitoring results have showed downward trend in groundwater for 2013-2014 as evidenced by the dominate orange colouring in **Table 3.24**; with six and eight locations at lowest recorded levels in the Quipolly Alluvium and Werris Basalt aquifers respectively.

In accordance the draft Site Water Management Plan, a cumulative sum (cusum) trend analysis was completed to evaluate the effects of seasonal variation on groundwater levels. This approach is used to determine if trends are apparent that are inconsistent with a background trend. The background trend is represented by a monitoring well that is considered to be at a sufficient distance from the Werris Creek Coal Mine to not be influenced by mining operations. Where variations that are inconsistent with background variation are occurring, an increasing trend that exceeds the red line trigger level occurs. The cusum analysis (Environ, 2014e) found was that only three locations within the Werrie Basalt aquifer had groundwater trends that were outside of the calculated statistical range for normal seasonal conditions. MW1, MW6 and P1 are three bores/piezometers that are on WCC owned that have shown downward trends outside of seasonal conditions believed to be due to mining depressurisation. As MW6 and P1 are within the mining lease, this is within the predicted impacts of the LOM Groundwater Impact Assessment and MW1 is just outside the mining lease but less than 500m from the mining area. No Quipolly Alluvium aquifer bores are being impacted by mining.

WCC engaged Environ to review the groundwater trend identified above in particular for MW12 (Environ, 2014b) and MW21a (Environ, 2014c) representative of the Quipolly Creek Alluvium aquifer as they landowners had contacted WCC with concerns regarding their groundwater supply. Both MW12 and MW21a have displayed groundwater level decline since the first measurements in 2005 and 2010 respectively. The current groundwater levels are similar to those measured in late 2010, following which the groundwater levels reached record high levels following heavy rain over the summer of 2010-2011.

This is indicates the variable nature of the Quipolly Creek Alluvium aquifer that the groundwater levels have varied over 4m for both locations in response to rainfall and dry conditions. Other groundwater monitoring locations within the Quipolly Creek Alluvium were reviewed including locations in the lower reaches of the Quipolly Creek that the base flow is from groundwater source contributions rather than MW12 and MW21a which are strongly influenced by the seasons and therefore MW7 and MW13 provide a clearer representation of as to whether there are any impacts from mining operations.

Impacts to the Quipolly Creek Alluvium aquifer from mining activities should be evident at MW7 and MW13 however the historical data does not show a decrease in groundwater levels and therefore it is considered that impacts from mining to the Quipolly Creek alluvium are not occurring; therefore the analysis focused on whether the groundwater level decline was in response to rainfall.

Figure 3.7 represents the monthly rainfall during the period in comparison to the groundwater level at MW12 with the decline in groundwater level apparent since March 2013 is consistent with a reduced rainfall over that period. Despite high rainfall events in November 2013 and March 2014, the cumulative rainfall for the 12 month period to April 2014 is below the same period for the previous four years indicating that there has been no rainfall recharging the Quipolly Alluvium aquifer (**Table 3.25**).

Table 3.25 also shows that low rainfall periods have been observed in 2006-2007, 2009-2010 and the current period. This is also evident in **Figure 3.7** showing similar decreased groundwater levels during these low rainfall periods. It is noted that the current period is showing the lowest groundwater level and this is to be expected based on the two consecutive low periods of rainfall occurring in 2012-2013 and 2013-2014.

The landowners of MW12 and MW21a have been notified that the current dry conditions are the cause of the decreasing groundwater levels and not as a result of mining operations and that WCC will not be taking any further action other than offering to install a data logger to increase the resolution of groundwater level variations particularly in response to rainfall.

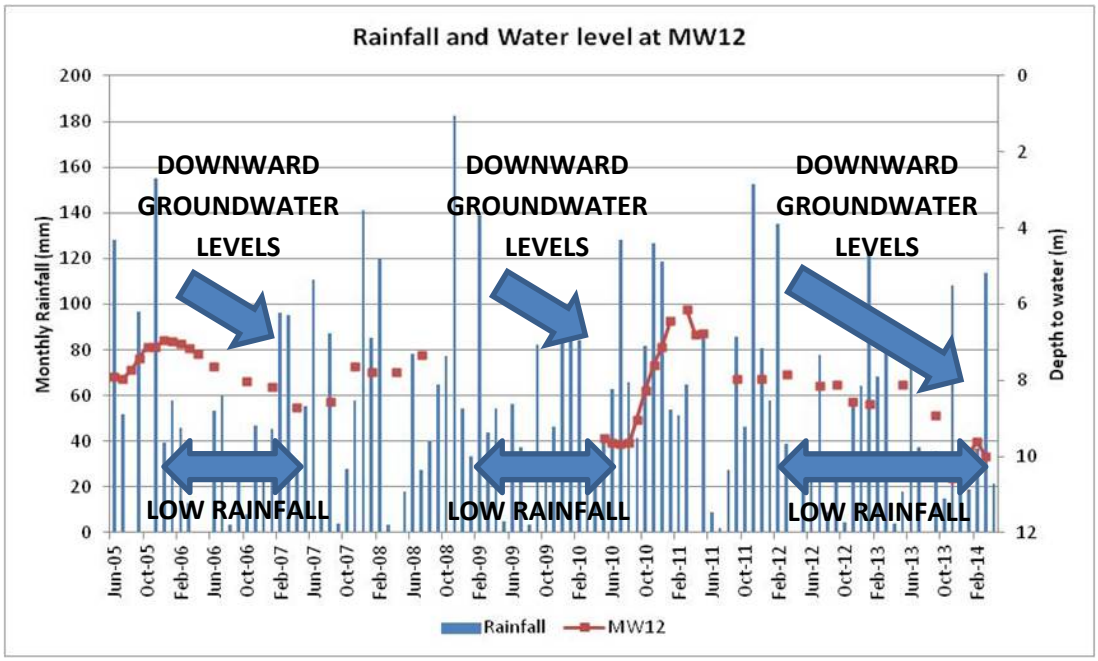


Figure 3.7 Historical Trend in Groundwater Levels and Rainfall at MW12

Table 3.25 Annual Rainfall from Werris Creek Post Office

12 Month Period	Total Rainfall (mm)
May 2005 - April 2006	595.9
May 2006 - April 2007	467.1
May 2007 - April 2008	700.0
May 2008 - April 2009	759.0
May 2009 - April 2010	562.3
May 2010 - April 2011	834.7
May 2011 - April 2012	723.6
May 2012 - April 2013	569.9
May 2013 - April 2014	503.3

Data source: BOM, Werris Creek Post Office, Station No. 55062

There were no sustained changes in pH or EC greater than 15% within the groundwater response trigger values. 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 more a reflection of the agricultural land use and fertiliser inputs than any impacts from mining operations.

As discussed above for MW1, MW6 and P1; no other bores are showing drawdown impacts outside of seasonal conditions as a result of WCC operations. This is consistent with the "*Werris Creek Coal Mine Life of Mine Project*" (R.W. Corkery and Co, 2010) which predicted negligible drawdown (<0.1m) in bores of the Werrie Basalt and Quipolly Alluvium aquifers off the mine site as a result of LOM Project. Also as predicted there have not been any impacts on groundwater quality to date and no

groundwater trigger levels were exceeded during the reporting period as per the Groundwater Contingency Plan.

As discussed in **Section 2.8**, Environ (2014a&e) have modelled both surface water and groundwater inputs into WCC mining pit finding that the groundwater intercepted is within the levels predicted in the LOM EA with the excess void water encountered as a result of high intensity rainfall events in 2012-2013 and the recycling of void water in pit during the current period to manage spon comb associated with the former underground mine.

3.3.3 Review of Water Complaints and Water Annual Review

A summary of surface and ground water complaints received by WCC since operations commenced in 2005 is presented in **Table 3.26**. During the period there were no community complaints for surface water impacts or groundwater level decline (MW21a landowner discussed above did register a groundwater level complaint but not until after the reporting period).

Table 3.26 Surface Water and Groundwater related Complaints since 2005

Complaint Issue	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Surface Water	1	0	2	0	0	0	0	1	0
Groundwater	1	0	0	0	0	3	0	1	0
All Complaints (inc Water)	**8**	**10**	**7**	**16**	**12**	**52**	**117**	**56**	**93**

WCC performance against the Environmental Management System water related objectives and targets developed from the draft Site Water Management Plan for the period 1st April 2013 to 31st March 2014 is outlined in **Table 3.27**. WCC achieved both targets set for water related objectives, however next year's targets may increase due to the predicted number of water related complaints expected given the long range forecast is for a return to El Nino (dry) conditions, which usually generate water related complaints.

Table 3.27 Water Objectives and Targets 2013-2014

Activity	Objective	Indicator	Actual 2013-2014	Target 2013-2014	Actual 2012-2013	Actual 2011-2012
Water	Discharge	# Exceedances	**0**	**0**	1	0
	Groundwater Level	# Complaints	**0**	**0**	1	0

Red – Exceeded Full Year Target

As required by PA 10_0059 Schedule 5 Condition 3, WCC as part of this Annual Environmental Management Report undertakes an annual review of its site water management for 2013-2014. **Table 3.28** summarises the site water management annual review from the discussion above.

Table 3.28 Site Water Management Annual Review 2013-2014

Annual Review	Discussion
Monitoring Results	• Criteria All controlled dirty water discharge results were within compliance. • Previous Year Water quality results are consistent with the results from the previous period. However groundwater levels have declined due to dry conditions. Analysis by hydro-geologist consultant confirms that the groundwater level decline is not as a result of mining operations.

Annual Review	Discussion
	• EA Predictions No surface water or groundwater impacts outside of those predicted in the Environmental Assessment.
Complaints	• This Year No water related complaints for the period. • Previous Year Two water related complaints were received in the previous period.
Compliance	• Criteria and other All water monitoring was in compliance. • Objectives & Targets WCC achieved both targets set for water related objectives.
Data Trends & Predicted Impacts	A review of groundwater intercepted in pit found that the excess void water managed by WCC was from high intensity rainfall events in 2012-2013 and use of the water curtain in 2013-2014. Groundwater levels declined across the period due to no rainfall recharge from the below average rainfall. No impacts have occurred to groundwater, due to mining, outside of those predicted in the EA.
Improvement Actions	There are three water management improvement actions planned for 2014-2015: • Construct a northern dirty water management infrastructure. • Construct a bund around water management infrastructure on VWD3/4. • Install real time high level and high high level alarm sensors in VWD1, VWD3/4 capable of sending SMSs when triggered.
Management Plan Review	Void water management system has been modified due to relocation of Mine Infrastructure Area and to manage excess in pit water. Dirty water management system modified due to expansion of western dump and construction of rail loop.
Management Plan Revision	Not required.

3.4 CONTAMINATED LAND

3.4.1 Management

WCC management practices for hydrocarbon management include:

- All bulk hydrocarbons (including fuel, oils, grease – new and waste) are retained at the mine contained within bunded areas (or self bunded tanks) within the contaminated water management system as described in **Section 2.8**;
- Hydrocarbon-contaminated materials as a consequence of any spillages will be disposed of appropriately;
- Minor spillages are cleaned up and the contaminated soil either bio-remediated on site or transferred off-site to an appropriately licensed waste disposal area;
- Liquid from the truck wash area is currently captured in a sump and passes through an oil/water separator device known as a ceptor;

- Residual solid materials in the sump of the wash bay is transported to the bioremediation area;
- A concrete apron installed in front of the diesel bowsers on site. This bunded area contains spills around the fill point draining back to the ceptor;
- The concrete bunded area for bulk oil storage containing any spills within the wash bay sump; and
- Workshop personnel regularly inspect hydrocarbon storage and bunded areas.

3.4.2 Performance

WCC engaged Mitchel Hanlon (2013a) contamination consultants to undertake a desktop review, field testing/sampling and clean-up verification of potentially contaminated land associated with the former workshop site. The original southern location of the MIA (office, workshop and crushing plant) was required to be relocated during the period to allow for the expansion of the western dump over the former MIA site when the facilities had been relocated to the new northern MIA.

The contamination investigation phase analysed over 30 soil samples across the former workshop, waste water remediation area and coal processing facility using a systematic/targeted soil sampling regime in accordance with the Sampling Design Guidelines (NSW EPA, 1995) to achieve a 95% probability of finding elevated analyte concentrations. **Figure 3.8** outlines the locations and concentrations of samples that triggered the thresholds outlined in National Environment Protection (Assessment of Site Contamination) Measure (National Environment Protection Council, 1999) for residential guideline levels to ensure that the site will not pose an unacceptable risk to health or the environment.

Based on the known site history, the potential contaminants of concern tested for included:

- Heavy Metals and other Metalloids;
- Total Petroleum Hydrocarbons (TPH);
- Benzene, Toluene, Ethyl benzene, Total Xylene's (BTEX);
- Polynuclear/cyclic Aromatic Hydrocarbons (PAHs); and
- Faecal coliforms and Escherichia coli.

The only contaminate triggering the residential guideline threshold was for TPH C10-C36 above 1,000mg/kg which was to be expected for sites that have used diesel. The number of soil samples above residential guideline level at the former workshop were four, former waste water utilisation area was two and one at the former coal processing area. The residential guideline standard threshold choosen is sufficiently low, ensuring that the final land use of woodland restoration (biodiversity) will not be affected.

The identified diesel contaminated soil was excavated and/or cut out using both an excavator and dozer (**Figure 3.9**) between 0.3m to 2m depth as required to remove any contaminated soil present. A total of 700m^3 of contaminated soil mostly from the vicinity of the former fuel farm bowser fill point and was transported to the onsite bioremediation area. Mitchel Hanlon (2013b) confirmed through validation soil testing that the contaminated soil was successfully removed and that the site was deemed to have been validated and is subsequently considered to be suitable for the proposed future land use. The Former Wastewater Area, Workshop Area and Crushing Plant Area are now

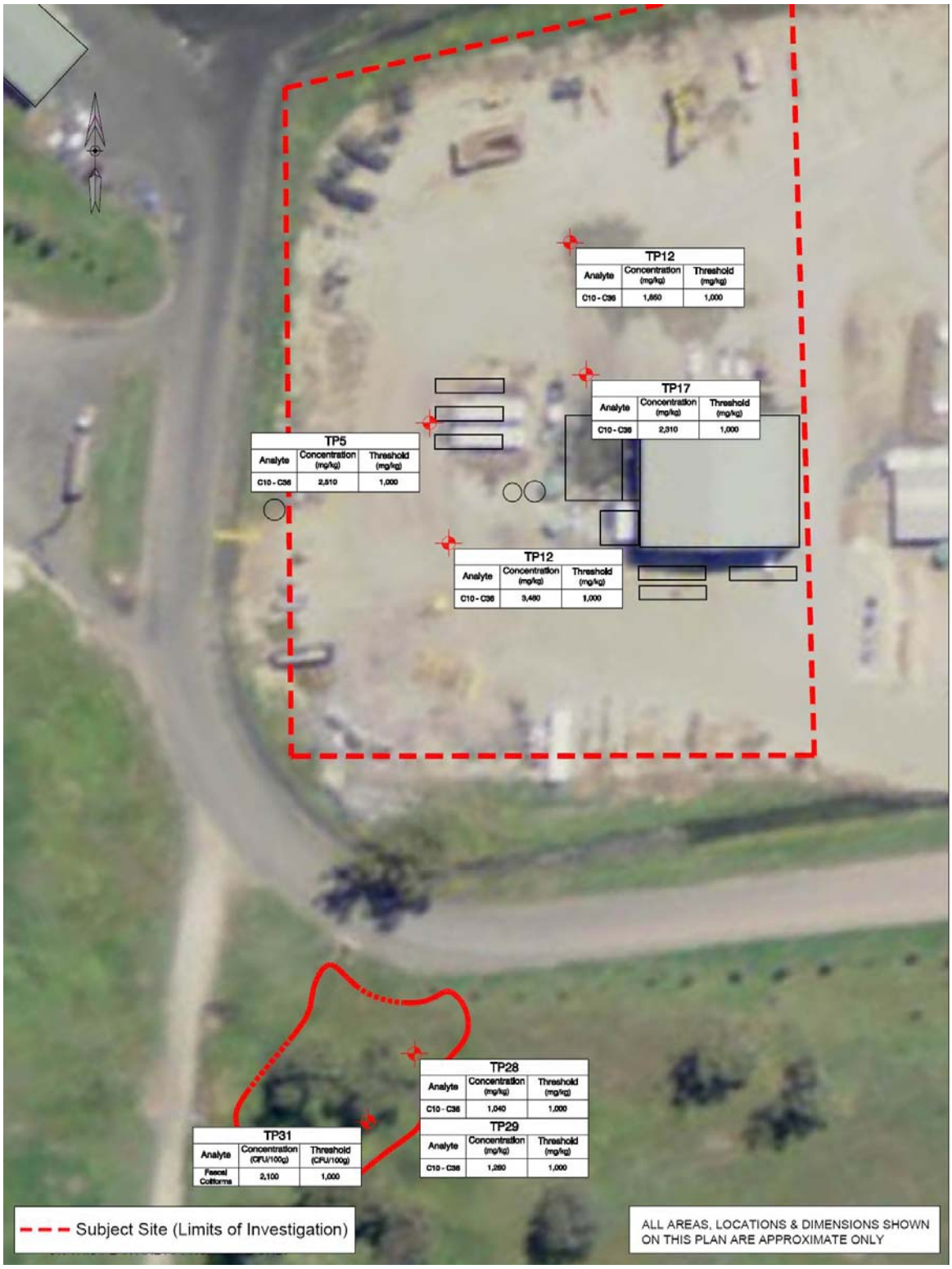


Figure 3.8 Former Workshop & Waste Water Area Soil Samples Locations above threshold

considered successfully remediated with the previously identified contaminated material removed to the bioremediation area.

WCC established a Bioremediation Area on the RL445 Dump to manage the contaminated soil from former MIA site. East West (2013) consultants and laboratory prepared a design specification for the Bioremediation Area outlined in the Environmental Guidelines: Solid Waste Landfills (EPA, 1996) and undertook the geotechnical testing confirming that the Bioremediation Area was constructed to that

Figure 3.9 Excavator removing hydrocarbon contamination from the Former Workshop site

specification. WCC will farm and periodically test the soil to confirm when it has been remediated (**Figure 3.10**). Given the relatively low levels of hydrocarbon contamination, WCC anticipates that by regularly exposing fresh soil to the atmosphere will aerate allowing the hydrocarbons present to volatize out over time reducing the contaminate levels back below the threshold.

Figure 3.10 Dozer aerating and turnover contaminated soil in the Bioremediation Area

3.5 BIODIVERSITY

3.5.1 Management

The Biodiversity and Offset Management Plan (BOMP) was approved by DP&I and DSEWPaC on the 30th August 2013 and 5th August 2013 respectively in accordance with PA10_0059 Schedule 3 Condition 28 and the EPBC Act Approval 2010/5571. **Figure 3.11** presents the LOM Biodiversity Offset Area (BOA) under PA10_0059 which covers an area of 1,319.49ha which is predominately Grassy White Box Woodland (a part of an Endangered Ecological Communities (EEC) White Box, Yellow Box and Blakely's Red Gum) in varying condition states.

The BOMP has been written to provide a management framework that will lead to an improvement in the condition of native vegetation through specific woodland restoration techniques. These actions will mitigate the impacts of key threatening processes for the vegetation communities being restored and the known or potential threatened species that inhabit the site. The management actions specified within the BOMP include:

- Vegetation Clearing;
- Establishing the Biodiversity Offset Strategy including providing long term security and conservation bond;
- Rehabilitation Area;
- Seed Collection and Propagation;
- Revegetation;
- Habitat Augmentation;
- Weed Management;
- Vertebrate Pest and Overabundant Native Herbivore Management;
- Fencing, Signage and Access Management;
- Narrawolga Axe Grinding Grooves and Aboriginal Heritage;
- Erosion and Sedimentation Management;
- Exclusion of Agriculture and Grazing;
- Fire Management;
- Salinity Management;
- Infrastructure Management and Rubbish Removal; and
- Management of Threatened Flora Species Digitaria Porrecta.

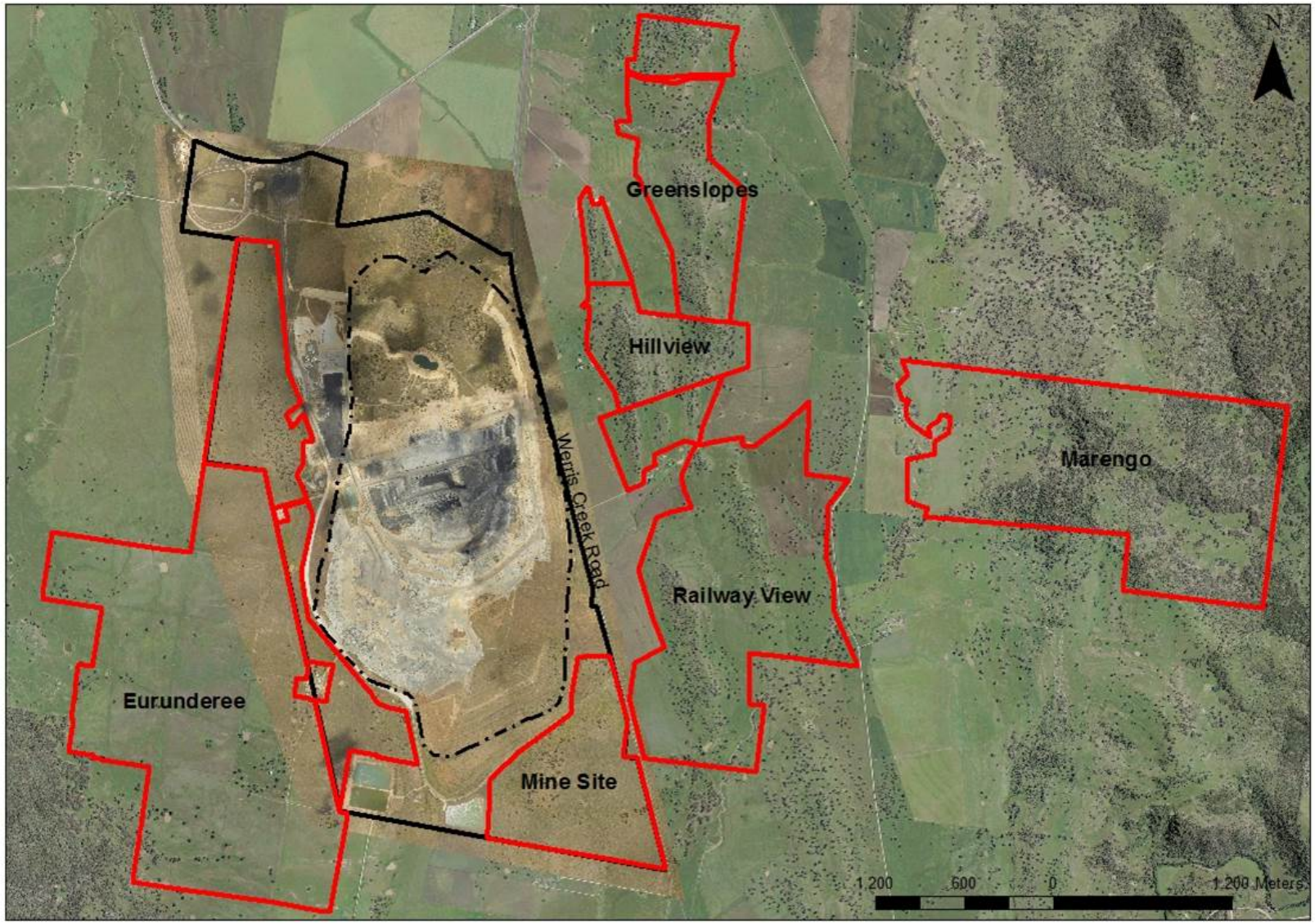


Figure 3.11 WCC Biodiversity Offset Area (shown in red boundary)

3.5.2 Implementation and Performance

The key management actions undertaken by WCC for the BOA over the reporting period have been:

- Weed Management: Predominately herbicide spraying treating environmental and noxious weeds over 1282 ha of the BOA and Rehabilitation areas;
- Fire Management: Controlled burns in August 2013 on 60ha of the Marengo BOA for both hazard reduction and ecological restoration purposes. Lightning strike on 20th January 2014 burnt 1ha on Railway View BOA. Maintenance of fire breaks across the BOA was undertaken during the year;
- Grazing Management: Continued to exclude grazing from the Mine Site and parts of Eurunderee and Railway View since 2010 and the remainder of the BOA since 2012;
- Revegetation: Replacement planting of 95 trees in Black Gully, North & Flat Paddock of Marengo BOA in March 2013;
- Habitat Augmentation: Placement of coarse woody debris in January 2014 and nest boxes on Rehabilitation and Eurunderee BOA in May 2014;
- BOA Security and Bond: Continued negotiation with DP&I regarding acceptance of Section 88E application of the Conveyancing Act 1919 to register covenants on each land title of the BOA. DP&I approved the Conservation Bond (in the form of a bank guarantee) in January 2014;
- Vegetation Clearing: Ecologists engaged to undertake inspections and monitoring of 31ha of vegetation cleared for mining in February 2014;
- Rehabilitation: Completed 7.80 ha of new rehabilitation on the post mining landform;
- Seed Collection: Collected 140kg of local providence native grass seed from the Eurunderee BOA and spread across 41ha of rehabilitation;
- Pest Management: Annual sand pad monitoring program identified Eastern Grey Kangaroos as high abundance; foxes as medium abundance (down from high the previous year) and rabbits, pig, hare and dogs as low or scarce. Using this information, two pest control programs across the entire BOA were implemented targeting foxes with a poisoned bait (1080) take rate of 24.1% in Winter 2013 and 29.8% in Autumn 2014 and two shoots culled a total of 99 Eastern Grey Kangaroos; and
- Signage: New BOA signs, Noxious Weed signs and Threatened Species signs were installed across the BOA.

3.5.3 Vegetation Monitoring

An independent ecological consultancy (Eco Logical Australia Pty Ltd) was engaged to undertake the BOA annual flora monitoring program from 11th November 2012 to 15th November 2013 in accordance with the flora and fauna monitoring program in the BOMP. Data was collected from a total of 24 sites (**Figure 3.12**); at analogue sites established in Condition Class 4 vegetation sites (3, 5, 10, 11, 13, 17, 18, 22 and 24), Condition Class 3 vegetation sites (1, 2, 8, 12, 19, 21, 23 and 25),

Condition Class 2 sites (7 and 16) and Condition Class 1 sites (6, 9, 14 and 15). Site 4 of Condition Class 3 was not monitored in 2013.

Vegetation monitoring methodology consisting of a nested 50m transect and a 50m x 20m plot established for the modified Biometric Assessment Methodology (modified BAM) at each monitoring site. Landscape Function Analysis (LFA) followed the Landscape Organisation and the Soil Surface Assessment (Tongway and Hindley, 2004) was only completed for the rehabilitation area sites of 6 and 14 and two analogue Condition Class 4 sites of 11 and 14. The monitoring in 2013 represents the second monitoring period for sites 13 to 24 established in 2012 and the fourth round monitoring for sites 1 to 12 (excluding Site 4) established in 2010.

The monitoring results of the modified BAM are presented in **Table 3.29** for the key completion criteria for woodland restoration of native species richness and native overstorey cover. Variable and below average rainfall for 2012-2013 and 2013-2014 has impacted the majority of monitoring sites. Given that the better and lower condition sites are both trending downwards does demonstrate that the prevailing dry conditions and not management actions are impacting the restoration of the vegetation communities.

The number of sites that met or partially meet both completion criteria since 2010 has remained consistent for 2013 as for 2012, with three achieving and seven partially achieving the required standard. Unfortunately with the climatic effects depressing restoration belies the fact that if an average rainfall season occurs that an extra nine sites should achieve one of the completion criteria and that six of the current partials should achieve both native species richness and overstorey cover completion criteria. The only site that was identified as requiring additional management intervention in addition to actions outlined in the BOMP was site 15 which is recommended to require overstorey tubestock planting to increase overstorey cover and outcompete weeds given the low resilience of the site.

LFA monitoring was completed at four sites, two rehabilitation sites and two analogue sites (representing good condition Grassy White Box Woodland within the BOA) for the purposes of monitoring soil surface condition on the rehabilitation area and comparing this to the good condition (Class 4) woodland sites. In interpreting the LFA results, the Landscape Organisation results are presented as an index, which essentially provides a proportion of the transect occupied by patches - patches being landscape elements that are relatively permanent and provide stable, resource accumulating structures, such as grassy tussocks, ground cover and logs. Therefore a higher Landscape Organisation index implies a more stable transect that is less prone to erosion. The Soil Surface Assessment results go one step further than this and provide an index on stability, infiltration and nutrient cycling for all patch and inter-patch types for the whole of landscape (transect).

As expected both the analogue sites LFA scores were better than the rehabilitation sites. Rehabilitation site 6 (planted in 2008) is remaining stable and is meeting the performance criteria for Landscape Organisation (**Table 3.30**). While the Soil Surface Assessment at site 6 is not yet meeting the target, the trend is showing recovery back towards 2010 (**Table 3.31**). Rehabilitation site 14 (planted in 2011) had scores below the performance criteria set for Landscape Organisation and Soil Surface assessment and this is expected for young rehabilitation (less than two years old at the time of monitoring) and is expected that these scores will increase in time similar to site 6. The last two years of variable and below average rainfall have impacted on the LFA scores at not just the rehabilitation sites but also the decrease in condition of the Class 4 woodland sites.

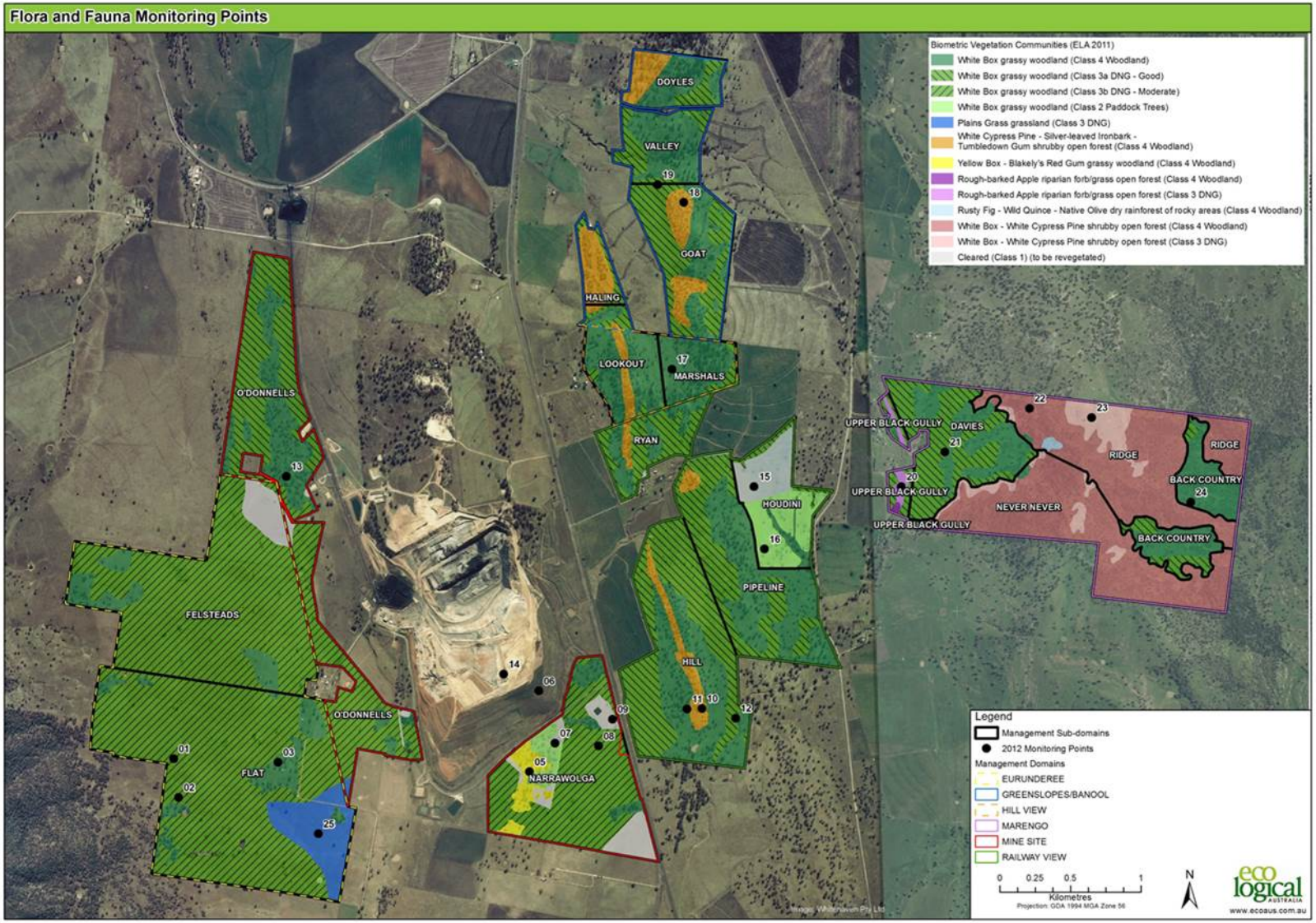


Figure 3.12 Biodiversity Offset Area Annual Monitoring Sites

Table 3.29 Vegetation Monitoring Results compared to Benchmark/Completion Criteria

Biometric Vegetation Type	Site No.	Condition Class	Number of Native Species				Completion Criteria	% Native Cover Overstorey				Completion Criteria	Completion Criteria met 2010 to 2013?
			2010	2011	2012	2013		2010	2011	2012	2013		
White Box grassy woodland	3	4	8	29	15	19	23	5	12.5	17.5	19.5	6-25	YES
	11	4	19	24	19	13	23	26	24.5	10	20	6-25	YES
	13	4	NM	NM	23	23	23	NM	NM	8.5	13	6-25	YES
	17	4	NM	NM	19	18	23	NM	NM	6	15	6-25	Partial
	24	4	NM	NM	19	20	23	NM	NM	19.5	14	6-25	Partial
	1	3	2	8	9	7	23	0	0	0	0	6-25	No
	2	3	10	12	9	13	23	0	0	0.5	0	6-25	No
	4	3	21	16	NM	NM	23	0	0	NM	NM	6-25	No
	8	3	2	14	9	6	23	0	0	0	0	6-25	No
	12	3	5	13	10	6	23	0	0	0	0	6-25	No
	19	3a	NM	NM	13	18	23	NM	NM	0	0	6-25	No
	21	3a	NM	NM	11	18	23	NM	NM	0	0	6-25	No
	7	2	10	10	14	9	23	0	0	1.7	0	6-25	No
	16	2	NM	NM	3	6	23	NM	NM	0	1.5	6-25	No
Plains Grass grassland on basaltic black earth soils	25	3	NM	NM	7	7	17	NM	NM	0	0	0	Partial
Rough-barked Apple riparian forb/grass open forest	20	3	NM	NM	6	12	25	NM	NM	0	0	6-25	No
Yellow Box – Blakely's Red Gum grassy woodland	5	4	9	18	17	14	23	5	12	15	4.5	6-25	Partial
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	10	4	7	12	14	15	30	0	0	0	1	6-40	No
	18	4	NM	NM	22	25	30	NM	NM	22	5.5	6-40	Partial
White Box-White Cypress Pine shrubby open forest	22	4	NM	NM	25	24	26	NM	NM	27.5	22.5	6-25	Partial
	23	3	NM	NM	13	14	26	NM	NM	8.5	0	6-25	Partial
Cleared land (Mine Rehab Site)	6	1	3	5	14	13	23	0	0	0	2.5	6-25	No
	14	1	NM	NM	6	5	23	NM	NM	0	0	6-25	No
Cleared land (formerly cultivated land)	9	1	5	5	5	4	23	0	0	0	0	6-25	No
	15	1	NM	NM	2	2	23	NM	NM	0	0	6-25	No

Red – Site underperforming against performance criteria and requiring targeted and prompt management; Orange – Site is performing poorly but is expected to reach completion criteria in time with continued management in accordance with the BOMP; Green – Site meeting or exceeding performance criteria and requires no additional or targeted management action; NM – Not monitored.

Table 3.30 Landscape Organisation for rehab sites 6 and 14 and analogue sites 11 and 17

Biometric vegetation type	Condition class (site no.)	Target	Landscape Organisation			
			2010	2011	2012	2013
White Box grassy woodland	4 (11)	0.86	1	0.96	0.47	1.0
	4 (17)		NM	NM	0.44	0.99
Mine Rehab	1 (6)	0.86	1	0.96	0.88	0.88
	1 (14)		NM	NM	0.8	0.52

Table 3.31 Soil Surface Assessment for rehab sites 6 and 14 and analogue sites 11 and 17

Biometric vegetation type	Condition class (site no.)	Target			2010			2011			2012			2013		
		S	I	N	S	I	N	S	I	N	S	I	N	S	I	N
White Box grassy woodland	4 (11)	63	34	30	69	39	36	59	35	30	64	33	26	59	28	27
	4 (17)				NM	NM	NM	NM	NM	NM	51	27	21	63	32	26
Cleared land(Mine Rehab Site)	1 (6)	63	34	30	66	45	36	61	40	27	43	27	17	59	34	25
	1 (14)				NM	NM	NM	NM	NM	NM	39	25	18	49	26	18

Red – Site underperforming against performance criteria and requiring targeted and prompt management; Orange – Site is performing poorly but is expected to reach completion criteria in time with continued management in accordance with the BOMP; Green – Site meeting or exceeding performance criteria and requires no additional or targeted management action; NM – Not monitored. Note: S = Stability; I = Infiltration; N = Nutrient cycling.

3.5.4 Fauna Monitoring

The fauna monitoring program for the first time included a Winter 2013 and a Spring 2013 survey between 18th to 28th November 2013 by Eco Logical Australia Pty Ltd. Twenty-four sites were monitored aligned with the same flora monitoring sites (**Figure 3.12**). The Winter monitoring focuses on birds in particular threatened Winter migratory birds such as the Regent Honeyeater and Swift Parrot while data collected during Spring monitoring included birds, herpetofauna (reptiles), microchiropteran bats and nocturnal fauna, though all opportunistic observations were also recorded, including threatened and introduced species. The fauna monitoring collected this year for the first time included species diversity and abundance; with the bird survey method also amended to expand to 100m transects. The objectives of the fauna monitoring methodology are to assess the reestablishment of fauna, particularly targeting the previously recorded threatened species onsite including woodland birds and microbats. These threatened species, as well as other mobile species such as reptiles provide more information on the progress of woodland restoration, particularly in the first 10 years of restoration activity. **Table 3.32** summaries the fauna monitoring methods with the details and results of the 2013 flora and fauna monitoring (ELA, 2014) provided in **Appendix 5**.

Table 3.32 WCC Fauna Monitoring Methodology

Method	Detail	Requirement per Site
Spotlighting	Pedestrian spotlight survey, 2 nights where appropriate habitat was identified at each site. Targeted nocturnal mammals, birds, reptiles and amphibians.	1 hr spotlighting transect covering 1km distance. Repeated over 2 nights

Method	Detail	Requirement per Site
Call playback	Nocturnal broadcasting of calls, two night at each site in conjunction with spotlighting. Targets nocturnal birds.	5 minutes of broadcasting plus 10 minutes listening.
Bat detection	Anabat recordings to identify microbat species occurring on site. 2 nights at each site	1 detector. for 2 nights set for a minimum of 4 hrs
Bird survey	Timed, fixed area surveys for diurnal birds, observing and listening.	20 minutes/transect count morning and dusk over 2 days for Winter and Spring
Herpetological searches	Timed, fixed area, direct searches for reptiles, scanning surfaces, rolling logs and rocks and raking leaf litter.	0.5 hrs/ha searching of microhabitat on 2 separate days.
Nest box searches	None installed	None installed
Dam Inspection – Amphibian	Dams and waterways will be inspected for frogs, once by day and once by night.	3 dams identified
Collection of scats	Collect scats and send to laboratory for analysis of predator and prey species.	Opportunistic.

Eleven fauna species listed under the *Threatened Species Conservation Act* 1995 (TSC Act) and/or the *Environmental Protection and Biodiversity Conservation Act* 1999 (EPBC Act) were recorded during the 2013 spring survey period. There were seven threatened bird species recorded, six of which were listed as vulnerable under the TSC Act and one as a migratory species *Merops ornatus (*Rainbow Bee-eater). The other four threatened species were bats, all listed as vulnerable under the TSC Act. *Chalinolobus dwyeri* (Large-eared Pied Bat) and *Nyctophilus corbenii* (Greater Long-eared Bat south-eastern form) are also listed as vulnerable under the EPBC Act.

Climacteris picumnus victoriae (Brown Treecreeper eastern subspecies) and *Pomatostomus temporalis temporalis* (Grey Crown Babbler) were both recorded by ELA for the first time during the first round of winter bird surveys in July 2013. *Chthonicola sagittata* (Speckled Warbler), *Circus assimilis* (Spotted Harrier) and the Grey Crown Babbler (prior to the winter bird surveys) have not been recorded previously on the WCC BOA. *Glossopsitta pusilla* (Little Lorikeet) and the Brown Treecreeper (prior to the winter bird surveys) have been recorded on the WCC BOA although had not been recorded by ELA during BOA monitoring.

A statistical analysis of bird populations across the BOA sites found that the main species to differentiate woodland (Class 4) from derived native grassland (Class 1-3) communities was *Manorina melanocephala* (Noisy Miner), which was more abundant in woodland habitat than derived native grassland. The Noisy Miner is an ecosystem engineer and is listed as a Key Threatening Process (KTP) under the NSW TSC Act. Other species that had higher densities at woodland sites were Pied Butcherbird, Australian King Parrot, and Apostle Bird. Rufous Songlark, Tree Martin, Australian Pipit, Magpie Lark and Black Shouldered Kite all occurred exclusively at the derived native grassland sites during these surveys.

Another statistical analysis was done to compare the bird communities in the two rehabilitated sites to that of the woodland sites. In the early stages of rehabilitation, the two bird communities are expected to differ, but the difference will become less as rehabilitation progresses. The results of this analysis indicate that the two bird communities do differ. Noisy Miners are the main species contributing to the difference between habitats, being present at all woodland sites and absent from the rehabilitation sites. Pied Butcherbird and Striated Pardalote were also absent from rehabilitated sites, though both occurred at six of the woodland sites.

Using the same statistical analysis this time for microbats found that there was no significant difference between woodland than derived native grassland habitats; however most species were recorded more frequently in the woodland habitat than derived native grassland. This was best demonstrated by the *Vespadelus vulturnus* (Little Forest Bat), *Chalinolobus gouldii* (Gould's Wattled Bat), and the *Tadarida australis* (White-striped Free-tail Bat). An exception was the *Chalinolobus morio* (Chocolate Wattled Bat), which had average abundances that were similar in derived native grassland habitats and woodland habitats.

The similarity between derived native grassland and woodland bat assemblages/activity could be due to a number of factors, including low call detection rates and likely overlap of species foraging paths between small patches of derived native grassland in close proximity to remnant vegetation. There was a significant difference in the bat communities at woodland and rehabilitated sites with the Little Forest Bat and Central-eastern Broad-nosed Bat were the only species present at woodland sites that were absent from rehabilitation sites. Gould's Wattled Bat, Southern Freetail Bat, Inland Freetail Bat, and Inland Broad-nosed Bat all occurred in both habitats, but were detected far more frequently at woodland sites than at rehabilitation sites. The only exception to this pattern was the White-striped Freetail Bat, which occurred at similar abundances in both habitats.

3.5.5 Biodiversity and Rehabilitation Management Annual Review

WCC performance against the Environmental Management System biodiversity and rehabilitation related objectives and targets from the Biodiversity and Offset Management Plan for the period 1st April 2013 to 31st March 2014 are outlined in **Table 3.33**. Unfortunately WCC just fell short of achieving both targets. As discussed above in **Section 3.5.3**, the biodiversity target of achieving four monitoring sites reaching the completion criteria for native species richness and native overstorey cover due to variable and below average rainfall impacting on the condition of both the good and poor woodland sites. WCC exceeded the rehabilitation target by 13.51ha in 2012-2013 by taking the opportunity to advance the eastern rehabilitation to improve visual amenity; however that meant that the area available for rehabilitation would be limited to only an extra 7.80ha on the visual amenity bund and RL445m dump; technically just falling short by 0.3ha but still in line with the annual rehabilitation target. Overall WCC is ahead of the MOP rehabilitation target. There were no biodiversity related complaints received during the reporting period.

Table 3.33 Biodiversity and Rehabilitation Objectives and Targets 2013-2014

Activity	Objective	Indicator	Actual 2013-2014	Target 2013-2014	Actual 2012-2013	Actual 2011-2012
Rehab & Biodiversity	Rehabilitation	Area (ha)	**21.31**	**21.6**	47.5	24.8
	Completion Criteria	# Monitoring Sites Meeting Criteria 2010 to 2014	**3**	**4**	3	2

Red – Exceeded Full Year Target

As required by PA 10_0059 Schedule 5 Condition 3, WCC as part of this Annual Environmental Management Report undertakes an annual review of its biodiversity management for 2013-2014. **Table 3.34** summarises the biodiversity and rehabilitation management annual review from the discussion above.

Table 3.34 Biodiversity Management Annual Review 2013-2014

Annual Review	Discussion
Monitoring Results	• Criteria Three out of 25 sites meet both native species richness completion criteria. Additional focus recommended for weed control and overstorey revegetation at monitoring site 15. • Previous Year The number of sites meeting completion criteria remained the same compared to 2012-2013 due to the variable and below average rainfall conditions. • EA Predictions The status of biodiversity restoration is within that predicted in the Environmental Assessment since woodland restoration commenced between 2-4 years ago.
Complaints	• This Year No biodiversity related complaints for the period. • Previous Year Biodiversity related complaints decreased from one complaint in the previous period.
Compliance	• Criteria and other Biodiversity and rehabilitation management was in compliance. • Objectives & Targets WCC did not achieve both targets set for biodiversity and rehabilitation related objectives due to dry conditions impacting woodland condition and extra rehabilitation areas were limited due to the additional rehabilitation completed in advance last period.
Data Trends & Predicted Impacts	While there was a trend of decreasing condition of woodland monitoring sites; this was due to two consecutive periods of variable and below average rainfall directly resulting no additional sites achieving the completion criteria against what was anticipated. The key management actions currently implemented by WCC do demonstrate overall improvement in restoration with the majority of sites exhibiting declines in exotic species due to active weed management (**Section 0**) and pest control programs are showing decrease in the fox population due to 1080 baiting (**Section 3.16)**.
Improvement Actions	For 2014-2015, WCC aims finalise the BOA security depending on DP&I approval.
Management Plan Review	Other than not finalising the long term security of the BOA during period; all other management actions were undertaken in line with BOMP.
Management Plan Revision	ELA (2014) Annual Biodiversity Monitoring Report recommends revising the Biodiversity Monitoring Program and Completion Criteria.

3.6 WEED MANAGEMENT

3.6.1 Management

WCC weed management strategy focuses control works/programs for noxious weeds as a priority and when resources/budget allows; the control of other environmental weeds present onsite will be undertaken. Periodically WCC will engage a consultant to map weeds across the BOA to monitor changes in infestations and abundance. The first/baseline weed survey was undertaken in March 2013 with the results presented in **Figure 3.13**. Surveillance of weed infestations is undertaken by informal (observation) and formal methods such as the quarterly inspections and weed surveys; with this information used for planning and to set priorities for weed management. WCC utilises only qualified weed control contractors that hold appropriate herbicide accreditation in accordance with the Pesticides Act 1999. In accordance with the legislation, WCC retains copies of the accreditation and daily records of weed control including the targeted weed, herbicide used, location and prevailing weather conditions. WCC also uses non-chemical weed control practices such as manual removal and slashing depending on the weed and season. Other methods such as low intensity ecological burns may be considered in time as part of a fire management program.

3.6.2 Performance

WCC implemented an extensive weed control program with over 1282ha of the BOA and Rehabilitations areas treated during the reporting period (**Figure 3.14**). The area identified as sprayed is high reflecting the area treated as mapped by the weed contractor but obviously over estimates the actual area of weed infestation (i.e. distance travelled to spray weeds as individuals or clumps is more than the actual ground covered by the weed plus repeated spraying of the same area across the year). WCC prioritised its weed control program by focusing on the noxious weeds within the Liverpool Plains Local Government Area such St John's Wort, Spiny Burr Grass, Johnson Grass and Scotch Thistle (plus other broadleaf weeds present). **Table 3.35** outlines the weeds targeted by WCC, including location and timing for 2013-2014 reporting period. The dry conditions during the period delayed the usual spraying time for the Spring and Summer growing weeds like St John's Wort and Spiny Burr Grass with areas requiring to be sprayed multiple times (early Spring and late Summer). Although the area treated St John's Wort and Spiny Burr Grass increased from that reported the previous period; the actual size of infestations had decreased either due to the poor year but hopefully also from targeted spraying programs that have been implemented since 2010.

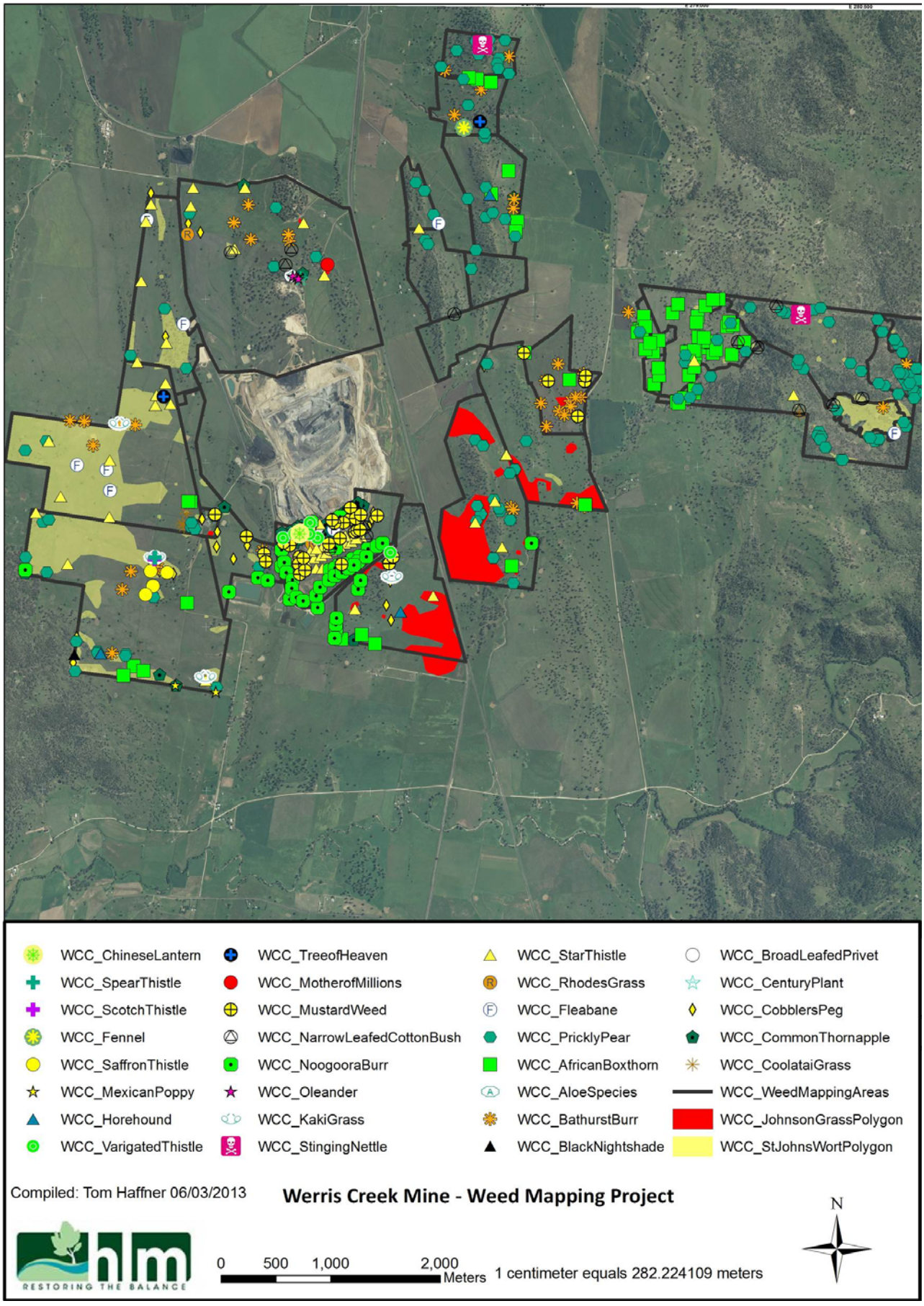


Figure 3.13 2013 Weed Survey showing the distribution of weeds across WCC

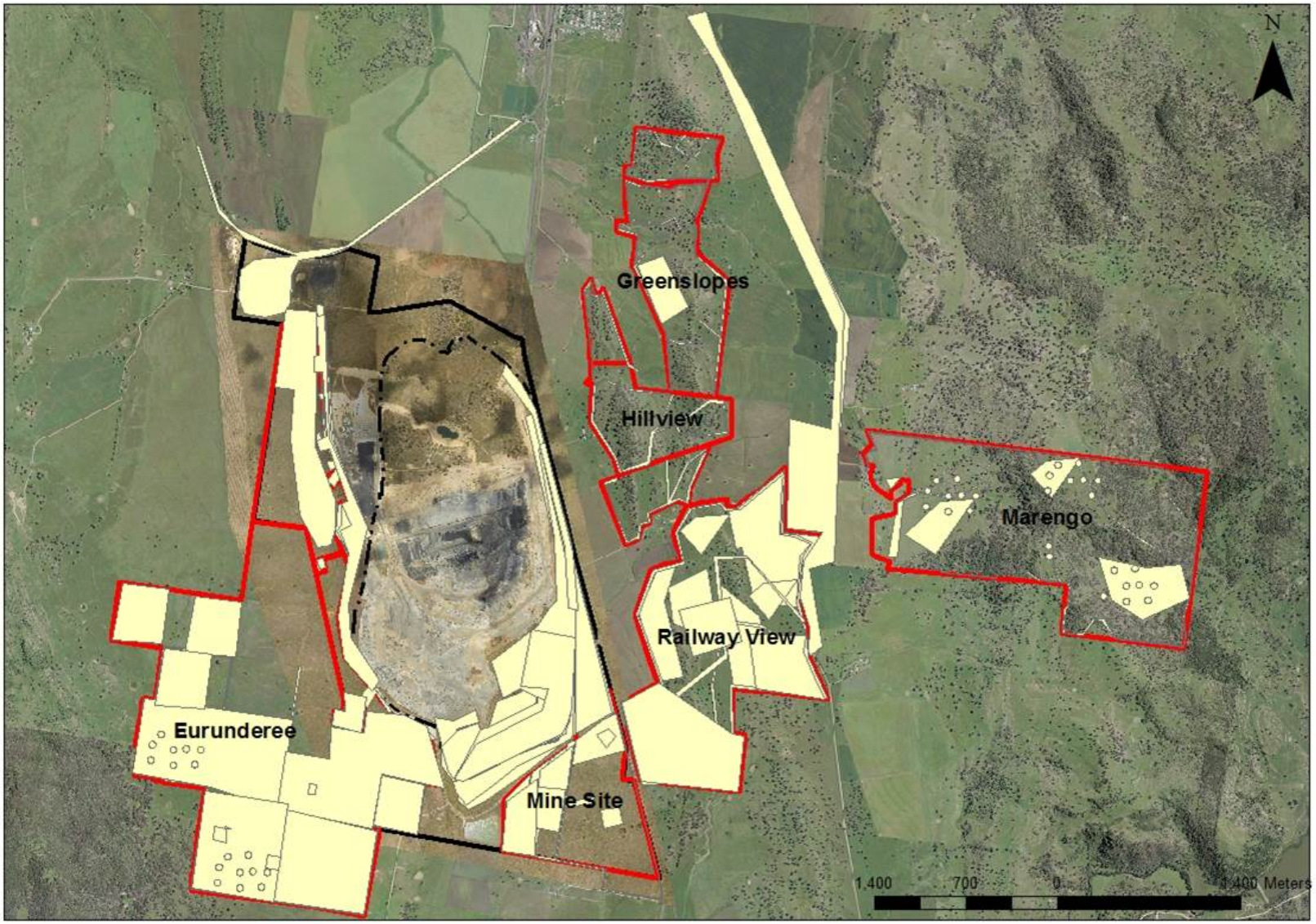


Figure 3.14 Weed Management Areas treated across the BOA and Rehabilitation 2013-2014

Table 3.35 WCC Weed Control Program by Location

Weed Name	Scientific Name	Noxious	Date	Location (ha)						
				Rehab	Mine Site	Hill view	Green slopes	Eurunderee	Railway View	Marengo
Spiny Burr Grass	*Cenchrus incertus*	W4	Dec 2013 to Feb 2014	2	47	-	-	-	-	-
St John's Wort	*Hypericum perforatum*	W4	October 2013	-	43	-	-	272	92	38
Prickly Pear	*Opuntia stricta*	W4	November 2013	-	-	-	-	17	-	26
Noogoora Burr	*Xanthium pungens*	W4	January 2014	-	-	-	-	-	-	-
Bathurst Burr	*Xanthium spinosum*	W4		-	26	-	-	-	-	-
Patersons Curse	*Echium plantagineum*	W4	-	-	-	-	-	-	-	-
African Box Thorn	*Lycium ferocissimum*	W4	October 2013	-	-	-	11	-	-	-
Johnson Grass	*Sorghum Halepense*	W4	Nov 2013 to Feb 2014	116	-	-	-	-	75	-
Scotch Thistle	*Onopordum acanthium*	W4	May 2013 to Feb 2014	158	120			7	46	3
Saffron Thistle	*Cathamus lanatus*	-								
St Barnabys Thistle	*Centaurea soltitialis*	-								
Turnip Weed	*Rapistrum rugosum*	-								

Infestations of Noogoora/Bathurst Burrs and Patterson's Curse decreased compared to the previous period due to active management and the poor season; however Johnson Grass infestations on the Rehabilitation and Railway View BOA increased from the previous year. Johnson Grass is being sourced from the adjacent road and railway corridors where WCC is now target spraying to reduce the edge effects and encroachment of this noxious weed into the BOA and Rehabilitation areas.

The annual biodiversity monitoring measures the presence of noxious weeds and exotic species cover for each monitoring site across the BOA and Rehabilitation. **Table 3.36** outlines the performance since 2010 of WCC in successfully reducing exotic species cover at the majority of monitoring sites reflecting the general reduction in the presence of weeds across the BOA. This level of improvement demonstrates the commitment of WCC to achieve the completion criteria target of noxious and environmental weeds are under control within rehabilitation or biodiversity offset areas. The lowest condition sites (9, 14, 15 and 16) do require additional focus on weed management of these areas because of their low resilience to buffer the impacts of below average rainfall.

Table 3.36 WCC Exotic Species Cover and Noxious Weeds Present in BOA

Biometric vegetation type	Condition class (site no.)	Performance criteria	Exotic species cover				Noxious species*			
			2010	2011	2012	2013	2010	2011	2012	2013
White Box grassy woodland	2 (7)	Noxious and environmental weeds are under control within rehabilitation or biodiversity offset areas	88	84	26	54	-	-	-	
	2 (16)		-	-	8	86	-	-	-	XO
	3 (1)		90	72	70	54	-	-	-	HP
	3 (2)		88	36	28	24	-	XO	-	HP
	3 (8)		94	50	46	20	-	-	-	
	3 (12)		76	67	82	34	-	-	-	
	3a (19)		-	-	8	16	-	-	-	
	3a (21)		-	-	20	6	-	-	-	
	4 (3)		70	22	4	4	EP, HP	-	-	HP
	4 (11)		80	40	6	12	EP	-	XS	HP
	4 (13)		NM	NM	8	6	-	-	-	HP
	4 (17)		NM	NM	2	2	-	-	-	
	4 (24)		NM	NM	0		-	-	-	
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)		78	32	30	30	-	-	-	
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)		88	70	30	20	EP	EP	-	HP
	4 (18)		NM	NM	0	0	-	-	XS	
White Box-White Cypress Pine shrubby open forest	4 (22)		NM	NM	0	0	-	-	-	
	3 (23)		NM	NM	6	14	-	-	-	HP
Plains Grass grassland on basaltic black earth soils	3 (25)		NM	NM	72	20	-	-	-	HP, EP
Rough-barked Apple riparian forb/grass open forest	3 (20)		NM	NM	70	52	-	-	OS	
Mine Rehab	1 (6)		50	94	18	26	-	-	-	
	1 (14)		NM	NM	24	40	-	-	HP	
Cleared land (formerly cultivated land)	1 (9)		94	40	64	70	-	-	HP	
	1 (15)		NM	NM	12	96	-	-	-	

Red – Site underperforming against performance criteria and requiring targeted and prompt management; Orange – Site is performing poorly but is expected to reach completion criteria in time with continued management in accordance with the BOMP; Green – Site meeting or exceeding performance criteria and requires no additional or targeted management action; NM – Not monitored; EP = *Echium plantagineum* (Patterson's Curse), HP = *Hypericum perforatum* (St Johns Wort), XO = *Xanthium occidentale* (Noogoora Burr).

3.7 BLASTING

3.7.1 Blast Criteria and Control Procedures

The blast criteria for WCC outlined in **Table 3.37** was established in accordance with PA10_0059 (Schedule 3 Conditions 6 to 13) and EPL 12290 (Conditions L5 and M7) and specify the following:

Table 3.37 WCC Blast Criteria

Location	Airblast Overpressure (dB(Lin Peak))	Ground Vibration (ppv(mm/s))	Allowable Exceedance
Any residence on privately-owned land	115	5	5% of the total number of blasts over a period of 12 months
	120	10	0%
All public infrastructure	-	50	0%

In addition to the above blasting criteria, there are other administrative compliance criteria that WCC must adhere to:

- Blasts can only be fired between 9am to 5pm Monday to Saturday*;
- No blasting on Sundays or Public Holidays*;
- Limited to one blast per day*; and
- Limited to 15 blasts per month*.

* Both PA 10_0059 and EPL 12290 contain exemptions which are discussed in the Blast Management Plan.

The Blast Management Plan was approved by DP&I on the 14th January 2014 which outlines the blast management controls implemented by WCC which are summarised in **Table 3.38** in order to mitigate the risks associated with blasting. The location of blast monitoring sites was determined in accordance with the Blast Monitoring Program as outlined in **Table 3.39** and locations identified in **Figure 3.15**.

Table 3.38 Blast Management Strategies and Controls

Measure	Timing
Property Acquisition and Private Agreement	As required
Pre-Blast Design assessment identify specific blast hazards requiring further controls	Prior to Design
Blast Design to minimise overpressure, vibration and fume impacts	Prior to Drilling
Predictive Vibration Site Law to target design vibration levels in Werris Creek below 1mm/s avoiding complaints	Prior to Loading
Burden Profiling to prevent face bursts and overpressure and fume impacts	Prior to Loading
Prior to drilling, good drill pad preparation prevents dust generation. During drilling the drillers log subsurface information such as coal seam, broken ground and underground locations to prevent overpressure or fume impacts	Prior to and During Drilling
Shotfirer Inspections includes surface and subsurface checks such as dipping hole depth, temperature, gamma and video camera logging of holes	Prior to Loading
Loading Explosives and Detonators to ensure that the right depth/quantity of explosives are used. The blast design should have selected the correct explosives product to make ground	Prior to Loading

Measure	Timing
conditions such as wet/water, broken and or soft ground and length of time the product will be in the ground.	
Stemming Height and Quality ensure that the right depth/quantity of stemming is used to contain the energy of the explosives and the stemming quality ensures that the material locks together to contain the energy in the ground.	Prior to Loading
Initiation Sequence is designed to prevent overpressure and vibration re-enforcement impacts by modifying the time that each individual blast hole is detonated in milliseconds.	Prior to Firing
Sleeping Shots are left in the ground for the minimum time practicable and no longer than the maximum time individual explosive products deteriorate.	Prior to Firing
Blast Times and Frequency in accordance with the conditions of EPL 12290 and PA 10_0059.	At Firing
Blast Notification included on Whitehaven Coal website providing up to date information of the next scheduled blast.	Post Firing
Road and Rail Closure process to notify Council, ARTC, emergency services to protect infrastructure and public safety.	Prior to Firing
Pre-Blast Weather Check to mitigate overpressure, dust and fume events from impacting on Werris Creek community.	Prior to Firing
Pre-Blast Planning at 9am meetings discussing how the forecasted weather conditions could impact on the blast.	Day of Firing
Structural Inspections of private property following claims of damage.	After Complaint

Table 3.39 WCC Blast Monitoring Program

Monitor Type	Purpose	Property/Location Description	Frequency	Direction from WCC	Distance (km)
Permanent	Community	R11 "Glenara"	Every Blast	South	3.2
Permanent	Community	R98 "Kyooma"	Every Blast	East	2.9
Permanent	Community	R62 Werris Creek South	Every Blast	North East	3.7
Permanent	Community	R92 Werris Creek Middle	Every Blast	North East	4.4
Portable	Infrastructure	Railway Culvert #406-099	Every Blast with 500m of Rail Line	East	0.3

Note: Grey shading indicates blast monitoring will be undertaken infrequently

3.7.2 Blast Monitoring Results

During the reporting period, a total of 90 blasts were fired by WCC. As from the 1st January 2014, Whitehaven Coal modified the contractual arrangements regarding blasting from the previous contractor (providing engineering design, shotfiring and explosives) to an in house WCC Drill and Blast Engineer and a crew of Shotfirers with a new contractor supplying explosives only. Whitehaven Coal made the change to improve control over blasting management and performance. The number of blasts has reduced from the previous reporting period as WCC is firing larger shots to improve production efficiency for the larger mining fleet (Hitachi EX5600 replacing Komatsu PC4000 excavator and ten CAT 793XQ replacing eleven CAT 785 trucks) requiring more blasted inventory due to faster dig rates and reducing lost time from stopping operations for blasting. Detailed blast monitoring results are included in **Appendix 6**. There were no blasting exceedances (>120dBL or >10mm/s) at privately owned properties or non-compliances associated with blasting for the reporting period 2013-2014. There were four instances of elevated blast results greater than the blasting targets of 115dB(L) and 1mm/s (for Werris Creek only) during the period (**Table 3.40**) as outlined below:

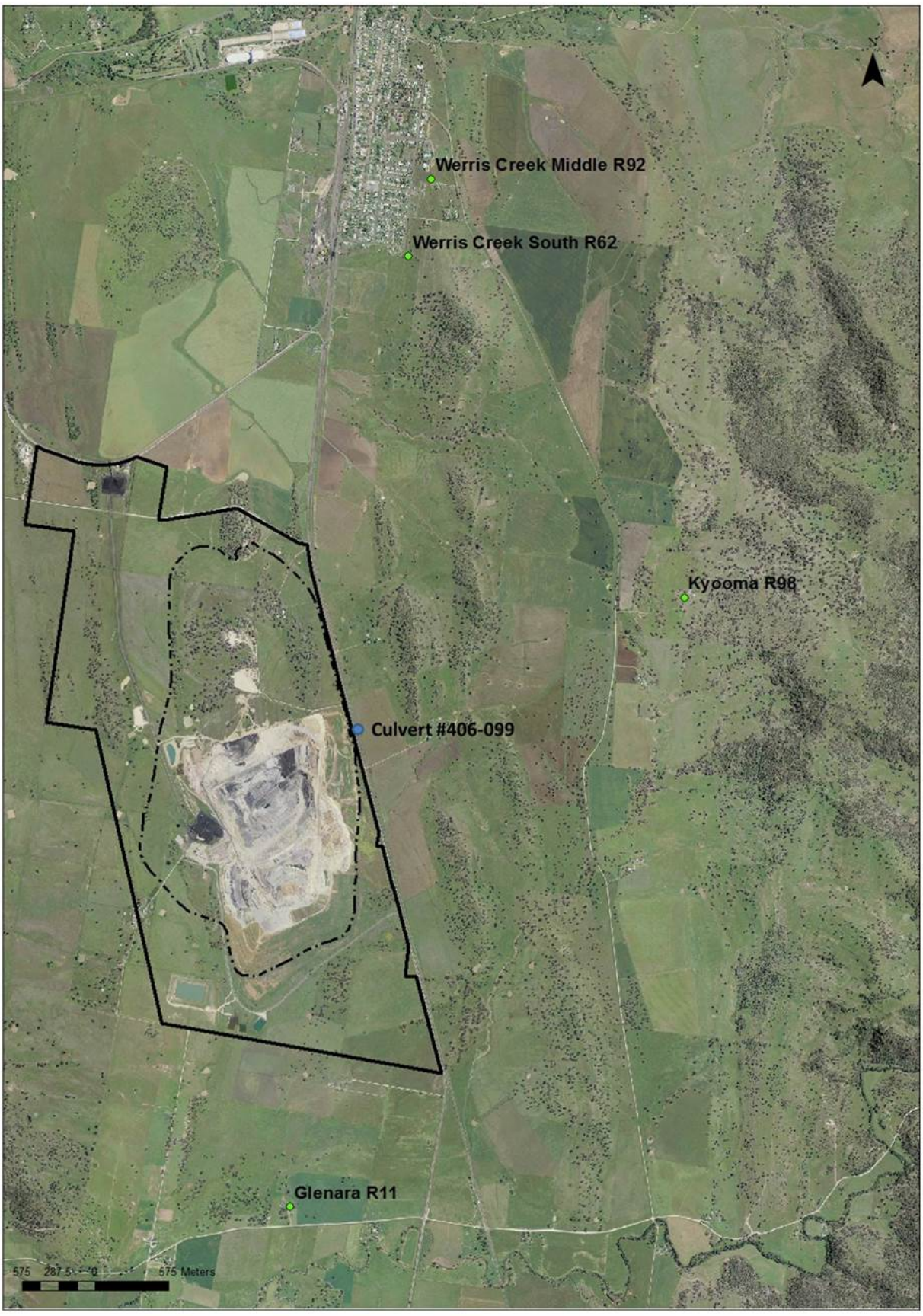


Figure 3.15 WCC Blast Monitoring Program

- An elevated vibration event on the 8th April 2013 recorded 1.19mm/s at the Werris Creek South monitor above the predicted blast design target for Werris Creek South of 1mm/s resulting in two complaints. The blast was in the G Coal Interburden with previous blasts in this strata also resulting in community complaints. The preventative action taken was for the Blasting Contractor to undertake signature wave blasting trial to improve the resolution of blast and ground parameters required to improve the prediction of blasts within this strata;
- An elevated overpressure event from the blast on the 1st May 2013 recorded 115.8dB(L) at "Talavera" above the target of 115dBL with no complaints reported. The preventative action taken will be to not fire a pre-split together with the production blast because the pre-split created the broken ground for the release of energy from the production blast into the atmosphere;
- An elevated overpressure event from the blast on 8th July 2013 recording 121.0dB(L) at "Tonsley Park" (owned by Whitehaven Coal and therefore maximum blast criteria of 120dB(L) is not applicable) and 119.0dB(L) at Werris Creek South due to ejection of stemming from an old underground bore and general rifling in the weathered material at natural surface. The blast caused 11 community complaints with the preventative action implemented for developing blast protocols for the blasting contractor to design to;
- An elevated vibration event on the 19th December 2013 recorded 1.05mm/s at the Werris Creek South monitor above the predicted blast design target for Werris Creek South of 1mm/s resulting in six community complaints. The action taken was change the structure of the blast contract with a new blast engineer, shotfiring team and explosive supplier in place from 1st January 2014.

Table 3.40 WCC 2013-2014 Blast Monitoring Results Summary

Month	Blasts		Glenara R11		Tonsley Park R20		Werris Creek South R62		Talavera R96	
			mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)
April 2013	8	Ave	0.26	102.4	0.89	102.6	0.66	103.9	<0.25	<109.8
		Max	0.38	109.7	1.45	108.9	1.19	108.3	<0.25	<109.8
May 2013	9	Ave	0.27	98.7	0.66	100.8	0.27	102.6	0.13	102.1
		Max	0.38	106.7	1.12	110.1	0.49	111.3	0.18	115.8
June 2013	6	Ave	0.23	100.4	0.89	102.0	0.32	101.8	0.23	107.6
		Max	0.24	102.1	1.75	108.0	0.47	106.1	0.24	109.1
July 2013	4	Ave	0.53	88.8	0.96	103.1	0.57	101.7	0.07	111.6
		Max	0.53	88.8	1.38	121.0	0.65	119.0	0.07	111.6
August 2013	7	Ave	<0.25	<109.8	0.87	101.5	0.51	99.7	0.26	105.9
		Max	<0.25	<109.8	1.23	111.2	0.60	102.5	0.45	110.6
September 2013	10	Ave	<0.25	<109.8	0.55	99.1	0.29	99.3	0.28	93.3
		Max	<0.25	<109.8	0.77	103.4	0.29	102.0	0.28	93.3
October 2013	7	Ave	<0.25	<109.8	0.86	101.6	0.48	96.7	0.41	104.1
		Max	<0.25	<109.8	1.54	108.4	0.66	109.5	0.50	107.1
November 2013	9	Ave	0.20	102.0	1.18	104.7	0.40	101.8	0.21	103.0
		Max	0.20	102.0	1.71	107.0	0.58	105.0	0.27	107.0
December 2013	6	Ave	0.20	102.2	1.69	103.8	0.59	100.6	0.40	106.4
		Max	0.26	107.0	3.39	108.0	1.05	104.0	0.53	112.0
Annual					**0.95**	**102.1**			**0.25**	**104.2**
					3.39	**121.0**			**0.53**	**115.8**

Month	Blasts		Glenara R11		Kyooma R98		Werris Creek South R62		Werris Creek Mid R92	
			mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)
January 2014	4	Ave	0.14	99.8	1.01	97.5	0.34	98.2	0.23	99.3
		Max	0.26	109.4	2.42	106.9	0.63	104.8	0.45	103.7
February 2014	8	Ave	0.12	97.2	0.64	100.1	0.26	97.8	0.16	99.7
		Max	0.23	107.8	1.07	108.8	0.54	104.1	0.26	104.2
March 2014	6	Ave	0.08	99.0	0.46	99.0	0.24	98.6	0.17	98.8
		Max	0.19	104.6	0.98	107.3	0.51	108.9	0.38	107.8
Annual	**90**	**Ave**	**0.22**	**98.9**	**0.70**	**98.9**	**0.41**	**100.2**	**0.18**	**99.3**
		Max	**0.53**	**109.7**	**2.42**	**108.8**	**1.19**	**119.0**	**0.45**	**107.8**

Yellow – Blast result above WCC Objective and Target level of 115dBL or 1mm/s (Werris Creek only).

All average blast vibration results at privately owned properties were consistently below the levels predicted in the LOM Environmental Assessment (R.W. Corkery and Co Pty Limited, 2010). The three instances of elevated overpressure greater than 115dB(L) were in fact higher than the Environmental Assessment predicted levels of 115dB(L) for "Tonsley Park", 110dB(L) for Werris Creek South (Kurrara Street) and 111dB(L) for "Talavera" (**Table 3.41**). Given the one off nature of these overpressure events due to the blast not performing as expected, this is not technically outside of the LOM Environmental Assessment prediction because the blasting predictions were made using a formula based on average blast results (blasts that performed as expected) and not worst case.

A comparison of blast results since blast monitoring commenced in Werris Creek in 2010 is presented in **Table 3.41**. The results for Werris Creek South monitoring site demonstrate that the average and maximum vibration levels have decreased over time despite the mining operations advancing 430m closer to town and reflects the effort and focus made by WCC to mitigate blasting impacts on the community of Werris Creek and minimise community complaints.

Table 3.41 WCC Blast Results from 2010 to 2014

Month	Results	2010-2011		2011-2012		2012-2013		2013-2014		LOM EA	
		mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)
Glenara R11	Ave	0.10	114.7	<0.37	<109.9	0.21	104.5	0.22	98.9	-	-
	Max	0.10	114.7	<0.37	<109.9	0.48	111.0	0.53	109.7		
Kyooma R98	Ave	NM	NM	NM	NM	NM	NM	0.70	98.9	-	-
	Max	NM	NM	NM	NM	NM	NM	2.42	108.8		
Werris Creek South R62	Ave	0.48	95.6	0.44	101.5	0.42	99.8	0.41	100.2	1.20	110.0
	Max	0.51	99.8	1.45	113.2	0.87	111.0	1.19	119.0		
Werris Creek Mid R92	Ave	NM	NM	NM	NM	NM	NM	0.18	99.3	-	-
	Max	NM	NM	NM	NM	NM	NM	0.45	107.8		
Tonsley Park R20	Ave	0.68	102.2	0.81	101.6	0.91	102.2	0.95	102.1	1.90	115.0
	Max	1.32	113.3	1.98	113.1	2.14	114.9	3.39	121.0		
Talavera R96	Ave	NM	NM	0.56	102.5	0.31	105.3	0.25	104.2	1.30	111.0
	Max	NM	NM	0.56	111.0	0.67	113.4	0.53	115.8		
Greenslopes R14	Ave	0.59	106.7	0.69	102.9	NM	NM	NM	NM	2.60	118.0
	Max	1.07	110.1	2.19	115.8	NM	NM	NM	NM		
Cintra R2	Ave	0.87	108.0	1.19	106.7	NM	NM	NM	NM	-	-
	Max	2.39	118.0	3.75	117.4	NM	NM	NM	NM		

NM – Not monitored.

During the period, the initial blasting contractor switched to an explosive product that was more resistant to generating fume in broken/incompetent ground found adjacent to the underground workings and the weathered overburden above RL370m in pit. Between April to December before the contract expired there were eleven Level 1 (minor – localised/onsite) fume events (**Appendix 6**).

The new explosive supplier until the end of March 2014 did record one Level 1 (minor – localised/onsite) and one Level 2 (minor) fume event on 23rd January 2014 that remained onsite not resulting in any impacts. Further investigation into the new explosive supplier's range of products is required to have more confidence about mitigating fume events in areas of broken ground.

3.7.3 Blast Management Annual and Complaint Review

A summary of blasting complaints received by WCC since operations commenced in 2005 is presented in **Table 3.42**. Blasting related complaints have been the most common community complaint resulting from WCC operations since the mine commenced in 2005.

Table 3.42 WCC Complaint Issues from 2005 to 2014

Complaint Issue	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Blast – Vibration & Overpressure	3	4	1	2	7	22	68	9	47
Blast – Fume & Dust	0	0	0	0	2	3	2	1	5
Blast – Other including Damage	0	0	0	0	0	0	1	4	3
All Complaints (including blast)	**8**	**10**	**7**	**16**	**12**	**52**	**117**	**56**	**93**

Historically, blasting complaints have accounted for just under half of all complaints received by WCC, however that increased in 2011-2012 to 61% of all complaints with the majority generated from four individual blasts (3rd & 16th June 2011 and 3rd and 17th August 2011). However for 2012-2013, the number of blasting complaints significantly decreased due to improved management and control of air blast impacts, revision of the pre-blast weather check process and no blasting in the G Coal Interburden which was a major source of complaints in 2011-2012. During 2013-2014, WCC increased the size of blasts (arrival of larger mining equipment in June 2013) which potentially increases the number of blasts with vibration levels above the community perception/complaint threshold leading to more complaints. The blast on 8th July 2013 recorded an overpressure of 119dB(L) and accounted for 11 complaints or 12% of the total complaints for the year but also appeared to sensitize the community to blasting impacts. WCC has since held two community meetings (6th November 2013 and 11th March 2014) to discuss blasting (and other) issues and explain the blasting process, the effects of geology and soils on causing house defects.

Until 2010, the majority of complaints relating to the mine (including blasting) were from Quipolly residents and a single receiver located to the east of the mine; however since 2010, complaints have been dominated by Werris Creek residents with over 80% of complaints. The likely reason for the increase in the number of complaints and complainants is because WCC is moving closer to Werris Creek, which has a larger and denser residential population of 1800 people than compared to the rural Quipolly area. WCC recognises that the number of complainants has also increased and that there is a shift towards Werris Creek residents making blast complaints that requires further management by WCC.

A review of multiple blasting complaints and blast locations identified in **Table 3.43** found that there was a trend for blasting complaints from particular areas of the pit. For example, blasts in the upper horizons of the pit (above RL385m and including the A and Black Seam) are resulting in overpressure complaints. Blasts deeper in pit (RL385m and below including the basal G Coal) have resulted in vibration complaints. WCC is continuing to work with our blast engineer to ensure that every blast

design takes into account the learning's from previous blast investigations into G Coal Interburden blast vibration complaints and overpressure related complaints above RL385m.

Table 3.43 WCC Blasting Complaints by Blast Event/Location since 2011

Period	Blast Location	Blast Type	# Complaints	Likely Blast Impact
January 2011	Strip 11_385	Overburden	2	Overpressure
January 2011	Strip 9_300	Interburden	2	Vibration
February 2011	Strip 9_GCoal	Interburden	2	Vibration
May-June 2011	Strip 9_300	Interburden	2	Vibration
June 2011	Strip 11/12_385	Overburden	31	Overpressure
August-September 2011	Strip 10_GCoal	Interburden	23	Vibration
September 2011	Strip 11_385	Overburden	3	Overpressure
January 2011	Strip 11_350	Interburden	2	Vibration
Dec 2011, Jan&Feb 2012	Strip 12_Aseam	Overburden	4	Overpressure
April 2012	BlackSeam4	Overburden	1	Overpressure
July 2012	Strip 14_385	Overburden	1	Overpressure
October 2012	Strip 15_385	Overburden	1	Overpressure
February 2013	Strip 16_385	Overburden	6	Vibration
April 2013	Strip 11_GCoal	Interburden	5	Vibration
June 2013	Strip 16_385	Overburden	2	Overpressure
July 2013	Strip 16_Blackseam	Overburden	11	Overpressure
July-September 2013	Strip 13_350/300/DE UG	Interburden	16	Vibration
September 2013	Strip 13_Rocks	Secondary	1	Overpressure
December 2013	Strip 12_GCoal	Interburden	1	Vibration
December 2013	Strip 17_Trim	Overburden	6	Vibration
January 2014	Strip 15_350	Interburden	5	Vibration

WCC performance against the Environmental Management System blasting related objectives and targets developed from the Blast Management Plan for the period 1st April 2013 to 31st March 2014 is outlined in **Table 3.44**. Because of the lower than expected blasting complaints for 2012-2013, the blast complaint target was set low for 2013-2014 and unfortunately easily exceeded by the number of actual blast complaint receive during the period. While there was no blast exceedances during the period, the two targets of achieving overpressure results less than 115dB(L) and vibration levels less than 1mm/s designed to minimise community complaints were not achieved and therefore the increase in community complaints was unavoidable. As discussed above in **Section 3.7.2**, with Whitehaven Coal changing the blasting management contract and replacing the explosives supplier, WCC is aiming to achieve better blast management which will flow onto better performance both in mining productivity as well as environment and community aspects. WCC only achieved one out of five targets related to blasting objectives.

Table 3.44 Blasting Objectives and Targets 2013-2014

Activity	Objective	Indicator	Actual 2013-2014	Target 2013-2014	Actual 2012-2013	Actual 2011-2012
Blasting	Complaint	# Complaints	55	13	14	71
		# Complainants	23	10	11	35
	Overpressure	All >115dBL	2	0	0	2
	Vibration	Werris >1mm/s	2	0	1	1
	All Exceedance	# Exceedances	0	0	1	1

Red – Exceeded Full Year Target

As required by PA 10_0059 Schedule 5 Condition 3, WCC as part of this Annual Environmental Management Report undertakes an annual review of its blasting management for 2013-2014. **Table 3.45** summarises the blasting management annual review from the discussion above.

Table 3.45 Blasting Management Annual Review 2013-2014

Annual Review	Discussion
Monitoring Results	• Criteria Two blasts recorded overpressure >115dB(L) and two blast recorded vibration >1mm/s. No exceedance of maximum criteria of 120dB(L) or 10mm/s at privately owned properties during the period. • Previous Year Blasting levels at Werris Creek South have remained the same although mining is occurring closer to town. Maximum overpressure and vibration levels in 2013-2014 were higher than the previous period. • EA Predictions Average blasting levels are consistently below those predicted in the Environmental Assessment.
Complaints	• This Year 55 blasting related complaints for the period. All complaints claiming damage had Property Investigations completed during period. • Previous Year Significant increase in blasting complaints from 2012-2013 but still below the number of complaints received in 2011-2012.
Compliance	• Criteria and other No blasting non-compliance during the period. • Objectives & Targets WCC achieved only one of the five targets related to blasting objectives.
Data Trends & Predicted Impacts	The number of blasting complaint's increased this period and WCC is aware that as mining progresses closer to Werris Creek town, that resident's are likely to become more sensitive to blast impacts. Average blasting results for Werris Creek South monitor demonstrate that actual vibration levels have been consistent since 2010.
Improvement Actions	For 2014-2015, continue to implement new SMS/email blast notification system and increased community consultation in regards to blasting. Bed down systems under the new blasting management team including fume mitigation.
Management Plan Review	All blast management strategies and actions were implemented during the period.
Management Plan Revision	No changes proposed to the Blast Management Plan.

3.8 OPERATIONAL NOISE

3.8.1 Management

WCC has noise criteria based on the Project Specific Noise Criteria in PA10_0059 and EPL 12290 that has been updated to reflect additional property acquisitions and private agreements negotiated by Whitehaven Coal. **Table 3.46** outlines the noise criteria for private properties without private agreements while **Table 3.47** displays the noise criteria for private properties with private agreements.

Table 3.46 LOM Project Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"[#]	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 3.47 Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45
R7	83 Wadwells Lane	40	45
R9	"Gedhurst"	40	45
R22	"Mountain View"	40	45

In accordance with EPL 12290 Condition L6.1, the noise criteria apply to mining noise levels measured under all meteorological conditions except for "adverse weather" defined as:

- Wind speeds greater than 3 metres/second at 10 metres above ground level; or
- Temperature inversion conditions up to +12°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
- Temperature inversion conditions greater than +12°C/100m.

The noise monitoring program incorporates both attended and real time monitoring. Attended noise monitoring is undertaken at 13 locations representative of 16 private properties as well as southern and central Werris Creek; while continuous noise monitoring is undertaken at a location representative of Quipolly and Werris Creek communities as outlined in **Figure 3.16**.

The Noise Management Plan approved by DP&I on 29th April 2014 outlines the noise management measures undertaken by WCC to mitigate potential noise impacts and comprises the following actions:

- Negotiate private agreements with private landholders for noise impacts or as a last resort, acquire private properties either privately or through acquisition processes outlined in PA10_0059;
- Noise attenuation of haul trucks so that CAT XQ793s achieve a sound power level of 115dB(L) and CAT 785s achieve 117.7dB(L). CAT XQ793s were commissioned in June 2013 while the final CAT 785 to be partially attenuated was completed in March 2014;
- A dedicated 'Noise Control Operator' to continually monitor real time noise levels and inform OCE if the dominant noise source is mining; then the OCE would modify or partially suspend mining operations to achieve 35dB(A) noise goal;

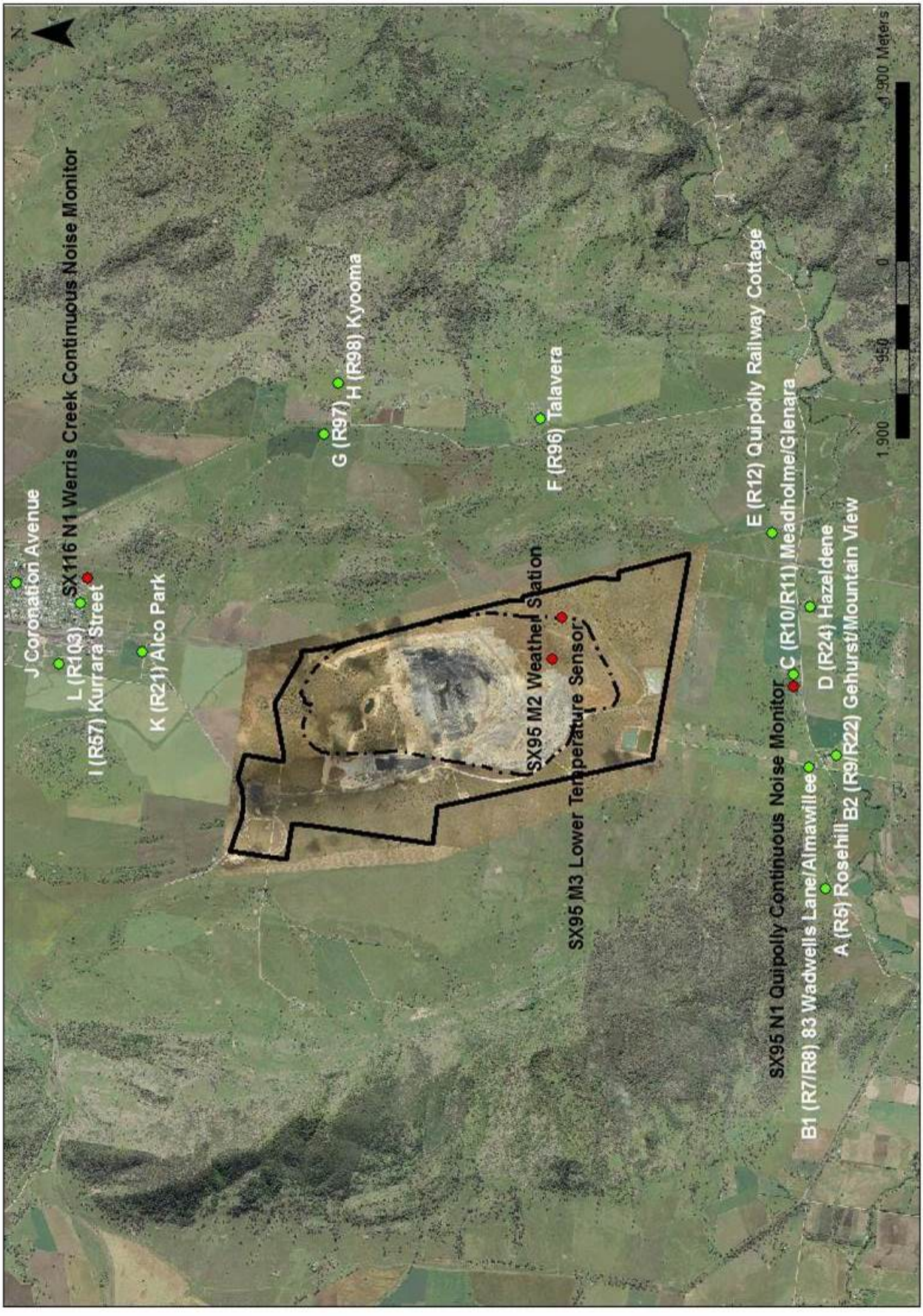


Figure 3.16 WCC Attended and Continuous Noise Monitoring and Weather Station Locations

- Real time noise monitoring in locations representative of Quipolly and Werris Creek communities;
- Real time meteorological monitoring can identify adverse weather conditions such wind direction/speed and temperature inversions using the weather stations on the overburden emplacement area separated by vertical distance of 80m (as approved in EPL 12290);
- Daily noise reduction mine planning as discussed at the daily meeting based on current location of mining activities and forecast weather conditions;
- Routine testing to confirm that regular and preventative maintenance of mining equipment maintain the sound power levels within a couple of decibels of the relevant levels outlined in the Noise Management Plan;
- Bunding or other physical barriers close to noise sources to create obstructions to the noise propagation towards receivers (i.e. visual bunds and highwalls);
- Use of operational noise controls such as minimising revs and the use of noise minimising alarms and horns; and
- Rail spur noise mitigation includes train speeds restricted to 15kph on the rail spur, minimising coal drop heights into wagons and maintaining coal within the loading bin at all times.

WCC has tracked the number of hours of production time lost due to potential for noise impacts using the Noise Control Operator and Real Time Noise Monitoring management measures outlined above. In total for 2013-2014, the sum of all individual items of plant ceased operations for a total of 976.3 hours across April to November 2013 (**Table 3.48**). 2013-2014 was the first year that lost production time was accurately tracked.

Table 3.48 Production Time Lost due to potential Noise Impacts

Period		Hours of Production Time Lost due to potential Noise Impacts											
		April	May	June	July	August	September	October	November	December	January	February	March
2013-2014	Excavators	3.0	25.5	24.7	17.5	118.4	28.4	19.3	1.9	0.0	0.0	0.0	0.0
	Trucks	0.0	0.0	104.5	32.4	471.3	71.4	56.0	2.0	0.0	0.0	0.0	0.0
	Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	976.3	3	25.5	129.2	49.9	589.7	99.8	75.3	3.9	0.0	0.0	0.0	0.0

3.8.2 Attended Noise Monitoring

The results of routine attended noise monitoring conducted on a monthly basis by Spectrum Acoustics Pty Limited are outlined in **Table 3.49** with full reports provided in **Appendix 7**. The noise levels reported are for WCC mining operations only and excludes other ambient or environmental noises. The strategic acquisition or negotiating private agreements with adjacent properties and the effective implementation of real time noise monitoring by the Noise Control Operator had been effective at mitigating noise impacts from mining operations. Unfortunately attended noise monitoring did identify four occasions that resulted in exceedances of the noise criteria during 2013-2014 and broke a run of 33 months (nearly 3 years) without any recorded noise non-compliance (**Table 3.50**). There was no exceedance of the LA1 (1 minute) criteria.

The noise non-compliance events are discussed below:

- Attended noise monitoring on Thursday 11th July 2013 measured noise non-compliance at three Quipolly properties. “Rosehill” (R5) recorded mining related noise of 36dB(A) at 9:24pm and “Gedhurst” (R9)/“Mountain View” (R22) recording mining related noise of 39dB(A) at 9:44pm. All properties are located on Paynes Road, Quipolly with R9 and R22 (B2) monitored together because the two residences are within 60m of each other and R5 (A) is located a further 1.5km to the west (**Figure 3.16**). The resulting exceedance at R5 was +1dB(A) above the noise criteria of 35dB(A) and R9/R22 was +2dB(A) and +3dB(A) respectively above the project specific noise criteria of 37dB(A) and 36dB(A). The cause of the noise exceedance was due to proximity of the western dump to the western Quipolly residences (compared to the central and eastern locations that did record complying noise levels) and that the measured wind and temperature inversion conditions were borderline between meteorological conditions that measured noise levels could and could not be assessed against the noise criteria. Mitigating the noise non-compliance was the fact that the Noise Control Operator records for Quipolly at the time did not record any noise exceedance (at the central Quipolly monitoring location) and that attended noise monitoring also occurred at B1 (R7,R8) at the same time as B2 (R9,R22) and did not record any noise exceedance despite only being 100m apart. Both the EPA and DoP agreed that the noise exceedance was not significant or protracted and that proactive management practices had been employed including attempting to negotiate private agreements; therefore no further action was required;
- Attended noise monitoring on Thursday 19th September 2013 measured noise non-compliance at one privately owned property east of the mine site. R97 (unnamed property - G) recorded mining related noise of 39dB(A) at 11:11pm. The R97 property is located on Black Gully Road, approximately 5km south of Werris Creek and 2.5km east of the closest active mining area at WCC (**Figure 3.16**). It is noted that R97 comprises of agricultural land with no residence located on the property. The resulting exceedance at R97 was +4dB(A) above the noise criteria of 35dB(A). The approximate east/west alignment of the mining strips is generally orientated towards R97 (and R98 “Kyooma” property which WCC has a private agreement in place with the owner) together with the westerly wind direction (source to receiver) is the likely cause of the exceedance. The weather conditions on the 19th September 2013 had been dominated by a strong north westerly to a westerly wind up until 11pm when the wind speed became almost calm. The Noise Control Operator had proactively advised the OCE to manage the mining noise levels in Quipolly and Werris Creek resulting in 22 hours of lost production. Unfortunately the real time noise monitoring in Werris Creek and Quipolly do not always represent the noise environment of the properties to the east of WCC. To manage this, Whitehaven Coal had acquired the “Marengo” property; successfully negotiated a private agreement with the owner of the “Kyooma” property and had attempted to negotiate with the owners of R97 and R96 since 2010. The EPA responded stating that this was not an EPL 12290 noise exceedance because there was no residence on the property.

An elevated noise level of 42dB(L) was recorded for R98 (“Kyooma”) on the 19th September 2013 which was the second trigger under the noise private agreement to undertake noise works at the property. During the period, WCC installed double glazed windows on the side of the house facing the mine. Due to the approved private agreement, this was not an exceedance of noise criteria.

Table 3.49 WCC Noise Monitoring Results for 2013-2014

Receiver	Decibels – dB(A) Leq 15 minute													
	Period[3]	Criteria[4]	April	May	June	July	August	September	October	November	December	January	February	March
R5 "Rosehill"	Day	35	IA	IA#	IA#	IA	IA#	IA#	IA#	IA	21	IA#	IA#	IA#
	Night	35	IA	IA	IA	**36**	IA#	IA#	IA#	32#	IA#	BA#	IA#	IA#
R8"Almawillee"* R7 83 Wadwells	Day	40/37[2]	IA	IA#	IA#	IA	IA#	IA#	IA#	22	IA#	IA#	IA#	IA#
	Night	40/37[2]	32	BA	IA	37	IA	IA#	34#	31#	31#	29#	IA#	26
R9 "Gedhurst" R22 "Mountain View"	Day	37/36[1]	20	BA#	IA#	20	IA #	IA#	IA#	23	26	22#	IA#	IA#
	Night	37/36[1]	25	IA	IA	**39**	IA#	IA#	28#	27#	IA#	26#	IA#	BA
R10 "Glenara"* R11 "Meadholme"*	Day	40	BA	BA#	IA#	IA#	IA#	BA#	32	IA	IA	IA#	IA	IA#
	Night	40	IA	IA	IA	38	IA	IA#	32#	26	BA#	BA#	IA	20
R24 "Hazeldene"	Day	37	BA	BA#	IA#	IA	IA#	BA#	BA#	IA	IA	IA#	IA	IA#
	Night	37	IA	BA#	IA	34	IA#	IA#	25#	25#	25	<20#	IA	18#
R12 "Railway Cottage"	Day	38	IA#	IA#	IA#	IA#	IA#	IA#	IA#	IA	IA	IA#	IA#	IA#
	Night	38	20	27#	IA	31	IA#	IA	32	20#	IA	IA#	IA#	22#
R96 "Talavera"	Day	38	25	34#	IA#	IA#	25#	BA#	27#	IA	20	IA#	BA#	IA#
	Night	37	26	34#	24	BA	32	36#	32#	IA#	IA#	BA#	IA#	IA
R97	Day	35	15#	34#	<30#	IA	32#	BA#	BA#	IA	20	BA#	18	IA#
	Night	35	34	30#	35	IA	25#	**39**	33#	IA#	IA#	IA#	IA#	IA#
R98 "Kyooma"*	Day	40	26	33#	IA#	25	26#	27#	23#	19	<20	IA#	20	IA#
	Night	40	34	36#	26	IA	32	**42**	35#	IA#	IA#	IA#	IA	IA
R57 Kurrara St	Day	35	IA#	IA#	32#	IA#	IA#	IA#	IA#	IA	IA	IA#	IA	IA#
	Night	35	32	32#	34	BA	BA#	32	IA#	IA#	IA#	IA#	IA	IA#
Coronation Ave	Day	35	IA#	IA#	IA#	IA	IA#	IA#	IA#	IA	IA	IA#	IA	IA#
	Night	35	IA	32	<30	30#	30	34	IA#	IA#	IA#	IA#	<20	IA
R21 "Alco Park"*	Day	40	IA	IA#	IA#	IA#	IA#	IA#	IA#	IA	IA	IA#	IA	IA#
	Night	40	32	27#	38	33#	34#	34	BA#	IA#	IA#	IA#	IA#	BA#
R103	Day	35	IA	IA#	30#	IA	IA#	IA#	IA#	IA	IA#	IA#	IA	IA#
	Night	35	32	27#	IA	IA	34#	31	IA#	IA	IA#	IA#	IA#	IA#

1 – Gedhurst noise criteria is 37dB(A) while Mountain View noise criteria is 36dB(A); 2 – Almawillee has a private agreement noise criteria is 40dB(A) while 83 Wadwells Lane noise criteria is 37dB(A); 3 – EPL12290 allows WCC to combine monitoring of evening and night periods together; 4 – Criteria is a combination of private agreement and PA10_0059/EPL12290 noise criteria; # - Adverse weather conditions enhancing noise emission not applicable to noise criteria as described in **Section 3.8.1**; * Non-project related property due to private agreement or WCC acquired property; IA – WCC specific noise is inaudible; BA – WCC specific noise is barely/faintly/occasionally audible <20dB; **Bold** – elevated result.

Table 3.50 Observed trends in noise non-compliance events

	Annual Reporting Period (April to March)								
	2005 to 2006	2006 to 2007	2007 to 2008	2008 to 2009	2009 to 2010	2010 to 2011	2011 to 2012	2012 to 2013	2013 to 2014
Number of Non-compliance events	2	46	23	3	1	1	0	0	4

Table 3.51 provides a summary of the annual average WCC only noise monitoring results measured under assessable weather conditions for the day and night periods for each attended noise monitoring location over the last three years. The arithmetic mean used here for the logarithmic values of noise (decibels) is only to demonstrate a year on year comparison at each location relative to the previous year and not for any other mathematic purpose. For example, the 2012-2013 period had eleven noise measurements with average noise levels lower and six locations with average higher noise levels than 2011-2012 period. Similarly the 2013-2014 period had thirteen noise measurements with average noise levels lower and five locations with average higher noise levels than 2012-2013 period. At a high level, the attended noise monitoring over the three year period can demonstrate a trend that the majority of locations have experienced decreasing WCC noise levels. This comparison is limited due to the exclusion of data where WCC noise levels were either inaudible

or were measured under non-assessable weather conditions. For example the annual average for R5 and R97 were both above 35dB(A) because of one noise exceedance at each location with all other results measured below 35dB(A) or inaudible. The attended noise monitoring indicates that WCC is likely to achieve its long term night time noise goal of 35dB(A) (PA10_0059 Schedule 3 Condition 4e). While this analysis is limited, it is consistent with the observed trends in the continuous noise monitoring (**Section 3.8.3**) and noise complaints (**Section 3.8.4**) correlating with the implementation of Noise Control Operator/Real Time Noise Monitoring and Truck Attenuation noise management measures.

Table 3.51 Annual Average WCC Attended Noise Monitoring Results for 2011-2014

Decibels – dB(A) Leq 15 minute																										
Period	R5 "Rosehill"		R8"Almawillee"* R7 83 Wadwells		R9 "Gedhurst" R22 "Mountain View"		R10 "Glenara"* R11 "Meadholme"*		R24 "Hazeldene"		R12 "Railway Cottage"		R96 "Talavera"		R97		R98 "Kyooma"*		R57 Kurrara St		Coronation Ave		R21 "Alco Park"*		R103	
	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N
2011-2012	31	33	31	32	31	32	30	30	39	25	-	28	21	30	-	30	-	33	32	26	-	34	-	33	-	-
2012-2013	-	25	24	33	24	31	30	30	29	29	30	31	24	27	23	26	25	28	-	34	-	32	26	35	-	-
2013-2014	21	36	22	32	22	32	32	28	-	30	-	28	23	27	19	36	23	34	-	33	-	32	-	35	-	32

D = Day period; N = Night period; Green = Equal or decrease in noise levels from the previous period; Orange = Increase in noise levels from previous period; - = no audible noise level measured during period under assessable weather conditions.

3.8.3 Continuous Noise Monitoring

WCC undertakes continuous (real time) noise monitoring in two locations representative of the Quipolly and Werris Creek communities (**Figure 3.16**). Both continuous noise monitoring units are on trailers run by solar panels to operate a sound level meter, processor and communication equipment capable of providing the data in near real time via an external website (SentineX Repository). The Quipolly continuous noise monitor (known as SentineX 95) is located at the "Meadholme" property (R10) which is one of the closest privately owned properties to WCC and was predicted to be the most impacted residence in the LOM Environmental Assessment and therefore if WCC can achieve compliance at R10; then mining noise levels should be compliant at all Quipolly properties. R10 is also currently unoccupied which minimises other non-mining sources being monitored; although the Great Northern Rail Line/Werris Creek Road 1.2-1.7km to the east and Kamilaroi Highway 3.5km to the west are all audible particularly at night. The Werris Creek continuous noise monitor (known as SentineX 116) is located next to property (R62) which is representative of the residences the southern side of Kurrara St which are the closest and most exposed to potential mining noise impacts. The Werris Creek continuous noise monitor is located at the eastern end of Kurrara St to mitigate rail noise sources from the Great Northern Rail Line and Werris Creek Rail Yard located only 600m to the east.

The continuous noise monitoring system is capable of analysing a range of statistical noise levels from LA1 to LA90 but is also able to a frequency filter the LAeq noise levels to exclude higher frequency noise levels (i.e. insects and wind) to produce a Low Frequency (LF) noise level that is more representative of industrial noise sources (including mining but also other heavy industries such rail transport) compared to the ambient/environmental noise sources that can increase ambient levels.

An analysis of the continuous noise monitoring data was compiled by Advitech Environmental (2014 – **Appendix 7**) with **Figure 3.17** summarising the monthly median night shift only LAeq LF noise levels for Quipolly and Werris Creek. Presenting the night time noise levels better reflects the noise contribution from mining operations (but still includes other low frequency ambient noise) that generally is drowned out by environmental and other ambient noise during the day time. The most notable difference is that Werris Creek noise levels are significantly higher than Quipolly due to the dominate noise sources of urban and rail (transport and yard), while Quipolly is a rural environment with WCC as the dominate night time noise source. While a downward trend is evident across the period for both Quipolly and Werris Creek, it is not clear what influence is from the changes in seasonal conditions (noise levels higher in winter and lower in summer) or from noise attenuation improvements made across the period.

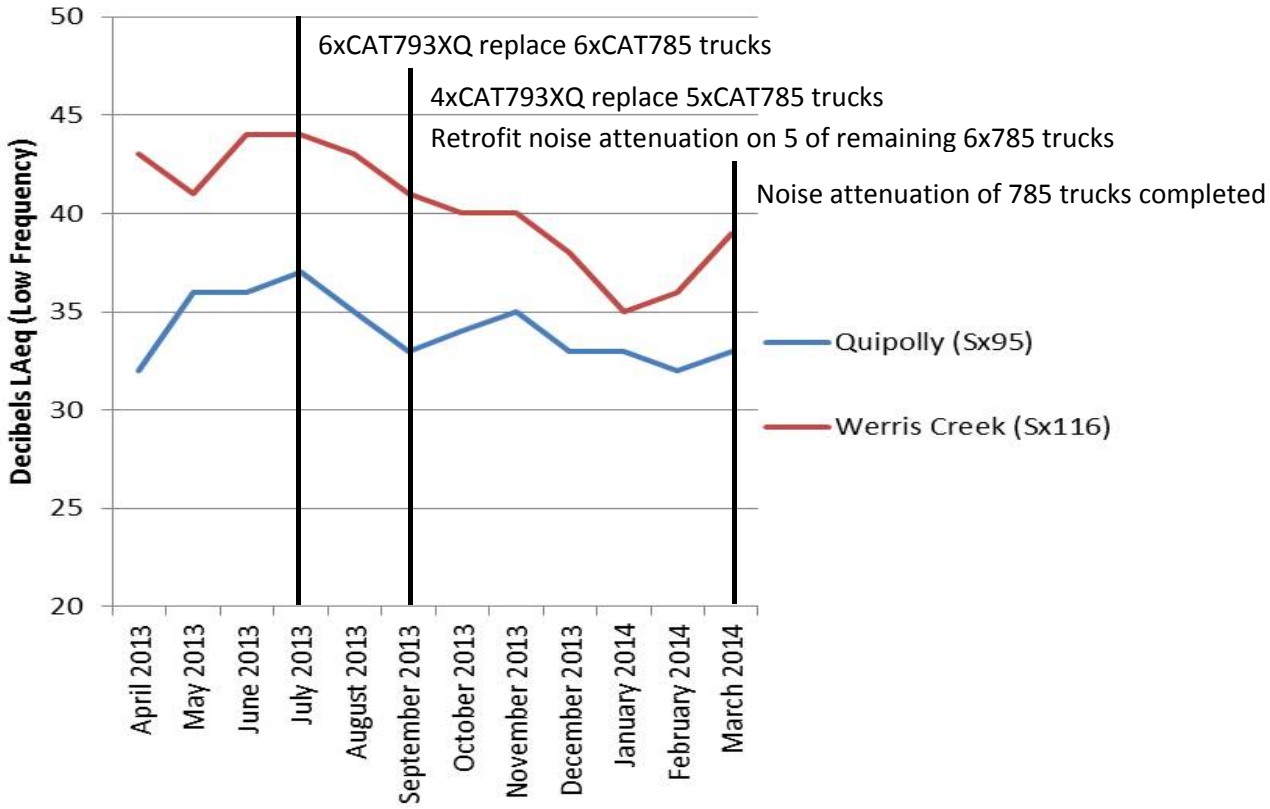


Figure 3.17 WCC Monthly Median Night Time Continuous Noise Levels for 2013-2014

Table 3.52 presents a comparison between 2012-2013 and 2013-2014 night shift only noise levels during assessable weather conditions. Because the data includes ambient noise sources (particularly Werris Creek), it cannot be compared with the noise criteria. The continuous noise monitoring indicates that WCC is achieving its long term night time noise goal of 35dB(A) (PA10_0059 Schedule 3 Condition 4e) for the Quipolly residences. Interestingly across all statistical noise levels, the Quipolly noise levels did not change between the two periods; however Werris Creek is for the current reporting period a couple of decibel lower than 2012-2013. With the implementation of noise attenuation to the truck fleet across the period, it would be expected that a reduction in Quipolly noise levels would be seen given that mining is the dominate noise source. Therefore the minor noise difference in Werris Creek is unlikely to be related to WCC operations. The next reporting period will provide a more definitive picture on long term noise level trends and noise level reduction achieved by attenuating the WCC truck fleet.

Table 3.52 Annual Summary of Continuous Noise Monitoring Data

Decibels – dB(A) Leq 15 minute																								
Night Shift Only	Quipolly – SentineX 95 (Sx95)												Werris Creek – SentineX 116 (Sx116)											
	LA1			LAeq			LAeqLF			L90			LA1			LAeq			LAeqLF			L90		
	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max	Min	Med	Max
2012-2013	42	55	69	31	39	50	28	34	40	22	32	42	45	53	60	38	45	50	34	42	47	30	38	43
2013-2014	43	55	71	31	39	51	29	34	40	22	31	43	44	51	57	37	43	49	33	40	46	31	37	42

3.8.4 Noise Management Annual and Complainants Review

A summary of noise complaints received by WCC since operations commenced in 2005 is presented in **Table 3.53**. Since 2005, noise complaints previously represented over a quarter of all complaints received by WCC until the current reporting period where noise complaints only represent 11% of the total complaints. Achieving full attenuation of the entire truck fleet at WCC during 2013-2014 coincides with the significant reduction in noise complaints since 2011-2012; which also coincided with the timing of the introduction of the Noise Control Operator and real time noise monitoring in 2012. These three noise management measures together have achieved no noise complaints from any Quipolly residents (including one specific Quipolly resident who still resides in R24) during 2013-2014 for the first time in WCC's history. Unfortunately Werris Creek community now accounts for 100% of the noise complaints and there is a risk that noise complaints could increase as WCC operations move closer to the town. However the improved noise management through the successful implementation of the three noise management measures gives WCC full confidence that noise impacts can be mitigated going forward.

Table 3.53 WCC Noise Complaints since 2005

Complaint Issue	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Noise – Mine	1	3	4	10	4	6	15	15	2
Noise – Rail Load Out	0	0	0	0	0	7	17	6	9
All Complaints (inc. Noise)	**8**	**10**	**7**	**16**	**12**	**52**	**117**	**56**	**93**
From the one Werris Creek Complainant - Noise	0	0	0	0	0	7	17	6	7
From the one Quipolly Complainant - Noise	0	0	0	0	0	2	11	12	0

As mentioned above, the total number of noise complaints in 2013-2014 has reduced from 2011-2012 and 2012-2013. However one individual Werris Creek complainant still dominates the number of noise complaints (>60%); all of which allegedly relate to the Rail Load-Out Facility. All Rail Load-Out Facility noise complaints were thoroughly investigated and on further review (real time audio and noise levels) were found to be actually in relation to train shunting and other rail activities in the Werris Creek Rail Yard, which is a separate facility within Werris Creek township itself and is unrelated to WCC operations.

WCC performance against the Environmental Management System noise related objectives and targets developed from the NMP for the period 1st April 2013 to 31st March 2014 is outlined in **Table 3.54**. WCC achieved two out of the four targets set for noise related objectives. Unfortunately the four noise exceedance were outside the planned target. The number of noise complaints related to the mining operations was only two compared to the target of 13 (a 10% reduction on 2012-2013),

which is a significant reduction with 2012-2013 performance of 15 complaints. Implementation of the real time noise monitoring and the noise control process has been successful in reducing noise complaints, all the while WCC has ramped up the production rate. By setting the Quipolly continuous noise monitor trigger level at 35dB(A) ensures that WCC is using its best endeavours to achieve PA10_0059 MOD1 Schedule 3 Condition 4(d). Due to one particular complainant in Werris Creek, the number of Train Load Out noise complaints increased above the target for the period.

Table 3.54 Noise Objectives and Targets 2013-2014

Activity	Objective	Indicator	Actual 2013-2014	Target 2013-2014	Actual 2012-2013	Actual 2011-2012
Noise	Noise Criteria	# Exceedances	**4**	**0**	0	0
	Open Cut Complaints	# Complaints	**2**	**13**	15	15
	Train Load Out Facility Complaints	# Complaints	**9**	**5**	6	17
	Complaints	# Complainants	**3**	**4**	4	5

Red – Exceeded Target.

As required by PA 10_0059 Schedule 5 Condition 3, WCC as part of this Annual Environmental Management Report undertakes an annual review of its noise management for 2013-2014. **Table 3.55** summarises the noise annual review from the information above.

Table 3.55 Noise Management Annual Review 2013-2014

Annual Review	Discussion
Monitoring Results	• Criteria Four exceedances of the NMP noise criteria were identified from attended noise monitoring during the reporting period. • Previous Year Attended WCC (mining) only noise levels and Werris Creek continuous noise monitoring level demonstrate a year on year decrease in noise levels at a majority of noise monitoring locations. • EA Predictions Mining noise was recorded at R5 and R97 higher than the Project Specific Noise Level predicted in the EA. In both occasions, each site is located behind a topographic ridge and that the Environmental Noise Model does not accurately predict noise levels behind acoustic barriers assumed in the model to be knife edge providing acoustic shadows while in the real world surface are rounded and sound wave refract around resulting in actual noise levels higher than predicted. A reassessment of noise impacts is not required.
Complaints	• This Year Noise complaints were dominated by one Werris Creek resident representing nine out of the eleven total noise complaints in the period. Nine out of the eleven noise complaints alleged to be from the Train Load Out facility when in fact from rail noise at the Werris Creek Rail Yard. • Previous Year WCC has reduced the total number of noise complaints from 2012-2013 by ~50%; attributed to attenuation of the truck fleet during the reporting period. The same Werris Creek complainant still dominates the noise complaints for this reporting period as for 2012-2013.
Compliance	• Criteria and other Four exceedances of the NMP noise criteria were identified from attended noise monitoring during the reporting period.

Annual Review	Discussion
	• Objectives & Targets WCC only achieved two out of the four targets set for noise related objectives – WCC did not achieve a 10% reduction on Train Load Out Facility related noise complaints for the reporting period from 2012-2013 and due to four noise exceedances.
Data Trends & Predicted Impacts	Attended WCC (mining) only noise levels demonstrate a year on year decrease in noise levels at a majority of noise monitoring locations since the commencement of the LOM Project. Except for the measured noise exceedances that occurred under individual location specific worse case conditions; WCC (mining) only noise levels are below the longterm noise goal.
Improvement Actions	While CAT773 water cart sound power levels are higher than levels used in the noise model; the noise impact would be insignificant and not requiring any immediate rectification.
Management Plan Review	Small changes to the fleet configuration including 10xCAT XQ793 trucks and 6xCAT785 trucks (Stage 1 Attenuation) would provide a lower truck noise generation compared to 6xCAT XQ793 trucks and 11xCAT785 trucks (Stage 1 Attenuation) adopted in the Noise Remodel Report April 2013. WCC to update Noise Model based on modified fleet configuration and incorporate in NMP. WCC has negotiated three additional private agreements. While 4 exceedances were measured during the reporting period, investigations did not identify any extra controls needed in addition to the Noise Control Operator and full attenuation of truck fleet.
Management Plan Revision	WCC updated NMP (approved by DP&I on 29th April 2014): - Noise Remodel; - Private Agreements - Noise Monitoring Program and EPL 12290

3.9 VISUAL AMENITY

3.9.1 Management

Various mining activities and/or features of WCC are visible from local and distant vantage points including the elevated residences in Werris Creek to the north-east, residences to the south in Quipolly and from Werris Creek Road.

Management controls to minimise the potential visual and light related impacts include:

- Tree screen plantings along the eastern (Werris Creek Road side) and south-east perimeter of WCC and the eastern and southern margins of the train load-out area;
- Undertaking activities in accordance with the various management plans applicable to the mine, all of which incorporate safeguards which indirectly reduce visual impact;
- Minimising the extent of land disturbance / clearing in advance of mining;
- Progressive rehabilitation of disturbed areas;
- Sympathetic positioning and direction of lights to avoid them impacting on local residences in accordance with AS 4282:1997;
- Acquisition of a number of properties to the east, north and west of operations;

- Restricting locomotive headlights to low beam when on the rail siding; and
- Installation of lighting at the train loading facility in accordance with AS 1680.2.4:1997 and their use only when the facility is in operation.
- Lighting monitoring camera established on the southern edge of Werris Creek township facing the mine site to monitor in real time and provide a daily summary of lighting emissions for feedback to production personnel to mitigate potential impacts and also to verify community complaints.

3.9.2 Performance

WCC has acquired all adjacent properties with direct views into the open cut pit. As a consequence, the potential for visual impacts (in pit) from the operation on surrounding landholders has been removed. Management of visual impacts has therefore moved further afield to focus on receptors that have views of the overburden emplacement in Quipolly, Werris Creek and Werris Creek Road.

During the reporting period, WCC completed another additional 7.8ha of rehabilitation along the visual amenity bund running north parallel to Werris Creek Road towards the "Cintra" property. The growth of the previously installed tree screens along Werris Creek Road has continued to reduce the visual impact (although brief when travelling past the site at 100km/h) associated with the mining operations from the surrounding transport routes (**Figure 3.18**). A tree screen along Werris Creek Road was planted in 2005 while an additional visual bund was completed and planted with wattles and White Box tubestock in September 2010. The methodology was for the wattles to be quick growing and bushy to further mitigate visual impacts for the next 10 to 15 years by which time the endemic White Box trees should be sufficiently mature to continue to screen the mine going forward. The road side tree screen is quiet prominent and becoming increasingly effective at mitigating views of mining operations (**Figure 3.19**).

WCC anticipated that visual amenity issues will arise with approval of the LOM Project allowing the northward continuation of mining from the current position 4km south to 2.6km south of Werris Creek. The visual amenity bund will provide a visual and acoustic barrier to mining operations in the later years of the LOM Project with two thirds of the bund now built and rehabilitated. The tree screen planted in front of the bund in 2010 with a combination of wattles and White Box and to date growth rates have been excellent over three year since being planted (**Figure 3.20**). The remainder of the visual amenity bund will be constructed in the 2014-2015 period.

During the reporting period, WCC received 8 complaints relating to lighting impacts which is slightly higher than the 6 visual amenity complaints from the previous period (**Table 3.56**). The lighting camera has given WCC management confidence that lighting impacts are being appropriately managed by being able to verify what, if any, mine lighting is visible from Werris Creek. The reduction in lighting complaints is due to real time monitoring enabling WCC to be conservative with lighting placement and also the daily summary video of the previous night has improved on site awareness and feedback to complainants (**Figure 3.21**). Of the 42 complaints received since 2010, 40 complaints have come from the one complainant located in Werris Creek.

Figure 3.18 View of WCC Eastern Rehabilitation from Werris Creek Road

Figure 3.19 Werris Creek Road Tree Screen and Visual Screen view towards the north

Figure 3.20 WCC LoM Visual Bund and Tree Screen planted to the east of "Cintra"

Table 3.56 Summary of Visual Amenity Complaints since 2010

Visual Amenity Complaints	2010-2011	2011-2012	2012-2013	2013-2014
Lights (Mine)	13	10	2	3
Lights (Rail Load Out)	2	3	4	5
All Complaints	52	117	56	93
From the one Werris Creek Complainant	13	13	6	8

Figure 3.21 Werris Creek Lighting Monitoring Camera facing towards WCC

3.10 HERITAGE MANAGEMENT

3.10.1 Predicted Impacts from LOM Project

The LOM Environmental Assessment determined that the LOM 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).

3.10.2 Monitoring Program

In accordance with the Heritage Management Plan approved by DP&I on the 1st November 2011, WCC undertakes quarterly inspections of the only known significant heritage item onsite – the "Narrawolga" Axe Grinding Grooves.

3.10.3 Management Measures

The Heritage Management Plan outlines procedures for the replacement of the "Narrawolga" Axe Grinding Grooves within the rehabilitation area once the site that the grooves were originally located has been fully rehabilitated. The Heritage Management Plan outlines additional management actions related to items associated with the former underground which have since 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.

3.10.4 Management Performance

WCC received no complaints or heritage non-compliances during the period and achieved the one heritage related objective and target. WCC complied with all management strategies and actions in the Heritage Management Plan. The quarterly inspections did not identify any changes in the condition of the "Narrawolga" axe grinding grooves during the period (**Figure 3.22**); with no aboriginal groups requesting to inspect the site.

A request from was received in correspondence from The Nungaroo Land Council and the Liverpool Plains Shire Council Aboriginal Advisory Committee to relocate that Axe Grinding Groove Rocks from WCC to the Willow Tree Visitor Information Centre for a public display. The rocks will become an integral part of the tourist attraction "The Kamilaroi: A Highway and a People project" as the Visitor Information Centre is located at the junction of the New England and Kamilaroi Highway. A study identified the need for a prominent marker defining the only highway in NSW named after an Aboriginal nation and these rocks would be more accessible to the general public if relocated. With the support of the Nungaroo Aboriginal Land Council, WCC has engaged an archaeologist to complete the relevant applications, amendment to the Heritage Management Plan and methodology reports required to obtain approval to transport the rocks to Willow Tree and transfer the care agreement over to the Nungaroo Aboriginal Land Council to be completed in the 2014-2015 reporting period.

Figure 3.22 Narrawolga Axe Grinding Grooves Temporary Storage Location on Eurunderee

3.11 SPONTANEOUS COMBUSTION

3.11.1 Propensity

Self Heating Temperature (SHT) determinations for the B to G seams at the Werris Creek Coal Mine were undertaken during the preparation of the "*Werris Creek Coal Mine Life of Mine Project Environmental Assessment* (R.W. Corkery and Co., 2010)" and showed the:

- Coal from the B, C and G seams to have a theoretical high spontaneous combustion potential;
- Coal from the D, E and F seams to have a theoretical medium spontaneous combustion potential; and

The overburden and interburden have a very low spontaneous combustion potential due to their low percentage of inorganic sulphur and the absence of unoxidised coal.

3.11.2 Occurrence and Management

There were a number of instances of spontaneous combustion (spon comb) on site during the reporting period that resulted in five odour community complaints from three Quipolly residents. A number of odour complaints (5th and 17th June, 9th and 13th December 2013) were recorded during the period that may have been related to spontaneous combustion. The coal associated with the former underground workings has a high propensity for self heating and spon comb which can occur when the former underground workings are being mined. These instances are managed by the use of water curtains to suppress hot areas plus uncovering and mining the workings quickly and soaking

any hot coal immediately. Smaller areas of spontaneous combustion can occur in the dumps or coal stockpiles but are attended to as soon as practicable. Now that the western dump expansion is complete, active dumping in pit will minimise the time that carbonaceous waste rock is exposed to the air to prevent spontaneous combustion in the dumps from becoming excessive. On each occasion of odour from spon comb, it was unlikely to contain harmful levels of SO_2 or H_2S because no alarms from personal gas detectors of employees occurred at the time of each complaint. Given the distance to the complainants' residences (between 4 to 6km away from the mine), WCC was unable to ascertain if the mine was the source of the odour complaint.

WCC has a Spontaneous Combustion Management Plan that all operators work to if spontaneous combustion occurs at either the rail load-out facility, the ROM / screening plant or from within the pit. This management plan also outlines the identification of spon comb, the preventative actions to reduce occurrences of spon comb, the correct handling and remediation procedures and reporting of spon comb. All incidents are reported to the Coal Processing Manager and/or Operations Manager as required.

3.12 FIRE MANAGEMENT

3.12.1 Management

The exclusion of grazing and agriculture from the BOA will aid restoration of the woodland vegetation communities; however, if not adequately managed, increasing biomass and fuel loads may create a fire hazard and create an imbalance between fire tolerant and fire sensitive species. The objectives of fire management across the BOA are:

- The protection of human life and safety;
- WCC mining operation asset protection and business continuity;
- Other infrastructure and rural asset protection on WCC owned land and adjacent private property; and
- Protection and maintenance of biodiversity within the BOA.

To achieve these objectives, WCC commissioned an experienced bushfire consultant to develop a Fire Management Strategy (FMS) to quantify current BOA fuel loads and determine what management actions are required. The FMS outlines the management actions to be implemented by WCC including hazard reduction, ecological burns and maintenance of firefighting capabilities for the period 2013 to 2015.

3.12.2 Performance

During 2013-2014, management measures included the installation of fire breaks on the Railway View, Hillview and Greenslopes BOA; the maintenance of fire breaks and tracks/access on the Marengo, Eurunderee and Mine Site BOA. The first annual ecological burns were undertaken in Winter 2013 in accordance with the BOMP targeting areas of high fuel loads on the Marengo BOA. Planning for the controlled burns commenced in May 2013 between a fire consultant/contractor and the NSW Rural Fire Service. Preparation for the burns was undertaken between July 2013 including installing buffer zones around sensitive vegetation, coarse woody debris and stag trees to minimise the loss of any resources or revegetation. The control burns were managed by NSW Rural Fire Service with the fires lit on 6th, 13th and 27th August 2013 on 60 ha of the Marengo BOA (**Figure 3.23**).

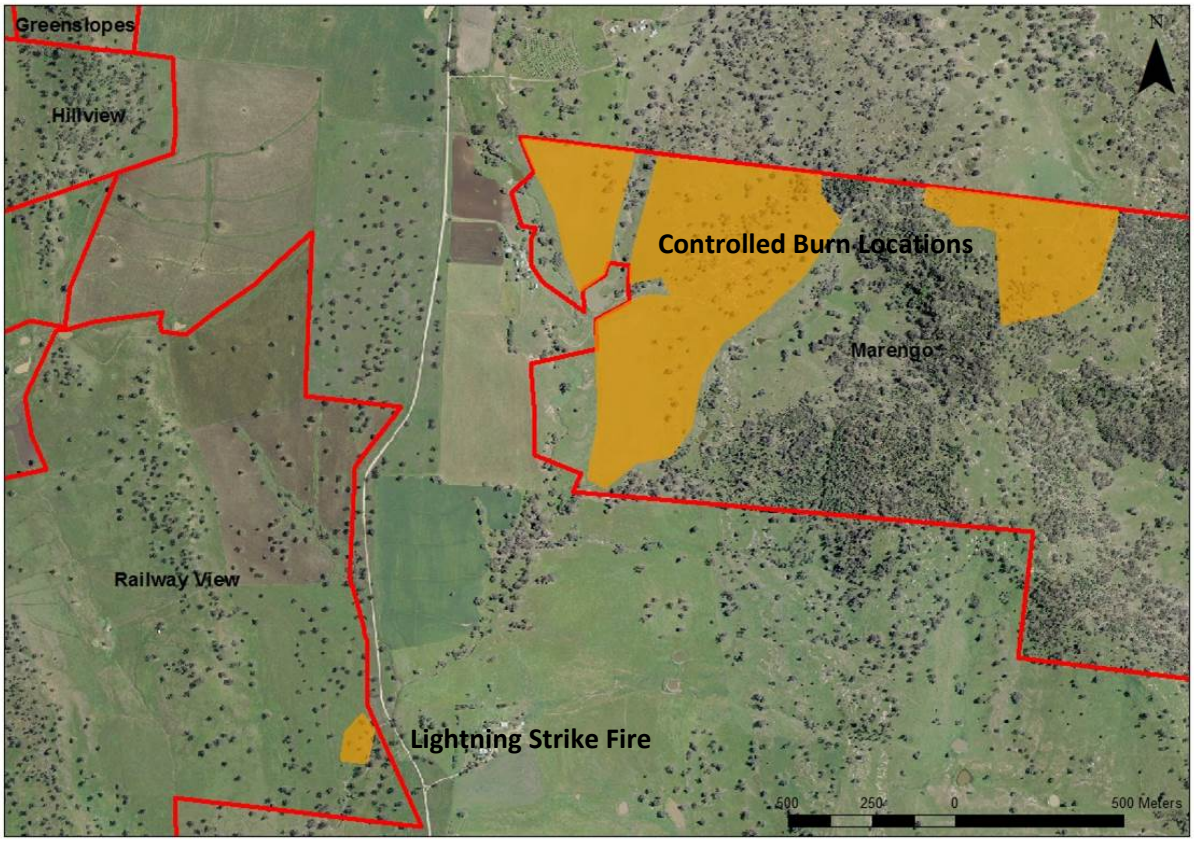


Figure 3.23 WCC Marengo BOA Ecological Burns and Lightning Strike Fire in 2013-2014

To achieve both the hazard reduction and ecological benefits; cool burn techniques were used which involves burning on cool days and into the wind which also improves safety during the activity (**Figure 3.24**). 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 (**Figure 3.25**). 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 more access to resources to hopefully improve woodland restoration outcomes. While the annual controlled burn target of 100ha was not achieved; this year was a trial at undertaking controlled burns as a biodiversity restoration management technique at WCC with much experience and learnings gained. A lightning strike on 20th January 2014 burnt 1ha on the Railway View BOA.

3.13 MINE SUBSIDENCE

Mine subsidence associated with the former underground colliery is managed by WCC by implementing risk assessment and exclusion zones for areas with shallow cover either on natural surface or where the workings will be intersected as the mining operations progressively head north. Previous survey investigations have been undertaken to ascertain the positioning and location of the underground bord and pillar operations. Internal procedures have been implemented and are enforced to remove the possibility of any vehicles or persons entering areas where old mine shafts or ventilation shafts may occur.

Figure 3.24 NSW Rural Fire Service patrolling the edge of the Marengo BOA Controlled Burn

Figure 3.25 Cool burn leaves grasses unburnt at ground level and does not scorch revegetation

3.14 METHANE DRAINAGE / VENTILATION

Methane drainage/ventilation is not considered an issue at WCC.

3.15 PUBLIC SAFETY

3.15.1 Management

WCC is located 4 km south of Werris Creek township and is accessed from Werris Creek Road. The access road into the mine is locked when no mine-related personnel are on site. The site is fenced and appropriate signs are installed with regular security patrols present on weekends.

Trucks carrying product coal to the Train Load Out Facility are required to travel at low speed through the intersection with Escott Road, after giving way to any approaching traffic travelling along Escott Road. Gates are positioned on either side of Escott Road and are locked to prevent public access outside of operational hours. Employees are inducted in safe working practices and regular follow-up safety meetings, toolbox talks and reviews are held. Visitors to the mine are required to report to the mine office and unauthorised personnel are not permitted to move around the mine area unaccompanied. WCC conducts site visits as required for approved visitors. Procedures are in place to ensure the area around each blast site is clear of personnel and that all surrounding residents are advised in advance of proposed blasts.

3.15.2 Performance

There have been no incidences of unauthorised access on site with all procedures in place being effective throughout the reporting period. Whitehaven Coal has now leased and negotiated the purchase of the Escott Road reserve from Liverpool Plains Shire Council. Escott Road is now a private road with only Zeolite Australia, “Cintra” and “Escott” permitted to use the road.

3.16 FERAL ANIMAL CONTROL

3.16.1 Management

WCC have devised a strategy for the management of vertebrate pest and overabundant native herbivore species based around routine monitoring of vertebrate pests and native herbivores in accordance with the BOMP. Vertebrate pest management in the BOA will focus on foxes and feral Pigs, however other pests are likely to be present periodically and their control will be undertaken if practical. These species have the potential to have detrimental effects on the biodiversity of the BOA. Vertebrate pests are known to impact upon native species diversity through competition with native predators and through predation of native fauna, including birds (threatened and non-threatened woodland birds), small mammals and reptiles. Feral pest and native herbivore management is to be undertaken in a responsible and humane fashion. Surveillance of pests is undertaken by informal (observation); quarterly inspections and annual sand pad monitoring using this information for planning and to set priorities for pest management. WCC utilises only qualified contractors that hold appropriate pesticide accreditation in accordance with the Pesticides Act 1999. In accordance with the legislation, WCC retains copies of the accreditation and records of pest control program.

3.16.2 Performance

WCC undertook the annual sand pad monitoring program in August 2013 across the BOA at the locations presented in **Figure 3.26**. Annual sand pad monitoring program involves placing a 3m wide row of fatty orange sand across tracks or other areas of concentrated movement by fauna to get footprints in the sand that can be used to identify what species are present. Results of the sandpad monitoring identified the Eastern Grey Kangaroos (Macropod) as continuing to have high abundance from the previous winter; foxes as medium abundance (down from high in 2012) and rabbits, pigs, hares and dogs as low or scarce (**Table 3.57**) based on NSW DEC and CSIRO (2005) sandplot methodology abundance ratings for ground-dwelling vertebrates in NSW.

Figure 3.26 Annual Sandpad Monitoring Locations for 2013

Table 3.57 Results of Annual Sandpad Monitoring

Target Species	% Plot Nights* Winter 2012**	Abundance Score Winter 2012**	% Plot Nights* Winter 2013**	Abundance Score Winter 2013**
Fox	48.8%	High	21.3%	Medium
Macropod	41.6%	High	29.3%	High
Rabbit	3.5%	Low	4%	Low
Pig	1.2%	Scarce	0%	Scarce
Hare	0%	Scarce	4%	Scarce
Dog	0%	Scarce	0%	Scarce

Based on the results of the sandplot abundance scores, WCC coordinated two vertebrate pest control programs in August 2013 (**Figure 3.27**) and March 2014 (**Figure 3.28**) focusing on 1080 baiting targeting foxes and shoot/cull program for overabundant Kangaroos across the BOA. The results for the fox control programs with a poisoned bait (1080) take rate of 24.1% in Winter 2013 and 29.8% in Autumn 2014 (**Figure 3.29**). The Autumn 2014 baiting program achieved a record take rate of 29.8% all by foxes with no takes by any non-target species (i.e. dogs, goannas or eagles). Clearly there is a high population of foxes across the WCC BOA due no coordinated control programs prior to 2012. However the BOMP pest management strategies are successful with the annual sandpad monitoring results indicating that the population is declining without the bait take rate declining, which is a positive for woodland restoration of the BOA. A total of 56 and 43 Eastern Grey Kangaroos were culled from the two shooting programs in Winter 2013 and Autumn 2014 respectively. Three free feed sites for pigs in the Marengo BOA were trialled in March 2014. If found to be used by pigs, then lethal baits will be deployed in the next period.

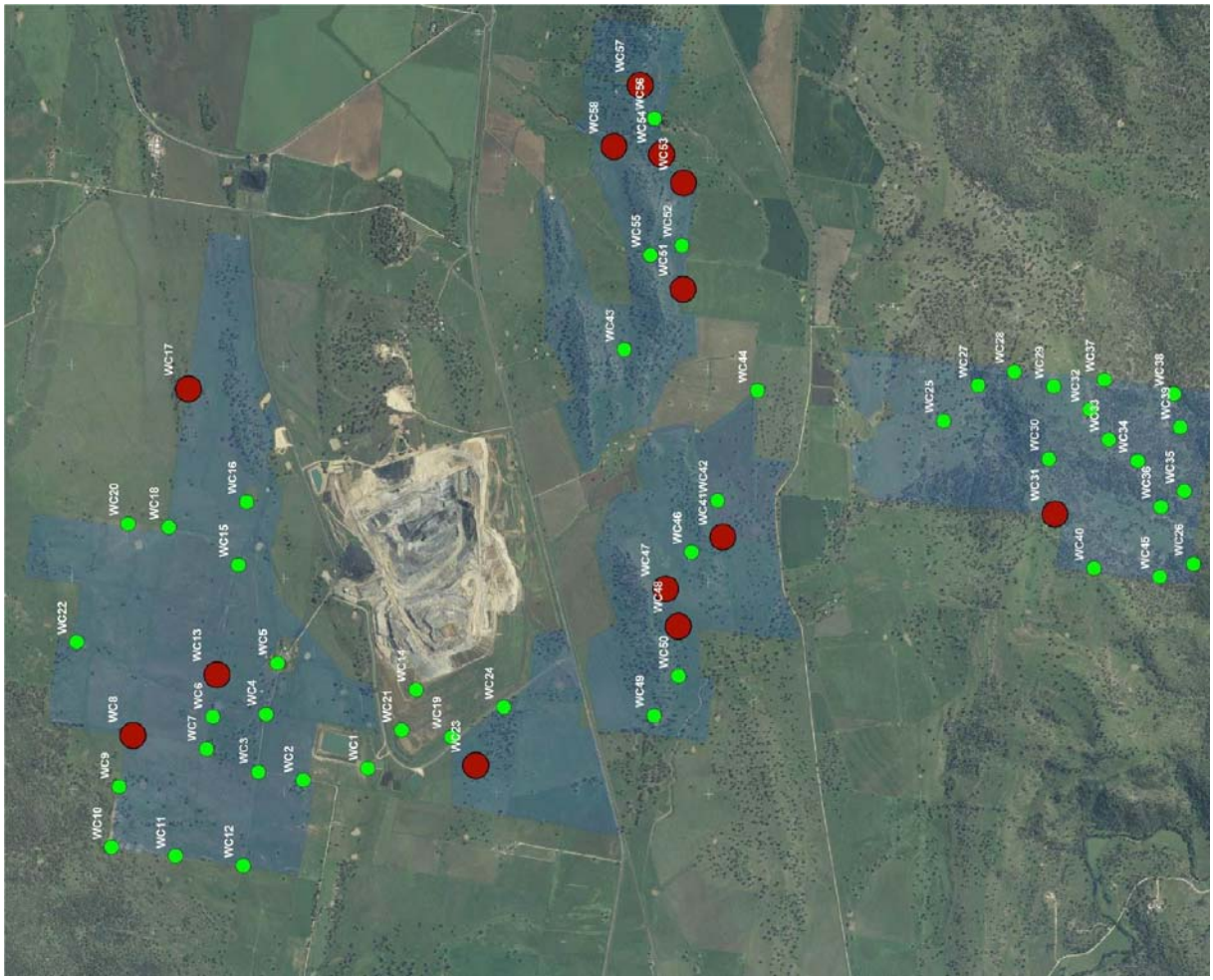


Figure 3.27 Fox Baiting (1080) Program Winter 2013 across WCC BOA

Red Circle – Bait Taken; Green Circle – Bait station with no takes recorded.

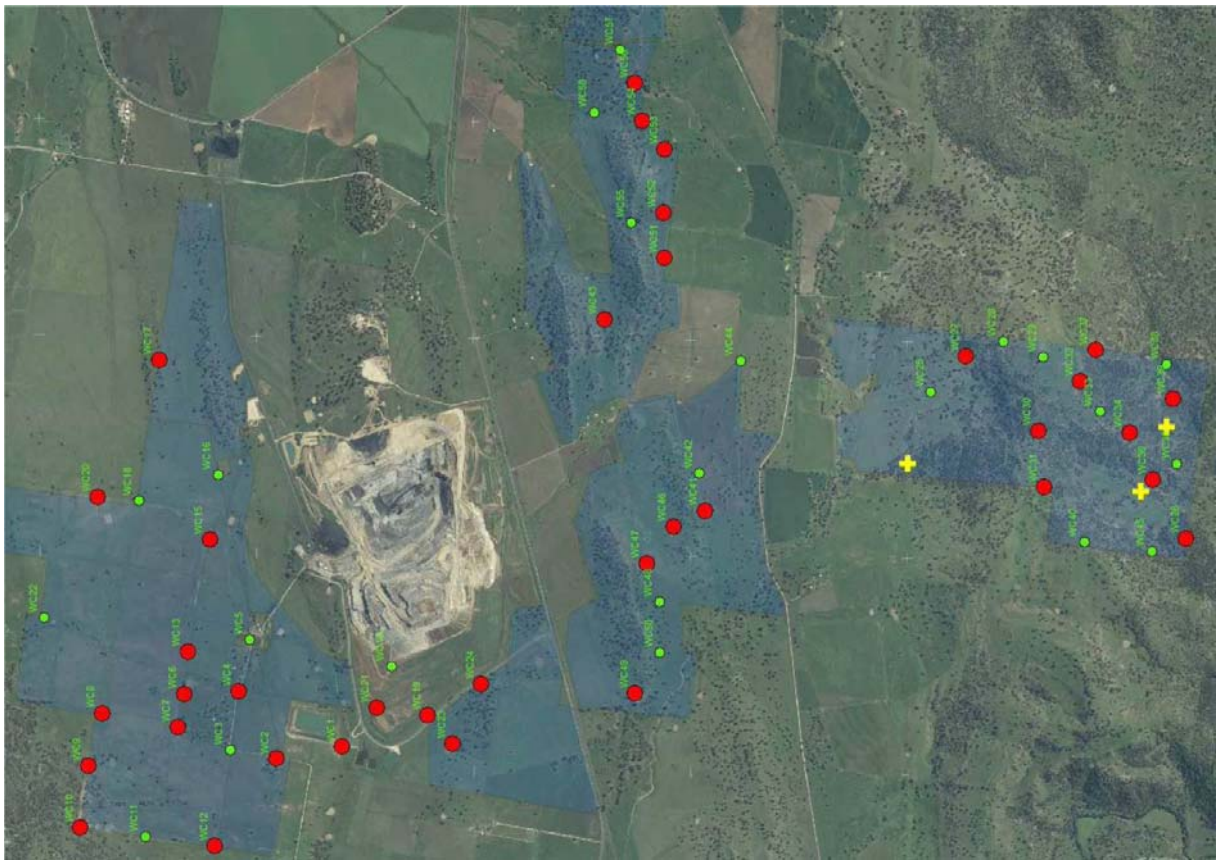


Figure 3.28 Fox Baiting (1080) Program Autumn 2014 across WCC BOA

Red Circle – Bait Taken; Green Circle – Bait station with no takes recorded; Yellow Plus Sign – Pig Free Feed Sites.

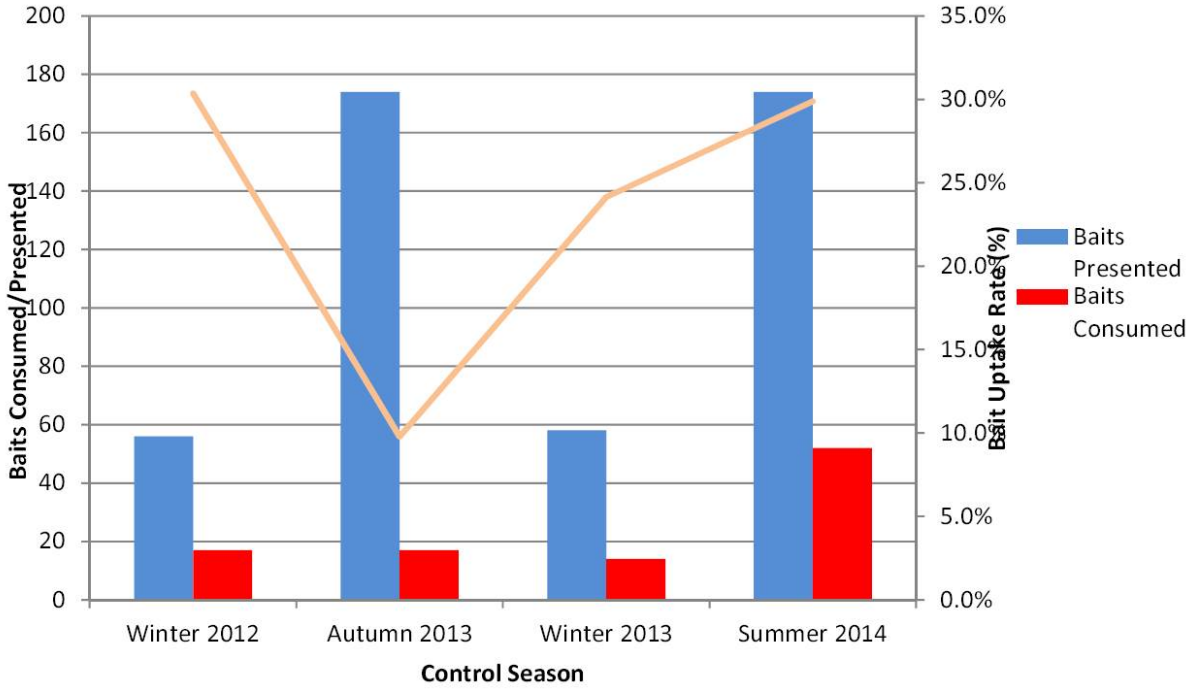


Figure 3.29 Results of Fox Baiting (1080) Program since 2012

3.17 METEOROLOGICAL MONITORING

WCC maintains an on-site weather station identified as "M2" (EPL 12290 EPA ID #9) located on the top level of the overburden emplacement (at final rehabilitated landform surface RL445m) as well as "M3" (EPL 12290 EPA ID #31) lower level temperature sensor (base of overburden emplacement area at RL373m). The direct measurement of the temperature difference between M2 and M3 over 80m is the method approved in EPL 12290 for WCC to measure temperature inversions.

In addition, WCC also maintains "mini" weather stations associated with the Continuous Noise Monitors ("M1"). "M2" is the main weather station utilised by WCC on a 10m mast which continuously monitors the meteorological parameters in **Table 3.58**.

Table 3.58 WCC "M2" Weather Station Meteorological Parameters

Parameter	Unit	Frequency	Period	Method	Calibrated
Rainfall	mm/h	Continuous	15 minute	AM-4	23/09/2013
Wind Speed @ 10m	m/s	Continuous	15 minute	AM-2 & AM-4	23/09/2013
Wind Direction @ 10m	^{o}*	Continuous	15 minute	AM-2 & AM-4	23/09/2013
Temperature @ 2m	^{o}C	Continuous	15 minute	AM-4	23/09/2013
Temperature @ 10m	^{o}C	Continuous	15 minute	AM-4	23/09/2013
Sigma Theta @ 10m	-	Continuous	15 minute	AM-2 & AM-4	23/09/2013
Solar Radiation	W/m^2	Continuous	15 minute	AM-4	23/09/2013
Barometer	hPa	Continuous	15 minute	-	23/09/2013
Humidity	%	Continuous	15 minute	-	23/09/2013
Location Siting	-	-	-	AM-1, AM4 & EPL 12290 Special Method 2	-

* Degrees clockwise from true north.

"M2" weather station operates in accordance with EPL 12290 (including AM-1, AM-2, AM-4 and Special Method 2) and *AS 2923 -1987: Guide for measurement of horizontal wind for air quality applications.*

Table 3.59 summarises the rainfall and temperature records measured at WCC and compares the results with the longer term meteorological records for the Quirindi Post Office (1882-2010) approximately 11km away. **Table 3.60** presents the annual rainfall measured at WCC since 2005. **Figure 3.30** provides the monthly wind roses measured at WCC.

Over the 12 month period to the end of March 2014, WCC only recorded 498mm of rain which is the lowest annual rainfall recorded since 2005 and nearly one-third below the long term annual average (**Table 3.60**). Also notably that the 2013-2014 period was on average between 1 and 2^{o}C warmer than the previous period with maximum monthly temperatures much higher than the long term maximum temperature averages outlined in **Table 3.59**. The combined climatic effect of the drier and hotter year for 2013-2014 is seen throughout this document, notably:

- increased regional dust levels (**Section 3.1**);
- fewer dirty water discharge events (**Section 2.8.1**);

- decreasing groundwater levels (**Section 3.3**); and
- declining condition of biodiversity (**Section 3.5.3**).

The average and 90th percentile night time lapse rates (worst case temperature inversions) are also presented below indicating that the "shoulder" seasons of autumn and spring have the strongest inversions rather than the middle of winter because of the cold nights together with the warm days produce the greatest lapse rate variations. The windiest time of the year is from July to November; with no significant change to the typical seasonal pattern of dominant north westerly winds June to October (Winter) and dominant south easterly winds December to April (Summer).

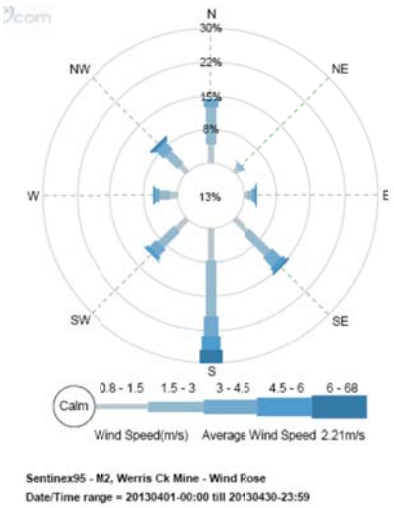
Table 3.59 Rainfall and Temperature Records for 2013-2014 Period

		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
Rainfall* (mm)		0.8	29.1	87.4	39.2	2.4	39.2	11.2	136.8	27.2	4.2	29.4	90.6	497.9
BOM Average (mm)		41.6	44.2	51.1	48.3	44.8	46.6	59.8	65.8	80.0	80.5	65.6	53.5	682.2
Temperature	**WCC Min (°C)**	8.1	0.0	2.9	2.6	-0.1	6.9	5.4	9.0	9.8	14.7	14.4	12.6	-0.1
	WCC Avg (°C)	17.9	13.8	11.3	11.8	12.8	18.2	19.7	20.4	24.2	26.3	24.9	21.7	18.6
	WCC Max (°C)	26.5	25.2	20.0	19.7	24.2	30.4	32.1	32.9	37.9	43.2	37.2	30.8	43.2
	Q BOM Max (°C)	25.0	20.5	16.6	15.9	17.9	21.5	25.2	28.5	31.1	32.2	31.3	29.3	24.6
	Q BOM Min (°C)	8.9	5.0	2.8	1.6	2.4	5.0	8.7	12.0	14.7	16.4	16.1	13.5	8.9
Average Lapse (°C/100m)		+2.5	+1.7	+1.1	+0.0	+2.4	+2.7	+1.5	+0.5	+0.7	-0.6	-0.4	-0.1	-
90% Lapse (°C/100m)		+9.4	+7.8	+6.1	+8.3	+9.6	+10.4	+9.8	+7.5	+7.9	+3.9	+4.3	+4.9	-

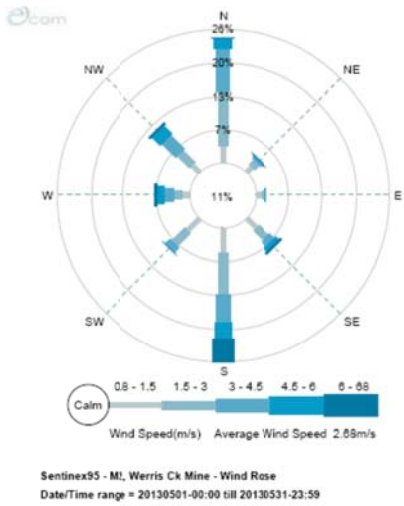
Note: BOM Average is the Quirindi Post Office Bureau of Meteorology long term monthly and annual rainfall average for 1882 to 2014. Q BOM Max and Min are Quirindi Post Office Bureau of Meteorology long term monthly and annual minimum and maximum temperatures for 1907 to 2013. * Rainfall is a compositive of the Sentinex meterology stations of onsite with noise trailer data.

Table 3.60 WCC Annual Average Rainfall since 2005

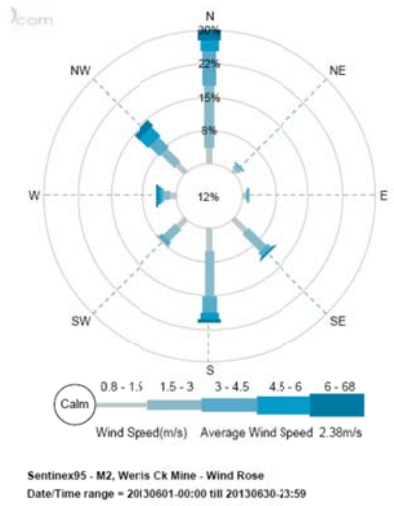
	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Annual Rainfall (mm)	591	559	753	869	605	817	794	786	498



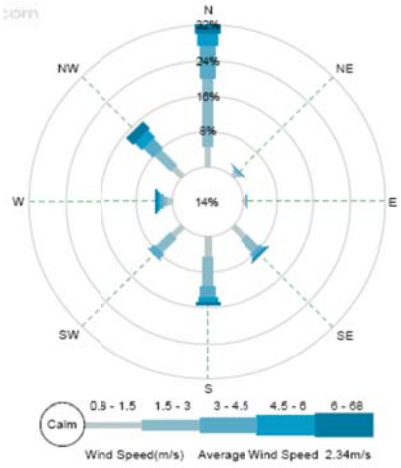
April 2013



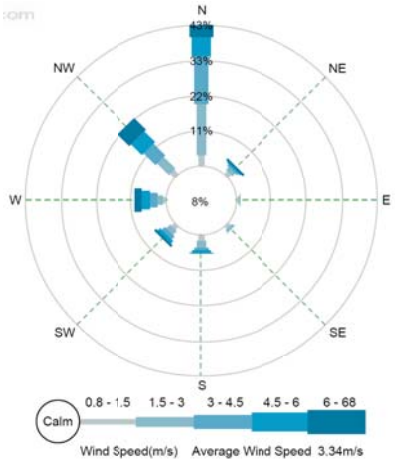
May 2013



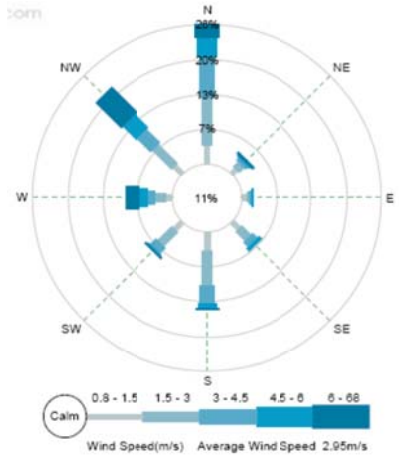
June 2013



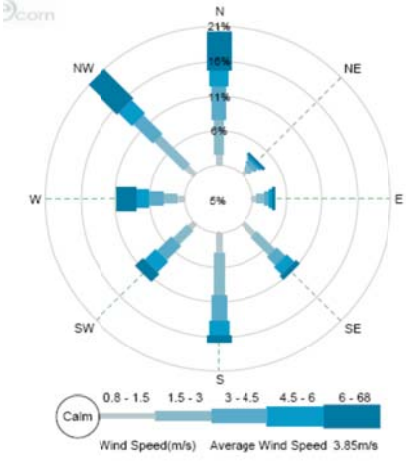
July 2013



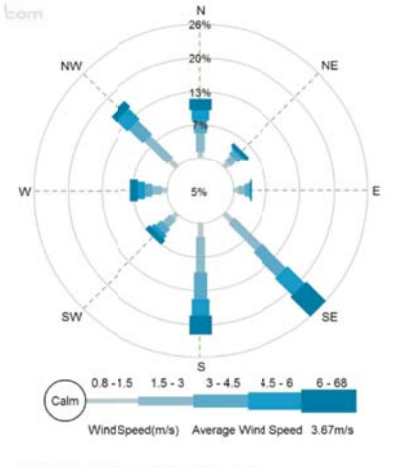
August 2013



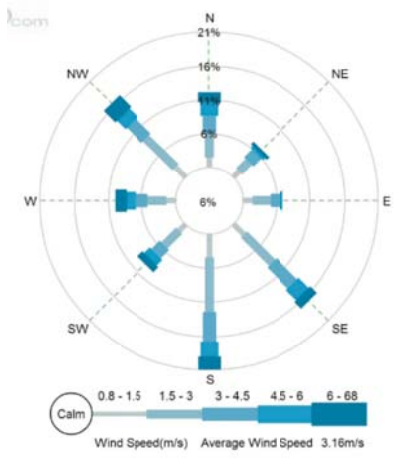
September 2013



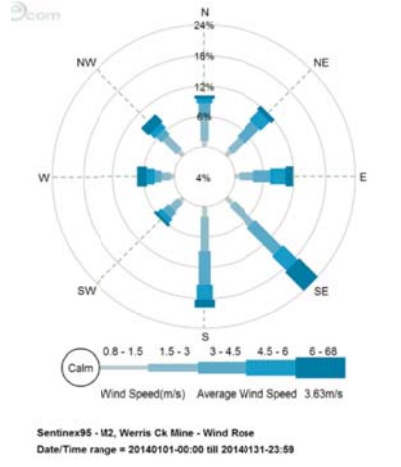
October 2013



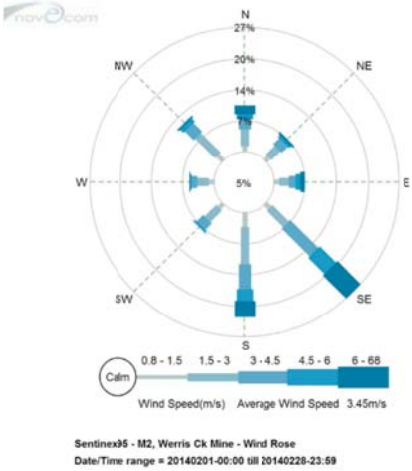
November 2013



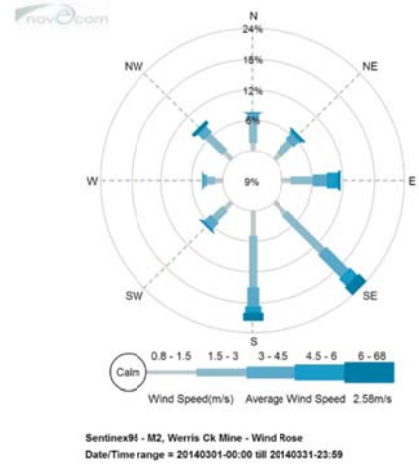
December 2013



January 2014



February 2014



March 2014

Figure 3.30 WCC Windroses for April 2013 to March 2014

4. COMMUNITY RELATIONS

4.1 COMMUNITY COMPLAINTS

WCC maintains a designated community telephone complaints line (02) 67687001 which is regularly published via Whitehaven Coal website, community newsletters, in the Werris Creek Flyer and signposted on the front entrance to the mine site.

For the 2013-2014 period there were 93 complaints received by WCC, which is an increase from the previous year (**Figure 4.1**) but still down on the 2011-2012 period. Since the mine commenced in 2005, the trend of complaints has increased as the scale of mining operations increased and the decreasing distance to the nearest major town of Werris Creek with a population of nearly 1800 people. Since 2010 when the height of the overburden emplacement increased by 35m and the expansion of the proposed dump footprint towards Werris Creek Road has resulted in an increased awareness by Werris Creek residents to WCC operations. The increase in the total number of complaints is due entirely to an increase in the number of blasting complaints from 14 complaints in 2012-2013 to 55 complaints in 2013-2014 but is still below the 71 blasting complaints received in 2011-2012 (**Table 4.1**).

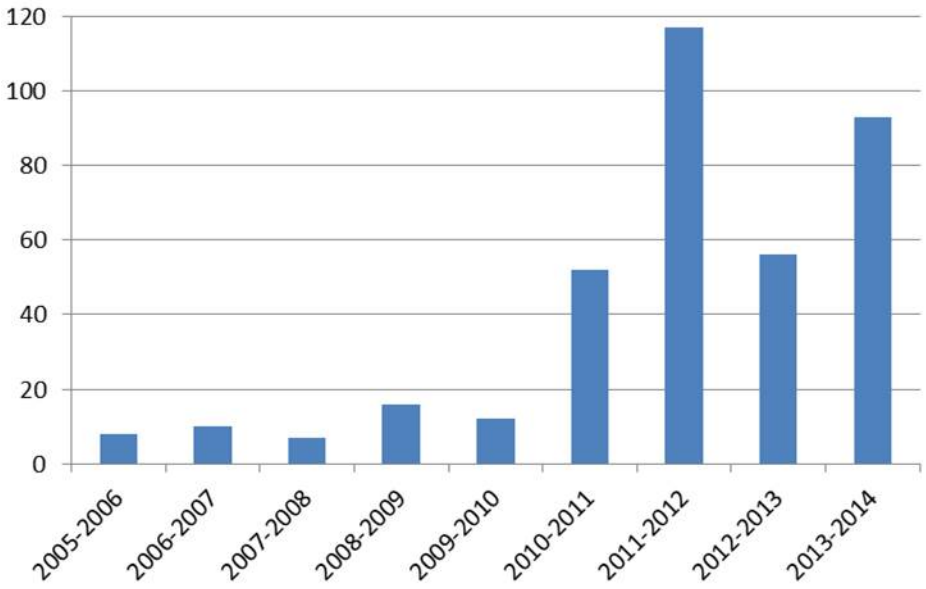


Figure 4.1 Total Number of Complaints Received by WCC from 2005 to 2014

The trend in location of complainants reflects the change from Quipolly residents to Werris Creek residents due to the closer proximity and awareness of mining operations to Werris Creek. This also in part explains the increase in the number of complaints and is more related to the exposure of mining operations to the higher population density of Werris Creek residents, rather than the lower population of Quipolly. For the first time since 2005, Werris Creek residents represented greater than 90% of the community complaints received during 2013-2014 (**Figure 4.2**). All immediately adjacent properties have been acquired by WCC and hence, no complaints from adjacent properties have been recorded since 2008.

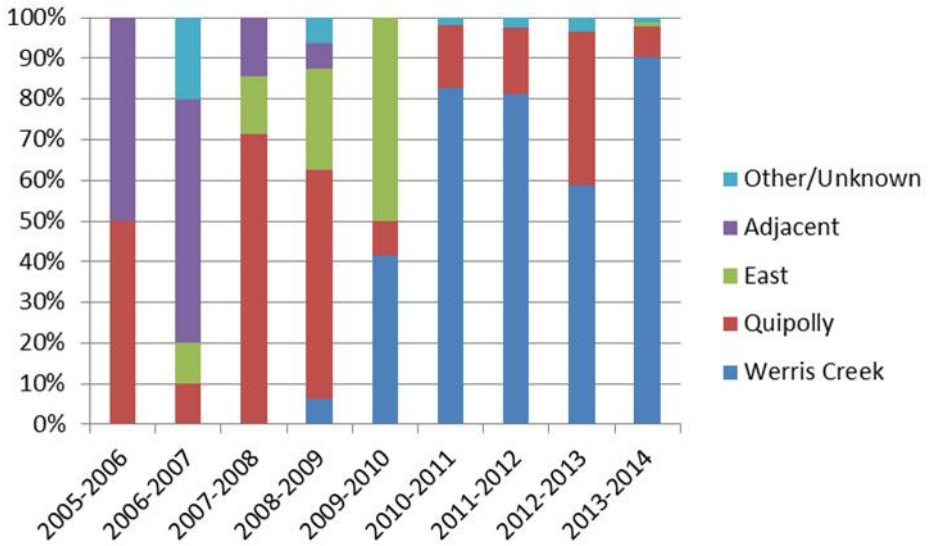


Figure 4.2 Locations of Complaints Received by WCC 2005 to 2014

Table 4.1 WCC Complaint Issues from 2005 to 2014

Issue	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Blast - Vibration/Overpressure	3	4	1	2	7	22	68	9	47
Blast - Dust/Fume	-	-	-	-	2	3	2	1	5
Blast/Other	-	-	-	-	-	-	1	4	3
Lights - Mine	1	1	1	-	-	13	10	2	3
Lights - TLO						2	3	4	5
Noise - Mine	1	3	4	10	4	6	15	15	2
Noise - TLO	-	-	-	-	-	7	17	6	9
Noise - Trains	-	1	-	-	-	-	1	-	-
Dust - Mine	1	2	-	3	-	5	7	12	11
Dust - TLO	-	-	-	1	-	-	-	-	3
Surface Water	1	-	2	-	-	-	-	1	-
Groundwater	1	-	-	-	-	3	-	1	-
Site Security	-	-	-	-	-	2	-	-	-
Clearing	-	-	-	-	-	1	-	1	-
Coal Spillage	-	-	-	-	-	-	1	-	-
Complaints Line	-	1	-	-	-	-	8	-	-
Odour	-	-	-	-	-	-	-	-	5
Number of Issues Raised*	**8***	**12***	**8***	**16***	**13***	**64***	**125***	**56**	**93**

* Number of complaints does not equal the number of issues raised as one complaint can raised multiple issues; TLO –Train Load Out Facility

As discussed in **Section 3.7.3**, there was an increase in the number of blasting related complaints during 2013-2014 from the previous period. WCC did not record any blast exceedances or non-conformances during 2013-2014; and despite recording an average blast vibration of 0.5mm/s and maximum vibration of 1.45mm/s at Werris Creek, the community continues to be very sensitive to blasting impacts. It is believed that the increase in blast complaints was due to a couple of specific blasts that had noticeably higher levels than normal and that blast sizes were increased during the period to accommodate larger and more productive equipment. A total of 18 complaints did occur for the four blasts that were elevated above either blast target level of 115dBL or 1mm/s (maximum compliance limits are 120dBL and 10mm/s) with the most notable blast event occurring on the 8th July 2013 that recorded an elevated overpressure reading of 119dBL in Werris Creek. Another factor

for the increase in blasting complaints was that WCC did fire a number of G Coal Interburden blasts during period (none the previous period) with this strata having a history of community complaints due to blast vibration.

WCC has focused efforts to minimise blasting complaints on two fronts (blast management and community relations) despite blasting levels being well below compliance levels. A review of the blasting contract during 2013 saw Whitehaven Coal change from the previous supplier of blast services (engineering design, shotfiring and explosive supply) to a dedicated Werris Creek Coal blasting engineer and shotfiring team and a new explosive supplier. The change was seen to be needed by Whitehaven Coal to increase responsibility and management of a critical process in the production system to improve productivity and at the same time improve the corporate environmental compliance and community impact management. Other blast management improvements included analysing the predicted vibration iteratively through the drill and blast process from design through to loading allowing management to address potential vibration or other concerns prior to blasting. In addition WCC has increased the amount of consultation with the community in particular regarding blasting, most notably holding two public meetings open to the Werris Creek community to discuss blasting and other concerns. Two actions taken out of those meetings were to increase the frequency of community newsletters from six monthly to quarterly and upgrade the blast notification capabilities to be able to send out SMS and email notifications.

The lighting and train load out noise complaints increased because of one specific Werris Creek complainant increasing the number of complaints from the previous period despite improved management of both lighting and noise management during the period. Overall noise complaints decreased due to no mining noise complaints from Quipolly residents during period as a result of the successful implementation of truck attenuation and noise control operator/real time noise monitoring. Dust complaints marginally increased in 2013-2014 compared to 2012-2013; which was in line with the prevailing dry conditions unrelated to WCC activities and reflect the increased dust levels measured in Werris Creek town during the 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 (**Section 3.7.2**), noise (**Section 3.8.2**) and lighting (**Section 3.9.2**), with the improvement strategies undertaken by WCC to address community concerns over these impacts included in the relevant sections of this report. For specific complaint details and actions taken refer to the Complaint Database for 2013-2014 in **Appendix 9**.

4.2 COMMUNITY LIAISON

There have been 30 Community Consultative Committee (CCC) meetings held since WCC commenced operations in 2005 with details of the meetings held summarised in **Table 4.2**.

Table 4.2 Community Consultative Committee Meetings since 2005

AEMR Reporting period	No. of meetings	CCC meeting dates	No. Of Attendees
1 June 2005 - 31 March 2006	2	23 June 2005 13 October 2005	11 (5 community representatives) not recorded
1 April 2006 - 31 March 2007	1	22 August 2006	9 (3 community representatives)
1 April 2007 - 31 March 2008	4	14 June 2007 28 August 2007	7 (2 community representatives) 6 (1 community representatives)

AEMR Reporting period	No. of meetings	CCC meeting dates	No. Of Attendees
		13 December 2007 21 February 2008	10 (6 community representatives) 9 (5 community representatives)
1 April 2008 - 31 March 2009	4	5th June 2008 4th September 2008 17th February 2009 12th March 2009	9 (4 community representatives) 8 (4 community representatives) 10 (4 community representatives) 7 (3 community representatives)
1 April 2009 - 31 March 2010	3	29th July 2009 19th November 2009 11th March 2010	7 (3 community representatives) 10 (5 community representatives) 9 (4 community representatives)
1 April 2010 - 31 March 2011	4	27th May 2010 16th September 2010 25th November 2010 24th February 2011	10 (4 community representatives) 10 (5 community representatives) 10 (4 community representatives) 4 (2 community representatives)
1 April 2011 – 31 March 2012	4	26th May 2011 1st September 2011 24th November 2011 20th March 2012	10 (4 community representatives) 10 (3 community representatives) 6 (2 community representatives) 9 (4 community representatives)
1 April 2012 – 31 March 2013	4	31st May 2012 30th August 2012 22nd November 2012 28th February 2013	8 (4 community representatives) 8 (4 community representatives) 6 (3 community representatives) 9 (4 community representatives)
1 April 2013 – 31 March 2014	4	27th June 2013 29th August 2013 21st November 2013 27th February 2014	7 (2 community representatives) 7 (3 community representatives) 7 (3 community representatives) 9 (4 community representatives)

The frequency of meetings during the 2013-2014 reporting period was held every quarter for a total of four CCC meetings. The meetings were generally well attended with no less than two community representatives at every meeting. The meetings continue to have strong representation from the Liverpool Plains Shire Council (a Councillor and the Director of Environment) and local community members in attendance willing to participate.

CCC members are provided with the quarterly environmental monitoring data for the previous three months before each meeting and an agenda is circulated with a number of mine related topics discussed with enthusiasm during the meetings. Before every meeting a tour of the mine is undertaken.

During the 2013-2014 reporting period, WCC released two community newsletters updating the community on the status of WCC operations including:

- Rehabilitation Program;
- New Werris Creek Skate Park;
- Dust Monitoring;
- Summary of Community Meeting on 6th November 2013 and 11th March 2014;
- New Blast Notification Process; and
- CCC Vacancy.

The community meeting on the 6th November 2013 came at the request of the local Member of Parliament after receiving a petition from Werris Creek residents regarding blasting impacts

following a high overpressure blast on 8th July 2013. WCC organised the second community meeting on the 11th March 2014 as a follow up on the communities concerns over blasting impacts with expert presenting on the blast process, the soils and geology of Werris Creek and structural defects of houses. These presentations were summarised and factsheets produced available on the Whitehaven Coal website at:

http://www.whitehavencoal.com.au/environment/werris_creek_mine_environmental_management.cfm

4.3 EMPLOYMENT STATUS, DEMOGRAPHY, SOCIO-ECONOMIC CONTRIBUTIONS

4.3.1 Employment Status and Demography

WCC currently employees 139 full-time equivalent personnel; of which 60 full-time employees live locally in the Liverpool Plains Shire including Quirindi, Werris Creek, Willow Tree, Wallabadah, Currabubula and Spring Ridge. The majority of the regular contractors are also based in Werris Creek, Quirindi, Tamworth and Gunnedah. The WCC LOM expansion of operations to achieve 2.5Mtpa in the previous period was beneficial to the local community with approximately 50 additional employees since 2011 from either locals or new people to have moved into the area to take up employment from WCC which will have a lasting positive flow on into the local economy.

4.3.2 Social and Economic Contributions

WCC has contributed to the local and regional communities, firstly through the provision of permanent employment (including training opportunities) for residents within the Liverpool Plains Shire (Werris Creek, Quipolly and Quirindi) and within the wider region (local government areas of Tamworth and Gunnedah). Employing locally and within the region ensures that the flow-on benefits to the socio-economic setting, i.e. through wages, viability of other businesses, remain within the local area and region.

In additional to the direct social and economic contribution, during the past 12 months WCC has contributed over $32,000 to events and services in the local area including:

- Westpac Rescue Helicopter;
- Australian Red Cross
- Currabubula Red Cross Art Show;
- Quirindi NAIDOC Week;
- Werris Creek Public School;
- Werris Creek Can Assist;
- Quirindi Public School;
- Young Indigenous Writers & Arts Program;
- Walhollow Public School;
- Quirindi High School;
- Women in Mining Awards;

- Werris Creek Pre-School;
- Werris Creek Lions Club;
- Quirindi Show Society;
- Spring Ridge Rural Fire Brigade;
- Country Education Foundation; and
- Lifeline.

WCC has demonstrated through these contributions its ongoing commitment to the social and economic well-being of the local communities within which the mine is located.

4.3.3 Community Enhancement Fund

WCC Life of Mine (LOM) Project was approved by the DP&I conditioning the establishment of a Community Enhancement Fund (CEF) based on the proposal agreed between Liverpool Plains Shire Council (Council) and Whitehaven Coal. The aim of the CEF is for Whitehaven Coal to support community projects in Liverpool Plains Shire for the benefit of the local community in particular the Werris Creek township.

The WCC LOM Project Approval 10_0059 Schedule 1 Condition 15 outlines the CEF requirements:

COMMUNITY ENHANCEMENT
The Proponent shall establish and operate a Community Enhancement Fund for the project to the satisfaction of the Director-General. This fund must:

(a) be established and operated in consultation with Council and the CCC;
(b) be directed towards providing benefits to the local communities affected by the project;
(c) provide for the expenditure of at least $300,000 (indexed to CPI) over 6 calendar years (2012 to 2017), and include at least $200,000 of expenditure within the town of Werris Creek; and

be operating from the end of April 2012, unless the Director-General agrees otherwise.

Following consultation with Council and the CCC in 2012, DP&I approved on 25th July 2012:

- a CEF funded to $300,000 over a 6 calendar year period commencing May 2012;
- The CEF will be indexed to CPI calculated on the monies not spent against the balance of the $300,000 at the end of each calendar year to provide an ongoing balance for the beginning of the next calendar year. This balance will be confirmed in writing by Werris Creek Coal at the beginning, or shortly thereafter, of each calendar year; and
- Two- thirds of the CEF will be spent in the Werris Creek township.

The most recently updated Community Project Schedule approved by CCC (meeting on 27th February 2014) and Council (in correspondence dated 28th March 2014) is outline in **Table 4.3**. Three projects were completed during the period with the construction of the Werris Creek Skate Park (**Figure 4.3**) and installation of lift and early warning evacuation alarm for the Australian Railway Museum which is the premier tourist attraction of Werris Creek.

Table 4.3 Community Enhancement Fund Project Schedule approved in 2014

YEAR	CEF Project Schedule	COST
2010	CEF established by Werris Creek Coal	$300,000
2010	Grand Piano for Royal Theatre, Quirindi	-$20,000
2012	2012 CPI 2.2% Increase	$6,160
2013	2013 CPI 2.7% Increase	$7,726.32
2013	Skate Park, Werris Creek	-$65,294.90
2014	Disabled Lift at Australian Railway Museum, Werris Creek	-$64,705.10
2014	Early Warning Evacuation Alarm, Australian Railway Museum, Werris Creek	-$30,000*
	Sub Total (Funds Remaining)	**$133,886.32**
2014	Additional Public Seating in Single Street outside CBD, Werris Creek	-$7,000
2014	Werris Creek Preschool Garden Items for Upgraded Sandpit, Werris Creek	-$755
2014	Finalise various items upstairs at Australian Railway Museum for Occupation Certificate, Werris Creek	-$6,000
2015	Upgrade or New Playground, Werris Creek	-$70,000
2016	Various playground improvements in Villages, Liverpool Plains Shire	-$50,000
2017	Nil	-$0
	Unallocated Funds	**$131.32**

* Projects Committed but Yet To Be Invoiced.

Figure 4.3 Werris Creek Skate Park opening on 6th July 2013 attended by WCC and Council

5. REHABILITATION

DRE approved the WCC LOM MOP on 29th November 2011 as meeting the Mining, Rehabilitation and Environmental Management Plan guidelines and subsequently approved Section 4 and 5 of the LOM MOP relating to rehabilitation activities as the Rehabilitation Management Plan (RMP) on 2nd May 2012 in accordance with Condition 43 of PA 10_0059. The LOM MOP/RMP outline the objectives, domains, completion criteria, methodology, targets, processes, activities and conceptual decommissioning relating to rehabilitation management at WCC.

WCC's rehabilitation objectives focus on restoration of native woodland vegetation, specifically the endangered ecological community Grassy White Box Woodland. The restoration of this woodland community would compensate for those areas disturbed by the mine development, linking with remnants of this community included in the BOA, and provide a greater area and more diverse native fauna habitat and wildlife corridors.

WCC rehabilitation objectives are divided into three specific categories below and in **Table 5.1**, outlining the specific objectives associated with each category consistent with the LOM MOP/RMP and "*Environmental Assessment for WCCM LOM Project*" (R.W. Corkery & Co, 2010):

- integrated landscapes;
- sustainable growth and development; and
- final land use.

Table 5.1 WCC Rehabilitation Objectives

Integrated Landscapes
• To provide an vegetation community corridor across the WCC land holdings and Quipolly Creek Catchment with sub-regional habitat corridors; • To reduce the visibility of mine-related activities from adjacent properties, Werris Creek and the local road network; • To blend the created landforms with the surrounding topography; and • To provide a low maintenance, geotechnically stable and safe landform with minimal erosion.
Sustainable Growth and Development
• To achieve a soil profile capable of sustaining the specified final land use; and • To establish native vegetation with the species diversity commensurate to each relevant vegetation community.
Final Land Use
• To re-instate Class III Land Capability commensurate with the agricultural land use on and adjacent to WCC; • To re-instate woodland vegetation communities commensurate with the remnant woodland vegetation on and adjacent to WCC; and • To undertake habitat augmentation to improve and promote corridors for fauna movement linking adjacent remnant woodland vegetation with the rehabilitation at WCC.

Rehabilitation will consist of two final land uses including:

- Class III land capability agricultural land; and
- Native vegetation communities including:
    - Grassy White Box Woodland (GWBW) (equivalent to the NSW Threatened Species Act Endangered Ecological Community "White Box Yellow Box Blakely's Red Gum Woodland" and also Commonwealth Environmental Protection and Biodiversity Conservation Act Critically Threatened Ecological Community "White Box-Yellow Box-Blakely's Red Gum (Box Gum) Grassy Woodland and Derived Native Grassland" made

up of the vegetation communities “White Box Grassy Woodland of the Nandewar and Brigalow Belt South Bioregions” and “Yellow Box-Blakely’s Red Gum Grassy Woodland of the Nandewar Region”);

- Shrubby White Box Woodland (SWBW) (not listed as endangered, vegetation community “White Cypress Pine – Silver-leaved Ironbark – Tumbledown Gum Shrubby Open Forest of the Nandewar and Brigalow Belt South Bioregions”); and
- Brigalow Woodland (equivalent to the NSW Threatened Species Act Endangered Ecological Community “Brigalow-Belah Woodland” and also Commonwealth Environmental Protection and Biodiversity Conservation Act Endangered Ecological Community “Brigalow Woodland” made up of the vegetation community “Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions”).

Woodland areas will include habitat augmentation and corridors for fauna movement linking with adjacent areas associated with the BOA. Rehabilitation strategies have been developed to target achieving sustainable final land uses as identified above by restoring within rehabilitation areas:

- Soil/growing medium;
- Endemic vegetation communities or exotic pastures; and
- Augmenting with habitat (ecological communities only).

5.1 INFRASTRUCTURE

The major infrastructure undertaken during the period was the Rail Loop Project which included the upgrade of the train loading system. The Rail Loop Project commenced in May 2013 and was completed in August 2013; however the use of the new rail loop did not begin until December 2013 once the testing and commissioning of loop and new automated loading process was complete.

Other infrastructure undertaken during 2013-2014 was to do with the completion of the Mine Infrastructure Area (MIA) relocation that commenced in the previous period. The new northern MIA was completed with the Administration, Workshop and Coal Processing Facilities successfully being relocated and commissioned during the period (**Figure 5.1**). No major infrastructure activity is planned for 2014-2015.

5.2 REHABILITATION PERFORMANCE AND STATUS

WCC completed an additional 7.80ha of rehabilitation during the period limited to the northern end of the eastern visual bund and RL445m rehabilitation areas. The rehabilitation was down compared to the previous period when WCC completed a record 47.71ha along the eastern rehabilitation in 2012-2013 resulting in WCC being ahead of the MOP/RMP rehabilitation commitments. As at March 2014, WCC had completed 105.47ha of rehabilitation since 2005 and is still ahead of the MOP/RMP target of 97.2ha by +8.27ha (**Table 5.2**).

Figure 5.1 Completed Northern Mine Infrastructure Area (MIA) viewed from Truck Loading Bin

Table 5.2 WCC Actual Rehabilitation Program compared to MOP/RMP Commitments

Period*			Woodland Vegetation Community			Agriculture Class 3 (ha)	Temporary Rehab (ha)	ANNUAL TOTAL (ha)	CUMULATIVE TOTAL (ha)
			GWBW(ha)	SWBW(ha)	Brigalow (ha)				
Actual Rehabilitation	2008-2009		14.31	0.0	0.0	0.0	-	14.31	14.31
	2009-2010		-5.12**	0.0	0.0	0.0	-	-5.12	9.19
	2010-2011		23.93	0.0	0.0	0.0	-	23.93	33.12
	2011-2012		16.84	0.0	0.0	0.0	-	16.84	49.96
	2012-2013		40.98	0.0	0.0	0.0	6.73	47.71	97.67
	2013-2014		**2.84**	**0.0**	**0.0**	**0.0**	**4.96**	**7.80**	**105.47**
Target/LOM MOP	**Year 2**	**2013 - 2014**	**21.6**	**0.0**	**0.0**	**0.0**	**-**	**21.6**	**97.2**
	Year 3	2014 - 2015	22.4	0.0	0.0	0.0	-	22.4	120.2
	Year 4	2015 - 2016	23.5	0.0	0.0	0.0	-	23.5	143.7
	Year 5	2016 - 2017	15.1	0.0	0.0	0.0	-	15.1	158.8
	Year 6	2017 - 2018	24.0	0.0	0.0	0.0	-	24.0	182.8
	Year 7	2018 - 2019	14.3	0.0	0.0	0.0	-	14.3	197.1
TOTAL			193.4	0.0	3.7	0.0	-	197.1	197.1
REMAINING***			188.1	180.0	0.0	47.9	-	408.2	408.2

Note: Rehabilitation data was transferred from AUTOCAD to ARCGIS program and the rehabilitation area values have had minor updates;
* Period aligns with WCC's annual statutory reporting dates 1st April to 31st March; ** Approval of DA 172-7-2004 MOD 5 for an extension to the eastern emplacement required 5ha of existing rehabilitation to be re-disturbed; *** Remaining rehabilitation to be completed by mine closure following ongoing mining until the resource is exhausted at WCC beyond this MOP period. **BOLD** compares the actual 2013-2014 rehabilitation with the LOM MOP targets for 2013-2014. Grey Shading is the values as per the approved RMP (MOP Section 4&5).

At the Annual AEMR meeting on the 19th February 2014, the DRE representative verbally requested the rehabilitation quantities to be presented demonstrating the standard/condition/quality of the rehabilitation completed by WCC to date. Seven simplified rehabilitation condition categories have been used as a basis to rate the quality and development of the rehabilitation since initial woodland revegetation works (i.e. cover crop, native ground cover and overstorey plantings) had been completed. The seven rehabilitation condition categories are:

- Temporary Rehabilitation (TEMP) – Rehabilitation has been topsoiled and seasonal cover crop sown;
- Woodland Condition 1 (WOOD1) – Revegetation of native woodland overstorey (Over) species has been sown or planted and growth of canopy height is less than 5m;
- Woodland Condition 2 (WOOD2) – Native woodland ground cover (NGC) species (most likely native grasses) have either been sown, planted or colonised the site less than 50% ground cover;
- Woodland Condition 3 (WOOD3) – Both WOOD1 and WOOD2 have occurred;
- Woodland Condition 4 (WOOD4) – Revegetation of native woodland overstorey species has been sown or planted and growth of canopy height is less than 5m and the native woodland ground cover species have either been sown, planted or colonised the site greater than 50% ground cover;
- Woodland Condition 5 (WOOD5) – Revegetation of native woodland overstorey species has been sown or planted and average canopy height is between 5m and 20m and the native woodland ground cover species have either been sown, planted or colonised the site greater than 50% ground cover; and
- Woodland Condition 6 (WOOD6) – Revegetation of native woodland overstorey species has been sown or planted and average canopy height greater than 20m and the native woodland ground cover species have either been sown, planted or colonised the site greater than 50% ground cover.

Figure 5.2 and **Table 5.3** summarises the condition of the woodland revegetation completed to date with the rehabilitation goal to move from left to right across the table; the far right column representing a tall canopy of woodland overstorey species (i.e. White Box) dominated by native ground cover species (i.e. native grasses). The 50% native ground cover criteria was taken from the relevant completion criteria performance indicator for Liverpool Plains Grass Grassland which had the highest biometric benchmark for all the woodland vegetation communities being restored at WCC (**Table 5.10**).

Table 5.3 Condition of Woodland Rehabilitation as at end of 2013-2014

Period*	TEMP (ha)	WOOD1 (ha)	WOOD2 (ha)	WOOD3 (ha)	WOOD4 (ha)	WOOD5 (ha)	WOOD6 (ha)
	Temporary Rehabilitation	Over<5m	<50% NGC	Over<5m & <50% NGC	Over<5m & >50% NGC	Over5-20m & >50% NGC	Over>20m & >50% NGC
2008-2009	-	-	-	-	-	9.19	-
2009-2010	-	-	-	-	-	-	-
2010-2011	-	-	10.14	0.73	13.06	-	-
2011-2012	-	-	3.76	13.08	-	-	-
2012-2013	6.73	-	28.81	12.17	-	-	-
2013-2014	4.96	2.84	-	-	-	-	-
TOTAL	**11.69**	**2.84**	**42.71**	**25.98**	**13.06**	**9.19**	**0.00**

Figure 5.2 WCC Rehabilitation Status as at the end March 2014

Table 5.4 summaries of the individual rehabilitation programs in **Figure 5.2** for 2013-2014 including the revegetation methodology implemented for those areas completed in the reporting period.

Table 5.4 WCC Rehabilitation Program Summary 2013-2014

Domain:	3	**Sub Domain:**	WOOD1	**Reveg Date:**	March 2014	**Area:**	2.84ha
Name:	Eastern Visual Amenity Bund Zone A and Z		**Land Use:**	Vegetation Community	**Seed/Plant:**	Grassy White Box Woodland species	
Description/Methodology: Shaping was completed in October 2013. Topsoil and subsoil was applied to 0.2m depth each using subsoil from Stockpile 4 and topsoil from the stripping of soil in the bund disturbance area in October 2013. D6 dozer undertook final trim and contour bank construction in December 2013. Jap Millet cover crop was sown at 10kg/ha. Planting preparation was undertaken between January to March 2014 with 0.3m deep holes either drilled with a mechanical auger dug with a mattock and back filled to create a basin for increased surface water retention. Following first decent rain at the end of March 2014, approximately 225 trees (hikos) were planted at a loose 10mx10m aiming to replicate a 100 stem/ha density. GWBW overstorey species ratio planted was White Box, Yellow Box, Blakely's Red Gum at 20:1:1. **Status/Progress:** December to March was dry, so minimal cover crop germination has occurred. No erosion present however thistle weed control will be required. Overstorey revegetation (tubestock) will need to be planted.							
Domain:	3	**Sub Domain:**	TEMP	**Reveg Date:**	March 2014	**Area:**	2.44ha
Name:	Eastern Visual Amenity Bund Zone A and Z		**Land Use:**	Vegetation Community	**Seed/Plant:**	Cover Crop	
Description/Methodology: Shaping was completed in October 2013. Topsoil and subsoil was applied to 0.2m depth each using subsoil from Stockpile 44 and topsoil from the stripping of soil in the bund disturbance area in October 2013. D6 dozer undertook final trim and contour bank construction in December 2013. Jap Millet cover crop was sown at 10kg/ha. **Status/Progress:** December to March was dry, so minimal cover crop germination has occurred. Overstorey revegetation did not occur due to the discovery of noxious weed Spiny Burr Grass that must have been transported in the soil stockpile.							
Domain:	3	**Sub Domain:**	TEMP	**Reveg Date:**	March 2014	**Area:**	1.21ha
Name:	RL445m Rehabilitation Soil Stockpile 58		**Land Use:**	Soil Stockpile	**Seed/Plant:**	Cover Crop	
Description/Methodology: Shaping to final surface level was completed in February 2013. Topsoil and subsoil was relocated from Soil Stockpile 4 in July 2013. D6 dozer trimmed the soil stockpile and sowed a Jap Millet cover crop at 10kg/ha. **Status/Progress:** Following first decent rain at the end of March 2014, cover crop has germinated.							
Domain:	3	**Sub Domain:**	TEMP	**Reveg Date:**	March 2014	**Area:**	0.89ha
Name:	RL445m Rehabilitation Soil Stockpile 58		**Land Use:**	Soil Stockpile	**Seed/Plant:**	Cover Crop	
Description/Methodology: Shaping to final surface level was completed in February 2013. Topsoil and subsoil was relocated from Soil Stockpile 4 in July 2013. D6 dozer trimmed the soil stockpile and sowed a Jap Millet cover crop at 10kg/ha. **Status/Progress:** Following first decent rain at the end of March 2014, cover crop has germinated.							
Domain:	3	**Sub Domain:**	TEMP	**Reveg Date:**	March 2014	**Area:**	0.42ha
Name:	RL445m Rehabilitation Soil Stockpile 58		**Land Use:**	Soil Stockpile	**Seed/Plant:**	Cover Crop	
Description/Methodology: Shaping to final surface level was completed in February 2013. Topsoil and subsoil was relocated from Soil Stockpile 4 in July 2013. D6 dozer trimmed the soil stockpile and sowed a Jap Millet cover crop at 10kg/ha. **Status/Progress:** Following first decent rain at the end of March 2014, cover crop has germinated.							

Due to the dry conditions that was present for the majority of the period, maintenance planting of woodland overstorey species in existing rehabilitation was limited to 12.17ha (**Table 5.5**). **Table 5.6** outlines the disturbance status (**Figure 5.3)** and maintenance works undertaken by WCC for 2013-2014. Due to the good maintenance earthworks in the previous period, with all existing rehabilitation, contour banks and soil stockpiles did not require any repairs to be undertaken (**Table 5.7**). As outlined in **Section 3.5**, the rehabilitation sites still need a high level of weed control managed mostly broadleaf weeds (thistles) and a couple of noxious weeds to improve the native grasses density and resilience/competition with approximately 276ha sprayed during the period which means that there was between two and three repeat weed spraying events.

Table 5.5 WCC Rehabilitation Maintenance Revegetation 2013-2014

Domain:	3	**Sub Domain:**	WOOD3	**Reveg Date:**	March 2014	**Area:**	12.17ha
Name:	Eastern Rehabilitation Zone A		**Land Use:**	Vegetation Community	**Seed/Plant:**	Grassy White Box Woodland species	
Description/Methodology: The area was sown with an oats cover crop and native grass seed collected onsite in March 2013. Planting preparation was undertaken March 2014 with 0.3m deep holes dug with a mattock and back filled to create a basin for increased surface water retention. Following first decent rain at the end of March 2014, approximately 195 trees (hikos) were planted at a loose 15mx15m aiming to replicate a 50 stem/ha density. GWBW overstorey species ratio planted was White Box, Yellow Box, Blakely's Red Gum at 10:1:1 with an area set aside for Brigalow revegetation given a close match in soil chemistry. **Status/Progress:** Cooler temperatures of Autumn have ensured survival despite no follow up rain.							

Table 5.6 Rehabilitation Summary

	Area Affected (hectares)			
	This Report Period (as of 31/3/2014)	**Last Report Period (as of 31/3/2013)**	**Next Report Period (estimated) (as at 31/03/2015)**	
A: MINE LEASE AREA				
A1 Mine Lease(s) Area	910			
B: DISTURBED AREA				
B1 Infrastructure area (other disturbed areas to be rehabilitated at closure including facilities, roads, soil stockpiles, dams)	137.2	113.6	140.0	
B2 Active Mining Area (excluding items B3 - B5 below)	73.9	65.2	75.0	
B3 Waste emplacements, (active/unshaped/in or out-of-pit)	119.6	108.3	100.0	
B4 Tailings emplacements, (active/unshaped/uncapped)	0	0	0	
B5 Shaped waste emplacement (awaits final vegetation)	30.5	0	0	
ALL DISTURBED AREAS	361.2	287.1	315.0	F1
C: REHABILITATION PROGRESS				
C1 Total Rehabilitated area (except for maintenance)	105.47	93.7	150.0	F2
D: REHABILITATION ON SLOPES				
D1 Less than or equal to 10 degrees	105.47	93.7	150.0	
D2 10 to 18 degrees	0	0	0	
D3 Greater than 18 degrees	0	0	0	
E: SURFACE OF REHABILITATED LAND				
E1 Pasture and grasses	0	0	0	
E2 Native forest/ecosystems	93.78	87.0	145.0	
E3 Plantations and crops	0	0	0	
E4 Other (include nonvegetative outcomes)	11.69	6.7	5.0	

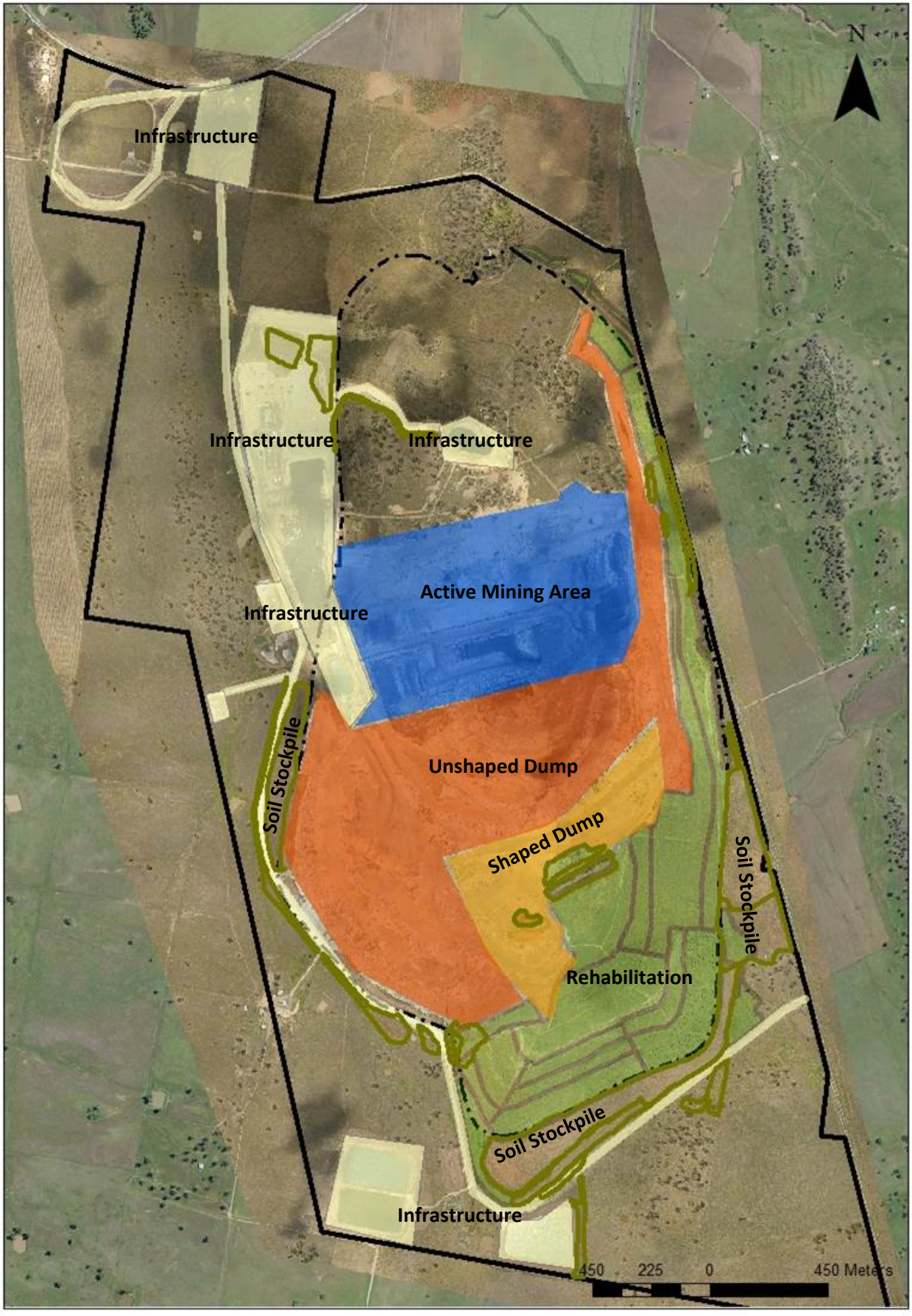


Figure 5.3 WCC Disturbance Status as at March 2014

Table 5.7 Maintenance Activities on Rehabilitated Land

	Area Treated (ha)		
Nature of Treatment	**Report period**	**Next period**	**Comment/control strategies/ treatment detail**
Additional erosion control works (drains re-contouring, rock protection)	0	As required	None
Re-covering (detail - further topsoil, subsoil sealing etc)	0	As required	None
Soil treatment (detail - fertilizer, lime, gypsum etc)	0	As required	None
Treatment/Management (detail - grazing, cropping, slashing etc)	0	As required	None
Re-seeding/Replanting (detail - species density, season etc)	12.17	As required	See **Table 5.5**
Adversely Affected by Weeds (detail - type and treatment)	276	As required	St Barnabys Thistle, Johnsons Grass, Spiny Burr Grass (**Section 3.6**)
Feral animal control (detail - additional fencing, trapping, baiting etc)	0	As required	No fox baiting on rehabilitation but in surround BOA (**Section 3.16**)

5.3 REHABILITATION METHODS

WCC rehabilitation methods have been developed to restore woodland vegetation communities while also achieving minimal erosion and mitigating weed infestations. After the soil has been respread, a seasonal cover crop is sown as soon as practicable to stabilise the soil and prevent erosion and out compete potential colonising weed species.

The actual methods used for the second revegetation stage will be determined for each campaign, however the current method is based on a “top down” restoration strategy of planting overstorey tubestock species at the required woodland densities. Indicatively, the overstorey tubestock species are planted into holes 0.15-0.3m deep by either a mechanical auger, pottiputki or mattock and depending on the conditions, a native tree fertiliser pill and water saving crystals may be added. The hole is back filled to create a basin for increased surface water retention and each tubestock is watered in with 1L at time of planting (depending on the conditions). The overstorey tubestock species are planted at loose spacings between 10mx10m and 15mx15m aiming to replicate between 30 to 100 stem/ha typical woodland density. The ratio of key overstorey species utilised range from White Box/Yellow Box dominant (also Blakely’s Red Gum and Rough Barked Apple) for the lower elevations on the overburden emplacement (known as Zone A) to White Box/Tumbledown Gum dominant (also White Cypress Pine and Iron Barks) on the upper elevations of the overburden emplacement (known as Zone F).

The third revegetation stage focuses on re-establishing lower storey woodland vegetation species. This will be undertaken by a number of methods such as encouraging native seed germination from the soil seed bank, allow native seed to disperse (by wind or passing animals) into the rehabilitation from adjacent areas, direct seeding (either broadcast or hand sown) or planting native grasses between the established overstorey species. Herbicide spraying will be used to limit weed and exotic grass competition and encourage the establishment of native grasses, herbs & forbs and shrubs.

Subject to commercial availability and seasons, seed and tubestock would be of local provenance. **Table 5.8** outlines the key 23 species (but not limited to) being revegetated to meet the required native species richness outlined in the NSW EPA biometric vegetation community benchmark for the Namoi Catchment Area (http://www.environment.nsw.gov.au/biobanking/VegTypeDatabase.htm DECCW, 2008), NSW Scientific Committee final determination (http://www.environment.nsw.gov.au/determinations/BoxgumWoodlandEndComListing.htm DECCW, 2011) and the Commonwealth Department of Sustainability, Environment, Water, Populations and Communities policy statement and species list (http://www.environment.gov.au/epbc/publications/box-gum.html DSEWPaC, 2011) for Grassy White Box Woodland. A summary of the NSW OEH biometric vegetation community benchmark is included in **Table 5.10**.

Table 5.8 Grassy White Box Woodland Species List

Over/Mid Storey Species		Lower Storey Species	
1. White Box	*Eucalyptus albens*	11. Queensland Red Grass	*Bothrichloa macra*
2. Yellow Box	*Eucalyptus melliodora*	12. Queensland Blue Grass	*Dichanthium sericeum*
3. Blakely's Red Gum	*Eucalyptus blakelyi*	13. Wallaby Grass	*Austrodanthonia racemosa*
4. Rough Barked Apple	*Angophora floribunda*	14. Plains Grass	*Austrostipa aristiglumis*
5. Kurrajong	*Brachychiton populneus*	15. Wire Grass	*Aristida ramosa*
6. White Cypress Pine	*Callitris glaucophylla*	16. Barbed Wire Grass	*Cymbopogon refractus*
7. Tumble Down Red Gum	*Eucalyptus dealbata*	17. Slender Rats Tail Grass	*Sporobolus creber*
8. Native Olive	*Notelaea microcarpa*	18. Slender Bamboo Grass	*Stipa verticillate*
9. Blackthorn	*Bursaria spinosa*	19. Windmill Grass	*Chloris truncata*
10. Rosewood	*Aectryon oleifolius*	20. Kangaroo Grass	*Themeda australis*
		21. Tufted Bluebell	*Wahlenbergia communis*
		22. Yellow Berry Bush	*Maytenus cunninghamii*
		23. Sticky Daisy Bush	*Olearia elliptica*

5.4 REHABILITATION MONITORING

The LOM MOP/RMP outlines the various rehabilitation monitoring programs undertaken include:

- Quarterly Visual Inspections;
- Annual Soil Analysis;
- Vegetation Monitoring;
- Fauna Monitoring;
- Land Capability Assessment; and
- Photo Monitoring.

The results of quarterly visual inspections, vegetation monitoring and fauna monitoring is discussed in **Section 3.5** as the rehabilitation area has been integrated with the biodiversity monitoring program. No land capability assessment has been completed to date as no rehabilitation for an agricultural land use has been completed to date.

Annual soil analysis monitoring was completed during the period with 16 samples taken from soil stockpiles, rehabilitation and biodiversity offset areas. **Table 5.9** summarises soil analysis results and where applicable whether the Rehabilitation/BOA sites met the completion criteria. Sampling of soil stockpiles, BOA and rehabilitation areas found the soil to be neutral to slightly alkaline with all soil

samples for 2013-2014 within the completion criteria range of pH 5 to 8.5. This is an interesting trend with all sites displaying a decreasing pH level and would appear that the disturbed rehab and stockpiled soils are trending closer to natural/in situ soils such as those from the BOA.

Table 5.9 Annual Soil Analysis Results

Soil	Sample ID	pH			Completion Criteria	Criteria Met?
		2014	2013	2011		
Stockpile	33 (Subsoil)	8.3	8.3	8.9	-	-
Stockpile	34 (Topsoil)	8.4	9.0	8.7	-	-
Stockpile	55 (Topsoil)	6.5	7.5	-	-	-
Stockpile	58 (Subsoil)	7.2	-	-	-	-
Stockpile	11 (Subsoil)	8.1	-	8.6	-	-
Stockpile	13 (Topsoil)	7.6	-	-	-	-
Stockpile	12 (Topsoil)	7.4	-	8.1	-	-
Stockpile	40 (Topsoil)	8.0	-	-	-	-
Stockpile	53 (Topsoil)	7.5	-	-	-	-
BOA	4	-	6.6	7.2	5.0 - 8.5	YES
BOA	5	6.0	6.7	-	5.0 - 8.5	YES
BOA	7	6.6	-	-	5.0 - 8.5	YES
BOA	8	7.4	7.7	-	5.0 - 8.5	YES
BOA	9	6.2	-	-	5.0 - 8.5	YES
BOA	15	-	6.9	-	5.0 - 8.5	YES
BOA	16	-	6.8	-	5.0 - 8.5	YES
BOA/Rehab	6/South East Zone B	8.0	8.8	8.9	5.0 - 8.5	YES
BOA/Rehab	14/South Zone E	8.0	8.9	-	5.0 - 8.5	YES
Rehab	East Zone A	8.3	8.7	-	5.0 - 8.5	YES
Rehab	East Zone F	-	8.5	-	5.0 - 8.5	YES
Rehab	West Zone A	7.9	8.7	8.7	5.0 - 8.5	YES

Routine photo monitoring of the rehabilitation is undertaken by WCC from two established locations to the south east and south west of the rehabilitation areas. **Figure 5.4a** displays the photopoint (south east) one month after planting in July 2008 and **Figure 5.4b** shows progress after nearly five years in March 2013. The key change observed in **Figure 5.5** is the development of revegetation now six years old averaging over 5m in height such that it is now difficult to see the coarse woody debris on the ground or stag trees installed at the site.

Figure 5.4 South East Rehabilitation Area a (left) July 2008 and b (right) March 2013

Figure 5.5 South East Rehabilitation Area at end of March 2014

Figure 5.6a displays the photopoint (south west) during contour bank and erosion maintenance in March 2010 and **Figure 5.6b** shows the status in March 2013. From **Figure 5.7**, the native grass cover has improved providing even coverage rather than the patchy appearance in 2013. Also the overstorey revegetation undertaken in 2010 is now visible above the grasses for the first time in 2014.

Figure 5.6 South West Rehabilitation Area a (left) March 2010 and b (right) March 2013

Figure 5.7 South West Rehabilitation Area at end of March 2014

5.5 COMPLETION CRITERIA

The LOM MOP/RMP outlines the completion criteria for the rehabilitation and biodiversity offset areas to achieve the designated final land uses for WCC, i.e. that they would be sustainable and self-supporting beyond mine closure. The completion criteria have been broken into categories aligned to the WCC rehabilitation objectives (**Table 5.1**):

- Integrated Landscapes;
- Sustainable Growth and Development; and
- Land Use.

Separate completion criteria have been established for the two different final land uses proposed for WCC of Class III Land Capability Agriculture and Woodland Ecological Community. **Table 5.10** summarises the completion criteria for each Woodland land use Ecological Community as no rehabilitation has been complete yet for an agricultural land use. The completion criteria have partially been based on NSW EPA biometric vegetation community benchmark indices. **Table 5.10** also compares against the data from **Table 3.29** and **Table 5.9** measured through the rehabilitation and biodiversity monitoring programs to quantify progress against the completion criteria and the trend towards being able to "sign off" on the final land uses.

Table 5.10 WCC Completion Criteria for Woodland Ecological Communities

Rehabilitation Objective	Completion Criteria	Performance Indicator	Completion Criteria Met?
Integrated Landscapes	The landform morphology fits in with the surrounding landscape.	Overburden emplacement rehabilitation slopes are at or less than 10° for out-of-pit emplacement area and less than18° for final void.	YES
	The area does not represent an erosion hazard.	Erosion does not exceed 0.3m (gully) deep.	No
Sustainable Growth Development – Woodland Ecological Community	Appropriate native plant species richness is present for the restored ecological community.	Native plant species numbers (per 400m²): • Box Gum Woodland: 23 • Other Woodland: 30 • Brigalow Woodland: 20	Partial 3/25
	Appropriate density/structure of native overstorey species is present.	Native overstorey cover range between: • Box Gum Woodland: 0-25% • Other Woodland: 6-40% • Brigalow Woodland: 0-25%	Partial 10/25
	Appropriate density/structure of native mid storey species is present.	Mid Storey cover range between: • Box Gum Woodland: 0-5% • Other Woodland: 6-25% • Brigalow Woodland: 0-5%	Partial 20/25
	Appropriate native groundcover is present.	Bare ground and litter does not exceed: • Box Gum Woodland: 55% • Other Woodland: 55% • Brigalow Woodland: 65%	Partial 24/25
Land Use	The land use is sustainable and consistent with the intended land use.	Establish areas of rehabilitation consistent approval conditions. Land use classifications to include: • Rehabilitation of GWBW. • Rehabilitation of Brigalow Woodland. • Agricultural land. • Biodiversity Offset Area.	Partial No Agricultural Rehabilitation
	No hazards that are inconsistent with intended land use.	The site is free of safety or environmental hazards including: • holes, tunnels or unstable areas; • mining infrastructure or debris; or • Hazardous materials.	YES
	Soil pH is representative of the intended land use.	pH levels are within the range generally acceptable for plant growth (5.0 to 8.5) until data from analogue sites is available.	YES 12/12
	Exotic/weed vegetation out competing natives or impacting on intended land use.	Noxious and environmental weeds are under control within rehabilitation or biodiversity offset areas	No
	Feral pests are not impacting on intended land use.	Feral pests are under control within rehabilitation or biodiversity offset areas	No

As expected, while progress is being made towards achieving a Woodland Ecological Land use; WCC still has a long way to achieve the completion criteria.

5.6 REHABILITATION TRIALS AND RESEARCH

No trials were undertaken during the period.

5.7 MINE CLOSURE

The LOM MOP/RMP discusses at a high level the rehabilitation management procedures for the ultimate closure of WCC and the final void. Currently, WCC is approved to cease mining operations in 2031 and therefore at this stage mine closure planning is conceptual in detail covering the cessation of mining and management of the final void to mitigate potential safety risks as well as any potential environmental impacts.

The LOM MOP/RMP identified five distinct domains across WCC requiring different management strategies to rehabilitate and return to a post-mining land use. Based on the analysis of constraints and opportunities, the preferred final land use options for each domain are summarised in **Table 5.11**.

Table 5.11 WCC Rehabilitation Domains and Final Land Use Options

Domain	Description	Final Land Use
D1	Infrastructure Areas	Woodland Ecological Community or Land Capability Class III Agriculture*
D2	Water Management Infrastructure	Woodland Ecological Community
D3	Mining and Overburden Emplacement (Rehabilitation) Areas	Woodland Ecological Community
D4	Final Void Area	Woodland Ecological Community
D5	Biodiversity Offset Area and Other Buffer Lands	Woodland Ecological Community or Land Capability Class III Agriculture*

* Final Land Use decision between Woodland Ecological Community or Land Capability Class III Agriculture will be determined on a location basis based upon the adjacent land use.

6. ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

WCC had made progress during the 2013-2014 period by maintaining a focus on continuous improvement of environmental management, maintaining compliance and improving consultation with neighbouring properties and the local community. Achievements documented for the 2013-2014 period:

- Community consultation included four WCC CCC meetings; two community newsletters distributed to Quipolly and Werris Creek residents; two public meeting held in Werris Creek; five Werris Creek specific factsheets developed; four community bus tours of mine site were held; and the Community Enhancement Fund supported the Werris Creek Skate Park and Lift Installation at the Australian Railway Museum;
- The following Management Plans or documents were approved by DP&I:
    - Noise Management Plan;
    - Blast Management Plan;
    - Biodiversity and Offset Management Plan (also approved by DSEWPaC); and
    - Biodiversity Offset Area Conservation Bond;
    - Air Quality and Greenhouse Gas Management Plan.
- Completed 105.5ha of rehabilitation has been completed since 2005 and WCC is ahead of the MOP target of 97.2ha;
- By March 2013, all truck onsite were attenuated – 10xCAT793XQ and 6xCAT785 (1 fully and 5 partially attenuated in accordance with Noise Management Plan);
- New biodiversity management measure of controlled burns for hazard reduction and ecological purposes resulted in 60ha of the Marengo BOA treated in Winter 2013;
- Introduction of Evaporator to improve the management of excess void water onsite; and
- Implementation of adverse weather triggers sent via SMS for the management of mining and coal processing operations during periods of high winds.

WCC targets for the 2013-2014 period:

- Obtain approval for the Site Water Management Plan and Environmental Management Strategy as required under PA10_0059;
- Secure the tenure of the LOM BOA onto the land title with the approval of DP&I and DSEWPaC;
- Increase area of rehabilitation completed to 120.2ha in line with MOP commitments;
- Relocate the Narrawolga Axe Grinding Groove Rocks in accordance with the consultation with the Nungaroo Local Aboriginal Land Council and updated Heritage Management Plan;
- Increased frequency of Community Newsletters from 6 monthly to quarterly;
- Completion of eastern visual amenity bund towards toward “Cintra” Hill;

- Installation of high water level alarms for Void Water Dams 1, 3 & 4 to SMS to key site personnel when triggered;
- Implementation of new SMS and email blast notification system to the community;
- Continue implementing BOA management strategies including increasing feral animal control to quarterly and targeted overstorey plant of BOA site 15 to improve restoration of woodland vegetation communities;
- Continued community liaison, support, involvement and education with respect to the Mine's activities; and
- Continued compliance with all statutory conditions of consent, leases, licence and approvals.

PLANS

(APPENDED TO THIS REPORT)

Plan 3 Land Preparation
Plan 4 Mining Activities
Plan 5 Rehabilitation

APPENDICES

Available to be downloaded from:
http://www.whitehavencoal.com.au/environment/werris_creek_mine_environmental_management.cfm

Appendix 1	Project Approval (PA10_0059)
Appendix 2	Licence and Lease
2(a)	Environment Protection Licence 12290
2(b)	Mining Lease 1563
2(c)	Mining Lease 1671
2(d)	Mining Lease 1672
Appendix 3	Air Quality Monitoring Results
3(a)	Deposited Dust Monitoring Results
3(b)	Tapered Element Oscillation Microbalance and High Volume Air Sampler Results
3(c)	Quirindi Dust Sampling Results
Appendix 4	Water Quality Monitoring Results
4(a)	Surface Water Monitoring Results
4(b)	Groundwater Modelling Reports – Environ Pty Ltd
4(c)	Groundwater Monitoring Results
Appendix 5	Biodiversity Offset Area Annual Monitoring Report – Eco Logical Australia Pty Ltd
Appendix 6	Blast Monitoring Results
Appendix 7	Monthly Operational Noise Monitoring
Appendix 8	Monthly Meteorological Data
Appendix 9	Complaints Database

REVISIONS				
REV.	DATE	BY	DESCRIPTION	CHK.
2	30/11/2013	PC	Updated to November 2013	AW

E 274 000
E 275 000
E 276 000
N 6526000
N 6525000
N 6524000
N 6523000
N 6522000
N 6 526 000
N 6 525 000
N 6 524 000
N 6 523 000
N 6 522 000

WERRIS CREEK 2.5 kms
OXLEY HIGHWAY
WERRIS CREEK - GUNNEDAH ROAD
MAIN NORTHERN RLY
QUIRINDI 12 kms

N
W E
S

0 100 200 300 400 500metres

LEGEND

- Colliery Holding / Lease / Project Boundary
- Current Extraction Approval Area
- Proposed Extraction Approval Area
- Area to be disturbed
- Project Area Mining Limit
- Existing Soil Stockpiles

TOPSOIL MAPPING UNITS AND STRIPPING DEPTHS

- NIL
- 300mm

Prepared by Horizon Surveying Pty Ltd Ph: 02 65 773214 Fax: 02 65 773216

Werris Creek Coal Pty Limited
1435 Werris Creek Road. Werris Creek 2341
TEL. +61 2 6768 7039

WERRIS CREEK MINE - AEMR PLAN
PROPOSED LAND PREPARATION - PLAN 3

Date	Drawn	Checked	Approved
23-05-2014	NG	AW	CD

Scale:	Drawing No.	Revision No.	Sheet Size
1:4000	000000-3	2	A0

REVISIONS				
REV.	DATE	BY	DESCRIPTION	CHK.
2	30/11/2013	PC	Updated to November 2013	AW

Abandoned Underground Workings have not been Surveyed to current standards. Further investigation will be required to ascertain their correct location.Workings are being adjusted to their Surveyed location as evidence becomes available. Floor levels have been derived from the recent drilling geological model.

LEGEND

- Colliery Holding / Lease / Project Boundary
- Current Extraction Approval Area
- Proposed Extraction Approval Area
- Area to be disturbed
- Project Area Mining Limit
- Soil Stockpiles (incl. vegetation stacking)
- Infrastructure Areas
- Proposed Topsoil Stripping Areas
- EPA Discharge Points
- Void water dams

Mining Sequence	Dump Sequence
2011	2011/2012
2012	2013
2013	2014
2014	2015
2015	2016
2016	2017
2017	2018
2018	

WERRIS CREEK MINE - AMER PLAN
PROPOSED MINING ACTIVITIES - PLAN 4

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Date	Drawn	Checked	Approved	Sheet Size
23-05-2014	NG	AW	CD	A0

Drawing No. 000000-4
Revision No. 2

REVISIONS				
REV.	DATE	BY	DESCRIPTION	CHK.
2	30/11/2013	PC	Updated to November 2013	AW

WERRIS CREEK MINE- AMER PLAN
PROPOSED REHABILITATION - PLAN 5

LEGEND

- Colliery Holding / Lease / Project Boundary
- Current Extraction Approval Area
- Proposed Extraction Approval Area
- Area to be disturbed
- Project Area Mining Limit

- Active Mining Area
- Existing Rehabilitation (Grassy White Box Woodland)
- Future Rehabilitation (Grassy White Box Woodland)
- Shaped Overburden
- Unshaped Overburden
- Infrastructure
- 2012 Rehabilitation Schedule
- Rehabilitated Brigalow Woodland
- Biodiversity Offset Area
- Water Management (Clean)
- Water Management (Dirty)
- Out of Pit Void Water Dam

Note: No Rehabilitated slopes >10°

SB10 (EPA 14)
SD13
SD10
SB15
SB9 (EPA 12)
SB11
SB8
SB5
SB4
SB12
SB3
(EPA 10)
SB2
SD4
SD5

PROPOSED RAIL LOOP
PROPOSED PRODUCT COAL STOCKPILE EXTENSION AREA
PROPOSED PRODUCT STOCKPILE
ADMIN, BATHHOUSE AND WORKSHOP
PROPOSED COAL PROCESSING AND ROM STOCKPILES
PROPOSED ACCESS ROAD
ACOUSTIC BUND
VWD5
VWD2
VWD3
VWD4
VWD1
clean water piped under dirty water
WERRIS CREEK - QUIRINDI ROAD
MAIN NORTHERN RLY
QUIRINDI 12 kms
WERRIS CREEK 2.5 kms
2018
2017
2016
2015
2014
2013
SF
RD
E 274 000
E 275 000
E 276 000
N 6526000
N 6525000
N 6524000
N 6 522 000
0 100 200 300 400 500metres

Prepared by Horizon Surveying Pty Ltd Ph: 02 65 773214 Fax: 02 65 773216

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Date	Scale:	Drawn	Checked	Approved	Drawing No.
23-05-2014	1:4000	NG	AW	CD	000000-5

Revision No. 2 | Sheet Size A0

Project Approval

Section 75J of the *Environmental Planning & Assessment Act 1979*

Under the Minister for Planning and Infrastructure's delegation of 14 September 2011, I approve the project application referred to in Schedule 1, subject to the conditions in Schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.

Chris Wilson
A/Deputy Director-General
Development Assessment and Systems Performance

SIGNED 25 OCTOBER 2011
Sydney 2011

SCHEDULE 1

Application Number:	10_0059
Proponent:	Werris Creek Coal Pty Limited
Approval Authority:	Minister for Planning and Infrastructure
Land:	See Appendix 1
Project:	Werris Creek Mine Extension Project

MOD 1 (August 2012) in red type

TABLE OF CONTENTS

DEFINITIONS

Annual Review	The review required by condition 3 of schedule 5
ARTC	Australian Rail Track Corporation
BCA	Building Code of Australia
Biodiversity offset strategy	The conservation and enhancement strategy described in EA, and shown conceptually in the figure in Appendix 4
CCC	Community Consultative Committee
CEEC	Critically endangered ecological community
Conditions of this approval	Conditions contained in schedules 2 to 5 inclusive
Council	Liverpool Plains Shire Council
Day	The period from 7 am to 6 pm on Monday to Saturday, and 8 am to 6 pm on Sundays and Public Holidays
Department	Department of Planning and Infrastructure
Director-General	Director-General of the Department, or delegate
DNG	Derived native grassland
DRE	Division of Resources and Energy (within the Department of Trade and Investment, Regional Infrastructure and Services)
EA	Environmental assessment titled *Werris Creek Coal Mine Life of Mine Project*, dated December 2010, as modified by the response to submissions, dated March 2011; and the letter from Whitehaven Coal Limited to the Department, dated 25 July 2011
EA (MOD 1)	The Environmental Assessment for 10_0059 MOD 1, comprising the letters from Whitehaven Coal Limited to the Department dated 3 August 2012 and 27 August 2012
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPA	Environment Protection Authority
EPL	Environment Protection Licence issued under the POEO Act
Evening	The period from 6 pm to 10 pm
Feasible	Feasible relates to engineering considerations and what is practical to build or carry out
Incident	A set of circumstances that: • causes or threatens to cause material harm to the environment; and/or • breaches or exceeds the limits or performance measures/criteria in this approval
Land	As defined in the EP&A Act, except for where the term is used in the noise and air quality conditions in schedules 3 and 4 of this approval where it is defined to mean the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this approval
Material harm to the environment	Actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial
Mining operations	Includes the removal of overburden and extraction, processing, handling, storage and transportation of coal
Minister	Minister for Planning and Infrastructure, or delegate
Mitigation	Activities associated with reducing the impacts of the project
Negligible	Small and unimportant, such as to be not worth considering
Night	The period from 10 pm to 7 am on Monday to Saturday, and 10 pm to 8 am on Sundays and Public Holidays
NOW	NSW Office of Water (within the Department of Primary Industries)
OEH	Office of Environment and Heritage (within the Department of Premier and Cabinet)
POEO Act	*Protection of the Environment Operations Act 1997*
Privately-owned land	Land that is not owned by a public agency or a mining company (or its subsidiary)
Project	The development described in the EA
Proponent	Werris Creek Coal Pty Limited, or its successors
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Rehabilitation	The return land disturbed by the project to a good condition, and ensure it is safe, stable and non-polluting
ROM	Run-of-mine
RMS	Roads and Maritime Services
Site	The land listed in Appendix 1
Statement of commitments	The Proponent's commitments in Appendix 6

SCHEDULE 2
ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. The Proponent shall implement all reasonable and feasible measures to prevent and/or minimise any material harm to the environment that may result from the construction, operation or rehabilitation of the project.

TERMS OF APPROVAL

2. The Proponent shall carry out the project generally in accordance with the:
   (a) EA;
   (b) statement of commitments;
   (c) EA MOD 1; and
   (d) the conditions of this approval.

   Notes:
   - *The general layout of the project is shown in Appendix 2; and*
   - *The statement of commitments is reproduced in Appendix 6.*

3. If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.

4. The Proponent shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
   (a) any reports, strategies, plans, programs, reviews, audits or correspondence that are submitted in accordance with this approval; and
   (b) the implementation of any actions or measures contained in these documents.

LIMITS ON APPROVAL

Mining Operations

5. The Proponent may carry out mining operations on site until the end of December 2032.

   Note: Under this approval, the Proponent is required to rehabilitate the site and carry out additional undertakings to the satisfaction of both the Director-General and the Executive Director, Mineral Resources in DRE. Consequently, this approval will continue to apply in all other respects other than the right to conduct mining operations until the rehabilitation of the site and those additional undertakings have been carried out satisfactorily.

Coal Extraction

6. The Proponent shall not extract more than 2.5 million tonnes of ROM coal from the site in a calendar year.

Coal Stockpiling

7. The Proponent shall not stockpile more than 250,000 tonnes of product coal on the site.

Coal Transport

8. The Proponent shall not transport:
   (a) more than 50,000 tonnes of product coal from the site by public road in any calendar year; and
   (b) any product coal from the site by public road to the Muswellbrook, Singleton, Mid-Western regional, Cessnock or Newcastle local government areas without the written approval of the Director-General.

SURRENDER OF EXISTING DEVELOPMENT CONSENT

9. By the end of October 2012, or as otherwise agreed by the Director-General, the Proponent shall surrender the existing development consent (DA 172-7-2004) for the Werris Creek mine in accordance with section 104A of the EP&A Act.

   Prior to the surrender of this development consent, the conditions of this approval shall prevail to the extent of any inconsistency with the conditions of the development consent.

STRUCTURAL ADEQUACY

10. The Proponent shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.

Notes:

- *Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates (where necessary) for the proposed building works; and*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.*

DEMOLITION

11. The Proponent shall ensure that all demolition work on site is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures,* or its latest version.

OPERATION OF PLANT AND EQUIPMENT

12. The Proponent shall ensure that all the plant and equipment used on site, or to transport coal from the site, is:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient manner.

STAGED SUBMISSION OF ANY STRATEGY, PLAN OR PROGRAM

13. With the approval of the Director-General, the Proponent may submit any strategy, plan or program required by this approval on a progressive basis.

Notes:

- *While any strategy, plan or program may be submitted on a progressive basis, the Proponent will need to ensure that the existing operations on site are covered by suitable strategies, plans or programs at all times; and*
- *If the submission of any strategy, plan or program is to be staged, then the relevant strategy, plan or program must clearly describe the specific stage to which the strategy, plan or program applies, the relationship of this stage to any future stages, and the trigger for updating the strategy, plan or program..*

14. Until they are replaced by an equivalent strategy, plan or program approved under this approval, the Proponent shall implement the existing strategies, plans or programs that apply under DA 172-7-2004.

COMMUNITY ENHANCEMENT

15. The Proponent shall establish and operate a Community Enhancement Fund for the project to the satisfaction of the Director-General. This fund must:
    (a) be established and operated in consultation with Council and the CCC;
    (b) be directed towards providing benefits to the local communities affected by the project;
    (c) provide for the expenditure of at least $300,000 (indexed to CPI) over 6 calendar years (2012 to 2017), and include at least $200,000 of expenditure within the town of Werris Creek; and
    (d) be operating from the end of April 2012, unless the Director-General agrees otherwise.

SCHEDULE 3
ENVIRONMENTAL PERFORMANCE CONDITIONS

NOISE

Noise Criteria

1. The Proponent shall ensure that the noise generated by the project (including noise generated on the Werris Creek Rail Spur) does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 1: Noise criteria

Location	***Day*** ***dB(A) $L_{Aeq(15\ min)}$***	***Evening & Night*** ***dB(A) $L_{Aeq(15\ min)}$***	***Night*** ***dB(A) $L_{A1\ (1\ min)}$***
R18	40	37	45
R10, R11, R14	39	39	45
R20, R21	39	37	45
R12	38	38	45
R96	38	37	45
R7, R8, R9, R24	37	37	45
R22, R98	36	36	45
All other privately-owned land	35	35	45

Notes:

- *To interpret the locations referred to in Table 1, see the applicable figure in Appendix 3; and*
- *Noise generated by the project is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

However, these criteria do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Noise Acquisition Criteria

2. If the noise generated by the project causes sustained exceedances of the criteria in Table 2 at any residence on privately-owned land or on more than 25 percent of any privately-owned land, then upon receiving a written request for acquisition from the landowner, the Proponent shall acquire the land in accordance with the procedures in conditions 5 - 6 of schedule 4.

Table 2: Noise acquisition criteria

Location	***Day/Evening/Night*** ***dB(A) $L_{Aeq\ (15min)}$***
All privately-owned land	40

Note: Noise generated by the project is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of the land listed in Table 3, the Proponent shall implement additional noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at any residence on the land in consultation with the owner. These measures must be reasonable and feasible.

If within 3 months of receiving this request from the owner, the Proponent and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.

Table 3: Land subject to additional noise mitigation measures

R10	R18
R11	R20
R12	R21
R14	R96

Note: To interpret the locations referred to in Table 3, see the applicable figure in Appendix 3.

Operating Conditions

4. The Proponent shall:
   (a) implement best practice noise management to minimise the operational, low frequency, rail and road traffic noise of the project;
   (b) regularly assess the real-time noise monitoring and meteorological forecasting data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this approval;
   (c) minimise the noise impacts of the project during temperature inversions; and
   (d) use its best endeavours to achieve the long-term noise goals in Table 4, where this is reasonable and feasible, and report on the progress towards achieving these goals in the annual review;
   (e) carry out a comprehensive noise audit of the project in conjunction with each independent environmental audit,

   to the satisfaction of the Director-General.

Table 4: Long-term noise goal

Location	***Day/Evening/Night*** ***dB(A) $L_{Aeq\ (15min)}$***
All privately-owned land	35

Note: Noise generated by the project is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.

Noise Management Plan

5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
   (a) be prepared in consultation with EPA by a suitably qualified expert whose appointment has been approved by the Director-General;
   (b) be submitted to the Director-General for approval by the end of April 2012;
   (c) describe the measures that would be implemented to ensure compliance with the relevant conditions of this approval, including:
      - a real-time noise management system that employs both reactive and proactive mitigation measures; and
      - rail spur management plan, that has been prepared in consultation with ARTC and the rail freight company; and
   (d) include a Noise Monitoring Program that:
      - uses a combination of real-time and supplementary attended noise monitoring measures to evaluate the performance of the project;
      - is capable of monitoring temperature inversion strengths at an appropriate sampling rate;
      - evaluates and reports on the effectiveness of the real-time noise management system;
      - includes a protocol for determining exceedances of the relevant conditions of this approval.

BLASTING

Blasting Criteria

6. The Proponent shall ensure that blasting on site does not cause exceedances of the criteria in Table 5.

Table 5: Blasting Criteria

Location	***Airblast Overpressure (dB(Lin Peak))***	***Ground Vibration (ppv(mm/s))***	***Allowable Exceedance***
Any residence on privately-owned land	115	5	5% of the total number of blasts over a period of 12 months
	120	10	0%
All public infrastructure	-	50	0%

However, these criteria do not apply if the Proponent has a written agreement with the relevant owner, and has advised the Department in writing of the terms of this agreement.

Blasting Hours

7. The Proponent shall only carry out blasting on site between 9 am and 5 pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Director-General.

Blasting Frequency

8. The Proponent shall not carry out more than:
   (a) 1 blast a day on site, unless an additional blast is required following a blast misfire; and
   (b) 15 blasts a month on site.

   This condition does not apply to blasts that generate ground vibration of 0.5 mm/s or less at any residence on privately-owned land, or blasts required to ensure the safety of the mine or its workers.

   Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.

Property Inspections

9. If the Proponent receives a written request from the owner of any privately-owned land within 2 kilometres of the approved open cut pit on site for a property inspection to establish the baseline condition of any buildings and/or structures on their land, or to have a previous property inspection report updated, then within 2 months of receiving this request the Proponent shall:
   (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General to:
      - establish the baseline condition of the buildings and/or structures on the land or update the previous property inspection report; and
      - identify any measures that should be implemented to minimise the potential blasting impacts of the projects on these buildings and/or structures; and
   (b) give the landowner a copy of the new or updated property inspection report.

Property Investigations

10. If the owner of any privately-owned land claims that the buildings and/or structures on their land have been damaged as a result of blasting on site, then within 2 months of receiving this claim the Proponent shall:
   (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to investigate the claim; and
   (b) give the landowner a copy of the property investigation report.

   If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damage to the satisfaction of the Director-General.

   If the Proponent or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Director-General for resolution.

Operating Conditions

11. The Proponent shall:
   (a) implement best practice blasting management on site to:
      - protect the safety of people and livestock in the surrounding area;
      - protect private or public property in the surrounding area;
      - minimise the dust and fume emissions of the blasting; and
   (b) minimise the duration and frequency of any road closures for blasting;
   (c) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site,
   to the satisfaction of the Director-General.

12. The Proponent shall not carry out blasting on site that is within 500 metres of:
   (a) Werris Creek Road without the approval of RMS;
   (b) the Main Northern Railway without the approval of ARTC; and
   (c) any land outside the site that is not owned by the Proponent unless:
      - the Proponent has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Proponent has advised the Director-General in writing of the terms of this agreement; or
      - the Proponent has:
         - demonstrated to the satisfaction of the Director-General that the blasting can be carried out closer to the land without compromising the safety of people or livestock on the land, or damaging the buildings and/or structures on the land; and

- updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the land.

Blast Management Plan

13. The Proponent shall prepare and implement a Blast Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be prepared in consultation with EPA, RMS and ARTC;
    (b) be submitted to the Director-General for approval by the end of April 2012;
    (c) describe the mitigation measures that would be implemented to ensure compliance with the relevant conditions of this approval;
    (d) describe the measures that would be implemented to ensure that the public can get up-to-date information on the proposed blasting schedule on site; and
    (e) include a blast monitoring program for evaluating the performance of the project, including:
    - compliance with the applicable criteria; and
    - minimising the fume emissions from the site.

AIR QUALITY & GREENHOUSE GAS

Odour

14. The Proponent shall ensure that no offensive odours, as defined under the POEO Act, are emitted from the site.

Greenhouse Gas Emissions

15. The Proponent shall implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site to the satisfaction of the Director-General.

Air Quality Criteria

16. The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the project do not exceed the criteria listed in Tables 6, 7 and 8 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 6: Long-term criteria for particulate matter

Pollutant	***Averaging Period***	[d] ***Criterion***
Total suspended particulate (TSP) matter	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3

Table 7: Short-term criterion for particulate matter

Pollutant	***Averaging Period***	[d] ***Criterion***
Particulate matter < 10 µm (PM_{10})	24 hour	[a] 50 µg/m^3

Table 8: Long-term criteria for deposited dust

Pollutant	***Averaging Period***	***Maximum increase in deposited dust level***	***Maximum total deposited dust level***
[c] Deposited dust	Annual	[b] 2 g/m^2/month	[a] 4 g/m^2/month

Notes to Tables 6-8:

- [a] *Total impact (ie incremental increase in concentrations due to the project plus background concentrations due to all other sources);*
- [b] *Incremental impact (ie incremental increase in concentrations due to the project on its own);*
- [c] *Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.*
- [d] *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents, illegal activities or any other activity agreed by the Director-General in consultation with EPA.*

Air Quality Acquisition Criteria

17. If particulate matter emissions generated by the project exceed the criteria in Tables 9, 10, and 11 at any residence on privately-owned land, or on more than 25 percent of any privately owned land, then upon written request for acquisition from the landowner, the Proponent shall acquire the land in accordance with the procedures in conditions 5-6 of schedule 4.

Table 9: Long term land acquisition criteria for particulate matter

Pollutant	***Averaging period***	***[d] Criterion***
Total suspended particulate (TSP) matter	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3

Table 10: Short term land acquisition criteria for particulate matter

Pollutant	***Averaging period***	***[da] Criterion***
Particulate matter < 10 µm (PM_{10})	24 hour	[a] 150 µg/m^3
Particulate matter < 10 µm (PM_{10})	24 hour	[b] 50 µg/m^3

Table 11: Long term land acquisition criteria for deposited dust

Pollutant	***Averaging period***	***Maximum increase[2] in deposited dust level***	***Maximum total[1] deposited dust level***
[c] Deposited dust	Annual	[b] 2 g/m^2/month	[a] 4 g/m^2/month

Notes to Tables 9-11:

- [a] *Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources);*
- [b] *Incremental impact (i.e. incremental increase in concentrations due to the development on its own);*
- [c] *Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method; and*
- [d] *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Director-General.*

Operating Conditions

18. The Proponent shall:
    (a) implement best practice air quality management on site to minimise the off-site odour, fume and particulate matter emissions of the project, including the dust emissions associated with the transport coal produced on site by road or rail;
    (b) minimise any visible air pollution generated by the project;
    (c) minimise any surface disturbance on site; and
    (d) regularly assess the real-time air quality monitoring and meteorological forecasting data and relocate, modify and/or stop operations on site to ensure compliance with the relevant conditions of this approval,

    to the satisfaction of the Director-General.

Air Quality and Greenhouse Gas Management Plan

19. The Proponent shall prepare and implement an Air Quality and Greenhouse Gas Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be prepared in consultation with EPA, and submitted to the Director-General by the end of April 2012;
    (b) describe the measures that would be implemented to ensure compliance with the relevant conditions of this approval, including a real-time air quality management system that employs both reactive and proactive mitigation measures;
    (c) describe the measures that would be implemented to minimise the release of greenhouse gas emissions from the site; and
    (d) include an air quality monitoring program, that:
        - uses a combination of real-time monitors and supplementary monitors, to evaluate the performance of the project;
        - evaluates and reports on the effectiveness of the real-time air quality management system; and
        - includes a protocol for determining any exceedances of the relevant conditions of this approval.

METEOROLOGICAL MONITORING

20. For the life of the project, the Proponent shall ensure that there is a suitable meteorological station operating in the vicinity of the site that:
    (a) complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline; and
    (b) is capable of continuous real-time measurement of temperature lapse rate, in accordance with the *NSW Industrial Noise Policy*, or as otherwise approved by EPA.

SOIL AND WATER

Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Proponent is required to obtain the necessary water licences for the project.

Water Supply

21. The Proponent shall ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of mining operations to match its available water supply, to the satisfaction of the Director-General.

Surface Water Discharges

22. The Proponent shall ensure that all surface water discharges from the site comply with the discharge limits (both volume and quality) set for the project in any EPL.

Water Management Plan

23. The Proponent shall prepare and implement a Water Management Plan for the project to the satisfaction of the Director-General. This plan must be prepared in consultation with NOW and EPA by suitably qualified and experienced persons whose appointment has been approved by the Director-General, and submitted to the Director-General by the end of April 2012.

    In addition to the standard requirements for management plans (see condition 2 of schedule 5), this plan must include:
    (a) a Site Water Balance that:
        - includes details of:
            - sources of water supply;
            - water use on site;
            - water management on site;
            - reporting procedures, which provide for the update of the site water balance in each annual review; and
        - describes what measures would be implemented to minimise potable water use on site;
    (b) a Surface Water Management Plan, that includes:
        - detailed baseline data of the surface water flows and quality in the waterbodies that could be affected by the project;
        - a detailed description of the water management system on site, including the:
            - clean water diversion systems;
            - erosion and sediment controls; and
            - water storages;
        - a plan for identifying, extracting, handling, and the long-term storage of potentially acid forming material on site;
        - detailed plans, including design objectives and performance criteria, for:
            - design and management of the final void;
            - reinstatement of drainage lines on the rehabilitated areas of the site; and
            - control of any potential water pollution from the rehabilitated areas of the site;
            - a program to monitor the effectiveness of the water management system;
        - a plan to respond to any exceedances of the performance criteria, and mitigate and/or offset any adverse surface water impacts of the project; and
    (c) a Groundwater Management Plan, which includes:
        - detailed baseline data of groundwater levels and quality surrounding the site;
        - groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts;
        - a program to monitor ***:***
            - groundwater inflows to the open cut mining operations;
            - the impacts of the project on any groundwater bores on privately-owned land;
            - the seepage/leachate from water storages or backfilled voids on site; and
        - a program to validate the groundwater model for the project, and calibrate it to site specific conditions; and
        - a plan to respond to any exceedances of the performance criteria, and mitigate and/or offset any adverse groundwater impacts of the project.

Void Water Dam 1

23a Within 2 months of the completion of construction works for the expanded Void Water Dam 1, the Proponent shall submit a "works as-executed" report to the Director-General and EPA, certified by a practising engineer, confirming that the expanded dam has been constructed to its design specifications.

BIODIVERSITY

Biodiversity Offset Strategy

24. The Proponent shall implement the biodiversity offset strategy for the project described in the EA, summarised in Table 12, and shown conceptually on the figure in Appendix 4 to the satisfaction of the Director-General.

Table 12: Summary of the Biodiversity Offset Strategy

Offset Areas	***Minimum Size (hectares)***
Eurunderee	363.93
Hillview	57.32
Marengo	284.12
Railway View	243.69
Mine Site	215.86
Greenslopes/Banool	123
TOTAL	**1,287.92**

Notes:
- *To identify the areas referred to in Table 12, see the applicable figure in Appendix 4;*
- *The strategy includes the enhancement of existing fauna habitat within these areas, and where necessary the targeted establishment of naturally scarce fauna habitat; and*
- *Greenslopes/Banool must have at least 74 hectares of Box Gum Woodland EEC.*

25. By the end of June 2012, unless the Director-General agrees otherwise, the Proponent shall update the biodiversity offset strategy for the project, in consultation with OEH, and to the satisfaction of the Director-General. The updated strategy must include the specific details of the Additional Offset Area (see Table 12).

26. The Proponent shall ensure that the biodiversity offset strategy and/or rehabilitation strategy is focused on the re-establishment and/or enhancement of:
(a) the following endangered ecological communities:
- White Box-Yellow Box-Blakely's Red Gum Woodland EEC; and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC; and

(b) habitat for threatened fauna species, including the:
- Regent Honeyeater, Swift Parrot, Brown Treecreeper, Hooded Robin, Little Lorikeet, and Barking Owl; and
- Eastern Bent-wing Bat, Eastern False pipistrelle, Yellow-bellied Bent-wing Bat and Greater Broad-nosed Bat.

Long Term Security of Offsets

27. The Proponent shall make suitable arrangements to provide appropriate long-term security for the offset areas (excluding the rehabilitation areas) by December 2012, or other date agreed by the Director-General, to the satisfaction of the Director-General.

Biodiversity Offset Management Plan

28. The Proponent shall prepare and implement a Biodiversity Management Plan for the project to the satisfaction of the Director-General. This plan must:
(a) be prepared in consultation with OEH, and submitted to the Director-General for approval by the end of December 2012;
(b) describe how the implementation of the biodiversity offset strategy would be integrated with the overall rehabilitation of the site;
(c) describe the short, medium, and long term measures that would be implemented to:
- manage the remnant vegetation and habitat on the site and in the offset area/s (if and when applicable); and

- implement the biodiversity offset strategy (if and when applicable), including detailed performance and completion criteria;

(d) include detailed performance and completion criteria for evaluating the performance of the biodiversity offset strategy, and triggering remedial action (if necessary);

(e) include a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:
- enhancing the quality of existing vegetation and fauna habitat;
- restoring native vegetation and fauna habitat on the biodiversity areas and rehabilitation area through focusing on assisted natural regeneration, targeted vegetation establishment and the introduction of naturally scarce fauna habitat features (where necessary);
- landscaping the land on site that faces public roads to minimise the visual and lighting impacts of the project;
- maximising the salvage of resources within the approved disturbance area - including vegetative, soil and cultural heritage resources – for beneficial reuse in the enhancement of the biodiversity areas or rehabilitation area;
- collecting and propagating seed;
- minimising the impacts on fauna on site, including undertaking pre-clearance surveys;
- managing any potential conflicts between the proposed restoration works in the biodiversity areas and any Aboriginal heritage values (both cultural and archaeological);
- managing salinity;
- controlling weeds and feral pests;
- controlling erosion;
- managing grazing and agriculture on site;
- controlling access; and
- bushfire management;

(f) include a seasonally-based program to monitor and report on the effectiveness of these measures, and progress against the detailed performance and completion criteria;

(g) identify the potential risks to the successful implementation of the biodiversity offset strategy, and include a description of the contingency measures that would be implemented to mitigate against these risks; and

(h) include details of who would be responsible for monitoring, reviewing, and implementing the plan.

Conservation Bond

29. Within 6 months of the approval of the biodiversity offset strategy, the Proponent shall lodge a conservation bond with the Department to ensure that the biodiversity offset strategy is implemented in accordance with the performance and completion criteria of the Biodiversity Management Plan.

The sum of the bond shall be determined by:

(a) calculating the full cost of implementing the offset strategy (other than land acquisition costs); and

(b) employing a suitably qualified quantity surveyor to verify the calculated costs,

to the satisfaction of the Director-General.

If the offset strategy is completed generally in accordance with the completion criteria in the Biodiversity Management Plan to the satisfaction of the Director-General, the Director-General will release the bond.

If the offset strategy is not completed generally in accordance with the completion criteria in the Biodiversity Management Plan, the Director-General will call in all or part of the conservation bond, and arrange for the satisfactory completion of the relevant works.

With the agreement of the Director-General, this bond may be combined with rehabilitation security deposit administered by DRE.

HERITAGE

Historic Heritage

30. By the end of April 2012, the Proponent shall:

(a) undertake primary historical investigations and provide a report prepared by an experienced heritage consultant approved by the Director-General on the archaeological potential of the former Werris Creek Colliery site, remaining buildings and surrounds;

(b) provide recommendations for the management, salvage or recording of any archaeological features on the site and a timetable for the implementation of these recommendations;

(c) include in this report detailed archival recording, including photographic recording and location plans of any structures relating to the former Werris Creek Colliery; and

(d) provide a copy of this report to the Department, Heritage Council of NSW and Council,

to the satisfaction of the Director-General.

Human Remains

31. This approval does not allow the Proponent to disturb any human remains found on the site.

Heritage Management Plan

32. The Proponent shall prepare and implement a Heritage Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Director-General;
    (b) be prepared in consultation with OEH and the Aboriginal stakeholders (in relation to the management of Aboriginal heritage values);
    (c) be submitted to the Director-General for approval by the end of June 2012, unless the Director-General agrees otherwise;
    (d) include the following for the management of Aboriginal Heritage:
        - a description of the measures that would be implemented for:
            - protecting, relocating, monitoring and/or managing the axe-grinding grooves known as the "Narrawolga site";
            - managing the discovery of any human remains or previously unidentified Aboriginal objects on site;
            - maintaining and managing reasonable access for Aboriginal stakeholders to heritage items on site and within any Aboriginal heritage conservation areas;
            - ongoing consultation with the Aboriginal stakeholders in the conservation and management of Aboriginal cultural heritage both on site and within any Aboriginal heritage conservation areas; and
            - ensuring any workers on site receive suitable heritage inductions and that suitable records are kept of these inductions;
        - a strategy for the storage of any heritage items salvaged on site, both during the project and in the long-term;
    (e) include the following for the management of historic heritage:
        - a detailed plan for the implementation of any measures resulting from the further investigations into the former Werris Creek Colliery site and buildings;
        - a description of the measures that would be implemented for:
            - managing the discovery of human remains or previously unidentified heritage items on site; and
            - ensuring any workers on site receive suitable heritage inductions and that suitable records are kept of these inductions.

Note: It is accepted that the detailed plan for the implementation of any measures resulting from further investigations into the former Werris Creek Colliery site will not be submitted with the initial Heritage Management Plan. They should be progressively added to the plan once they are completed.

TRANSPORT

Roadworks

33. Prior to the use of the Northern Site Access Road, the Proponent shall:
    (a) construct the intersection of the Northern Site Access Road (see the figure in Appendix 2) to the satisfaction of Council;
    (b) tar seal Escott Road from Werris Creek Road to the coal haul road to the satisfaction of Council;
    (c) upgrade the intersection of Escott Road and Werris Creek Road to a CHR type intersection to the satisfaction of RMS and Council;
    (d) install appropriate rail crossings at the rail loop on Escott Road; and
    (e) install appropriate advance warning signs and lighting on Escott Road and at the intersection of the Northern Site Access Road to the satisfaction of Council.

34. Within 3 months of the commencement of coal transport from the Northern Site Access Road, the Proponent shall close the existing mine entrance on Werris Creek Road (see Figure 1 of Appendix 2) to coal transport (unless required in an emergency).

Road Maintenance

35. For the life of the project, the Proponent shall continue to provide funding towards the maintenance of Taylors Lane, in accordance with the existing road maintenance contributions agreement with Council.

Monitoring of Coal Transport

36. The Proponent shall:
    (a) keep accurate records of the amount of coal transported from the site (on a monthly basis); and
    (b) make these records available on its website at the end of each calendar year.

VISUAL

Visual Amenity

37. The Proponent shall:
    (a) implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the project, including:
        - progressively rehabilitating overburden emplacement areas (particularly the outer batters), including partial rehabilitation of temporarily inactive areas and proposed topsoil storage stockpiles;
        - constructing a 15 metre high visual/amenity bund along the northeastern perimeter of the northern extent of the open-cut pit, and
        - planting trees at the foot of the overburden emplacement area along the eastern boundary of the site, in front of the visual/amenity bund, and to the north and east of the product coal stockpile and rail load-out facility;
    (b) establish and maintain an effective vegetative screen along the boundary of the site adjoining public roads;
    (c) ensure no outdoor lights shine above the horizontal; and
    (d) ensure that all external lighting associated with the development complies with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting*,

    to the satisfaction of the Director-General.

Additional Visual Impact Mitigation

38. Upon receiving a written request from the owner of any residence on privately-owned land which has, or would have, significant direct views of the mining operations on site during the project, the Proponent shall implement additional visual impact mitigation measures (such as landscaping treatments or vegetation screens) to reduce the visibility of these mining operations from the residences on their properties.

    These mitigation measures must be reasonable and feasible, and must be implemented within a reasonable timeframe.

    If the Proponent and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.

    Notes:
    - *The additional visual impact mitigation measures must be aimed at reducing the visibility of the mining operations on site from significantly affected residences, and do not require measures to reduce the visibility of the mining operations from other locations on the affected properties;*
    - *The additional visual impact mitigation measures do not necessarily have to include the implementation of measures on the affected property itself (i.e. the additional measures could involve the implementation of measures outside the affected property boundary that provide an effective reduction in visual impacts).*

WASTE

39. The Proponent shall:
    (a) implement all reasonable and feasible measures to minimise the waste generated by the project;
    (b) ensure that the waste generated by the project is appropriately stored, handled and disposed of; and
    (c) monitor and report on effectiveness of the waste minimisation and management measures in the annual review.

BUSHFIRE MANAGEMENT

40. The Proponent shall:
    (a) ensure that the project is suitably equipped to respond to any fires on site; and
    (b) assist the Rural Fire Service and emergency services as much as possible if there is a fire in the surrounding area.

REHABILITATION

Rehabilitation Objectives

41. The Proponent shall rehabilitate the site to the satisfaction of the Executive Director, Mineral resources in DRE. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EA (and shown conceptually in the figure in Appendix 5), and comply with the objectives in Table 13.

Table 13: Rehabilitation objectives

Feature	***Objective***
Mine site (as a whole)	• Safe, stable & non-polluting; • A landform consistent with the surrounding environment, and final land uses compatible with surrounding land uses; • Establishment of 280 hectares of the White Box-Yellow Box-Blakely's Red Gum Woodland EEC; and • Restoration of ecosystem function, including maintaining or establishing self-sustaining native ecosystems, comprised of: - local native plant species; - 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.

Progressive Rehabilitation

42. The Proponent shall rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance.

Rehabilitation Management Plan

43. The Proponent shall prepare and implement a Rehabilitation Management Plan for the project to the satisfaction of the Executive Director, Mineral Resources in DRE. This plan must:
    (a) be prepared in consultation with the Department, NOW, OEH, Council and the CCC;
    (b) be submitted to the Executive Director, Mineral Resources in DRE by the end of April 2012
    (c) be prepared in accordance with any relevant DRE guideline;
    (d) describe how the rehabilitation of the site would be integrated with the implementation of the biodiversity offset strategy;
    (e) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, and triggering remedial action (if necessary);
    (f) describe the measures that would be implemented to ensure compliance with the conditions of this approval, and address all aspect of rehabilitation including mine closure, final landform, and final land use;
    (g) include a program to monitor and report on the effectiveness of the measures, and progress against the detailed performance and completion criteria; and
    (h) build to the maximum extent practicable on the other management plans required under this approval.

SCHEDULE 4
ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. By the end of December 2011, the Proponent shall:
   (a) notify in writing the owners of:
      - any residence on the land listed in Table 3 of schedule 3 that they are entitled to ask the Proponent to install additional noise mitigation measures at their residence at any stage during the project; and
      - any privately-owned land within 2 kilometres of the approved open cut mining pit that they are entitled to ask the proponent for a property inspection to establish the baseline condition of any buildings or structures on their land, or to have a previous property inspection report updated; and
   (b) send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the owners of any land (including mine-owned land) where the predictions in the EA identify that dust emissions generated by the project are likely to be greater than the relevant air quality criteria in schedule 3 at any time during the life of the project.

2. As soon as practicable after obtaining monitoring results showing:
   (a) an exceedance of the relevant criteria in schedule 3, the Proponent shall notify the affected landowner in writing of the exceedance, and provide regular monitoring results to each of these parties until the project is complying with the relevant criteria again; and
   (b) an exceedance of the relevant air quality criteria schedule 3, the Proponent shall send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the affected landowners.

INDEPENDENT REVIEW

3. If an owner of privately-owned land considers the project to be exceeding the relevant criteria in schedule 3, then he/she may ask the Director-General in writing for an independent review of the impacts of the project on his/her land.

   If the Director-General is satisfied that an independent review is warranted, then within 2 months of the Director-General's decision the Proponent shall:
   (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to:
      - consult with the landowner to determine his/her concerns;
      - conduct monitoring to determine whether the project is complying with the relevant criteria in schedule 3; and
      - if the project is not complying with these criteria, then identify the measures that could be implemented to ensure compliance with the relevant criteria; and
   (b) give the Director-General and landowner a copy of the independent review.

4. If the independent review determines that the project is complying with the relevant criteria in schedule 3, then the Proponent may discontinue the independent review with the approval of the Director-General.

   If the independent review determines that the project is not complying with the relevant criteria in schedule 3, then the Proponent shall:
   (a) implement all reasonable and feasible mitigation measures, in consultation with the landowner and appointed independent person, and conduct further monitoring until the project complies with the relevant criteria; and
   (b) secure a written agreement with the landowner to allow exceedances of the relevant criteria;

   to the satisfaction of the Director-General.

   If the independent review determines that the project is not complying with the relevant acquisition criteria, and that the project is primarily responsible for this non-compliance, then upon receiving a written request from the landowner, the Proponent shall acquire all or part of the landowner's land in accordance with the procedures in condition 5-6 below.

LAND ACQUISITION

5. Within 3 months of receiving a written request from a landowner with acquisition rights, the Proponent shall make a binding written offer to the landowner based on:
   (a) the current market value of the landowner's interest in the land at the date of this written request, as if the land was unaffected by the project, having regard to the:
      - existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and
      - presence of improvements on the land and/or any approved building or structure which has been physically commenced at the date of the landowner's written request, and is due to be

completed subsequent to that date, but excluding any improvements that have resulted from the implementation of 'additional noise mitigation measures' in condition 4 of schedule 3;

(b) the reasonable costs associated with:
- relocating within the Liverpool Plains Shire local government area, or to any other local government area agreed to by the Director-General;
- obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is to be acquired; and

(c) reasonable compensation for any disturbance caused by the land acquisition process.

However, if at the end of this period, the Proponent and landowner cannot agree on the acquisition price of the land and/or the terms upon which the land is to be acquired, then either party may refer the matter to the Director-General for resolution.

Upon receiving such a request, the Director-General will request the President of the NSW Division of the Australian Property Institute to appoint a qualified independent valuer to:
- consider submissions from both parties;
- determine a fair and reasonable acquisition price for the land and/or the terms upon which the land is to be acquired, having regard to the matters referred to in paragraphs (a)-(c) above;
- prepare a detailed report setting out the reasons for any determination; and
- provide a copy of the report to both parties.

Within 14 days of receiving the independent valuer's report, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the independent valuer's determination.

However, if either party disputes the independent valuer's determination, then within 14 days of receiving the independent valuer's report, they may refer the matter to the Director-General for review. Any request for a review must be accompanied by a detailed report setting out the reasons why the party disputes the independent valuer's determination. Following consultation with the independent valuer and both parties, the Director-General will determine a fair and reasonable acquisition price for the land, having regard to the matters referred to in paragraphs (a)-(c) above, the independent valuer's report and any other relevant submissions. Within 14 days of this determination, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the Director-General's determination.

If the landowner refuses to accept the Proponent's binding written offer under this condition within 6 months of the offer being made, then the Proponent's obligations to acquire the land shall cease, unless the Director-General determines otherwise.

6. The Proponent shall pay all reasonable costs associated with the land acquisition process described in condition 4 above, including the costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of the plan at the Office of the Registrar-General.

SCHEDULE 5
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Director-General. This strategy must:
   (a) be submitted to the Director-General for approval by the end of April 2012;
   (b) provide the strategic framework for the environmental management of the project;
   (c) identify the statutory approvals that apply to the project;
   (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
   (e) describe the procedures that would be implemented to:
      - keep the local community and relevant agencies informed about the operation and environmental performance of the project;
      - receive, handle, respond to, and record complaints;
      - resolve any disputes that may arise during the course of the project;
      - respond to any non-compliance;
      - respond to emergencies; and
   (f) include:
      - copies of any strategies, plans and programs approved under the conditions of this approval; and
      - a clear plan depicting all the monitoring required to be carried out under the conditions of this approval.

Management Plan Requirements

2. The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:
   (a) detailed baseline data;
   (b) a description of:
      - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
      - any relevant limits or performance measures/criteria;
      - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;
   (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
   (d) a program to monitor and report on the:
      - impacts and environmental performance of the project;
      - effectiveness of any management measures (see (c) above);
   (e) a contingency plan to manage any unpredicted impacts and their consequences;
   (f) a protocol for managing and reporting any:
      - incidents;
      - complaints;
      - non-compliances with statutory requirements; and
      - exceedances of the impact assessment criteria and/or performance criteria; and
   (g) a protocol for periodic review of the plan.

Annual Review

3. By the end of March each year, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:
   (a) describe the development (including any rehabilitation) that was carried out in the past year, and the development that is proposed to be carried out over the next year;
   (b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against the:
      - relevant statutory requirements, limits or performance measures/criteria;
      - monitoring results of previous years; and
      - relevant predictions in the EA;
   (c) identify any non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;
   (d) identify any trends in the monitoring data over the life of the project;
   (e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
   (f) describe what measures will be implemented over the next year to improve the environmental performance of the project.

Revision of Strategies, Plans and Programs

4. Within 3 months of:
   (a) the submission of an annual review under condition 3 above;
   (b) the submission of an incident report under condition 6 below;
   (c) the submission of an audit under condition 8 below; or
   (d) any modification to the conditions of this approval (unless the conditions require otherwise),

   the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Director-General.

   Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.

Community Consultative Committee

5. The Proponent shall operate a Community Consultative Committee (CCC) for the Werris Creek Coal Mine for the life of the project, in general accordance with the *Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects* (Department of Planning, 2007, or its latest version), and to the satisfaction of the Director-General.

   Notes:
   - *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Proponent complies with this approval; and*
   - *In accordance with the guideline, the Committee should be comprised of an independent chair and appropriate representation from the Proponent, Council, recognised environmental groups and the local community.*

REPORTING

Incident Reporting

6. The Proponent shall notify, at the earliest opportunity, the Director-General and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the project, the Proponent shall notify the Director-General and any other relevant agencies as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Director-General and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

Regular Reporting

7. The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval.

INDEPENDENT ENVIRONMENTAL AUDIT

8. By the end of June 2014, and every 3 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:
   (a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General;
   (b) include consultation with the relevant agencies;
   (c) assess the:
      - environmental performance of the project; and
      - whether it is complying with the requirements in this approval, any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals); and
   (d) recommend appropriate measures or actions to improve the environmental performance and rehabilitation of the project.

   Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Director-General.

9. Within 6 weeks of the completion of this audit, or as otherwise agreed by the Director-General, the Proponent shall submit a copy of the audit report to the Director-General, together with its response to any recommendations contained in the audit report.

ACCESS TO INFORMATION

10. The Proponent shall:
   (a) make copies of the following publicly available on its website:
      - the EA;
      - current statutory approvals for the project;
      - approved strategies, plans and programs required under the conditions of this approval;

- a comprehensive summary of the monitoring results of the project, which have been reported in accordance with the conditions of this approval or any approved plans or programs;
- a complaints register, which is to be updated on a monthly basis;
- minutes of any CCC meetings;
- the last five annual reviews;
- any independent environmental audit of the project, and the Proponent's response to the recommendations in any audit;
- any other matter required by the Director-General; and

(b) keep this information up-to-date,

to the satisfaction of the Director-General.

APPENDIX 1
SCHEDULE OF LAND

Lot(s)	*DP Number*
19, 20, 65, 73-75, 83, 90, 92, 109, 110, 112, 120, 121, 123, 126-130, 131-135, 217, 225	751017
1-4	1022826
1-4	1037145
2	431951
1	186633
270	257307
2	1095262
1	344178
1	1114226
1	328762
1	328763
11-12	1160636
2	1085891
All Crown and public roads within the project boundary, as shown in Figure 1.	

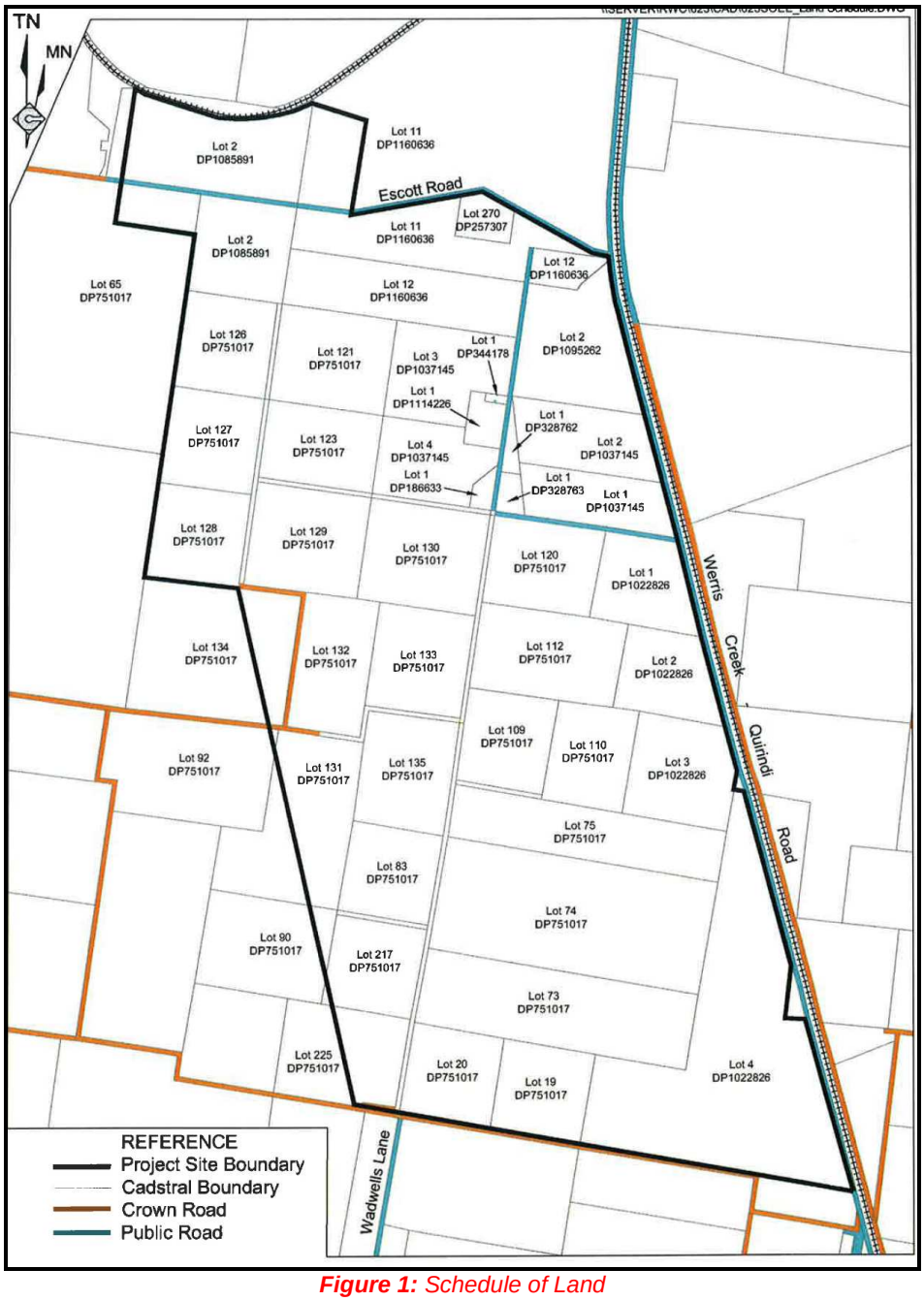

Figure 1: *Schedule of Land*

APPENDIX 2
PROJECT LAYOUT PLAN

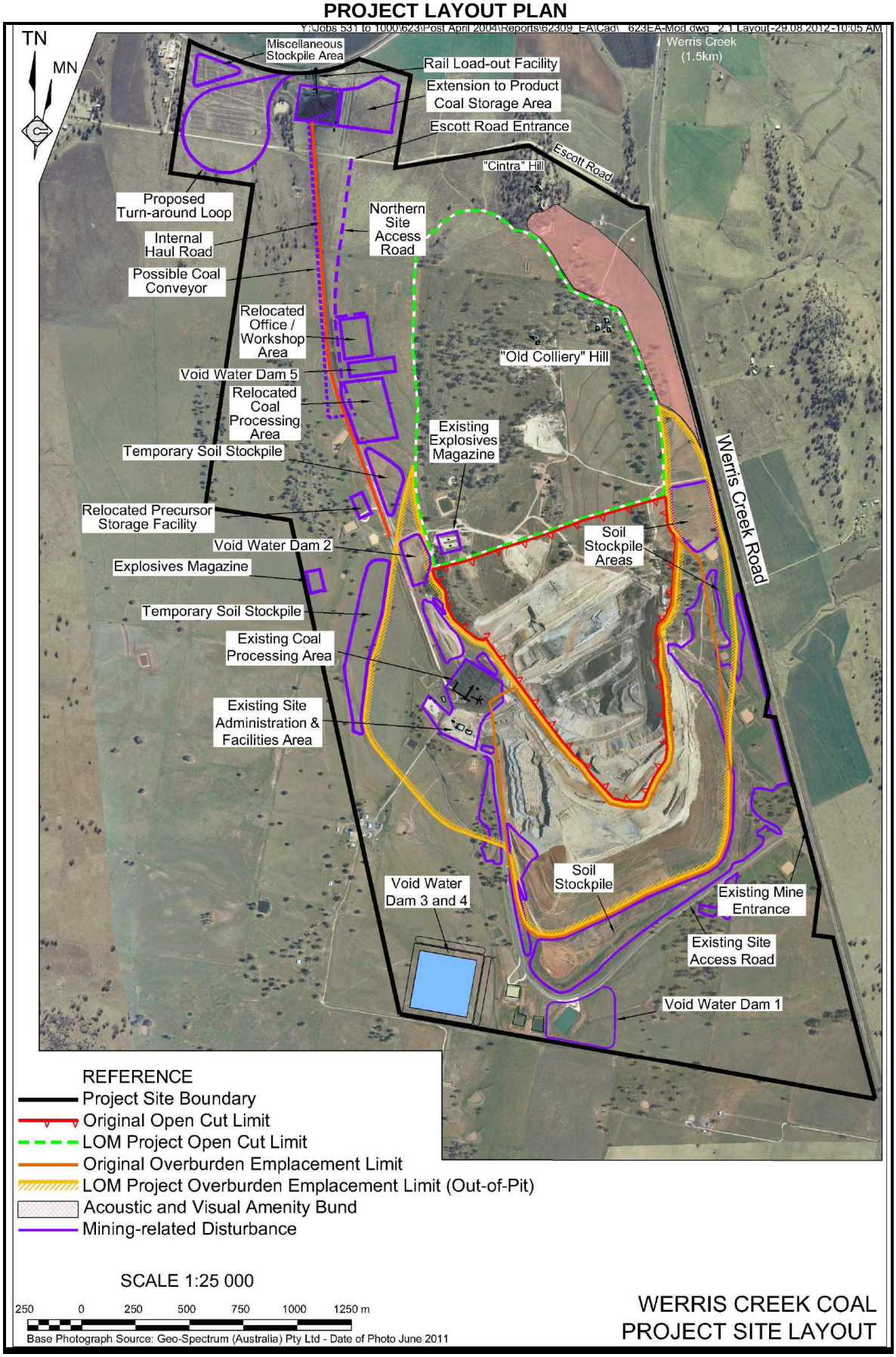

Figure 1: *Project General Arrangement*

APPENDIX 3
NOISE RECEIVER LOCATIONS

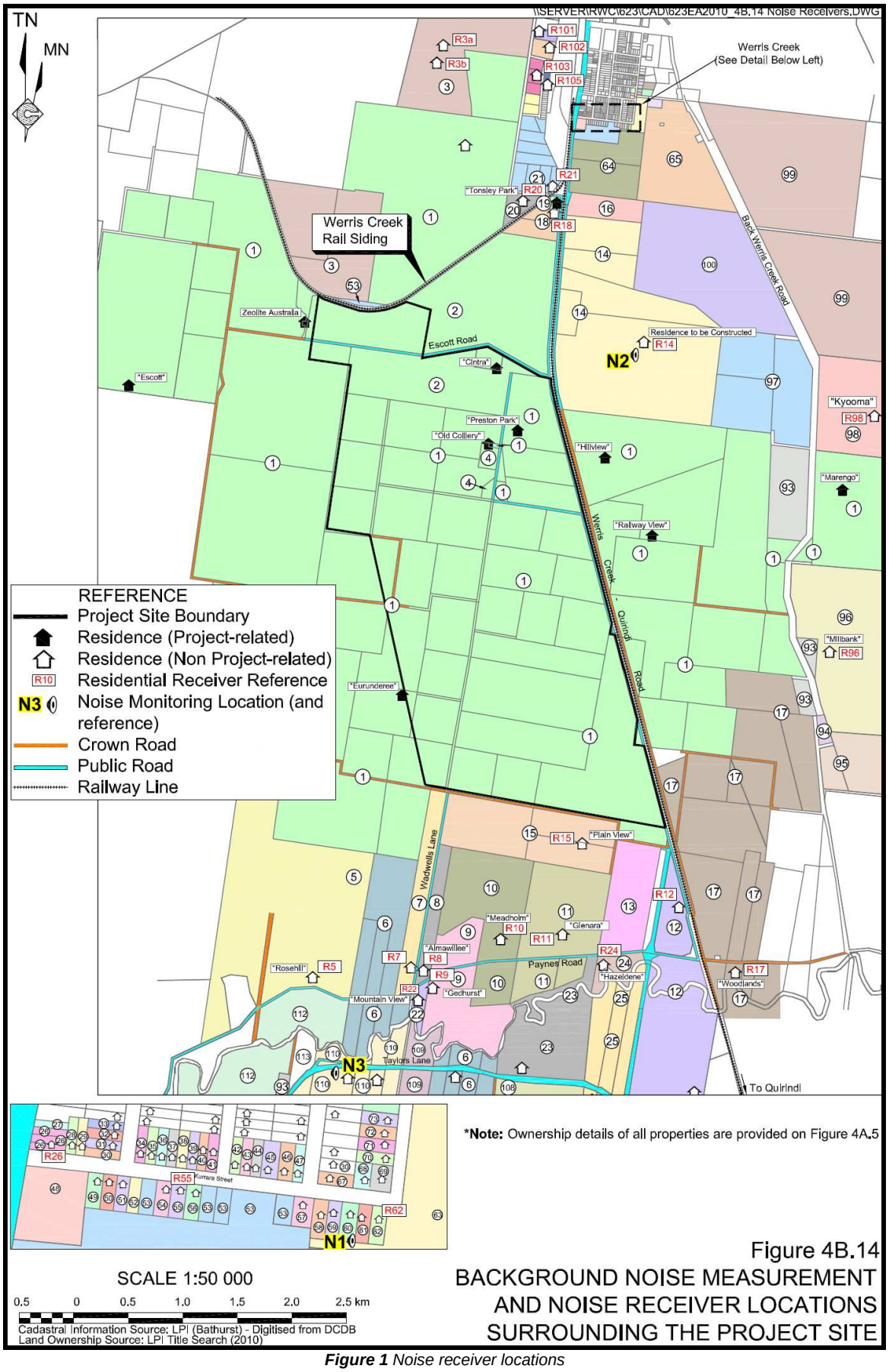

Figure 1 *Noise receiver locations*

APPENDIX 4
BIODIVERSITY OFFSET STRATEGY

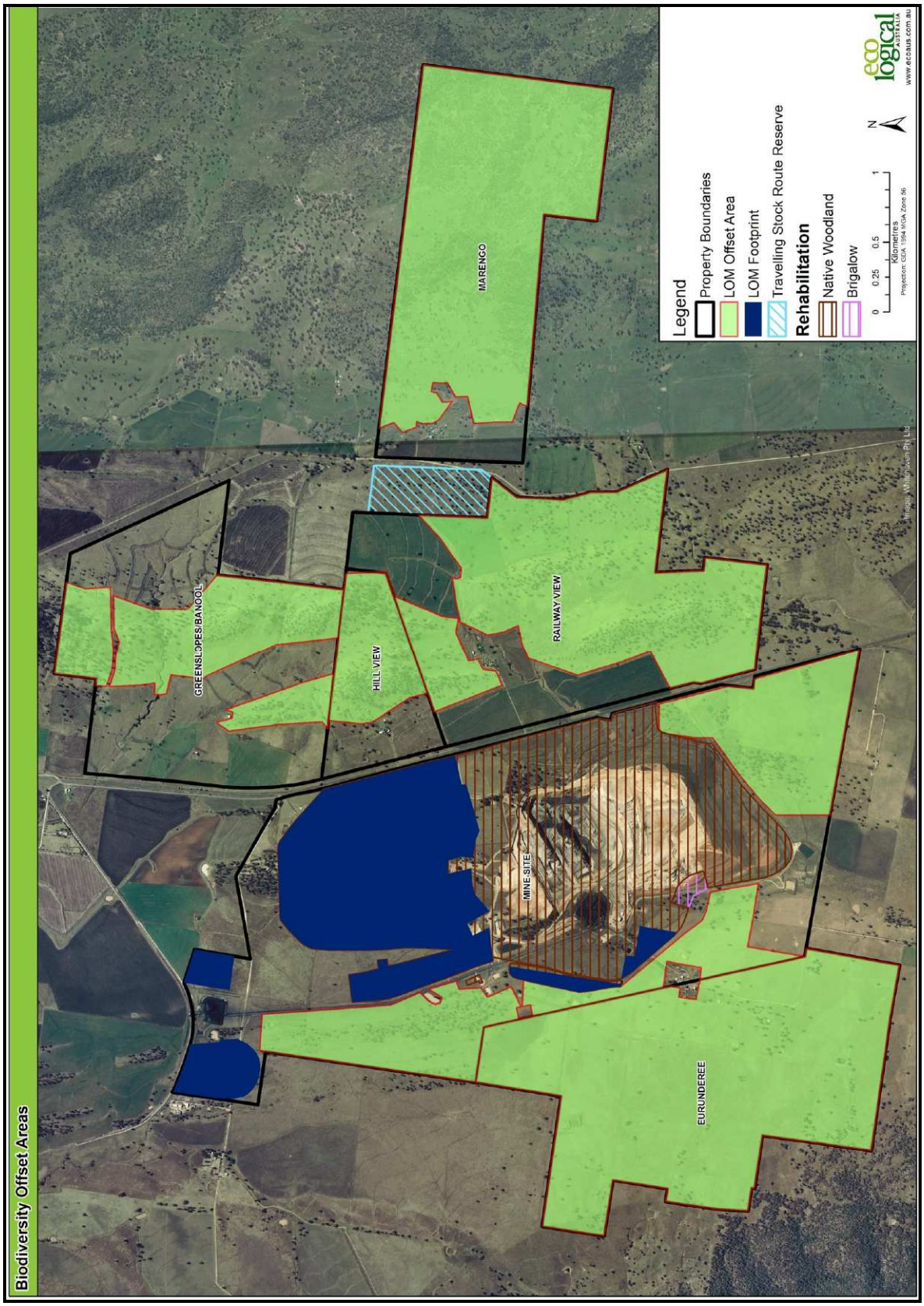

Figure 1: *Modified Biodiversity Offset Strategy*

APPENDIX 5
CONCEPTUAL FINAL LANDFORM PLAN

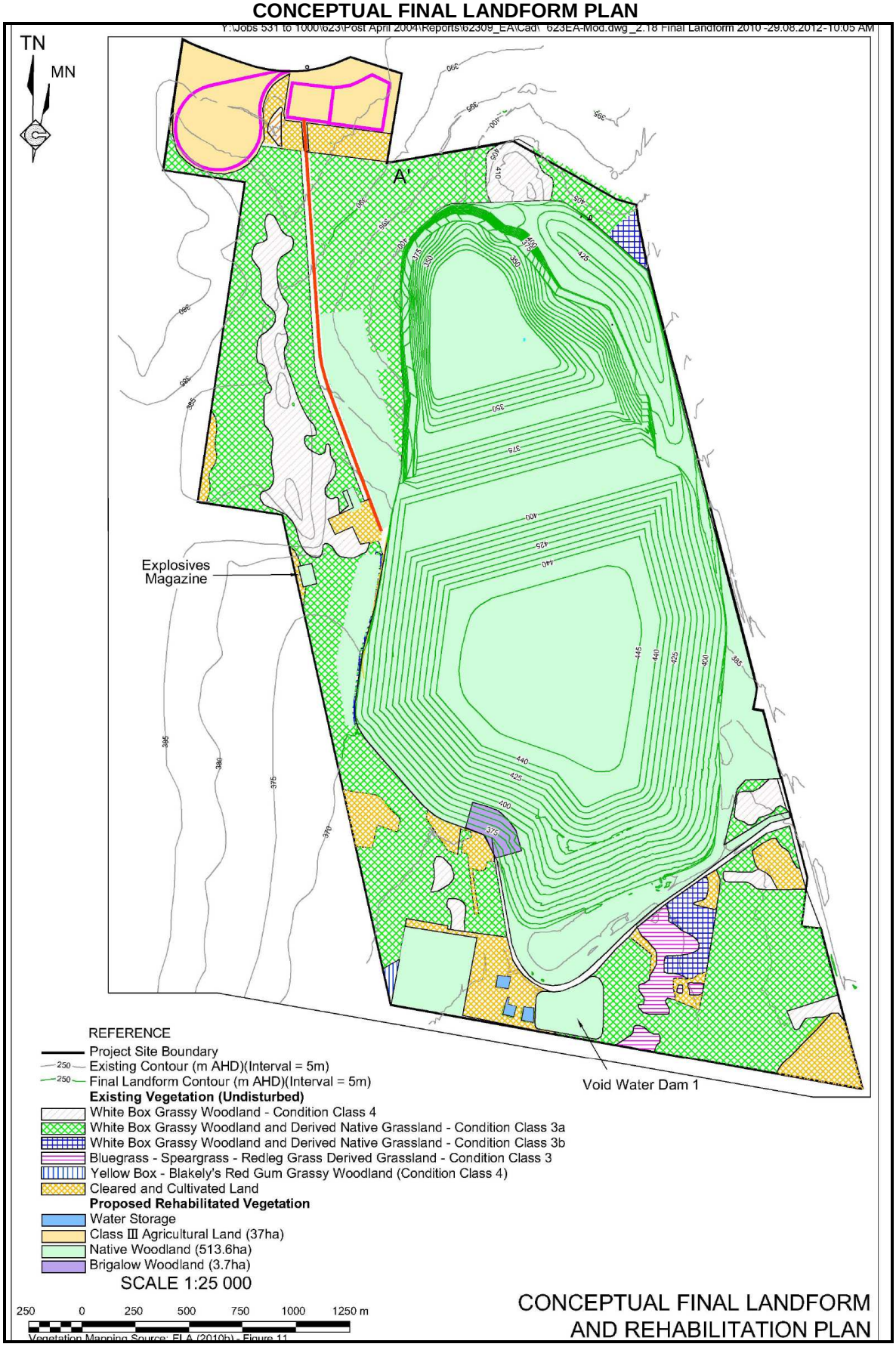

Figure 1: *Conceptual Final Landform*

APPENDIX 6
STATEMENT OF COMMITMENTS

Desired Outcome	Action		Timing
1. Groundwater			
Effective management of water dewatered from the former Werris Creek Colliery underground workings.	1.1	Dewater water from the underground workings to the already approved groundwater storage cells and use it preferentially for dust suppression activities.	Ongoing
Effective management of the potential contamination of groundwater resources.	1.2	Implement mitigation measures associated with the contamination of groundwater due to a hydrocarbon spill in accordance with the existing *Groundwater Contingency Plan.*	If contamination of groundwater due to a hydrocarbon spill occurs
	1.3	Fill the final void above the equilibrium water level following the cessation of mining in order to avoid leaving a potentially saline water body, which may have the potential to contaminate the surrounding aquifers.	Following the cessation of mining
	1.4	Increase the groundwater monitoring regime analytes monitored and/or frequency of sampling to confirm the magnitude and extent of any change in water chemistry and verify the change is a consequence of operations associated with the LOM Project.	If pH or EC trigger level exceeded
	1.5	Install one or more piezometers into the back filled void and monitor water chemistry to confirm back filled overburden and interburden is not adversely affecting the local groundwater.	Within 2 years of project approval
	1.6	Ongoing analysis of overburden / interburden samples to confirm the low potential for acid and soluble salt generation, or other potential contamination.	Ongoing
Ensure the availability of groundwater to surrounding users is maintained.	1.7	Review, update and incorporate the Groundwater Contingency Plan into a Water Management Plan for the Werris Creek Coal Mine.	Within 6 months of project approval
	1.8	In the event that routine monitoring indicates that a groundwater trigger has been reached, commence contingency procedures which will require an increased monitoring frequency to confirm a breach of the trigger. If the breach confirmed, commission a hydrogeologist to review the data, and provide independent advice as to the cause of the trigger. The outcomes of that review, including any recommendations, will be subject to discussion and agreement with hydrogeologists from NOW.	In the event that routine monitoring indicates that a groundwater trigger has been reached
Ensure the availability of groundwater to surrounding users is maintained. (cont'd)	1.9	If the saturated thickness in any bore is reduced below trigger level, notify the affected landowner(s).	If the saturated thickness trigger level is achieved in any bore

Desired Outcome	Action		Timing
	1.10	If a reduction in the saturated thickness within any bore is in excess of the trigger level, and is determined to be as a consequence of operations associated with the LOM Project, negotiate with the affected landowner(s) with the intent of formulating an agreement in accordance with the *Groundwater Contingency Plan.*	In the event that monitoring identifies a reduction in the saturated thickness and is determined to be a consequence of operations associated with the LOM Project
2. Surface Water			
Separate clean water from dirty water.	2.1	Construct temporary diversion banks on the upslope boundary of all areas to be stripped of groundcover and soil.	Prior to clearing and stripping operations
	2.2	Construct catch drains or banks and/or install a sediment fence on the downslope boundary of an area to be stripped of groundcover and soil.	Prior to clearing and stripping operations
	2.3	Direct sediment-laden runoff into sediment basins for treatment prior to discharge (if required).	Ongoing
	2.4	Construct all water management infrastructure in accordance with Volume 2E of the guideline document "*Soils and Construction: Managing Urban Stormwater*" (DECC, 2008).	Construction of water management infrastructure
Prevent the discharge of contaminated water from the Project Site	2.5	Install a sediment trap in the coal crushing/ stockpiling and maintenance area to remove coal fines from surface flows.	Ongoing
	2.6	Install an oil/water separating unit to receive and treat potentially contaminated water from the maintenance and wash-down bay prior to further treatment within the dirty water management system.	Ongoing
Implementation of a comprehensive and ongoing surface water monitoring program.	2.7	Monitor surface water quality for pH, electrical conductivity, total suspended solid concentration, Oil & Grease levels, within: • licensed discharge points; • receiving waters (Werris and Quipolly Creeks); and • Clean, Dirty and Void Water Dams	 Quarterly and during discharge Quarterly and within 12 hours after discharge Quarterly
Prevention of saline water discharge off site.	2.8	Retain all void water within the Void Water Dams or sumps within the open cut.	Ongoing

Desired Outcome	Action		Timing
2. Surface Water (cont'd)			
Prevention of dirty water flowing into Werris and Quipolly Creeks.	2.9	Where practically possible, ensure the licensed discharge points / sediment basins are maintained in a dry condition to provide full storage capacity in the event of rainfall events exceeding 39.2 mm of rain over a 5-day period.	Ongoing
3. Biodiversity			
Avoid and minimise impacts on native vegetation (including the two identified EECs) where possible.	3.1	Ensure disturbance associated with the relocation of site infrastructure occurs in the locations specified on **Figure 2.1**, i.e. on cleared and cultivated land (Condition Class 1), or derived native grassland without native tree overstorey (Condition Class 3).	Prior to and during relocation of infrastructure
	3.2	Limit vegetation clearing each year to an area required for the following 12 months mine development.	Annual
	3.3	Clearly mark / peg areas required for surface infrastructure establishment and mining.	Ongoing
	3.4	Retain felled trees on the Project Site for subsequent use during rehabilitation activities.	Site establishment and rehabilitation phases
Mitigate unavoidable disturbance to native vegetation and fauna habitat.	3.5	Identify, as part of the Pre-start Clearing Inspection, biological resources within the disturbance area including habitat resources such as hollows, stag trees and coarse woody debris, and the availability of endemic seed.	During annual clearing campaigns
	3.6	Implement a seed collection strategy and program to harvest endemic seed from local vegetation to either directly sow or propagate for tube stock planting in either biodiversity offset or rehabilitation areas.	Ongoing
	3.7	Complete monitoring and inspection programs to review the progress of rehabilitation against criteria based on vegetation community benchmark data.	Annual
Rehabilitate disturbed areas to create a final landform that maintains or improves biodiversity values of the Project Site.	3.8	Create a final landform generally similar to that of the pre-mining landform, i.e. approximating the conceptual final landform provided by **Figure 2.18**.	Ongoing
	3.9	Revegetate the final landform as nominated by **Figure 2.18** (or subsequent Rehabilitation Management Plan), i.e. predominantly native woodland vegetation which will supplement the LOM Project BOS and improve the linkage between remnant areas of native woodland vegetation to the east and west.	Ongoing
	3.10	Designate approximately 3.7ha of the final landform as Brigalow woodland.	During rehabilitation

Desired Outcome	Action		Timing
3. Biodiversity (cont'd)			
Rehabilitate disturbed areas to create a final landform that maintains or improves biodiversity values of the Project Site.	3.11	Augment habitat through the placement of previously cleared timber (on the ground as well as upright 'stags') to provide important habitat value for arboreal and ground hollow dependant fauna and perching sites.	During rehabilitation operations
Manage the impacts of noxious weeds.	3.12	Monitor noxious weeds on a regular basis, and if required, conduct weed management campaigns to manage weed outbreaks.	Ongoing
Minimise or avoid impacts on native fauna (including threatened species).	3.13	Undertake vegetation clearing during a single campaign each year (except when there are extenuating circumstances), preferably during seasons that minimise the risk of impacting on hibernating microbats or breeding woodland birds, i.e. Autumn.	Vegetation clearing and ongoing
	3.14	Commission a Pre-start Clearing Inspection of the proposed disturbance area by an ecologist to identify the presence of native fauna (including threatened species such as the Koala and microbats).	Vegetation clearing and ongoing
	3.15	Suspend all clearing activities, in the event a koala (or other threatened fauna species) is present in the trees to be cleared, until it moves away from the subject area or is relocated by a suitably qualified person.	Prior to clearing operations within areas of remnant vegetation
Offset residual impact of the LOM Project.	3.16	Develop and implement, in consultation with the DECCW, DoP and DSEWPaC, a Biodiversity Offset Strategy for the LOM Project.	Within 18 months of Project Approval
	3.17	Prepare a Biodiversity Offset Management Plan which includes a detailed description of the procedures to be applied within the offset area including: • erosion and sediment control; • soil and water management, bushfire management; • exclusion of domestic stock; • weed management; • retention of regrowth and native vegetation; • retention of dead timber and fallen logs; • in-fill planting with locally indigenous species where required; • feral animal control; • limitation of human access; and • an annual review and reporting requirement.	Within 18 months of Project Approval

Desired Outcome	Action		Timing
3. Biodiversity (cont'd)			
Offset residual impact of the LOM Project. (cont'd)	3.18	Provide for the completion of an independent review of the BOMP at least every 5 years to report on the success of BOMP procedures (see Commitment 3.17).	Every 5 years following the establishment of the BOMP
4. Heritage			
Maintain Aboriginal heritage values on site.	4.1	Update the Aboriginal Cultural Heritage Management Plan to reflect the approval of the LOM Project.	Within 12 months of project approval
	4.2	Re-instate the Narrawolga Axe Grinding Grooves to a position as close as possible to their original location following rehabilitation of the Project Site in consultation with local Aboriginal community representatives.	Following mine closure
	4.3	Continue awareness training of staff and contractors for cultural heritage matters	Ongoing
	4.4	In the event the Project Site disturbance footprint changes, ensure that appropriate consultation and field survey is undertaken to confirm no sites or objects of Aboriginal heritage significance are impacted.	If the disturbance footprint changes
Maintain Aboriginal heritage values on site.	4.5	In the event any previously unidentified 'objects' or other Aboriginal sites (such as burials) are uncovered, ensure that work in that area is suspended and the DECCW Western Regional Archaeologist (Dubbo Office) and local Aboriginal community are contacted to discuss how to proceed.	If a previously unidentified object or Aboriginal site is uncovered
Develop an historic context for the Project Site particularly in reference to the operation of the former Werris Creek Colliery.	4.6	Salvage the concrete marked with the hand and footprints of the former Deputy Mine Manager's daughter at the residence and provide to Ms Dora Koops (one of the daughters) for posterity.	Prior to the demolition of the residence
	4.7	Provide the photo record held by the Proponent and its consultants to the Werris Creek Historical Society (or other similar community group) as a record of the remnant features at the time of removal.	Once available
	4.8	Provide a copy of the Cultural Heritage Assessment (Landskape, 2010) to the Werris Creek Historical Society (or other similar community group) as a record of the remnant features at the time of removal.	Once available
5. Transport Aspects			
Product haulage by public road is conducted in an appropriate and safe manner.	5.1	Limit the road transportation of coal to 50 000tpa.	Ongoing
	5.2	Provide final detailed design for the proposed road upgrades to accommodate B-Double use and in accordance with Austroads Pt. 4 – Road Design Guide.	In designing road and intersection upgrades

Desired Outcome	Action		Timing
5. Transport Aspects (cont'd)			
Product haulage by public road is conducted in an appropriate and safe manner. (cont'd)	5.3	Complete all intersections to a standard providing appropriate dimensional capacity and signage and to the satisfaction of the relevant road authority.	During road and intersection construction
	5.4	Prevent spillage from the trucks through the continuation of a 'covered load' policy.	Ongoing
	5.5	Obtain school bus timetable at the beginning of each year and manage road haulage despatch to avoid potential conflict.	Ongoing
Accommodate the increased volume of traffic using Escott Road.	5.6	Upgrade the intersection between Escott Road and Werris Creek Road generally in accordance with the designs provided by Constructive Solutions (2010) and in accordance with Austroads Pt. 4 – Road Design Guide 2009.	During the construction phase of the Project
	5.7	Upgrade Escott Road as recommended by Constructive Solutions (2010) and in accordance with AUSTROADS Pt. 4 – Road Design Guide 2009.	During the construction phase of the Project
	5.8	Provide for a seal of at least 50m of the Northern Site Access Road from the Escott Road Entrance	During the construction phase of the Project
Accommodate the increased volume of traffic using the Rail Load-out Road	5.9	Construct the Escott Road – Rail Load-out Road cross-junction as an RTA Modified BAR type intersection.	During the construction phase of the Project
Maintain access across the rail turn-around loop.	5.10	Construct two level crossings across the rail turn-around loop.	During construction of the rail turn-around loop
	5.11	Construct an all-weather side track around the rail loop to allow emergency access should the road be blocked by a train.	During construction of the rail turn-around loop
Contribute to the maintenance of Taylors Lane.	5.12	Provide ongoing funding for maintenance of Taylors Lane on a per tonne basis (in the form of section 94 contributions) as per the current agreement that exists with Liverpool Plains Shire Council.	Ongoing
Provide traffic management for road closures required for blasting	5.13	Review and update (as required) the traffic management procedure "*Whitehaven Coal Procedure – Road Closure*".	During the construction phase of the Project

Desired Outcome	Action	Timing
6. Noise		
Attenuate mining noise sources to ensure compliance with Project Specific Noise Criteria.	6.1 Construct an Acoustic and Visual Amenity Bund at the northern extent of mining operations.	Once mining operations reach the base of "Old Colliery" Hill
	6.2 Locate all mining-related infrastructure, eg. the Coal Processing Area and Site Administration and Facilities Area, in such a way that local topography (of "Old Colliery" and "Cintra" Hills) provides a natural acoustic barrier to the town of Werris Creek and the residential receivers located to the south of the town.	During the construction phase of the Project
	6.3 Use temporary ROM coal stockpiles from time to time within the open cut mine area to minimise the transmission of noise during night-time operations.	Ongoing during night-time period
	6.4 Continue to enclose the conveyor belt of the rail load out facility.	Ongoing
	6.5 Ensure that all noise mitigation measures are implemented to ensure that all noise emissions from the Project Site meet predicted noise levels. This may include the following. • Apply the manufacturer specified attenuator kits to each truck to achieve a noise reduction of 8dB. • Apply a 1 600rpm reverse gear limiter on bulldozers operating on exposed areas of the Project Site such as the Product Coal Storage Area and ROM Pad.	 Ongoing Ongoing
	• Construct a 5m high barrier around the northeastern perimeter of the relocated coal processing infrastructure. • Ensure that all equipment exhibits sound power levels consistent with the schedules in *Appendix D* of Spectrum Acoustics (2010). • Limit the number of operating drills (non exploration) on the Project Site to two at any one time. • Stand down all mobile equipment operating to the north of the advancing open cut under noise enhancing conditions during the evening and night-time, i.e. temperature inversion and winds from the south-southeast or northwest. • Whilst the Coal Processing Area remains in its current location, limit the number of trucks and excavators operating during inversion conditions to 10 and 3 respectively. • Ensure that during periods of noise enhancing winds, overburden emplacement activities are preferentially undertaken 'in-pit'.	Within 6 months of Project Approval Ongoing Ongoing During adverse meteorological conditions during the night-time period Ongoing until the coal crushing and screening infrastructure are relocated Ongoing

Desired Outcome	Action		Timing
6. Noise (cont'd)			
Monitor and manage noise generated by the LOM Project	6.6	Update the Noise Management Plan (NMP) for the LOM Project.	Within 12 months of project approval
	6.7	Continue the existing monthly Noise Monitoring Program at the existing site to include five new locations to be affected by the Project.	Ongoing
	6.8	Implement a real-time noise monitoring program at selected residential locations that would be most affected by the LOM Project.	Within 12 months of project approval
	6.9	Implement a real-time meteorological monitoring program at the Project Site to gather data on wind speed and direction, and deduce inversion conditions.	Within 12 months of project approval
	6.10	Use the real time meteorological data in the management of mining operations to minimise impact of noise on the environment.	Ongoing
7. Blasting			
Minimise impacts from blasting on surrounding receptors and infrastructure.	7.1	Maintain the Deed of Agreement that has been established with ARTC.	Ongoing
	7.2	Continue to implement the road closure management procedure when blasting occurs within the 500m of Werris Creek Road.	Ongoing
	7.3	Minimise the number of blasts by maximising blast size without compromising compliance with the environmental criteria.	Ongoing
Minimise impacts from blasting on surrounding receptors and infrastructure. (cnt'd)	7.4	Implement refinements to blast design components on the basis of monitoring results and the achievement of specific blasting objectives.	Ongoing
	7.5	Blast design and implementation is undertaken by a suitably qualified blasting engineer and/or experienced and appropriately certified shot-firer.	All blasts
	7.6	Ensure that the minimum practicable weight of explosive detonates at an instant for each blast.	All blasts
	7.7	Maintain a blast exclusion zone of 500m around each blast.	All blasts
	7.8	Continue to monitor blasting impacts at the current monitoring locations.	All blasts
8. Air Quality			
Minimise impacts to air quality relating to the Project.	8.1	Maintain the enclosed conveyor belt on the rail load out facility.	Ongoing
	8.2	Cleared vegetation would not be burnt.	Ongoing
	8.3	Limit groundcover removal in advance of mining to be consistent with operational requirements.	Ongoing

Desired Outcome	Action		Timing
8. Air Quality (cont'd)			
Minimise impacts to air quality relating to the Project.	8.4	Where practicable, soil stripping operations would be undertaken at a time when there is sufficient soil moisture to prevent significant lift-off of dust.	During soil stripping operations
	8.5	Overburden emplacement would be limited on the top lift of the overburden emplacement area when winds are from a northerly direction and greater than 3m/s over more than four consecutive 15 minute periods during operations similar to those operations modelled in Scenario 1.	Ongoing until Coal Processing Area relocated to the north
	8.6	Apply water at the feed hopper, crusher and at all conveyor transfer and discharge points.	Ongoing
	8.7	Fit all conveyors with appropriate cleaning and collection devices to minimise the amount of material falling from the return conveyor belts.	Ongoing in the current CHPP and prior to the operation of the relocated CHPP
	8.8	Cease coal processing activities during periods of concurrent high winds and temperatures which cause coal dust dispersal, independent of water applications.	During high winds and temperatures which cause coal dispersal independent of water applications
	8.9	Apply water to exposed surfaces with emphasis on those areas subject to frequent vehicle / equipment movements which may cause dust generation and dispersal.	Ongoing
	8.10	Water all internal haul roads regularly.	Ongoing
	8.11	Ensure operators use appropriate speeds to limit trafficable dust emissions on all vehicles and equipment.	Ongoing
	8.12	Progressively rehabilitate areas of disturbance once they are no longer required for mining purposes.	Ongoing
	8.13	Use water injection on all drill rigs.	Ongoing during drilling operations
	8.14	Cover all product coal trucks prior to leaving the Project Site	Ongoing
Monitor and manage dust emissions generated by the LOM Project	8.15	Update the Air Quality Monitoring Program (AQMP) for the LOM Project.	Within 12 months of project approval
	8.16	Continue the existing deposited dust, PM_{10} and TSP monitoring at the existing site locations.	Ongoing
	8.17	Implement a real-time particulate matter monitoring program at locations to be determined within 12 months of approval.	Within 12 months of project approval

Desired Outcome	Action		Timing
8. Air Quality (cont'd)			
Monitor and manage dust emissions generated by the LOM Project (cont'd)	8.18	Use the real time monitoring data in the management of mining operations to minimise the impact of PM_{10} and $PM_{2.5}$ on the environment.	Ongoing
	8.19	Review the existing Energy Savings Action Plan.	In accordance with approval conditions
9. Visibility			
Screen the operation visually from the surrounding local area.	9.1	Construct an Acoustic and Visual Amenity Bund at the northern extent of mining operations.	Once mining operations reach the base of "Old Colliery" Hill
	9.2	Locate all mining-related infrastructure, e.g. the Coal Processing Area and Site Administration and Facilities Area, in such a way that local topography (of "Old Colliery" and "Cintra" Hills) provides a visual barrier to the town of Werris Creek and the residential receivers located to the south of the town.	As infrastructure is constructed
	9.3	Plant a screen of native trees and shrubs in front of the Acoustic and Visual Amenity Bund prior to its construction.	Commencement of the Project
	9.4	Plant trees around the perimeter of the extended product coal storage area.	On completion of construction of the extended product coal storage area
	9.5	Continue to construct the existing overburden emplacement area to create a visual barrier to the east of the Project Site including Werris Creek Road.	Ongoing
	9.6	Progressively rehabilitate areas of disturbance once they are no longer required for mining purposes.	Ongoing
	9.7	Continue to position and direct floodlights to minimise emissions.	During night-time operations
	9.8	Maintain the LOM Project area and associated areas of disturbance in a clean and tidy condition at all times.	Ongoing
10. Soils, Land Capability and Agricultural Suitability			
Create a final landform that is safe, stable and is amenable to a combination of agricultural and native flora/fauna conservation activities.	10.1	(Where practicable), immediately transfer stripped soil from source to active rehabilitation.	During soil stockpiling activities
	10.2	Stockpile the soils of each soil unit separately. This will allow the Dark Brown Vertosol soils to be preferentially used for areas of the final landform designated for the re-establishment of higher quality agricultural land.	During soil stockpiling activities

Desired Outcome	Action	Timing
10. Soils, Land Capability and Agricultural Suitability (cont'd)		
Create a final landform that is safe, stable and is amenable to a combination of agricultural and native flora/fauna conservation activities.	10.3 Maintain a soil inventory: • to ensure appropriate volumes of different soil units are stripped consistently with the soil requirements of the final landform. • to identify the age of various soil stockpiles on the Project Site and therefore assist in minimising the length of time soils remained stockpiled. • to assist the Proponent in using the most appropriate soils for the different elements of the final landform.	Ongoing
	10.4 Construct the eastern, southern and western surfaces of the overburden emplacement at 10^{o} or less.	During regrading of the final slopes
	10.5 Construct the northern surface of the overburden emplacement, which runs into the open cut void with steeper slopes which would ultimately be reduced to 18º (1V:3H) or less in the final landform.	During regrading of the final slopes
	10.6 Create a series of contour banks, similar to those on the existing landform, on the outer slopes of the regraded emplacement to manage surface water runoff and assist in minimising erosion of these slopes.	During rehabilitation activities
	10.7 Conduct monitoring of rehabilitation performance against the proposed sustainable land use outcome and carry out amelioration works where necessary.	During rehabilitation activities
	10.8 Reinstate at least 37a of Class III land on the rehabilitated landform.	By the end of mine life
	10.9 Backfill the final void to above the modelled final water table level.	During construction of the final void
Minimise the degradation to soil resources.	10.10 Undertake vegetation clearing activities so as to minimise soil disturbance.	During clearing of larger vegetation
	10.11 Retain smaller vegetation and leaf litter in the soil to be stripped.	During soil stripping activities
	10.12 Stripping of soil during periods of excessive soil moisture content will be avoided to reduce the likelihood of damage to soil structure.	During soil stripping activities
	10.13 Soil to be preferentially respread on areas of the final landform immediately following stripping rather than being stockpiled.	During soil stripping activities
	10.14 Where stockpiling is necessary, soil stockpiles would not exceed 3m in height.	During soil stockpiling activities
Maximise the retention of soil resources.	10.15 Soil is to be generally stripped in accordance with **Table 2.7.**	During soil stripping activities

Desired Outcome	Action	Timing
11. Waste		
Manage waste appropriately on site.	11.1 Maintain a register of the types and quantities of wastes produced on the Project Site.	Ongoing
	11.2 Design and maintain storage areas to contain spillages.	Ongoing
	11.3 Segregate and retain recyclable and non-recyclable waste in designated storage areas prior to removal from the Project Site.	Ongoing
	11.4 Keep the Project Site in a clean and tidy condition.	Ongoing
	11.5 Ensure waste is regularly removed from the Project Site by a licensed contractor.	Ongoing
12. Hazards		
Manage bushfire hazards appropriately.	12.1 Maintain an immediate method of egress from the Project Site to Project personnel in the event of bushfire attack on the Project Site.	Ongoing.
	12.2 Follow all instructions provided by the NSW Rural Fire Service (RFS) or police in the event of a local bushfire event threatening the Project Site.	In the event of a local bushfire event threatening the Project Site.
Manage bushfire hazards appropriately. (cont'd)	12.3 Provide access to all Project Site water storages to the RFS and any reasonable assistance offered to RFS or police personnel.	In the event of a local bushfire event threatening the Project Site.
	12.4 Refuelling to be undertaken within designated fuel bays or within cleared area of the Project Site.	Ongoing.
	12.5 Turn off vehicles during refuelling.	During refuelling.
	12.6 Enforce a no smoking policy in designated areas of the Project Site.	Ongoing.
	12.7 Maintain fire extinguishers within site vehicles and refuelling areas.	Ongoing.
	12.8 Ensure a water cart is available to assist in extinguishing any fire ignited.	In the event of a fire.
	12.9 Equip all equipment on site with adequate and fully operational fire suppression equipment in accordance with AS 1841 and AS 1851.	Ongoing.
	12.10 Train all employees in the proper use of fire fighting equipment held on site.	Ongoing.
	12.11 Set aside water especially for fire fighting on site.	Ongoing.
	12.12 Ensure that fire fighting equipment is made available to the local Rural Fire Service if required in the event of a bushfire in the land surrounding the Project Site.	In the event of a bushfire in the land surrounding the Project Site
	12.13 Develop and maintain firebreaks at the edge of the Project Site.	Ongoing.

Desired Outcome	Action		Timing
12. Hazards (cont'd)			
Minimise the potential for a traffic incident on a public road involving a Project related vehicle.	12.14	Locate the Escott Road Entrance to the Project Site to the east of the Rail Load-out Road with light vehicle traffic to the Project Site offices not required to cross the Rail Load-out Road.	During the construction phase of the Project
	12.15	Install level crossings at the two points where Escott Road crosses the turn-around rail loop.	During construction of the rail loop
	12.16	Construct an all-weather access road around the perimeter of the turn-around rail loop.	During construction of the rail loop
The storage and handling of hazardous materials is appropriately managed.	12.17	Direct all water from wash-down areas and workshops to oil separators and containment systems.	Ongoing
	12.18	Ensure that all storage tanks are either self bunded tanks or bunded with an impermeable surface and a capacity to contain a minimum 110% of the largest storage tank capacity.	Ongoing
	12.19	Securely store all hydrocarbon products.	Ongoing
	12.20	Designate areas for refuelling and minor maintenance work (with the exception of less mobile mining equipment, e.g. excavators which would be refuelled within the open cut area) and enforce the use of these areas.	Ongoing
13. Community Contributions			
Provide for ongoing support to the Werris Creek local community and Liverpool Plains Shire Council.	13.1	Maintain the Community Consultative Committee and include local community representative as stipulated by project approval conditions.	Ongoing
	13.2	Complete and distribute regular newsletters regarding project progress and operations.	At least 6 monthly
	13.3	Continue to provide funding towards maintenance of Taylors Lane through S94 contributions as per the current contributions agreement with LPSC.	Ongoing
	13.4	Establish a Community Enhancement Fund through Liverpool Plains Shire Council as agreed by Council in their 5 July 2010.	Ongoing
14. Environmental Monitoring			
Implement a comprehensive and ongoing surface water monitoring program.	14.1	Monitor surface water quality for: pH, electrical conductivity, total suspended solid concentration, Oil & Grease levels at licensed discharge points, receiving waters (Werris and Quipolly Creeks) and clean, dirty and void water dams. (See also Commitment 2.7).	Quarterly and during surface overflow events from licensed discharge points Quarterly and within 12 hours after an overflow event to the receiving waters

Desired Outcome	Action		Timing
14. Environmental Monitoring (cont'd)			
Implement a comprehensive and ongoing groundwater monitoring program.	14.2	Continue monitoring of piezometers and groundwater bores on and surrounding the Project Site in accordance with the current Groundwater Monitoring Program.	Both monthly and continuous (dependent on particular piezometer or groundwater bore)
Implement a comprehensive and ongoing groundwater monitoring program.	14.3	Update the Groundwater Monitoring Program.	Within 12 months of receiving project approval
	14.4	Commission an experienced hydrogeologist to collate and review the monitoring data collected annually in order to assess the impacts of the project on the groundwater environment, and to compare any observed impacts with those predicted from groundwater modelling.	Annual
	14.5	Implement the Groundwater Contingency Plan as required.	In the event that routine monitoring indicates that a trigger has been reached
Implementation of an appropriate noise monitoring program to ensure continuing compliance with DECCW guideline levels.	14.6	Undertake attended noise monitoring at the residences most likely to be affected by the LOM Project. • R20: "Tonsley Park" • R9: "Almawillee" • R11: "Glenara" • R12: Fletcher • Werris Creek Town (R55 or R62) • R14: "Greenslopes & Banool"	Monthly
	14.7	Implement a real-time noise monitoring program with monitoring to be conducted at the most affected receiver based on the prevailing conditions at the time	Within 12 months of project approval
Implementation of an appropriate noise monitoring program to ensure continuing compliance with DECCW guideline levels.	14.8	Update the Noise Monitoring Program to reflect additional attended and real time monitoring sites.	Within 12 months of receiving project approval
Implementation of an appropriate air quality monitoring program to ensure continuing compliance with DECCW guideline levels.	14.9	Maintain the existing dust (WC1 to WC10), PM_{10} (WCHV1 to WCHV4) and TSP (WCTSP) monitoring network as identified in the Werris Creek Coal Mine Air Quality Monitoring Program.	Ongoing
	14.10	Install a new High Volume Air Sampler, monitoring for $PM_{2.5}$,	Within 12 months of project approval
	14.11	Implement a real-time particulate matter monitoring program at locations to be determined within 12 months of approval.	Within 12 months of project approval

Desired Outcome	Action	Timing
15. Environmental Management System		
A systematic set of documents are in place to guide the planning and implementation of all environmental management strategies.	15.1 Incorporate the environmental procedures in an on-site management system.	Prior to relevant activity
	15.2 Prepare or update the following management and monitoring plans; • Mining Operations Plan • Aboriginal Cultural Heritage Management Plan • Energy Savings Action Plan • Water Management Plan • Erosion & Sediment Control Plan • Noise Management Plan • Noise Monitoring Program • Air Quality Monitoring Program • Rehabilitation and Landscape Management Plan • Biodiversity Offset Management Plan	Various and as nominated by project approval
	15.3 Incorporate relevant environmental data / information in Annual Environmental Management Reports.	Annually

Environment Protection Licence

Licence - 12290

Licence Details	
Number:	12290
Anniversary Date:	01-April

Licensee
WERRIS CREEK COAL PTY LIMITED
PO BOX 125
WERRIS CREEK NSW 2341

Premises
WERRIS CREEK COAL
1435 WERRIS CREEK ROAD
WERRIS CREEK NSW 2341

Scheduled Activity
Coal Works
Mining for Coal

Fee Based Activity	Scale
Coal works	> 2000000-5000000 T handled
Mining for coal	> 2000000-3500000 T produced

Region
North - Armidale
Ground Floor, NSW Govt Offices, 85 Faulkner Street ARMIDALE NSW 2350
Phone: (02) 6773 7000
Fax: (02) 6772 2336
PO Box 494 ARMIDALE
NSW 2350

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Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act); and
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

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The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

WERRIS CREEK COAL PTY LIMITED
PO BOX 125
WERRIS CREEK NSW 2341

subject to the conditions which follow.

Environment Protection Licence

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1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled development work listed below at the premises listed in A2:
Construct mine entrance/ access/ rail load out roads; site preparation; (clearing/ soil removal) including mining activities, earthworks for processing plant, coal loading & office facility installation; install water management controls.

A1.2 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Coal Works	Coal works	> 2000000 - 5000000 T handled
Mining for Coal	Mining for coal	> 2000000 - 3500000 T produced

A1.3 The licensee must not carry on any scheduled activities until the scheduled development works are completed, except as elsewhere provided in this licence.

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
WERRIS CREEK COAL
1435 WERRIS CREEK ROAD
WERRIS CREEK
NSW 2341
THE LAND BOUND WITHIN THE "PROJECT SITE BOUNDARY" IDENTIFIED IN THE MAP TITLED "FIGURE 1: SCHEDULE OF LAND" OF APPENDIX 1 SCHEDULE OF LAND OF PROJECT APPROVAL 10_0059, DATED 25 OCTOBER 2011 (DOC13/87398).

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
9	Ambient Weather Monitoring.		Weather station located on the top level of the overburden emplacement at RL 445m
28	Ambient Air Monitoring/Air Discharge Quality	Ambient Air Monitoring/Air Discharge Quality	Within 100m of the residence "Kyooma" identified as "R98" in Appendix 3 of Project Approval 10_0059.
29	Ambient Air Monitoring / Air Discharge Quality	Ambient Air Monitoring / Air Discharge Quality	Within 100 metres of the residence "Glenara" identified as "R11" in Appendix 3 of Project Approval 10_0059.
30	Ambient Air Monitoring / Air Discharge Monitoring	Ambient Air Monitoring / Air Discharge Monitoring	Within 100m of the location idenitifed as property number "92" in Figure 4A.5 of Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project Dated Decmber 2010 prepared by R.W. Corkery & Co. Pty Limited.
31	Ambient Weather Monitoring		Lower level temperature sensor located at the toe of the south eastern rehabilitation area at RL 373.5m AHD.

P1.2 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

P1.3 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description

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10	Wet Weather Discharge / Discharge Water Quality Monitoring.	Wet Weather Discharge / Discharge Water Quality Monitoring.	Point idenitifed as "SB2" marked on Figure 4B.10 of the Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project referenced in Project Approval 10_0059.
12	Wet Weather Discharge / Discharge Water Quality Monitoring	Wet Weather Discharge / Discharge Water Quality Monitoring	Point idenitifed as "SB9" in Figure 4B.10 of the Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project referenced in Project Approval 10_0059.
14	Wet Weather Discharge / Discharge Water Quality Monitoring	Wet Weather Discharge / Discharge Water Quality Monitoring	Point identified as "SB10" marked on Figure 4B.10 of the Environmental Assessment for Werris Creek Coal mine, Life of Mine Project referenced in Project Approval 10_0059.
16	Water Quality Monitoring		Point idenitifed as "VWD1" marked on Figure 4B.10 in the Environmental Assessment for Werris Creek Coal mine, Life of Mine Project referenced in Project Approval 10_0059.
17	Groundwater Quality Monitoring		Point identified as "GW966036/MW1" marked on Figure 4B.2 in the Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project referenced in Project Approval 10_0059.
18	Groundwater Quality Monitoring		Point identified as "GW966127/MW2" marked on Figure 4B.2 in the Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project referenced in Project Approval 10_0059.
19	Groundwater Quality Monitoring		Point identified as "GW965729/MW3" on Figure 4B.2 in the Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project referenced in Project Approval 10_0059.
20	Groundwater Quality Monitoring		Point identified as "MW4b" on Figure 4B.2 in the Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project referenced in Project Approval 10_0059.

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21	Groundwater Quality Monitoring	Point identified as "GW968728/MW5" on Figure 4B.2 in the Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project referenced in Project Approval 10_0059.
22	Groundwater Quality Monitoring	Point identified as "MW6" on Figure 4B.2 in the Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project referenced in Project Approval 10_0059.
23	Ambient/Discharge Water Quality Monitoring	Point WC-U on Werris Creek marked on Figure 4 in the Site Water Management Plan for Werris Creek Coal Mine dated March 2009 that was submitted to EPA on 22-9-09 and which is kept on file LIC07/2029.09.
24	Ambient/Discharge Water Quality Monitoring	Point WC-D on Werris Creek marked on Figure 4 in the Site Water Management Plan for Werris Creek Coal Mine dated March 2009 that was submitted to EPA on 22-9-09 and which is kept on file LIC07/2029-09.
25	Ambient/Discharge Water Quality Monitoring	Point QC-U on Quipolly Creek marked on Figure 4 in the Site Water Management Plan for Werris Creek Coal Mine dated March 2009 that was submitted to EPA on 22-9-09 and which is kept on file LIC07/2029-09.
26	Ambient/Discharge Water Quality Monitoring	Point QC-D on Quipolly Creek marked on Figure 4 in the Site Water Management Plan for Werris Creek Coal Mine dated March 2009 that was submitted to EPA on 22-9-09 and which is kept on file LIC07/2029-09.
27	Water Quality Montioring	Point identified as "VWD2" on Figure 4B.10 in the Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project referenced in Project Approval 10_0059.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with

section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Water and/or Land Concentration Limits

POINT 10,12,14

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	milligrams per litre	-	-	-	10
pH	pH	-	-	-	6.5- 8.5
Total suspended solids	milligrams per litre	20	35	-	50

L2.5 The Total Suspended Solids concentration limits specified for Points 10, 12 and 14 may be exceeded for water discharged from the sediment basins provided that:

(a) the discharge occurs solely as a result of rainfall measured at the premises that exceeds 39.2 millimetres over any consecutive 5 day period immediately prior to the discharge occurring; and

(b) all practical measures have been implemented to dewater all sediment dams within 5 days of rainfall such that they have sufficient capacity to store run off from a 39.2 millimetre, 5 day rainfall event.

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.

Environment Protection Licence

L3.2 This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if those activities require an environment protection licence.

L4 Noise limits

L4.1 Noise generated from the premises must not exceed the noise limits in the table below. The locations referred to in the table below are defined within Appendix 3 of Werris Creek Coal Mine, Extension Project Approval 10_0059:

Locality and Location	Day LAeq (15 minute)	Evening LAeq (15 minute)	Night LAeq (15 minute)	Night LA1 (1 minute)
The residence on the property "Talavera" marked as location "R96" in Appendix 3 of Project Approval 10_0059	38	37	37	45
The residence known as "Quipolly Railway Cottage" marked as location "R12" in Appendix 3 of Project Approval 10_0059	38	38	38	45
The residence located at 83 Wadwells Lane marked as location "R7" in Appendix 3 of Project Approval 10_0059	37	37	37	45
The residence on the property "Gedhurst" marked as location "R9" in Appendix 3 of Project Approval 10_0059	37	37	37	45
The residence on the property "Hazeldene" marked as location "R24" in Appendix 3 of Project Approval 10_0059	37	37	37	45

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The residence on the property "Mountain View" marked as location "R22" in Appendix 3 of Project Approval 10_0059	36	36	36	45
Any other affected residence not owned by the licensee or its related companies	35	35	35	45

L4.2 For the purpose of the condition above;
a) Day is defined as the period from 7am to 6pm on any day.
b) Evening is defined as the period 6pm to 10pm on any day.
c) Night is defined as the period from 10pm to 7am on any day.

Note: For the purpose of the noise criteria for this condition, 5dBA must be added to the measurement level if the noise is substantially tonal or impulsive in character.

L4.3 The noise limits set out in the Noise Limits table apply under all meteorological conditions except for the following:
a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
b) Temperature inversion conditions up to 12ºC/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
c) Temperature inversion conditions greater than 12ºC/100m.

Note: For the purpoess of this condition, data recorded by the meteorological station identified as EPA Indentification Point no. 9 and the lower level temperature sensor identified as EPA Identification Point No. 31 must be used to determine meteorological conditions.

Note: Temperature inversion conditions (vertical temperature gradient in degrees C/100m) are to be determined as [(TM2 – TM3 – 0.7) * 1.25], where TM2 is the temperature from sensor M2 (10m weather station at top of rehabilitated overburden emplacement) and TM3 is the temperature from sensor M3 (lower weather station at base of rehabilitated overburden emplacement). Reference: Spectrum Acoustics letter report Ref: 04035/4580 of 7 November 2012 to Werris Creek Coal.

L4.4 Noise impacts where wind speed exceeds 3 metres per second at 10 metres above the ground must be addressed by:

a) documenting noise complaints received to identify any higher level of impacts or wind patterns;
b) where levels of noise complaints indicate a higher level of impact then actions to quantify and ameliorate any enhanced impacts where wind speed exceeds 3 metres per second at 10 metres above the ground must be developed and implemented.

L4.5 The noise limits set by condition L4.1 of the licence do not apply where a current legally binding agreement exists between the proponent and the occupant of a residential property that:

a) agrees to an alternative noise limit for that property; or
b) provides an alternative means of compensation to address noise impacts from the premises.

A copy of any agreement must be provided to the EPA before the proponent can take advantage of the agreement.

L4.6 **Determining Compliance**

To determine compliance:
a) with the Leq(15 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located:
i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or
ii) within 30 metres of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable
iii) within approximately 50 metres of the boundary of a National Park or a Nature Reserve.
b) with the LA1(1 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located within 1 metre of a dwelling façade.
c) with the noise limits in the Noise Limits table, the noise measurement equipment must be located:
i) at the most affected point at a location where there is no dwelling at the location; or
ii) at the most affected point within an area at a location prescribed by part (a) or part (b) of this condition.

Note: A non-compliance of the Noise Limits table will still occur where noise generated from the premises in excess of the appropriate limit is measured:
i) at a location other than an area prescribed in part (a) and part (b); and/or
ii) at a point other than the most affected point at a location.

L5 Blasting

L5.1 The overpressure level from blasting operations at the premises must not exceed 120dB (Lin Peak) at any time. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.

L5.2 The airblast overpressure level from blasting operations at the premises must not exceed 115dB (Lin Peak) at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.

L5.3 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 10mm/sec at any time at any noise sensitive locations. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.

L5.4 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5mm/sec at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.

L5.5 Blasting operations at the premises may only take place between 9:00am-5:00pm Monday to Saturday. Blasting is not permitted on public holidays.

Blasting outside the hours specified above can only take place with the written approval of the EPA.

L5.6 The hours of operation for blasting operations specified in this licence may be varied by the EPA, having regard to the effect that the proposed variation would have on the amenity of the residents in the locality, gives written consent to the variation.

L5.7 Blasting at the premises is limited to 1 blast on each day on which blasting is permitted.

Note: Additional blasts are permitted where the EPA and neighbours have been notified of the intended blast prior to the additional blast being fired; and
- it is demonstrated to be necessary for safety reasons; or
- the previous blast generated ground vibration levels of less than 0.5 mm per second at all non-project related residences.

L5.8 To determine compliance with condition(s) L5.1, L5.2, L5.3 and L5.4
a) Airblast overpressure and ground vibration levels must be measured and electronically recorded at any point within 30 metres of any non-project related residential building or other sensitive locations such as schools or hospitals for all blasts carried out in or on the premises; and
b) Instrumentation used to measure the airblast overpressure and ground vibration must meet the requirements of Australian Standard AS 2187.2-2006.

Note: A breach of the licence will still occur where airblast overpressure or ground vibration levels from the blasting operations at the premises exceeds the limit specified in this licence at any “noise sensitive locations” other than the locations identified in the above condition.

L6 Hours of operation

L6.1 Activities at the premises, other than blasting (which is subject to the limits applied by condition L5.5), may be carried out 24 hours a day, 7 days per week.

L7 Potentially offensive odour

L7.1 No condition in this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997 provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the

activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

O3.2 Trucks transporting coal from the premises must be covered immediately after loading to prevent wind blown emissions and spillage. The covering must be maintained until immediately before unloading the trucks.

O4 Other operating conditions

O4.1 All reversing beepers fitted to vehicles on the premises must be a mid-high frequency broadband type as described in the EIS.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

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M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Air Monitoring Requirements

POINT 28,29,30

Pollutant	Units of measure	Frequency	Sampling Method
PM10	micrograms per cubic metre	Every 6 days	AM-18
Solid Particles	grams per square metre per month	Continuous	AM-19

M2.3 Water and/ or Land Monitoring Requirements

POINT 10,12,14

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Special Frequency 1	Grab sample
Nitrate	milligrams per litre	Special Frequency 1	Grab sample
Nitrogen (total)	milligrams per litre	Special Frequency 1	Grab sample
Oil and Grease	milligrams per litre	Special Frequency 1	Grab sample
pH	pH	Special Frequency 1	Grab sample
Phosphorus (total)	milligrams per litre	Special Frequency 1	Grab sample
Reactive Phosphorus	milligrams per litre	Special Frequency 1	Grab sample
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

POINT 16,27

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Every 3 months	Grab sample
Nitrate	milligrams per litre	Every 3 months	Grab sample
Nitrogen (total)	milligrams per litre	Every 3 months	Grab sample
Oil and Grease	milligrams per litre	Every 3 months	Grab sample
pH	pH	Every 3 months	Grab sample
Phosphorus (total)	milligrams per litre	Every 3 months	Grab sample
Reactive Phosphorus	milligrams per litre	Every 3 months	Grab sample

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Total suspended solids	milligrams per litre	Every 3 months	Grab sample

POINT 17,18,19,20,22,21

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Every 6 months	Representative sample
Nitrate	milligrams per litre	Every 6 months	Representative sample
Nitrogen (total)	milligrams per litre	Every 6 months	Representative sample
pH	pH	Every 6 months	Representative sample
Phosphorus (total)	milligrams per litre	Every 6 months	Representative sample
Reactive Phosphorus	milligrams per litre	Every 6 months	Representative sample
Standing Water Level	metres	Every 6 months	In situ

POINT 23,24,25,26

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Special Frequency 2	Special Method 1
Nitrate	milligrams per litre	Special Frequency 2	Special Method 1
Nitrogen (total)	milligrams per litre	Special Frequency 2	Special Method 1
Oil and Grease	milligrams per litre	Special Frequency 2	Special Method 1
pH	pH	Special Frequency 2	Special Method 1
Phosphorus (total)	milligrams per litre	Special Frequency 2	Special Method 1
Reactive Phosphorus	milligrams per litre	Special Frequency 2	Special Method 1
Total suspended solids	milligrams per litre	Special Frequency 2	Special Method 1

Note: For the purposes of this condition, Special Frequency 1 means as soon as practicable after overflow commences and in any case not more than 12 hours after any overflow commencing.

For the purposes of this condition, Special Frequency 2 means within 12 hours after any overflow from a storage dam(s) on the premises occurring.

For the purposes of this condition, Special Method 1 means that grab samples must be taken from those ambient/discharge water quality monitoring points (i.e. points 23-26) located in same drainage catchment (Werris Creek and/or Quipolly Creek) as those wet weather discharge points (i.e. points 10, 12 and/or 14) overflowing in any individual discharge event.

Note: The frequency of monitoring and the pollutant/s to be monitored may be varied by the EPA once the variability of the water quality and ground water quality is established.

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M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2010* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Weather monitoring

M4.1 Weather Monitoring Requirements

POINT 9

Parameter	Units of Measure	Frequency	Averaging Period	Sampling Method
Rainfall	millimetres per hour	continuous	1 hour	AM-4
Wind speed @10 metres	metres per second	continuous	15 minute	AM-2 & AM-4
Wind direction @10 metres	degrees clockwise from true north	continuous	15 minute	AM-2 & AM-4
Temperature @2 metres	degrees celsius	continuous	15 minute	AM-4
Temperature @10 metres	degrees celsius	continuous	15 minute	AM-4
Sigma theta @10 metres	degrees clockwise from true north	continuous	15 minute	AM-2 & AM-4
Solar radiation	watts per square metre	continuous	15 minute	AM-4
Additional requirements - siting	-	-	-	AM-1, AM-4 & special method 2
Additional requirements - measurement	-	-	-	AM-1, AM-4 & special method 2

M4.2 POINT 31

Parameter	Units of Measure	Frequency	Averaging Period	Sampling Method
Temperature @ 2 metres	degrees celsius	continuous	15 minute	AM-4 & special method 2

Note: For the purposes of conditions M4.1 & M4.2, Special Method 2 means that the location of the meteorological monitoring equipment and details of that equipment, the equipment operation and maintenance/service procedures and schedules must be submitted in writing and approved in writing by the EPA before any sampling or analysis is carried out. The meteorological monitoring equipment must be calibrated at least once every 12 months. Any proposed changes to the meteorological monitoring equipment location, operating and maintenance/service procedures and schedules, or to the monitoring hardware itself must also be submitted in writing and approved in writing by the EPA. The EPA is to be provided with the monitoring data on request in a Microsoft ® Office software compatible format.

M5 Recording of pollution complaints

M5.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M5.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M5.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M5.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M6 Telephone complaints line

M6.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M6.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M6.3 The preceding two conditions do not apply until 3 months after:
a) the date of the issue of this licence or
b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was

served on the licensee under clause 10 of that regulation.

M7 Blasting

M7.1 POINTS: Within 30 metres of the residences at the locations marked as "R98" ("Kyooma"), "R11" ("Glenara") and "R62" (43 Kurrara Street, Werris Creek) on Appendix 3 of Project Approval 10_0059 and within 30 metres of the location marked as "R92" in Figure 4A.5 of Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project, dated December 2010 and prepared by R.W. Corkery and Co. Pty Limited.

Parameter	Units of Measure	Frequency	Sampling Method
Blast Noise	dB (Lin Peak)	Every Blast	Type 1 Noise/Blast Logger
Blast Vibration	mm/s	Every Blast	Geophone Logger or similar

M8 Other monitoring and recording conditions

M8.1 NOISE MONITORING

M8.2 To assess compliance with the noise limits presented in the Noise Limits table, attended noise monitoring must be undertaken in accordance with the condition titled Determining Compliance, outlined above, and:
a) at the locations marked as "R7" (83 Wadwells Lane), "R9" ("Gedhurst"), "R22" ("Mountain View"), "R24" (Hazeldene"), "R12" ("Quipolly railway Cottage"), "R96" ("Talvera" listed as "Millbank") and non project related residence number "57" (33 Kurrara Street) on Appendix 3 of Project Approval 10_0059;
b) occur monthly in a reporting period;
c) occur during each day, evening and night period as defined in the NSW Industrial Noise Policy for a minimum of:
i) 1 hour during the day; and
ii) 1 hour during the evening or night.

Note: The frequency of monitoring may be varied by the EPA once the variability of the noise impact is established.

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
a) a Statement of Compliance; and
b) a Monitoring and Complaints Summary.
At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

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Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R1.8 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

R2 Notification of environmental harm

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Other reporting conditions

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the monthly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:
a) an assessment of compliance with noise limits presented in the Noise Limits table; and
b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in the Noise Limits table.

7 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G2 Other general conditions

G2.1 **Completed Pollution Studies and Reduction Programs (PRPs)**

PRP	Description	Completed Date
PRP 1: Noise Monitoring and Assessment Program	This PRP requires the licensee to undertake a noise monitoring and assessment of the impacts of typical construction and mining activities on the premises.	15-May-2008
PRP 2: Coal Mine Particulate Matter Control Best Practice	Requires licensee to conduct a site specific best management practice (BMP) determination to identify ways to reduce particulate emissions.	27-June-2012

8 Pollution Studies and Reduction Programs

U1 Particulate Matter Control Best Practice Implementation – Wheel Generated Dust

U1.1 The Licensee must achieve and maintain a dust control efficiency of 80% or more on all active haul roads by 22 March 2013.

Control efficiency is calculated as:

$$CE = \frac{E\ (uncontrolled) - E\ (controlled)}{E\ (uncontrolled)} \times 100$$

Where E = the emission rate of the activity

U1.2 To assess compliance with Condition U1.1, the Licensee must:

- measure uncontrolled and controlled haul road emissions on at least 2 occasions using a mobile dust monitor;
- continuously measure and record 'additional site data' including:

· vehicle kilometres travelled (VKT),
· meteorological conditions,
· water use for dust suppression.

- undertake silt content and soil moisture sampling during sampling events; and
- determine if a site specific relationship can be derived between the measured control efficiency, additional site data, water use, meteorological data; and silt content and soil moisture levels.

The measurement of uncontrolled and controlled haul road PM10 emissions must be undertaken under varying meteorological conditions, including at those times when analysis of meteorological data indicates that elevated levels of dust are most likely at the Premises.

Note: The EPA acknowledges that in order to determine uncontrolled PM10 emissions, the section of haul road to be sampled will need to be left untreated for a period of up to 12 hours prior to the sampling taking place.

U1.3 The Licensee must submit a report to the EPA which documents the results of the assessment undertaken in accordance with Condition U1.1. The report must include an assessment of:

- the dust control effectiveness,
- the dust levels recorded, and
- any relationship established between control effectiveness and the additional site data.

The report must be submitted by the Licensee to the Environment Protection Authority Regional Manager Armidale, at PO Box 494, ARMIDALE by 15 August 2014.

U1.4 The report required by condition U1.3 must be made publicly available by the Licensee on the Licensee's website by (two weeks from submission date nominated in U1.3).

U2 Particulate Matter Control Best Practice Implementation – Disturbing and Handling Overburden under Adverse Weather Conditions

U2.1 The licensee must alter or cease the use of equipment on overburden and the loading and dumping of overburden during adverse weather conditions to minimise the generation of particulate matter from 22 March 2013.

U2.2 To assess compliance with Condition U2.1, the Licensee must:
- undertake daily visual dust level assessments, continuously record real-time PM10 levels and continuously measure and record real-time meteorological conditions; and
- record changes to mining activities due to adverse weather conditions.

U2.3 The Licensee must submit a report to the EPA which documents the results of the actions taken in accordance with Condition U2.1. The report must include an assessment of the effectiveness of changes made to mining activities due to adverse weather and document meteorological conditions and the resultant dust levels. The report must be submitted by the Licensee to the Environment Protection Authority Regional Manager Armidale, at PO Box 494, ARMIDALE by 15 August 2014.

U2.4 The report required by Condition U2.3 must be made publicly available by the Licensee on the Licensee's website by (two weeks from submission date in 2.3 above).

U3 Particulate Matter Control Best Practice Implementation – Trial of Best Practice Measures for Disturbing and Handling Overburden

U3.1 The Licensee must submit a report documenting an investigation and trial of best practice measures for the control of particulate matter from the use of equipment on overburden and the loading and dumping of

overburden. Best practice measures may include, but should not be limited to, the following:

- the use of foggers;
- the use of water sprays; and
- reduction of drop heights.

The report must document the investigation and trial of each best practice measure. It must quantify the particulate matter control effectiveness and discuss the practicability of each best practice measure.

The report must be submitted by the Licensee to the Environment Protection Authority Regional Manager Armidale, at PO Box 494, ARMIDALE by 14 April 2014.

9 Special Conditions

E1 Three Yearly Independent Noise Audit

E1.1 The licensee must provide the EPA with a copy of any Noise Audit and Independent Environmental Audit Report required by condition 4 of Schedule 3 and conditions 8 and 9 of Schedule 5 of the Werris Creek Mine Extension Project Approval (No. 10_0059). If the Noise Audit and Independent Environmental Audit Report do not incorporate the following information or assessments, then the licensee must also provide a separate report to the EPA that incorporates the following:

(a) An assessment of noise emissions from the premises against the noise limits established by the Project Approval (No. 10_0059), as well as against the long term noise goal and noise acquisition criteria established within Project Approval No. 10_0059 that has been completed in accordance with the procedures defined in the *NSW Industrial Noise Policy* and any relevant Application Notes published by the EPA;
(b) An evaluation of current mine noise impacts at all non-project related receptors and the noise mitigation practices that have been implemented at the premises against the best available economically achievable technology and current best practice principles for minimising noise emissions; and
(c) Where noise impacts at any affected non-project related receptor exceeds the long term noise goal established by condition 4 of Schedule 3 of Project Approval 10_0059, the licensee must provide documented evidence that demonstrates that reasonable attempts have been made to reach a negotiated agreement with all relevant affected receptors within the last 3 years.

The reports required by this condition must be submitted to the EPA's Armidale office within 6 weeks of the 30 June 2014, and every three years thereafter.

Note: For the purposes of this condition, a privately owned property that is subject to a current and legally biding negotiated agreement between the licensee and the relevant property owner, is considered project related, as is any property or residence held in the ownership of the licensee or its associated companies.

E1.2 If the reports required by E1.1 above indicate that non-project related receptors continue to receive impacts that exceed the long term noise goal established by condition 4 of Schedule 3 of Project Approval 10_0059, then the licensee must provide the EPA with a report detailing the actions it will take during the next three year period, to further reduce noise impacts from the mine. The report must:

(a) Provide details of any trials, tests or research that it will commission in an attempt to develop new or

innovative noise mitigation technologies or management practices;
(b) Detail the nature of any works that will be carried out at the premises or at the relevant receptor locations to further reduce noise impacts;
(c) Provide timelines and provisional costings for the proposed actions or works;
(d) Provide an analysis where possible of the potential noise reductions that the proposed actions are likely to achieve; and
(e) Define any additional noise monitoring programs that might be required to measure/validate the performance of the proposed mitigation actions.

The report required by this condition must be submitted to the EPA by **31 August 2014 and every three years thereafter** until noise emissions from the premises meet the long term noise goal established by condition 4 of Schedule 3 of Project Approval 10_0059.

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Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder describe d at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste

Mr Stephen O'Donoghue

Environment Protection Authority

(By Delegation)

Date of this edition: 18-April-2005

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End Notes

1	Licence varied by notice 1059992, issued on 23-May-2006, which came into effect on 23-May-2006.
2	Licence varied by notice 1064880, issued on 14-Sep-2006, which came into effect on 14-Sep-2006.
3	Licence varied by notice 1067351, issued on 04-Jan-2007, which came into effect on 04-Jan-2007.
4	Licence fee period changed by notice 1079180 approved on .
5	Licence varied by notice 1087334, issued on 07-Oct-2009, which came into effect on 07-Oct-2009.
6	Licence varied by notice 1115057, issued on 16-Jun-2010, which came into effect on 16-Jun-2010.
7	Licence varied by notice 1122371, issued on 23-Dec-2010, which came into effect on 23-Dec-2010.
8	Licence varied by notice 1126948, issued on 13-Jul-2011, which came into effect on 13-Jul-2011.
9	Licence varied by notice 1503171 issued on 20-Dec-2011
10	Licence varied by notice 1503674 issued on 04-Apr-2012
11	Licence varied by notice 1510431 issued on 21-Mar-2013
12	Licence varied by notice 1513290 issued on 01-May-2013
13	Licence varied by notice 1516119 issued on 06-Sep-2013
14	Licence varied by notice 1518349 issued on 08-Jan-2014

N.S.W. STAMP DUTY
CL No. 1846988 COAL MINING LEASE
2003•••2004•••2005

MINING LEASE

MINING ACT 1992

NO. **1563**

DATED **23rd March 2005**

THE MINISTER FOR MINERAL RESOURCES

OF THE STATE

OF NEW SOUTH WALES

TO

Creek Resources Pty Limited
(A. C. N. 100 228 886)

AND

Betalpha Pty Limited
(A. C. N. 105 663 518)

RECORDED in the Department of Primary Industries, Mineral Resources

this **fifth** day of **April 2005** A.D.

at the hour of **10:00**

o'clock in the fore noon.

Director-General

MINING ACT 1992

MINING LEASE

THIS DEED made the **twenty third**——————————day of **March**——— Two thousand and **five**——————————in pursuance of the provisions of the Mining Act 1992 (hereinafter called "the Act") BETWEEN **THE HONOURABLE KERRY ARTHUR HICKEY MINISTER FOR MINERAL RESOURCES** of the State of New South Wales (hereinafter called "the Minister" which expression shall where the context admits or requires include the successors in office of the Minister and the person acting as such Minister for the time being) AND **Creek Resources Pty Limited (A. C. N. 100 228 886) and Betalpha Pty Limited (A. C. N. 105 663 518)** (which with its successors and transferees is hereinafter called "the lease holder")

WHEREAS

(a) in conformity with the Act application was made for a mining lease over the lands hereinafter described; and

(b) all conditions and things required to be done and performed before granting a mining lease under the Act have been done and performed NOW THIS DEED WITNESSETH that in consideration of the observance and performance of the covenants contained in this Deed and the payment of royalty by the lease holder, the Minister in pursuance of the provisions of the Act DOES HEREBY demise and lease to the lease holder ALL THAT piece or parcel of land containing by admeasurement of **678.5 hectares** and more particularly described and delineated in the plan catalogue No. **M27037** attached for the purpose of prospecting and mining for **coal.**

TO HOLD the said land together with any appurtenances thereon subject to:

(a) such rights and interests as may be lawfully subsisting therein or which may be reserved by the Act at the date of this Deed; and

(b) such conditions, provisos and stipulations as are contained in this Deed UNTO the lease holder from and including the date of this Deed for the period of **twenty one (21) years** for the purpose as stated and for no other purpose.

1. THAT in this lease except insofar as the context otherwise indicates or requires:

   (a) any reference to an Act includes that Act and any Act amending or in substitution for the same; "Director-General" means the person for the time being holding office or acting as Director-General, Department of Mineral Resources, Sydney; the word "mine" has the meaning assigned to it by the Act; words importing the singular number shall include the plural, the masculine gender the feminine or neuter gender and vice versa; and

(b) any covenant on the part of two or more persons shall be deemed to bind them jointly and severally.

2. THAT the lease holder shall during the said term pay to the Minister in Sydney in respect of all such minerals as stated, recovered from the land hereby demised, royalty at the rate or rates prescribed by the Act and the Regulations thereunder at the time the minerals are recovered, or at the rate or rates fixed by the Minister from time to time during the term of this demise in exercise of the power in that behalf conferred upon him by the Act.

3. THAT the lease holder shall at all times during the term of this lease keep and preserve the said mine from all avoidable injury or damage and also the levels, drifts, shafts, watercourses, roadways, works, erections and fixtures therein and thereon in good repair and condition and in such state and condition shall on the expiration or sooner determination of the said term or any renewal thereof deliver possession of the land and the premises hereby demised to the Minister or other persons authorised to receive possession thereof.

4. THAT the conditions and provisions set forth in the Schedule of Mining Lease Conditions 2004 herein and numbered:- **1 to 21 (inclusive), 23, 24, 25, 29, 30 and 31** are embodied and incorporated within this Deed as conditions and provisions of the lease hereby granted.

PROVIDED always and it is hereby declared as follows:

(a) THAT this lease is granted subject to amendment as provided under Section 79 of the Act.

(b) THAT if the lease holder at any time during the term of this demise -

(i) fails to fulfil or contravenes the covenants and conditions herein contained; or

(ii) fails to comply with any provision of the Act or the Regulations with which the lease holder is required to comply; or

(iii) fails to comply with the requirements of any agreement or assessment in relation to the payment of compensation,

this lease may be cancelled by the Minister by instrument in writing and the cancellation shall have effect from and including the date on which notice of the cancellation is served on the lease holder or on such later date as is specified in the notice; and any liability incurred by the lease holder before the cancellation took effect shall not be affected.

(c) THAT no implied covenant for title or for quiet enjoyment shall be contained herein.

(d) THAT all the conditions and provisions contained in the Mining Act 1992 and the Regulations thereunder, the Mines Inspection Act 1901 and the Coal Mines Regulation Act 1982 or any other law hereafter to be passed or prescribed shall be incorporated within this Deed as conditions and provisions of the lease granted. The lease holder hereby covenants to observe, fulfil and perform the same.

(e) THAT such of the provisions and conditions declared and contained in this Deed as requiring anything to be done or not to be done by the lease holder, shall be read and construed as covenants by the lease holder with the Minister which are to be observed and performed.

IN WITNESS WHEREOF the parties hereto have executed this Deed the day and year first abovewritten.

SIGNED SEALED AND DELIVERED
BY

The Honourable Kerry Arthur Hickey
as such Minister as aforesaid

.....
Minister

in the presence of

.....
Witness

SIGNED SEALED AND DELIVERED
by the said

Creek Resources Pty Limited
(A. C. N. 100 228 886)

in the presence of

.....
Witness

SIGNED IN ACCORDANCE WITH THE CONSTITUTION '81:

Betalpha Pty Limited
(A. C. N. 105 663 518)

.....
K ROSS - DIRECTOR.

in the presence of

.....
Witness
HAMILTON - SECRETARY.

MINING LEASE CONDITIONS 2004

Notice to Landholders

1. Within a period of three months from the date of grant of this lease or within such further time as the Minister may allow, the lease holder must serve on each landholder of the land a notice in writing indicating that this lease has been granted and whether the lease includes the surface. An adequate plan and description of the lease area must accompany the notice.

   If there are ten or more landholders affected, the lease holder may serve the notice by publication in a newspaper circulating in the region where the lease area is situated. The notice must indicate that this lease has been granted; state whether the lease includes the surface and must contain an adequate plan and description of the lease area.

Mining, Rehabilitation, Environmental Management Process (MREMP)

Mining Operations Plan (MOP)

2. (1) Mining operations, including mining purposes, must be conducted in accordance with a Mining Operations Plan (the Plan) satisfactory to the Director-General. The Plan together with environmental conditions of development consent and other approvals will form the basis for:-

   (a) ongoing mining operations and environmental management; and

   (b) ongoing monitoring of the project.

   (2) The Plan must be prepared in accordance with the Director-General's guidelines current at the time of lodgement.

   (3) A Plan must be lodged with the Director-General:-

   (a) prior to the commencement of mining operations (including mining purposes);

   (b) subsequently as appropriate prior to the expiry of any current Plan; and

   (c) in accordance with any direction issued by the Director-General.

   (4) The Plan must present a schedule of proposed mine development for a period of up to seven (7) years and contain diagrams and documentation which identify:-

   (a) area(s) proposed to be disturbed under the Plan;

   (b) mining and rehabilitation method(s) to be used and their sequence;

   (c) areas to be used for disposal of tailings/waste;

(d) existing and proposed surface infrastructure;

(e) existing flora and fauna on the site;

(f) progressive rehabilitation schedules;

(g) areas of particular environmental, ecological and cultural sensitivity and measures to protect these areas;

(h) water management systems (including erosion and sediment controls);

(i) proposed resource recovery; and

(j) where the mine will cease extraction during the term of the Plan, a closure plan including final rehabilitation objectives/methods and post mining landuse/vegetation.

(5) The Plan when lodged will be reviewed by the Department.

(6) The Director-General may within two (2) months of the lodgement of a Plan, require modification and re-lodgement.

(7) If a requirement in accordance with clause (6) is not issued within two (2) months of the lodgement of a Plan, the lease holder may proceed with implementation of the Plan.

(8) During the life of the Mining Operations Plan, proposed modifications to the Plan must be lodged with the Director-General and will be subject to the review process outlined in clauses (5) - (7) above.

Annual Environmental Management Report (AEMR)

3. (1) Within 12 months of the commencement of mining operations and thereafter annually or, at such other times as may be allowed by the Director-General, the lease holder must lodge an Annual Environmental Management Report (AEMR) with the Director-General.

(2) The AEMR must be prepared in accordance with the Director-General's guidelines current at the time of reporting and contain a review and forecast of performance for the preceding and ensuing twelve months in terms of:

(a) the accepted Mining Operations Plan;

(b) development consent requirements and conditions;

(c) Department of Environment and Conservation and Department of Infrastructure, Planning and Natural Resources licences and approvals;

(d) any other statutory environmental requirements;

(e) details of any variations to environmental approvals applicable to the lease area; and

(f) where relevant, progress towards final rehabilitation objectives.

(3) After considering an AEMR the Director-General may, by notice in writing, direct the lease holder to undertake operations, remedial actions or supplementary studies in the manner and within the period specified in the notice to ensure that operations on the lease area are conducted in accordance with sound mining and environmental practice.

(4) The lease holder shall, as and when directed by the Minister, co-operate with the Director-General to conduct and facilitate review of the AEMR involving other government agencies and the local council.

Subsidence Management

4. (a) The lease holder shall prepare a Subsidence Management Plan prior to commencing any underground mining operations which will potentially lead to subsidence of the land surface.

(b) Underground mining operations which will potentially lead to subsidence include secondary extraction panels such as longwalls or miniwalls, associated first workings (gateroads, installation roads and associated main headings, etc), and pillar extractions, and are otherwise defined by the *Guideline for Applications for Subsidence Management Approvals.*

(c) The lease holder must not commence or undertake underground mining operations that will potentially lead to subsidence other than in accordance with a Subsidence Management Plan approved by the Director-General, an approval under the *Coal Mines Regulation Act 1982*, or the document *New Subsidence Management Plan Approval Process – Transitional Provisions.*

(d) Subsidence Management Plans are to be prepared in accordance with the *Guideline for Applications for Subsidence Management Approvals.*

(e) Subsidence Management Plans as approved shall form part of the Mining Operations Plan required under Condition 2 and will be subject to the Annual Environmental Management Report process as set out under Condition 3. The SMP is also subject to the requirements for subsidence monitoring and reporting set out in the document *New Approval Process for Management of Coal Mining Subsidence - Policy.*

Working Requirement

5. The lease holder must:

(a) ensure that at least **28** competent people are efficiently employed on the lease area on each week day except Saturday or any week day that is a public holiday,

OR

(b) expend on operations carried out in the course of prospecting or mining the lease area, an amount of not less than **$490,000.00** per annum whilst the lease is in force.

The Minister may at any time or times, by instrument in writing served on the lease holder, increase or decrease the expenditure required or the number of people to be employed.

Control of Operations

6. (a) If an Environmental Officer of the Department believes that the lease holder is not complying with any provision of the Act or any condition of this lease relating to the working of the lease, he may direct the lease holder to:-

(i) cease working the lease; or

(ii) cease that part of the operation not complying with the Act or conditions;

until in the opinion of the Environmental Officer the situation is rectified.

(b) The lease holder must comply with any direction given. The Director-General may confirm, vary or revoke any such direction.

(c) A direction referred to in this condition may be served on the Mine Manager.

Reports

7. The lease holder must provide an exploration report, within a period of twenty-eight days after each anniversary of the date this lease has effect or at such other date as the Director-General may stipulate, of each year. The report must be to the satisfaction of the Director-General and contain the following:

(a) Full particulars, including results, interpretation and conclusions, of all exploration conducted during the twelve months period;

(b) Details of expenditure incurred in conducting that exploration;

(c) A summary of all geological findings acquired through mining or development evaluation activities;

(d) Particulars of exploration proposed to be conducted in the next twelve months period;

(e) All plans, maps, sections and other data necessary to satisfactorily interpret the report.

Licence to Use Reports

8. (a) The lease holder grants to the Minister, by way of a non-exclusive licence, the right in copyright to publish, print, adapt and reproduce all exploration reports lodged in any form and for the full duration of copyright.

(b) The non-exclusive licence will operate as a consent for the purposes of section 365 of the Mining Act 1992.

Confidentiality

9. (a) All exploration reports submitted in accordance with the conditions of this lease will be kept confidential while the lease is in force, except in cases where:

(i) the lease holder has agreed that specified reports may be made non-confidential.

(ii) reports deal with exploration conducted exclusively on areas that have ceased to be part of the lease.

(b) Confidentiality will be continued beyond the termination of a lease where an application for a flow-on title was lodged during the currency of the lease. The confidentiality will last until that flow-on title or any subsequent flow-on title, has terminated.

(c) The Director-General may extend the period of confidentiality.

Terms of the non-exclusive licence

10. The terms of the non-exclusive copyright licence granted under condition 8 (a) are:

(a) the Minister may sub-licence others to publish, print, adapt and reproduce but not on-licence reports.

(b) the Minister and any sub-licensee will acknowledge the lease holder's and any identifiable consultant's ownership of copyright in any reproduction of the reports, including storage of reports onto an electronic database.

(c) the lease holder does not warrant ownership of all copyright works in any report and, the lease holder will use best endeavours to identify those parts of the report for which the lease holder owns the copyright.

(d) there is no royalty payable by the Minister for the licence.

(e) if the lease holder has reasonable grounds to believe that the Minister has exercised his rights under the non-exclusive copyright licence in a manner which adversely affects the operations of the lease holder, that licence is revocable on the giving of a period of not less than three months notice.

Blasting

11. (a) Ground Vibration

The lease holder must ensure that the ground vibration peak particle velocity generated by any blasting within the lease area does not exceed 10 mm/second and does not exceed 5 mm/second in more than 5% of the total number of blasts over a period of 12 months at any dwelling or occupied premises as the case may be, unless determined otherwise by the Department of Environment and Conservation.

(b) Blast Overpressure

The lease holder must ensure that the blast overpressure noise level generated by any blasting within the lease area does not exceed 120 dB (linear) and does not exceed 115 dB (linear) in more than 5% of the total number of blasts over a period of 12 months, at any dwelling or occupied premises, as the case may be, unless determined otherwise by the Department of Environment and Conservation.

Safety

12. Operations must be carried out in a manner that ensures the safety of persons or stock in the vicinity of the operations. All drill holes shafts and excavations must be appropriately protected, to the satisfaction of the Director-General, to ensure that access to them by persons and stock is restricted. Abandoned shafts and excavations opened up or used by the lease holder must be filled in or otherwise rendered safe to a standard acceptable to the Director-General.

Rehabilitation

13. (a) Land disturbed must be rehabilitated to a stable and permanent form suitable for a subsequent land use acceptable to the Director-General and in accordance with the Mining Operations Plan so that:-

- there is no adverse environmental effect outside the disturbed area and that the land is properly drained and protected from soil erosion.
- the state of the land is compatible with the surrounding land and land use requirements.
- the landforms, soils, hydrology and flora require no greater maintenance than that in the surrounding land.
- in cases where revegetation is required and native vegetation has been removed or damaged, the original species must be re-established with close reference to the flora survey included in the Mining Operations Plan. If the original vegetation was not native, any re-established vegetation must be appropriate to the area and at an acceptable density.

- the land does not pose a threat to public safety.

(b) Any topsoil that is removed must be stored and maintained in a manner acceptable to the Director-General.

14. The lease holder must comply with any direction given by the Director-General regarding the stabilisation and revegetation of any mine residues, tailings or overburden dumps situated on the lease area.

Exploratory Drilling

15. (1) At least twenty eight days prior to commencement of drilling operations the lease holder must notify the relevant Department of Infrastructure, Planning and Natural Resources regional hydrogeologist of the intention to drill exploratory drill holes together with information on the location of the proposed holes.

(2) If the lease holder drills exploratory drill holes he must satisfy the Director-General that:-

(a) all cored holes are accurately surveyed and permanently marked in accordance with Departmental guidelines so that their location can be easily established;

(b) all holes cored or otherwise are sealed to prevent the collapse of the surrounding surface;

(c) all drill holes are permanently sealed with cement plugs to prevent surface discharge of groundwaters;

(d) if any drill hole meets natural or noxious gases it is plugged or sealed to prevent their escape;

(e) if any drill hole meets an artesian or sub-artesian flow it is effectively sealed to prevent contamination of aquifers.

(f) once any drill hole ceases to be used the hole must be sealed in accordance with Departmental guidelines. Alternatively, the hole must be sealed as instructed by the Director-General.

(g) once any drill hole ceases to be used the land and its immediate vicinity is left in a clean, tidy and stable condition.

Prevention of Soil Erosion and Pollution

16. Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation) or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. For the purpose of this condition, water shall be taken to include any watercourse, waterbody or groundwaters. The lease holder must observe and perform any instructions given by the Director-General in this regard.

Transmission lines, Communication lines and Pipelines

17. Operations must not interfere with or impair the stability or efficiency of any transmission line, communication line, pipeline or any other utility on the lease area without the prior written approval of the Director-General and subject to any conditions he may stipulate.

Fences, Gates

18. (a) Activities on the lease must not interfere with or damage fences without the prior written approval of the owner thereof or the Minister and subject to any conditions the Minister may stipulate.

(b) Gates within the lease area must be closed or left open in accordance with the requirements of the landholder.

Roads and Tracks

19. (a) Operations must not affect any road unless in accordance with an accepted Mining Operations Plan or with the prior written approval of the Director-General and subject to any conditions he may stipulate.

(b) The lease holder must pay to the designated authority in control of the road (generally the local council or the Roads and Traffic Authority) the cost incurred in fixing any damage to roads caused by operations carried out under the lease, less any amount paid or payable from the Mine Subsidence Compensation Fund.

20. Access tracks must be kept to a minimum and be positioned so that they do not cause any unnecessary damage to the land. Temporary access tracks must be ripped, topsoiled and revegetated as soon as possible after they are no longer required for mining operations. The design and construction of access tracks must be in accordance with specifications fixed by the Department of Infrastructure, Planning and Natural Resources.

Trees and Timber

21. (a) The lease holder must not fell trees, strip bark or cut timber on the lease without the consent of the landholder who is entitled to the use of the timber, or if such a landholder refuses consent or attaches unreasonable conditions to the consent, without the approval of a warden.

(b) The lease holder must not cut, destroy, ringbark or remove any timber or other vegetative cover on the lease area except such as directly obstructs or prevents the carrying on of operations. Any clearing not authorised under the Mining Act 1992 must comply with the provisions of the Native Vegetation Conservation Act 1997.

(c) The lease holder must obtain all necessary approvals or licences before using timber from any Crown land within the lease area.

Resource Recovery

23. (a) Notwithstanding any description of mining methods and their sequence or of proposed resource recovery contained within the Mining Operations Plan, if at any time the Director-General is of the opinion that minerals which the lease entitles the lease holder to mine and which are economically recoverable at the time are not being recovered from the lease area, or that any such minerals which are being recovered are not being recovered to the extent which should be economically possible or which for environmental reasons are necessary to be recovered, he may give notice in writing to the lease holder requiring the holder to recover such minerals.

(b) The notice shall specify the minerals to be recovered and the extent to which they are to be recovered, or the objectives in regard to resource recovery, but shall not specify the processes the lease holder shall use to achieve the specified recovery.

(c) The lease holder must, when requested by the Director-General, provide such information as the Director-General may specify about the recovery of the mineral resources of the lease area.

(d) The Director-General shall issue no such notice unless the matter has firstly been thoroughly discussed with and a report to the Director-General has incorporated the views of the lease holder.

(e) The lease holder may object to the requirements of any notice issued under this condition and on receipt of such an objection the Minister shall refer it to a Warden for inquiry and report under Section 334 of the Mining Act, 1992.

(f) After considering the Warden's report the Minister shall decide whether to withdraw, modify or maintain the requirements specified in the original notice and shall give the lease holder written notice of the decision. The lease holder must comply with the requirements of this notice.

Indemnity

24. The lease holder must indemnify and keep indemnified the Crown from and against all actions, suits, claims and demands of whatsoever nature and all costs, charges and expenses which may be brought against the lease holder or which the lease holder may incur in respect of any accident or injury to any person or property which may arise out of the construction, maintenance or working of any workings now existing or to be made by the lease holder within the lease area or in connection with any of the operations notwithstanding that all other conditions of this lease shall in all respects have been observed by the lease holder or that any such accident or injury shall arise from any act or thing which the lease holder may be licensed or compelled to do.

Security

25. (a) A security in the sum of **$50,000.00** must be given and maintained with the Minister by the lease holder for the purpose of ensuring the fulfilment by the lease holder of obligations under this lease. If the lease holder fails to fulfil any one or more of such obligations the said sum may be applied at the discretion of the Minister towards the cost of fulfilling such obligations. For the purpose of this clause the lease holder shall be deemed to have failed to fulfil the obligations of this lease if the lease holder fails to comply with any condition or provision hereof, any provision of the Act or regulations made thereunder or any condition or direction imposed or given pursuant to a condition or provision hereof or of any provision of the Act or regulations made thereunder.

(b) The lease holder must provide the security required by sub-clause (a) in one of the following forms:

(i) cash,

(ii) a security certificate in a form approved by the Minister and issued by an authorised deposit-taking institution.

Barriers

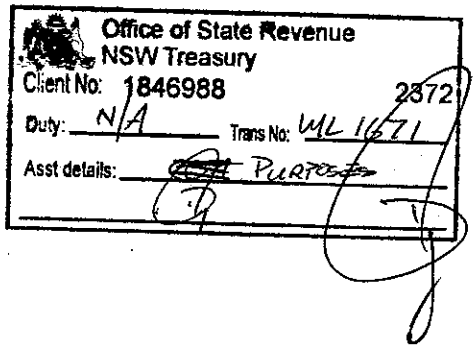
29. (a) Unless with the consent of the Minister first had and obtained and subject to such further conditions as he may impose, the lease holder shall not mine within a barrier of 50 metres in width against the underground workings of the former Werris Creek Colliery as referred to in the Environmental Impact Statement entitled "Werris Creek Coal Pty Limited – ABN 69 107 169 103 - Environmental Impact Statement for the Proposed Werris Creek Coal Mine" dated August 2004.

(b) The lease holder must, prior to seeking the Ministers consent under this condition, complete a risk assessment to determine hazards and develop management controls. This risk assessment is to be subject to any amendments as may be required by the Director General.

Special Conditions

30. The lease holder shall ensure that operations on the lease area are conducted in a manner consistent with the Environmental Impact Statement, except were no longer applicable due to subsequent approval, conditioning or exemption.

31. The lease holder shall ensure that 53 hectares of the rehabilitated landform is revegetated with species from the White Box Yellow Box Blakley's Red Gum Endangered Ecological Community, and stock are excluded from the 200 hectares as shown in Figure 4.15 of the Environmental Impact Statement.



MINING LEASE (PURPOSES)

MINING ACT 1992

NO 1671

DATED 9 MARCH 2012

THE MINISTER FOR RESOURCES AND ENERGY

OF THE STATE

OF NEW SOUTH WALES

TO

WERRIS CREEK COAL PTY LIMITED

(ACN 107169 102)

Mining Lease Application No 407

MINING ACT 1992

MINING LEASE
(PURPOSES)

THIS DEED made the Ninth day of March Two Thousand and Twelve in pursuance of the provisions of the *Mining Act 1992* (hereinafter called "the Act") BETWEEN, **CHRIS HARTCHER MP, MINISTER FOR RESOURCES AND ENERGY** of the State of New South Wales (hereinafter called "the Minister" which expression shall where the context admits or requires include the successors in office of the Minister and the person acting as such Minister for the time being) AND **WERRIS CREEK COAL PTY LIMITED (ACN 107 169 102)** (which with its successors and transferees is hereinafter called "the lease holder") of **Level 28, 259 George Street, SYDNEY NSW 2000.**

WHEREAS

(a) in conformity with the Act application was made for a mining lease over the lands hereinafter described; and

(b) all conditions and things required to be done and performed before granting a mining lease under the Act have been done and performed NOW THIS DEED WITNESSETH that in consideration of the observance and performance of the covenants contained in this Deed, the Minister in pursuance of the provisions of the Act DOES HEREBY demise and lease to the lease holder ALL THAT piece or parcel of land containing by admeasurement **96.15 hectares** as shown on Plan No **M27210** more particularly described and delineated in the plan attached for mining purposes of:

(a) The construction, maintenance or use (in or in connection with mining operations) of any one or more of the following:
   i. Any building or mining plant,
   ii. Any road, railway, tramway, bridge or jetty,
   iii. Any reservoir, dam, drain or water race,
   iv. Any cable, conveyor, pipeline, telephone line or signalling system.

(c) The removal, stockpiling, management or depositing of overburden, ore or tailings to the extent that it is associated with mineral extraction or mineral beneficiation.

(d) The storage of fuel, machinery, timber or equipment for use in or in connection with mining operations.

(e) the generation and transmission of electricity for use in or in connection with mining operations.

(f) the construction, maintenance and use (in or in connection with mining operations) of any drillhole or shaft for:

ii. drainage or conveyance of water, or

iv. conveyance of electricity, or

v. conveyance of materials.

TO HOLD the said land together with any appurtenances thereon subject to:

(a) such rights and interests as may be lawfully subsisting therein or which may be reserved by the Act at the date of this Deed; and

(b) such conditions, provisos and stipulations as are contained in this Deed UNTO the lease holder from and including the date of this Deed for the period of **twenty one (21) years,** for the purpose as stated and for no other purpose.

1. THAT in this lease except insofar as the context otherwise indicates or requires:

(a) any reference to an Act includes that Act and any Act amending or in substitution for the same; "Director-General" means the person for the time being holding office or acting as Director-General, Department of Trade and Investment; Regional Infrastructure and Services; the word "mine" has the meaning assigned to it by the Act; words importing the singular number shall include the plural, the masculine gender the feminine or neuter gender and vice versa; and

(b) any covenant on the part of two or more persons shall be deemed to bind them jointly and severally.

2. THAT the lease holder shall at all times during the term of this lease keep and preserve the said mine from all avoidable injury or damage and also the levels, drifts, shafts, watercourses, roadways, works, erections and fixtures therein and thereon in good repair and condition and in such state and condition shall on the expiration or sooner determination of the said term or any renewal thereof deliver possession of the land and

the premises hereby demised to the Minister or other persons authorised to receive possession thereof.

3. THAT the conditions and provisions set forth in the Schedule of Mining Lease Conditions 2010 herein and numbered: **1-7 (inclusive), 10-15 (inclusive), 18, 20 and 24** are embodied and incorporated within this Deed as conditions and provisions of the lease hereby granted AND that the lease holder shall observe fulfil and perform the same. Conditions 2 to 7 and 12 to 16 (if included in the mining lease) are identified as conditions relating to environmental management for the purposes of Section 374A(1) of the *Mining Act 1992.*

Note: Conditions 2 to 7 and 12 to 15 of this mining lease are imposed pursuant to sections 238 and 239 of the Mining Act 1992. Clause 7 of Schedule 12 of the Mining Regulation 2010 saves higher penalties for a breach of condition imposed by or under sections 238 or 239 of the Act.

PROVIDED always and it is hereby declared as follows:

(a) THAT this lease is granted subject to amendment as provided under Sections 79 and 168A of the Act.

(b) THAT if the lease holder at any time during the term of this demise -

(i) fails to fulfil or contravenes the covenants and conditions herein contained; or

(ii) fails to comply with any provision of the Act or the Regulations with which the lease holder is required to comply; or

(iii) fails to comply with the requirements of any agreement or assessment in relation to the payment of compensation,

this lease may be cancelled by the Minister by instrument in writing and the cancellation shall have effect from and including the date on which notice of the cancellation is served on the lease holder or on such later date as is specified in the notice; and any liability incurred by the lease holder before the cancellation took effect shall not be affected.

(c) THAT no implied covenant for title or for quiet enjoyment shall be contained herein.

(d) THAT all the conditions and provisions contained in the *Mining Act 1992* and the Regulations thereunder, the *Mine Health & Safety Act 2004, Mine Health & Safety Regulation 2007 or Coal Mine Health & Safety Regulation 2006,* or any other law hereafter to be passed or prescribed shall be incorporated within this Deed as conditions and provisions of the lease granted. The lease holder hereby covenants to observe, fulfil and perform the same.

(e) THAT such of the provisions and conditions declared and contained in this Deed as requiring anything to be done or not to be done by the lease holder, shall be read and construed as covenants by the lease holder with the Minister which are to be observed and performed.

IN WITNESS WHEREOF the parties hereto have executed this Deed the day and year first abovewritten.

SIGNED AND DELIVERED
BY

WERRIS CREEK COAL PTY LIMITED
(ACN 107 169 102)

.....

in the presence of

.....
Witness

SIGNED AND DELIVERED
BY

.....

in the presence of

.....
Witness

MINING LEASE CONDITIONS 2010

Content

Definition

Note: Exploration Reports (Geological and Geophysical)

Definition:

"Director-General" means the Director-General of the Department of Trade and Investment; Regional Infrastructure and Services

1. Notice to Landholders

(a) Within a period of three months from the date of grant/renewal of this lease or within such further time as the Minister may allow, the lease holder must serve on each landholder of the land a notice in writing indicating that this lease has been granted/renewed and whether the lease includes the surface. An adequate plan and description of the lease area must accompany the notice.

(b) If there are ten or more landholders affected, the lease holder may serve the notice by publication in a newspaper circulating in the region where the lease area is situated. The notice must indicate that this lease has been granted/renewed; state whether the lease includes the surface and must contain an adequate plan and description of the lease area.

2. Environmental Harm

(a) The lease holder must implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation or rehabilitation of any activities under this lease.

(b) For the purposes of this condition:

(i) environment means components of the earth, including:

(A) land, air and water, and

(B) any layer of the atmosphere, and

(C) any organic or inorganic matter and any living organism, and

(D) human-made or modified structures and areas,

and includes interacting natural ecosystems that include components referred to in paragraphs (A)–(C).

(ii) harm to the environment includes any direct or indirect alteration of the environment that has the effect of degrading the environment and, without limiting the generality of the above, includes any act or omission that results in pollution, contributes to the extinction or degradation of any threatened species, populations or ecological communities and their habitats and causes impacts to places, objects and features of significance to Aboriginal people.

3. Mining Operations Plan

(a) Mining operations must not be carried out otherwise than in accordance with a Mining Operations Plan (MOP) which has been approved by the Director-General.

(b) The MOP must:

(i) identify areas that will be disturbed by mining operations;

(ii) detail the staging of specific mining operations;

(iii) identify how the mine will be managed to allow mine closure;

(iv) identify how mining operations will be carried out in order to prevent and or minimise harm to the environment;

(v) reflect the conditions of approval under:

- the *Environmental Planning and Assessment Act 1979*
- the *Protection of the Environment Operations Act 1997*
- and any other approvals relevant to the development including the conditions of this lease; and
- have regard to any relevant guidelines adopted by the Director-General.

(c) The leaseholder may apply to the Director-General to amend an approved MOP at any time.

(d) It is not a breach of this condition if:

(i) the operations constituting the breach were necessary to comply with a lawful order or direction given under the *Mining Act 1992*, the *Environmental Planning and Assessment Act 1979*, *Protection of the Environment Operations Act 1997*, *Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002* and *Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006* or the *Occupational Health and Safety Act 2000*; and

(ii) the Director-General had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out.

(e) A MOP ceases to have effect 7 years after date of approval or other such period as identified by the Director-General.

4. Environment Management Report

(a) The lease holder must lodge Environmental Management Reports (EMR) with the Director-General annually or at dates otherwise directed by the Director-General.

(b) The EMR must:

(i) report against compliance with the MOP;

(ii) report on progress in respect of rehabilitation completion criteria;

(iii) report on the extent of compliance with regulatory requirements; and

(iv) have regard to any relevant guidelines adopted by the Director-General;

5. Environmental Incident Report

(a) The lease holder must report any environmental incidents. The report must:

(i) be prepared according to any relevant Departmental guidelines;

(ii) be submitted within 24 hours of the environmental incident occurring:

(b) For the purposes of this condition, environmental incident includes:

(i) any incident causing or threatening material harm to the environment

(ii) any breach of Conditions 1 to 9 and 11 to 24;

(iii) any breach of environment protection legislation; or,

(iv) a serious complaint from landholders or the public.

(c) For the purposes of this condition, harm to the environment is material if:

(i) it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or

(ii) it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, where loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment.

6. Additional Environmental Reports

Additional environmental reports may be required from time to time as directed in writing by the Director-General and must be lodged as instructed.

7. Rehabilitation

Any disturbance as a result of activities under this lease must be rehabilitated to the satisfaction of the Director-General.

10. Blasting

(a) Ground Vibration

The lease holder must ensure that the ground vibration peak particle velocity generated by any blasting within the lease area does not exceed 10 mm/second and does not exceed 5 mm/second in more than 5% of the total number of blasts over a period of 12 months at any dwelling or occupied premises as the case may be, unless determined otherwise by the Department of Environment, Climate Change and Water.

(b) Blast Overpressure

The lease holder must ensure that the blast overpressure noise level generated by any blasting within the lease area does not exceed 120 dB (linear) and does not exceed 115 dB (linear) in more than 5% of the total number of blasts over a period of 12 months, at any dwelling or occupied premises, as the case may be, unless determined otherwise by the Department of Environment, Climate Change and Water.

11. Safety

Operations must be carried out in a manner that ensures the safety of persons or stock in the vicinity of the operations. All drill holes shafts and excavations must be appropriately protected, to the satisfaction of the Director-General, to ensure that access to them by persons and stock is restricted. Abandoned shafts and excavations opened up or used by the lease holder must be notified in writing to the Department and filled in or otherwise rendered safe to a standard acceptable to the Director-General.

12. Prevention of soil erosion and pollution

Prospecting operations must be carried out in a manner that does not cause or aggravate air pollution, water (including groundwater) pollution, soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan.

13. Transmission lines, Communication lines and Pipelines

Operations must not interfere with or impair the stability or efficiency of any transmission line, communication line, pipeline or any other utility on the lease area without the prior written approval of the Director-General and subject to any conditions stipulated.

14. Roads and Tracks

(a) The lease holder must pay to the relevant roads authority in control of the road or track the reasonable costs incurred by the roads authority in making good any damage to roads or tracks caused by operations carried out under this lease less any amount paid or payable from the Mine Subsidence Compensation Fund.

(b) During wet weather the use of any road or track must be restricted so as to prevent damage to the road or track.

(c) Existing access tracks should be used for all operations where reasonably practicable. New access tracks must be kept to a minimum and be positioned in order to minimise damage to the land, watercourses or vegetation.

(d) Temporary access tracks must be rehabilitated and revegetated to the satisfaction of the Director-General as soon as reasonably practicable after they are no longer required under this lease.

15. Trees and Vegetation

(a) The lease holder must not fell trees, strip bark or cut timber on any land subject of this lease without the consent of the landholder who is entitled to the use of the timber.

(b) The lease holder must contact Forests NSW and obtain any required permit, licence or approval before taking timber from any Crown land within the lease area.

Note: Any clearing not authorised under the Act must comply with the requirements of the Native Vegetation Act 2003. Any clearing or taking of timber on Crown land is subject to the requirements of the Forestry Act 1916.

18. Indemnity

The lease holder must indemnify and keep indemnified the Crown from and against all actions, suits, claims and demands of whatsoever nature and all costs, charges and expenses which may be brought against the lease holder or which the lease holder may incur in respect of any accident or injury to any person or property which may arise out of the construction, maintenance or working of any workings now existing or to be made by the lease holder within the lease area or in connection with any of the operations notwithstanding that all other conditions of this lease shall in all respects have been observed by the lease holder or that any such accident or injury shall arise from any act or thing which the lease holder may be licensed or compelled to do.

20 Single Security

A single security in the sum of **$4,062,000** must be given and maintained with the Minister by the lease holder for the purpose of ensuring the fulfilment by the lease holder of obligations under each Mining Lease 1563 (Act 1992) and any lease granted in satisfaction of Mining Lease Applications 407, 408 and 409 (Act 1992).

24. Cooperation Agreement

The lease holder must make every reasonable attempt, and be able to demonstrate their attempts, to enter into a cooperation agreement with the holder(s) of any overlapping title(s). The cooperation agreement should address but not be limited to issues such as:

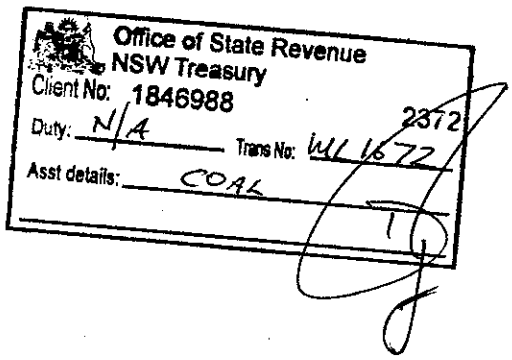
- access arrangements
- operational interaction procedures
- dispute resolution
- information exchange
- well location
- timing of drilling
- potential resource extraction conflicts and

- rehabilitation issues.

Note: *Exploration Reports (Geological and Geophysical)*

The lease holder must lodge reports to the satisfaction of the Director-General in accordance with section 163C of the Mining Act 1992 and in accordance with clause 57 of the Mining Regulation 2010.

Reports must be prepared in accordance with Exploration Reporting: A guide for reporting on exploration and prospecting in New South Wales (Department of Trade and Investment; Regional Infrastructure and Services 2010).



MINING LEASE

MINING ACT 1992

NO 1672

DATED 9 MARCH 2012

THE MINISTER FOR RESOURCES AND ENERGY

OF THE STATE

OF NEW SOUTH WALES

TO

WERRIS CREEK COAL PTY LIMITED
(ACN 107 169 102)

Mining Lease Application Nos 408 and 409

MINING ACT 1992

MINING LEASE

THIS DEED made the Ninth day of March Two Thousand and Twelve in pursuance of the provisions of the *Mining Act 1992* (hereinafter called "the Act") BETWEEN **CHRIS HARTCHER MP, MINISTER FOR RESOURCES AND ENERGY** of the State of New South Wales (hereinafter called "the Minister" which expression shall where the context admits or requires include the successors in office of the Minister and the person acting as such Minister for the time being) AND **WERRIS CREEK COAL PTY LIMITED ACN 107 169 102** (which with its successors and transferees is hereinafter called "the lease holder") of **Level 28, 259 George Street, SYDNEY NSW 2000**.

WHEREAS

(a) in conformity with the Act application was made for a mining lease over the lands hereinafter described; and

(b) all conditions and things required to be done and performed before granting a mining lease under the Act have been done and performed NOW THIS DEED WITNESSETH that in consideration of the observance and performance of the covenants contained in this Deed and the payment of royalty by the lease holder, the Minister in pursuance of the provisions of the Act DOES HEREBY demise and lease to the lease holder ALL THAT piece or parcel of land containing by admeasurement **130.5** hectares as shown on Plan No. **M27211**, more particularly described and delineated in the plan attached for the purpose of prospecting and mining for **COAL**.

TO HOLD the said land together with any appurtenances thereon subject to:

(a) such rights and interests as may be lawfully subsisting therein or which may be reserved by the Act at the date of this Deed; and

(b) such conditions, provisos and stipulations as are contained in this Deed UNTO the lease holder from and including the date of this Deed for the term of **twenty one (21) years,** for the purpose as stated and for no other purpose.

1. THAT in this lease except insofar as the context otherwise indicates or requires:

   (a) any reference to an Act includes that Act and any Act amending or in substitution for the same; "Director-General" means the person for the time being holding office or acting as Director-General, Department of Trade and Investment; Regional Infrastructure and Services; the word "mine" has the meaning assigned to it by the Act; words importing the singular number shall include the plural, the masculine gender the feminine or neuter gender and vice versa; and

   (b) any covenant on the part of two or more persons shall be deemed to bind them jointly and severally.

2. THAT the lease holder shall during the said term pay to the Minister in Sydney in respect of all such minerals as stated, recovered from the land hereby demised, royalty at the rate or rates prescribed by the Act and the Regulations thereunder at the time the minerals are recovered, or at the rate or rates fixed by the Minister from time to time during the term of this demise in exercise of the power in that behalf conferred upon him by the Act.

3. THAT the lease holder shall at all times during the term of this lease keep and preserve the said mine from all avoidable injury or damage and also the levels, drifts, shafts, watercourses, roadways, works, erections and fixtures therein and thereon in good repair and condition and in such state and condition shall on the expiration or sooner determination of the said term or any renewal thereof deliver possession of the land and the premises hereby demised to the Minister or other persons authorised to receive possession thereof.

4. THAT the conditions and provisions set forth in the Schedule of Mining Lease Conditions 2010 herein and numbered: **1-15 (inclusive), 17, 18, 20, 23 and 24** are embodied and incorporated within this Deed as conditions and provisions of the lease hereby granted AND that the lease holder shall observe fulfil and perform the same. Conditions 2 to 8 and 12 to 16 (if included in the mining lease) are identified as conditions relating to environmental management for the purposes of Section 374A(1) of the *Mining Act 1992.*

   Note: Conditions 2 to 8 and 12 to 15 of this mining lease are imposed pursuant to sections 238 and 239 of the Mining Act 1992. Clause 7 of Schedule 12 of the Mining Regulation 2010 saves higher penalties for a breach of condition imposed by or under sections 238 or 239 of the Act.

PROVIDED always and it is hereby declared as follows:

(a) THAT this lease is granted subject to amendment as provided under Section 79 and 168A of the Act.

(b) THAT if the lease holder at any time during the term of this demise -

(i) fails to fulfil or contravenes the covenants and conditions herein contained; or

(ii) fails to comply with any provision of the Act or the Regulations with which the lease holder is required to comply; or

(iii) fails to comply with the requirements of any agreement or assessment in relation to the payment of compensation,

this lease may be cancelled by the Minister by instrument in writing and the cancellation shall have effect from and including the date on which notice of the cancellation is served on the lease holder or on such later date as is specified in the notice; and any liability incurred by the lease holder before the cancellation took effect shall not be affected.

(c) THAT no implied covenant for title or for quiet enjoyment shall be contained herein.

(d) THAT all the conditions and provisions contained in the *Mining Act 1992* and the Regulations thereunder, the *Mine Health & Safety Act 2004,* the *Mine Health and Safety Regulation 2007* or the *Coal Mine Health & Safety Regulation 2006*, or any other law hereafter to be passed or prescribed shall be incorporated within this Deed as conditions and provisions of the lease granted. The lease holder hereby covenants to observe, fulfil and perform the same.

(e) THAT such of the provisions and conditions declared and contained in this Deed as requiring anything to be done or not to be done by the lease holder, shall be read and construed as covenants by the lease holder with the Minister which are to be observed and performed.

IN WITNESS WHEREOF the parties hereto have executed this Deed the day and year first abovewritten.

SIGNED AND DELIVERED
BY

WERRIS CREEK COAL PTY LIMITED
(ACN 107 169 102)

.....

in the presence of

.....
Witness

SIGNED AND DELIVERED
BY

.....

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.....
Witness

MINING LEASE CONDITIONS 2010

Content

Note: Exploration Reports (Geological and Geophysical)

Definition:

"Director-General" means the Director-General of the Department of Trade and Investment; Regional Infrastructure and Services

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and includes interacting natural ecosystems that include components referred to in paragraphs (A)–(C).

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(ii) detail the staging of specific mining operations;

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(v) reflect the conditions of approval under:

- the *Environmental Planning and Assessment Act 1979*
- the *Protection of the Environment Operations Act 1997*
- and any other approvals relevant to the development including the conditions of this lease; and
- have regard to any relevant guidelines adopted by the Director-General.

(c) The leaseholder may apply to the Director-General to amend an approved MOP at any time.

(d) It is not a breach of this condition if:

(i) the operations constituting the breach were necessary to comply with a lawful order or direction given under the *Mining Act 1992*, the *Environmental Planning and Assessment Act 1979*, *Protection of the Environment Operations Act 1997, Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002* and *Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006* or the *Occupational Health and Safety Act 2000*; and

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(a) The lease holder must lodge Environmental Management Reports (EMR) with the Director-General annually or at dates otherwise directed by the Director-General.

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(a) The lease holder must report any environmental incidents. The report must:

(i) be prepared according to any relevant Departmental guidelines;

(ii) be submitted within 24 hours of the environmental incident occurring:

(b) For the purposes of this condition, environmental incident includes:

(i) any incident causing or threatening material harm to the environment

(ii) any breach of Conditions 1 to 9 and 11 to 24;

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(c) For the purposes of this condition, harm to the environment is material if:

(i) it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or

(ii) it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, where loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment.

6. Additional Environmental Reports

Additional environmental reports may be required from time to time as directed in writing by the Director-General and must be lodged as instructed.

7. Rehabilitation

Any disturbance as a result of activities under this lease must be rehabilitated to the satisfaction of the Director-General.

8. Subsidence Management

(a) The lease holder shall prepare a Subsidence Management Plan prior to commencing any underground mining operations which will potentially lead to subsidence of the land surface.

(b) Underground mining operations which will potentially lead to subsidence include secondary extraction panels such as longwalls or miniwalls, associated first workings (gateroads, installation roads and associated main headings, etc), and pillar extractions, and are otherwise defined by the Applications for Subsidence Management Approvals guidelines (EDG17)

(c) The lease holder must not commence or undertake underground mining operations that will potentially lead to subsidence other than in accordance with a Subsidence Management Plan approved by the Director-General, an approval under the *Coal Mine Health & Safety Act 2002*, or the document New Subsidence Management Plan Approval Process – Transitional Provisions (EDP09).

(d) Subsidence Management Plans are to be prepared in accordance with the Guideline for Applications for Subsidence Management Approvals.

(e) Subsidence Management Plans as approved shall form part of the Mining Operations Plan required under Condition 3 and will be subject to the Environmental Management Report process as set out under Condition 4. The SMP is also subject to the requirements for subsidence monitoring and reporting set out in the document New Approval Process for Management of Coal Mining Subsidence - Policy.

9. Working Requirement

The lease holder must:

(a) ensure that at least **six (6)** competent people are efficiently employed in relation to the mining process or mining operations on the lease area

OR

(b) expend on operations carried out in the course of prospecting or mining the lease area, an amount of not less than **$105,000** per annum whilst the lease is in force.

The Minister may at any time or times, by instrument in writing served on the lease holder, increase or decrease the expenditure required or the number of people to be employed.

10. Blasting

(a) Ground Vibration

The lease holder must ensure that the ground vibration peak particle velocity generated by any blasting within the lease area does not exceed 10 mm/second and does not exceed 5 mm/second in more than 5% of the total number of blasts over a period of 12 months at any dwelling or occupied premises as the case may be, unless determined otherwise by the Department of Environment, Climate Change and Water.

(b) Blast Overpressure

The lease holder must ensure that the blast overpressure noise level generated by any blasting within the lease area does not exceed 120 dB (linear) and does not exceed 115 dB (linear) in more than 5% of the total number of blasts over a period of 12 months, at any dwelling or occupied premises, as the case may be, unless determined otherwise by the Department of Environment, Climate Change and Water.

11. Safety

Operations must be carried out in a manner that ensures the safety of persons or stock in the vicinity of the operations. All drill holes shafts and excavations must be appropriately protected, to the satisfaction of the Director-General, to ensure that access to them by persons and stock is restricted. Abandoned shafts and excavations opened up or used by the lease holder must be notified in writing to the Department and filled in or otherwise rendered safe to a standard acceptable to the Director-General.

12. Prevention of soil erosion and pollution

Prospecting operations must be carried out in a manner that does not cause or aggravate air pollution, water (including groundwater) pollution, soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan.

13. Transmission lines, Communication lines and Pipelines

Operations must not interfere with or impair the stability or efficiency of any transmission line, communication line, pipeline or any other utility on the lease area without the prior written approval of the Director-General and subject to any conditions stipulated.

14. Roads and Tracks

(a) The lease holder must pay to the relevant roads authority in control of the road or track the reasonable costs incurred by the roads authority in making good any damage to roads or tracks caused by operations carried out under this lease less any amount paid or payable from the Mine Subsidence Compensation Fund.

(b) During wet weather the use of any road or track must be restricted so as to prevent damage to the road or track.

(c) Existing access tracks should be used for all operations where reasonably practicable. New access tracks must be kept to a minimum and be positioned in order to minimise damage to the land, watercourses or vegetation.

(d) Temporary access tracks must be rehabilitated and revegetated to the satisfaction of the Director-General as soon as reasonably practicable after they are no longer required under this lease.

15. Trees and Vegetation

(a) The lease holder must not fell trees, strip bark or cut timber on any land subject of this lease without the consent of the landholder who is entitled to the use of the timber.

(b) The lease holder must contact Forests NSW and obtain any required permit, licence or approval before taking timber from any Crown land within the lease area.

Note: Any clearing not authorised under the Act must comply with the requirements of the Native Vegetation Act 2003. Any clearing or taking of timber on Crown land is subject to the requirements of the Forestry Act 1916.

17. Resource Recovery

(a) Notwithstanding any description of mining methods and their sequence or of proposed resource recovery contained within the Mining Operations Plan, if at any time the Director-General is of the opinion that minerals which the lease entitles the lease holder to mine and which are economically recoverable at the time are not being recovered from the lease area, or that any such minerals which are being recovered are not being recovered to the extent which should be economically possible or which for environmental reasons are necessary to be recovered, notice in writing to the lease holder may be given requiring the holder to recover such minerals.

(b) The notice shall specify the minerals to be recovered and the extent to which they are to be recovered, or the objectives in regard to resource recovery, but shall not specify the processes the lease holder shall use to achieve the specified recovery.

(c) The lease holder must, when requested by the Director-General, provide such information as the Director-General may specify about the recovery of the mineral resources of the lease area.

18. Indemnity

The lease holder must indemnify and keep indemnified the Crown from and against all actions, suits, claims and demands of whatsoever nature and all costs, charges and expenses which may be brought against the lease holder or which the lease holder may incur in respect of any accident or injury to any person or property which may arise out of the construction, maintenance or working of any workings now existing or to be made by the lease holder within the lease area or in connection with any of the operations notwithstanding that all other conditions of this lease shall in all respects have been observed by the lease holder or that any such accident or injury shall arise from any act or thing which the lease holder may be licensed or compelled to do.

20 Single Security

A single security in the sum of **$4,062,000** must be given and maintained with the Minister by the lease holder for the purpose of ensuring the fulfilment by the lease holder of obligations under each Mining Lease 1563 (Act 1992) and any lease granted in satisfaction of Mining Lease Applications 407, 408 and 409 (Act 1992).

23. Suspension of Mining Operations

The holder of a mining lease may not suspend mining operations in the mining area other than in accordance with the consent of the Minister.

24. Cooperation Agreement

The lease holder must make every reasonable attempt, and be able to demonstrate their attempts, to enter into a cooperation agreement with the holder(s) of any overlapping title(s). The cooperation agreement should address but not be limited to issues such as:

- access arrangements
- operational interaction procedures
- dispute resolution
- information exchange
- well location
- timing of drilling
- potential resource extraction conflicts and
- rehabilitation issues.

Note: *Exploration Reports (Geological and Geophysical)*

The lease holder must lodge reports to the satisfaction of the Director-General in accordance with section 163C of the Mining Act 1992 and in accordance with clause 57 of the Mining Regulation 2010.

Reports must be prepared in accordance with Exploration Reporting: A guide for reporting on exploration and prospecting in New South Wales (Department of Trade and Investment; Regional Infrastructure and Services 2010).

Deposited Dust - Werris Creek Coal Mine 2013-2014

MONTH (g/m2/month)				April 2013	May 2013	June 2013	July 2013	August 2013	September 2013	October 2013	November 2013	December 2013	January 2014	February 2014	March 2014	ANNUAL AVERAGE	AVERAGE - EXCLUDED	MINIMUM	MAXIMUM	AQGHGMP Criteria
-	DG2	Cintra	Total Matter	4.1	1.5	1.3	1.2	0.4	2.2	0.5	1.3	2.7	1.5	4.4	2.8	2.0	2.0	0.4	4.4	4.0
			Ash Content	3.0	0.8	0.9	0.8	0.3	1.2	0.4	0.7	1.7	0.6	2.2	1.4					
-	DG5	Railway View	Total Matter	0.7	1.0	0.9	0.8	0.5	1.2	1.0	1.8	1.1	0.1	1.3	2.3	1.1	0.9	0.1	2.3	4.0
			Ash Content	0.5	0.6	0.9	0.6	0.5	0.8	0.7	1.2	0.7	<0.1	0.8	0.3					
EPL #1	DG20	Tonsley Park	Total Matter	1.2	0.6	0.4	0.6	0.4	1.4	0.5	1.2	7.8	0.7	1.4	1.0	1.4	0.8	0.4	7.8	4.0
			Ash Content	0.7	0.3	0.4	0.4	0.3	0.6	0.4	0.8	1.7	0.3	0.9	0.6					
-	DG15	Plain View	Total Matter	2.6	1.0	1.2	0.8	1.1	0.8	0.7	1.3	0.3	<0.1	1.0	8.8	1.8	1.1	0.3	8.8	4.0
			Ash Content	1.3	0.6	1.0	0.5	0.7	0.5	0.6	0.9	0.2	<0.1	0.6	0.3					
-	DG9	Marengo	Total Matter	1.4	0.8	0.3	0.4	0.5	0.6	0.5	1.2	0.6	0.1	0.3	2.5	0.8	0.5	0.1	2.5	4.0
			Ash Content	0.6	0.3	0.2	0.2	0.4	0.3	0.4	0.6	0.6	<0.1	<0.1	0.1					
-	DG22	Mountain View	Total Matter	0.7	0.8	1.5	0.5	0.5	2.8	1.3	6.9	0.7	<0.1	4.7	2.8	2.1	1.6	0.5	6.9	4.0
			Ash Content	0.5	0.7	1.2	0.4	0.5	2.0	0.8	3.3	0.6	<0.1	3.4	1.8					
EPL#29	DG11	Glenara	Total Matter	0.2	0.2	0.2	0.1	0.8	1.1	0.9	1.6	1.2	0.7	1.9	0.1	0.8	0.6	0.1	1.9	4.0
			Ash Content	0.1	0.1	0.1	0.1	0.6	0.8	0.6	1.1	0.7	0.6	0.8	0.1					
-	DG24	Hazeldene	Total Matter	0.8	0.5	0.4	0.3	0.4	0.6	0.7	2.4	1.0	<0.1	1.3	1.0	0.9	0.9	0.3	2.4	4.0
			Ash Content	0.4	0.4	0.4	0.2	0.3	0.6	0.6	1.3	0.7	<0.1	1.0	0.6					
-	DG17	Woodlands	Total Matter	0.8	0.7	0.4	0.4	0.5	0.5	1.3	1.8	0.7	0.7	0.4	1.1	0.8	0.8	0.4	1.8	4.0
			Ash Content	0.5	0.4	0.4	0.3	0.5	0.5	1.1	1.1	0.6	0.5	0.2	0.6					
-	DG96	Talavera	Total Matter	0.7	0.4	0.2	0.2	0.4	0.6	0.5	1.1	0.7	0.6	0.9	0.3	0.6	0.6	0.2	1.1	4.0
			Ash Content	0.4	0.2	0.2	0.2	0.2	0.3	0.4	0.9	0.6	0.4	0.6	<0.1					
EPL#28	DG98	Kyooma	Total Matter	0.2	0.2	0.1	0.2	0.2	0.3	0.4	0.6	0.3	<0.1	0.6	0.5	0.3	0.3	0.1	0.6	4.0
			Ash Content	0.2	0.2	0.1	0.2	0.2	0.3	0.4	0.5	0.3	<0.1	0.3	0.2					
-	DG14	Greenslopes	Total Matter	0.4	0.3	0.3	0.3	0.3	0.6	0.3	1.1	0.8	0.1	2.9	0.7	0.7	0.7	0.1	2.9	4.0
			Ash Content	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.8	0.6	<0.1	2.0	0.3					
-	DG62	Werris Creek South	Total Matter	0.3	0.3	0.2	0.9	0.2	0.3	0.3	1.4	0.9	<0.1	0.6	0.4	0.5	0.5	0.2	1.4	4.0
			Ash Content	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.8	0.6	<0.1	0.3	0.1					
EPL#30	DG92	Werris Creek Centre	Total Matter	0.5	0.8	0.3	0.3	0.1	0.3	0.2	1.1	0.6	3.9	1.8	0.4	0.9	0.8	0.1	3.9	4.0
			Ash Content	0.3	0.6	0.2	0.2	0.1	0.2	0.2	0.7	0.5	1.6	0.7	0.1					
-	DG101	Westfall	Total Matter	1.2	0.5	0.4	0.5	0.4	0.6	0.7	1.3	3.0	0.6	2.0	1.0	1.0	1.0	0.4	3.0	4.0
			Ash Content	0.8	0.5	0.2	0.3	0.2	0.5	0.4	0.9	2.5	0.4	1.5	0.8					
-	DG103	West Street	Total Matter	0.8	0.5	0.3	0.7	0.5	0.6	0.5	1.5	1.8	0.1	1.5	1.0	0.8	0.8	0.1	1.8	4.0
			Ash Content	0.6	0.5	0.2	0.4	0.3	0.5	0.5	1.0	1.4	0.1	1.1	0.6					
-	DG1	Escott	Total Matter	2.4	0.2	1.6	0.7	0.2	0.5	5.0	1.4	0.7	0.5	0.7	0.6	1.2	0.8	0.2	5.0	4.0
			Ash Content	1.0	0.2	0.6	0.5	0.1	0.2	1.4	0.9	0.6	0.2	0.5	0.3					
-	DG3	Eurunderee	Total Matter	1.1	0.6	0.7	0.4	0.6	1.6	0.2	1.0	1.2	<0.1	1.6	0.3	0.8	0.9	0.2	1.6	4.0
			Ash Content	0.8	0.5	0.4	0.2	0.4	1.4	0.2	0.6	0.9	<0.1	1.0	<0.1					
-	DG34	8 Kurrara Street	Total Matter	13.7	6.2	54.1	0.4	0.2	0.6	0.3	0.9	19.6	31.8	0.9	1.7	10.9	0.6	0.2	54.1	4.0
			Ash Content	9.8	4.6	43.6	0.2	0.2	0.3	0.3	0.6	13.1	10.4	0.6	0.9					
-	DG106	Villamagna	Total Matter	0.8	0.4	0.4	0.3	0.4	0.4	3.0	2.6	1.3	0.2	1.2	1.0	1.0	0.9	0.2	3.0	4.0
			Ash Content	0.5	0.3	0.2	0.1	0.3	0.3	1.3	1.6	1.0	0.2	0.8	0.8					

Note: All results are in the form of Insoluble Matter (g/m2/month); NS - Not sampled

BROWN - indicates sample is contaminated from a Non-Werris Creek Coal dust source

YELLOW - sample contaminated with excessive organic matter (>50%) from non-mining source (i.e bird droppings and insects)

RED - result above 4g/m2/month

Werris Creek Coal
HVAS TEOM Dust Monitoring
2013-2014

Site / Date	2.5TEOM92 Werris Creek	Monthly Summary	Annual Average	10TEOM92 Werris Creek	EPL#30 Monthly Summary	Annual Average	HVP20 Tonsley Park	EPL#1 Monthly Summary	Rolling Annual Average	HVP98 Kyooma	EPL#28 Monthly Summary	Rolling Annual Average	HVP1 Escott	Monthly Summary	Rolling Annual Average	HVP11 Glenara	EPL#29 Monthly Summary	Rolling Annual Average	HVT98 Kyooma	Monthly Summary	Rolling Annual Average	PM10 24hr Limit	PM10 Annual Average	TSP Annual Average
03-Apr-13		1.8			4.0		18	8.8	17.9	8	3.5	7.9	11	4.8	11.4	12	12.3	12.4	14	7.1	14.4	50	30	90
09-Apr-13		6.2	6.2		12.3	12.3	16	14.6	16.8	3.5	7.2	5.7	4.8	8.7	8.1	12.3	17.8	12.4	7	12.5	10.8	50	30	90
15-Apr-13		5.9			11.3		16	15.9	16.5	13	6.1	8.2	14	8.2	9.9	31	14.3	18.4	20	11.4	13.8	50	30	90
21-Apr-13		12.7			25.7		9	17.9	14.6	4	13.1	7.2	5	13.5	8.7	16	30.5	17.8	8	20.0	12.5	50	30	90
27-Apr-13							19		15.4	17		9.1	16		10.2	27		19.7	50		19.9	50	30	90
03-May-13		2.3			5.0		15	5.5	15.4	8	5.2	8.9	11	3.2	10.3	15	6.7	19.0	18.9	17.4	19.8	50	30	90
09-May-13		6.7	6.4		11.9	12.1	18	15.4	15.8	20	11.8	10.4	7	9.5	9.8	20	17.6	19.1	76	35.8	27.7	50	30	90
15-May-13		6.5			11.4		6	18.3	14.5	5	9.6	9.8	3	9.9	9.0	7	19.1	17.6	17.4	18.9	26.4	50	30	90
21-May-13		14.0			26.8		19	19.0	15.0	10	19.6	9.8	10	16.2	9.1	19	27.4	17.7	18	75.5	25.4	50	30	90
27-May-13							17		15.2	6		9.4	7		8.9	11		17.0	13		24.2	50	30	90
02-Jun-13		2.9			4.0		3	1.3	14.1	1	1.1	8.7	2	1.7	8.3	3	1.3	15.8	3	3.2	22.3	50	30	90
08-Jun-13		6.4	6.4		9.0	11.1	6	7.7	13.4	3	3.4	8.2	4	4.0	7.9	3	5.6	14.7	6	6.4	20.9	50	30	90
14-Jun-13		6.3			8.5		1	6.4	12.5	3	3.2	7.8	2	3.5	7.4	1	3.3	13.7	3	4.6	19.6	50	30	90
20-Jun-13		12.2			16.7		11	16.5	12.4	4	6.2	7.5	6	7.2	7.3	9	10.8	13.4	<0.1	13.1	19.6	50	30	90
26-Jun-13							9		12.2	3		7.2	4		7.1	2		12.7			19.6	50	30	90
02-Jul-13		2.5			3.5		12	5.6	12.2	3	2.7	6.9	6	4.2	7.0	5	1.9	12.2	4	3.9	18.5	50	30	90
08-Jul-13		6.4	6.4		9.3	10.6	19	11.9	12.6	6	3.8	6.9	9	5.7	7.1	9	5.5	12.0	9	6.7	17.8	50	30	90
14-Jul-13		5.9			9.2		14	12.1	12.6	5	3.3	6.7	6	5.6	7.0	9	4.8	11.8	8	6.9	17.2	50	30	90
20-Jul-13		15.2			17.7		6	18.6	12.3	3	5.6	6.5	4	8.6	6.9	2	9.3	11.3	6	9.2	16.5	50	30	90
26-Jul-13							15		12.4	10		6.7	9		7.0	14		11.4	12		16.3	50	30	90
01-Aug-13		0.1			1.5		10	9.8	12.3	6	6.4	6.7	7	6.6	7.0	10	7.5	11.3	8	8.3	15.9	50	30	90
07-Aug-13		5.5	6.2		9.9	10.5	20	13.5	12.6	7	8.6	6.7	8	7.5	7.0	19	12.6	11.7	16	14.1	15.9	50	30	90
13-Aug-13		4.8			8.3		12	11.5	12.6	9	8.5	6.8	7	7.0	7.0	14	13.5	11.8	12	12.4	15.7	50	30	90
19-Aug-13		20.0			30.3		11	19.8	12.5	11	11.0	7.0	7	9.4	7.0	8	18.6	11.6	22	22.1	16.0	50	30	90
25-Aug-13							10		12.4	7		7.0	7		7.0	12		11.6	13		15.9	50	30	90
31-Aug-13							19		12.7	12		7.2	13		7.2	16		11.8	19		16.0	50	30	90
06-Sep-13		1.8			5.0		30	5.2	13.3	18	3.7	7.6	17	4.6	7.6	39	7.7	12.8	27	6.4	16.4	50	30	90
12-Sep-13		8.1	6.5		15.3	11.3	28	21.4	13.9	10	14.0	7.7	17	14.3	7.9	30	25.2	13.4	22	26.5	16.6	50	30	90
18-Sep-13		7.4			14.8		5	23.6	13.6	4	11.3	7.5	5	14.9	7.8	8	22.8	13.2	6	20.4	16.3	50	30	90
24-Sep-13		17.8			33.7		35	35.2	14.3	32	32.4	8.4	28	27.6	8.5	46	46.3	14.3	72	71.7	18.2	50	30	90
30-Sep-13							23		14.6	12		8.5	12		8.6	56		15.7	16		18.1	50	30	90
06-Oct-13		4.0			8.8		13	12.8	14.5	8	7.7	8.4	8	6.8	8.6	22	22.1	15.9	14	14.3	18.0	50	30	90
12-Oct-13		8.2	6.8		16.6	12.1	41	27.2	15.3	20	15.9	8.8	22	17.0	9.0	32	34.9	16.4	37	26.7	18.6	50	30	90
18-Oct-13		7.1			14.4		38	22.6	16.0	31	11.5	9.4	36	12.0	9.8	42	31.6	17.1	46	21.3	19.5	50	30	90
24-Oct-13		24.5			43.7		22	41.1	16.1	10	31.2	9.4	7	36.2	9.7	23	56.4	17.3	21	45.6	19.5	50	30	90
30-Oct-13							16		16.1	9		9.4	10		9.7	16		17.2	16		19.4	50	30	90
05-Nov-13		1.5			1.5		21	5.8	16.3	11	3.2	9.5	12	5.4	9.8	31	4.2	17.6	23	5.6	19.5	50	30	90
11-Nov-13		8.7	7.0		15.0	12.4	13	12.5	16.2	6	6.8	9.4	8	8.5	9.7	16	14.8	17.5	13	15.7	19.3	50	30	90
17-Nov-13		7.4			12.4		7	13.1	15.9	5	6.1	9.3	7	7.6	9.6	8	15.7	17.3	21	16.1	19.4	50	30	90
23-Nov-13		27.6			40.5		6	21.2	15.7	3	10.5	9.1	5	12.2	9.5	4	30.7	16.9	6	22.5	19.0	50	30	90
29-Nov-13							16		15.7	13		9.2	13		9.6	16		16.9	22		19.1	50	30	90
05-Dec-13		3.9			6.2		12	10.1	15.6	12	5.9	9.3	12	7.8	9.7	12	9.3	16.8	23	9.5	19.2	50	30	90
11-Dec-13		8.7	7.2		14.9	12.7	21	17.1	15.7	11	12.1	9.3	12	12.1	9.7	13	16.9	16.7	21	22.8	19.2	50	30	90
17-Dec-13		8.1			14.3		10	16.0	15.6	6	12.0	9.2	8	11.7	9.7	9	13.4	16.6	10	22.2	19.0	50	30	90
23-Dec-13		15.5			28.4		27	27.4	15.8	18	18.4	9.4	16	16.0	9.8	34	33.9	16.9	38	38.3	19.5	50	30	90
29-Dec-13							25		16.0	20		9.7	20		10.0	26		17.1	31		19.7	50	30	90
04-Jan-14		3.5			7.1		28	15.0	16.3	22	2.0	9.9	24	9.0	10.3	37	12.5	17.5	38	14.0	20.1	50	30	90
10-Jan-14		11.0	7.6		17.7	13.2	15	21.4	16.3	2	12.8	9.8	9	17.0	10.3	13	24.0	17.4	14	26.7	20.0	50	30	90
16-Jan-14		9.6			16.5		20	20.2	16.3	4	15.9	9.6	16	16.6	10.4	20	25.1	17.5	22	28.6	20.0	50	30	90
22-Jan-14		28.0			37.9		19	27.8	16.4	16	22.1	9.8	17	23.5	10.5	25	37.1	17.6	29	37.9	20.2	50	30	90
28-Jan-14							8		16.2	8		9.7	7		10.5	7		17.4	15		20.1	50	30	90
03-Feb-14		5.5			9.9		18	7.6	16.3	9	7.9	9.7	13	6.8	10.5	18	7.0	17.4	14	14.4	20.0	50	30	90
09-Feb-14		12.4	8.0		19.1	13.7	11	15.8	16.2	14	12.8	9.8	12	13.2	10.5	29	18.8	17.7	33	25.0	20.3	50	30	90
15-Feb-14		11.4			17.7		20	18.3	16.2	17	13.7	9.9	18	12.7	10.7	20	20.2	17.7	35	26.7	20.6	50	30	90
21-Feb-14		25.5			37.5		21	21.3	16.3	16	17.0	10.1	16	18.3	10.8	20	28.7	17.7	27	35.4	20.7	50	30	90
27-Feb-14							35		16.7	16		10.2	19		10.9	40		18.1	24		20.7	50	30	90
05-Mar-14							15		16.6	10		10.1	10		10.9	21		18.2	19		20.7	50	30	90
11-Mar-14		4.2			7.2		7	5.4	16.5	4	3.5	10.0	10	2.7	10.9	10	4.0	18.1	7	6.8	20.4	50	30	90
17-Mar-14		9.5	8.1		13.5	13.7	11	13.5	16.4	6	7.5	10.0	6	8.6	10.8	8	16.5	17.9	11	13.2	20.3	50	30	90
23-Mar-14		9.1			13.0		5	9.3	16.2	6	5.9	9.9	5	7.7	10.7	16	13.0	17.9	11	11.2	20.1	50	30	90
29-Mar-14		18.9			27.3		7	35.3	16.1	4	15.8	9.8	3	18.8	10.6	4	40.0	17.6	7	24.3	19.9	50	30	90
Min							**1.3**			**1.1**			**1.7**			**1.3**			**3.2**					
Median							**15.4**			**8.2**			**9.0**			**15.7**			**16.1**					
Max							**41.1**			**32.4**			**36.2**			**56.4**			**75.5**					
Capture							**100%**			**100%**			**100%**			**100%**			**97%**					

Deposited Dust - Quirindi Trains 2013-2014

	DDW30				DDW20				DDW13				DDE13				DDE20				DDE30				Guideline
	Total Matter	% Coal	% Vegetation/ Insects	% Dirt	Total Matter	% Coal	% Vegetation/ Insects	% Dirt	Total Matter	% Coal	% Vegetation/ Insects	% Dirt	Total Matter	% Coal	% Vegetation/ Insects	% Dirt	Total Matter	% Coal	% Vegetation/ Insects	% Dirt	Total Matter	% Coal	% Vegetation/ Insects	% Dirt	
April 2013	0.8	15%	45%	40%	0.5	15%	50%	35%	-	-	-	-	1.0	15%	45%	15%	0.9	15%	60%	25%	0.7	5%	55%	40%	4.0
May 2013	1.4	<1%	50%	30%	0.7	<1%	90%	10%	0.5	10%	85%	5%	0.6	<1%	70%	20%	0.9	<1%	30%	60%	0.5	<1%	90%	10%	4.0
June 2013	1.0	30%	30%	35%	0.5	40%	35%	20%	-	-	-	-	-	-	-	-	0.4	30%	40%	20%	0.8	15%	50%	15%	4.0
July 2013	1.0	30%	40%	20%	1.2	25%	40%	10%	0.9	30%	20%	10%	0.8	20%	40%	20%	1.7	20%	30%	40%	1.6	10%	25%	30%	4.0
August 2013	0.8	5%	30%	60%	0.5	10%	30%	50%	0.5	35%	20%	45%	0.7	30%	40%	25%	0.6	30%	40%	20%	0.9	5%	30%	35%	4.0
September 2013	1.2	-	-	-	1.1	-	-	-	1.7	-	-	-	1.8	-	-	-	1.2	-	-	-	1.0	-	-	-	4.0
October 2013	-	-	-	-	1.9	20%	40%	30%	1.4	40%	20%	40%	2.9	70%	10%	20%	2.4	60%	20%	20%	3.1	20%	20%	30%	4.0
November 2013	2.0	15%	45%	35%	2.6	15%	30%	50%	2.8	75%	10%	15%	c18.1	<1%	10%	90%	1.3	35%	20%	40%	1.5	10%	35%	40%	4.0
December 2013	1.5	10%	40%	20%	1.6	10%	30%	20%	c5.7	10%	20%	10%	0.9	10%	40%	40%	2.5	20%	10%	10%	2.1	5%	35%	10%	4.0
January 2014	0.6	40%	30%	20%	2.3	40%	10%	<1%	1.9	55%	15%	20%	1.4	80%	15%	5%	0.8	50%	20%	20%	1.6	20%	10%	10%	4.0
February 2014	1.9	25%	35%	30%	2.7	30%	10%	55%	3.4	75%	5%	20%	1.2	45%	<1	50%	0.7	25%	15%	55%	1.8	5%	65%	20%	4.0
March 2014	0.8	20%	20%	60%	1.3	40%	20%	40%	1.2	60%	10%	30%	-	-	-	-	0.9	20%	20%	60%	1.2	10%	20%	70%	4.0
ANNUAL AVERAGE	**1.2**				**1.4**				**1.6**				**1.3**				**1.2**				**1.4**				**4.0**
Average Coal %	**21.1%**				**24.5%**				**43.3%**				**38.6%**				**30.5%**				**10.5%**				**-**
Average Coal g/m2	**0.25**				**0.35**				**0.69**				**0.48**				**0.36**				**0.15**				**-**
MINIMUM	**0.6**				**0.5**				**0.5**				**0.6**				**0.4**				**0.5**				**-**
MAXIMUM	**2.0**				**2.7**				**3.4**				**2.9**				**2.5**				**3.1**				**4.0**

Note: All results are in the form of Insoluble Matter (g/m2/month)

	SB2		EPL ID 10									
Sample Date	**Type**	**pH - lab**	**Electrical Conductivity uS/cm - lab**	**Suspended Solids**	**Nitrite as N mg/L**	**Nitrate as N mg/L**	**Nitrite + Nitrate as N mg/L**	**Total Kjeldahl Nitrogen as N mg/L**	**Total Nitrogen as N mg/L**	**Total Phosphorus as P mg/L**	**Reactive Phosphorus as P mg/L**	**Oil and Grease**
5-Feb-07	Unknown	9	0.44	38		0.032			0.7	0.02	<0.02	<5
10-Jul-08	Unknown	8.6	470									
07-Oct-08	Unknown	7.5	375	41								<2
27-Oct-08	Unknown	7.4	425	120		<0.01			1.9	0.67	0.21	<1
15-Jan-09	Unknown	8.4	335	67		<0.01			1.1	0.21	0.12	<2
6/05/2009	Quarterly	8.58	376	17	<0.01	0.02	0.02	0.4	0.4	0.01	<0.01	<5
26/08/2009	Quarterly	8.16	389	6	<0.01	0.01	0.01	0.5	0.6	0.01	<0.01	<10
8/02/2010	Non-Rout	8.02	413	44								<5
15/02/2010	Non-Rout	8	338	30	0.01	0.09	0.1	0.9	1	0.12	0.04	<5
23/02/2010	Quarterly	7.99	338	5	<0.01	<0.01	<0.01	0.6	0.6	0.13	0.02	<5
11/05/2010	**Quarterly**	8.77	457	<1	<0.01	0.01	0.01	0.3	0.3	0.04	0.01	<5
28/07/2010	**Wet Weather**	8.33	393	17	<0.01	<0.01	<0.01	0.7	0.7	0.04	0.03	<5
12/08/2010	**Wet Weather**	7.52	389	6	<0.01	0.23	0.23	0.5	0.7	0.16	0.1	<5
19/08/2010	**Quarterly**	8.05	363	38	0	0.01	0.01	1	1	0.26	0.09	<5
25/10/2010	**Wet Weather**	8.27	417	16	<0.01	<0.01	<0.01	0.8	0.8	0.06	0.01	<5
2/11/2010	**Controlled**	8.34	427	20	<0.01	0.03	0.03	0.3	0.3	<0.01	<0.01	<5
16/11/2010	**Wet Weather**	8.59	397	11	<0.01	0.54	0.54	1	1.5	0.02	<0.01	<5
23/11/2010	**Non-routine**	8.64	411	13	<0.01	<0.01	<0.01	0.8	0.8	0.17	<0.01	<5
29/11/2010	**Controlled**	8.36	444	22	<0.01	0.01	0.01	0.7	0.7	<0.01	<0.01	<5
8/12/2010	**Quarterly**	8.71	422	11	<0.01	0.04	0.04	0.9	0.9	0.04	<0.01	<5
10/12/2010	**Wet Weather**	8.05	406	25	<0.01	0.02	0.02	1	1	0.04	0.02	<5
15/12/2010	**Controlled**	7.95	242	7	<0.01	0.01	0.01	0.2	0.2	0.04	0.05	<5
17/01/2011	**Non-routine**	8.72	418	20	<0.01	<0.01	<0.01	0.5	0.5	0.11	0.02	<5
3/03/2011	**Quarterly**	8.06	388	37	<0.01	0.02	0.02	0.1	0.1	<0.01	<0.01	<5
7/03/2011	**Controlled**	7.95	333	18	<0.01	0.02	0.02	0.3	0.3	<0.01	<0.01	<5
29/03/2011	**Non-routine**	8.96	346	28	<0.01	0.01	0.01	0.3	0.3	0.2	<0.01	<5
12/04/2011	**Controlled**	7.90	444	34	0.03	0.05			0.80	0.08	0.04	<5
12/05/2011	**Quarterly**	8.12	545	36	<0.01	0.04	0.04	1.00	1.00	<0.01	<0.01	<5
1/06/2011	**Controlled**	8.09	493	20	<0.01	0.04	0.04	1.1	1.1	0.07	<0.01	<5
16/06/2011	**Controlled**	8.17	510	28	<0.01	0.06	0.06	0.7	0.8	0.09	<0.01	<5
18/08/2011	**Quarterly**	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
27/09/2011	**Non-routine**	8.64	536	18	0.02	0.25	0.27	0.5	0.8	<0.01	<0.01	<5
18/10/2011	**Non-routine**	8.21	608	19	0.03	0.53	0.56	0.6	1.2	0.06	0.02	<5
23/11/2011	**Quarterly**	8.24	626	18	<0.01	0.04	0.04	0.5	0.5	0.05	<0.01	<5
25/11/2011	**Wet Weather**	7.8	407	34	0.01	0.35	0.36	<0.1	0.4	0.21	0.17	<5
13/12/2011	**Controlled**	7.92	464	<5	0.01	0.07	0.08	0.9	1	0.16	0.11	<5
20/12/2011	**Controlled**	7.98	468	12	0.01	0.04	0.04	0.3	0.3	0.09	0.06	<5
7/02/2012	**Non-routine**	8.59	411	12	<0.01	<0.01	<0.01	0.2	0.2	0.04	<0.01	<5
16/02/2012	**Controlled**	7.92	436	16	<0.01	0.02	0.02	0.4	0.4	0.02	<0.01	<5
23/02/2012	**Quarterly**	8.34	444	14	<0.01	<0.01	<0.01	0.4	0.4	0.03	<0.01	<5
10/05/2012	**Quarterly**	7.98	485	47	<0.01	0.01	0.01	1	1	0.11	<0.01	<5
13/07/2012	**Non-routine**	8.01	506	42	<0.01	0.16	0.16	0.7	0.9	0.21	0.08	<5
31/07/2012	**Controlled**	8.26	507	10	<0.01	<0.01	<0.01	0.6	0.60	0.10	0.06	<5
27/08/2012	**Quarterly**	8.75	553	9	<0.01	<0.01	<0.01	0.6	0.6	0.06	<0.01	<5
29/11/2012	**Quarterly**	9.08	589	33	<0.01	<0.01	<0.01	0.5	0.5	0.04	<0.01	<5
24/12/2012	**Wet Weather**	7.99	368	110	0.29	5.03	5.32	5.1	10.4	0.35	0.21	<5
26/01/2013	**Non-routine**	8.03	319	89	-	-	-	-	-	-	-	-
29/01/2013	**Wet Weather**	7.4	199	298	0.02	1.17	1.19	1.2	2.4	0.53	0.5	<5
25/02/2013	**Wet Weather**	7.97	281	62	<0.01	<0.01	<0.01	1	1	0.33	0.14	<5
12/03/2013	**Quarterly**	7.64	399	24	0.06	1.46	1.52	1.6	3.1	0.17	0.12	<5
20/03/2013	**Non-routine**				0.08	1.52	1.6	1.8	3.4	0.18	0.12	
25/06/2013	**Quarterly**	8.66	924	8	0.03	0.63	0.66	0.7	1.4	<0.01	<0.01	<5
12/08/2013	**Controlled**	8.44	1010	<5	<0.01	0.08	0.08	0.5	0.6	0.02	<0.01	<5
27/08/2013	**Quarterly**	8.37	1010	7	<0.01	0.01	0.01	0.6	0.6	0.02	<0.01	<5
14/11/2013	**Quarterly**	8.37	1300	44	<0.01	<0.01	<0.01	0.6	0.6	0.06	<0.01	<5
25/02/2014	**Quarterly**	9.04	1790	47	<0.01	<0.01	<0.01	0.9	0.9	0.04	<0.01	<5

SB9

EPL ID 12

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease mg/L
11-Oct-07	Unknown	8.7	530	16	<0.01			0.67	0.08	<0.01	<2	
10-Jul-08	Unknown	7.9	575	37								
27-Oct-08	Unknown	7.5	215	360		0.65		1	0.44	0.08	<1	
14-Jan-09	Unknown	8.0	165	130		<0.01		2.5	0.71	0.36	<2	
6/05/2009	Quarterly	8.14	164	100	<0.01	0.64	0.64	0.3	0.9	0.05	0.02	<5
26/08/2009	Quarterly	7.78	177	107	0.02	0.65	0.67	1.2	1.8	0.22	<0.01	<10
10/11/2009	Quarterly	7.95	179	128	<0.01	0.22	0.22	3.1	3.3	0.4	0.02	<5
4/01/2010	Discharge	7.41	122	30								<5
8/02/2010	Non-Rout	8.21	142	38								5
15/02/2010	Discharge	7.9	129	138	<0.01	0.1	0.1	1.4	1.5	0.18	<0.01	<5
23/02/2010	Quarterly	7.92	134	113	<0.01	0.01	0.01	1.8	1.8	0.24	<0.01	<5
9/03/2010	Non-Rout	8.09	160	10								
28/04/2010	**Non-routine**	7.82	171	30								
5/05/2010	**Controlled**	7.98	173	46	0.02	<0.01	<0.01	1.6	1.6	0.35	0.04	<5
11/05/2010	**Quarterly**	8.08	180	120	<0.01	0.01	0.01	1.2	1.2	0.13	0.03	7
25/06/2010	**Non-routine**	8.55	245	3								<5
12/07/2010	**Wet Weather**	8.02	290	13		0.38	0.4	1.2	1.6	0.13	0.01	<5
28/07/2010	**Wet Weather**	7.64	268	22	0.02	0.58	0.59	1.5	2.1	0.11	0.05	<5
12/08/2010	**Wet Weather**	7.63	121	73	<0.01	0.41	0.41	0.8	1.2	0.28	0.18	<5
19/08/2010	**Quarterly**	7.66	131	295		0.4	0.4	1.1	1.5	0.38	0.16	<5
28/09/2010	**Non-routine**	8.24	133	42		0.03	0.03	1.5	1.5	0.36	0.04	10
11/11/2010	**Wet Weather**	7.38	164	160	0.01	0.34	0.35	1.8	2.2	0.41	0.04	<5
16/11/2010	**Wet Weather**	7.53	157	26	<0.01	0.81	0.81	1	1.8	0.06	0.05	5
23/11/2010	**Controlled**	7.57	149	31	<0.01	0.19	0.19	1.2	1.4	0.24	0.05	<5
8/12/2010	**Quarterly**	7.84	170	23	0.01	0.21	0.22	1	1.2	0.19	0.04	<5
10/12/2010	**Wet Weather**	7.25	95	137	<0.01	0.09	0.09	1.6	1.7	0.22	0.21	<5
18/12/2010	**Controlled**	7.36	131	31	<0.01	0.02	0.02	1.1	1.1	0.11	0.07	<5
3/03/2011	**Quarterly**	8	149	30	0.01	<0.01	0.02	<0.1	<0.1	<0.01	<0.01	<5
7/03/2011	**Controlled**	7.81	148	15	<0.01	0.03	0.03	1.4	1.4	0.14	<0.01	<5
29/03/2011	**Non-routine**	8.69	149	20	<0.01	0.29	0.29	1.1	1.4	0.22	<0.01	<5
12/04/2011	**Controlled**	8.13	528.00	20.00	0.12	5.87			9.00	0.04	0.02	<5
12/05/2011	**Quarterly**	7.95	634.00	28.00	0.21	4.13	4.34	2.30	6.60	<0.01	<0.01	<5
7/06/2011	**Controlled**	7.72	666	8	0.15	6.88	7.04	2.9	9.9	0.09	<0.01	<5
16/06/2011	**Controlled**	8.05	712	<5	0.13	7.26	7.39	1.4	8.8	<0.01	<0.01	<5
18/08/2011	**Quarterly**	9.19	681	7	0.12	3.67	3.79	0.9	4.7	<0.01	<0.01	<5
27/09/2011	**Controlled**	8.16	683	6	0.22	2.13	2.35	1.2	3.6	<0.01	<0.01	<5
16/10/2011	**Wet Weather**	7.72	658	6	0.1	2.22	2.32	1	3.3	0.05	0.03	<5
18/10/2011	**Controlled**	7.77	641	16	0.1	2.09	2.19	1.5	3.7	0.06	0.02	<5
23/11/2011	**Quarterly**	7.95	584	6	0.13	1.86	1.99	1.9	3.9	<0.01	<0.01	<5
25/11/2011	**Wet Weather**	7.42	493	40	0.1	2.23	2.33	2.3	4.6	0.18	0.08	<5
13/12/2011	**Wet Weather**	7.68	224	18	0.11	0.93	1.04	1.9	2.9	0.22	0.16	<5
20/12/2011	**Controlled**	7.67	214	14		<0.01	0.06	0.9	1	0.09	<0.01	<5
18/01/2012	**Non-routine**	7.99	248	41	<0.01	0.02	0.02	1.1	1.1	0.12	0.01	<5
2/02/2012	**Wet Weather**	7.92	404	32	0.06	2.39	2.45	2.7	5.2	0.08	0.04	<5
7/02/2012	**Non-routine**	9.24	308	47	<0.01	<0.01	0.01	0.4	0.4	0.06	<0.01	<5
16/02/2012	**Controlled**	7.18	325	41	0.03	0.3	0.33	0.9	1.2	0.17	<0.01	<5
23/02/2012	**Quarterly**	7.89	306	28	<0.01	<0.01	<0.01	0.5	0.5	0.04	<0.01	<5
		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
13/07/2012	**Wet Weather**	7.79	346	100	0.06	6.22	6.28	4.5	10.8	0.14	0.06	<5
6/08/2012	**Controlled**	7.97	732	33	0.2	3.96	4.16	1.6	5.8	0.09	0.01	<5
27/08/2012	**Quarterly**	8.36	323	7	0.16	2.99	3.15	2.2	5.4	0.16	<0.01	<5
3/09/2012	**Non-routine**	8.6	329	<5	0.17	2.67	2.84	2	4.8	0.02	<0.01	<5
25/09/2012	**Controlled**	8.49	353	<5	0.17	1.26	1.43	1.5	2.9	0.05	<0.01	<5
29/11/2012	**Quarterly**	8.36	418	20	0.01	0.08	0.09	0.7	0.8	0.02	<0.01	<5
24/12/2012	**Wet Weather**	7.2	166	1530	0.03	0.61	0.64	1.5	2.1	0.3	0.01	<5
26/01/2013	**Non-routine**	6.95	160	502	-	-	-	-	-	-	-	-
29/01/2013	**Wet Weather**	6.88	169	198	0.09	0.86	0.95	1	2	0.3	0.01	<5
25/02/2013	**Wet Weather**	7.28	158	82	<0.01	0.33	0.33	1.7	2	0.04	<0.01	<5
12/03/2013	**Quarterly**	7.53	236	327	<0.01	1.58	1.58	1.8	3.4	0.25	<0.01	<5
13/06/2013	**Non-routine**	7.86	184	50	0.01	0.4	0.41	0.6	1	0.3	<0.01	19
25/06/2013	**arterly/Controll**	7.95	203	48	0.03	0.87	0.9	0.6	1.5	0.01	<0.01	<5
27/08/2013	**Quarterly**	8.1	208	8	<0.01	0.7	0.7	0.7	1.4	0.05	<0.01	<5
14/11/2013	**Quarterly**	8.33	297	134	<0.01	0.05	0.05	0.7	0.8	0.12	<0.01	<5
21/11/2013	**Controlled**	7.7	396	14	0.11	3.45	3.56	0.8	4.4	<0.01	<0.01	<5
29/11/2013	**Non-routine**	7.82	329	13	0.07	2.19	2.26	2.3	4.6	0.01	<0.01	<5
17/12/2013	**Controlled**	7.98	356	11	0.1	2	2.1	0.5	2.6	0.05	<0.01	<5
18/02/2014	**Quarterly**	8.44	670	17	<0.01	0.01	0.01	0.6	0.6	0.03	<0.01	<5

SB10			EPL ID 14									
Sample Date	**Type**	**pH - lab**	**Electrical Conductivity uS/cm - lab**	**Suspended Solids**	**Nitrite as N mg/L**	**Nitrate as N mg/L**	**Nitrite + Nitrate as N mg/L**	**Total Kjeldahl Nitrogen as N mg/L**	**Total Nitrogen as N mg/L**	**Total Phosphorus as P mg/L**	**Reactive Phosphorus as P mg/L**	**Oil and Grease**
15-Jan-09	Unknown	7.1	255	35		0.11		1.3	0.58	0.47	<2	
6/05/2009	Quarterly	8.12	214	47	<0.01	0.09	0.09	0.6	0.7	0.08	0.02	<5
26/08/2009	Quarterly	7.88	282	60	0.01	<0.01	0.02	3.5	3.5	0.32	0.07	<10
15/02/2010	Non-Rout	7.93	180	464	0.02	1.6	1.62	2.8	4.4	0.32	0.11	<5
23/02/2010	Quarterly	7.68	189	48	0.03	1.03	1.06	1.3	2.4	0.25	0.09	<5
11/05/2010	Quarterly	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
28/07/2010	**Wet Weather**	7.92	199	132	0.01	1.07	1.08	1.6	2.7	0.17	0.11	<5
12/08/2010	**Non-routine**	7.3	91	68	<0.01	0.03	0.03	1.3	1.3	0.82	0.68	<5
19/08/2010	**Quarterly**	7.65	190	365		0.87	0.87	0.7	1.6	0.28	0.17	<5
16/11/2010	**Non-routine**	7.49	276	108	0.05	4.55	4.6	2.2	6.8	0.13	0.15	11
8/12/2010	**Quarterly**	7.71	274	148	0.02	2.33	2.35	1.6	4	0.18	0.17	<5
10/12/2010	**Wet Weather**	7.22	179	314	<0.01	0.76	0.76	<0.1	0.8	0.42	0.29	<5
3/03/2011	**Quarterly**	7.99	176	153	<0.01	0.17	0.17	<0.1	0.2	0.07	0.05	<5
12/05/2011	**Quarterly**	7.67	457	17	<0.01	<0.01	<0.01	0.2	0.2	<0.01	0.02	<5
18/08/2011	**Quarterly**	8.00	416	70	<0.01	<0.01	<0.01	<0.1	<0.1	0.04	<0.01	<5
18/10/2011	**Non-routine**	7.71	349	62	0.04	1.41	1.45	2.6	4	0.17	0.09	<5
25/10/2011	**Controlled**	7.43	352	<5	0.06	0.76	0.82	1.8	2.6	0.02	0.02	<5
23/11/2011	**Quarterly**	7.81	383	64	0.01	2.21	2.22	1.8	4	0.04	0.08	<5
26/11/2011	**Wet Weather**	7.6	342	106	0.03	3.61	3.64	1.2	4.8	0.21	0.16	<5
2/02/2012	**Wet Weather**	7.59	282	300	0.02	0.63	0.65	2.3	3	0.17	0.04	<5
16/02/2012	**Non-routine**	8.97	265	10	<0.01	0.02	0.02	0.6	0.6	0.18	<0.01	<5
23/02/2012	**Quarterly**	8.68	258	7	<0.01	0.01	0.01	0.3	0.3	0.03	<0.01	<5
10/05/2012	**Quarterly**	7.63	391	27	<0.01	0.13	0.13	0.6	0.7	0.07	<0.01	<5
13/07/2012	**Non-routine**	7.84	269	364	0.01	0.36	0.37	2.3	2.7	0.26	0.1	<5
27/08/2012	**Quarterly**	8.02	300	42	0.01	0.38	0.39	1.2	1.6	0.1	0.06	<5
29/11/2012	**Quarterly**	8.31	486	22	0.01	0.03	0.04	0.4	0.4	0.02	<0.01	<5
29/01/2013	**Wet Weather**	7.32	202	508	0.02	0.64	0.66	2	2.7	0.46	0.07	<5
12/03/2013	**Quarterly**	7.64	195	168	<0.01	0.39	0.39	1.2	1.6	0.19	0.06	<5
25/06/2013	**Under construction**											
27/08/2013	**Under construction**											
14/11/2013	**Quarterly**	7.73	168	1030	0.03	1.08	1.11	4	5.1	0.74	0.05	<5
25/02/2014	**Quarterly**	7.85	199	197	0.02	<0.01	0.02	10.5	10.5	1.92	0.38	<5

SD4

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
16-Aug-07	Unknown	7.8	400	58	<0.01			1.1	0.19	0.06	<2	
11-Oct-07	Unknown	8	220	17	<0.01			1.4	0.67	0.49	<2	
14-Jan-08	Unknown	8.9	270	15	1.1			1.1	0.39	0.21	<2	
09-Apr-08	Unknown	8.6	320	47		<0.01		2	0.22	0.18	<2	
08-Jul-08	Unknown	9.0	335	41		<0.01		2.2	0.24	0.02	<2	
15-Jan-09	Unknown	8.1	225	15		<0.01		2.9	0.78	0.96	<2	
6/05/2009	Quarterly	9.07	270	10	<0.01	<0.01	<0.01	1.1	1.1	0.13	0.1	<5
26/08/2009	Quarterly	8.7	252	16	<0.01	<0.01	<0.01	1	1	0.1	<0.01	<10
10/11/2009	Quarterly	9.16	241	48	<0.01	<0.01	<0.01	1.4	1.4	0.1	0.01	<5
23/02/2010	Quarterly	8.86	238	21	<0.01	<0.01	<0.01	1.3	1.3	0.05	<0.01	<5
11/05/2010	Quarterly	8.7	343	214	<0.01	0.02	0.02	0.8	0.8	0.23	0.02	<5
8/12/2010	Quarterly	9.18	196	8	<0.01	0.03	0.03	1.3	1.3	0.76	0.64	<5
3/03/2011	Quarterly	8.33	220	15	<0.01	0.03	0.03	0.6	0.6	0.78	0.76	<5
12/05/2011	Quarterly	7.82	281	20	<0.01	<0.01	<0.01	1.2	1.2	0.64	0.6	<5
18/08/2011	Quarterly	8.37	306	46	<0.01	0.02	0.02	<0.1	<0.1	0.49	0.37	<5
30/12/2011	Quarterly	7.49	155	66	<0.01	0.02	0.02	1.5	1.5	1.5	1.24	<5
23/02/2012	Quarterly	8.06	211	9	0.02	0.09	0.11	1.1	1.2	0.8	0.75	<5
10/05/2012	Quarterly	7.86	262	104	<0.01	0.3	0.3	13.7	14	2.11	0.55	<5
27/08/2012	Quarterly	8.51	284	8	0.02	0.09	0.11	0.8	0.9	0.77	0.43	<5
29/11/2012	Quarterly	8.84	328	6	<0.01	0.01	0.01	0.9	0.9	0.54	0.59	<5
13/03/2013	Quarterly	8.66	161	251	0.09	1.73	1.82	4	5.8	1	0.63	<5
25/06/2013	Quarterly	7.61	175	25	0.01	0.47	0.48	1	1.5	0.37	0.34	<5
27/08/2013	Quarterly	9.23	240	20	<0.01	0.01	0.01	0.9	0.9	0.21	0.18	<5
14/11/2013	Quarterly	8.51	339	24	<0.01	<0.01	<0.01	0.9	0.9	0.21	0.14	<5
25/02/2014	Quarterly	8.33	384	292	<0.01	0.02	0.02	1.4	1.4	0.31	0.07	<5

SD5

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
11-Oct-07	Quarterly	8.2	180	14	0.02				2.3	0.94	0.83	<2
14-Jan-08	Quarterly	9	280	11	<0.01				1.8	0.42	0.35	<2
09-Apr-08	Quarterly	9.2	360	11		<0.01			0.58	0.08	0.04	<2
08-Jul-08	Quarterly	9.0	415	32		<0.01			6.1	0.01	0.02	<2
30-Oct-08	Quarterly	9.2	380			<0.01			0.58	0.01	0.03	<1
15-Jan-09	Quarterly	7.5	255	13		<0.01			1.8	0.03	0.02	<2
6/05/2009	Quarterly	9.03	329	29	<0.01	<0.01	<0.01	1.3	1.3	0.08	0.02	<5
26/08/2009	Quarterly	8.71	372	312	<0.01	<0.01	<0.01	3.6	3.6	0.33	<0.01	<10
10/11/2009	Quarterly	8.65	458	136	<0.01	0.03	0.03	3.5	3.6	0.24	<0.01	<5
23/02/2010	Quarterly	8.89	269	22	0.01	<0.01	<0.01	1.7	1.7	0.28	0.18	<5
11/05/2010	Quarterly	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
8/12/2010	Quarterly	8.48	212	43	<0.01	0.06	0.06	2.9	3	0.81	0.6	<5
3/03/2011	Quarterly	9.55	250	36	0.01	<0.01	0.02	1	1	0.24	0.2	<5
12/05/2011	Quarterly	8.21	316	69	<0.01	<0.01	<0.01	2.2	2.2	0.12	0.07	<5
18/08/2011	Quarterly	7.95	343	56	<0.01	0.02	0.02	1	1	0.26	0.16	<5
30/12/2012	Quarterly	7.48	135	14	0.02	0.14	0.16	2.1	2.3	1.49	1.44	<5
23/02/2012	Quarterly	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
10/05/2012	Quarterly	8.2	321	23	0.01	0.06	0.07	1.8	1.9	0.53	0.4	<5
27/08/2012	Quarterly	8.59	350	16	<0.01	<0.01	<0.01	1.4	1.4	0.26	0.16	<5
29/11/2012	Quarterly	8.89	362	109	<0.01	<0.01	<0.01	2.3	2.3	0.18	<0.01	<5
13/03/2013	Quarterly	7.13	112	10	<0.01	<0.01	<0.01	1.2	1.2	1.16	1.04	<5
25/06/2013	Quarterly	7.94	237	28	<0.01	0.1	0.1	1.3	1.4	0.73	0.67	<5
27/08/2013	Quarterly	8.18	273	5	<0.01	0.18	0.18	1.2	1.4	0.62	0.63	<5
14/11/2013	Quarterly	8.66	381	14	<0.01	0.02	0.02	0.9	0.9	0.48	0.44	<5
25/02/2014	Quarterly	8.65	457	71	<0.01	0.01	0.01	1.7	1.7	0.28	0.19	<5

VWD1

EPL ID 16

4.9

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
15-Jan-09		8.4	845	68		0.32			0.73	0.07	0.04	<2
6/05/2009	Quarterly	8.4	1080	5	0.04	3.97	4	0.9	4.9	<0.01	<0.01	<5
26/08/2009	Quarterly	8.29	977	14	0.01	1.67	1.68	1.2	2.9	<0.01	<0.01	<10
10/11/2009	Quarterly	8.27	1010	12	0.01	2.42	2.44	1	3.4	0.04	<0.01	<5
23/02/2010	Quarterly	8.03	1070	5	0.06	1.87	1.93	1.3	3.2	<0.01	<0.01	<5
11/05/2010	Quarterly	7.9	1220	148	0.04	2.31	2.35	0.8	3.2	<0.01	0.01	<5
19/08/2010	Quarterly	8.13	1010	16		1.32	1.32	1.1	2.4	0.52	0.04	<5
8/12/2010	Quarterly	8.27	941	<5	0.06	3.3	3.36	1.2	4.6	<0.01	<0.01	<5
3/03/2011	Quarterly	8.43	808	19	0.02	0.81	0.84	<0.1	0.8	<0.01	<0.01	<5
12/05/2011	Quarterly	7.9	1150	8	0.04	5.62	5.65	2.1	7.8	<0.01	<0.01	<5
18/08/2011	Quarterly	8.19	1050	11	0.03	3.8	3.83	0.4	4.2	<0.01	<0.01	<5
23/11/2011	Quarterly	8.32	954	8	0.03	1.45	1.48	0.4	1.9	<0.01	<0.01	<5
23/02/2012	Quarterly	8.04	912	6	0.15	3.91	4.06	1.6	5.7	0.03	<0.01	<5
10/05/2012	Quarterly	8.23	916	22	0.03	8.12	8.15	1.2	9.4	0.06	<0.01	<5
27/08/2012	Quarterly	8.72	918	11	0.01	0.1	0.11	0.6	0.7	<0.01	<0.01	<5
29/11/2012	Quarterly	Under construction										
12/03/2013	Quarterly	8.1	1040	18	0.08	2.87	2.95	1.7	4.6	<0.01	<0.01	<5
25/06/2013	Under construction											
27/08/2013	Under construction											
14/11/2013	Quarterly	8.73	1030	29	0.04	0.51	0.55	0.3	0.8	0.03	<0.01	<5
25/02/2014	Quarterly	8.29	1050	14	<0.01	0.55	0.55	0.2	0.8	<0.01	<0.01	<5

VWD2

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
23-Jan-09		8.0	1040			1.5			7.2	0.06	0.1	<2
6/05/2009	Quarterly	7.9	1220	20	0.28	6.24	6.52	2.6	9.1	0.02	<0.01	<5
26/08/2009	Quarterly	8.48	932	257	<0.01	0.04	0.04	0.6	0.6	0.04	<0.01	<10
23/02/2010	Quarterly	8.06	979	3	0.06	2.13	2.2	0.9	3.1	<0.01	<0.01	<5
11/05/2010	**Quarterly**	7.89	1200	280	0.35	14.4	14.7	4.6	19.3	0.01	<0.01	<5
19/08/2010	**Quarterly**	8.56	839	16	0	4.53	4.61	2.6	7.2	0.91	0.01	<5
8/12/2010	**Quarterly**	8.8	646	8	0.05	2.01	2.06	0.9	3	0.25	<0.01	<5
3/03/2011	**Quarterly**	8.81	659	51	0.02	0.02	0.04	<0.1	<0.1	<0.1	<0.01	<5
12/05/2011	**Quarterly**	7.64	1220	14	0.36	15.9	16.3	5.5	21.8	<0.01	<0.01	<5
18/08/2011	**Quarterly**	8.21	996	6	0.09	4.24	4.33	3.4	7.7	<0.1	<0.01	<5
23/11/2011	**Quarterly**	8.34	878	6	0.12	11.3	11.4	2.6	14	<0.01	<0.01	<5
23/02/2012	**Quarterly**	8.01	871	22	0.05	3.83	3.88	1.2	5.1	<0.01	<0.01	<5
10/05/2012	**Quarterly**	8.13	918	20	0.02	1.59	1.61	1.1	2.7	0.06	0.05	<5
27/08/2012	**Quarterly**	8.38	939	9	<0.01	0.58	0.58	0.4	1	0.15	<0.01	<5
29/11/2013	**Quarterly**	8.05	1120	6	0.06	8.55	8.61	2.4	11	<0.05	<0.01	<5
12/03/2013	**Quarterly**	8.36	805	24	0.06	2.44	2.5	0.9	3.4	0.01	<0.01	<5
25/06/2013	**Quarterly**	8.05	880	<5	0.05	0.86	0.91	0.7	1.6	<0.01	<0.01	<5
27/08/2013	**Quarterly**	8.44	963	12	<0.01	0.74	0.74	0.6	1.3	0.06	<0.01	<5
14/11/2013	**Quarterly**	8.25	1110	10	0.02	1.77	1.79	0.5	2.3	<0.01	<0.01	<5
25/02/2014	**Quarterly**	8.21	980	14	<0.01	0.39	0.39	0.2	0.6	0.01	<0.01	<5

200ML Dam North (VWD3)

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
8/12/2010	Quarterly	8.09	912	<5	0.04	3.16	3.2	1	4.2	<0.01	<0.01	<5
3/03/2011	Quarterly	8.31	830	11	0.02	0.92	0.94	0.4	1.3	0.09	<0.01	<5
12/05/2011	Quarterly	7.81	1190	28	0.22	6.35	6.57	3.5	10.1	<0.01	<0.01	<5
18/08/2011	Quarterly	8.29	1040	8	0.08	4.98	5.06	1.8	6.9	<0.01	<0.01	<5
23/11/2011	Quarterly	8.37	925	6	0.08	4.15	4.23	1.2	5.4	<0.01	<0.01	<5
23/02/2012	Quarterly	8.38	851	64	0.12	8.37	8.49	2.4	10.9	0.03	<0.01	<5
10/05/2012	Quarterly	8.1	918	25	0.02	0.69	0.71	1	1.7	0.07	<0.01	<5
27/08/2012	Quarterly	8.48	888	14	0.06	3.5	3.56	0.6	4.2	0.05	<0.01	<5
29/11/2012	Quarterly	8.24	1120	218	0.06	9.07	9.13	1.9	11	0.06	<0.01	<5
12/03/2013	Quarterly	8.37	1050	6	0.11	5.33	5.44	1.6	7	<0.01	<0.01	<5
25/06/2013	Quarterly	8.41	1100	10	0.07	4.33	4.4	2	6.4	<0.01	<0.01	<5
27/08/2013	Quarterly	8.46	1080	19	0.04	3.55	3.59	1.6	5.2	0.08	<0.01	<5
14/11/2013	Quarterly	8.38	1190	13	0.04	2.95	2.99	0.9	3.9	0.02	<0.01	<5
25/02/2014	Quarterly	8.39	1120	42	0.02	0.88	0.9	0.6	1.5	0.02	<0.01	<5

200ML Dam South (VWD4)

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
23/11/2011	Quarterly	8.27	928	18		7.93	7.95	3.2	11.2	0.04	<0.01	<5
23/02/2012	Quarterly	8.45	881	<5		1.61	1.65	1	2.6	0.02	<0.01	<5
10/05/2012	Quarterly	8.54	858	16	0.13	5.48	5.61	1.2	6.8	0.05	<0.01	<5
27/08/2012	Quarterly	8.52	942	67	<0.01	0.03	0.03	0.7	0.7	0.08	<0.01	<5
29/11/2012	Quarterly	8.75	894	17	0.04	1.89	1.93	0.8	2.7	0.08	<0.01	<5
12/03/2013	Quarterly	8.44	909	14	0.02	0.33	0.35	0.6	1	0.01	<0.01	<5
25/06/2013	Quarterly	8.58	986	5	<0.01	0.1	0.1	2.7	2.8	<0.01	<0.01	<5
27/08/2013	Quarterly	8.6	992	36	<0.01	0.22	0.22	0.6	0.8	0.02	<0.01	<5
14/11/2013	Quarterly	8.32	1130	14	0.03	1.42	1.45	0.6	2	0.02	<0.01	<5
25/02/2014	Quarterly	8.34	1050	8	0.01	0.41	0.42	0.4	0.8	<0.01	<0.01	<5

BGD

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
20/05/2010	Quarterly	8.32	496	216	<0.01	0.02	0.02	8.7	8.7	0.9	<0.01	11
19/08/2010	Quarterly	7.78	159	37		0.02	0.06	2.6	2.7	0.52	0.37	<5
8/12/2010	Quarterly	8.38	608	88	0.03	0.66	0.69	1.9	2.6	0.46	0.37	<5
3/03/2011	Quarterly	8.35	408	173	<0.01	0.07	0.07	1.6	1.7	0.55	0.29	<5
12/05/2011	Quarterly	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
18/08/2011	Quarterly	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
23/02/2012	Quarterly	7.95	304	35	<0.01	<0.01	<0.01	1.1	1.1	0.86	0.77	<5
10/05/2012	Quarterly	8	833	140	<0.01	0.02	0.02	1.5	1.5	0.37	0.08	<5
27/08/2012	Quarterly	8.08	364	150	<0.01	<0.01	<0.01	1.8	1.8	0.67	0.2	<5
29/11/2012	Quarterly	7.42	151	77	0.05	0.06	0.11	1.4	1.5	0.87	0.79	<5
13/03/2013	Quarterly	7.26	311	70	<0.01	<0.01	<0.01	1.8	1.8	1.07	0.43	<5
25/06/2013	Quarterly	8.01	322	116	<0.01	0.03	0.03	1.2	1.2	0.18	0.11	<5
27/08/2013	Quarterly	8	636	65	0.01	0.03	0.04	5.6	5.6	0.49	0.26	<5
14/11/2013	Dry											
25/02/2014	Dry											

QCU			EPL ID 25									
Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
27-Jun-07	Unknown											
17-Jul-07	Unknown	8	0.94	4								<5
18-Jul-07	Unknown	7.9	990	7						0.1	0.07	<2
21-Aug-07	Unknown	7.5	0.1	92		0.037			1.2	0.84		<5
07-Oct-08	Unknown	7.9	400	327							<2	
5/05/2010	Controlled	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
12/07/2010	Wet Weather	7.41	1790	41		0.03	0.03	0.5	0.5	0.08	0.02	<5
28/07/2010	Wet Weather	7.45	1680	33	<0.01	<0.01	<0.01	2.2	2.2	0.17	0.04	<5
12/08/2010	Wet Weather	7.6	256	22	<0.01	0.18	0.18	0.8	1	0.22	0.1	<5
19/08/2010	Quarterly	8.13	285	10		0.24	0.25	0.9	1.2	0.18	0.09	<5
25/10/2010	Wet Weather	7.89	370	20	0.02	0.22	0.23	1.8	2	0.18	0.12	<5
2/11/2010	Controlled	7.23	546	1	<0.01	0.39	0.39	0.1	0.5	0.08	0.02	<5
11/11/2010	Wet Weather	7.06	523	63	<0.01	0.66	0.66	1.2	1.9	0.21	0.01	<5
16/11/2010	Wet Weather	8.2	316	6	<0.01	0.49	0.49	0.8	1.3	0.09	0.08	<5
23/11/2010	Controlled	7.27	428	<5	<0.01	0.27	0.27	0.6	0.9	0.2	0.07	<5
29/11/2010	Controlled	7.02	591	<5	0.02	0.88	0.9	0.9	1.8	0.08	0.04	<5
8/12/2010	Quarterly	7.58	593	70	<0.01	0.15	0.15	0.9	1	0.24	0.22	<5
10/12/2010	Wet Weather	7.84	286	22	<0.01	0.02	0.02	<0.1	<0.1	0.18	0.18	<5
15/12/2010	Controlled	7.39	362	<5	<0.01	0.11	0.11	0.8	0.9	0.18	0.16	<5
18/12/2010	Controlled	7.05	661	<5	<0.01	0.8	0.8	<0.1	0.8	0.07	0.05	<5
17/01/2011	Non-routine	8.19	589	<5	<0.01	0.59	0.59	0.4	1	0.08	0.06	<5
3/03/2011	Quarterly	7.33	493	6	<0.01	0.54	0.54	<0.1	0.5	0.09	0.08	<5
7/03/2011	Controlled	7.04	414	6	<0.01	0.57	0.57	0.4	1	0.15	0.05	<5
29/03/2011	Non-routine	7.67	368	10	<0.01	0.61	0.61	0.2	0.8	0.17	0.11	<5
12/04/2011	Controlled	7.37	509	31	<0.01	0.45			0.8	0.10	0.05	<5
12/05/2011	Quarterly	7.20	376	11	<0.01	0.48	0.48	0.3	0.8	<0.01	<0.01	<5
1/06/2011	Controlled	7.37	465	8	<0.01	0.56	0.56	0.7	1.3	0.1	0.04	<5
7/06/2011	Controlled	7.46	461	12	<0.01	0.5	0.5	0.6	1.1	0.1	0.05	<5
16/06/2011	Controlled	7.44	479	12	<0.01	0.64	0.64	0.3	0.9	0.03	0.04	<5
18/08/2011	Quarterly	7.76	442	18	<0.01	0.31	0.31	<0.1	0.3	0.09	0.02	<5
27/09/2011	Controlled	8.02	448	14	<0.01	0.09	0.09	0.2	0.3	<0.01	<0.01	<5
16/10/2011	Wet Weather	7.51	466	34	<0.01	<0.01	<0.01	1	1	0.19	0.01	<5
18/10/2011	Controlled	7.63	464	21	<0.01	0.01	0.01	1	1	0.2	0.01	<5
23/11/2011	Quarterly	7.79	438	24	<0.01	<0.01	<0.01	0.6	0.6	0.11	<0.01	<5
25/11/2011	Wet Weather	7.65	405	40	<0.01	<0.01	<0.01	0.4	0.4	0.16	<0.01	<5
13/12/2011	Wet Weather	7.57	452	24	<0.01	0.28	0.28	0.8	1.1	0.15	0.06	<5
20/12/2011	Controlled	7.42	439	15		0.44	0.44	0.1	0.5	0.07	0.05	<5
18/01/2012	Non-routine	7.84	478	16	<0.01	0.03	0.03	0.5	0.5	0.12	0.01	<5
2/02/2012	Wet Weather	7.88	411	<5	<0.01	<0.01	<0.01	1.5	1.5	0.32	0.08	<5
7/02/2012	Non-routine	7.97	400	<5	<0.01	<0.01	<0.01	0.5	0.5	0.12	0.07	<5
16/02/2012	Controlled	7.42	450	10	<0.01	0.41	0.41	<0.1	0.4	<0.01	0.03	<5
23/02/2012	Quarterly	7.5	317	16	0.02	0.15	0.17	0.7	0.9	0.48	0.44	<5
10/05/2012	Quarterly	7.55	465	11	<0.01	0.43	0.43	0.2	0.6	0.1	0.03	<5
13/07/2012	Wet Weather	7.63	427	29	<0.01	0.23	0.23	0.4	0.6	0.14	0.04	<5
31/07/2012	Controlled	7.52	476	16	<0.01	0.06	0.06	<0.1	<0.1	0.07	<0.01	<5
6/08/2012	Controlled	7.52	528	95	<0.01	<0.01	<0.01	0.3	0.3	0.01	<0.01	<5
27/08/2012	Quarterly	7.99	472	56	<0.01	<0.01	<0.01	0.9	0.9	0.16	<0.01	<5
3/09/2012	Non-routine	7.68	476	22	0.01	0.42	0.43	0.5	0.9	0.14	0.03	<5
25/09/2012	Controlled	7.87	486	22	<0.01	0.03	0.03	0.4	0.4	0.1	0.01	<5
29/11/2012	Quarterly	8.03	467	18	<0.01	0.01	0.01	0.4	0.4	0.14	0.05	<5
24/12/2012	Wet Weather	8.36	507	102	<0.01	<0.01	<0.01	2.2	2.2	0.34	<0.01	<5
26/01/2013	Non-routine	7.46	451	154								
29/01/2013	Wet Weather	6.94	97	64	0.02	0.5	0.52	1.5	2	0.64	0.51	<5
5/02/2013	Non-routine	7.08	171	30	<0.01	0.1	0.1	1.3	1.4	0.42	0.32	<5
25/02/2013	Wet Weather	7.65	436	<5	<0.01	0.02	0.02	0.6	0.6	0.14	0.03	<5
13/03/2013	Quarterly	7.39	467	<5	<0.01	0.26	0.26	0.4	0.7	0.06	0.01	<5
20/03/2013	Non-routine				<0.01	0.18	0.18	0.3	0.5	0.02	<0.01	<5
13/06/2013	Non-routine	7.8	458	18	<0.01	0.14	0.14	1.2	1.3	0.14	<0.01	<5
25/06/2013	uarterly/Controll	7.74	484	5	<0.01	0.32	0.32	<0.1	0.3	0.18	0.01	<5
12/08/2013	Controlled	7.93	467	10	<0.01	0.14	0.14	0.2	0.3	0.02	<0.01	<5
27/08/2013	Quarterly	7.9	470	25	<0.01	0.22	0.22	0.5	0.7	0.05	<0.01	<5
14/11/2013	Quarterly	7.59	490	30	0.01	0.07	0.08	0.6	0.7	0.13	0.02	<5
21/11/2013	Controlled	7.65	454	32	<0.01	0.01	0.01	0.4	0.4	0.04	<0.01	<5
17/12/2013	Controlled	8.08	499	58	<0.01	<0.01	<0.01	1.4	1.4	0.21	0.01	<5
25/02/2014	Quarterly	7.6	463	180	<0.01	<0.01	<0.01	5	5	0.9	<0.01	<5

QCD			EPL ID 26									
Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
27-Jun-07	Unknown	7.2	780	13		<0.01		0.55	0.5	0.14	<2	
21-Aug-07	Unknown	7.4		125	0.24			0.8	0.71		<5	
07-Oct-08	Unknown	7.5	380	21							<2	
6/01/2010	Discharge	7.71	687	10								<5
15/02/2010	Discharge	7.82	861	10	<0.01	0.02	0.02	0.3	0.3	0.1	0.1	<5
5/05/2010	Controlled	7.99	1010	8	<0.01	<0.01	<0.01	0.3	0.3	0.15	0.02	<5
12/07/2010	Wet Weather	7.72	920	6		0.04	0.04	<0.1	<0.1	0.18	0.03	<5
28/07/2010	Wet Weather	7.2	813	6	<0.01	0.07	0.07	0.4	0.5	0.08	0.04	<5
12/08/2010	Wet Weather	7.39	231	105	<0.01	0.25	0.25	0.8	1	0.32	0.39	<5
19/08/2010	Quarterly	7.8	468	18		0.03	0.18	1.1	1.3	0.15	0.14	<5
25/10/2010	Wet Weather	7.81	924	7	<0.01	0.07	0.07	0.3	0.4	0.07	0.07	<5
2/11/2010	Controlled	7.68	808	10	<0.01	0.35	0.35	0.2	0.6	0.11	0.1	<5
11/11/2010	Wet Weather	7.71	897	9	<0.01	0.03	0.03	0.4	0.4	0.31	0.1	<5
16/11/2010	Wet Weather	7.57	488	19	<0.01	0.86	0.86	0.9	1.8	0.18	0.2	<5
23/11/2010	Controlled	7.54	563	18	0.02	0.14	0.16	0.7	0.9	0.31	0.11	<5
29/11/2010	Controlled	7.69	866	14	<0.01	0.15	0.15	0.6	0.8	0.2	0.08	<5
8/12/2010	Quarterly	7.02	560	<5	0.02	0.56	0.59	0.3	0.9	0.15	0.03	<5
10/12/2010	Wet Weather	7.66	240	55	0.03	<0.01	0.03	1.5	1.5	0.4	0.37	<5
15/12/2010	Controlled	7.41	471	12	<0.01	0.15	0.15	0.7	0.8	0.24	0.29	<5
18/12/2010	Controlled	7.6	777	13	<0.01	0.3	0.3	<0.1	0.3	0.12	0.11	<5
17/01/2011	Non-routine	7.69	705	24	<0.01	0.16	0.16	0.5	0.7	0.18	0.1	<5
3/03/2011	Quarterly	7.75	729	17	<0.01	0.12	0.12	0.1	0.2	0.22	0.08	<5
7/03/2011	Controlled	7.77	686	17	<0.01	0.12	0.12	0.2	0.3	0.2	0.08	<5
29/03/2011	Non-routine	8.05	766	19	<0.01	0.02	0.02	<0.1	<0.1	0.07	0.04	<5
12/04/2011	Controlled	7.93	839	8	<0.01	0.1			0.5	0.2	0.07	<5
12/05/2011	Quarterly	7.6	894	6	<0.01	0.12	0.12	0.2	0.3	<0.01	<0.01	<5
1/06/2011	Controlled	7.98	830	16	<0.01	0.18	0.18	0.6	0.8	0.17	0.04	<5
7/06/2011	Controlled	8.02	860	12	<0.01	0.13	0.13	0.4	0.5	0.08	0.05	<5
16/06/2011	Controlled	8.04	915	18	<0.01	0.15	0.15	0.5	0.6	0.07	0.03	<5
18/08/2011	Quarterly	8.05	869	16	<0.01	0.15	0.15	<0.1	0.2	0.05	0.04	<5
27/09/2011	Controlled	8.35	902	26	<0.01	<0.01	<0.01	0.3	0.3	0.06	0.03	<5
16/10/2011	Wet Weather	7.99	895	24	<0.01	0.02	0.02	0.3	0.3	0.09	0.05	<5
18/10/2011	Controlled	8.02	884	18	<0.01	0.02	0.02	0.3	0.3	0.08	0.05	<5
23/11/2011	Quarterly	8.02	868	15	<0.01	0.03	0.03	0.2	0.2	0.09	0.1	<5
25/11/2011	Wet Weather	7.94	810	13	<0.01	0.16	0.16	<0.1	0.2	0.2	0.1	<5
13/12/2011	Wet Weather	7.98	783	12	<0.01	0.18	0.18	0.4	0.6	0.14	0.09	<5
20/12/2011	Controlled	7.97	750	20		0.28	0.28	0.2	0.5	0.13	0.1	<5
18/01/2012	Non-routine	8.19	894	18	<0.01	0.16	0.16	0.1	0.3	0.16	0.07	<5
2/02/2012	Wet Weather	8.19	812	25	<0.01	0.08	0.08	0.4	0.5	0.12	0.08	<5
7/02/2012	Non-routine	7.84	499	20	<0.01	0.08	0.08	0.5	0.6	0.16	0.1	<5
16/02/2012	Controlled	8	807	20	<0.01	0.03	0.03	0.2	0.2	0.07	0.07	<5
23/02/2012	Quarterly	7.83	482	37	<0.01	0.08	0.08	0.9	1	0.39	0.31	<5
10/05/2012	Quarterly	7.97	849	11	<0.01	0.04	0.04	0.4	0.4	0.13	0.03	<5
13/07/2012	Wet Weather	7.97	773	15	<0.01	0.24	0.24	0.4	0.6	0.2	0.06	<5
31/07/2012	Controlled	8.04	822	8	<0.01	0.17	0.17	0.1	0.3	0.06	0.06	<5
6/08/2012	Controlled	8.02	829	8	<0.01	0.11	0.11	0.1	0.2	0.05	0.04	<5
27/08/2012	Quarterly	8.11	857	30	<0.01	<0.01	<0.01	0.1	0.1	<0.01	0.03	<5
3/09/2012	Non-routine	8.07	855	14	<0.01	0.04	0.04	0.4	0.4	0.12	0.04	<5
25/09/2012	Controlled	8.13	884	13	<0.01	0.02	0.02	0.2	0.2	0.1	0.06	<5
29/11/2012	Quarterly	7.98	815	<5	<0.01	<0.01	<0.01	0.2	0.2	0.21	0.15	<5
24/12/2012	Wet Weather	8.55	926	6	<0.01	0.02	0.02	0.5	0.5	0.14	0.14	<5
26/01/2013	Non-routine	7.7	853	47								
29/01/2013	Wet Weather	7.02	112	182	0.02	0.42	0.44	1.4	1.8	0.6	0.44	<5
5/02/2013	Non-routine	7.47	438	36	<0.01	0.1	0.1	1.3	1.4	0.42	0.32	<5
25/02/2013	Wet Weather	7.87	774	14	<0.01	0.08	0.08	0.3	0.4	0.16	0.1	<5
13/03/2013	Quarterly	7.77	768	16	<0.01	0.05	0.05	0.3	0.4	0.22	0.18	<5
13/06/2013	Non-routine	7.94	807	11	<0.01	0.16	0.16	0.3	0.5	0.08	0.06	<5
25/06/2013	Quarterly/Controlled	7.95	850	<5	<0.01	0.14	0.14	0.2	0.3	0.08	0.05	<5
12/08/2013	Controlled	8.14	827	8	<0.01	0.04	0.04	0.2	0.2	0.06	0.04	<5
27/08/2013	Quarterly	8.05	826	11	<0.01	0.03	0.03	0.1	0.1	0.04	0.05	<5
14/11/2013	Quarterly	7.98	1010	16	<0.01	0.02	0.02	0.3	0.3	0.16	0.12	<5
21/11/2013	Controlled	7.92	884	20	<0.01	0.01	0.01	0.2	0.2	0.1	0.09	<5
17/12/2013	Controlled	8.32	942	25	<0.01	0.02	0.02	0.3	0.3	0.14	0.11	<5
25/02/2014	Quarterly	7.89	1080	26	<0.01	0.01	0.01	0.6	0.6	0.16	0.11	<5

WCU			EPL ID 23									
Sample Date	**Type**	**pH - lab**	**Electrical Conductivity uS/cm - lab**	**Suspended Solids**	**Nitrite as N mg/L**	**Nitrate as N mg/L**	**Nitrite + Nitrate as N mg/L**	**Total Kjeldahl Nitrogen as N mg/L**	**Total Nitrogen as N mg/L**	**Total Phosphorus as P mg/L**	**Reactive Phosphorus as P mg/L**	**Oil and Grease**
21-Aug-07	Unknown	7.9	0.19	165	0.84			1.7	0.55		<5	
07-Oct-08	Unknown	7.7	905	6				1.4	<0.01	0.03	<2	
6/01/2010	Discharge	7.87	1270	18								<5
15/02/2010	Discharge	7.84	1110	18	<0.01	<0.01	<0.01	0.6	0.6	0.25	0.22	<5
28/07/2010	Wet Weather	7.49	1210	92	0.01	3.8	3.81	2.2	6	0.13	0.08	<5
12/08/2010	Non-routine	7.62	323	148	<0.01	0.81	0.81	0.8	1.6	0.43	0.4	<5
19/08/2010	Quarterly	7.85	618	8		0.53	0.53	1.1	1.6	0.26	0.12	<5
25/10/2010	Non-routine	7.83	549	13	0.38	0.4	0.78	1.9	2.7	0.86	0.81	<5
11/11/2010	Non-routine	7.44	382	504	0.02	1.77	1.79	3.1	4.9	1.69	0.62	<5
16/11/2010	Non-routine	7.79	370	56	<0.01	1.07	1.07	1.1	2.2	0.52	0.58	7
8/12/2010	Quarterly	7.79	667	56	0.02	1.17	1.18	2.8	4	0.97	0.68	<5
10/12/2010	Wet Weather	7.67	299	65	<0.01	0.19	0.19	1.4	1.6	0.59	0.56	<5
3/03/2011	Quarterly	7.62	1170	15	0.03	3.38	3.41	0.4	3.8	0.07	0.03	<5
12/05/2011	Quarterly	7.42	1500	6	<0.01	4.44	4.44	1.5	5.9	<0.01	<0.01	<5
18/08/2011	Quarterly	8.01	1410	<5	0.02	3.28	3.30	0.3	3.6	0.08	0.03	<5
25/10/2011	Controlled	7.77	1330	44	0.03	3.25	3.28	1	4.3	0.14	0.08	<5
23/11/2011	Quarterly	8.02	1360	50	0.03	3.28	3.31	1.3	4.6	0.17	0.06	<5
26/11/2011	Wet Weather	7.64	148	261	<0.01	0.25	0.25	1.4	1.6	0.87	0.81	<5
2/02/2012	Wet Weather	7.79	93	53	0.01	0.33	0.34	0.8	1.1	0.66	0.52	<5
16/02/2012	Non-routine	7.94	1360	18	0.02	2.68	2.7	0.4	3.1	0.1	0.06	<5
23/02/2012	Quarterly	8.02	1360	45	0.02	3	3.02	0.9	3.9	0.06	0.04	<5
10/05/2012	Quarterly	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
13/07/2012	Non-routine	8.08	803	24	0.03	2.2	2.23	1.8	4	0.18	0.11	<5
27/08/2012	Quarterly	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
29/11/2012	Quarterly	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
29/01/2013	Wet Weather	7.78	452	<5	0.04	2.37	2.41	0.9	3.3	0.21	0.19	<5
13/03/2013	Quarterly	8.06	868	8	0.01	0.26	0.27	0.8	1.1	0.18	0.13	<5
25/06/2013	Dry											
27/08/2013	Dry											
14/11/2013	Quarterly	7.97	427	<5	0.06	0.14	0.2	0.8	1	0.35	0.27	<5
25/02/2014	Dry											

WCD

EPL ID 24

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
21/08/2007	Unknown	7.9	0.21	690		1.2			2.3	0.96		<5
7/10/2008	Unknown	7.8	375	64								<2
6/01/2010	Discharge	8.16	668	54								<5
15/02/2010	Discharge	7.82	118	62	0.04	3.87	3.91	1.9	5.8	0.11	0.05	<5
11/05/2010	Quarterly	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
28/07/2010	Wet Weather	7.71	1130	32	0.03	0.9	0.93	1.7	2.6	0.29	0.2	<5
12/08/2010	Non-routine	7.6	324	130	<0.01	0.68	0.68	0.6	1.3	0.42	0.4	<5
19/08/2010	Quarterly	8.2	811	28	<0.01	0.54	0.56	0.6	1.2	0.53	0.2	<5
25/10/2010	Non-routine	7.86	587	200	<0.01	25.2	25.2	5.5	30.7	0.41	0.3	<5
11/11/2010	Non-routine	7.64	443	1640	0.09	19.4	19.4	4.2	23.6	1.27	0.34	<5
16/11/2010	Non-routine	7.69	426	690	0.11	10.5	10.6	3.2	13.8	0.54	0.46	<5
8/12/2010	Quarterly	7.49	177	14	<0.01	0.03	0.03	2	2	0.6	0.6	<5
10/12/2010	Wet Weather	7.69	273	305	0.01	1.78	1.79	2.2	4	0.69	0.64	<5
3/03/2011	Quarterly	8.23	1050	20	<0.01	0.05	0.05	0.1	0.2	0.23	0.14	<5
12/05/2011	Quarterly	8.00	1400	24	<0.01	0.61	0.61	0.4	1	<0.01	<0.01	<5
18/08/2011	Quarterly	8.41	1370	26	0.02	0.71	0.73	0.2	0.9	0.24	0.05	<5
25/10/2011	Controlled	8.11	1150	16	0.01	0.12	0.13	0.9	1	0.31	0.28	<5
23/11/2011	Quarterly	8.38	1310	32	<0.01	0.01	0.01	0.4	0.4	0.28	0.19	<5
25/11/2011	Wet Weather	7.82	162	1340	0.02	2.76	2.78	3	5.8	1.66	0.66	<5
2/02/2012	Wet Weather	7.86	224	1830	0.02	5.14	5.16	4	9.2	1.38	0.44	<5
16/02/2012	Non-routine	8.32	1120	9	<0.01	0.01	0.01	0.2	0.2	0.19	0.16	<5
23/02/2012	Quarterly	8.24	1220	25	<0.01	<0.01	<0.01	0.2	0.2	0.18	0.14	<5
10/05/2012	Quarterly	8.13	1320	18	0.02	0.62	0.64	0.5	1.1	0.21	0.14	<5
13/07/2012	Non-routine	8	524	522	0.22	16	16.2	2.9	19.1	0.65	0.42	<5
27/08/2012	Quarterly	8.47	1280	37	<0.01	0.03	0.03	0.8	0.8	0.06	<0.01	<5
29/11/2012	Quarterly	8.35	1260	36	<0.01	<0.01	<0.01	0.3	0.3	0.24	0.23	<5
29/01/2013	Wet Weather	7.34	210	202	0.09	2.64	2.73	1.9	4.6	0.74	0.62	<5
12/03/2013	Quarterly	8.31	1030	24	<0.01	<0.01	<0.01	0.5	0.5	0.23	0.21	<5
25/06/2013	Quarterly	8.26	1350	12	0.01	0.71	0.72	0.3	1	0.18	0.14	<5
27/08/2013	Quarterly	8.43	1270	15	<0.01	<0.01	<0.01	0.3	0.3	0.07	0.04	<5
14/11/2013	Quarterly	8.32	1390	19	<0.01	0.02	0.02	0.3	0.3	0.23	0.2	<5
25/02/2014	Quarterly	8.38	1350	27	<0.01	0.02	0.02	0.5	0.5	0.18	0.15	<5

Evaluation of Void Water intercepted by Werris Creek Coal Mine Operations

Prepared for:
Werris Creek Coal Pty Ltd

Prepared by:
ENVIRON Australia Pty Ltd

Date:
10 April 2014

Project Number:
AS130338

ENVIRON

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VERSION CONTROL RECORD

Document File Name	**Date Issued**	**Version**	**Author**	**Reviewer**
_338 Evaluation of groundwater inflows Werris Creek Coal Mine 2014_FINAL	5 March 2014	Draft 1	S Gaskell/F Robinson	F Robinson
_338 Evaluation of groundwater inflows Werris Creek Coal Min 2014_FINAL	10 April 2014	FINAL	S Gaskell/F Robinson	F Robinson

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1 Introduction

Werris Creek Coal Mine (WCCM) is situated in the North West Slopes and Plains of New South Wales and is located 4km south of Werris Creek. The mine operates under project approval PA 10_0059 MOD 1.

During the 2012/2013 Annual Review, WCC identified that the volume of void water (water intercepted in pit) had increased beyond that could not be accounted for by the existing surface and groundwater site balance. In addition, the previous assumption that the former underground workings were to be dewatered had not occurred due to spontaneous combustion management resulting in changes required to the groundwater model.

1.1 Background

In 2005, Werris Creek Coal Mine commenced mining of the Greta Coal Measures – Werris Creek outlier, situated within the Werrie Basin. The coal measures overlie Werrie Basalt, which is directly beneath and surrounds the coal measures in all directions. The upper layers of the basalt have been shown to be highly weathered to form a clay aquitard providing confinement to semi-confinement between aquifers within the coal measures and underlying basalt hard rock.

Underground mining of part of the coal seam was undertaken prior to the commencement of open cut mining in 2005. The open cut operations will mine through the former underground mine workings.

Planning approval for the open cut mining operations was sought in two stages, representing the initial project and the Life of Mine Project (LOM). Each stage was subject to a groundwater impact assessment which involved three dimensional modelling of the aquifer systems to assess impacts from the proposed operations. Modelling was based on measured groundwater levels for the project site and known or assumed geological parameters. Modelling for the second project approval, the LOM project, also included calibration of the initial model to observed site conditions.

1.2 Study Objective

The objective of this study is to validate the groundwater model and calibrate the model to site specific conditions. Where site specific conditions invalidate the previous model, to evaluate impacts to the aquifer system and assess the significance of these in relation to the project approval trigger conditions.

1.3 Scope of Work

The following scope of works was proposed to meet the project objective.

1. Review site groundwater monitoring data to assess drawdown in the aquifer in response to mining;
2. Assess the water balance volumes between the period September 2012 and March 2013 to validate groundwater inflows against modelled predictions;
3. Compare the observed groundwater inflows against modelled groundwater inflows and if necessary,

- re-calibrate the groundwater model against observed data if necessary and evaluate impacts to the aquifer for forward mine plans; and
- evaluate the groundwater table recovery and stabilised level following cessation of mining and land rehabilitation.

4. Document the study in a report.

2 Groundwater Level Observations

A summary of this monitoring data is presented in **Table 1** and graphically in the following figures. The ten monitoring well locations below are shown in **Figure 1**.

Table 1 Groundwater Monitoring Data

Monitoring Well #	Depth in m	**Drawdown in m** (difference between last and first reading) [1]
P1	42	14.7
P2[2]	61	0.75
MW1	68.7	3.9
MW2	65.5	3.0
MW3	39.6	-0.7
MW4b	NK	3.7
MW5	28	0.7
MW6	16	2.8
MW9	28	2.0 [3]
MW14	26	1.8
MW8		2.5

[1] At February 2014. [2]Destroyed, last monitoring in September 2012. [3]Destroyed during rail construction September 2013. NK – not known

Monitoring wells P1, MW1, MW4b, MW6, MW9 and MW14 showed drawdown trends that represent a declining head at these locations. Monitoring wells MW2, MW3 and MW5 showed stable or increasing head. Of those wells showing declining heads, changes in head were less than 4.0m except at P1 where a decline of approximately 15m has been observed. P1 is located immediately adjacent to the open cut pit and therefore would be more affected by drawdown impacts given its proximity.

Monitoring well MW8 is considered to represent background fluctuations in an area unaffected by mining. This monitoring well has shows a drawdown of 2.5m compared to the initial standing level. The results suggest that the regional groundwater table is depressed following a period of lower than average rainfall (Bureau of Meteorology website, for years 2012, 2013 and year to date 2014).

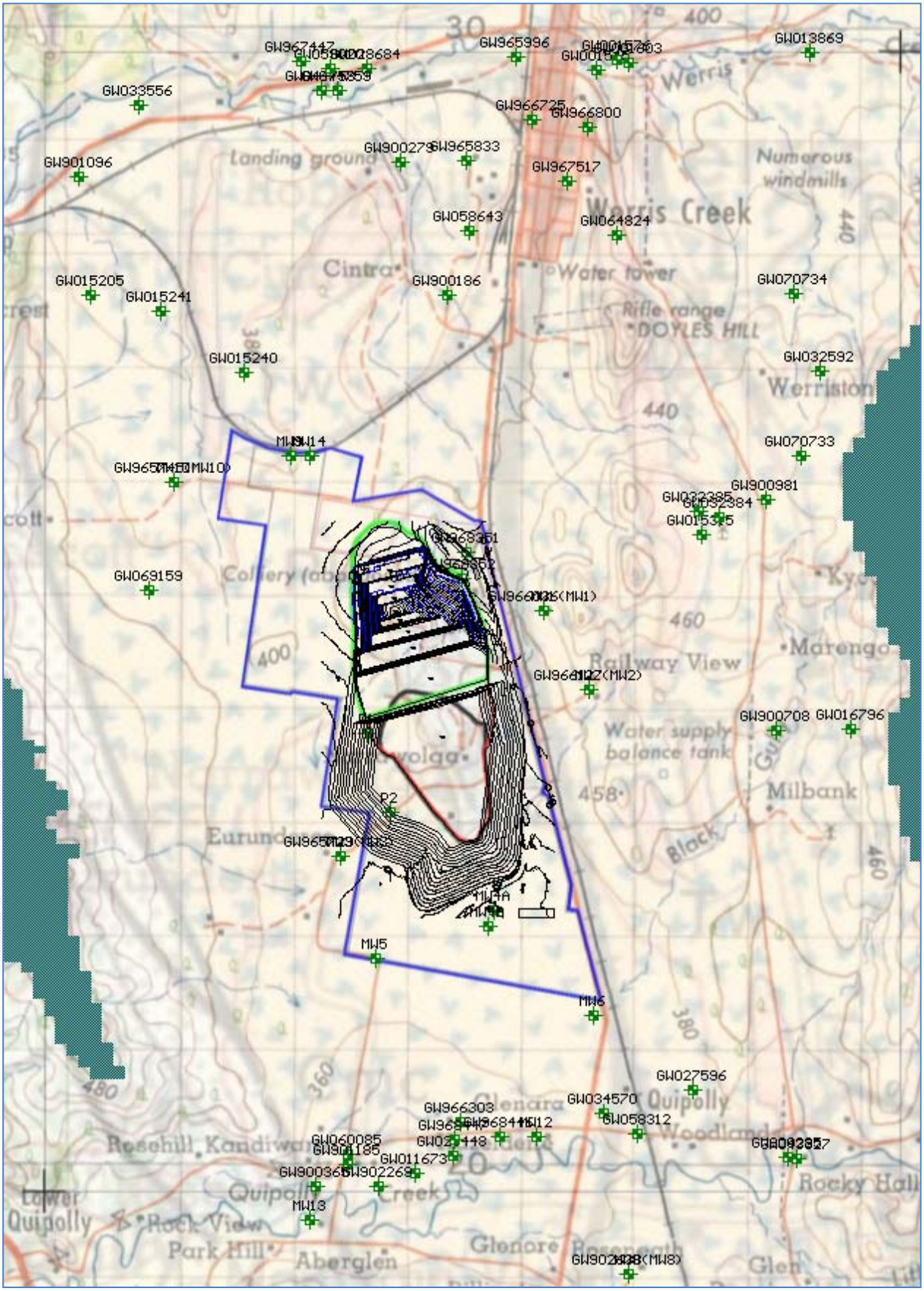

Figure 1 - Monitoring Well Locations

3 Water Balance

A water balance model (WBM) representing flow to the pit void is shown in **Figure 2**.

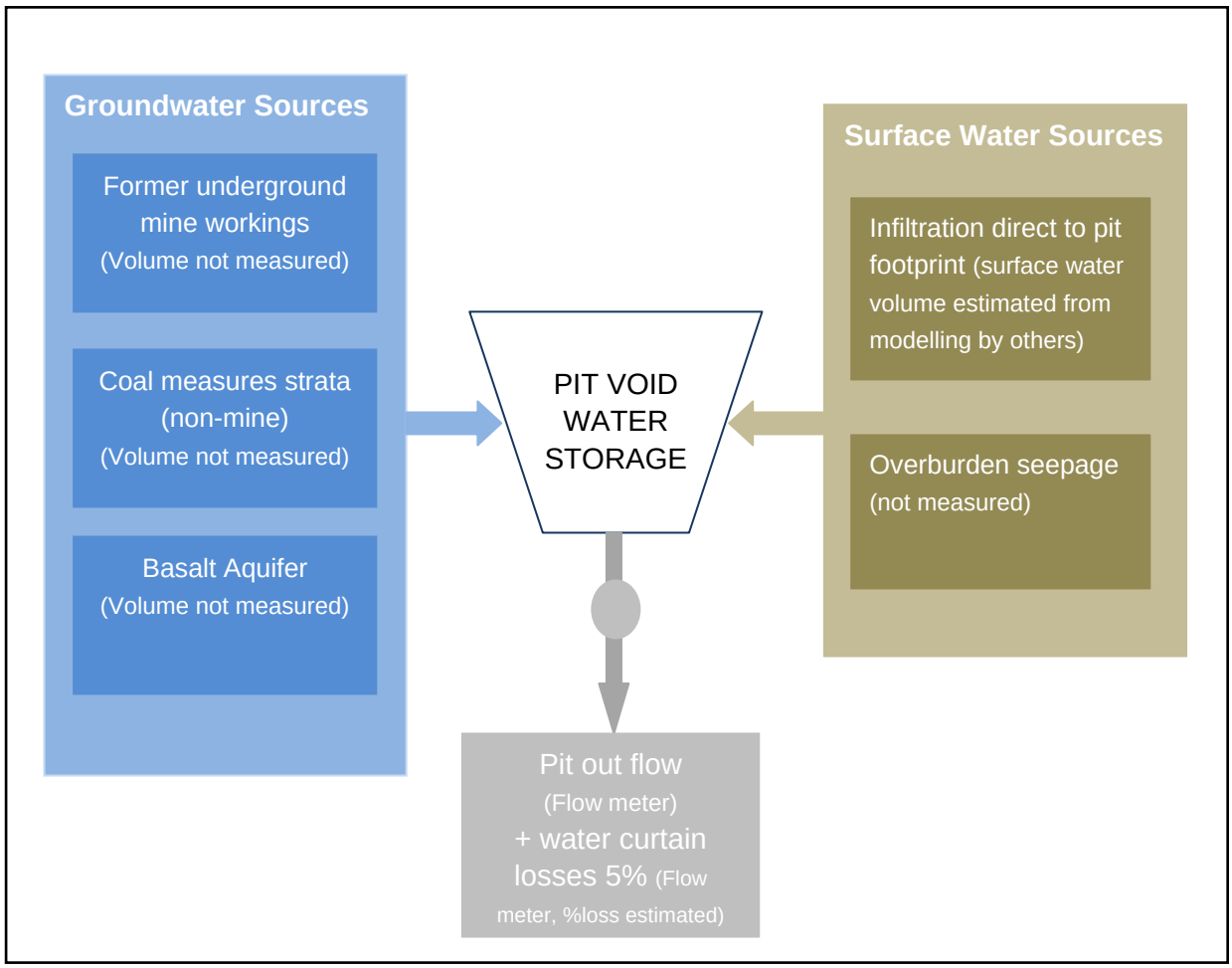

Figure 2 - Flow Chart – Pit Inflows

Following from **Figure 2**, the groundwater inflows to the pit can be estimated by Equation 1.

Groundwater inflows = Pit out flow + change in pit void water storage + water curtain losses - surface water inflows [1]

In the above, groundwater inflows and overburden seepage are determined using the calibrated groundwater model. Surface water runoff is determined from rainfall rates, the catchment area and assumptions of infiltration. Overburden seepage is determined using the calibrated groundwater model, and is directly related to rainfall and infiltration assumptions.

Pit void water storage has been surveyed by the site surveyor since August 2012. Pit outflows are measured through a flow meter that is routinely monitored.

Data measured at the site between September 2012 and March 2013 is presented in **Table 2**. This data set is the most comprehensive set measured to date. For other monthly data, the site either did not monitor pit void water storages or the discharged pit void measurements were difficult to interpret due to site water management requirements. At the beginning of September 2012, i.e. the beginning of pit outflow monitoring which is considered to be accurate, the volume of water contained within the void was calculated to be 410 ML. At the end of March 2013, the volume of water contained within the void was calculated to be 83 ML. The total change in storage was therefore calculated to be 327 ML.

Water pumped out of pit and recirculated through the mine workings has not been included in the out of pit pumping total but has been included as a loss from the void. It has been assumed that 95% of this water returns to the void in-pit storage, and 5% is lost through the pumping and reticulation process. This approach is considered reasonable as the purpose of the curtain is to maintain saturation at the working face and therefore there is direct connectivity through the workings (post blast) to the pit void.

To estimate the contribution from surface water runoff to the pit void, daily rainfall data was input to the WBM either directly to the void surface area or as a percentage of runoff from areas discharging into the void. The void surface area was calculated from the relationship between the geometry of the void space (using survey data between September 2012 and March 2013) and the volume of water in the void. This relationship is presented in **Figure 3**.

Three areas were identified to provide runoff input to the void:

- the active open cut area [50% runoff] including Overburden Emplacement;
- bare/compacted soil area to the north of the active open cut area [60% runoff]; and
- undisturbed land to the north of the active open cut area (“old colliery” hill) [20% runoff].

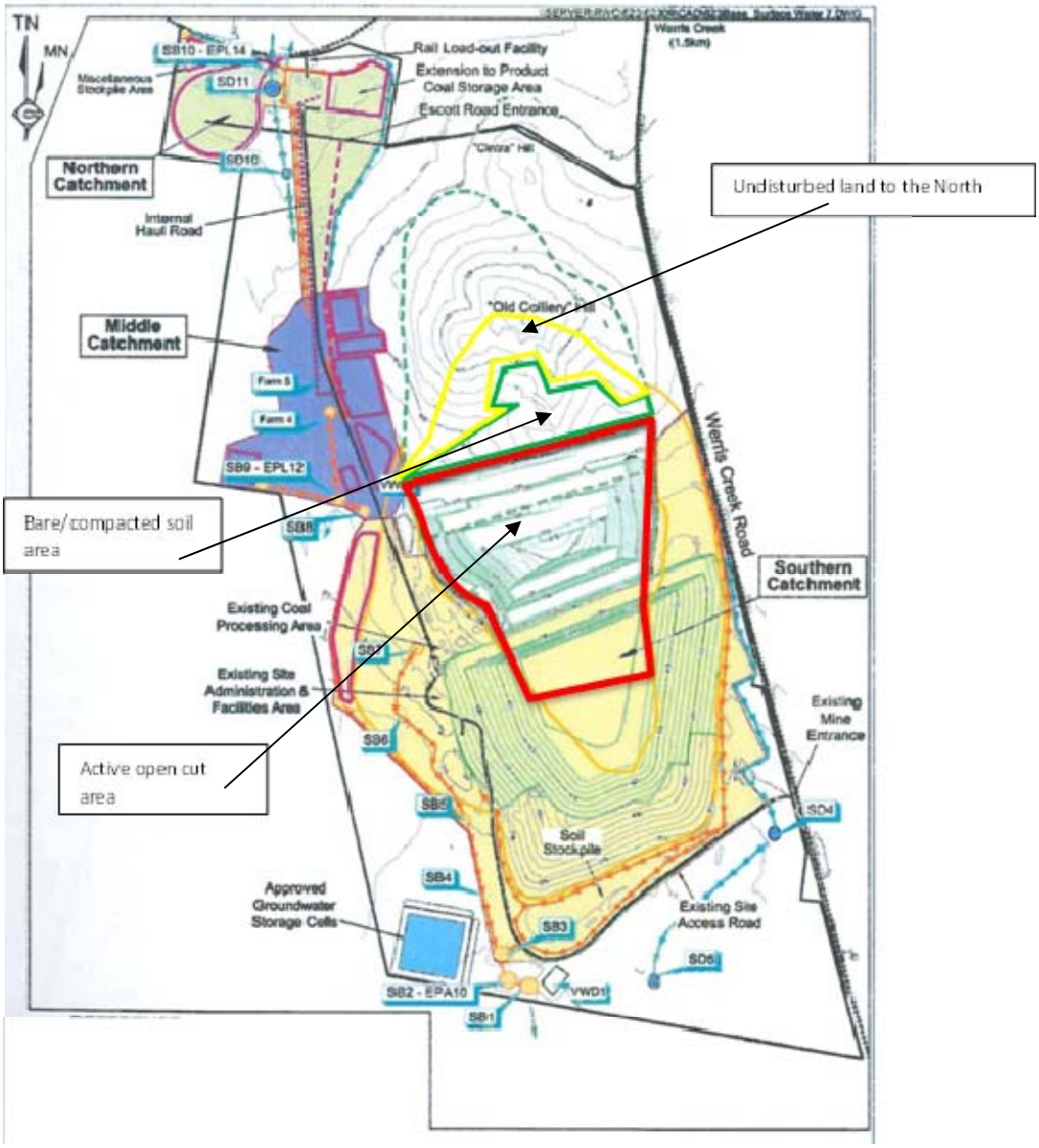

Figure 3 – Identified runoff areas

Runoff coefficients were taken from the GSSE surface water assessment[1]. With the exception of the void surface itself, the effects of evaporation on surface water are incorporated in the runoff coefficients. Evaporative losses from the void surface are calculated on the basis of daily average evaporation (in mm derived from Bureau of Meteorology monthly averages at Quirindi Post Office) from the surface area of the void. The surface area of the void changes as a result of the geometry of the void area and the volume of water predicted to be within it. Initial model runs were carried out with no input from groundwater to examine the results in the context of modelled groundwater inflows.

[1] GSSE, Surface Water Assessment, Life of Mine Project, December 2010

Table 2 Measured Water Balance Volumes (ML)

Description	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13
Out of Pit	0	0	0.6	0	0	25.1	33.8	126.8	154.9	78.6	123.9	127.3
Change in void storage	NK	NK	NK	NK	NK	-84	-21	-53	-45	-57	-25	-42
water curtain losses	0	0	0	0	9	4	4	0	0	1	0	0
average monthly rainfall												
Historical 90th percentile data (mm)[2]	166	150.7	115.6	83.2	93.8	106	91.3	85.7	95.6	110.3	128.1	145.6
Mean average rainfall for Werris Creek (mm)[2]	16.9	32.2	6.9	79.3	16.6	31.2	5.6	64.7	13.8	29.1	4.9	51.9
Measured site rainfall (mm)	14.8	32.8	34.4	92	10.4	22.6	6.2	43.8	141.8	173	148.2	63.9
Rainfall compared to historical	average	average	high	average	low	average	average	low	high	high	high	average

NK – not known.

[2] Bureau of Meteorology online historical data for Werris Creek Post Office.

Figure 4 presents the volume of water in the void calculated from the initial WBM run over 7 months between September 2012 and March 2013 against site measurements.

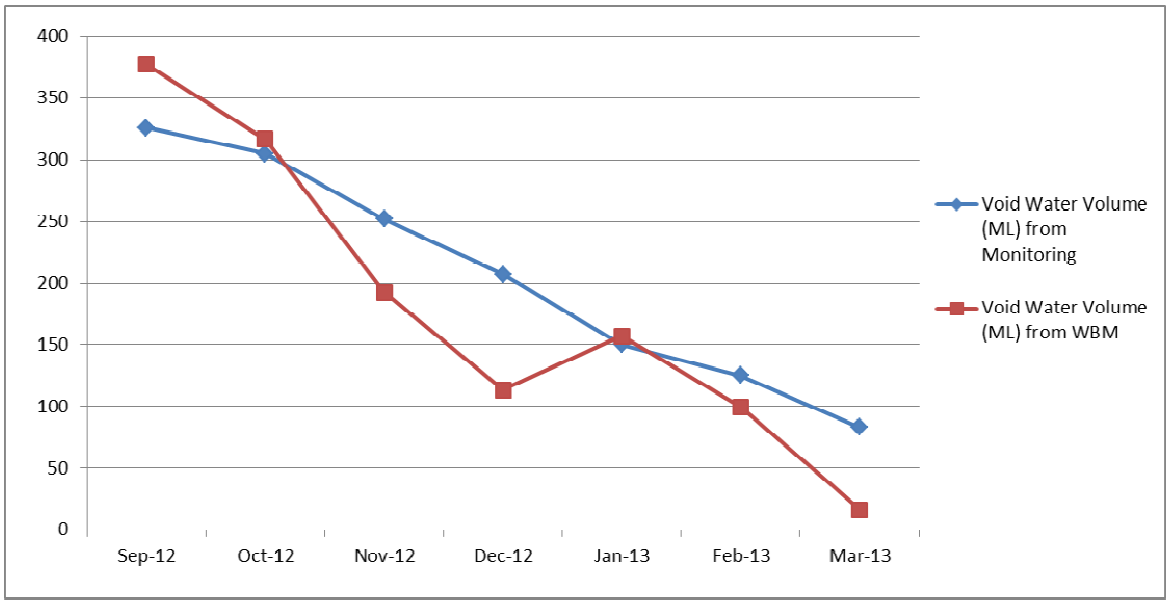

Figure 4 - Measured Results vs Initial WBM Results

The results presented in **Figure 4** suggest that the WBM underestimates the volume of groundwater inflow to the void, and this is particularly evident in November and December 2012. The difference between monitored water volumes and modelled water volumes is presented in **Table 3.**

Table 3 Measured Water Balance Volumes versus Initial WBM (ML)

Description	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13
Void Water Volume (measured)	326	305	252	207	150	125	83
Void Water Volume (WBM)	377	317	193	113	157	100	16
Difference	-51	-12	59	94	-7	25	67

The data, presented for 7 months in **Table 3**, can be annualised for 12 months and equates to approximately 300 ML per year.

Previous modelling of groundwater inflow for the monitoring period April 2012 to March 2013 estimated inflow to be 106 ML (annual). This prediction was determined using the calibrated groundwater model developed for the assessment of impacts from the Life of Mine proposal (model groundwater 2010). The predicted groundwater inflow volumes were found to increase from the initial predictions (2010) due to the assumptions regarding dewatering of the mine workings that were made during the initial model development. In the 2010 groundwater model, it was assumed that the mine workings would be dewatered prior to mine encroachment, however mine workings have remained saturated for the purpose of managing spontaneous combustion risk and this is resulting in a higher than predicted contribution from groundwater to the void.

The calculated groundwater flows from each groundwater component for the 2012-2013 period are tabulated in **Table 4**. These predictions were made using the 2012 model which revised the boundary conditions for the mine void.

Table 4 Predicted Groundwater Inflow, Apr 2012 Mar 2013 Monitoring Period

Description	Totals
Total groundwater inflow to void	106ML
Contribution of seepage from basalt (i.e. outside of basin)	10.6ML
Seepage from Coal Measures and workings	93.0ML
Seepage to void from overburden	2.1ML

Water balance modelling was undertaken to test three groundwater inflow scenarios to determine the best fit against the WBM:

1. Groundwater inflow of 13 ML per year;
2. Groundwater inflow of 106 ML per year; and
3. Groundwater inflow of 300 ML per year.

It has been acknowledged by the site that there may be error in measurements of the volume of water in the void each month and that these may be as large as ± 10 ML. Furthermore, the runoff coefficients assumed in the model are not based on any empirical data. A sensitivity test of a range of runoff coefficients, varied by ± 10% was also undertaken.

Figures 5 to 7 present the results of these additional WBM runs.

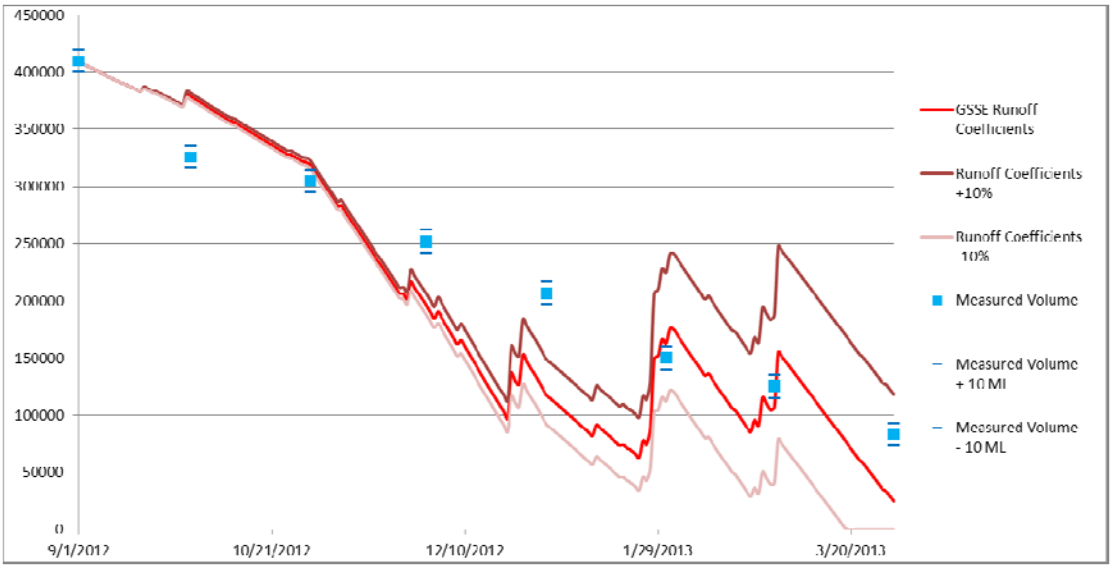

Figure 5 - Groundwater Inflow Scenario 1 (13 ML per year) Measured Results vs Initial WBM Results (m^3)

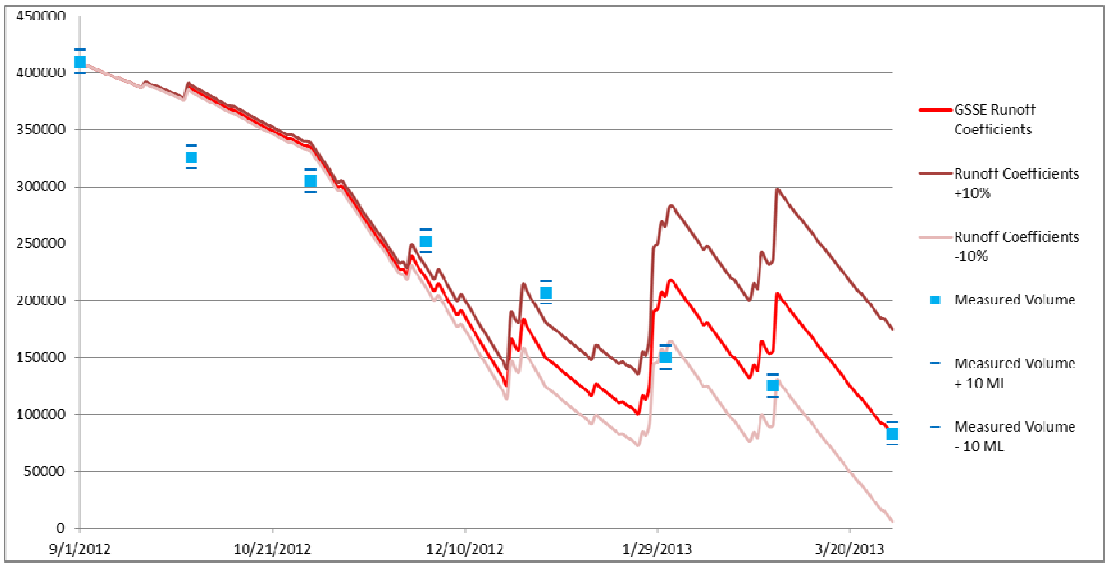

Figure 6 - Groundwater Inflow Scenario 2 (106 ML per year) Measured Results vs Initial WBM Results (m^3)

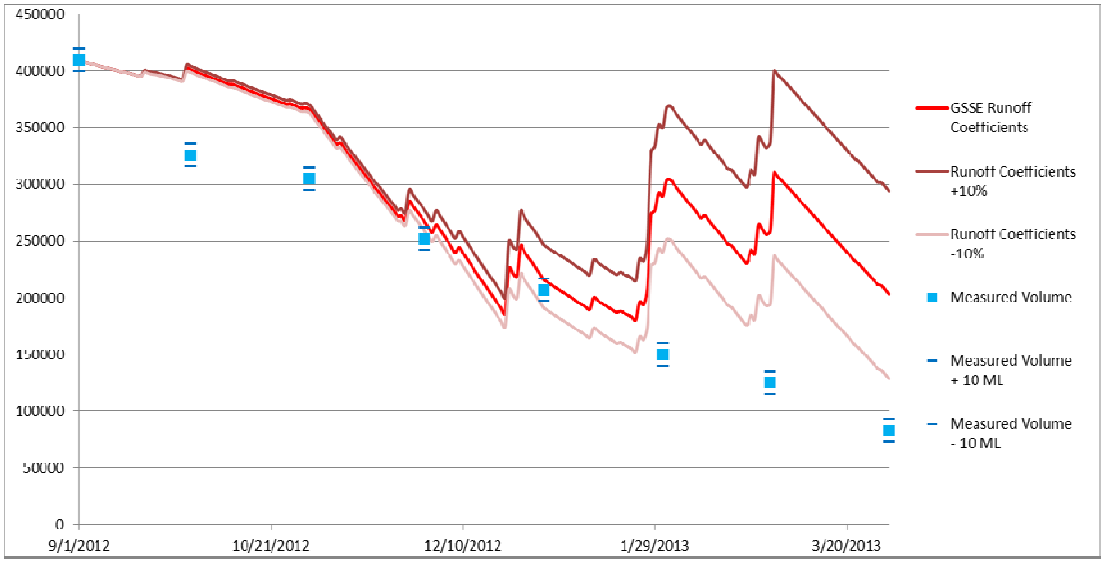

Figure 7 - Groundwater Inflow Scenario 3 (300 ML per year) Measured Results vs Initial WBM Results (m^3)

Of the three scenarios modelled, Scenario 3 appears to show the poorest fit. The closest fit appears to be achieved in Scenario 1, where 5 of the 8 measured volumes fall within the range of WBM water volumes at the end of the month. However, given the monitoring uncertainty and the fact that the beginning and end volumes appear to agree closest in Scenario 2, it may be that groundwater inflows are closer to 100 ML per year and is consistent with the 2012 groundwater model predictions. This also infers the additional water captured in the pit as void water was sourced from the high intensity rain events between November 2012 and February 2013 and not from an increase in groundwater flow from the basalt aquifer.

4 Conclusions and Recommendations

In accordance with the Annual Review requirement of the Project Approval; ENVIRON have conducted an evaluation of inflow volumes to the mine void. This calculation has been undertaken by initially predicting the groundwater inflows using a calibrated model and then verifying the predictions by undertaking a water balance for the mine pit over a discrete period. The analysis found a good correlation between the water balance and the predicted groundwater inflows when considering the water management of the site.

This process has further validated the groundwater model developed for the LOM project, which was refined in 2012. 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. Minor modification of the boundary conditions adopted in the model was undertaken in 2012 following changes to the management of groundwater within the former mine workings. On this basis the predictions of impacts to the groundwater levels in the basalt aquifer are considered to remain valid.

Groundwater levels in monitoring wells within the basalt aquifer have been observed to decrease in excess of that predicted to occur from mining operations. These effects are also observed at bores remote from the mining operations. On this basis it is considered that these effects are representative of a general decline in the groundwater level as a result of below average rainfall conditions.

To further assess the variation in groundwater levels, it is recommended that the groundwater monitoring database be expanded to include a statistical analysis of groundwater level variations using a statistical trending analysis such as CUSUM. These tools allow for identification of trends that are independent of background variation.

Through the above process of validation, the use of a discrete time interval WBM has proven to be a critical tool in validating the groundwater model predictions. This analysis has determined that groundwater inflows are closer to 100 ML per year as predicted in the 2012 groundwater model assessment. This also infers the additional water captured in the pit as void water was sourced from the high intensity rain events between November 2012 and February 2013 and not from an increase in groundwater flow from the basalt aquifer.

5 References

RW Corkery & Co. Pty Ltd, 'Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project', December 2010.

Bureau of Meteorology (http://www.bom.gov.au): Online historical data for Werris Creek Post Office

6 Limitations

ENVIRON Australia prepared this report in accordance with the scope of work as outlined in our proposal to Werris Creek Coal Pty Ltd dated 19th June 2013 and in accordance with our understanding and interpretation of current regulatory standards.

Site conditions may change over time. This report is based on conditions encountered at the site at the time of the report and ENVIRON disclaims responsibility for any changes that may have occurred after this time.

The conclusions presented in this report represent ENVIRON's professional judgment based on information made available during the course of this assignment and are true and correct to the best of ENVIRON's knowledge as at the date of the assessment.

ENVIRON did not independently verify all of the written or oral information provided to ENVIRON during the course of this investigation. While ENVIRON has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided to ENVIRON was itself complete and accurate.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

6.1 User Reliance

This report has been prepared exclusively for Werris Creek Coal Pty Ltd and may not be relied upon by any other person or entity without ENVIRON's express written permission.

By email: awright@whitehavencoal.com.au

21st May 2014

Andrew Wright
Environmental Officer – Werris Creek Coal
Whitehaven Coal Limited
PO Box 125, Werris Creek NSW 2341.

Re: CUSUM analysis tool for assessment groundwater impact

Dear Andrew

An assessment of groundwater bores was conducted where an analysis of variance in groundwater level data from each bore site was assessed to provide an early indicator of trends. The assessment analysis measured the variation of water levels against a background site and, where variations independent of the background site are observed, these may be indicative of mining, or other, independent interference.

CUSUM Water level assessment tool

The one-sided cumulative sum analysis (CUSUM) spreadsheet tool was developed to provide an early indication of a trend in the groundwater level. The initial twelve months of monitoring data was used as an establishment mean ground water level for each borehole. If groundwater levels for a particular bore are reducing beyond the established mean level by more than the water level variation observed in the background bore, then a positive value is produced by the CUSUM analysis and plotted on the graph. If the CUSUM statistical calculations show three values where the CUSUM value is greater than zero, this is deemed to be an indication of a trend occurring. Where the graph has data equal to zero there has not been a significant change from the establishment groundwater level.

Where the CUSUM value exceeds the Action Level, the CUSUM spreadsheet flags the value in a red colour. The Action Level for each aquifer is calculated from the variance in the water level of the background borehole.

For a CUSUM analysis to be conducted background bores were selected for a controlled comparison of sites. The purpose of the background sites is to provide information on the variation in groundwater level due to natural and seasonal fluctuation. Water level data for borehole MW8 was used as a background bore for the Werrie Basalt aquifer bores. Borehole MW28a was used as a background bore for Quipolly aquifer. Borehole MW8 was also used for the 'unknown' bores as an initial background comparison; this can be updated as more information becomes available. Background sites were selected due to their location and availability of water level data.

Bore Identification and trending comments.

Tables 1 summarises findings of groundwater trends as indicated by the CUSUM tool. The CUSUM analysis is a trend identifying tool and is used as a preliminary screening evaluation to initiate further investigations at a trending well. It is through these further investigations that cause and need for mitigation are evaluated.

Action level met - Potentially affected by Mine activities (water level trending downwards)

Groundwater bore sites listed below have shown a trend in the groundwater level as indicated by the CUSUM spreadsheet. All wells listed below are within the Werris Creek Coal Mine property boundary. Other wells do not show trends above the action criteria. However, increasing trends were observed for at least the last four monitoring events at wells MW8, MW9, MW14, MW21a and MW27.

Table 1: Bores where CUSUM indicates a lowering of groundwater levels

Groundwater bore identification	Aquifier	Action level triggered	Comments where groundwater level is decreasing	Impact by mining activities ?
MW1	Werrie Basalt	Yes	Slow downwards trend over three years (2006-2009). Consistent downwards trend from Aug 2009.	
MW6	Werrie Basalt	Yes	Action level triggered in November 2012. First 12 months of water level data used as a basis for comparison is 2 m higher than current water levels.	CUSUM suggests mine impacts.
P1	Werrie Basalt	Yes	Trend in decreasing groundwater levels commences April 2011. Action level attained March 2012 and continuing.	Well is immediately adjacent pit.

Appendix A outlines the data gaps and the information sought from Werris Creek Coal Mine to assist ENVIRON with identification of the aquifers corresponding to the boreholes that were either not shown or a map or did not have aquifer details in the supplied database.

Limitations

ENVIRON Australia prepared this report in accordance with the scope of work as outlined in our proposal to Whitehaven Coal Pty Limited dated 19th June 2013 and in accordance with our understanding and interpretation of current regulatory standards.

A representative program of sampling and laboratory analyses was undertaken as part of this investigation, based on past and present known uses of the site. While every care has been taken, concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. We cannot therefore preclude the presence of materials that may be hazardous.

Site conditions may change over time. This report is based on conditions encountered at the site at the time of the report and ENVIRON disclaims responsibility for any changes that may have occurred after this time.

The conclusions presented in this report represent ENVIRON's professional judgment based on information made available during the course of this assignment and are true and correct to the best of ENVIRON's knowledge as at the date of the assessment.

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Sincerely,
ENVIRON Australia Pty Ltd

Fiona Robinson
Senior Environmental Engineer

Appendix A

More information required:

Data from the CUSUM analysis was classified according to aquifer; reference to background site information is included in each spreadsheet. The boreholes listed below are the data sets that did not include an identifier of either of the Werrie Basalt or Quipolly aquifers; confirmation of the aquifer associated with the borehole is required. Many of these sites had minimal to no data provided. Conclusions regarding any mining activity impacts of those boreholes with limited data may alter as more data becomes available.

Bore site identification	**Comments**	**Information required from Werris Creek Coal Mine**
MW24a	Not shown on supplied map	Aquifer identification and map showing location
MW25a	Not shown on supplied map Only two data points	Aquifer Identification and map showing location
MW25b	Not shown on supplied map. Only two data points	Aquifer identification and map showing location
MW29	Not shown on supplied map.	Aquifer identification and map showing location
MW31	Not shown on supplied map. Only five data points	Aquifer identification and map showing location
MW32		Aquifer identification
MW14b	No shown on supplied map.	Aquifer identification and map showing location
MW5b	Not shown on supplied map	Aquifer identification and map showing location
WCD	No data	Confirm Aquifer
WCU	No data	Confirm Aquifer

Determination of groundwater interception
Werris Creek Coal Mine

Prepared for:
Whitehaven Coal Pty Limited

Prepared by:
ENVIRON Australia Pty Ltd

Date:
27 May 2014

Project Number:
AS130379

ENVIRON

Prepared by:				**Authorised by:**			
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Signature:		Date:	27/5/14	Signature:		Date:	27/5/14

This document is issued in confidence to Whitehaven Coal Pty Limited for the purposes determining the groundwater interception from the Werris Creek Coal operations for the period 2013 to 2014. It should not be used for any other purpose.

VERSION CONTROL RECORD

Document File Name	**Date Issued**	**Version**	**Author**	**Reviewer**
_379 Evaluation of groundwater inflows Werris Creek Coal Mine 2014_Draft_V2	27/5/14	Draft 1	F Robinson	F Robinson

Contents

List of Tables

1 Introduction

Werris Creek Coal Mine (WCCM) is situated in the north west slopes and plains of New South Wales and is located 4km south of Werris Creek. The mine operates under project approval PA 10_0059 MOD 1.

1.1 Background

In 2005, Werris Creek Coal Mine commenced mining of the Greta Coal Measures – Werris Creek outlier, situated within the Werrie Basin. The coal measures overlie Werrie Basalt, which is directly beneath and surrounds the coal measures in all directions. The upper layers of the basalt have been shown to be highly weathered to form a clay aquitard providing confinement to semi-confinement between aquifers within the coal measures and underlying basalt hard rock.

Underground mining of part of the coal seam was undertaken prior to the commencement of open cut mining in 2005. The open cut operations will mine through the former underground mine workings.

Planning approval for the open cut mining operations was sought in two stages, representing the initial project and the Life of Mine Project (LOM). Each stage was subject to a groundwater impact assessment which involved three dimensional modelling of the aquifer systems to assess impacts from the proposed operations. Modelling was based on measured groundwater levels for the project site and known or assumed geological parameters. Modelling for the second project approval, the LOM project, also included calibration of the initial model to observed site conditions.

1.2 Study Objective

Mining operations occur within the Werrie basin. Whilst not mining the surrounding basalt aquifer, the removal of groundwater from the Werrie Basin can cause groundwater flow from the basalt aquifer to the Werrie basin to occur resulting in an incidental interception of groundwater within the basalt aquifer.

The objective of this study is to determine the volume of groundwater intercepted from the basalt aquifer by the mining operations for the period April 2013 to March 2014.

1.3 Scope of Work

The following scope of works was proposed to meet the project objective.

1. Use the existing hydrogeological model (LOM model) to predict the volume of groundwater interception for the period; and
2. Document the study in a report.

2 Modelling

Modelling of groundwater inflow for the monitoring period April 2013 to March 2014 estimated inflow to be 72 ML (annual). This prediction was determined using the calibrated groundwater model developed for the assessment of impacts from the Life of Mine proposal (model groundwater 2010).

The calculated groundwater flows from each groundwater component for the 2013-2014 period are tabulated in **Table 1**.

Table 1 Predicted Groundwater Inflow, Apr 2013 Mar 2014 Monitoring Period

Description	Totals
Total groundwater inflow to void	72ML
Contribution of seepage from basalt (i.e. outside of basin)	32ML
Seepage from Coal Measures and workings	55ML
Seepage to void from overburden	4ML

Mining operations are now reaching the greatest depth of extraction and therefore the impacts to the basalt aquifer are expected to increase. This is reflected by the increase in groundwater inflow from the basalt aquifer from 10ML for the 2012-2013 modelled period to 35ML for the current period. Additionally, the contribution from the former mine workings has decreased, as extraction through the former workings progresses forward and the workings are increasingly depressurised. The model predicts that a change in storage occurred for the period, where water levels in the former workings were maintained by inflow (19ML) from the basalt aquifer. This volume is included in the total presented above as it was removed from the basalt aquifer, but has not been extracted from the pit.

3 Conclusions

In accordance with the Annual Review requirement of the Project Approval; ENVIRON have conducted an evaluation of inflow volumes to the mine void. This calculation has been undertaken by predicting the groundwater inflows using a calibrated model.

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. Minor modification of the boundary conditions adopted in the model was undertaken in 2012 following changes to the management of groundwater within the former mine workings. On this basis the predictions of impacts to the groundwater levels in the basalt aquifer are considered to remain valid.

Groundwater levels in monitoring wells within the basalt aquifer have been observed to decrease in excess of that predicted to occur from mining operations. These effects are also observed at bores remote from the mining operations. On this basis it is considered that these effects are representative of a general decline in the groundwater level as a result of below average rainfall conditions.

4 References

RW Corkery & Co. Pty Ltd, 'Environmental Assessment for Werris Creek Coal Mine, Life of Mine Project', December 2010.

5 Limitations

ENVIRON Australia prepared this report in accordance with the scope of work as outlined in our proposal to Werris Creek Coal Pty Ltd dated 11th April 2014 and in accordance with our understanding and interpretation of current regulatory standards.

Site conditions may change over time. This report is based on conditions encountered at the site at the time of the report and ENVIRON disclaims responsibility for any changes that may have occurred after this time.

The conclusions presented in this report represent ENVIRON's professional judgment based on information made available during the course of this assignment and are true and correct to the best of ENVIRON's knowledge as at the date of the assessment.

ENVIRON did not independently verify all of the written or oral information provided to ENVIRON during the course of this investigation. While ENVIRON has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided to ENVIRON was itself complete and accurate.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

5.1 User Reliance

This report has been prepared exclusively for Werris Creek Coal Pty Ltd and may not be relied upon by any other person or entity without ENVIRON's express written permission.

Piezo ID	MW1				Other Name		Hillview Bore	
Aquifer	Werrie Basalt				Ground RL		418.692	
Coordinates	276322.7		6525107	Elevation	EPL ID 17		Stick Up	0.27m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	44.11		6.5	1240	6.3	7.0	0.1	0.08
Jul-05	49.10		6.8	1190	6.1	5.9	0.1	0.03
Aug-05	Sampling Suspended - Managers Request							
Sep-05	Sampling Suspended - Managers Request							
Oct-05	Sampling Suspended - Managers Request							
Nov-05	Sampling Suspended - Managers Request							
Dec-05	Sampling Suspended - Managers Request							
Jan-06	Sampling Suspended - Managers Request							
Feb-06	Sampling Suspended - Managers Request							
Mar-06	Sampling Suspended - Managers Request							
Apr-06	Sampling Suspended - Managers Request							
Jul-06	Sampling Suspended - Managers Request							
Nov-06	52.00		7.0	1230	6.3	6.7	0.05	0.01
Jan-07	51.05		6.7	1250	6.7	6.9	0.10	0.04
Apr-07	52.40		6.9	730	6.6	7.0	0.09	0.03
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	51.48		Pump Disconnected					
Oct-07	Pump Failed. Site to be re-sampled in November 2007							
Nov-07	51.00		No sample obtained					
Jan-08	50.91		No sample obtained, no access					
Apr-08	50.92		No sample obtained, no access					
Jul-08	51.07		No sample obtained, no access					
Oct-08	51.35		7.2	1250	7.2	7.9	0.11	0.04
Jan-09	51.16		6.6	1240	6.6	8.2	0.1	0.04
Apr-09	No sample taken - contract change over							
Jun-09	50		6.8	1280	N/T	10.2	0.01	0.04
26/08/2009	51.94		7	1230	Testing for these analytes not undertaken			
Nov-09	51.62		6.86	1254	Testing for these analytes not undertaken			
23/02/2010	52.03		7.65	1289	7.37	7.1	0.03	0.05
20/05/2010	52.34	-1%	7.56	1880	7.06	8.7	0.07	0.05
8/09/2010	52.17	0%	6.71	1235	8.6	9.2	0.13	0.05
11/01/2011	51.32	2%	6.58	952	8.05	10	0.28	0.34
16/03/2011	50.3	2%	6.8	1095	4.68	9.5	0.24	0.24
Lowest	**50.3**		**6.58**	**952**	**4.68**	**8.7**	**0.07**	**0.05**
Highest	**52.34**		**7.56**	**1880**	**8.6**	**10**	**0.28**	**0.34**
Mean	**51.5325**		**6.9125**	**1290.5**	**7.0975**	**9.35**	**0.18**	**0.17**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
18/05/2011	50.6	-1%	6.95	1130	0.9	2.2	0.25	0.21
12/09/2011	51.56	-2%	6.73	1070	1.82	2.5	0.12	0.11
13/12/2011	52.42	-2%	6.77	1036	2.78	4.6	0.14	0.11
26/03/2012	52.2	0%	7.01	1240	2.98	1.4	0.15	0.09
Lowest	**50.6**		**6.73**	**1036**	**0.9**	**1.4**	**0.12**	**0.09**
Average	**51.695**		**6.865**	**1119**	**2.12**	**2.675**	**0.165**	**0.13**
Highest	**52.42**		**7.01**	**1240**	**2.98**	**4.6**	**0.25**	**0.21**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
2/07/2012	52.37		Water Depth Only Monitored					
5/09/2012	52.71	-1%	6.94	1180	4.59	5.6	0.11	0.1
21/11/2012	53.26	-1%	Water Depth Only Monitored					
24/01/2013	53.82	-1%	Water Depth Only Monitored					
25/03/2013	54.1	-1%	7.05	1180	4.67	5.8	0.13	0.11
7/05/2013	54.22	0%	6.87	1190	5.14	6.7	0.14	0.07
25/07/2013	54.06	0%	Water Depth Only Monitored					
24/09/2013	54.9	-2%	6.95	1180	7.05	9.6	0.81	0.08
11/11/2013	55.34	-1%	Water Depth Only Monitored					
20/01/2014	55.94	-1%	Water Depth Only Monitored					
26/03/2014	56.42	-1%	6.9	1170	6.82	7.3	0.03	0.14

Piezo ID	MW2				Other Name		Railway View Bore	
Aquifer	Werrie Basalt				Ground RL		413.151	
Coordinates	276816.16		6524331	Elevation	EPL ID 18		Stick Up	0.3m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	24.2		No access					
Jul-05	24.0		7.1	940	5.4	5.3	0.14	0.06
Aug-05	24.9		6.8	940	5.8	5.5	0.90	0.14
Sep-05	25.0		6.9	990	5.5	5.2	0.08	0.06
Oct-05	25.2		7.1	1030	5.7	5.8	0.22	0.08
Nov-05	25.5		6.9	1050	6.3	6.4	0.14	0.12
Dec-05	25.9		7.3	990	6.2	6.6	0.20	0.12
Jan-06	25.9		7.2	1010	7.0	6.5	0.06	0.04
Feb-06	26.3		7.0	1020	5.9	7.0	0.10	0.04
Mar-06	31.3		7.1	990	6.6	6.9	0.12	0.08
Apr-06	26.4		7.3	1200	6.4	6.9	0.29	0.05
Jul-06	26.7		7.1	1000	6.9	7.2	0.08	0.05
Oct-06	27.3		7.0	1010	6.9	7.3	0.08	0.02
Jan-07	27.6		6.9	1020	7.2	7.4	0.12	0.05
Apr-07	27.9		7.0	1020	6.8	7.4	0.11	0.05
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	28.1		6.8	1030	7.0	7.6	0.08	0.03
Nov-07	27.2		7.2	970	5.5	7.0	0.40	0.09
Jan-08	27.2		7.3	1020	7.6	7.4	0.15	0.05
Apr-08	27.22		7.1	1020	7.4	7.9	0.09	0.06
Jul-08	27.48		7.2	1020	6	7.5	0.06	0.05
Oct-08	N/A		7.1	1010	7.4	8	0.08	0.07
Jan-09	N/A		7.1	970	5.6	6.8	0.07	0.05
Apr-09	No sample taken - contract change over							
Jun-09	N/A		7.2	930	N/T	7.6	0.02	0.03
Aug-09	N/A		7.5	980	Testing for these analytes not undertaken			
Nov-09	26.35		6.7	1020	Testing for these analytes not undertaken			
23/02/2010	26.55		7.57	1027	6.07	7.1	0.03	0.05
20/05/2010	26.91	-1%	8.27	1470	5.68	7.4	0.05	0.05
8/09/2010	25.38	6%	7.5	924	5.14	5.4	0.15	0.07
11/01/2011	23.57	8%	Pump not running - sample not taken					
16/03/2011	23.35	1%	Pump not running - sample not taken					
Lowest	**23.35**		**7.5**	**924**	**5.14**	**5.4**	**0.05**	**0.05**
Highest	**26.91**		**8.27**	**1470**	**5.68**	**7.4**	**0.15**	**0.07**
Mean	**24.80**		**7.89**	**1197**	**5.41**	**6.4**	**0.1**	**0.06**
Number of samples	**4**		**2**	**2**	**2**	**2**	**2**	**2**
17/05/2011	24.04	6%	Pump not running - sample not taken					
12/09/2011	24.80	-3%	7.20	750	0.72	1.00	0.04	0.03
13/12/2011	25.09	-1%	7.36	730	0.68	1.10	0.02	0.01
26/03/2012	23.70	0.06	7.54	810	0.35	0.40	0.06	0.04
Lowest	**23.70**		**7.20**	**730.00**	**0.35**	**0.40**	**0.02**	**0.01**
Average	**24.4075**		**7.37**	**763.33**	**0.58**	**0.83**	**0.04**	**0.03**
Highest	**25.09**		**7.54**	**810**	**0.72**	**1.1**	**0.06**	**0.04**
Number of samples	**4**		**3**	**3**	**3**	**3**	**3**	**3**
2/07/2012	24.32		Water Depth Only Monitored					
5/09/2012	25.09	-3%	7.6	815	0.08	<0.1	0.06	0.06
25/09/2012	25.27	-1%	Water Depth Only Monitored					
21/11/2012	25.68	-2%	Water Depth Only Monitored					
24/01/2013	26.14	-2%	Water Depth Only Monitored					
25/03/2013	25.42	3%	7.58	821	0.01	0.1	0.14	0.02
7/05/2013	25.42	0%						
25/07/2013	25.91	-2%	Water Depth Only Monitored					
24/09/2013	26.25	-1%	7.04	796	2.36	3.7	0.07	0.07
11/11/2013	26.73	-2%	Water Depth Only Monitored					
20/01/2014	27.27	-2%	Water Depth Only Monitored					
26/03/2014	27.87	-2%	7.50	788	3.05	3.4	0.05	0.07

Piezo ID	MW3				Other Name		Eurunderee	
Aquifer	Werrie Basalt				Ground RL		367.267	
Coordinates	274594.69		6522940		EPL ID 19		Stick Up	0.4m/ 0.95m
Sample Date	Depth to Ground - metres		pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	Site Not Sampled - Managers Request							
Jul-05	Site Not Sampled - Managers Request							
Aug-05	16.73		6.9	2360	3.8	4.0	0.06	0.04
Sep-05	15.66		7.7	2610	2.3	2.5	0.44	0.18
Oct-05	16.95		7.7	2940	0.83	2.0	2.30	0.28
Nov-05	7.76		7.0	2770	2.8	3.8	1.70	0.16
Dec-05	15.33		7.3	2530	3.2	3.6	0.27	0.27
Jan-06	15.35		7.4	900	2.2	2.2	0.06	0.02
Feb-06	16.45		7.3	2620	2.7	3.6	0.22	0.08
Mar-06	15.53		7.1	2410	4.0	4.2	0.06	0.04
Apr-06	14.85		7.8	1700	6.4	8.5	0.98	0.37
Jul-06	14.95		7.0	2400	3.8	3.9	0.44	0.08
Oct-06	15.34		7.4	2830	1.1	2.1	0.66	0.2
Jan-07	14.95		7.0	2670	2.4	2.8	0.37	0.18
Apr-07	16.32		7.0	2480	4.1	4.4	0.10	0.07
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	15.33		7.1	2450	3.9	4.6	0.09	0.05
Nov-07	14.7		7.4	2330	0.54	3.6	1.5	0.29
Jan-08	14.94		7.4	2130	0.28	3.7	0.5	0.39
Apr-08	16.19		7.5	2710	1.3	2.6	0.4	0.11
Jul-08	14.61		7.8	2500	0.7	1.7	0.18	0.15
Oct-08	16.38		7.2	1480	0.13	2.2	1.9	0.14
Jan-09	14.13		7.5	2280	0.27	2.3	2.3	0.06
Apr-09	No sample taken - contract change over							
Jun-09	No access							
Aug-09	N/A		8.1	890	Testing for these analytes not undertaken			
Nov-09	N/A		8.04	840	Testing for these analytes not undertaken			
23/02/2010	N/A		8.36	1742	0.54	0.7	<0.01	0.01
19/05/2010	N/A		7.81	760	0.89	0.9	0.19	<0.01
9/09/2010	N/A		7.7	25	0.42	0.4	0.03	0.02
6/01/2011	N/A		7.02	73	0.03	0.8	<0.01	0.02
15/03/2011	N/A		7.09	42	0.28	0.5	<0.01	0.02
Lowest	**0**		**7.02**	**25**	**0.03**	**0.4**	**0.03**	**0.02**
Highest	**0**		**7.81**	**760**	**0.89**	**0.9**	**0.19**	**0.02**
Mean	**#DIV/0!**		**7.405**	**225**	**0.405**	**0.65**	**0.11**	**0.02**
Number of samples	**0**		**4**	**4**	**4**	**4**	**2**	**3**
17/05/2011	N/A		6.85	37	0.18	0.3	0.1	<0.01
13/09/2011	11.97		No sample taken - pump not working and tank empty					
14/12/2011	13.91		7.25	50	0.16	0.9	0.25	0.22
27/03/2012	14.1		7.03	82	0.02	0.9	0.42	0.26
Lowest	**11.97**		**6.85**	**37.00**	**0.02**	**0.30**	**0.10**	**0.01**
Average	**13.33**		**7.04**	**56.33**	**0.12**	**0.7**	**0.26**	**0.16**
Highest	**14.10**		**7.25**	**82**	**0.18**	**0.9**	**0.42**	**0.26**
Number of samples	**3**		**3**	**3**	**3**	**3**	**3**	**3**
9/05/2012	14.17		6.88	3270	16.6	16.6	0.02	0.02
2/07/2012	27.12		Water Depth Only Monitored					
13/09/2012	15.26		6.89	185	0.78	1.4	0.37	0.35
25/09/2012	15.38	-1%	7.1	150	18.4	20.4	0.03	0.01
21/11/2012	15.59	-1%	Water Depth Only Monitored					
25/01/2013	15.68	-1%	Water Depth Only Monitored					
25/03/2013	15.13	4%	7.36	249	1.65	2.4	0.39	0.41
9/05/2013	15.01	1%	6.78	3160	20.2	25.5	<0.05	0.02
26/07/2013	14.97	0%	Water Depth Only Monitored					
25/09/2013	15.3	-2%	6.74	3080	20.4	24.8	<0.01	<0.01
8/11/2013	15.61	-2%	Water Depth Only Monitored					
21/01/2014	16.01	-2%	Water Depth Only Monitored					
31/03/2014	16.45	-3%	6.70	3320	23.0	25.0	0.01	<0.01

Piezo ID	MW4B				Other Name			
Aquifer	Werrie Basalt				Ground RL		364	
Coordinates	275896.4		6522328		EPL ID 20		Stick Up	0.68m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jul-06	7.88		7.2	1000	<0.2	69.0	6.6	3.40
Nov-06	9.71		6.7	2670	Sample contaminated			
Jan-07	9.03		Dry					
Apr-07	9.63		7.2	1040	3.40	34.0	0.08	0.04
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	9.49		7.0	910	0.04	1.8	0.04	0.02
Nov-07	9.39		7.4	810	0.03	0.34	0.8	<0.01
Jan-08	9.51		Very slow recharge of bore					
Apr-08	9.14		8.0	1040	0.03	6.8	0.82	0.12
Jul-08	9.35		7.9	930	<0.1	6.5	0.03	<0.01
Oct-08	9.62		Dry					
Jan-09	9.48		Dry					
1/04/2009	No sample taken - contract change over							
1/06/2009	9.88		7.9	990	Testing for these analytes not undertaken			
1/08/2009	9.86		7.5	1070	Testing for these analytes not undertaken			
1/11/2009	9.97		7.42	1080	Testing for these analytes not undertaken			
23/02/2010	10.24		7.7	1078	1.45	2.2	0.02	<0.01
19/05/2010	10.38	-1%	8.06	950	1.66	2.6	0.1	0.05
9/09/2010	10.36	0%	7.58	1021	1.48	2.5	0.32	0.05
15/09/2010	10.28	1%	Water Depth Only Monitored					
6/01/2011	10.04	2%	7.53	920	1.1	2.3	0.02	<0.01
15/03/2011	9.38	7%	7.49	674	1.27	2.1	<0.01	0.02
Lowest	**9.38**		**7.49**	**674**	**1.1**	**2.1**	**0.02**	**0.02**
Highest	**10.38**		**8.06**	**1021**	**1.66**	**2.6**	**0.32**	**0.05**
Mean	**10.09**		**7.67**	**891.25**	**1.38**	**2.38**	**0.15**	**0.04**
Number of samples	**5**		**4**	**4**	**4**	**4**	**3**	**3**
27/03/2012	10.2		7.52	975	1.24	2.5	0.06	0.06
17/05/2011	9.42	0%	7.6	944	0.95	1.2	0.28	<0.01
13/09/2011	9.76	-3%	7.36	880	1.1	1.4	0.02	0.01
14/12/2011	10.26	-5%	7.26	882	1.45	2	0.02	0.01
Lowest	**9.42**		**7.26**	**880.00**	**0.95**	**1.20**	**0.02**	**0.01**
Average	**9.91**		**7.44**	**920.25**	**1.19**	**1.78**	**0.10**	**0.02**
Highest	**10.26**		**7.60**	**975.00**	**1.45**	**2.50**	**0.28**	**0.06**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
3/07/2012	8.62		Water Depth Only Monitored					
13/09/2012	10.56	-18%	7.7	970	1.34	1.7	0.04	0.02
25/09/2012	10.64	-1%	Water Depth Only Monitored					
21/11/2012	10.88	-2%	Water Depth Only Monitored					
25/01/2013	11.12	-2%	Water Depth Only Monitored					
25/03/2013	10.39	7%	7.76	978	1.35	2	0.10	0.02
9/05/2013	9.95	4%	7.76	974	1.44	1.6	0.05	0.02
30/05/2013	10.56	-6%	Water Depth Only Monitored					
26/07/2013	10.07	5%	Water Depth Only Monitored					
24/09/2013	10.66	-6%	7.67	981	1.01	1.6	0.11	0.03
8/11/2013	11.10	-4%	Water Depth Only Monitored					
21/01/2014	11.62	-4%	Water Depth Only Monitored					
31/03/2014	12.14	-4%	8	956	1.99	2.1	0.03	0.03

Piezo ID	MW5				Other Name		Narrawolga/Eurundere e Boundary	
Aquifer	Werrie Basalt				Ground RL		360.173m	
Coordinates	274899.5		6522046		EPL ID 21		Stick Up	1.13m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	Site Not Installed							
Jul-05	Site Not Installed							
Aug-05	Site Not Installed							
Sep-05	Site Not Installed							
Oct-05	8.70		6.8	2310	1.2	1.4	0.18	0.02
Nov-05	8.64		6.9	2320	0	0.33	0.16	0.04
Dec-05	8.55		7.5	2160	0	0.51	0.28	0.09
Jan-06	8.56		7.3	1850	3.00	3.7	0.50	0.04
Feb-06	8.38		7.1	2280	0.01	1.9	0.26	0.04
Mar-06	8.30		7.2	2260	0.01	1.7	0.26	0.08
Apr-06	8.33		7.4	1900	<0.01	5.1	1.05	0.05
Jul-06	8.40		7.3	2230	<0.2	2.8	0.16	0.02
Oct-06	8.43		7.2	2180	<0.01	2.0	0.17	0.03
Jan-07	8.63		6.6	2640	2.0	2.0	0.02	0.06
Apr-07	9.74		6.9	2630	2.0	2.2	0.13	<0.01
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	8.62		6.9	2690	2.0	2.3	0.03	<0.01
Nov-07	8.47		7.0	2620	2.2	2	0.32	<0.01
Jan-08	8.41		7.0	2740	2.2	2.2	0.05	0.01
Apr-08	8.17		6.9	2720	2.3	2.2	0.12	0.01
Jul-08	8.12		6.9	2920	2.3	2.4	0.22	<0.01
Oct-08	7.88		6.8	2780	2.4	2.7	0.04	0.03
Jan-09	7.39		7	2630	1.7	2.6	0.02	0.04
Apr-09	No sample taken - contract change over							
Jun-09	No access							
Aug-09	8.6		7.4	2150	Testing for these analytes not undertaken			
Nov-09	8.77		7	2660	Testing for these analytes not undertaken			
23/02/2010	9.04		7.41	2440	0.97	14.5	0.72	0.73
19/05/2010	9.29	-3%	e7.5	e4080	2.56	2.6	0.08	0.01
9/09/2010	8.41	10%	7.33	1902	0.04	10.9	0.97	0.86
6/01/2011	7.81	8%	7.01	2230	2.3	2.8	<0.01	0.02
15/03/2011	7.19	9%	6.95	2178	2.42	2.9	<0.01	<0.01
Lowest	**7.19**		**6.95**	**1902**	**0.04**	**2.6**	**0.08**	**0.01**
Highest	**9.29**		**7.33**	**2230**	**2.56**	**10.9**	**0.97**	**0.86**
Mean	**8.18**		**7.10**	**2103.333**	**1.83**	**4.8**	**0.53**	**0.30**
Number of samples	**4**		**3**	**3**	**4**	**4**	**2**	**3**
17/05/2011	7.28	-1%	7.05	2230	2.06	2.4	0.01	<0.01
13/09/2011	e6.71		7.22	1405	9.18	16.8	1.67	1.6
30/09/2011	7.66	-5%	Water Depth Only Monitored					
14/12/2011	7.81	-2%	7.21	1410	3.78	24	1.86	1.92
27/03/2012	7.89	-0.01	7.64	1640	0.37	72.2	5.07	5.19
Lowest	**7.28**		**7.05**	**1405.00**	**0.37**	**2.40**	**0.01**	**0.01**
Average	**7.66**		**7.28**	**1671.25**	**3.85**	**28.85**	**2.15**	**2.18**
Highest	**7.89**		**7.64**	**2230.00**	**9.18**	**72.20**	**5.07**	**5.19**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
8/05/2012			7.05	3040	1.96	2	<0.01	0.01
3/07/2012	8.63		Water Depth Only Monitored					
13/09/2012	8.41	3%	7.43	2030	0.55	17	1.95	1.46
21/11/2012	8.75	-4%	Water Depth Only Monitored					
25/01/2013	8.76	0%	Water Depth Only Monitored					
25/03/2013	7.69	14%	7.57	2260	0.11	8.4	1.27	1.48
9/05/2013	7.44	3%						
30/05/2013	7.54	-1%	Water Depth Only Monitored					
26/07/2013	7.91	-5%	Water Depth Only Monitored					
24/09/2013	8.53	-7%	7.55	2280	1.3	6.4	1.03	1.01
8/11/2013	8.93	-4%	Water Depth Only Monitored					
21/01/2014	9.4	-5%	Water Depth Only Monitored					
31/03/2014	9.88	-5%	7.70	2390	5.80	6.3	0.77	0.78

Piezo ID	MW6				Other Name		Plain View Bore	
Aquifer	Werrie Basalt				Ground RL		367	
Coordinates	276810.4		6521544				Stick Up	1.05m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	Site Not Installed							
Jul-05	Site Not Installed							
Aug-05	Site Not Installed							
Sep-05	Site Not Installed							
Oct-05	10.00		6.9	1960	3.3	3.7	0.10	0.08
Nov-05	9.99		6.9	2000	2.1	2.5	3.30	0.08
Dec-05	9.95		7.2	1840	2.8	3.2	2.00	0.14
Jan-06	9.88		7.2	1880	3.3	3.6	0.36	0.04
Feb-06	9.89		7.0	1920	2.6	3.5	0.42	0.10
Mar-06	9.81		7.0	1880	2.8	3.3	0.32	0.08
Apr-06	9.91		7.3	1600	3.1	3.9	0.23	0.04
Jul-06	10.18		7.0	1920	3.6	3.9	0.60	0.24
Oct-06	10.53		7.0	1890	3.5	4.0	0.20	0.07
Jan-07	10.68		6.9	1930	4.0	4.0	0.06	0.13
Apr-07	10.93		6.9	1970	4.1	4.3	0.14	0.06
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	11.70		6.8	1950	4.0	4.3	0.06	0.03
Nov-07	11.1		7.1	1930	4.3	4.2	0.05	0.04
Jan-08	11.51		7.0	1960	4.2	4.1	0.05	0.04
Apr-08	10.94		7.1	1930	3.4	4.0	0.33	0.05
Jul-08	10.94		7.0	2060	3.8	3.9	0.77	0.09
Oct-08	11.14		7.2	1960	4.4	5.3	0.23	0.1
Jan-09	10.87		7	1940	3.6	4.2	0.08	0.05
Apr-09	No sample taken - contract change over							
Jun-09	11.67		7	2060	N/T	4.9	0.03	0.04
Aug-09	11.83		7.2	1930	Testing for these analytes not undertaken			
Nov-09	12.11		7.61	1973	Testing for these analytes not undertaken			
23/02/2010	12.32		7.54	1990	3.36	3.9	0.46	0.06
20/05/2010	12.53		8.08	2920	3.71	4.5	0.23	0.1
8/09/2010	12.68	-1%	7.13	1966	4.58	5.3	0.57	0.11
15/09/2010	12.6	1%	Water Depth Only Monitored					
11/01/2011	12.31	2%	7.12	1598	4.32	6	0.19	0.09
16/03/2011	11.28	9%	7.11	1669	3.57	5.1	0.11	0.06
Lowest	**11.28**		**7.11**	**1598**	**3.57**	**4.5**	**0.11**	**0.06**
Highest	**12.68**		**8.08**	**2920**	**4.58**	**6**	**0.57**	**0.11**
Mean	**12.28**		**7.36**	**2038.25**	**4.05**	**5.23**	**0.28**	**0.09**
Number of samples	**5**		**4**	**4**	**4**	**4**	**4**	**4**
18/05/2011	11.19	1%	7.2	1730	3.03	4.2	0.14	0.05
12/09/2011	11.48	-3%	7.05	1610	2.88	4.0	0.06	0.06
13/12/2011	11.83	-3%	6.97	1615	3.10	4.1	0.13	0.07
27/03/2012	12.00	-0.01	7.21	1750	3.37	4.9	0.27	0.08
Lowest	**11.19**		**6.97**	**1610.00**	**2.88**	**4.00**	**0.06**	**0.05**
Average	**11.63**		**7.11**	**1676.25**	**3.10**	**4.30**	**0.15**	**0.07**
Highest	**12.00**		**7.21**	**1750.00**	**3.37**	**4.90**	**0.27**	**0.08**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
2/07/2012	11.96		Water Depth Only Monitored					
5/09/2012	12.1	-1%	7.14	1750	3.89	5	0.22	0.03
21/11/2012	12.23	-1%	Water Depth Only Monitored					
24/01/2013	12.41	-1%	Water Depth Only Monitored					
25/03/2013	12.47	0%	7.38	1750	4.85	6.6	0.14	0.08
7/05/2013	12.49	0%						
25/07/2013	12.49	0%	Water Depth Only Monitored					
24/09/2013	12.45	0%	7.18	1730	4.72	6	0.96	0.08
8/11/2013	12.64	-2%	Water Depth Only Monitored					
20/01/2014	12.83	-1%	Water Depth Only Monitored					
26/03/2014	13.1	-2%	7.40	1720	4.40	5.0	0.22	0.07

Piezo ID	MW7				Other Name		Anderson Irrigation	
Aquifer	Quipolly Creek Alluvium				Ground RL		347.877m	
Coordinates	273181		6519844	Depth	7.25m		Stick Up	0.12m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	4.83		6.0	490	1.3	1.5	0.14	0.12
Jul-05	4.44		6.9	490	1.3	1.5	0.12	0.07
Aug-05	4.47		7.0	520	1.4	1.4	0.08	0.08
Sep-05	4.44		6.8	520	1.4	1.4	0.12	0.08
Oct-05	4.36		7.1	540	1.3	1.5	0.24	0.10
Nov-05	4.44		6.8	530	1.5	1.4	0.16	0.10
Dec-05	4.38		6.8	520	1.2	1.3	0.26	0.14
Jan-06	4.38		7.5	890	2.2	2.4	0.10	0.02
Feb-06	4.42		6.8	500	1.0	1.3	0.12	0.80
Mar-06	4.56		6.9	510	1.1	1.3	0.10	0.80
Apr-06	4.51		7.0	380	0.98	1.1	0.12	0.07
Jul-06	4.35		6.9	520	1.4	1.4	0.10	0.08
Oct-06	4.39		7.1	510	1.1	1.2	0.09	0.03
Jan-07	4.73		6.7	530	1.3	1.4	0.15	0.07
Apr-07	4.60		6.7	550	1.4	1.6	0.12	0.06
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	4.41		6.3	540	1.4	1.6	0.07	0.04
Nov-07	4.36		7.2	520	1.4	1.3	0.37	0.05
Jan-08	4.35		6.8	520	1.4	1.2	0.52	0.06
Apr-08	4.45		7	530	1.1	1.5	0.52	0.07
Jul-08	4.41		6.8	540	1.3	1.3	0.69	0.06
Oct-08	4.35		7	520	1.3	1.5	0.09	0.07
Jan-09	4.00		8.1	510	1.1	1.5	0.1	0.07
Apr-09	No sample taken - contract change over							
Jun-09	4.28		6.9	510	N/T	1.7	0.02	0.04
26/08/2009	4.43		7.7	520	Testing for these analytes not undertaken			
Nov-09	4.27		7.91	590	Testing for these analytes not undertaken			
23/02/2010	4.42		7.79	561	1.36	1.4	0.06	0.05
30/04/2010	4.48		Water Depth Only Monitored					
19/05/2010	4.55	-2%	e8.2	e479	1.37	2	0.24	0.06
20/07/2010	4.5	1%	Water Depth Only Monitored					
8/09/2010	4.15	8%	7.01	535	1.67	2.2	0.09	0.08
7/10/2010	4.25	-2%	Water Depth Only Monitored					
10/01/2011	4.16	2%	7.1	463	1.24	1.4	0.09	0.07
7/04/2011	4.33	-4%	Water Depth Only Monitored					
13/04/2011	N/A		7.29	565	1.08	1.7	0.1	0.05
Lowest	**4.15**		**7.01**	**463**	**1.08**	**1.4**	**0.09**	**0.05**
Highest	**4.55**		**7.29**	**565**	**1.67**	**2.2**	**0.24**	**0.08**
Mean	**4.28**		**7.13**	**521.00**	**1.33**	**1.77**	**0.09**	**0.07**
Number of samples	**6**		**3**	**3**	**4**	**4**	**4**	**4**
7/09/2011	4.29	1%			0.92	1.7	0.07	0.06
14/12/2011	4.28	0%	6.73	560	1.5	1.8	0.11	0.07
26/03/2012	c5.22	-	7.06	588	0.87	1	0.09	0.07
Lowest	**4.28**		**6.73**	**560**	**0.87**	**1**	**0.07**	**0.06**
Highest	**5.22**		**7.06**	**588**	**1.5**	**1.8**	**0.11**	**0.07**
Mean	**4.6**		**6.9**	**574**	**1.1**	**1.5**	**0.09**	**0.07**
Number of samples	**3**		**2**	**2**	**3**	**3**	**3**	**3**
25/03/2013	4.2	2%			4.04	6.4	0.30	0.31
25/03/2014	4.6	-9%	7.20	485	1.23	1.4	0.09	0.08

Piezo ID	MW8				Other Name		Roseneath	
Aquifer	Werrie Basalt				Ground RL		369.576	
Coordinates	277123.8		6519281				Stick Up	
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	Site Not Sampled - Managers Request							
Jul-05	Site Not Sampled - Managers Request							
Aug-05	14.35		6.8	1160	4.5	4.2	0.04	0.01
Sep-05	13.78		6.8	1190	3.8	3.7	0.10	0.04
Oct-05	13.29		7.0	1190	3.4	3.6	0.08	0.06
Nov-05	13.42		6.9	1190	3.5	3.6	0.08	0.06
Dec-05	13.65		7.3	1170	3.2	3.0	0.24	0.11
Jan-06	13.63		7.3	880	2.1	2.2	0.08	0.02
Feb-06	14.33		7.2	1210	3.6	4.3	0.08	0.06
Mar-06	14.55		6.9	1180	4.1	4.2	0.24	0.04
Apr-06	14.93		7.3	1290	4.0	4.4	0.14	0.03
Jul-06	15.75		7.0	1470	5.4	5.2	2.8	0.03
Oct-06	16.60		7.0	790	1.5	1.6	0.09	0.02
Jan-07	17.35		7.1	1650	6.4	6.7	0.07	0.03
Apr-07	18.71		7.1	1700	6.2	7.1	0.04	0.01
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	17.87		6.8	1730	6.6	7.2	0.02	<0.01
Nov-07	15.9		7.0	1300	5.4	5.5	1.1	0.01
Jan-08	17.6		7.0	1320	4.6	4.5	1	0.01
Apr-08	14.6		7.2	820	1.5	1.7	0.08	0.06
Jul-08	15.79		7.3	1170	3.7	3.8	0.03	0.01
Oct-08	N/A		7.3	1210	4.1	4.3	0.04	0.03
Jan-09	N/A		7.1	1040	2.9	3.4	0.04	0.03
Apr-09	No sample taken - contract change over							
Jun-09	14.67		7.2	1250	N/T	5.6	<0.01	<0.01
Aug-09	15.58		7.6	1240	Testing for these analytes not undertaken			
Nov-09	N/A		7.04	1402	Testing for these analytes not undertaken			
23/02/2010	17.05		7.64	1467	5.24	5.8	<0.01	<0.01
20/05/2010	17.44	-2%	8.05	2190	5.19	6.2	0.05	0.02
8/09/2010	14.33	22%						
8/11/2010	12.82	12%						
11/01/2011	12.06	6%	7.16	813	3.88	4.5	0.14	0.07
16/03/2011	11.68	3%	7.24	620	2.78	4.1	0.09	0.02
Lowest	**11.68**		**7.16**	**620**	**2.78**	**4.1**	**0.05**	**0.02**
Highest	**17.44**		**8.05**	**2190**	**5.19**	**6.2**	**0.14**	**0.07**
Mean	**13.67**		**7.48**	**1207.67**	**3.95**	**4.93**	**0.09**	**0.04**
Number of samples	**5**		**3**	**3**	**3**	**3**	**3**	**3**
18/05/2011	12.72	-8%	7.25	1050	3.72	4.5	0.03	0.02
12/09/2011	14.36	-11%	7.35	1060	3.92	4.9	<0.01	0.01
14/12/2011	14.4	0%	7.05	1075	5.02	5	0.06	0.02
27/03/2012	12.8	0.13	7.88	1020	2.76	3.7	0.03	0.07
Lowest	**12.72**		**7.05**	**1020**	**2.76**	**3.7**	**<0.01**	**0.01**
Highest	**14.36**		**7.88**	**1075**	**5.02**	**5**	**0.06**	**0.07**
Mean	**13.57**		**7.38**	**1051.25**	**3.86**	**4.53**	**0.03**	**0.03**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
3/07/2012	14.16		Water Depth Only Monitored					
5/09/2012	14.2	0%	Water Depth Only Monitored					
16/11/2012	14.27	0%	Water Depth Only Monitored					
24/01/2013	15.05	-5%	Water Depth Only Monitored					
26/03/2013	14.1	7%	Water Depth Only Monitored					
8/05/2013	14.42	-2%						
25/07/2013	15.28	-6%	Water Depth Only Monitored					
24/09/2013	15.86	-4%	Water Depth Only Monitored					
11/11/2013	16.31	-3%	Water Depth Only Monitored					
21/01/2014	16.8	-3%	Water Depth Only Monitored					
31/03/2014	17.22	-2%	7.60	1320	5.83	6.8	0.03	<0.01

Piezo ID	MW9				Other Name		train load out	
Aquifer	Werrie Basalt				Ground RL		378.059m	
Coordinates	274164.7		6526458				Stick Up	1.07m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	Site Not Installed							
Jul-05	Site Not Installed							
Aug-05	Site Not Installed							
Sep-05	Site Not Installed							
Oct-05	13.78		6.7	1230	17.0	18.0	0.04	0.02
Nov-05	13.53		6.9	1160	9.2	9.0	0.12	0.10
Dec-05	12.55		7.4	1080	14.0	15.0	0.26	0.09
Jan-06	11.72		7.2	2080	25.0	24.0	0.54	0.10
Feb-06	12.86		7.2	980	9.7	11.0	0.12	0.08
Mar-06	13.06		7.2	960	10.0	11.0	0.08	0.06
Apr-06	13.42		7.3	1100	9.2	12.0	0.22	0.33
Jul-06	13.95		7.2	990	8.9	9.6	0.19	0.04
Oct-06	14.46		7.2	970	7.8	8.4	0.10	0.03
Jan-07	14.84		6.8	1120	14.0	14.0	0.07	0.02
Apr-07	14.67		6.9	1120	12.0	12.0	0.04	<0.01
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	14.25		6.9	1040	8.3	8.9	0.45	<0.01
Nov-07	13.8		7.0	1070	11	10	0.03	<0.01
Jan-08	12.88		7.1	940	6.4	6.2	0.02	<0.01
Apr-08	13.8		Pump Failure					
Jul-08	14.05		7	1010	8.2	8.5	0.04	<0.01
Oct-08	12.89		7	870	4.2	4.5	0.03	0.03
Jan-09	12.55		7.2	770	5.3	6.2	0.02	0.04
Apr-09	No sample taken - contract change over							
Jun-09	14.68		7.2	860	N/T	8.8	<0.01	<0.01
Aug-09	15.17		7.2	900	Testing for these analytes not undertaken			
Nov-09	15.41		7.17	905	Testing for these analytes not undertaken			
23/02/2010	14.3		7.78	885	2.55	3.2	0.04	<0.01
19/05/2010	15.07	-5%	7.79	873	5.62	6.3	0.11	0.01
9/09/2010	13.69	10%						
6/01/2011	13.41	2%	7.32	689	3.29	3.9	<0.01	0.02
15/03/2011	13.48	-1%	7.25	682	3.14	4.9	0.03	<0.01
Lowest	**13.41**		**7.25**	**682**	**3.14**	**3.9**	**0.03**	**0.01**
Highest	**15.07**		**7.79**	**873**	**5.62**	**6.3**	**0.11**	**0.02**
Mean	**13.91**		**7.45**	**748.00**	**4.02**	**5.03**	**0.07**	**0.02**
Number of samples	**4**		**3**	**3**	**3**	**3**	**2**	**2**
17/05/2011	14.08	-4%	7.35	781	3.21	4.2	0.06	<0.01
13/09/2011	14.73	-4%	7.03	865	4.62	5.1	0.02	0.02
14/12/2011	13.66	8%	7.13	716	2.74	2.9	0.07	0.01
27/03/2012	14.1	-0.03	7.54	753	2.44	3.9	0.06	0.04
Lowest	**13.66**		**7.03**	**716**	**2.44**	**2.9**	**0.02**	**0.01**
Highest	**14.73**		**7.54**	**865**	**4.62**	**5.1**	**0.07**	**0.04**
Mean	**14.14**		**7.26**	**779**	**3.25**	**4.03**	**0.05**	**0.02**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
3/07/2012	14.92		Water Depth Only Monitored					
13/09/2012	14.92	0%	Water Depth Only Monitored					
21/11/2012	15.43	-3%	Water Depth Only Monitored					
25/01/2013	15.54	-1%	Water Depth Only Monitored					
25/03/2013	15.47	0%	Water Depth Only Monitored					
9/05/2013	15.27	1%						
26/07/2013	15.74	-3%	Water Depth Only Monitored					
24/09/2013	-	-	Standpipe broken during Rail Loop Construction					
8/11/2013	-	-	Standpipe broken during Rail Loop Construction					
21/01/2014	-	-	Standpipe broken during Rail Loop Construction					

Piezo ID	MW10				Other Name		Zeolite	
Aquifer	Werrie Basalt				Ground RL		371.458m	
Coordinates	273130.6		6526225				Stick Up	0.2m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	17.00		6.8	2120	22	24	0.04	0.02
Jul-05	17.29		6.9	2070	23	23	0.08	0.01
Aug-05	14.26		7.1	2030	23	23	0.04	0
Sep-05	17.75		6.8	2240	23	22	0.06	0.04
Oct-05	17.28		7.1	2210	22	23	0.08	0.04
Nov-05	18.31		6.8	2180	25	25	0.08	0.04
Dec-05	17.32		7.4	2180	23	23	0.24	0.08
Jan-06	17.61		7.1	2050	25	23	0.12	0.02
Feb-06	17.66		7.1	2060	22	24	0.08	0.06
Mar-06	17.5		7.1	2090	23	24	0.04	0.04
Apr-06	17.95		7.2	1800	23	27	0.07	0.01
Jul-06	17.46		7.4	1970	24	25	3.70	0.03
Oct-06	17.38		7.1	2040	22	24	0.06	0.01
Jan-07	17.25		7.2	2040	23	24	0.09	0.02
Apr-07	18.20		7.6	1920	23	24	0.06	<0.01
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	17.38		7.2	1970	22	23	0.02	<0.01
Nov-07	17.80		7.6	1890	24	24	0.01	<0.01
Jan-08	18.76		7.3	1950	24	24	0.01	<0.01
Apr-08	17.91		7.4	1850	21	23	0.02	0.02
Jul-08	17.85		7.3	2300	24	24	0.05	<0.01
Oct-08	N/A		7.8	1810	20	22	0.04	0.03
Jan-09	N/A		7.5	1920	20	23	0.02	0.02
Apr-09	No sample taken - contract change over							
Jun-09	N/A		7.5	1670	N/T	18.8	<0.01	<0.01
Aug-09	N/A		7.3	1940	Testing for these analytes not undertaken			
Nov-09	18.86		7.3	2007	Testing for these analytes not undertaken			
23/02/2010	18.43		7.48	1875	20.9	21.4	<0.01	<0.01
19/05/2010	17.44	6%	8.5	2860	14.9	17.2	0.15	<0.01
8/09/2010	17.18	2%						
11/01/2011	17.2	0%	7.22	1698	21.9	25.7	0.06	<0.01
16/03/2011	11.25	53%	7.13	1678	19.8	22.7	<0.01	0.01
Lowest	**11.25**		**7.13**	**1678**	**14.9**	**17.2**	**0.06**	**0.01**
Highest	**17.44**		**8.5**	**2860**	**21.9**	**25.7**	**0.15**	**0.01**
Mean	**15.77**		**7.62**	**2078.67**	**18.87**	**21.87**	**0.11**	**0.01**
Number of samples	**4**		**3**	**3**	**3**	**3**	**2**	**1**
18/05/2011	17.06	1%	7.3	1080	6.41	8.6	0.13	0.02
12/09/2011	16.98	0%	7.56	1080	6.92	8.3	0.04	0.01
13/12/2011	16.98	0%	7.25	1115	7.25	8.3	0.02	<0.01
26/03/2012	20	-0.15	7.31	1780	18.3	19.5	<0.01	0.01
Lowest	**16.98**		**7.25**	**1080**	**6.41**	**8.3**	**0.02**	**0.01**
Highest	**20**		**7.56**	**1780**	**18.3**	**19.5**	**0.13**	**0.02**
Mean	**17.76**		**7.36**	**1264**	**9.72**	**11.18**	**0.05**	**0.01**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
2/07/2012	18.32		Water Depth Only Monitored					
5/09/2012	18.07	1%	Water Depth Only Monitored					
21/11/2012	17.96	1%	Water Depth Only Monitored					
24/01/2013	17.6	2%	Water Depth Only Monitored					
25/03/2013	17.21	2%	Water Depth Only Monitored					
7/05/2013	17.1	1%						
25/07/2013	17.01	1%	Water Depth Only Monitored					
25/09/2013	16.93	0%	Water Depth Only Monitored					
8/11/2013	16.92	0%	Water Depth Only Monitored					
20/01/2014	16.95	0%	Water Depth Only Monitored					
25/03/2014	16.99	0%	7.80	1150	11.1	11.9	0.05	0.03

Piezo ID	MW11				Other Name		Turnbull's Gap	
Aquifer	Sandstone				Ground RL		347.557m	
Coordinates	272279.663		6528596				Stick Up	
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	Site Not Sampled - Managers Request							
Jul-05	N/A		7.4	1230	0.08	0.31	0.08	0.01
Aug-05	N/A		7.6	1210	0	0.65	0.02	0.01
Sep-05	N/A		7.4	1770	16	17.0	0.08	0.04
Oct-05	N/A		7.6	1430	13	14.0	0.24	0.06
Nov-05	N/A		7.5	1430	12	13.0	0.10	0.06
Dec-05	N/A		7.4	2170	24	22.0	0.20	0.07
Jan-06	N/A		7.4	2070	25	23.0	0.08	0.04
Feb-06	N/A		7.4	1390	11	13.0	0.12	0.08
Mar-06	N/A		7.5	1370	12	13.0	0.06	0.06
Apr-06	Sampling postponed due to unsafe access following wet weather							
Jul-06	N/A		7.4	1840	22	22.0	0.18	0.04
Oct-06	N/A		7.5	1600	16	17.0	0.06	0.02
Jan-07	N/A		7.4	1380	14	14.0	0.09	0.05
Apr-07	N/A		7.4	1380	14	15.0	0.13	0.02
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	N/A		7.5	1370	13	13.0	0.05	0.01
Nov-07	N/A		7.4	1290	13	13.0	0.04	0.02
Jan-08	N/A		7.6	1350	13	13	0.06	0.03
Apr-08	N/A		7.5	1300	10	12	0.05	0.03
Jul-08	N/A		Pump Failure					
Oct-08	N/A		7.6	1230	11	12	0.06	0.05
Jan-09	N/A		7.6	1190	7.5	8.7	0.05	0.04
Apr-09	No sample taken - contract change over							
Jun-09	N/A		7.5	1270	N/T	14	<0.01	0.02
Aug-09	N/A		7.7	1580	Testing for these analytes not undertaken			
Nov-09	N/A		7.5	1365	Testing for these analytes not undertaken			
23/02/2010	N/A		7.62	1410	12.1	12.8	<0.01	<0.01
20/05/2010	N/A		8.45	2000	10.2	10.8	0.1	0.03
9/09/2010	N/A							
11/01/2011	N/A							
16/03/2011	N/A		7.37	1092	6.23	8.6	0.08	0.04
Lowest	**0**		**7.37**	**1092**	**6.23**	**8.6**	**0.08**	**0.03**
Highest	**0**		**8.45**	**2000**	**10.2**	**10.8**	**0.1**	**0.04**
Mean	**#DIV/0!**		**7.91**	**1546.00**	**8.22**	**9.70**	**0.09**	**0.04**
Number of samples	**0**		**2**	**2**	**2**	**2**	**2**	**2**
18/05/2011			7.45	1150	7.17	8.7	0.18	0.03
12/09/2011			7.44	1130	8.25	9.6	0.06	0.03
14/12/2011	Sampling postponed due to unsafe access following wet weather							
26/03/2012			7.6	1150	5.63	7	0.03	0.04
Lowest			**7.44**	**1130**	**5.63**	**7**	**0.03**	**0.03**
Highest			**7.6**	**1150**	**8.25**	**9.6**	**0.18**	**0.04**
Mean			**7.5**	**1143**	**7.02**	**8.43**	**0.09**	**0.03**
Number of samples			**3**	**3**	**3**	**3**	**3**	**3**
No access to dip bore								

Piezo ID	MW12				Other Name		Hazeldene Bore	
Aquifer	Alluvium (Quipolly Creek)				Ground RL (m)		360.179	
Coordinates	276311.8		6520488.7	Licence	?		Stick Up (m)	0.55
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	7.89		6.6	880	1.8	2.0	0.10	0.10
Jul-05	7.96		7.1	870	1.8	2.0	1.00	0.03
Aug-05	7.73		7.2	850	1.8	1.8	0.06	0.03
Sep-05	7.42		7.1	900	1.8	1.8	0.14	0.06
Oct-05	7.11		7.3	930	1.9	2.0	0.22	0.08
Nov-05	7.12		7.0	940	2.6	2.1	0.16	0.08
Dec-05	6.93		7.4	930	2.0	2.2	2.30	0.12
Jan-06	6.97		7.2	910	2.2	2.5	0.10	0.04
Feb-06	7.02		7.2	940	1.8	2.3	0.10	0.06
Mar-06	7.16		7.3	910	2.1	2.2	0.08	0.08
Apr-06	7.29		7.4	1000	2.0	2.1	2.50	0.05
Jul-06	7.64		7.2	970	2.4	2.5	0.13	0.06
Oct-06	8.02		7.2	920	2.3	2.4	0.07	0.02
Jan-07	8.16		7.2	940	2.3	2.4	0.20	0.06
Apr-07	8.70		7.1	930	2.4	2.5	0.16	0.04
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	8.55		6.9	930	2.3	2.5	0.05	0.02
Nov-07	7.64		7.3	910	2.4	2.6	0.18	0.02
Jan-08	7.78		7.3	950	2.3	2.2	0.21	0.05
Apr-08	7.78		7.3	930	2.1	2.4	0.31	0.04
Jul-08	7.32		7.3	930	2.1	2.3	0.08	0.03
Oct-08	Pump Failure							
Jan-09	No access							
Apr-09	No sample taken - contract change over							
Jun-09	N/A		7.1	500	N/T	2	<0.01	0.03
26/08/2009	N/A		7.6	570	Testing for these analytes not undertaken			
Nov-09	N/A		7.56	529	Testing for these analytes not undertaken			
23/02/2010	N/A		7.78	602	0.96	1.1	0.03	0.04
20/05/2010	9.52		e8.2	e488	0.95	1.2	0.06	0.05
30/06/2010	9.64	-1%	Water Depth Only Monitored					
8/07/2010	9.66	0%	Water Depth Only Monitored					
23/07/2010	9.64	0%	Water Depth Only Monitored					
6/08/2010	9.03	7%	Water Depth Only Monitored					
19/08/2010	8.27	9%	Water Depth Only Monitored					
8/09/2010	7.59	9%	7.17	505	1.25	1.6	0.04	0.04
8/11/2010	7.11	7%	Water Depth Only Monitored					
11/01/2011	6.43	11%	7.2	361	0.62	0.8	0.06	0.04
16/03/2011	6.13	5%	7.15	440	1.32	1.9	0.12	0.05
Lowest	**6.13**		**7.15**	**361**	**0.62**	**0.8**	**0.04**	**0.04**
Highest	**9.66**		**7.2**	**505**	**1.32**	**1.9**	**0.12**	**0.05**
Mean	**8.30**		**7.17**	**435.33**	**1.04**	**1.38**	**0.07**	**0.05**
Number of samples	**10**		**3**	**3**	**4**	**4**	**4**	**4**
18/05/2011	6.78	-10%						
18/05/2011	6.75	0%	7.2	413	0.97	1.7	0.1	0.05
13/09/2011	7.96	-15%	7.23	384	0.69	0.9	0.04	0.04
13/12/2011	7.95	0%	7.03	392	1.16	1.5	0.08	0.06
27/03/2012	7.84	0.014031	7.17	448	0.99	1.5	0.04	0.09
Lowest	**6.75**		**7.03**	**384**	**0.69**	**0.9**	**0.04**	**0.04**
Highest	**7.96**		**7.23**	**448**	**1.16**	**1.7**	**0.08**	**0.09**
Mean	**7.46**		**7.16**	**409**	**0.95**	**1.4**	**0.07**	**0.06**
Number of samples	**5**		**4**	**4**	**4**	**4**	**4**	**4**
3/07/2012	8.13		Water Depth Only Monitored					
13/09/2012	8.11	0%	Water Depth Only Monitored					
16/11/2012	8.55	-5%	Water Depth Only Monitored					
24/01/2013	8.61	-1%	Water Depth Only Monitored					
26/03/2013	7.03	22%	Water Depth Only Monitored					
9/05/2013	8.1	-13%	7.1	462				
26/07/2013	-		Blockage in bore at 8.5m					
25/09/2013	8.91	-9%	Water Depth Only Monitored					
11/11/2013	10.56	-16%	Water Depth Only Monitored					
3/01/2013	9.88	7%	Water Depth Only Monitored					
21/01/2013	9.62	3%	Water Depth Only Monitored					
28/03/2014	10.01	-4%	7.50	526	0.93	0.9	0.04	0.03

Piezo ID	MW13				Other Name		Parkhill Bore	
Aquifer	Alluvium (Quipolly Creek)				Ground RL		352.10	
Coordinates	274327.4		6519749				Stick Up	0.45m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	Site Not Sampled - Managers Request							
Jul-05	5.38		6.9	1050	3.4	3.5	0.10	0.07
Aug-05	5.23		6.6	1110	4.4	3.7	0.12	0.05
Sep-05	5.01		6.6	1210	3.9	3.8	0.12	0.08
Oct-05	5.08		6.8	1260	3.9	4.0	0.26	0.10
Nov-05	5.04		6.6	1240	4.0	4.0	0.14	0.10
Dec-05	4.20		7.0	1150	3.5	3.9	0.38	0.14
Jan-06	4.21		7.3	920	2.2	2.3	0.12	0.04
Feb-06	5.27		6.7	1190	3.2	3.8	0.14	0.08
Mar-06	5.76		6.7	1120	3.6	3.7	0.08	0.08
Apr-06	5.24		6.8	900	3.4	3.6	0.16	0.05
Jul-06	5.17		6.7	1120	3.6	3.6	0.10	0.07
Oct-06	5.33		6.7	1030	3.0	3.2	0.09	0.05
Jan-07	5.63		6.6	920	2.6	2.8	0.14	0.08
Apr-07	5.74		6.6	860	2.4	2.6	0.11	0.06
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	5.77		6.8	790	2.2	2.4	0.07	0.05
Nov-07	5.35		6.9	750	2.3	2.2	0.09	0.06
Jan-08	5.42		7.0	790	2.4	2.3	0.07	0.06
Apr-08	4.95		6.8	840	2.5	2.9	0.12	0.07
Jul-08	4.98		6.6	1120	2.6	2.8	0.14	0.07
Oct-08	4.63		6.9	1000	3.2	3.4	0.11	0.07
Jan-09	4.18		7	930	2.8	3.1	0.07	0.06
Apr-09	No sample taken - contract change over							
Jun-09	4.7		6.8	1050	N/T	4.4	0.02	0.04
Aug-09	5.63		7.3	880	Testing for these analytes not undertaken			
Nov-09	5.6		7.46	912	Testing for these analytes not undertaken			
23/02/2010	5.37		7.79	840	2.03	2.1	0.06	0.06
20/05/2010	5.62	-4%	7.92	676	1.72	1.9	0.11	0.08
8/07/2010	5.68	-1%	Water Depth Only Monitored					
23/07/2010	5.68	0%	Water Depth Only Monitored					
8/09/2010	4.44	28%	Water Depth Only Monitored					
15/09/2010	4.51	-2%						
8/11/2010	4.44	2%						
11/01/2011	3.81	17%	7.09	732	2.64	3.3	0.08	0.07
16/03/2011	4.25	-10%	7.1	887	2.56	3.7	0.07	0.08
Lowest	**3.81**		**7.09**	**676**	**1.72**	**1.9**	**0.07**	**0.07**
Highest	**5.68**		**7.92**	**887**	**2.64**	**3.7**	**0.11**	**0.08**
Mean	**4.80**		**7.37**	**765.00**	**2.31**	**2.97**	**0.09**	**0.08**
Number of samples	**8**		**3**	**3**	**3**	**3**	**3**	**3**
18/05/2011	5.03	-16%	7.2	990	1.03	1.4	0.22	0.07
12/09/2011	4.46	13%	6.84	648	1.33	1.6	0.06	0.07
13/12/2011	4.37	2%	6.93	570	1.05	2	0.09	0.08
26/03/2012	4.43	-0.01354	7.12	634	1.22	1.7	0.07	0.09
Lowest	**4.37**		**6.84**	**634**	**1.03**	**1.4**	**0.06**	**0.07**
Highest	**5.03**		**7.2**	**990**	**1.33**	**2**	**0.22**	**0.09**
Mean	**4.57**		**7.02**	**710**	**1.16**	**1.68**	**0.11**	**0.08**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
3/07/2012	4.53		Water Depth Only Monitored					
5/09/2012	4.53	0%	Water Depth Only Monitored					
16/11/2012	4.74	-4%	Water Depth Only Monitored					
24/01/2013	4.98	-5%	Water Depth Only Monitored					
5/02/2013			6.93	651	2.06	2.6	0.08	0.07
26/03/2013	4.4	13%	Water Depth Only Monitored					
8/05/2013	4.52	-3%						
25/07/2013	4.6	-2%	Water Depth Only Monitored					
25/09/2013	4.63	-1%	Water Depth Only Monitored					
11/11/2013	5.97	-	Water Depth Only Monitored					
20/01/2014	5.34	-13%	Water Depth Only Monitored					
25/03/2014	5.59	7%	7.10	655	1.62	1.9	0.09	0.10

Piezo ID	MW13b				Other Name		Parkhill Bore	
Aquifer	Alluvium (Quipolly Creek)				Ground RL		350	
Coordinates	273967.8		6519581				Stick Up	0.33m
Sample Date	Depth to Ground - metres		pH -field	Electrical Conductivity uS/cm field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
23/07/2010	4.02		Water Depth Only Monitored					
6/08/2010	3.18		Water Depth Only Monitored					
15/09/2010	2.93		Water Depth Only Monitored					
8/11/2010	3.16		Water Depth Only Monitored					
25/07/2012	3.15							
5/09/2012	3.23	-2%	Water Depth Only Monitored					
16/11/2012	3.28	-2%	Water Depth Only Monitored					
24/01/2013	3.49	-6%	Water Depth Only Monitored					
26/03/2013	3.11	12%	Water Depth Only Monitored					
8/05/2013	3.18	-2%						
25/07/2013	3.19	0%	Water Depth Only Monitored					
25/09/2013	3.26	-2%	Water Depth Only Monitored					
11/11/2013	3.35	-3%	Water Depth Only Monitored					
20/01/2014	3.85	-13%	Water Depth Only Monitored					
25/03/2014	4.12	-7%	8.20	1080	0.24	5.0	0.49	<0.01

Piezo ID	MW13d				Other Name		Parkhill Bore	
Aquifer	Alluvium (Quipolly Creek)				Ground RL		348.79	
Coordinates	273653.6		6519723				Stick Up	0.32m
Sample Date	Depth to Ground - metres		pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
23/07/2010	4.75		Water Depth Only Monitored					
6/08/2010	4.17		Water Depth Only Monitored					
15/09/2010	3.56		Water Depth Only Monitored					
8/11/2010	4.64		Water Depth Only Monitored					
25/07/2012	4.73		Water Depth Only Monitored					
5/09/2012	5.3	-11%	Water Depth Only Monitored					
16/11/2012	4.86	9%	Water Depth Only Monitored					
24/01/2013	5.06	-4%	Water Depth Only Monitored					
26/03/2013	4.37	16%	Water Depth Only Monitored					
8/05/2013	4.58	-5%						
25/07/2013	4.61	-1%	Water Depth Only Monitored					
25/09/2013	4.69	-2%	Water Depth Only Monitored					
11/11/2013	4.82	-3%	Water Depth Only Monitored					
20/01/2014	5	-4%	Water Depth Only Monitored					
25/03/2014	4.76	5%	7.20	1120	0.04	0.1	0.09	0.06

Piezo ID	MW14				Other Name		Train Load Out	
Aquifer	Werrie Basalt				Ground RL		379.94m	
Coordinates	274322.6		6526454				Stick Up	1.03m
Sample Date	Depth to Ground - metres	% Difference	pH - field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jul-05	Site Not Installed							
Aug-05	Site Not Installed							
Sep-05	Site Not Installed							
Oct-05	16.02		6.8	1080	22.0	22.0	2.40	0.02
Nov-05	15.93		6.9	1130	20.0	22.0	0.12	0.06
Dec-05	15.57		7.4	1150	18.0	19.0	0.28	0.10
Jan-06	15.32		7.1	2080	26.0	24.0	0.32	0.04
Feb-06	14.23		7.2	1080	12.0	16.0	0.24	0.08
Mar-06	15.28		7.3	1050	14.0	15.0	0.10	0.06
Apr-06	15.47		7.5	900	11.0	17.0	0.60	0.05
Jul-06	15.88		7.3	1030	6.9	11.0	0.17	0.06
Oct-06	16.17		7.3	1010	4.0	6.9	0.09	0.04
Jan-07	16.46		6.9	1060	15.0	15.0	0.14	0.04
Apr-07	16.41		7.0	1080	19.0	21.0	0.07	<0.01
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	16.23		6.9	1070	21.0	22.0	0.06	0.04
Nov-07	15.9		7.1	1050	20.0	18.0	0.65	0.01
Jan-08	15.69		7.2	1080	20.0	20.0	0.60	0.03
Apr-08	13.9		7.0	960	20.0	20.0	0.54	0.01
Jul-08	16.0		6.9	1130	18.0	19.0	0.2	<0.01
Oct-08	15.69		6.9	1080	14	16	0.06	0.04
Jan-09	14.78		7	1080	16	18	0.1	0.03
Apr-09	No sample taken - contract change over							
Jun-09	16.41		7.1	1140	N/T	16.6	0.07	0.06
Aug-09	16.81		7.2	1140	Testing for these analytes not undertaken			
Nov-09	16.35		7.04	1260	Testing for these analytes not undertaken			
23/02/2010	16.54		7.74	1310	15.3	16.8	0.09	<0.01
19/05/2010	16.72	-1%	e8.1	e1830	11.3	13.8	0.17	0.07
9/09/2010	15.88	5%	7.01	1220	17.6	18.6	0.12	0.02
6/01/2011	15.59	2%	7.03	1090	13.8	16.4	<0.01	0.02
15/03/2011	15.29	2%	6.98	1100	13.4	17.5	0.12	<0.01
Lowest	**15.29**		**6.98**	**1090**	**11.3**	**13.8**	**0.12**	**0.02**
Highest	**16.72**		**7.03**	**1220**	**17.6**	**18.6**	**0.17**	**0.07**
Mean	**15.87**		**7.01**	**1136.67**	**14.03**	**16.58**	**0.14**	**0.04**
Number of samples	**4**		**3**	**3**	**4**	**4**	**3**	**3**
17/05/2011	15.57	-2%	7.1	1080	11	12.7	0.05	0.02
13/09/2011	16.1	-3%	6.92	1040	10.9	15.4	0.24	0.03
14/12/2011	15.49	4%	6.9	1025	12	13.3	0.08	0.05
27/03/2012	15.4	0.01	7.28	1220	20.7	23.5	0.1	0.09
Lowest	**15.4**		**6.9**	**1025**	**10.9**	**12.7**	**0.05**	**0.02**
Highest	**16.1**		**7.28**	**1220**	**20.7**	**23.5**	**0.24**	**0.09**
Mean	**15.64**		**7.05**	**1091**	**13.6**	**16.23**	**0.12**	**0.05**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
3/07/2012	16.09		Water Depth Only Monitored					
13/09/2012	16.36	-2%	Water Depth Only Monitored					
21/11/2012	16.75	-2%	Water Depth Only Monitored					
25/01/2013	17.05	-2%	Water Depth Only Monitored					
25/03/2013	16.71	2%	Water Depth Only Monitored					
9/05/2013	16.96	-1%	7.28	1100				
26/07/2013	17.39	-2%	Water Depth Only Monitored					
24/09/2013	17.55	-1%	Water Depth Only Monitored					
8/11/2013	17.74	-1%	Water Depth Only Monitored					
21/01/2014	17.78	0%	Water Depth Only Monitored					
31/03/2014	18.12	-2%	7.50	1060	14.4	15.6	0.13	0.07

Piezo ID	MW15				Other Name		Capp Bore	
Aquifer	Alluvium (Quipolly Creek)				Ground RL		351.47	
Coordinates	274222		6520047				Stick Up	0.50m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
13/05/2010	5.1		Water Depth Only Monitored					
17/05/2010	5.1	0%	Water Depth Only Monitored					
18/05/2010	5.11	0%	Water Depth Only Monitored					
19/05/2010	5.13	0%	8.38	1610	1.15	1.40	0.12	0.07
21/05/2010	5.11	0%	Water Depth Only Monitored					
24/05/2010	5.12	0%	Water Depth Only Monitored					
26/05/2010	5.12	0%	Water Depth Only Monitored					
28/05/2010	5.12	0%	Water Depth Only Monitored					
31/05/2010	5.12	0%	Water Depth Only Monitored					
2/06/2010	5.13	0%	Water Depth Only Monitored					
11/06/2010	5.14	0%	Water Depth Only Monitored					
30/06/2010	5.16	0%	Water Depth Only Monitored					
8/07/2010	5.19	-1%	Water Depth Only Monitored					
6/08/2010	4.47	16%	Water Depth Only Monitored					
8/09/2010	4.69	-5%	7.23	1004	1.42	1.80	0.12	0.09
15/09/2010	3.95	19%	Water Depth Only Monitored					
8/11/2010	3.91	1%	Water Depth Only Monitored					
11/01/2011	3.7	6%	7.18	957	1.14	1.7	0.11	0.07
16/03/2011	3.75	-1%	7.18	980	1.3	1.8	0.1	0.09
Lowest	**3.7**		**7.18**	**957**	**1.14**	**1.4**	**0.1**	**0.07**
Highest	**5.19**		**8.38**	**1610**	**1.42**	**1.8**	**0.12**	**0.09**
Mean	**4.80**		**7.49**	**1137.75**	**1.24**	**1.68**	**0.11**	**0.08**
Number of samples	**19**		**4**	**4**	**4**	**4**	**4**	**4**
18/05/2011	3.81	-2%	7.2	990	1.03	1.4	0.22	0.07
12/09/2011	3.95	-4%	7.12	896	0.89	1.3	0.06	0.07
13/12/2011	3.98	-1%	7.14	890	1.17	1.4	0.12	0.08
26/03/2012	3.89	2%	7.3	1010	0.85	1.2	0.07	0.1
Lowest	**3.81**		**7.12**	**890**	**0.85**	**1.2**	**0.06**	**0.07**
Highest	**3.98**		**7.3**	**1010**	**1.17**	**1.4**	**0.22**	**0.1**
Mean	**3.91**		**7.19**	**946**	**0.99**	**1.33**	**0.12**	**0.08**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
3/07/2012	3.99		Water Depth Only Monitored					
5/09/2012	4.04	-1%	Water Depth Only Monitored					
16/11/2012	4.26	-5%	Water Depth Only Monitored					
24/01/2013	4.47	-5%	Water Depth Only Monitored					
26/03/2013	3.92	14%	Water Depth Only Monitored					
8/05/2013	4.1	-4%						
25/07/2013	4.13	-1%	Water Depth Only Monitored					
25/09/2013	4.39	-6%	Water Depth Only Monitored					
11/11/2013	4.64	-5%	Water Depth Only Monitored					
20/01/2014	4.82	-4%	Water Depth Only Monitored					
25/03/2014	5.1	-5%	7.40	1000	1.42	1.7	0.08	0.10

Piezo ID	MW16				Other Name		Mountain View Bore	
Aquifer	Alluvium (Quipolly Creek)				Ground RL		353.798	
Coordinates	274657.2		6520225	Licence	Bore Log		Stick Up	0.28m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
8/07/2010	6.1		Water Depth Only Monitored					
23/07/2010	6.04	1%	Water Depth Only Monitored					
6/08/2010	5.39	12%	Water Depth Only Monitored					
8/09/2010	4.43	22%	7.18	1035	20.2	23.3	0.15	0.12
8/11/2010	4.19	6%	Water Depth Only Monitored					
11/01/2011	3.71	13%	7.01	779	10.7	13.5	0.07	0.08
16/03/2011	3.75	-1%	7.17	691	4.3	6.4	0.14	0.09
Lowest	**3.71**		**7.01**	**691**	**4.34**	**6.4**	**0.07**	**0.08**
Highest	**6.1**		**7.18**	**1035**	**20.2**	**23.3**	**0.15**	**0.12**
Mean	**4.80**		**7.12**	**835.00**	**11.75**	**14.40**	**0.12**	**0.10**
Number of samples	**7**		**3**	**3**	**3**	**3**	**3**	**3**
13/05/2011	3.91							
18/05/2011	3.99	-6%	7.15	661	3.2	5.3	0.02	0.06
12/09/2011	4.26	-6%	7.08	703	6.5	7.2	0.14	0.08
13/12/2011	4.21	1%	7.1	687	4.8	5.3	0.08	0.06
26/03/2012	4.16	0.01	7.17	684	3.33	3.6	0.25	0.09
Lowest	**3.91**		**7.08**	**661**	**3.2**	**3.6**	**0.02**	**0.06**
Highest	**4.26**		**7.17**	**703**	**6.5**	**7.2**	**0.25**	**0.09**
Mean	**4.11**		**7.13**	**684**	**4.5**	**5.4**	**0.13**	**0.07**
Number of samples	**5**		**4**	**4**	**4**	**4**	**4**	**4**
3/07/2012	4.31		Water Depth Only Monitored					
5/09/2012	4.46	-3%	Water Depth Only Monitored					
16/11/2012	4.81	-7%	Water Depth Only Monitored					
24/01/2013	5.05	-5%	Water Depth Only Monitored					
26/03/2013	4.37	16%	Water Depth Only Monitored					
8/05/2013	4.56	-4%						
26/07/2013	4.65	-2%	Water Depth Only Monitored					
25/09/2013	4.93	-6%	Water Depth Only Monitored					
11/11/2013	5.49	-10%	Water Depth Only Monitored					
20/01/2014	5.51	0%	Water Depth Only Monitored					
28/03/2014	5.97	-8%	6.90	634	1.67	1.7	0.07	0.07

Piezo ID	MW17a				Other Name		Andrews House	
Aquifer	Alluvium (Black Gully)				Ground RL		352.749	
Coordinates	274563		6520332				Stick Up	0.41m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
8/07/2010	5.18		Water Depth Only Monitored					
23/07/2010	5.16	0%	Water Depth Only Monitored					
6/08/2010	4.57	13%	Water Depth Only Monitored					
8/09/2010	3.59	27%	7.02	962	1.2	1.3	0.12	0.09
8/11/2010	3.32	8%	Water Depth Only Monitored					
11/01/2011	3.25	2%	7.18	781	0.86	1.1	0.09	0.08
16/03/2011	2.9	12%	7.26	770	0.8	1.2	0.05	0.08
Lowest	**2.9**		**7.02**	**770**	**0.76**	**1.1**	**0.05**	**0.08**
Highest	**5.18**		**7.26**	**962**	**1.2**	**1.3**	**0.12**	**0.09**
Mean	**4.00**		**7.15**	**837.67**	**0.94**	**1.20**	**0.09**	**0.08**
Number of samples	**7**		**3**	**3**	**3**	**3**	**3**	**3**
13/05/2011	3.02	-4%	Water Depth Only Monitored					
18/05/2011	3.04	-1%	7.30	776.00	0.42	1.0	0.32	0.08
12/09/2011	3.37	-10%	7.1	784	0.8	1.0	0.08	0.08
13/12/2011	3.33	1%	7.1	830	1.2	1.2	0.08	0.08
26/03/2012	3.27	2%	7.24	919	0.78	1.0	0.08	0.08
Lowest	**3.02**		**7.1**	**827**	**0.4**	**1.0**	**0.08**	**0.08**
Highest	**3.37**		**7.3**	**784**	**1.2**	**1.2**	**0.32**	**0.08**
Mean	**3.21**		**7.19**	**919**	**0.8**	**1.1**	**0.14**	**0.08**
Number of samples	**5**		**4**	**4**	**4**	**4**	**4**	**4**
3/07/2012	3.54		Water Depth Only Monitored					
5/09/2012	3.64	-3%	Water Depth Only Monitored					
16/11/2012	3.87	-6%	Water Depth Only Monitored					
24/01/2013	4.15	-7%	Water Depth Only Monitored					
26/03/2013	3.49	19%	Water Depth Only Monitored					
8/05/2013	3.64	-4%						
26/07/2013	3.79	-4%	Water Depth Only Monitored					
25/09/2013	4.04	-6%	Water Depth Only Monitored					
8/11/2013	4.29	-6%	Water Depth Only Monitored					
20/01/2014	4.72	-9%	Water Depth Only Monitored					
26/03/2014	5.07	-7%	7.30	890	1.28	1.3	0.09	0.10

Piezo ID	MW17b				Other Name		Andrews North	
Aquifer	Werrie Basalt				Ground RL		359.633	
Coordinates	274708.2		6521382				Stick Up	0.63m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Ancedotal	6		Water Depth Only Monitored					
8/07/2010	11.26	-47%	Water Depth Only Monitored					
23/07/2010	11.13	1%	Water Depth Only Monitored					
6/08/2010	11.11	0%	Water Depth Only Monitored					
8/09/2010	9.73	14%	8.54	238	0.2	1.0	0.03	0.03
8/11/2010	9.3	5%	Water Depth Only Monitored					
11/01/2011	8.61	8%	8.04	1784	0.24	0.6	<0.01	<0.01
16/03/2011	8.7	-1%	8.11	1810	0.1	0.6	0.04	0.01
Lowest	**6**		**8.04**	**238**	**0.11**	**0.6**	**0.03**	**0.01**
Highest	**11.26**		**8.54**	**1810**	**0.24**	**1**	**0.04**	**0.03**
Mean	**9.48**		**8.23**	**1277.33**	**0.19**	**0.73**	**0.04**	**0.02**
Number of samples	**8**		**3**	**3**	**3**	**3**	**2**	**2**
13/05/2011	8.75	-1%	Water Depth Only Monitored					
18/05/2011	8.83	-1%	8.25	1890	0.0	0.8	0.08	<0.01
12/09/2011	9.24	-4%	8.25	1930	<0.01	0.5	<0.01	<0.01
30/09/2011	9.26	0%	Water Depth Only Monitored					
13/12/2011	9.18	1%	8.06	2015	0.05	0.2	<0.01	<0.01
26/03/2012	9.4	-2%	8.76	2290	0.0	0.9	0.30	<0.01
Lowest	**8.75**		**8.06**	**1890**	**0.0**	**0.2**	**0.08**	**<0.01**
Highest	**9.4**		**8.76**	**2290**	**0.05**	**0.9**	**0.30**	**<0.01**
Mean	**9.1**		**8.3**	**2031**	**0.02**	**0.6**	**0.19**	**<0.01**
Number of samples	**6**		**4**	**4**	**4**	**4**	**4**	**4**
3/07/2012	9.47		Water Depth Only Monitored					
5/09/2012	18.77	-50%	Water Depth Only Monitored					
25/09/2012	9.63	-2%	Water Depth Only Monitored					
16/11/2012	9.98	-4%	Water Depth Only Monitored					
24/01/2013	11.89	-16%	Water Depth Only Monitored					
26/03/2013	9.53	5%	Water Depth Only Monitored					
8/05/2013	9.53	0%						
26/07/2013	9.63	-1%	Water Depth Only Monitored					
25/09/2013	9.94	-3%	Water Depth Only Monitored					
11/11/2013	10.26	-3%	Water Depth Only Monitored					
20/01/2014	10.74	-4%	Water Depth Only Monitored					
28/03/2014	11.07	-3%	8.70	2150	0.04	0.6	0.02	<0.01

Piezo ID	MW18a				Other Name		Hird House	
Aquifer	Alluvium (Black Gully)				Ground RL		353.036	
Coordinates	274608.4		6520353				Stick Up	0.01m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
23/07/2010	4.99		Water Depth Only Monitored					
6/08/2010	4.39	14%	Water Depth Only Monitored					
15/09/2010	3.3	33%	Water Depth Only Monitored					
8/11/2010	3.07	7%	Water Depth Only Monitored					
19/01/2011	2.55	20%	Water Depth Only Monitored					
6/04/2011	2.68	-5%	Water Depth Only Monitored					
Lowest	**2.55**		**0**	**0**	**0**	**0**	**0**	**0**
Highest	**4.99**		**0**	**0**	**0**	**0**	**0**	**0**
Mean	**3.50**							
Number of samples	**6**		**0**	**0**	**0**	**0**	**0**	**0**
13/05/2011	2.77	-3%	Water Depth Only Monitored					
30/09/2011	3.23	-14%	Water Depth Only Monitored					
25/07/2012	3.35	-4%	Water Depth Only Monitored					
5/09/2012	3.36	0%	Water Depth Only Monitored					
16/11/2012	3.55	-5%	Water Depth Only Monitored					
24/01/2013	3.94	-10%	Water Depth Only Monitored					
26/03/2013	3.3	19%	Water Depth Only Monitored					
8/05/2013	3.45	-4%						
26/07/2013	3.57	-3%	Water Depth Only Monitored					
25/09/2013	3.85	-7%	Water Depth Only Monitored					
11/11/2013	4.16	-7%	Water Depth Only Monitored					
20/01/2014	4.54	-8%	Water Depth Only Monitored					
26/03/2014	4.86	-7%	7.20	859	1.30	1.5	0.09	0.10

Piezo ID	MW19a				Other Name		McCullock Irrigation	
Aquifer	Werrie Basalt				Ground RL		359.744	
Coordinates	275498.7		6519421				Stick Up	
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Ancedotal	4.5		Water Depth Only Monitored					
23/07/2010	7.23	-38%	Water Depth Only Monitored					
15/09/2010	4.93	47%	Water Depth Only Monitored					
8/11/2010	5.03	-2%	Water Depth Only Monitored					
Lowest	**4.93**		**0**	**0**	**0**	**0**	**0**	**0**
Highest	**7.23**		**0**	**0**	**0**	**0**	**0**	**0**
Mean	**5.73**							
Number of samples	**3**		**0**	**0**	**0**	**0**	**0**	**0**
3/07/2012	5.6		Water Depth Only Monitored					
5/09/2012	5.77	-3%	Water Depth Only Monitored					
16/11/2012	5.85	-1%	Water Depth Only Monitored					
24/01/2013	6.07	-4%	Water Depth Only Monitored					
26/03/2013	6.89	-12%	Water Depth Only Monitored					
8/05/2013	6.03	14%						
25/07/2013	5.73	5%	Water Depth Only Monitored					
24/09/2013	5.82	-2%	Water Depth Only Monitored					
11/11/2013	5.93	-2%	Water Depth Only Monitored					
20/01/2014	6.04	-2%	Water Depth Only Monitored					
31/03/2014	8.18	-26%	8.80	820	<0.01	<0.1	<0.01	<0.01

Piezo ID	MW20				Other Name		Pattersons	
Aquifer	Werrie Basalt				Ground RL		385.085	
Coordinates	275564.8		6527436.9				Stick Up	0.53m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Convert to Feet	61.02362							
Ancedotal			Water Depth Only Monitored					
6/08/2010	19.76		Water Depth Only Monitored					
20/10/2010	17.35	14%	Water Depth Only Monitored					
18/01/2011	17.78	-2%	Water Depth Only Monitored					
31/03/2011	18.6	-4%	Water Depth Only Monitored					
Lowest	**17.35**		**0**	**0**	**0**	**0**	**0**	**0**
Highest	**19.76**		**0**	**0**	**0**	**0**	**0**	**0**
Mean	**18.37**							
Number of samples	**4**		**0**	**0**	**0**	**0**	**0**	**0**
29/09/2011	18.79	-1%	Water Depth Only Monitored					
30/01/2012	18.82	0%	Water Depth Only Monitored					
2/07/2012	18.79		Water Depth Only Monitored					
5/09/2012	18.93	-1%	Water Depth Only Monitored					
21/11/2012	19.19	-1%	Water Depth Only Monitored					
24/01/2013	19.41	-1%	Water Depth Only Monitored					
25/03/2013	19.39	0%	Water Depth Only Monitored					
7/05/2013	19.46	0%						
25/07/2013	19.51	0%	Water Depth Only Monitored					
25/09/2013	19.71	-1%	Water Depth Only Monitored					
8/11/2013	19.83	-1%	Water Depth Only Monitored					
20/01/2014	19.99	-1%	Water Depth Only Monitored					
25/03/2014	20.17	-1%						

Piezo ID	MW21a				Other Name		Ryans Windmill	
Aquifer	Alluvium (Black Gully)				Ground RL		357.191	
Coordinates	275669		6520609.4				Stick Up	0.27m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Ancedotal			Water Depth Only Monitored					
6/08/2010	8.21		Water Depth Only Monitored					
15/09/2010	6.24	32%	Water Depth Only Monitored					
15/10/2010	6.14	2%	Water Depth Only Monitored					
8/11/2010	5.67	8%	Water Depth Only Monitored					
11/01/2011	4.63	22%	Water Depth Only Monitored					
28/01/2011	4.78	-3%	Water Depth Only Monitored					
6/04/2011	4.88	-2%	Water Depth Only Monitored					
13/05/2011	5.11	-5%	Water Depth Only Monitored					
15/09/2011	5.98	-15%	Water Depth Only Monitored					
19/01/2012	6.01	0%	Water Depth Only Monitored					
29/06/2012	6.24	-4%	Water Depth Only Monitored					
5/09/2012	6.4	-3%	Water Depth Only Monitored					
21/11/2012	6.7	-4%	Water Depth Only Monitored					
24/01/2013	7.09	-6%	Water Depth Only Monitored					
25/03/2013	6.32	12%	Water Depth Only Monitored					
8/05/2013	6.34	0%						
25/07/2013	6.56	-3%	Water Depth Only Monitored					
21/08/2013	6.75	-3%	Water Depth Only Monitored					
25/09/2013	7.09	-5%	Water Depth Only Monitored					
8/11/2013	7.45	-5%	Water Depth Only Monitored					
21/01/2014	7.96	-6%	Water Depth Only Monitored					
26/03/2014	8.38	-5%	7.20	764	1.70	1.8	0.08	0.09

Piezo ID	MW22a				Other Name		Smith House	
Aquifer	Quipolly Alluvium				Ground RL		353.661	
Coordinates	274750.2		6520214.3				Stick Up	0.57m
			pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Ancedotal			Water Depth Only Monitored					
6/08/2010	5.55		Water Depth Only Monitored					
15/09/2010	4.43	25%	Water Depth Only Monitored					
8/11/2010	4.28	4%	Water Depth Only Monitored					
11/01/2011	3.73	15%	Water Depth Only Monitored					
6/04/2011	3.82	-2%	Water Depth Only Monitored					
13/05/2011	4.02	-5%	Water Depth Only Monitored					
30/09/2011	4.42	-9%	Water Depth Only Monitored					
25/07/2012	4.53	-2%	Water Depth Only Monitored					
5/09/2012	4.53	0%	Water Depth Only Monitored					
16/11/2012	4.79	-5%	Water Depth Only Monitored					
24/01/2013	5.18	-8%	Water Depth Only Monitored					
26/03/2013	4.46	16%	Water Depth Only Monitored					
8/05/2013	4.62	-3%						
26/07/2013	4.77	-3%	Water Depth Only Monitored					
25/09/2013	5.07	-6%	Water Depth Only Monitored					
11/11/2013	5.35	-5%	Water Depth Only Monitored					
21/01/2014	5.74	-7%	Water Depth Only Monitored					
28/03/2014	6.09	-6%	7.00	515	1.47	1.5	0.07	0.07

Piezo ID	MW22b				Other Name		Smith Irrigation	
Aquifer	Quipolly Alluvium				Ground RL		354.222	
Coordinates	274916.8		6520035.5				Stick Up	0.48m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Ancedotal			Water Depth Only Monitored					
6/08/2010	5.77		Water Depth Only Monitored					
15/09/2010	4.48	29%	Water Depth Only Monitored					
8/11/2010	4.34	3%	Water Depth Only Monitored					
11/01/2011	3.74	16%	Water Depth Only Monitored					
6/04/2011	3.93	-5%	Water Depth Only Monitored					
13/05/2011	4.32	-9%	Water Depth Only Monitored					
30/09/2011	4.59	-6%	Water Depth Only Monitored					
25/07/2012	4.72	-3%	Water Depth Only Monitored					
5/09/2012	4.64	2%	Water Depth Only Monitored					
16/11/2012	5.02	-8%	Water Depth Only Monitored					
24/01/2013	5.3	-5%	Water Depth Only Monitored					
26/03/2013	4.63	14%	Water Depth Only Monitored					
8/05/2013	4.89	-5%						
26/07/2013	4.93	-1%	Water Depth Only Monitored					
25/09/2013	5.33	-8%	Water Depth Only Monitored					
11/11/2013	5.57	-4%	Water Depth Only Monitored					
21/01/2014	5.96	-7%	Water Depth Only Monitored					
28/03/2014	6.32	-6%	7.20	390	2.66	3.0	0.22	0.16

Piezo ID	MW23a				Other Name		Easey Yard	
Aquifer	Quipolly Alluvium				Ground RL		346.058	
Coordinates	272835.7		6519720				Stick Up	0.15m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Ancedotal			Water Depth Only Monitored					
6/08/2010	3.51		Water Depth Only Monitored					
15/09/2010	3.26	8%	Water Depth Only Monitored					
8/11/2010	3.74	-13%	Water Depth Only Monitored					
25/07/2012	3.86	-3%	Water Depth Only Monitored					
5/09/2012	3.9	-1%	Water Depth Only Monitored					
16/11/2012	3.7	5%	Water Depth Only Monitored					
24/01/2013	3.85	-4%	Water Depth Only Monitored					
26/03/2013	3.47	11%	Water Depth Only Monitored					
9/05/2013	3.86	-10%						
25/07/2013	3.64	6%	Water Depth Only Monitored					
25/09/2013	3.95	-8%	Water Depth Only Monitored					
11/11/2013	3.93	1%	Water Depth Only Monitored					
20/01/2014	3.96	-1%	Water Depth Only Monitored					
25/03/2014	3.87	2%	7.10	843	1.33	1.5	0.07	0.09

Piezo ID	MW23b				Other Name		Easey Irrigation	
Aquifer	Quipolly Alluvium				Ground RL		345.59	
Coordinates	272689.2		6519537.1				Stick Up	0.1m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Ancedotal			Water Depth Only Monitored					
6/08/2010	3.83		Water Depth Only Monitored					
15/09/2010	4.03	-5%	Water Depth Only Monitored					
8/11/2010	4.1	-2%	Water Depth Only Monitored					
25/07/2012	4.16	-1%	Water Depth Only Monitored					
5/09/2012	4.75	-12%	Water Depth Only Monitored					
16/11/2012	4.21	13%	Water Depth Only Monitored					
24/01/2013	4.37	-4%	Water Depth Only Monitored					
26/03/2013	4.04	8%	Water Depth Only Monitored					
9/05/2013	4.1	-1%						
25/07/2013	4.23	-3%	Water Depth Only Monitored					
25/09/2013	4.7	-10%	Water Depth Only Monitored					
11/11/2013	4.18	12%	Water Depth Only Monitored					
20/01/2014	4.24	-1%	Water Depth Only Monitored					
25/03/2014	4.26	0%	7.10	805	0.87	1.0	0.11	0.12

Piezo ID	P1				Other Name			
Aquifer	Werrie Basalt				Ground RL		391.269	
Coordinates	274821.4		6524023				Stick Up	0.92m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	0.92m
30/04/2010	21.68		Water Depth Only Monitored					
20/05/2010	20.8	4%	8.4	1880	0.33	0.8	0.14	0.06
23/07/2010	20.74	0%	Water Depth Only Monitored					
9/09/2010	20.55	1%	6.65	1720	<0.01	<0.1	0.04	0.02
6/01/2011	22.68	-9%	6.61	1480	<0.01	<0.1	0.04	<0.01
15/03/2011	23.65	-4%	6.58	1410	0.0	<0.1	0.04	<0.01
7/04/2011	23.09	2%	Water Depth Only Monitored					
Lowest	**20.55**		**6.58**	**1410**	**0.03**	**0.8**	**0.04**	**0.02**
Highest	**23.65**		**8.4**	**1880**	**0.33**	**0.8**	**0.14**	**0.06**
Mean	**21.88**		**7.06**	**1622.50**	**0.18**	**0.80**	**0.07**	**0.04**
Number of samples	**7**		**4**	**4**	**2**	**1**	**4**	**2**
17/05/2011	22.72	2%	6.6	1430	0.0	<0.1	<0.01	<0.01
7/09/2011	24.24	-6%	Water Depth Only Monitored					
13/09/2011	24.44	-1%	6.82	1290	0.6	0.8	<0.01	<0.01
14/12/2011	26.87	-9%	6.72	1130	1.8	2.6	0.10	<0.01
27/03/2012	28.70	-6%	7.26	1000	2.6	3.8	0.04	0.03
Lowest	**22.72**		**6.60**	**1000**	**0.0**	**0.8**	**0.04**	**0.03**
Highest	**28.70**		**7.30**	**1430**	**2.6**	**3.8**	**0.10**	**0.03**
Mean	**25.39**		**6.86**	**1213**	**1.3**	**2.4**	**0.07**	**0.03**
Number of samples	**5**		**4**	**4**	**4**	**3**	**2**	**1**
27/07/2012	30.72		Water Depth Only Monitored					
13/09/2012	30.51	1%	Water Depth Only Monitored					
21/11/2012	31.42	-3%	Water Depth Only Monitored					
25/01/2013	31.95	-2%	Water Depth Only Monitored					
30/05/2013	34.65	-8%	Water Depth Only Monitored					
21/08/2013	34.05	2%	Water Depth Only Monitored					
1/10/2013	35.4	-4%	Water Depth Only Monitored					
21/11/2013	36.07	-2%	Water Depth Only Monitored					
21/01/2014	36.37	-1%	Water Depth Only Monitored					
19/03/2014	36.63	-1%	Water Depth Only Monitored					

Piezo ID	MW27				Other Name		Cintra North Paddocl off Escott Road	
Aquifer					Ground RL			
Coordinates				Elevation			Stick Up	
Sample Date	Depth to Ground - metres		pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
2/07/2012	39.97		Water Depth Only Monitored					
5/09/2012	39.94	0%	Water Depth Only Monitored					
21/11/2012	40.52	-1%	Water Depth Only Monitored					
24/01/2013	40.75	-1%	Water Depth Only Monitored					
25/03/2013	41.43	-2%	Water Depth Only Monitored					
7/05/2013	42.04	-1%	Water Depth Only Monitored					
25/07/2013	43.03	-2%	Water Depth Only Monitored					
24/09/2013	43.46	-1%	Water Depth Only Monitored					
8/11/2013	43.41	0%	Water Depth Only Monitored					
20/01/2014	45.76	-5%	Water Depth Only Monitored					
26/03/2014	45.68	0%	7.30	1270	14.9	16.1	0.14	<0.01

Piezo ID	MW28a				Other Name		Woodlands Windmill Northside of Lowes Ck Road	
Aquifer					Ground RL			
Coordinates				Elevation			Stick Up	0.25m
Sample Date	Depth to Ground - metres		pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
29/06/2012	10.25		Water Depth Only Monitored					
13/09/2012	8.45	21%	Water Depth Only Monitored					
16/11/2012	10.07	-16%	Water Depth Only Monitored					
24/01/2013	11.2	-10%	Water Depth Only Monitored					
26/03/2013	8.97	25%	Water Depth Only Monitored					
7/05/2013	9.97	-10%						
25/07/2013	10.91	-9%	Water Depth Only Monitored					
24/09/2013	11.75	-7%	Water Depth Only Monitored					
11/11/2013	12.22	-4%	Water Depth Only Monitored					
21/01/2014	12.62	-3%	Water Depth Only Monitored					
28/03/2014	12.92	-2%	7.50	337	0.63	5.3	0.32	0.02

Piezo ID	MW29				Other Name		Kyooma	
Aquifer					Ground RL			
Coordinates				Elevation			Stick Up	
Sample Date	Depth to Ground - metres		pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
29/06/2012	11.91		Water Depth Only Monitored					
13/09/2012	22.84	-48%	Water Depth Only Monitored					
25/09/2012	12.52	82%	Water Depth Only Monitored					
16/11/2012	16.89	-26%	Water Depth Only Monitored					
24/01/2013	16.5	2%	Water Depth Only Monitored					
25/03/2013	11.57	43%	Water Depth Only Monitored					
7/05/2013	11.51	1%	Water Depth Only Monitored					
25/07/2013	11.28	2%	Water Depth Only Monitored					
25/09/2013	11.54	-2%	Water Depth Only Monitored					
8/11/2013	13.68	-16%	Water Depth Only Monitored					
21/01/2014	12.25	12%	Water Depth Only Monitored					
26/03/2014	12.28	0%	8.80	1070	1.08	1.8	<0.01	<0.01

Piezo ID	MW32				Other Name		Naranji	
Aquifer					Ground RL			
Coordinates				Elevation			Stick Up	0.46m
Sample Date	Depth to Ground - metres		pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
5/02/2013	3.96		7.6	60	0.52	1	0.08	0.06
20/03/2013			7.1	775	0.79	1.3	0.08	0.07
26/03/2013	3.67	8%	Water Depth Only Monitored					
8/05/2013	4.62	-21%	7.28	726	0.72	0.8	0.1	0.12
25/07/2013	3.92	18%	Water Depth Only Monitored					
25/09/2013	4.02	-2%	Water Depth Only Monitored					
11/11/2013	4.13	-3%	Water Depth Only Monitored					
20/01/2014	4.14	0%	Water Depth Only Monitored					
25/03/2014	4.10	1%	7.00	720	0.86	0.9	0.10	0.12

Piezo ID	MW34				Other Name		25 Silo Road	
Aquifer	Alluvium (Werris Creek)				Ground RL			
Coordinates							Stick Up	
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
20/11/2013	11.41		Water Depth Only Monitored					
20/01/2014	12.27	-7%	Water Depth Only Monitored					
19/03/2014	12.53	-2%	Water Depth Only Monitored					

Piezo ID	MW35				Other Name		Black Gully Road	
Aquifer	Werrie Basalt				Ground RL			
Coordinates							Stick Up	
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
18/12/2013	105.56		Water Depth Only Monitored					
20/01/2014	106.06	0%	Water Depth Only Monitored					
19/03/2014	106.23	0%	Water Depth Only Monitored					

Werris Creek Coal Mine – Biodiversity Offset Area

Annual Monitoring Report Volume 1 – Monitoring report and analysis 2013

Prepared for
Werris Creek Coal Pty. Ltd.

9 May 2014

DOCUMENT TRACKING

Item	Detail
Project Name	Werris Creek Coal Mine – Biodiversity Offset Area Annual Monitoring Report Spring 2013
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Project Manager	Antony Von Chrismar (08) 4910 3408 Suites 28 & 29, Level 7 19 Bolton St Newcastle
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Approved by	Robert Humphries
Status	Final
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Cover photo	Clockwise: *Litoria peronii* (Peron's Tree Frog), *Tyto alba* (Barn Owl), *Chelodina longicollis* (Eastern Snake-necked Turtle), Werris Creek Coal Biodiversity Offset Area (photographed by Peter Knock)

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Abbreviations

Abbreviation	Description
ANOSIM	Analysis of Similarity
BOA	Biodiversity Offset Area
BOAAMR	Biodiversity Offset Area Annual Monitoring Report
BOMP	Biodiversity Offset Management Plan
BOSMP	Biodiversity Offset Strategy and Management Plan
CWD	Coarse Woody Debris
DoE	Commonwealth Department of the Environment
DNG	Derived Native Grassland
DP&I	Department of Planning and Infrastructure
ELA	Eco Logical Australia Pty Ltd
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999
HBT	Hollow Bearing Tree
KTP	Key Threatening Process
LOM	Life of Mine
LFA	Landscape Function Analysis
nMDS	Non-metric Multidimensional Scaling
OEH	NSW Office of Environment and Heritage
PA	Project Approval
TSC Act	NSW *Threatened Species Conservation Act* 1995
SEWPaC	Former Commonwealth Department of Sustainability, Environment, Water, Population and Communities (now DoE)
SSA	Soil Surface Assessment
WCC	Werris Creek Coal Pty Ltd
WONS	Weeds of National Significance

Key findings

This Biodiversity Offset Area Annual Monitoring Report (BOA AMR) has been prepared by Eco Logical Australia Pty Ltd (ELA) on behalf of Werris Creek Coal Pty Ltd (WCC) in accordance with the Biodiversity Offset Strategy, as detailed in the Biodiversity Offset Management Plan (BOMP) (WCC 2012a), and Schedule 3 Condition 24 of PA 10_0059. Flora and fauna monitoring is being undertaken to assess the BOA progressive trajectory towards self-sustainability and meeting the performance criteria specified in Section 7 of the BOMP.

This is the fourth BOA AMR, with monitoring having been completed on sites 1-12 in spring 2010 and 2011. In 2012, the monitoring program was modified in accordance with the approved BOMP (WCC 2013), with a total of 24 monitoring sites, including sites 1 to 3 and 5 to12 of the original monitoring sites. Therefore, this monitoring report represents year four for sites 1 to 3 and 5 to12 and year two for sites 13 to 25.

The methods employed at the monitoring sites were consistent with the approved BOMP (WCC 2013) and included floristic monitoring, biometric monitoring, Landscape Function Analysis on the rehabilitation area and analogue sites and fauna monitoring (targeting herpetofauna, birds, microbats and nocturnal fauna).

Table 1 provides a summary of the results against the completion criteria and recommended management actions.

Table 1: Monitoring sites, completion criteria and overall evaluation of performance

Note: PC=Performance Criteria; NNS=Number of Native Species; NOC=Native Overstorey Cover; NMS=Native Midstorey Cover; NGC=Native Ground Cover; ES=Combination of exotic species cover, number of exotic species and presence of noxious weeds; LO=Landscape Organisation; SSA=Soil Surface Assessment; FA=Fauna results. Red=Site underperforming against performance criteria and requiring targeted and prompt management; Amber=Site is performing poorly but is expected to reach CC in time with continued monitoring in accordance with the BOMP; Green=Site meeting or exceeding performance criteria and requires no additional or targeted management action.

Biometric vegetation type	Condition class No. (Site)	Overall site performance against performance measures								Comments on underperforming sites and management action
		NNS	NOC	NMS	NGC	ES	LO	SSA	FA	
White Box grassy woodland	2 (7)						N/A	N/A		NNS reduced in 2013, NOC continues to be low, and ES cover remains relatively high. At this stage, in accordance with the BOMP (WCC 2013), whilst these poorly performing attributes are not meeting PC, continued monitoring is recommended to review whether trends in NNS and NOC improve over time. Continued weed management is required to control exotic species.
	2 (16)						N/A	N/A		ES cover remains high, including the presence of *Xanthium occidentale* (Noogoora Burr) a noxious weed requiring management. Weed management is an ongoing issue for the BOA and weed spraying should continue. It is hoped that grass and other native seed will blow in and colonise this area.
	3 (1)						N/A	N/A		NNS reduced in 2013, NOC continues to be low, and ES cover remains high, though weed cover has reduced by 16% since 2012 and 36% since 2010. That said, weed management should continue in accordance with the BOMP.
	3 (2)						N/A	N/A		NOC continues to be low, and ES cover remains high, though weed cover has reduced by 4% since 2012 and over 60% since 2010. That said, weed management should continue in accordance with the BOMP.

Biometric vegetation type	Condition class No. (Site)	Overall site performance against performance measures								Comments on underperforming sites and management action
		NNS	NOC	NMS	NGC	ES	LO	SSA	FA	
	3 (8)						N/A	N/A		NNS reduced in 2013, NOC continues to be low, and ES cover remains high, though weed cover has reduced by 26% since 2012 and 74% since 2010. That said, weed management should continue in accordance with the BOMP.
	3 (12)						N/A	N/A		NNS reduced in 2013, NOC continues to be low, and ES cover remains high, though weed cover has reduced by 48% since 2012 and 42% since 2010. That said, weed management should continue in accordance with the BOMP.
	3a (19)						N/A	N/A		NOC continues to be low, and ES cover remains high, with an actual increase in weed cover of 8% since 2012. Therefore, weed management should continue in accordance with the BOMP.
	3a (21)						N/A	N/A		NOC continues to be low. Revegetation using tube stock may be necessary if NOC does not show signs of improvement in medium term.
	4 (3)						N/A	N/A		NNS is less than the PC, though has improved since 2012. Native species diversity fluctuates depending on climatic conditions in respective years. Future monitoring of diversity will inform actual performance of the site.
	4 (11)									NNS is less than the PC and has reduced from previous years of monitoring. Native species diversity fluctuates depending on climatic conditions in respective years. Future monitoring of diversity will inform actual performance of the site. ES cover has significantly reduced from previous years, though the presence of *Hypericum perforatum* (St Johns Wort) requires targeted weed management. Future LFA monitoring will inform whether SSA results are a downward trend.
	4 (13)						N/A	N/A		

Biometric vegetation type	Condition class No. (Site)	Overall site performance against performance measures								Comments on underperforming sites and management action
		NNS	NOC	NMS	NGC	ES	LO	SSA	FA	
	4 (17)									NNS is less than the PC, though has remained stable since 2012. Native species diversity fluctuates depending on climatic conditions in respective years. Future monitoring of diversity will inform actual performance of the site. Future LFA monitoring will inform whether SSA results are a downward trend.
	4 (24)						N/A	N/A		NNS is less than the PC, though has remained stable since 2012. Native species diversity fluctuates depending on climatic conditions in respective years. Future monitoring of diversity will inform actual performance of the site.
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)						N/A	N/A		ES cover remains high, though weed cover has remained constant since 2012 and has reduced by 48% since 2010. That said, weed management should continue in accordance with the BOMP.
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)						N/A	N/A		ES remains high, including the presence of *Hypericum perforatum* (St Johns Wort), though weed cover has reduced by 10% since 2012 and has reduced by 68% since 2010. That said, weed management should continue in accordance with the BOMP.
	4 (18)						N/A	N/A		NNS and NMS are below PC, though diversity is relative stable in comparison to the previous 2012 monitoring results. Current management in accordance with the BOMP and continued monitoring of trends is considered adequate
White Box-White Cypress Pine shrubby open	4 (22)						N/A	N/A		NNS and NMS are below PC, though diversity is relative stable in comparison to the previous 2012 monitoring results. Current management in accordance with the BOMP and continued monitoring of trends is

Biometric vegetation type	Condition class No. (Site)	Overall site performance against performance measures								Comments on underperforming sites and management action
		NNS	NOC	NMS	NGC	ES	LO	SSA	FA	
forest										considered adequate.
	3 (23)						N/A	N/A		NNS, NOC and NMS are all below PC, though trends from previous years are stable.
Plains Grass grassland on basaltic black earth soils	3 (25)						N/A	N/A		NNS is well below PC, but has remained stable since monitoring commenced in 2012. Active management to improve diversity may be necessary at some point in the future, though at this stage management in accordance with the BOMP is adequate. ES cover is relatively high at 20%, but has reduced significantly from 72% in 2012. The presence of *Echium plantagineum* (Patterson's Curse), *Hypericum perforatum* (St Johns Wort) requires targeted action.
Rough-barked Apple riparian forb/grass open forest	3 (20)						N/A	N/A		NNS, NOC, NMS continues to be below PC. ES has reduced from 70% in 2012 to 52% in 2013, though continued management in accordance with the BOMP is still necessary.
Mine rehab	1 (6)									Whilst NNS and NOC is below PC, there has been substantial improvement in these attributes when compared to previous years of monitoring. ES is high and has increase slightly from the previous monitoring year. Future LFA monitoring will inform whether SSA results are a downward trend. Current management regimes in accordance with the BOMP are expected to improve the poorly performing attributes.
	1 (14)									NNS remains low, NOC remains low and LFA results are poor too. Given this is a rehab site, improvements responding to management regimes in accordance with the BOMP will take some time, though current management in accordance with the BOMP is considered appropriate. ES

Biometric vegetation type	Condition class No. (Site)	Overall site performance against performance measures								Comments on underperforming sites and management action
		NNS	NOC	NMS	NGC	ES	LO	SSA	FA	
										cover has actually increased since 2012 and requires further treatment.
Cleared	1 (9)						N/A	N/A		NNS is low, though this may be a reflection of past disturbance and low resilience of the site and surrounds. NOC remains low but there is a likely lag period between the plantings that have been established and cover score readings. ES cover has actually increased since 2011 and 2012 and requires further treatment.
	1 (15)						N/A	N/A		NNS reduced in 2013, though this may be an artefact of poor climatic conditions and it is hoped that native seed blown in from adjacent paddocks will colonise the area in time. NOC continues to be low, and ES cover remains high.

1 Introduction

WCC was granted Project Approval (PA 10_0059) on 25 October 2011 from the then Department of Planning and Infrastructure (DP&I) and on 21 December 2011 (EPBC 2010/5571) from the then Commonwealth Department of Sustainability, Environment, Water and Communities (SEWPaC) for the Life of Mine (LOM) project. As a condition of PA10_0059, WCC were required to update the Biodiversity Offset Strategy (BOS) in the form of a Biodiversity Offset Management Plan (BOMP) (WCC 2013). The BOMP relates to management of biodiversity within the LOM footprint and the approximate 1,319 ha of land identified for management under the BOS, including the former Eurunderee, Hillview, Marengo and Railway View properties, the Mine Site and Greenslopes (WCC 2013).

Eco Logical Australia (ELA) was commissioned by Werris Creek Coal Pty Ltd (WCC) to undertake winter bird surveys and spring flora and fauna monitoring in 2013. This included a fourth year of biodiversity monitoring at all, except one (Site 4), of the monitoring sites established in 2010 within the WCC Biodiversity Offset Area (BOA) (DA 172-7-2004), and the second year of monitoring for those sites established in 2012.

A description of the BOA (location, climate) and the vegetation communities supported within the BOA, including their condition and area covered, is provided in Section 4 of the BOMP (WCC 2013).

ELA's scope of works was to:

- Record data using Floristic, Landscape Function Analysis (LFA), Biometric vegetation condition assessment and standard census of the key vertebrate fauna groups (bats, nocturnal birds and mammals, diurnal birds, reptiles and amphibians) within previously established and newly established monitoring plots
- Where applicable, compare data to the benchmark condition or performance criteria for vegetation communities specified in Section 7.1 of the Werris Creek Coal BOMP (WCC 2013) and assess the progressive trajectory of the BOA towards self sustainability
- Report the findings from the 2010, 2011, 2012 and 2013 (current survey).

1.1 Report Structure

The report is structured according to the following sections

- **Key findings –** provides a summary of the results and recommended management actions
- **Section 1: Introduction** – provides the context for the flora and fauna monitoring program
- **Section 2: Methodology** – outlines the methods used in the 2013 monitoring survey.
- **Section 3: Results, site performance and discussion** – provides a summary of the results relevant to the performance indicators and completion criteria so that the performance of each monitoring site can be evaluated and actions implemented
- **Section 4: Conclusion and Recommendations** – provides recommendations for land management and suggestions for future monitoring

- References – provides details of the references cited in the report

The data associated with this report is provided in Volume two of this report.

1.2 Management activities in the BOA in 2013

The Werris Creek Coal Annual Environmental Monitoring Report (WCC 2014) reported the following management activities in the BOA in 2013:

- Weed Management: Predominately herbicide spraying treating environmental and noxious weeds over 1282 ha of the BOA and Rehabilitation areas;
- Fire Management: Controlled burns in August 2013 on 60 ha of the Marengo BOA for both hazard reduction and ecological restoration purposes. Lightning strike on 20th January 2014 burnt 1ha on Railway View BOA. Maintenance of fire breaks across the BOA was undertaken during the year;
- Grazing Management: Continued to exclude grazing from the Mine Site and parts of Eurunderee and Railway View since 2010 and the remainder of the BOA since 2012;
- Revegetation: Replacement planting of 50 trees in Black Gully and North Paddock of Marengo BOA in March 2013;
- Habitat Augmentation: Placement of coarse woody debris in January 2014 and nest boxes on Rehabilitation and Eurunderee BOA in March 2014;
- BOA Security and Bond: Continued negotiation with DP&I regarding acceptance of Section 88E application of the Conveyancing Act 1919 to register convenants on each land title of the BOA. DP&I approved the Conservation Bond (in the form of a bank guarantee) in January 2014;
- Vegetation Clearing: Ecologists engaged to undertake inspections and monitoring of 31 ha of vegetation cleared for mining in February 2014;
- Rehabilitation: Completed 7.36 ha of new rehabilitation on the post mining landform;
- Seed Collection: Collected 140kg of local providence native grass seed from the Eurunderee BOA and spread across 41 ha of rehabilitation;
- Pest Management: Two pest control programs across the entire BOA were implemented targeting foxes with a poisoned bait (1080) take rate of 24.1% in Winter 2013 and X% in Autumn 2014. A total of 99 Eastern Grey Kangaroos were culled from two shoots based on the annual sand pad monitoring program; and
- Signage: New BOA signs and Threatened Species signs were installed across the BOA.

2 Methodology

Seven vegetation types have been mapped within the BOA and are described in accordance with the biometric vegetation types used as a statewide standard by the NSW Office of Environment and Heritage (OEH). Vegetation types were mapped across the entire BOA, and trimmed to the boundary of the offset site after the mapping was completed (**Figure 1**). A description of the vegetation communities supported within the BOA, including their area covered, is provided in the BOMP (WCC 2013).

2.1 Floristic and LFA survey

Flora and LFA field investigations for the current survey were conducted between the 11 and 15 November 2013 by ELA ecologists, Antony von Chrismar and Daniel McKenzie. Data was collected from a total of 24 sites; analogue sites established in Condition Class 4 vegetation sites (3, 5, 10, 11, 13, 17, 18, 22 and 24), Condition Class 3 vegetation sites (1, 2, 8, 12, 19, 21, 20, 23 and 25), Condition Class 2 sites (7 and 16) and Condition Class 1 sites (6, 9, 14 and 15).

Two LFA sites were monitored within the rehabilitation area (sites 6 and 14) and two analogue sites were monitored within Condition Class 4 vegetation of the target vegetation type for the rehabilitation areas (sites 11 and 17). Landscape Function Analysis methods followed the method for Landscape Organisation and the Soil Surface Assessment, as provided in Tongway and Hindley (2004).

2.2 Fauna

Fauna field investigations were undertaken between 18 and 28 November 2013 by ELA ecologists, Peter Knock and Rebecca McCue. Twenty-four fauna monitoring sites were selected for winter and spring fauna monitoring (in alignment with floristic and biometric monitoring) (**Figure 1**). Data collected included birds, herpetofauna, microchiropteran bats and nocturnal fauna, though all opportunistic observations were also recorded, including introduced species, though winter surveys only involved bird surveys targeting seasonal migrants to the Liverpool Plains region, such as the *Xanthomyza phrygia* (Regent Honeyeater) and *Lathamus discolor* (Swift Parrot). All fauna survey data, including winter bird data is provided in Volume 2, and further analysis of winter bird monitoring will be completed once consecutive years of data have been collected.

Changes to the fauna monitoring included the recording of both species diversity and abundance for all survey methods. The bird census approach was also adjusted, whereby a permanent 100 m by 50 m bird survey transect was established at each of the fauna sites. Each transect survey was carried-out for a period of 20 minutes twice (once in the morning and once in the evening as per the 2012 survey), with a maximum of 5 minutes spent at each of four 'point survey stations'. All birds identified visually or aurally, within each transect, during the 20 minute survey time were identified and their abundance recorded in a data sheet.

2.3 Data analysis

This report presents the second year of annual monitoring data for sites 13 to 25 established during the spring 2012 monitoring period, and also presents the fourth year of annual monitoring data for the sites 1 to 12 (excluding site 4). Data analysis in the form of a non-metric multidimensional scaling (nMDS) plot has been undertaken to compare all fauna monitoring results for all sites across all monitoring years. This allows for measures of similarity of fauna species presence between the sites, which is particularly important when measuring fauna usage between rehabilitation sites, derived native

grasslands (DNG) and sites in degraded condition (Class 3, 2 and 1 sites) and analogue sites (Class 4 sites). MDS plots allow multi-parametric data, such as species presence/absence, to be displayed in two dimensions. Sites with similar community compositions will appear close to each other on nMDS plots, while those that are less similar will appear further apart (Clarke & Warwick 2001). For repeated longitudinal sampling of monitoring sites it is possible to then detect and map changes in a community over time (Clarke and Warwick 2001).

In terms of the analysis of fauna data, in line with the recommendations of ELA (2013), an nMDS analysis of the similarity of bird and microchiropteran assemblage and abundance (birds) or activity (bats) between DNG vs woodland fauna sites has been undertaken. Details of these analyses are provided in **section 3.3.**

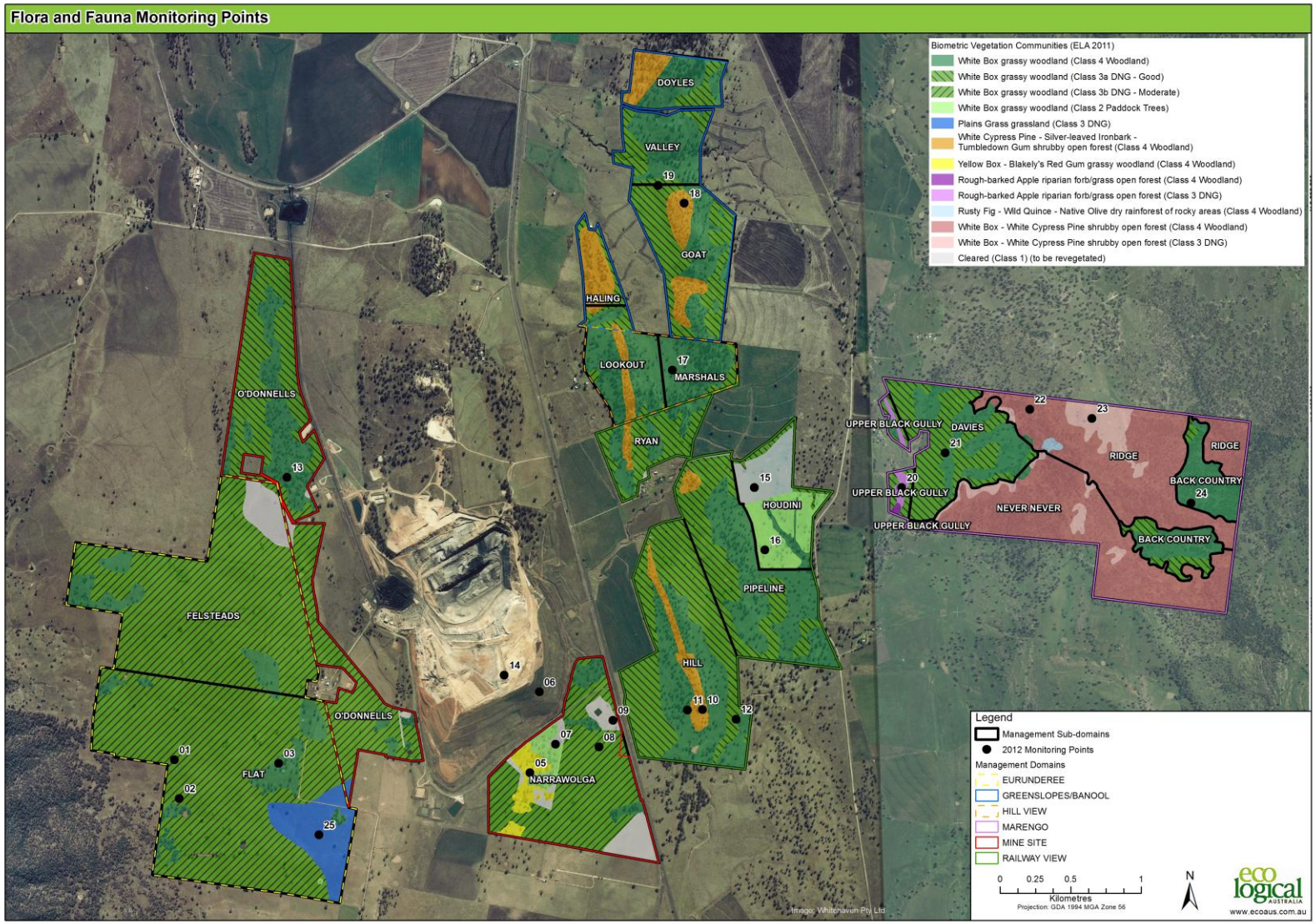

Figure 1: BOA vegetation and condition mapping and monitoring site locations.

2.4 Weather Conditions

2.4.1 Climate preceding the spring survey period

The average daily temperatures in the three months preceding the monitoring period were mild to warm, with the average maximum temperature slightly above the historical average in all months. Below average rainfall occurred in the four months from August through to November, particularly during August (1.7 mm) and October (13 mm). A total of 173.9 mm of rainfall fell during these four months which is 80% of the historical average (216.9 mm) over the same period. **Table 2** provides the weather records for the monitoring period from the nearest weather station, Quirindi, NSW (BoM 2014).

Table 2: Weather observations (Source: BOM Quirindi station, NSW).

Date	Min temp (°C)	Max temp (°C)	Rainfall (mm)	9am Temp (°C)	9am rel. hum. (%)	9am cloud amount (oktas)	9am wind direction	9am wind speed (km/h)
July								
1	8.2	17	0	12.8	84	4		4
2	6.8	19.2	0.1	11.6	93	0		Calm
3	0.6	20	0	7.8	89	0		Calm
4	2.6	19.6	0	9.8	90	7		Calm
5	9.4	20	0	15.6	79	4		Calm
November								
1	10.8	30.4	0	20.4	62	0		Calm
2	12.4	32.4	0	23.8	48	5		4
3	11.4	34.4	0	26.4	50	0		Calm
4	10.4	25.6	0	18	61	2		
5	10.2	27.4	0	16.4	70	0		Calm
6	8.4	31.4	0	19.4	43	0		Calm
7	11	33.6	0	22.4	44	0		Calm
8	14.6	36.4	0	26.8	33	0		Calm
9	20		0	24	54	6		Calm
10		29	0					
11	14	27.4	0					
12	15	26	26	19.2	83	8		4
13	9	31	3	19.4	56	0		Calm
14	8	31	0	21	45	0		Calm
15	8		0	21.4	60	0		Calm
16			0					
17		24.2	0					
18	11.2	17	0.6	14.8	76	5		4
19	10	26.6	26.2	16.4	84	3		Calm
20	10.6	31.6	0	22.6	55	3		Calm
21	14.2	35.4	0	25	60	0		Calm
22	21	26	12	24.4	65	8		4
23	15.6	24.6	29	18.8	74	8		

Date	Min temp (°C)	Max temp (°C)	Rainfall (mm)	9am Temp (°C)	9am rel. hum. (%)	9am cloud amount (oktas)	9am wind direction	9am wind speed (km/h)
24	10.6	28.4	5	20.8	67	2		Calm
25	9.6	27.6	0	19.8	69	0		Calm
26	9.4	26.4	0	19	83	0		Calm
27	7.6	29.6	0	18.8	57	0		Calm
28	10.8		0	24.4	47	0		Calm

2.4.2 Rainfall summary and discussion

The past two years (2011-2012) were wetter than the historic mean total monthly rainfall; however, 2013 was considerably lower than the historic mean by 167.8 mm. This indicates conditions were drier than usual for the 2013 monitoring surveys.

Weather conditions during the monitoring period were considered suitable for the biodiversity surveys. There were two significant rainfall events during the fauna monitoring period; one on the night of day 1 (26.2 mm) and another on day 6 (29 mm). These rainfall events stimulated frog activity. The days during the flora and fauna monitoring period were mostly calm, and temperatures were warm to hot.

3 Results, site performance and discussion

This section provides information on the performance criteria provided in the BOMP (WCC 2012a), and additional performance criteria for Landscape Function Analysis has also been provided. A traffic light colour coding system has then been applied, whereby RED sites are under performing and need management intervention, AMBER sites are performing poorly and may require future management intervention depending on future monitoring results and GREEN sites are performing well and do not require any additional targeted management actions or intervention.

The results and discussion section presents the results of the 2013 monitoring survey as well as previous monitoring years (2010, 2011 and 2012) and provides a comparison of the data against the completion criteria established in the BOMP (WCC 2012a).

3.1 Floristic and biometric data

The floristic and biometric data collected during monitoring is summarised below, with the full floristic plot data provided in **Volume 2**.

3.1.1 Number of native species

Species richness is a measureable performance criteria established in the BOMP. The following provides a description of the results from the 2013 monitoring event, as well as a comparison of these results with previous years of monitoring and the performance criteria (**Table 3**).

Table 3: Floristic summary as compared to Biometric Benchmarks and Performance Criteria

Biometric vegetation type	Condition class (site no.)	Performance criteria	No. Natives species			
			2010	2011	2012	2013
White Box grassy woodland	2 (7)	23	10	10	14	9
	2 (16)		-	-	3	6
	3 (1)		2	8	9	7
	3 (2)		10	12	9	13
	3 (8)		2	14	9	6
	3 (12)		5	13	10	6
	3a (19)		-	-	13	18
	3a (21)		-	-	11	18
	4 (3)		8	29	15	19
	4 (11)		19	24	19	13
	4 (13)		-	-	23	23
	4 (17)		-	-	19	18
	4 (24)		-	-	19	20
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	23	9	18	17	14

Biometric vegetation type	Condition class (site no.)	Performance criteria	No. Natives species			
			2010	2011	2012	2013
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	30	7	12	14	15
	4 (18)		-	-	22	25
White Box-White Cypress Pine shrubby open forest	4 (22)	26	-	-	25	24
	3 (23)		-	-	13	14
Plains Grass grassland on basaltic black earth soils	3 (25)	17	-	-	7	7
Rough-barked Apple riparian forb/grass open forest	3 (20)	25	-	-	6	12
Mine rehab	1 (6)	23	3	5	14	13
	1 (14)		-	-	6	5
Cleared land (formerly cultivated land)	1 (9)	23	5	5	5	4
	1 (15)		-	-	2	2

Discussion of performance and actions

Only site 13 met the performance criteria for number of native species. Although a prolonged dry period preceding the monitoring is considered to have reduced native species diversity, given all site were consistently lower than the performance criteria (derived from vegetation type benchmarks on the NSW Biometric vegetation benchmark database). It is recommended that the completion criteria for native species diversity be reviewed and performance criteria for each three year period be established consistent with the DP&I Best Practice Guidelines (DP&I 2014). This will enable an incremental analysis of performance against long term completion criteria.

Despite this, there are several sites that are recording low species diversity (i.e. sites 1, 7, 8, 9, 12, 14, 15, 16, 25). These sites and the adjacent areas that they are representative of are performing poorly. Given that biodiversity management of the BOA is only in the early stages, in accordance with Section 8.5 of the BOMP (WCC 2013); WCC has allowed approximately 5 years to monitor if exclusion of grazing and implementation of fire and weed management will assist natural regrowth regeneration.

3.1.2 Native overstorey cover

Native overstorey is a completion criteria established in the BOMP (WCC 2013). The following provides a description of the results from the 2013 monitoring event, as well as a comparison of these results with previous years of monitoring and the performance criteria (**Table 4**).

Table 4: Native overstorey cover (%) in comparison to Biometric Benchmarks and Performance Criteria

Biometric vegetation type	Condition class (site no.)	Performance criteria (%)	Native overstorey cover (%)			
			2010	2011	2012	2013
White Box grassy woodland	2 (7)	6-25	0	0	1.7	0
	2 (16)		-	-	0	1.5
	3 (1)		0	0	0	0
	3 (2)		0	0	0.5	0
	3 (8)		0	0	0	0
	3 (12)		0	0	0	0
	3a (19)		-	-	0	0
	3a (21)		-	-	0	0
	4 (3)		5	12.5	17.5	19.5
	4 (11)		26	24.5	10	20
	4 (13)		-	-	8.5	13
	4 (17)		-	-	6	15
	4 (24)		-	-	19.5	14
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	6-25	5	12	15	4.5
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	6-40	0	0	0	1
	4 (18)		-	-	22	5.5
White Box-White Cypress Pine shrubby open forest	4 (22)	6-25	-	-	27.5	22.5
	3 (23)		-	-	0	0
Plains Grass grassland on basaltic black earth soils	3 (25)	0	-	-	0	0
Rough-barked Apple riparian forb/grass open forest	3 (20)	6-25	-	-	0	0
Mine rehab	1 (6)	6-25	0	0	0	2.5
	1 (14)		-	-	0	0
Cleared land (formerly cultivated land)	1 (9)	6-25	0	0	0	0
	1 (15)		-	-	0	0

Discussion of performance and actions

Several sites were found to have canopy cover of zero or just above (i.e. sites 1, 2, 7, 16, 8, 12, 19, 21, 23, 20, 14, 9, 15). Given that biodiversity management of the BOA is only in the early stages, in accordance with Section 8.5 of the BOMP (WCC 2013); WCC has allowed approximately 5 years to monitor if exclusion of grazing and implementation of fire and weed management will assist natural regrowth regeneration. Therefore, at this stage revegetation works are not recommended for those poorly performing sites (amber coloured sites). However, revegetation works using local provenance tube stock of canopy species representative of the vegetation community and consistent with section 8.5 of the BOMP (WCC 2012b) may be necessary in the medium term for these sites if future monitoring continues to record poor natural regeneration results. The rehab sites (i.e. 6 and 14) have

already been planted with canopy species and current results are indicative of the lag period between tube stock planting and canopy establishment. However, sites where planting may be considered (even in the short term) include 9 and 15 and the surrounding areas, which have noticeably low resilience due to cropping history.

Similar to native species richness, it is recommended that the completion criteria for canopy cover be reviewed and performance criteria for each three year period be established consistent with the DP&I Best Practice Guidelines (DP&I 2014). This will enable an incremental analysis of performance against long term completion criteria.

3.1.3 Native midstorey cover

Native midstorey cover is a completion criteria established in the BOMP (WCC 2013). The following provides the results from the spring 2013 monitoring event and compares these results with previous years of monitoring and the performance criteria (**Table 5**).

Table 5: Native midstorey cover (%) in comparison to Biometric Benchmarks and Performance Criteria

Biometric vegetation type	Condition class (site no.)	Performance criteria (%)	Native midstorey cover (%)			
			2010	2011	2012	2013
White Box grassy woodland	2 (7)	0-5	0	0	0	0
	2 (16)		-	-	0	0
	3 (1)		0	0	0	0
	3 (2)		0	0	0	0
	3 (8)		0	0	0	0
	3 (12)		0	0	0	0
	3a (19)		-	-	0	0
	3a (21)		-	-	0	0
	4 (3)		0	0	0	0
	4 (11)		0	0	0	0
	4 (13)		-	-	0	0
	4 (17)		-	-	0	0
	4 (24)		-	-	1.5	2
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	0-5	0	0	0	0
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	6-25	0	0	0	0
	4 (18)		-	-	0	0
White Box-White Cypress Pine shrubby open forest	4 (22)	6-25	-	-	8.5	2
	3 (23)		-	-	0	0
Plains Grass grassland on basaltic black earth soils	3 (25)	0	-	-	0	0
Rough-barked Apple riparian forb/grass open forest	3 (20)	0-5	-	-	0	0
Mine rehab	1 (6)	0-5	0	0	4	0
	1 (14)		-	-	0	0

Biometric vegetation type	Condition class (site no.)	Performance criteria (%)	Native midstorey cover (%)			
			2010	2011	2012	2013
Cleared land (formerly cultivated land)	1 (9)	0-5	0	0	0	0
	1 (15)		-	-	0	0

Discussion of performance and actions

A native midstorey was only recorded at sites 22 and 24 (Condition Class 4) (**Table 5**). However, all sites located within the vegetation types, White Box grassy woodland, Yellow Box – Blakely's Red Gum grassy woodland, Plains Grass grassland on basaltic black earth soils, Rough-barked Apple riparian forb/grass open forest and cleared land met the native midstorey vegetation cover performance criteria, as these vegetation types only require a native midstorey cover between 0 and 5%. Condition Class 4 Site 22 did not meet the native midstorey vegetation cover performance criteria of 6 – 25% for White Box-White Cypress Pine shrubby open forest in 2013, though in time this site is considered likely to meet this prescribed performance criteria.

Given the midstorey cover category is not a strong feature of the target vegetation communities (i.e. low target cover levels), no underperforming sites occurred and no action is considered necessary.

3.1.4 Native ground cover

Native ground cover (shrubs < 1m, native grasses and native herbs) is a completion criteria established in the BOMP (WCC 2013). The following provides the results from the 2013 monitoring event and compares these results with previous years of monitoring and the performance criteria (**Table 6**).

Table 6: Native understorey cover (%) in comparison to Biometric Benchmarks and Performance Criteria

Biometric vegetation type	Condition class (site no.)	Performance criteria (%)	Native ground cover (%)			
			2010	2011	2012	2013
White Box grassy woodland	2 (7)	33-45	20	18	26	30
	2 (16)		-	-	0	0
	3 (1)		4	46	36	46
	3 (2)		32	58	74	76
	3 (8)		4	64	72	80
	3 (12)		33	80	54	58
	3a (19)		-	-	98	84
	3a (21)		-	-	82	94
	4 (3)		32	90	98	96
	4 (11)		40	80	80	88
	4 (13)		-	-	58	94
	4 (17)		-	-	56	98
	4 (24)		-	-	80	92
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	33-45	50	78	74	70
White Cypress Pine – Silver-leaved Ironbark – Tumbledown	4 (10)	26-45	36	80	96	80

Biometric vegetation type	Condition class (site no.)	Performance criteria (%)	Native ground cover (%)			
			2010	2011	2012	2013
Red Gum open shrubby forest	4 (18)		-	-	92	90
White Box-White Cypress Pine shrubby open forest	4 (22)	6-25	-	-	64	86
	3 (23)		-	-	92	86
Plains Grass grassland on basaltic black earth soils	3 (25)	0	-	-	42	30
Rough-barked Apple riparian forb/grass open forest	3 (20)	0-5	-	-	52	48
Mine rehab	1 (6)	0-5	0	8	54	74
	1 (14)		-	-	28	30
Cleared land (formerly cultivated land)	1 (9)	0-5	8	20	34	30
	1 (15)		-	-	2	2

Discussion of performance and actions

Native understorey cover was strongly represented at most sites, and exceeded the performance criteria range in several instances. Sites that exceeded this performance criteria bracket were not assessed as having not met the performance criteria, as it is likely that this may be a response to grazing removal and a levelling off of cover may occur in subsequent monitoring events as a native canopy re-establishes. The ground layer was dominated by native grass cover at all Condition Class 4 sites, all Condition Class 3 sites, one of two Condition Class 2 sites and three of four one Condition Class 1 sites.

Only one site, site 16, was well below the performance criteria range with a score of zero. Given that biodiversity management of the BOA is only in the early stages, in accordance with Section 8.5 of the BOMP (WCC 2013); WCC has allowed approximately 5 years to monitor if exclusion of grazing and implementation of fire and weed management will assist natural regrowth regeneration. Continued monitoring of site 16 will determine if additional management action is required earlier. This may also be considered for site 15, which also had a low native ground cover score, though still meeting the performance criteria.

3.1.5 Exotic species richness, cover and problem species

The control of noxious and environmental weeds within the rehabilitation and biodiversity offset areas is a completion criteria established in the BOMP (WCC 2012a). The following provides the results from the 2013 monitoring event and compares these results with previous years of monitoring and the performance criteria (**Table 7**).

Table 7: Exotic species richness, cover and noxious species in comparison to Performance Criteria.

Note: Note: EP = *Echium plantagineum* (Patterson's Curse), HP = *Hypericum perforatum* (St Johns Wort), XO = *Xanthium occidentale* (Noogoora Burr).

Biometric vegetation type	Condition class (site no.)	Performance criteria	No. Exotic species				Exotic species cover				Noxious species*			
			2010	2011	2012	2013	2010	2011	2012	2013	2010	2011	2012	2013
White Box grassy woodland	2 (7)	Noxious and environmental weeds are under control within rehabilitation or biodiversity offset areas	11	14	12	14	88	84	26	54	-	-	-	
	2 (16)		-	-	10	12	-	-	8	86	-	-	-	XO
	3 (1)		11	25	15	16	90	72	70	54	-	-	-	HP
	3 (2)		20	25	12	19	88	36	28	24	-	XO	-	HP
	3 (8)		9	23	9	16	94	50	46	20	-	-	-	
	3 (12)		15	17	16	9	76	67	82	34	-	-	-	
	3a (19)		-	-	11	10	-	-	8	16	-	-	-	
	3a (21)		-	-	14	5	-	-	20	6	-	-	-	
	4 (3)		25	23	13	17	70	22	4	4	EP, HP	-	-	HP
	4 (11)		19	16	10	9	80	40	6	12	EP	-	XS	HP
	4 (13)		-	-	6	8	-	-	8	6	-	-	-	HP
	4 (17)		-	-	2	6	-	-	2	2	-	-	-	
	4 (24)		-	-	1	2	-	-	0		-	-	-	
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)		14	19	12	19	78	32	30	30	-	-	-	

Biometric vegetation type	Condition class (site no.)	Performance criteria	No. Exotic species				Exotic species cover				Noxious species*			
			2010	2011	2012	2013	2010	2011	2012	2013	2010	2011	2012	2013
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)		19	19	12	9	88	70	30	20	EP	EP	-	HP
	4 (18)		-	-	0	2	-	-	0	0	-	-	XS	
White Box-White Cypress Pine shrubby open forest	4 (22)		-	-	1	1	-	-	0	0	-	-	-	
	3 (23)		-	-	7	7	-	-	6	14	-	-	-	HP
Plains Grass grassland on basaltic black earth soils	3 (25)		-	-	14	21	-	-	72	20	-	-	-	HP, EP
Rough-barked Apple riparian forb/grass open forest	3 (20)		-	-	9	16	-	-	70	52	-	-	OS	
Mine Rehab	1 (6)		16	19	15	13	50	94	18	26	-	-	-	
	1 (14)		-	-	19	18	-	-	24	40	-	-	HP	
Cleared land (formerly cultivated land)	1 (9)		20	16	12	11	94	40	64	70	-	-	HP	
	1 (15)		-	-	9	9	-	-	12	96	-	-	-	

Discussion of performance and actions

Weed management in the last 12 months has led to significant reductions in weed cover at several sites (ie 3 (1), 3 (2), 3 (8), 3 (12), 4 (10), 3 (25), 3 (20)). That said, weed management is an ongoing issue requiring continued management. Exotic species cover was present at all sites, with the exception of three Condition Class 4 sites. Condition Class 1 Site 15 had the highest exotic species cover (96%).

3.2 Landscape Function Analysis

Landscape Function Analysis (LFA) has been used to monitor the soil surface condition of the rehabilitation sites (Sites 6 and 14) against the two analogue sites (Sites 11 and 17). The following presents the spring 2013 landscape organisation and soil surface assessment results for these sites, as well as data from previous years, where available.

In interpreting the LFA results, the Landscape Organisation results are presented as an index, which essentially provides a proportion of the transect occupied by patches - patches being landscape elements that are relatively permanent and provide stable, resource accumulating structures, such as grassy tussocks, ground cover and logs. Therefore a higher Landscape Organisation index implies a more stable transect that is less prone to erosion. The SSA results go one step further than this and provide an index on stability, infiltration and nutrient cycling for all patch and inter-patch types for the whole of landscape (transect).

When analysing trends in monitoring data, long-term, multi-year monitoring is far more informative, as variables such as climatic conditions and different monitoring technicians can influence results. The earliest LFA data recorded was in spring 2010 at Site 6 and Site 11.

In order to measure site performance, performance criteria have been provided, though these have been developed herein and are not provided in the current version of the BOMP (WCC 2013). The performance criteria for each vegetation sampling unit has been developed by calculating the average score from the respective analogue sites.

3.2.1 Landscape Organisation

The Landscape Organisation index has been presented for each of the sites monitored through LFA in **Table 8** below, with the results of previous years monitoring also provided.

Table 8: Landscape Organisation (LO) for rehabilitation sites 6 and 14 and analogue sites 11 and 17

Biometric vegetation type	Condition class (site no.)	Performance criteria	Landscape Organisation			
			2010	2011	2012	2013
White Box grassy woodland	4 (11)	0.86	1	0.96	0.47	1.0
	4 (17)		-	-	0.44	0.99
Mine Rehab	1 (6)	0.86	1	0.96	0.88	0.88
	1 (14)		-	0.8	-	0.52

3.2.2 Soil Surface Assessment

Although the Landscape Organisation provides an indication of soil surface stability, the SSA results presented for these same sites in **Table 9**, provides a more accurate picture of how these transects are functioning by way of soil surface stability, infiltration and nutrient cycling.

Table 9: Soil Surface Assessment indices results for rehabilitation sites 6 and 14 and analogue sites 11 and 17.

Note: S = Stability; I = Infiltration; N = Nutrient cycling.

Biometric vegetation type	Condition class (site no.)	Performance criteria			2010			2011			2012			2013		
		S	I	N	S	I	N	S	I	N	S	I	N	S	I	N
White Box grassy woodland	4 (11)	63	34	30	69	39	36	59	35	30	64	33	26	59	28	27
	4 (17)				-	-	-	-	-	-	51	27	21	63	32	26
Cleared land(Mine Rehab Site)	1 (6)	63	34	30	66	45	36	61	40	27	43	27	17	59	34	25
	1 (14)				-	-	-	-	-	-	39	25	18	49	26	18

Discussion of performance and actions

In terms of comparison between rehabilitation sites and analogue sites in 2013, as expected both the analogue sites performed better than the rehabilitation sites. Rehabilitation site 6 (planted in 2008) is remaining stable and is meeting the performance criteria for Landscape Organisation, which is a positive sign. However, in terms of Soil Surface Assessment, site 6 was below the performance criteria, but is generally considered to be tracking well towards analogue scores. Rehabilitation site 14 (planted in 2011) had scores below the performance criteria set for Landscape Organisation and Soil Surface assessment. This is expected for young rehabilitation (less than two years old at the time of monitoring) and, in time, it is expected that these scores will increase. Continued monitoring of this site should occur to observe this trend.

3.3 Fauna

It is generally difficult to set performance measures and criteria for fauna monitoring, due to the complexity and dynamics of fauna assemblages. For this reason, the approach to evaluating fauna monitoring results has been to identify trends and provide comparisons between Rehabilitation monitoring sites, DNG and woodland/analogue monitoring sites. The following section provides a summary of the threatened species encountered during the 2013 fauna monitoring, followed by an analysis of the similarity of bird and microbat assemblages at Rehabilitation sites, DNG and woodland/analogue monitoring sites.

3.3.1 Summary of fauna results, threatened and migratory species

A total of 135 species were recorded during the 2013 monitoring period. This consisted of 92 birds, 15 reptiles, 21 mammals and 7 amphibians (frogs). Species lists for both winter and spring 2013 are provided in **Volume 2**. Further analysis of winter bird surveys will be undertaken once consecutive years of monitoring have been completed.

Eleven fauna species listed under the *Threatened Species Conservation Act* 1995 (TSC Act) and/or the *Environmental Protection and Biodiversity Conservation Act* 1999 (EPBC Act) were recorded during the 2013 spring survey period. There were seven threatened bird species recorded, six of which were listed as vulnerable under the TSC Act and one as a migratory species *Merops ornatus (*Rainbow Bee-eater) (**Table 10**). The other four threatened species were bats, all listed as vulnerable under the TSC Act. *Chalinolobus dwyeri* (Large-eared Pied Bat) and *Nyctophilus corbenii* (Greater Long-eared Bat south-eastern form) are also listed as vulnerable under the EPBC Act.

Climacteris picumnus victoriae (Brown Treecreeper eastern subspecies) and *Pomatostomus temporalis temporalis* (Grey Crown Babbler) were both recorded by ELA for the first time during the first round of winter bird surveys in July 2013 (**Volume 2**). *Chthonicola sagittata* (Speckled Warbler), *Circus assimilis* (Spotted Harrier) and the Grey Crown Babbler (prior to the winter bird surveys) have not been recorded previously on the Werris Creek BOA. *Glossopsitta pusilla* (Little Lorikeet) and the Brown Treecreeper (prior to the winter bird surveys) have been recorded on the Werris Creek BOA although have not been recorded by ELA during BOA monitoring.

The threatened bird and bat species observed on the Werris Creek BOA are listed in **Table 10**.

Table 10: Threatened species recorded during 2013 survey period

Scientific name	Species	TSC act	EPBC act	Location
Aves				
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Eastern area of Marengo (incidental)
Glossopsitta pusilla	Little Lorikeet	V	-	Site 15
Circus assimilis	Spotted Harrier	V	-	Sites 8/9 (incidental) and Site 15 (incidental)
Merops ornatus	Rainbow Bee-eater	-	M	Site 24
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	Site 24

Scientific name	Species	TSC act	EPBC act	Location
Pyrrholaemus saggitatus	Speckled Warbler	V	-	Site 23 (incidental)
Stagonopleura guttata	Diamond Firetail	V	-	Site 3 and Marengo house (incidental)
Mammalia				
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Sites 17 and 22
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Sites 2, 9, 10, 12, 20, 21, 22 and 23
Vespadelus troughtoni	Eastern Cave Bat	V	-	Sites 3 and 13
Nyctophilus spp.	A long eared bat	V	V	Sites 1, 2, 8, 10, 11, 12, 18, 21, 22, 23 and 25

3.3.2 Analysis of bird assemblages between DNG and woodland

An nMDS plot (**Figure 2**) was produced using the bird assemblages and maximum number of birds counted from the eight 5 minute surveys at each site (i.e. four point survey stations in the morning and afternoon for each site). For analysis, sites were grouped by vegetation type (symbol shape and colour in plot), and whether they were DNG (delineated with an orange dash) or woodland (no underline). Community differences between DNG and woodland were then assessed with one-way ANOSIM, and the species contributing most significantly to the grouping were determined with SIMPER analyses. Multivariate analyses were performed using Primer v 6.1.6 (Clarke and Gorley 2006).

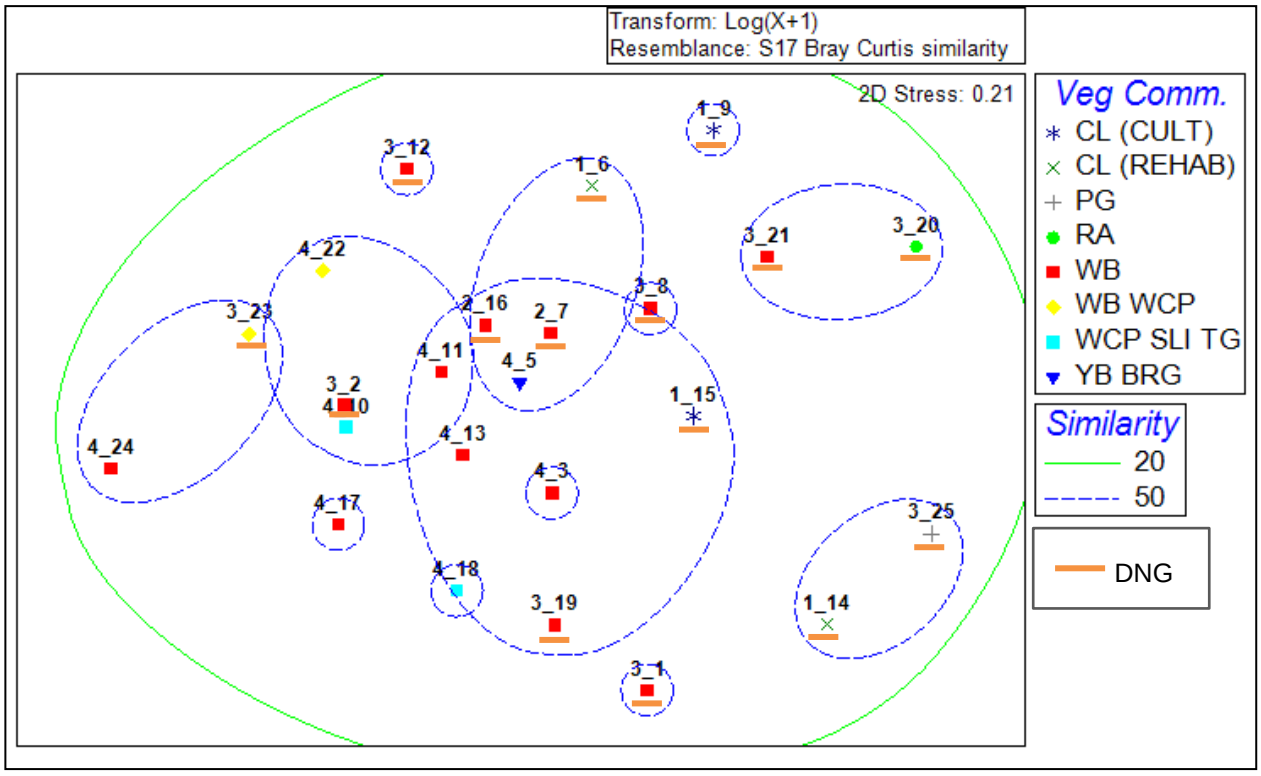

Figure 2: nMDS plot of all bird count data at each site with Log(x+1) transformation.

Sites were grouped by vegetation type and whether they were woodland or DNG (delineated with an orange dash). Data was then analysed using both SIMPER and ANOSIM methods. Key to vegetation types: CL (cult) = cleared land, previously cultivated; CL (rehab) = rehabilitated land; PG = Plains Grass grassland; RA = Rough-barked Apple riparian forb/grass open forest; WB = White Box grassy woodland; WB WCP = White Box - White Cypress Pine shrubby open forest; WCP SLI TG = White Cypress Pine – Silver-leaved Ironbark - Tumbledown Gum shrubby open forest; YB BRG = Yellow Box - Blakely's Red Gum woodland

The nMDS plot shows that all sites share at least 20 % of the species present. ANOSIM found no clear distinction between DNG and woodland bird communities (Global R= -0.081, P= 0.843), and although all but one of the woodland sites appear in the lower left quarter of the plot, there are also some DNG sites among them, indicating shared species. Five of nine woodland sites have a similarity of over 50%.

According to the nMDS, Condition Class 2 sites 7 and 16 show strong similarity with Condition class 4 site 5 and 11.

SIMPER analysis found that the main species to differentiate woodland from DNG communities was *Manorina melanocephala* (Noisy Miner), which was more abundant in woodland habitat than DNG. The Noisy Miner is an ecosystem engineer and is listed as a Key Threatening Process (KTP) under the NSW TSC Act. The remaining sites, being woodland sites, all showed strong clustering to other woodland sites, which is expected.

Other species that had higher densities at woodland sites were Pied Butcherbird, Australian King Parrot, and Apostle Bird. Rufous Songlark, Tree Martin, Australian Pipit, Magpie Lark and Black Shouldered Kite all occurred exclusively at the DNG sites during these surveys.

An ANOSIM was done to compare the bird communities in the two rehabilitated sites to that of the woodland sites. In the early stages of rehabilitation, the two bird communities are expected to differ, but the difference will become less as rehabilitation progresses. The results of this analysis indicate that the two bird communities do differ (Global R = 0.742, P = 0.018). Noisy Miners are the main species contributing to the difference between habitats, being present at all woodland sites and absent from the rehabilitation sites. Pied Butcherbird and Striated Pardalote were also absent from rehabilitated sites, though both occurred at 6 of the woodland sites.

3.3.3 Analysis of microbat assemblages between DNG and woodland

Similar to the analysis on bird assemblages, an analysis between microchiropteran bat assemblages for Rehabilitation sites, DNG and woodland/analogue sites was carried out. Instead of abundance data (as used for the bird analysis) the number of 'positive passes' (successful identification of microbat echolocation recordings) were used as proxy for bat activity in each habitat type.

Two nMDS plots were developed; one for the nine sites monitored for fauna in all three monitoring years only (sites 1, 2, 3, 5, 6, 7, 9 and 12) (**Figure 3**) and one with all sites monitored in all three monitoring years, including the 12 sites added in 2012 and sites 8 and 10 (**Figure 4**). The nMDS ordination showed no distinct groupings of DNG or woodland bat communities, indicating that there were species shared between both habitats. This was confirmed by ANOSIM (Global R = -0.081, P = 0.83). Despite the similar bat communities in both habitats, SIMPER analysis indicates that most species were recorded more frequently by Anabat in the woodland habitat than DNG. This was best demonstrated by the *Vespadelus vulturnus* (Little Forest Bat) (average of 2.96 positive passes per site in woodland and 1.95 in DNG), *Chalinolobus gouldii* (Gould's Wattled Bat) (3.32 and 2.04 respectively), and the *Tadarida australis* (White-striped Free-tail Bat) (2.27 and 1.66 respectively). An exception was the *Chalinolobus morio* (Chocolate Wattled Bat), which had average abundances that were similar in DNG and woodland habitats (0.57 and 0.58 positive passes).

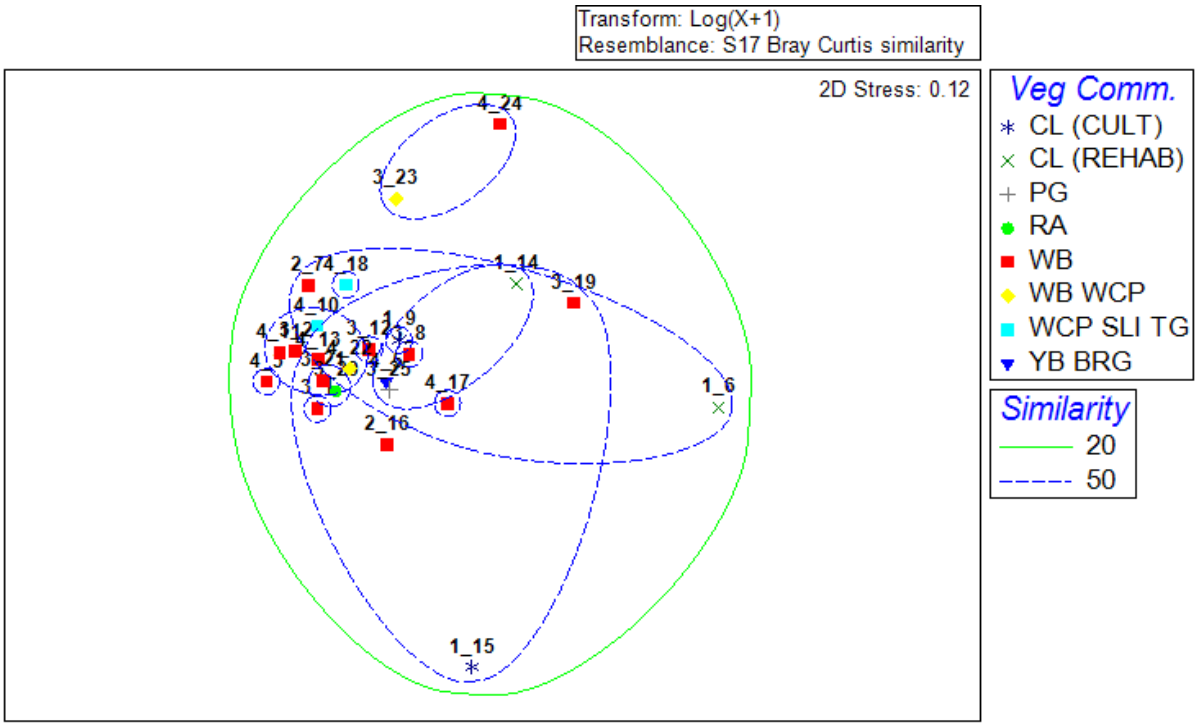

Figure 3: Microbat assemblages comparing all monitoring years.

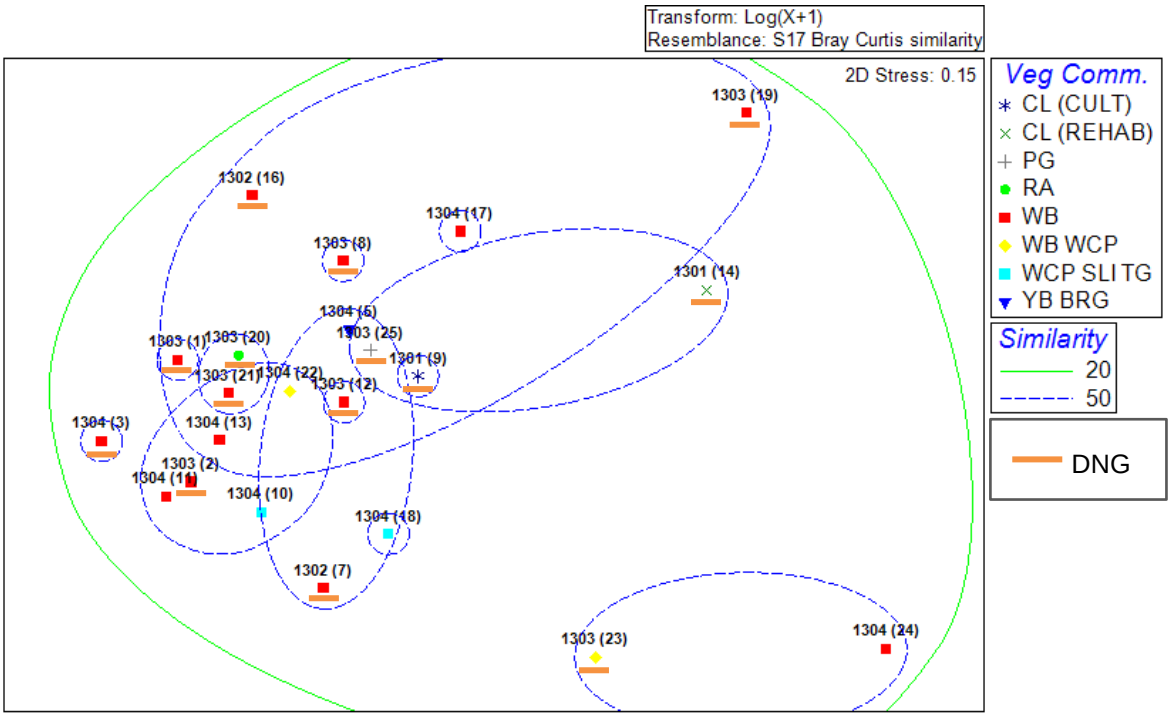

Figure 4: nMDS plot of bat communities based on log(x+1) transformation.

Sites were grouped by vegetation type and whether they were woodland or DNG (delineated with an orange dash). Data was then analysed using both SIMPER and ANOSIM methods. Key to vegetation types: CL (cult) = cleared land, previously cultivated; CL (rehab) = rehabilitated land; PG = Plains Grass grassland; RA = Rough-barked Apple riparian forb/grass open forest; WB = White Box grassy woodland; WB WCP = White Box - White Cypress Pine shrubby open forest; WCP SLI TG = White Cypress Pine – Silver-leaved Ironbark - Tumbledown Gum shrubby open forest; YB BRG = Yellow Box - Blakely's Red Gum woodland

The similarity between DNG and woodland bat assemblages/activity could be due to a number of factors, including low call detection rates and likely overlap of species foraging paths between small patches of DNG in close proximity to remnant vegetation.

There was a significant difference in the bat communities at woodland and rehabilitated sites (ANOSIM Global R = 0.67, P = 0.036). Little Forest Bat and Central-eastern Broad-nosed Bat were the only species present at woodland sites that were absent from rehabilitation sites. Gould's Wattled Bat, Southern Freetail Bat, Inland Freetail Bat, and Inland Broad-nosed Bat all occurred in both habitats, but were detected far more frequently at woodland sites than at rehabilitation sites. The only exception to this pattern was the White-striped Freetail Bat, which occurred at similar abundances in both habitats.

4 Conclusion and Recommendations

This report has presented the results of the 2013 monitoring at the Werris Creek BOA. The results of the 2013 monitoring, when compared to the performance criteria, suggest that the BOA is generally performing well, with some focus areas that require management actions. **Section 4.1** below compiles the recommended land management actions, based on the monitoring site performance.

4.1 Overall site performance and recommended actions

Table 11 provides the overall site performance and recommended actions to be implemented not only at the site but also in the area surrounding the relevant sites (i.e. the monitoring site results are representative of issues that are in the broader area around the site).

As mentioned in **section 3.1.1**, and as a broader recommendation associated with the next revision of the BOMP, it is recommended that three year performance targets for native species richness and canopy cover are included in the BOMP to assess the incremental progression towards the long term completion criteria. This will bring the BOMP into line with the 'Mine Site Best Practice Guidelines for Biodiversity Offset Management Plans' prepared by DP&I (DP&I 2014). Other completion criteria should also be reviewed for adequacy, now that baseline data has been acquired, and it would be appropriate to include completion and performance criteria for LFA monitoring.

Table 11: Overall site performance and management actions

Biometric vegetation type	Condition class No. (Site)	Overall site performance against performance measures								Comments on underperforming sites and management action
		NNS	NOC	NMS	NGC	ES	LO	SSA	FA	
White Box grassy woodland	2 (7)						N/A	N/A		NNS reduced in 2013, NOC continues to be low, and ES cover remains relatively high. At this stage, in accordance with the BOMP (WCC 2013), whilst these poorly performing attributes are not meeting PC, continued monitoring is recommended to review whether trends in NNS and NOC improve over time. Continued weed management is required to control exotic species.

Biometric vegetation type	Condition class No. (Site)	Overall site performance against performance measures								Comments on underperforming sites and management action
		NNS	NOC	NMS	NGC	ES	LO	SSA	FA	
	2 (16)						N/A	N/A		ES cover remains high, including the presence of *Xanthium occidentale* (Noogoora Burr) a noxious weed requiring management. Weed management is an ongoing issue for the BOA and weed spraying should continue. It is hoped that grass and other native seed will blow in and colonise this area.
	3 (1)						N/A	N/A		NNS reduced in 2013, NOC continues to be low, and ES cover remains high, though weed cover has reduced by 16% since 2012 and 36% since 2010. That said, weed management should continue in accordance with the BOMP.
	3 (2)						N/A	N/A		NOC continues to be low, and ES cover remains high, though weed cover has reduced by 4% since 2012 and over 60% since 2010. That said, weed management should continue in accordance with the BOMP.
	3 (8)						N/A	N/A		NNS reduced in 2013, NOC continues to be low, and ES cover remains high, though weed cover has reduced by 26% since 2012 and 74% since 2010. That said, weed management should continue in accordance with the BOMP.
	3 (12)						N/A	N/A		NNS reduced in 2013, NOC continues to be low, and ES cover remains high, though weed cover has reduced by 48% since 2012 and 42% since 2010. That said, weed management should continue in accordance with the BOMP.
	3a (19)						N/A	N/A		NOC continues to be low, and ES cover remains high, with an actual increase in weed cover of 8% since 2012. Therefore, weed management should continue in accordance with the BOMP.

Biometric vegetation type	Condition class No. (Site)	Overall site performance against performance measures								Comments on underperforming sites and management action
		NNS	NOC	NMS	NGC	ES	LO	SSA	FA	
	3a (21)						N/A	N/A		NOC continues to be low. Revegetation using tube stock may be necessary if NOC does not show signs of improvement in medium term.
	4 (3)						N/A	N/A		NNS is less than the PC, though has improved since 2012. Native species diversity fluctuates depending on climatic conditions in respective years. Future monitoring of diversity will inform actual performance of the site.
	4 (11)									NNS is less than the PC and has reduced from previous years of monitoring. Native species diversity fluctuates depending on climatic conditions in respective years. Future monitoring of diversity will inform actual performance of the site. ES cover has significantly reduced from previous years, though the presence of *Hypericum perforatum* (St Johns Wort) requires targeted weed management. Future LFA monitoring will inform whether SSA results are a downward trend.
	4 (13)						N/A	N/A		
	4 (17)									NNS is less than the PC, though has remained stable since 2012. Native species diversity fluctuates depending on climatic conditions in respective years. Future monitoring of diversity will inform actual performance of the site. Future LFA monitoring will inform whether SSA results are a downward trend.
	4 (24)						N/A	N/A		NNS is less than the PC, though has remained stable since 2012. Native species diversity fluctuates depending on climatic conditions in respective years. Future monitoring of diversity will inform actual performance of the site.
Yellow Box – Blakely's Red	4 (5)						N/A	N/A		ES cover remains high, though weed cover has remained constant since 2012 and has reduced by 48% since 2010. That said, weed management

Biometric vegetation type	Condition class No. (Site)	Overall site performance against performance measures								Comments on underperforming sites and management action
		NNS	NOC	NMS	NGC	ES	LO	SSA	FA	
Gum grassy woodland										should continue in accordance with the BOMP.
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)						N/A	N/A		ES remains high, including the presence of *Hypericum perforatum* (St Johns Wort), though weed cover has reduced by 10% since 2012 and has reduced by 68% since 2010. That said, weed management should continue in accordance with the BOMP.
	4 (18)						N/A	N/A		NNS and NMS are below PC, though diversity is relative stable in comparison to the previous 2012 monitoring results. Current management in accordance with the BOMP and continued monitoring of trends is considered adequate
White Box-White Cypress Pine shrubby open forest	4 (22)						N/A	N/A		NNS and NMS are below PC, though diversity is relative stable in comparison to the previous 2012 monitoring results. Current management in accordance with the BOMP and continued monitoring of trends is considered adequate.
	3 (23)						N/A	N/A		NNS, NOC and NMS are all below PC, though trends from previous years are stable.
Plains Grass grassland on basaltic black earth soils	3 (25)						N/A	N/A		NNS is well below PC, but has remained stable since monitoring commenced in 2012. Active management to improve diversity may be necessary at some point in the future, though at this stage management in accordance with the BOMP is adequate. ES cover is relatively high at 20%, but has reduced significantly from 72% in 2012. The presence of *Echium plantagineum* (Patterson's Curse), *Hypericum perforatum* (St Johns Wort) requires targeted action.

Biometric vegetation type	Condition class No. (Site)	Overall site performance against performance measures								Comments on underperforming sites and management action
		NNS	NOC	NMS	NGC	ES	LO	SSA	FA	
Rough-barked Apple riparian forb/grass open forest	3 (20)						N/A	N/A		NNS, NOC, NMS continues to be below PC. ES has reduced from 70% in 2012 to 52% in 2013, though continued management in accordance with the BOMP is still necessary.
Mine rehab	1 (6)									Whilst NNS and NOC is below PC, there has been substantial improvement in these attributes when compared to previous years of monitoring. ES is high and has increase slightly from the previous monitoring year. Future LFA monitoring will inform whether SSA results are a downward trend. Current management regimes in accordance with the BOMP are expected to improve the poorly performing attributes.
	1 (14)									NNS remains low, NOC remains low and LFA results are poor too. Given this is a rehab site, improvements responding to management regimes in accordance with the BOMP will take some time, though current management in accordance with the BOMP is considered appropriate. ES cover has actually increased since 2012 and requires further treatment.
Cleared	1 (9)						N/A	N/A		NNS is low, though this may be a reflection of past disturbance and low resilience of the site and surrounds. NOC remains low but there is a likely lag period between the plantings that have been established and cover score readings. ES cover has actually increased since 2011 and 2012 and requires further treatment.
	1 (15)						N/A	N/A		NNS reduced in 2013, though this may be an artefact of poor climatic conditions and it is hoped that native seed blown in from adjacent paddocks will colonise the area in time. NOC continues to be low, and ES cover remains high.

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Werris Creek Coal Mine – Biodiversity Offset Area

Annual Monitoring Report Volume 2 – Monitoring data

Prepared for
Werris Creek Coal Pty. Ltd.

4 April 2014

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Contents

1 Photo Monitoring Points

See photos supplied on disc.

2 Biometric Monitoring Results

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL
1	0	0	0	46	0	0	54	0	0	0
2	0	0	0	74	0	2	24	0	1	0
3	0	19.5	0	92	2	2	4	1	1	16
5	0	4.5	0	64	0	6	30	1	0	62
6	0	2.5	0	74	0	0	26	0	1	22
7	0	0	0	30	0	0	54	0	0	43.5
8	0	0	0	80	0	0	20	0	0	20
9	0	0	0	30	0	0	70	0	0	0
10	0	1	0	70	0	10	20	1	1	0
11	0	20	0	84	0	4	12	3	1	45
12	0	0	0	50	0	8	34	0	0	0
13	0	13	0	74	0	20	6	0	0.5	13
14	0	0	0	30	0	0	40	0	1	10
15	0	0	0	0	0	2	96	0	0	0
16	0	1.5	0	0	0	0	86	1	0	0
17	0	15	0	88	2	8	2	1	1	20
18	0	5.5	0	80	8	2	0	5	1	57
19	0	0	0	72	0	12	16	0	0	0
20	0	0	0	40	0	8	52	0	0	4
21	0	0	0	94	0	0	6	0	0	1.5
22	0	22.5	2	60	10	16	0	0	0.5	21
23	0	0	0	76	0	10	14	0	0	0
24	0	14	2	84	0	8	0	0	1	41
25	0	0	0	30	0	0	70	0	0	0

3 Floristic Monitoring Results

Family	Scientific Name	Common name	Native / Exotic	1	2	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Acanthaceae	*Brunoniella australis*	Blue Trumpet	N																	2			1		1		
Adiantaceae	*Cheilanthes sieberi*	Rock Fern	N	1	2							1			2				1	1	2		1		1	1	1
Adiantaceae	*Cheilanthes distans*	Bristly Cloak Fern	N												1												
Apiaceae	*Ammi majus*	Bishop's Weed	E				3				3			2		1		2									
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	E													1											
Apiaceae	*Daucus glochidiatus*	Native Carrot	N																		1						
Apocynaceae	*Gomphocarpus sp.*	Cotton Bush	E					1								1											
Asteraceae	*Centaurea solstitialis*	St Barnaby's Thistle	E	1	3	1	1	1	1	1	1	2	1				2	1									1
Asteraceae	*Cirsium vulgare*	Spear Thistle	E	2	2						2			1								1					
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	E	2							1					1											
Asteraceae	*Calotis lappulacea*	Yellow Burr-daisy	N		1	1						2			2					1	2						2
Asteraceae	*Bidens sp.*		E		1		1		3	1		1								1							
Asteraceae	*Hypochaeris radicata*	Catsear	E		1						3											1					2
Asteraceae	*Conyza sp.*	Fleabane	E		2	2	2	1										1					1				1
Asteraceae	*Lactuca serriola*	Prickly Lettuce	E		2																1						
Asteraceae	*Carthamus lanatus*	Saffron Thistle	E		3	1	1	1				1					2				1	1	1		2		2
Asteraceae	*Vittadinia cuneata*	A Fuzzweed	N			1														2							
Asteraceae	*Chrysocephalum apiculatum*	Common Everlasting	N			3																					
Asteraceae	*Euchiton sphaericus*	Star Cudweed	N			3																					
Asteraceae	*Lactuca serriola*	Prickly Lettuce	E				1																				
Asteraceae	*Senecio quadridentatus*	Cotton Fireweed	N				2	1		2		2	1												2		
Asteraceae	*Euchiton sp.*		N						1									1									
Asteraceae	*Ambrosia spp.*	Ragweed	E						1																		
Asteraceae	*Vittadinia muelleri*	A Fuzzweed	N							1									1		2					1	
Asteraceae	*Onopordum acanthium*	Scotch Thistle	E										1		1				1								

Family	Scientific Name	Common name	Native / Exotic	1	2	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	E										1			1									1		
Asteraceae	*Calotis cuneifolia*	Purple Burr-Daisy	N												1						1						1
Asteraceae	*Bidens subalternans*	Greater Beggar's Ticks	E													1											
Asteraceae	*Silybum marianum*	Variegated Thistle	E														1										
Asteraceae	*Xanthium occidentale*	Noogoora Burr	E															2									
Asteraceae	*Cymbonotus lawsonianus*	Bear's Ear	N																		1	1	2				
Asteraceae	*Olearia sp. aff. Elliptica*		N																							1	
Boraginaceae	*Echium plantagineum*	Paterson's Curse, Salvation Jane	E																								1
Brassicaceae	*Lepidium africanum*	Common Peppercress	E			2				1					1				1								
Cactaceae	*Opuntia stricta*	Common Prickly Pear, Smooth Pest Pear	E																2					1		1	
Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell	N				2	1		3					1			1		1		1	1				
Caryophyllaceae	*Petrorhagia nanteuilii*	Proliferous Pink	E	2	2	2	2					1	1		2				3		2	1			2		2
Caryophyllaceae	*Paronychia brasiliana*		E			2																					1
Caryophyllaceae	*Polycarpon tetraphyllum*	Four-leaved Allseed	E																1								
Chenopodiaceae	*Maireana microphylla*	Small-leaf Bluebush	N				1																				
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush	N			2						2															
Chenopodiaceae	*Einadia hastata*	Berry Saltbush	N									3															
Chenopodiaceae	*Einadia trigonos*	Fishweed	N												2							1					
Chenopodiaceae	*Einadia polygonoides*	Knotweed Goosefoot	N																1	1			1		1		
Clusiaceae	*Hypericum perforatum*	St. Johns Wort	E	2	3	3						1	1		2										1		1
Convolvulaceae	*Dichondra sp. A*	Kidney Weed	N		1								2		2				2	2	2	2	1	2	1	2	
Convolvulaceae	*Dichondra repens*	Kidney Weed	N			2	1																				
Convolvulaceae	*Convolvulus graminetinus*		N																		1						
Convolvulaceae	*Polymeria calycina*		N																						1		

Family	Scientific Name	Common name	Native / Exotic	1	2	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Cupressaceae	*Callitris glaucophylla*	White Cypress Pine	N																					4			
Cyperaceae	*Carex inversa*	Knob Sedge	N	2	1	3	2		3			2	3	3	1						1		2		3		
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-sedge	N													1				1	1						
Cyperaceae	*Cyperus rotundus*	Nutgrass	E													1											
Cyperaceae	*Scleria mackaviensis*		N																					2		1	
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge	N																							1	
Dilleniaceae	*Hibbertia obtusifolia*	Hoary guinea flower, Grey Guinea Flower	N																					2			
Euphorbiaceae	*Chamaesyce drummondii*	Caustic Weed	N		1																						
Euphorbiaceae	*Chamaesyce spp.*		N															1									
Fabaceae - Faboideae	*Medicago minima*	Woolly Burr Medic	E	2	3	2	1		2							1						1					1
Fabaceae - Faboideae	*Medicago truncatula*	Barrel Medic	E	3																							
Fabaceae - Faboideae	*Medicago sp.*	Medic	E		2					2					1						1						1
Fabaceae - Faboideae	*Medicago scutellata*	Snail Medic	E			1																					
Fabaceae - Faboideae	*Vicia sativa*	Common Vetch	E				4	3			1																
Fabaceae - Faboideae	*Trifolium vesiculosum*	Arrow-leaf Clover	E					2																			
Fabaceae - Faboideae	*Trifolium resupinatum*	Shaftal Clover	E							3																	
Fabaceae - Faboideae	*Desmodium sp.*		N															1									
Fabaceae - Faboideae	*Trifolium sp.*	Clover	E																			1					
Fabaceae (Faboideae)	*Medicago sativa*	Lucerne	E							3																	
Fabaceae (Faboideae)	*Glycine clandestina*		N												1				2				2	1			
Fabaceae (Faboideae)	*Desmodium brachypodum*	Large Tick-trefoil	N												2					1				1		2	

Family	Scientific Name	Common name	Native / Exotic	1	2	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Fabaceae (Faboideae)	*Vicia spp.*	Vetch	E													1											
Fabaceae (Faboideae)	*Swainsona galegifolia*	Smooth Darling Pea	N																	1				1		1	
Fabaceae (Faboideae)	*Templetonia stenophylla*	Leafy Templetonia	N																					1			
Fabaceae (Mimosoideae)	*Acacia implexa*	Hickory Wattle	N																					1			
Geraniaceae	*Geranium solanderi*	Native Geranium	N		1							1	1									3					
Goodeniaceae	*Goodenia pinnatifida*	Scrambles Eggs	N			2																					
Juncaceae	*Juncus usitatus*		N																			1					1
Juncaceae	*Juncus sp.*		N																				1				
Lamiaceae	*Mentha satureioides*	Native Pennyroyal	N				3	1				3	3	2							2	3	2		1		
Lamiaceae	*Marrubium vulgare*	Horehound	E															1									
Liliaceae	*Agapanthus sp.*	Agapanthus	E	1																							
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush	N			1																	2	2		2	
Lomandraceae	*Lomandra multiflora subsp. multiflora*	Many-flowered Mat-rush	N				3								1					1							
Loranthaceae	*Amyema miquelii*	Box Mistletoe	N																					1			
Malvaceae	*Sida cordifolia*		E		1	2																					
Malvaceae	*Sida corrugata*	Corrugated Sida	N				1		1			2			2				1	2							
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	E				1		1													1					
Malvaceae	*Sida sp.*		N				2	1	1																		
Malvaceae	*Sida spinosa*		E					1					1		1			1			1	2	2		2		
Myrsinaceae	*Anagallis arvensis*	Scarlet Pimpernel	E	3	2	1	1			2																	2
Myrtaceae	*Eucalyptus albens*	White Box	N			4							4					4	4	4				4		4	
Myrtaceae	*Eucalyptus melliodora*	Yellow Box	N					1																			
Myrtaceae	*Eucalyptus dealbata*	Tumbledown Red Gum	N									4			3					4							
Myrtaceae	*Eucalyptus blakelyi*	Blakely's Red Gum	N													1											

Family	Scientific Name	Common name	Native / Exotic	1	2	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark	N																					1			
Nyctaginaceae	*Boerhavia dominii*	Tarvine	N					1															1				
Oleaceae	*Notelaea microcarpa*	Native Olive	N																	1				2	1	2	
Oxalidaceae	*Oxalis perennans*		N			1													1			1					
Phormiaceae	*Dianella longifolia*	A Blue Flax Lily	N												1												
Phormiaceae	*Dianella spp.*		N																	1				1			
Phyllanthaceae	*Phyllanthus subcrenulatus*		N																					1			
Pittosporaceae	*Bursaria spinosa*	Native Blackthorn	N																					1			
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	E				2			3	2		1							1		1					1
Plantaginaceae	*Veronica plebeia*	Creeping Speedwell N																								1	
Poaceae	*Eragrostis sp.*		E	1	1	3																					
Poaceae	*Chloris truncata*	Windmill Grass	N	1	1																		1				
Poaceae	*Avena spp.*	Oats	E	1					1					3		4	5	3									1
Poaceae	*Lolium perenne*	Perennial Ryegrass	E	2	3	4	3	3	5			3															
Poaceae	*Cymbopogon refractus*	Barbed Wire Grass	N	2											2						2			2		2	
Poaceae	*Cynodon dactylon*	Common Couch	N	3	1			2								1											
Poaceae	*Bromus hordeaceus subsp. molliformis*	Soft Brome	E	3							2	3	1	2							2		2		1		3
Poaceae	*Bromus catharticus*	Prairie Grass	E	4	3	4	3	2	3	1	3			3		1			1			2					
Poaceae	*Aristidea ramosa var. speciosa*	Purple Wiregrass	N	5	5	3	5		3	2	1	5	3	2	1				3	3	4	5	2	3		3	3
Poaceae	*Avena sativa*	Oats	E		3	5	1	5		4	4																
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass	N			2			1															1	2		2
Poaceae	*Austrodanthonia spp.*	A Wallaby Grass	N			3		1								1			2	1	1		1				
Poaceae	*Austrostipa scabra*	Speargrass	N			5						2	2		3					3	1		2	2	3	2	
Poaceae	*Bothriochloa macra*	Red Grass	N				1			5		3	2	2					4		4	2	4		5		
Poaceae	*Panicum decompositum*		N				2									2											

Family	Scientific Name	Common name	Native / Exotic	1	2	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Poaceae	*Austrostipa aristiglumis*	Plains Grass	N				3	3	2		4		4	5				1	1			2					
Poaceae	*Lachnagrostis sp.*		N					1																			
Poaceae	*Dichanthium sericeum*	Queensland Bluegrass	N					4								2											2
Poaceae	*Bothriochloa spp.*	Redgrass, Bluegrass	N						1																	2	
Poaceae	*Lolium spp.*	A Ryegrass	E							2	3		1	1							1						1
Poaceae	*Lachnagrostis filiformis*		N								2																
Poaceae	*Paspalum dilatatum*	Paspalum	E								2																
Poaceae	*Aristidea vagans*	Three-awn Speargrass		N									1	2						1					2		1
Poaceae	*Vulpia spp.*	Rat's-tail Fescue	E									1															2
Poaceae	*Microlaena stipoides*	Weeping Grass	N									2	2						1								
Poaceae	*Chloris ventricosa*	Tall Chloris	N										1		3				3					1		1	
Poaceae	*Paspalum spp.*	Paspalum	E											1								2					
Poaceae	*Phalaris spp.*		E													2											
Poaceae	*Lolium rigidum*	Wimmera Ryegrass	E													4	5	3				2					
Poaceae	*Bromus spp.*	A Brome	E															1			2						4
Poaceae	*Briza minor*	Shivery Grass	E																								1
Poaceae	*Aira sp.*		E																								2
Polygonaceae	*Rumex brownii*	Swamp Dock	N		2	2	2		2		3										1		1		1		1
Polygonaceae	*Rumex crispus*	Curled Dock	E											1								2					
Polygonaceae	*Fallopia convolvulus*	Black Bindweed	E													1											
Rubiaceae	*Asperula conferta*	Common Woodruff	N			1	3								1												
Rubiaceae	*Asperula cunninghamii*	Twining Woodruff	N																1								
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	E												1	1											
Solanaceae	*Datura ferox*	Fierce Thornapple	E													1											
Sterculiaceae	*Brachychiton populneus*	Kurrajong	N												1									1		1	
Thymelaeaceae	*Pimelea neo-anglica*	Poison Pimelea	N																1	1				2		2	

Family	Scientific Name	Common name	Native / Exotic	1	2	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Verbenaceae	*Verbena bonariensis*	Purpletop	E	1	1						2			4								2					
Verbenaceae	*Verbena incompta*		E																								3
	Galium propinquum	Maori Bedstraw	N																	1						1	

4 Fauna Monitoring Results

All fauna recorded in winter and spring monitoring 2013.

Species in **BOLD** are threatened species.

Species highlight in red are those species recorded by ELA for the first time in the BOA.

Class	Family	Species	Common Name	13 Jul (winter)	13-Nov (spring)
Amphibia	Hylidae	*Litoria caerulea*	Green Tree Frog		x
	Hylidae	*Litoria latopalmata*	Broad-palmed Frog		x
	Hylidae	*Litoria peronii*	Peron's Tree Frog		x
	Hylidae	*Litoria rubella*	Desert Tree Frog		x
	Myobatrachidae	*Crinia signifera*	Common Eastern Froglet		x
	Myobatrachidae	*Limnodynastes dumerilii*	Eastern Banjo Frog		
	Myobatrachidae	*Limnodynastes fletcheri*	Barking March Frog		x
	Myobatrachidae	*Limnodynastes salmini*	Salmon-striped Frog		
	Myobatrachidae	*Limnodynastes tasmaniensis*	Spotted Marsh Frog	x	x
	Myobatrachidae	*Neobatrachus sudelli*	Painted Burrowing Frog	x	x
	Myobatrachidae	*Pseudophryne bibronii*	Bibron's toadlet	x	x
	Myobatrachidae	*Uperoleia laevigata*	Smooth Toadlet	x	x
Aves	Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	x	x
	Acanthizidae	*Acanthiza nana*	Yellow Thornbill	x	x
	Acanthizidae	***Chthonicola sagittata***	**Speckled Warbler**	x	x
	Acanthizidae	*Gerygone fusca*	Western Gerygone	x	x
	Acanthizidae	*Gerygone olivacea*	White-throated Gerygone	x	x
	Acanthizidae	*Smicrornis brevirostris*	Weebill	x	x
	Acanthizidae	*Western Gerygone*	Gerygone fusca	x	x
	Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk	x	x
	Accipitridae	*Accipiter fasciatus*	Brown Goshawk	x	x
	Accipitridae	*Aquila audax*	Wedge-tailed Eagle	x	x
	Accipitridae	***Circus assimilis***	**Spotted Harrier**	x	x
	Accipitridae	*Elanus axillaris*	Black-shouldered Kite	x	x
	Accipitridae	*Haliastur sphenurus*	Whistling Kite	x	x
	Accipitridae	***Hieraaetus morphnoides***	**Little Eagle**	x	x
	Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar		x
	Alaudidae	*Alauda arvensis**	Skylark		x
	Alaudidae	*Mirafra javanica*	Horsefield's Bushlark		x
	Anatidae	*Anas gracilis*	Grey Teal		x
	Anatidae	*Anas superciliosa*	Pacific Black Duck		x
	Anatidae	*Aythya australis*	Hardhead		x
	Anatidae	*Chenonetta jubata*	Australian Wood Duck		x
	Anatidae	*Dendrocygna eytoni*	Plumed Whistling-Duck		x
	Anatidae	***Oxyura australis***	**Blue-billed Duck**		x

Class	Family	Species	Common Name	13 Jul (winter)	13-Nov (spring)
	Apodidae	***Hirundapus caudacutus***	**White-throated Needletail**		x
	Ardeidae	*Ardea pacifica*	White-necked Heron		x
	Ardeidae	*Egretta novaehollandiae*	White-faced Heron		x
	Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		x
	Artamidae	*Artamus superciliosus*	White-browed Woodswallow		x
	Artamidae	*Cracticus nigrogularis*	Pied Butcherbird		x
	Artamidae	*Cracticus torquatus*	Grey Butcherbird		x
	Artamidae	*Gymnorhina tibicen*	Australian Magpie		x
	Artamidae	*Strepera graculina*	Pied Currawong		x
	Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo		x
	Cacatuidae	*Cacatua tenuirostris*	Long-billed Corella		x
	Cacatuidae	*Eolophus roseicapillus*	Galah		x
	Cacatuidae	*Nymphicus hollandicus*	Cockatiel		x
	Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		x
	Campephagidae	*Coracina papuensis*	White-bellied Cuckoo-shrike		
	Campephagidae	*Lalage tricolor*	White-winged Triller		
	Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel		
	Charadriidae	*Vanellus miles*	Masked Lapwing		
	Climacteridae	***Climacteris picumnus***	**Brown Treecreeper**		
	Climacteridae	*Cormobates leucophaea*	White-throated treecreeper		
	Columbidae	*Columba livia*	Rock Dove *		
	Columbidae	*Geopelia humeralis*	Bar-shouldered Dove		
	Columbidae	*Geopelia striata*	Peaceful Dove		
	Columbidae	*Ocyphaps lophotes*	Crested Pigeon		
	Columbidae	*Phaps chalcoptera*	Common Bronzewing		
	Coraciidae	*Eurystomus orientalis*	Dollarbird		
	Corcoracidae	*Struthidea cinerea*	Apostlebird		
	Corvidae	*Corvus bennetti*	Little Crow		
	Corvidae	*Corvus coronoides*	Australian Raven	x	x
	Corvidae	*Corvus mellori*	Little Raven		x
	Cuculidae	*Scythrops novaehollandiae*	Channel-billed Cuckoo		
	Cuculiformes	Eudynamys orientalis	Eastern Koel		x
	Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird		x
	Dicruridae	*Grallina cyanoleuca*	Magpie-lark	x	x
	Dicruridae	*Rhipidura albiscapa*	Grey Fantail		x
	Dicruridae	*Rhipidura leucophrys*	Willie Wagtail	x	x
	Estrildidae	*Neochmia temporalis*	Red-browed Finch		x
	Estrildidae	***Stagonopleura guttata***	**Diamond Firetail**	x	x
	Estrildidae	*Taeniopygia bichenovii*	Double-barred Finch	x	x
	Falconidae	*Falco berigora*	Brown Falcon	x	x
	Falconidae	*Falco cenchroides*	Nankeen Kestrel	x	x
	Falconidae	*Falco longipennis*	Australian Hobby		x

Class	Family	Species	Common Name	13 Jul (winter)	13-Nov (spring)
	Falconidae	*Falco peregrinus*	Peregrine Falcon		
	Falconidae	*Falco subniger*	Black Falcon		
	Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	x	x
	Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher		
	Hirundinidae	*Cheramoeca leucosternus*	White-backed Swallow		
	Hirundinidae	*Hirundo ariel*	Fairy Martin	x	x
	Hirundinidae	*Hirundo neoxena*	Welcome Swallow	x	x
	Hirundinidae	*Petrochelidon nigricans*	Tree Martin		x
	Locustellidae	*Cincloramphus cruralis*	Brown Songlark		x
	Maluridae	*Malurus cyaneus*	Superb Fairy-wren	x	x
	Maluridae	*Malurus lamberti*	Variegated Wren		
	Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater		x
	Meliphagidae	*Lichenostomus chrysops*	Yellow-faced Honeyeater		
	Meliphagidae	*Lichenostomus penicillatus*	White-plumed Honeyeater		x
	Meliphagidae	*Manorina melanocephala*	Noisy Miner	x	x
	Meliphagidae	*Philemon corniculatus*	Noisy Friarbird	x	x
	Meliphagidae	*Plectorhyncha lanceolata*	Striped Honeyeater	x	x
	Meropidae	***Merops ornatus***	**Rainbow bee-eater**		x
	Monarchidae	*Myiagra rubecula*	Leaden Flycatcher		x
	Motacillidae	*Anthus australis*	Australian (Richard's) Pitpit		x
	Oriolidae	*Sphecotheres vieilloti*	Australasian Figbird		
	Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush	x	x
	Pachycephalidae	*Falcunculus frontatus*	Crested Shrike-tit		
	Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler	x	x
	Pardalotidae	*Acanthiza reguloides*	Buff-rumped Thornbill		x
	Pardalotidae	*Aphelocephala leucopsis*	Southern Whiteface		x
	Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote	x	x
	Pardalotidae	*Pardalotus striatus*	Striated Pardalote	x	x
	Passeridae	*Passer domesticus*	House Sparrow		
	Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		x
	Petroicidae	*Eopsaltria australis*	Eastern Yellow Robin		x
	Petroicidae	***Melanodryas cucullata***	**Hooded Robin**		
	Petroicidae	*Microeca fascinans*	Jacky Winter	x	x
	Phalacrocoracidae	*Phalacrocorax melanoleucos*	Little Pied Cormorant		
	Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant		x
	Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		x
	Phasianidae	*Coturnix pectoralis*	Stubble Quail		
	Phasianidae	*Coturnix ypsilophora*	Brown Quail		x
	Podargidae	*Podargus strigoides*	Tawny Frogmouth		x
	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe		x
	Pomatostomidae	***Pomatostomus temporalis temporalis***	Grey-crowned Babbler (eastern subspecies)	x	x
	Psittacidae	*Alisterus scapularis*	Australian King-Parrot	x	x

Class	Family	Species	Common Name	13 Jul (winter)	13-Nov (spring)
	Psittacidae	*Glossopsitta concinna*	Musk Lorikeet	x	x
	Psittacidae	*Glossopsitta pusilla*	Little Lorikeet		x
	Psittacidae	*Platycercus adscitus eximius*	Eastern Rosella	x	x
	Psittacidae	*Psephotus haematonotus*	Red-rumped Parrot	x	x
	Psittacidae	*Psephotus varius*	Mulga Parrot		
	Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet		x
	Strigidae	*Ninox novaeseelandiae*	Southern Boobook		x
	Sturnidae	*Sturnus vulgaris* *	European Starling	x	x
	Sturnidae	*Turdus merula* *	Common Myna		x
	Sylviidae	*Cincloramphus mathewsi*	Rufous Songlark	x	x
	Sylviidae	*Cisticola exilis*	Golden-headed Cisticola		x
	Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		x
	Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		
	Tytonidae	*Tyto alba*	Barn Owl		x
	Zosteropidae	*Zosterops lateralis*	Silvereye		x
Mammalia	Bovidae	*Bos taurus**	Cow		
(Non-flying)	Canidae	*Canis (lupus) familiaris* *	Dog		
	Canidae	*Vulpes vulpes* *	European Red Fox		x
	Felidae	*Felis catus**	Feral Cat		
	Leporidae	*Lepus capensis* *	Brown Hare		x
	Leporidae	*Oryctolagus cuniculus* *	European Rabbit		x
	Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo		x
	Macropodidae	*Macropus robustus*	Wallaroo		x
	Macropodidae	*Macropus rufogriseus*	Red-necked Wallaby		x
	Muridae	*Mus musculus**	House Mouse		
	Muridae	*Rattus rattus**	Black Rat		
	Muridae	*Rattus sp.*	Rat species		
	Phalangeridae	*Trichosurus vulpecula*	Common Brush-tail Possum		x
	Phascolarctidae	***Phascolarctos cinereus***	**Koala**		
	Tachyglossidae	*Tachyglossus aculeatus*	Short-beak Echidna		
(Bats)	**Emballonuridae**	***Saccolaimus flaviventris***	**Yellow-bellied Sheath-tail Bat**		
Mammalia	**Emballonuridae**	***Saccolaimus flaviventris***	**Yellow-bellied Sheath-tail Bat**		x
	Molossidae	*Mormopterus species 3*	Undescribed Little Mastiff-bat @ 25KHz		x
	Molossidae	*Mormopterus species 4*	Undescribed Little Mastiff-bat @ 30KHz		x
	Molossidae	*Tadarida australis*	White-striped Free-tail (or Mastiff-bat) Bat		x
	Rhinolophidae	*Rhinolophus megaphyllus*	Eastern Horseshoe Bat		x
	Vespertilionidae	***Chalinolobus dwyeri***	**Large-eared Pied Bat**		x
	Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat		x
	Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat		x
	Vespertilionidae	***Falsistrellus tasmaniensis***	**Eastern False Pipistrelle**		x

Class	Family	Species	Common Name	13 Jul (winter)	13-Nov (spring)
	Vespertilionidae	***Miniopterus schreibersii oceanensis***	**Eastern Bent-wing Bat**		x
	Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat		
	Vespertilionidae	*Nyctophilus sp.*			x
	Vespertilionidae	***Scoteanax rueppellii***	**Greater Broad-nosed Bat**		
	Vespertilionidae	*Scotorepens balstoni*	Inland Broad-nosed Bat		x
	Vespertilionidae	*Scotorepens greyii*	Little Broad-nosed Bat		x
	Vespertilionidae	*Scotorepens sp.*	Central-eastern Broad-nosed Bat		x
	Vespertilionidae	*Vespadelus darlingtoni*	Large Forest Bat		
	Vespertilionidae	***Vespadelus troughtoni***	**Eastern Cave Bat**		x
	Vespertilionidae	*Vespadelus vulturnus*	Little Forest Bat		x
Reptilia	Agamidae	*Pogona barbata*	Eastern Bearded Dragon		x
	Chelidae	*Chelodina longicollis*	Eastern Snake-necked Turtle		x
	Elapidae	*Demansia psammophis*	Yellow-faced Whipsnake		
	Elapidae	*Pseudechis guttatus*	Blue-bellied Black Snake		
	Elapidae	*Pseudonaja textilis*	Eastern Brown Snake		
	Gekkonidae	*Diplodactylus vittatus*	Wood Gecko		x
	Gekkonidae	*Gehyra dubia*	Dubious Dtella		
	Gekkonidae	*Gehyra variegata*	Common Dtella		x
	Gekkonidae	*Oedura robusta*	Robust Velvet Gecko		x
	Gekkonidae	*Strophurus williamsi*	Eastern Spiny-tailed Gecko		x
	Gekkonidae	*Underwoodisaurus milii*	Barking Gecko		
	Pygopodidae	*Delma inornata*	Plain Snake-lizard		
	Pygopodidae	*Delma plebeia*	Basalt Snake-lizard		
	Pygopodidae	*Lialis burtonis*	Burton's Snake-lizard		
	Scincidae	*Acritoscincus platynota*	Red-throated Skink		x
	Scincidae	*Anomalopus leuckartii*	Two-clawed Worm-skink		
	Scincidae	*Carlia* sp.			x
	Scincidae	*Carlia tetradactyla*	Southern Rainbow Skink		
	Scincidae	*Cryptoblepharus pannosus*	Ragged Snake-eyed Skink		
	Scincidae	*Cryptoblepharus pulcher*	Elegant Snake-eyed Skink		x
	Scincidae	*Cryptoblepharus virgatus*	Wall Lizard		
	Scincidae	*Ctenotus robustus*	Eastern Striped Skink		
	Scincidae	*Ctenotus sp.*			
	Scincidae	*Ctenotus taeniatus*	Copper-tailed skink		x
	Scincidae	*Egernia sp.*			
	Scincidae	*Egernia striolata*	Tree skink		x
	Scincidae	*Eulamprus tenuis*	Greater Bar-sided Skink		
	Scincidae	*Lampropholis delicata*	Garden Sunskink		
	Scincidae	*Lampropholis guichenoti*	Pale-flecked / Grass Garden Sunskink		

Class	Family	Species	Common Name	13 Jul (winter)	13-Nov (spring)
	Scincidae	*Liopholis whitii*	White's Skink		x
	Scincidae	*Menetia greyii*	Dwarf Skink		
	Scincidae	*Morethia boulengeri*	Boulanger's Morethia		x
	Scincidae	*Tiliqua scincoides scincoides*	Eastern Blue-tongued Lizard		
	Scincidae	*Unidentified skink*			x
	Scincidae	*Unidentified worm skink*			x
	Scincidae	*Unknown Reptile eggshells*	(Possibly *M. boulengeri*)		
	Scincidae	*Unknown Reptile eggshells*			
	Typhlopidae	*Ramphotyphlops wiedii*	Blind Snake		

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WERRIS CREEK COAL BLASTING RESULTS
APRIL 2013

Shot number	Date fired	Time Fired	Location	Type	Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2013-22	2/04/2013	15:06	S13_14-18_A1coal	OB	<0.25	<109.8	1.00	104.9	0.45	101.0	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-0.8	265	1.5	0	0	0	0
2013-23	8/04/2013	12:12	S11_6-10_Gcoal	IB	<0.25	<109.8	1.45	103.0	1.19	107.3	<0.25	<109.8	10.00	120.0	13.20	-	50.00	-1.7	182	2.9	0	2	0	0
2013-24	11/04/2013	13:17	S11_12-17_Gcoal pt2	IB	0.38	109.7	1.00	108.9	0.66	108.3	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-1.3	154	2.5	0	3	0	0
2013-25	12/04/2013	13:07	S12_11_Decoal pt1	IB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-1.5	165	2.1	0	0	0	0
2013-26	16/04/2013	13:12	S14_11-20_370 trim	OB	<0.25	<109.8	0.55	104.7	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-1.7	345	2.4	0	0	0	0
2013-27	17/04/2013	13:11	S12_11_Decoal pt2	IB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.8	323	3.9	0	0	0	0
2013-28	22/04/2013	12:13	S12_18_290_TSB31/Decoal	TSB/IB	<0.25	<109.8	0.40	94.2	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.9	319	4.4	0	0	0	0
2013-29	26/04/2013	12:12	S16_5-8_385	OB	0.13	95.1	0.95	99.8	0.34	99	<0.25	<109.8	10.00	120.0	1.83	-	50.00	-2.6	174	1.8	0	0	0	0
TOTALS	**APRIL 2013**	**# BLAST**	**8**	**AVERAGE**	**0.26**	**102.4**	**0.89**	**102.6**	**0.66**	**103.9**	**<0.25**	**<109.8**	**5.00**	**115.0**										
TOTALS	**APRIL 2013**	**#>0.5mm**	**2**	**HIGHEST**	**0.38**	**109.7**	**1.45**	**108.9**	**1.19**	**108.3**	**<0.25**	**<109.8**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**8**	**AVERAGE**	**0.26**	**102.4**	**0.89**	**102.6**	**0.66**	**103.9**	**<0.25**	**<109.8**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**										

WERRIS CREEK COAL BLASTING RESULTS
MAY 2013

Shot number	Date fired	Time Fired	Location	Type	Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2013-30	1/05/2013	13:12	S13_6-8_Decoal/350 UG collapse	IB	0.24	106.7	0.30	101.6	0.34	94.4	0.08	115.8	10.00	120.0	0.30	-	50.00	-3.2	354	5.3	0	0	0	0
2013-31	3/05/2013	13:12	S14_22-23_370 TSB29	TSB	0.26	98.3	1.05	102.6	0.37	102.6	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.8	297	2.5	0	0	0	0
2013-32	8/05/2013	12:11	S15_9-11_370	OB	<0.25	<109.8	0.59	105.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.8	213	1.1	1	0	0	0
2013-33	13/05/2013	13:23	S13_13-14_A1 Coal	OB	0.18	102.1	0.90	98.9	0.32	98.3	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-3.2	320	5.4	0	0	0	0
2013-34	16/05/2013	13:12	S14_22-23_Ramp TSB	TSB	<0.25	<109.8	0.35	110.1	0.08	111.3	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.3	295	3.5	0	0	0	0
2013-35	17/05/2013	13:21	S15_17-18_385	OB	<0.25	<109.8	0.87	100.0	0.20	109.0	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-3.3	285	5.4	0	0	0	0
2013-36	22/05/2013	12:17	S13_4-5_360 trim	OB	<0.25	<109.8	0.37	95.0	0.12	98.5	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-1.2	218	0.3	0	0	0	0
2013-37	23/05/2013	10:17	S14_15-20_ramp	OB	<0.25	<109.8	1.12	106.0	0.49	104.0	0.18	97.6	10.00	120.0	Not Monitored		50.00	-1.9	175	5.3	0	0	0	0
2013-38	28/05/2013	13:10	Seed Wave Trial Blast	-	0.38	87.8	0.40	87.3	<0.25	<109.8	0.13	92.9	10.00	120.0	Not Monitored		50.00	-2.3	138	1.8	0	0	0	0
TOTALS	**MAY 2013**	**# BLAST**	**9**	**AVERAGE**	**0.27**	**98.7**	**0.66**	**100.8**	**0.27**	**102.6**	**0.13**	**102.1**	**5.00**	**115.0**										
TOTALS	**MAY 2013**	**#>0.5mm**	**0**	**HIGHEST**	**0.38**	**106.7**	**1.12**	**110.1**	**0.49**	**111.3**	**0.18**	**115.8**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**17**	**AVERAGE**	**0.26**	**100.6**	**0.78**	**101.7**	**0.47**	**103.2**	**0.13**	**102.1**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5.9%**	**5%**	**5%**										

WERRIS CREEK COAL BLASTING RESULTS
JUNE 2013

Shot number	Date fired	Time Fired	Location	Type	Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2013-39&40	5/06/2013	12:17	S13_3-4_350 trim & S16_8-11_385 pt 1	IB/OB	<0.25	<109.8	0.58	102.0	<0.25	<109.8	0.21	106.0	10.00	120.0	<0.25	-	50.00	-2.6	347	4.7	1	0	0	0
2013-41	6/06/2013	15:08	S15_12-18_Blackseam	OB	<0.25	<109.8	1.05	104.0	0.32	102.6	0.24	109.1	10.00	120.0	Not Monitored		50.00	-1.9	307	3.2	0	0	0	0
2013-42&43	7/06/2013	11:53	S11_17-19_Gcoal & S12_18_290 TSB secondary	IB/TSB	<0.25	<109.8	0.45	97.6	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-1.6	342	5.8	0	0	0	0
2013-44	18/06/2013	13:11	S16_8-11_385 Pt2	OB	0.21	102.1	1.75	108	0.47	106.1	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-3.2	304	2.9	1	2	0	0
2013-45&46	21/06/2013	13:20	S12_15-17_280 TSB34 & S13_4-5_350 Trim Pt2	TSB	0.24	98.7	0.95	102.3	0.32	101.6	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-3.1	222	1.7	0	0	0	0
2013-47	27/06/2013	13:33	S12_12-13_ramp TSB33	TSB	<0.25	<109.8	0.58	97.9	0.18	96.9	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-1.8	173	1.9	0	0	0	0
TOTALS	**JUNE 2013**	**# BLAST**	**6**	**AVERAGE**	**0.23**	**100.4**	**0.89**	**102.0**	**0.32**	**101.8**	**0.23**	**107.6**	**5.00**	**115.0**										
TOTALS	**JUNE 2013**	**#>0.5mm**	**0**	**HIGHEST**	**0.24**	**102.1**	**1.75**	**108.0**	**0.47**	**106.1**	**0.24**	**109.1**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**23**	**AVERAGE**	**0.25**	**100.5**	**0.82**	**101.8**	**0.42**	**102.8**	**0.18**	**104.8**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**4.3%**	**0%**	**4.3%**	**0%**	**4.3%**	**5%**	**5%**										

WERRIS CREEK COAL BLASTING RESULTS
JULY 2013

Shot number	Date fired	Time Fired	Location	Type	Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2013-48	8/07/2013	13:35	S16_12-18_Blackseam	OB	<0.25	<109.8	0.93	121.0	0.45	119.0	0.07	111.6	10.00	120.0	Not Monitored		50.00	-2.3	167	1.1	1	11	0	0
2013-49	17/07/2013	15:32	S13_18-23_350 TSB35	TSB	<0.25	<109.8	1.25	102.6	0.60	88.1	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.2	258	1.3	1	4	0	0
2013-50	26/07/2013	13:26	S13_22-23_350 TSB	TSB	0.53	88.8	0.28	88.9	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.8	276	1.9	0	0	0	1
2013-51	30/07/2013	12:12	S13_10-13_330	OB	<0.25	<109.8	1.38	99.8	0.65	98.0	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.3	168	1.8	1	2	0	0
TOTALS	**JULY 2013**	**# BLAST**	**4**	**AVERAGE**	**0.53**	**88.8**	**0.96**	**103.1**	**0.57**	**101.7**	**0.07**	**111.6**	**5.00**	**115.0**										
TOTALS	**JULY 2013**	**#>0.5mm**	**2**	**HIGHEST**	**0.53**	**88.8**	**1.38**	**121.0**	**0.65**	**119.0**	**0.07**	**111.6**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**27**	**AVERAGE**	**0.32**	**97.6**	**0.85**	**102.1**	**0.46**	**102.5**	**0.14**	**107.1**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**3.7%**	**0%**	**3.7%**	**0%**	**3.7%**	**5%**	**5%**										

WERRIS CREEK COAL BLASTING RESULTS
AUGUST 2013

Shot number	Date fired	Time Fired	Location	Type	Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2013-52	6/08/2013	13:15	S13_3-7_330 TSB37	TSB	<0.25	<109.8	1.02	108.6	0.60	102.5	0.07	110.6	10.00	120.0	12.23	117.7	50.00	-2.9	331	8.4	0	3	0	0
2013-53	13/08/2013	10:09	S13_8-10_Decoal UG collapse pt1 TSB38	TSB	<0.25	<109.8	0.99	84.4	0.34	94.3	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-1.8	4	3.2	0	0	0	0
2013-54	16/08/2013	12:08	S13_14-17_330	IB	<0.25	<109.8	0.70	100.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-3.7	177	4.6	0	0	0	0
2013-55	16/08/2013	12:08	S13_10_330 trim	IB	<0.25	<109.8	0.70	100.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-3.7	177	4.6	0	0	0	0
2013-56	22/08/2013	13:41	S13_8-10_330 DE Coal UG Collapse	TSB	<0.25	<109.8	1.23	97.7	0.39	100.4	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.0	332	8.4	0	1	0	0
2013-57	23/08/2013	13:14	S13_8-10_DE Coal	IB	<0.25	<109.8	0.63	111.2	<0.25	<109.8	<0.25	<109.8	10.00	120.0	2.53	119.7	50.00	-3.3	295	6.3	1	1	0	0
2013-58	29/08/2013	12:09	S13_18_330	IB	<0.25	<109.8	<0.25	<109.8	0.60	100.6	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.6	23	3.5	1	0	0	0
2013-59	29/08/2013	12:09	S13_8-10_330 Pt2	IB	<0.25	<109.8	<0.25	<109.8	0.60	100.6	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.6	23	3.5	1	0	0	0
2013-60	30/08/2013	12:13	S15_4-5_DE UG Collapse	TSB	<0.25	<109.8	0.85	106.9	<0.25	<109.8	0.45	101.2	10.00	120.0	Not Monitored		50.00	-3.3	343	10.2	1	0	0	0
TOTALS	**AUGUST 2013**	**# BLAST**	**9**	**AVERAGE**	**<0.25**	**<109.8**	**0.87**	**101.5**	**0.51**	**99.7**	**0.26**	**105.9**	**5.00**	**115.0**										
TOTALS	**AUGUST 2013**	**#>0.5mm**	**3**	**HIGHEST**	**<0.25**	**<109.8**	**1.23**	**111.2**	**0.60**	**102.5**	**0.45**	**110.6**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**36**	**AVERAGE**	**0.32**	**97.6**	**0.86**	**102.0**	**0.47**	**101.9**	**0.17**	**106.8**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**2.8%**	**0%**	**2.8%**	**0%**	**2.8%**	**5%**	**5%**										

WERRIS CREEK COAL BLASTING RESULTS
SEPTEMBER 2013

Shot number	Date fired	Time Fired	Location	Type	Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2013-61	2/09/2013	13:10	S16_5-8_Decoal_UG Collapse	TSB	<0.25	<109.8	0.51	102.4	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.5	181	2.1	1	0	0	0
2013-62	4/09/2013	13:14	S13-8-10_DE Coal UG Collapse	TSB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.3	38	2.0	0	0	0	0
2013-63	5/09/2013	13:04	S13_9-10_330	IB	<0.25	<109.8	0.29	92.9	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.6	342	2.8	0	0	0	0
2013-64	6/09/2013	13:15	S13_22_350	IB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.7	336	2.9	0	0	0	0
2013-65	6/09/2013	13:15	S12_14_330	IB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.7	336	2.9	0	0	0	0
2013-66	9/09/2013	12:18	S15_6-8_370	OB	<0.25	<109.8	0.77	103.4	0.29	102	0.28	93.3	10.00	120.0	Not Monitored		50.00	-3.1	344	6	0	0	0	0
2013-67	10/09/2013	14:48	S16_4-6_400_UG Collapse	TSB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	0.13	110.3	50.00	-2.2	332	9.3	0	0	0	0
2013-68A	11/09/2013	12:16	S13_330 (Cap Rocks)	OB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.3	138	1.4	0	1	0	0
2013-68	12/09/2013	13:18	S15_11-17_385_Blackseam	OB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-3.2	304	4.3	0	0	0	0
2013-69	18/09/2013	13:49	S15_2-6_DE UG Collapse & TSB40	TSB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	<0.25	<109.8	50.00	-3.0	312	6.2	0	1	0	0
2013-70	20/09/2013	15:16	S15_2-6_UG Collapse Pt2	TSB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.3	267	8.3	0	0	0	0
2013-71&72	25/09/2013	12:08	S13_18-21_350-330_TSB42_pt2 & S13_10-11-Hardig & S13 Redrill	TSB	<0.25	<109.8	0.61	97.7	0.29	96.5	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.5	340	3.9	0	0	0	0
2013-73	27/09/2013	15:20	S13_8-10_DEcoal_UG Collapse	TSB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-1.5	325	0.4	0	0	0	0
TOTALS	**SEPTEMBER 2013**	**# BLAST**	**13**	**AVERAGE**	**<0.25**	**<109.8**	**0.55**	**99.1**	**0.29**	**99.3**	**0.28**	**93.3**	**5.00**	**115.0**										
TOTALS	**SEPTEMBER 2013**	**#>0.5mm**	**0**	**HIGHEST**	**<0.25**	**<109.8**	**0.77**	**103.4**	**0.29**	**102.0**	**0.28**	**93.3**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**49**	**AVERAGE**	**0.32**	**97.6**	**0.80**	**101.5**	**0.44**	**101.5**	**0.19**	**104.1**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**2.0%**	**0%**	**2.0%**	**0%**	**2.0%**	**5%**	**5%**										

WERRIS CREEK COAL BLASTING RESULTS
OCTOBER 2013

Shot number	Date fired	Time Fired	Location	Type	Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2013-74	1/10/2013	10:49	S15_19-23_370_TSB36_Pt1	TSB	<0.25	<109.8	<0.25	<109.8	0.55	87	0.34	107.1	10.00	120.0	Not Monitored		50.00	-1.6	345	9.7	0	0	0	0
2013-75	4/10/2013	15:41	S13_18-21_350-330_TSB41 Part1	TSB	<0.25	<109.8	0.88	101.3	0.60	97.4	0.39	100.6	10.00	120.0	Not Monitored		50.00	-3.4	196	4.4	0	1	0	0
2013-76	10/10/2013	10:46	S13_18-21_TSB42	TSB	<0.25	<109.8	0.79	105.0	0.37	101.5	0.42	105.6	10.00	120.0	Not Monitored		50.00	-2.8	343	4.7	0	1	0	0
2013-77	14/10/2013	13:16	S15_11-17_370_Blackseam_Part1	OB	<0.25	<109.8	0.74	107.0	0.37	103.5	0.41	105.0	10.00	120.0	Not Monitored		50.00	-4.2	268	3.3	0	0	0	0
2013-78	21/10/2013	12:11	S13_10-17_Ccoal West	IB	<0.25	<109.8	1.04	93.9	0.50	94.3	0.50	104.9	10.00	120.0	Not Monitored		50.00	-4.3	293	4.6	0	0	0	0
2013-79	25/10/2013	10:15	S13_10-17_Ccoal Decoal UG collapse pt1	TSB	<0.25	<109.8	1.54	97.7	0.66	83.5	0.40	101.6	10.00	120.0	Not Monitored		50.00	-4.2	290	1.7	0	0	0	0
2013-80	28/10/2013	13:08	S13_7_DECoal Wedge	IB	<0.25	<109.8	0.43	97.7	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-3.5	303	5.1	0	0	1	0
2013-81	31/10/2013	13:09	S13_11-DE Coal_UG Collapse	IB	<0.25	<109.8	0.61	108.4	0.34	109.5	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-4.1	151	2.5	0	0	0	0
TOTALS	**OCTOBER 2013**	**# BLAST**	**8**	**AVERAGE**	**<0.25**	**<109.8**	**0.86**	**101.6**	**0.48**	**96.7**	**0.41**	**104.1**	**5.00**	**115.0**										
TOTALS	**OCTOBER 2013**	**#>0.5mm**	**0**	**HIGHEST**	**<0.25**	**<109.8**	**1.54**	**108.4**	**0.66**	**109.5**	**0.50**	**107.1**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**57**	**AVERAGE**	**0.32**	**97.6**	**0.81**	**101.5**	**0.44**	**100.8**	**0.23**	**104.1**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**1.8%**	**0%**	**1.8%**	**0%**	**1.8%**	**5%**	**5%**										

WERRIS CREEK COAL BLASTING RESULTS
NOVEMBER 2013

Shot number	Date fired	Time Fired	Location	Type	Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2013-82	1/11/2013	13:13	S15_17-19_370RL	OB	<0.25	<109.8	0.64	101.7	0.29	100.4	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.0	205	2.0	0	0	0	0
2013-83	4/11/2013	12:11	S13_S14_DE Wedge	IB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-4.5	163	7.4	0	0	0	0
2013-84	5/11/2013	13:13	S13_10 & S13_9_DE Coal UG Collapse	TSB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-4.3	122	2.7	0	0	0	0
2013-85	7/11/2013	16:10	S13 DE UG Collapse	IB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-2.6	147	1.7	0	0	0	0
2013-86	12/11/2013	10:42	S15_10-12_370	OB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-1.4	0	5.6	0	0	0	0
2013-87	13/11/2013	13:27	S13_4-9_TSB43_Presplit and Rock Pops	PS	<0.25	<109.8	1.71	105.0	0.42	97.4	<0.25	<109.8	10.00	120.0	6.47	125.6	50.00	-3.3	281	1.9	0	1	0	0
2013-88	20/11/2013	12:07	S13_4-9_310 TSB43 Pt1	TSB	<0.25	<109.8	1.36	105.0	0.58	103.0	<0.25	<109.8	10.00	120.0	8.97	97.1	50.00	-3.3	175	4.8	0	1	0	0
2013-89&90	27/11/2013	13:06	S16_19-23_370	OB	0.20	102.0	1.37	105.0	0.50	103.0	0.27	99.0	10.00	120.0	Not Monitored		50.00	-2.7	175	3.3	0	0	0	0
2013-91	29/11/2013	13:25	S16_17-20_385	OB	<0.25	<109.8	0.84	107.0	0.21	105.0	0.14	107.0	10.00	120.0	Not Monitored		50.00	-1.6	312	5.4	0	0	0	0
TOTALS	**NOVEMBER 2013**	**# BLAST**	**9**	**AVERAGE**	**0.20**	**102.0**	**1.18**	**104.7**	**0.40**	**101.8**	**0.21**	**103.0**	**5.00**	**115.0**										
TOTALS	**NOVEMBER 2013**	**#>0.5mm**	**1**	**HIGHEST**	**0.20**	**102.0**	**1.71**	**107.0**	**0.58**	**105.0**	**0.27**	**107.0**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**66**	**AVERAGE**	**0.30**	**98.5**	**0.86**	**101.9**	**0.44**	**100.9**	**0.23**	**103.9**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**1.5%**	**0%**	**1.5%**	**0%**	**1.5%**	**5%**	**5%**										

WERRIS CREEK COAL BLASTING RESULTS
DECEMBER 2013

Shot number	Date fired	Time Fired	Location	Type	Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2013-92	4/12/2013	13:09	S16_12-15_370	OB	0.17	107.0	1.89	105.0	0.48	104.0	0.37	112.0	10.00	120.0	Not Monitored		50.00	-2.7	296	6.9	0	0	1	0
2013-93	5/12/2013	13:13	S15_Wedge	IB	<0.25	<109.8	0.46	108.0	<0.25	<109.8	<0.25	<109.8	10.00	120.0	Not Monitored		50.00	-3.5	271	8.9	0	0	0	0
2013-94	11/12/2013	13:14	S17_Trim_Pt1	OB	0.20	102.0	1.79	101.0	0.51	96.0	0.36	105.0	10.00	120.0	Not Monitored		50.00	-3.4	274	6.6	0	0	0	0
2013-95	13/12/2013	15:12	S12_12-16_Gcoal	IB	0.26	107.0	1.08	103.0	0.54	101.0	0.47	108.0	10.00	120.0	Not Monitored		50.00	-1.5	290	3.5	0	1	0	0
2013-96	19/12/2013	12:17	S17_Trim_Pt2	OB	0.24	97.0	3.39	103.0	1.05	102.0	0.53	104.0	10.00	120.0	Not Monitored		50.00	-2.2	133	3.3	0	6	0	0
2013-97&98	24/12/2013	13:05	S17_Trim_Pt3 & S13_Wedge	OB/IB	0.13	98.0	1.51	103.0	0.37	100.0	0.27	103.0	10.00	120.0	4.69	119.9	50.00	-2.5	181	4.5	0	0	0	1
TOTALS	**DECEMBER 2013**	**# BLAST**	**6**	**AVERAGE**	**0.20**	**102.2**	**1.69**	**103.8**	**0.59**	**100.6**	**0.40**	**106.4**	**5.00**	**115.0**										
TOTALS	**DECEMBER 2013**	**#>0.5mm**	**3**	**HIGHEST**	**0.26**	**107.0**	**3.39**	**108.0**	**1.05**	**104.0**	**0.53**	**112.0**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**72**	**AVERAGE**	**0.28**	**99.1**	**0.95**	**102.1**	**0.45**	**100.9**	**0.25**	**104.2**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**1.4%**	**0%**	**1.4%**	**0%**	**1.4%**	**5%**	**5%**										

WERRIS CREEK COAL BLASTING RESULTS
JANUARY 2014

Shot number	Date fired	Time Fired	Location	Type	Glenara R11		Kyooma R98		Werris Ck Sth R62		Werris Ck Mid R92		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2014-01	10/01/2014	13:19	S15_370-330_Presplit	PS	0.07	86.8	0.46	84.7	0.16	88.1	0.18	91.2	10.00	120.0	Not Monitored		50.00	-3.5	132	0.3	1	0	0	0
2014-02	23/01/2014	13:02	S15_13-16_370-350	IB	0.26	104	2.42	106.9	0.63	104.8	0.45	103.7	10.00	120.0	Not Monitored		50.00	-3.1	33	4.4	2	3	0	0
2014-03	24/01/2014	13:14	Rock Pop Shot	ReBlast	0.04	109.4	0.01	99.7	0.00	99.0	0.01	103.0	10.00	120.0	Not Monitored		50.00	-3.5	290	5.3	0	0	0	0
2014-04	31/01/2014	14:08	S15_17-18_370-350	TSB	0.18	99.0	1.14	98.8	0.57	100.8	0.26	99.1	10.00	120.0	Not Monitored		50.00	-2.7	165	3.8	0	2	0	0
TOTALS	**JANUARY 2014**	**# BLAST**	**4**	**AVERAGE**	**0.14**	**99.8**	**1.01**	**97.5**	**0.34**	**98.2**	**0.23**	**99.3**	**5.00**	**115.0**										
TOTALS	**JANUARY 2014**	**#>0.5mm**	**2**	**HIGHEST**	**0.26**	**109.4**	**2.42**	**106.9**	**0.63**	**104.8**	**0.45**	**103.7**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**76**	**AVERAGE**	**0.26**	**99.2**	**1.01**	**97.5**	**0.44**	**100.6**	**0.23**	**99.3**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**0%**	**0%**	**1.3%**	**0%**	**0%**	**5%**	**5%**										

Shot number	Date fired	Time Fired	Location	Type	WERRIS CREEK COAL BLASTING RESULTS FEBRUARY 2014																			
					Glenara R11		Kyooma R98		Werris Ck Sth R62		Werris Ck Mid R92		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2014-05&06	4/02/2014	13:09	S13_6_Gseam + Rock Pop Shot	IB	0.11	98.6	0.74	99.7	0.28	104.1	0.17	104.2	10.00	120.0	Not Monitored		50.00	-3.6	142	5.2	0	0	0	0
2014-07	8/02/2014	12:39	S15_19-23_370-350	TSB	0.23	99.3	0.94	99.1	0.54	100.8	0.26	101.0	10.00	120.0	Not Monitored		50.00	-3.4	171	2.4	0	0	1	0
2014-08	11/02/2014	16:37	S13_10-16_UG Collapse + Rock Pop Shot	IB	0.13	96.6	1.07	97.3	0.32	103.2	0.22	102.9	10.00	120.0	Not Monitored		50.00	-3.1	159	3.0	0	0	0	0
2014-09	20/02/2014	13:04	S13_17-23_310 TSB	TSB	0.16	100.7	0.65	101.4	0.26	94.9	0.21	93.8	10.00	120.0	Not Monitored		50.00	-3.5	297	4.3	0	0	0	0
2014-10&11	25/02/2014	11:43	S13_8-10_310 + S14_Ramp_Remnant	IB	0.18	107.8	0.73	108.8	0.32	101.1	0.16	99.4	10.00	120.0	Not Monitored		50.00	-3.3	307	1.9	0	0	2	0
2014-12	26/02/2014	13:20	S13_10-16_UG Collapse Secondary Blast	IB	0.00	91.0	0.03	99.3	0.00	93.1	0.00	96.5	10.00	120.0	Not Monitored		50.00	-3.8	315	3.5	0	0	0	0
2014-12a	26/02/2014	14:42	Misfire refire S13_10-16_UG Collapse Secondary Blast	IB	0.00	82.9	0.02	93.0	0.00	88.2	0.00	103.2	10.00	120.0	Not Monitored		50.00	-3.3	284	3.3	0	0	0	0
2014-13	28/02/2014	12:23	S13_16-20_DE UG Collapse	IB	0.13	100.7	0.97	101.8	0.32	96.8	0.24	96.9	10.00	120.0	Not Monitored		50.00	-2.6	155	4.2	0	0	0	0
TOTALS	**FEBRUARY 2014**	**# BLAST**	**8**	**AVERAGE**	**0.12**	**97.2**	**0.64**	**100.1**	**0.26**	**97.8**	**0.16**	**99.7**	**5.00**	**115.0**										
TOTALS	**FEBRUARY 2014**	**#>0.5mm**	**6**	**HIGHEST**	**0.23**	**107.8**	**1.07**	**108.8**	**0.54**	**104.1**	**0.26**	**104.2**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**84**	**AVERAGE**	**0.24**	**98.9**	**0.83**	**98.8**	**0.43**	**100.4**	**0.19**	**99.5**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**0%**	**0%**	**1.2%**	**0%**	**0.0%**	**5%**	**5%**										

Shot number	Date fired	Time Fired	Location	Type	WERRIS CREEK COAL BLASTING RESULTS MARCH 2014																			
					Glenara R11		Kyooma R98		Werris Ck Sth R62		Werris Ck Mid R92		COMPLIANCE		ARTC Culvert		COMPLIANCE	TEMPERATURE	WIND		FUME	COMPLAINTS		
					Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)	Vib (mm/s)	Inversion oC/100m	Direction	m/s	0 to 5	OP/Vib	Dust/Fume	Other
2014-14&15	6/03/2014	16:43	S13_17-22_310 Part 2 and Rock Pop Shot	IB	0.19	104.0	0.88	107.3	0.51	108.9	0.38	105.9	10.00	120.0	Not Monitored		50.00	-2.7	179	6.3	0	0	0	0
2014-16	10/03/2014	13:02	S13_Rock Pop Shot	SB	0.01	93.4	0.03	89.2	0.01	88.3	0.01	88.7	10.00	120.0	Not Monitored		50.00	-3.2	169	1.5	0	0	0	0
2014-17	13/03/2014	13:59	S13_Rock Pop Shot	SB	0.01	100.0	0.04	100.0	0.01	95.6	0.01	96.6	10.00	120.0	Not Monitored		50.00	-4.0	229	2.6	0	0	0	0
2014-18	14/03/2014	13:18	S15_Ramp Shot	IB	0.16	104.6	0.98	97.9	0.45	97.2	0.36	97.3	10.00	120.0	Not Monitored		50.00	-3.2	269	4.6	0	0	0	0
2014-19	18/03/2014	13:08	S13_Rock Pop Shot	SB	0.01	91.2	0.05	97.7	0.01	99.5	0.01	96.7	10.00	120.0	Not Monitored		50.00	-3.0	49	0.5	0	0	0	0
2014-20	20/03/2014	13:09	S13_7-10_G Seam Terrace Shot and Rock Pop Shot	IB	0.10	100.7	0.76	101.8	0.45	102.1	0.22	107.8	10.00	120.0	Not Monitored		50.00	-3.1	113	4.4	0	0	0	0
TOTALS	**MARCH 2014**	**# BLAST**	**6**	**AVERAGE**	**0.08**	**99.0**	**0.46**	**99.0**	**0.24**	**98.6**	**0.17**	**98.8**	**5.00**	**115.0**										
TOTALS	**MARCH 2014**	**#>0.5mm**	**3**	**HIGHEST**	**0.19**	**104.6**	**0.98**	**107.3**	**0.51**	**108.9**	**0.38**	**107.8**	**10.00**	**120.0**										
TOTALS	**ANNUAL**	**# BLAST**	**90**	**AVERAGE**	**0.22**	**98.9**	**0.70**	**98.9**	**0.41**	**100.2**	**0.18**	**99.3**	**5.00**	**115.0**										
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s or MAX # Blasts Per Month**	**15**	**0%**	**0%**	**0%**	**0%**	**0%**	**1.1%**	**0%**	**0.0%**	**5%**	**5%**										

29 April 2013

Ref: 04035/4757

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: APRIL 2013 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Tuesday 23rd April, 2013 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, C and K are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is

required for analysing INP 'modifying factors'. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather stations.

WCC Operations

WCC operations on 23rd April 2013 had the 3600 excavator in Strip 12 centre at RL300m; the PC4000 excavator in Strip 11 centre at RL280m; a 1900 excavator in Strip 16 centre at RL410m and a 1900 excavator in Strip 14 west at RL370m. The overburden truck fleets were running to the RL390m western dump on day and night shift. The crushing plant operated to 3:30am with no trains loaded.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 23 April 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	2:40 pm	32	35	n/a	2.5/288	Birds & insects (29), traffic (29), **WCC inaudible**
B1 R7 83 Wadwells Lane/R8 Almawillee	4:00 pm	39	37	n/a	2.2/247	Birds & insects (38), cattle (28), horses (25), **WCC inaudible**
B2 R9Gedhurst/ R22 Mountain View	1:25 pm	38	37/36*	n/a	2.2/275	Birds & insects (37), traffic (30), **WCC (20)**
C R10 Meadholme/ R11 Glenara	3:02 pm	39	39	n/a	2.6/282	Birds & insects (38), traffic (31), **WCC barely audible**
D R24 Hazeldene	3:21 pm	35	37	n/a	1.9/283	Traffic (33), birds & insects (31), **WCC barely audible**
E R12 Railway Cottage	5:03 pm	49	38	n/a	3.9/216	Traffic (48), birds & insects (40), **WCC inaudible**
F R96 Talavera	2:30 pm	43	38	n/a	2.5/287	Birds & insects (42), traffic (35), **WCC (25)**
G R97	1:50 pm	35	35	n/a	3.0/303	Birds & insects (35), **WCC (15)**
H R98 Kyooma	2:10 pm	36	36	n/a	2.1/272	Birds & insects (36), **WCC (26)**
I R57 Kurrara St	5:08 pm	47	35	n/a	3.9/216	Trains (44), birds & insects (42), traffic (40), **WCC inaudible**
J R57 Coronation Ave	4:50 pm	42	35	n/a	3.9/279	Traffic (38), trains (38), birds & insects (36), **WCC inaudible**
K R21 Alco Park	4:30 pm	41	39	n/a	2.5/266	Birds & insects (39), traffic (36), **WCC inaudible**
L R103	3:41 pm	34	35	n/a	1.5/272	Trains, (30), birds & insects (28), domestic noise (28), traffic (25), **WCC inaudible**

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 23 April 2013 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	9:05 pm	n/a	38	35	+9.5	1.6/189	Pump? (35), traffic (34), **WCC inaudible**
B1 R7 83 Wadwells Lane/R8 Almawillee	10:25 pm	37	33	37	+10.3	0.9/188	**WCC (32)**, cattle (26)
B2 R9Gedhurst/ R22 Mountain View	8:00 pm	34	30	37/36*	+8.5	0.8/154	Traffic (27), insects (22), **WCC (25)**
C R10 Meadholme/ R11 Glenara	9:26 pm	n/a	33	39	+8.9	1.2/171	Traffic (33), **WCC inaudible**
D R24 Hazeldene	9:45 pm	n/a	40	37	+9.6	1.1/182	Traffic (40), **WCC inaudible**
E R12 Railway Cottage	11:40 pm	<25	22	38	+10.5	0.2/75	**WCC (20)**, insects (16),
F R96 Talavera	8:50 pm	35	27	37	+9.2	1.3/172	**WCC (26)**, traffic (21)
G R97	8:05 pm	38	35	35	+7.7	0.4/142	**WCC (34)**, insects (25), traffic (25)
H R98 Kyooma	8:25 pm	41	34	36	+8.6	0.9/156	**WCC (34)**
I R57 Kurrara St	11:28 pm	40	42	35	+10.0	0.3/92	Trains (42), **WCC (32)**
J R57 Coronation Ave	11:10 pm	n/a	40	35	+10.4	1.0/179	Train (39), traffic (34), **WCC inaudible**
K R21 Alco Park	10:52 pm	40	44	37	+10.4	1.0/194	Traffic (41), trains (40), **WCC (32)**
L R103	10:02 pm	39	38	35	+9.7	1.1/192	Traffic (37), **WCC (32)**

1. L1 (1 min) from mine noise only.
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels were below the relevant noise criterion at each monitoring location during each monitoring period.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site. For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-minute calculated sound power level of 350m long sections of haul road. These values are typically 7-10 dB lower than the single pass-by level.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

Author:

Neil Pennington
Acoustical Consultant

Review:

Ross Hodge
Acoustical Consultant

Appendix I

Attended Noise Monitoring Locations

Appendix II

Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R7	83 Wadwells Lane	37	37	45	35	40
R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		EA SWLs		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.	Leq	Lmax			
Haul truck CAT 785C (unattenuated)	608	108	116	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	108	116	116	119	6/2/13
Haul truck CAT 785C (unattenuated)	614	108	116		120	17/7/12
Haul truck CAT 785C (unattenuated)	609	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	108	116	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	600	108	116	119		11/9/12
Haul truck CAT 785C (attenuated)	608	108	116	117	120	11/9/12
Water Cart	WA897	111	118	113		11/9/12
Scraper	SC882	118	121	113		11/9/12
Excavator (PC 3600)	EX551	116	120	115		11/9/12
Dozer	829	107	114	114		11/9/12
Crushing Plant	n/a	114	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	108	116		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	108	116		124	11/9/12
Haul truck CAT 793XQ	662	n/a	n/a	115	118	18/12/12
Excavator (PC4000)	EX837	116	120	115		18/12/12
Dozer D10T (2nd gear) (1st gear)	505	107 (1st)	114 (1st)	113 109	128 121	18/12/12
Dozer D10T on stockpile (2nd gear) (1st gear)		107 (1st)	114 (1st)	118 109	124 113	6/2/13
Dozer D9T on stockpile (2nd gear) (1st gear)		107 (1st)	114 (1st)	119 113	122 118	6/2/13

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

20 May 2013

Ref: 04035/4757

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: MAY 2013 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Tuesday 14th May, 2013 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, C and K are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is

required for analysing INP 'modifying factors'. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather stations.

WCC Operations

WCC operations on 14th May 2013 had the 3600 excavator in Strip 12 centre at RL300m; the PC4000 excavator in Strip 11 centre at RL280m; a 1900 excavator in Strip 13 west at RL390m and two 1900 excavators in Strip 11 east at RL290m. The overburden truck fleets were running to the RL390m western dump on day and night shift. While the two 1900 excavator truck fleets were hauling coal to the ROM. The crushing plant operated to 3:30am with no trains loaded.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 14 May 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	2:15 pm	41	35	n/a	5.2/331	Birds & insects (39), traffic (36), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	1:15 pm	43	37	n/a	5.4/326	Birds & insects (41), traffic (36), wind (35), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	1:10 pm	44	37/36*	n/a	5.4/326	Birds & insects (44), WCC barely audible
C R10 Meadholme/ R11 Glenara	2:35 pm	38	39	n/a	5.7/319	Birds & insects (36), traffic (34), WCC barely audible
D R24 Hazeldene	2:53 pm	42	37	n/a	4.8/323	Birds & insects (40), traffic (39), WCC barely audible
E R12 Railway Cottage	4:30 pm	49	38	n/a	4.3/310	Traffic (48), rail works (40), WCC inaudible
F R96 Talavera	3:59 pm	46	38	n/a	4.4/318	Birds & insects (46), traffic (36), WCC (34)
G R97	3:12 pm	37	35	n/a	5.0/336	Birds & insects (34), WCC (34), traffic (27)
H R98 Kyooma	3:34 pm	40	36	n/a	4.7/317	Wind (36), birds & insects (34), WCC (33), traffic (30)
I R57 Kurrara St	4:50 pm	48	35	n/a	4.0/308	Traffic (46), birds & insects (43), WCC inaudible
J R57 Coronation Ave	2:44 pm	55	35	n/a	5.1/330	Traffic (55), birds & insects (46), domestic noise (40), WCC inaudible
K R21 Alco Park	4:02 pm	45	35	n/a	4.6/324	Birds & insects (43), traffic (42), WCC inaudible
L R103	4:22 pm	51	35	n/a	4.1/315	Birds & insects (50), traffic (44), WCC inaudible

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 14 May 2013 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	7:33 pm	n/a	31	35	+3.6	0.6/203	Traffic (31), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	7:40 pm	n/a	32	37	+4.8	0.8/231	Traffic (32), insects 22, WCC barely audible
B2 R9Gedhurst/ R22 Mountain View	7:53 pm	n/a	30	37/36*	+5.4	0.8/231	Traffic (30), WCC inaudible
C R10 Meadholme/ R11 Glenara	8:55 pm	n/a	33	39	+6.3	0.8/261	Traffic (33), WCC inaudible
D R24 Hazeldene	9:13 pm	n/a	33	37	+6.8	2.7/337	Traffic (33), WCC barely audible
E R12 Railway Cottage	12:03 am	37	41	38	+7.4	2.7/3.0	Traffic (41), WCC (27)
F R96 Talavera	10:49 pm	40	34	37	+7.0	3.3/358	WCC (34)
G R97	9:44 pm	37	30	35	+6.8	3.9/340	WCC (30)
H R98 Kyooma	10:17 pm	42	36	36	+5.3	3.6/344	WCC (36)
I R57 Kurrara St	11:00 pm	39	36	35	+7.2	3.3/358	Traffic (32), WCC (32), train (28)
J R57 Coronation Ave	9:08 pm	40	37	35	+6.6	0.7/288	Traffic (33), WCC (32), dogs (31)
K R21 Alco Park	10:20 pm	35	32		+5.6	3.6/344	Traffic (29), WCC (27)
L R103	10:38 pm	30	31	35	+6.2	3.5/350	Traffic (27), WCC (27), train (26)

1. L1 (1 min) from mine noise only.
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels did not exceed the relevant noise criterion at each monitoring location during each monitoring period.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site. For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-minute calculated sound power level of 350m long sections of haul road. These values are typically 7-10 dB lower than the single pass-by level.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

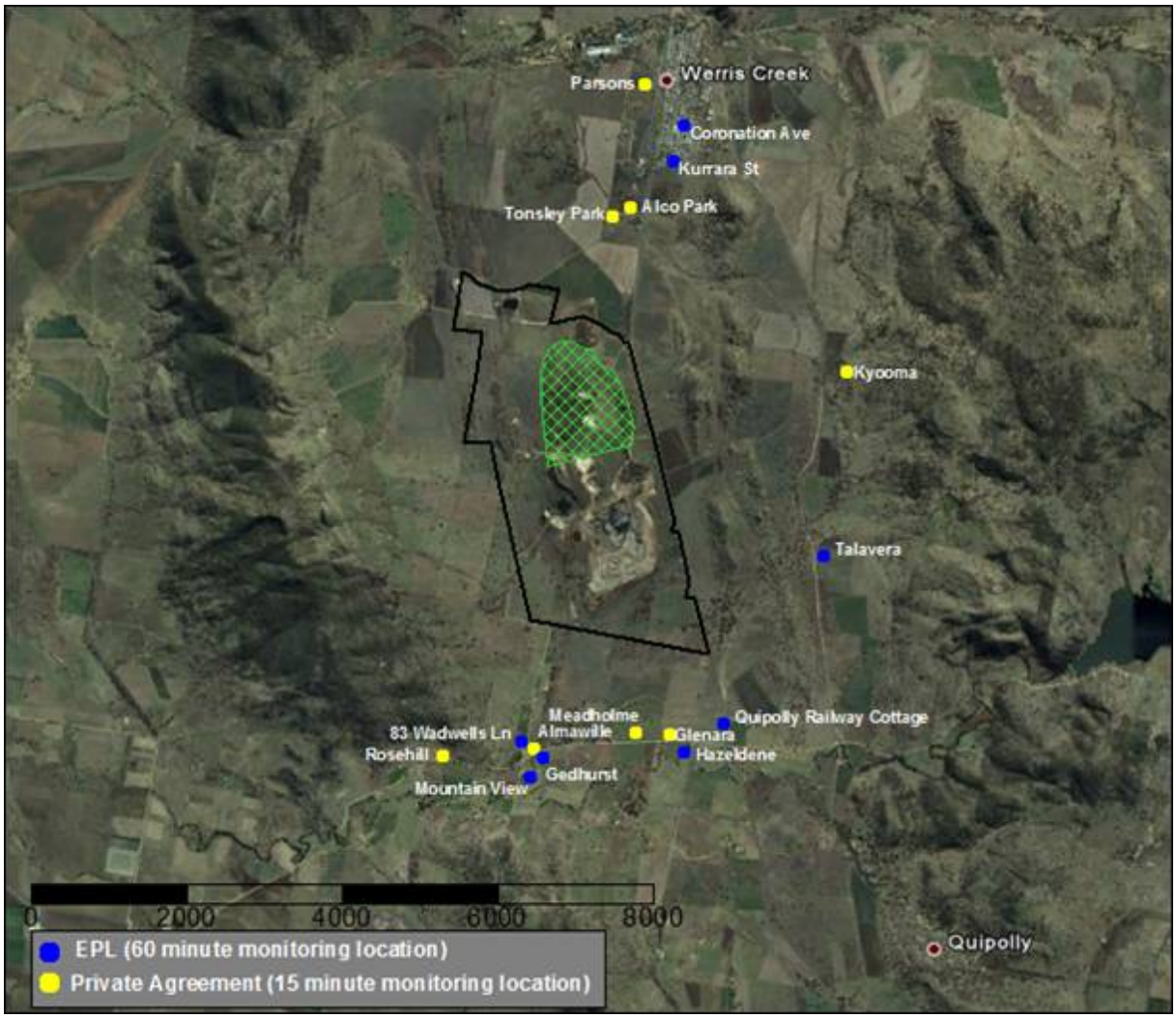
Author:

Neil Pennington
Acoustical Consultant

Review:

Ross Hodge
Acoustical Consultant

Appendix I



Attended Noise Monitoring Locations

Appendix II

Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R7	83 Wadwells Lane	37	37	45	35	40
R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		EA SWLs		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.	Leq	Lmax			
Haul truck CAT 785C (unattenuated)	608	108	116	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	108	116	116	119	6/2/13
Haul truck CAT 785C (unattenuated)	614	108	116		120	17/7/12
Haul truck CAT 785C (unattenuated)	609	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	108	116	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	600	108	116	119		11/9/12
Haul truck CAT 785C (attenuated)	608	108	116	117	120	11/9/12
Haul truck CAT 785C (unattenuated)	602	108	116	119		14/5/13
Haul truck CAT 785C (unattenuated)	612	108	116	120		14/5/13
Haul truck CAT 785C (unattenuated)	613	108	116	121		14/5/13
Haul truck CAT 785C (unattenuated)	623	108	116	122		14/5/13
Haul truck CAT 785C (unattenuated)	624	108	116	120		14/5/13
Water Cart	WA897	111	118	113		11/9/12
Scraper	SC882	118	121	113		11/9/12
Excavator (PC 3600)	EX551	116	120	115		11/9/12
Dozer	829	107	114	114		11/9/12
Crushing Plant	n/a	114	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	108	116		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	108	116		124	11/9/12
Haul truck CAT 793XQ	662	n/a	n/a	115	118	18/12/12
Excavator (PC4000)	EX837	116	120	115		18/12/12
Excavator (Mitsubishi engine)	EX543	116	120	116		14/5/13
Excavator (Cummins engine)	EX542	116	120	113		14/5/13
Dozer D10T (2nd gear) (1st gear)	505	107 (1st)	114 (1st)	113 109	128 121	18/12/12
Dozer D10T on stockpile (2nd gear) (1st gear)		107 (1st)	114 (1st)	118 109	124 113	6/2/13

Dozer D9T on stockpile (2nd gear) (1st gear)		107 (1st)	114 (1st)	119 113	122 118	6/2/13
Drill	DR523	116		119		14/5/13
Drill	CJC 837	116		113		14/5/13

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

1 July 2013

Ref: 04035/4818

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: JUNE 2013 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Wednesday 19th June, 2013 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, C and K are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather station M2 which is located on top of the overburden emplacement.

WCC Operations

WCC operations on Wednesday 19th June 2013 had the 5600 excavator in Strip 16 west at RL380m, 3600 excavator in Strip 13 centre at RL350m; the PC4000 excavator in Strip 13 centre at RL350m and a 1900 excavator in Strip 11 centre at RL270m. The overburden truck fleets were running to the RL390m western dump and in pit dump at RL300m on day and night shift. The 1900 excavator truck fleets were hauling coal to the ROM. The crushing plant operated to 3:30am with no trains loaded.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 19 June 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	3:02 pm	43	35	n/a	5 / 150	Birds (40), traffic (40), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	3:37 pm	45	37	n/a	5 / 166	Dog (41), tractor (40), wind (38), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	3:21 pm	49	37/36*	n/a	5 / 166	Car (48), traffic (39), birds (35), WCC inaudible
C R10 Meadholme/ R11 Glenara	2:42 pm	48	39	n/a	5 / 150	Birds (43), traffic (43), wind (43), WCC inaudible
D R24 Hazeldene	1:49 pm	51	37	n/a	5.5 / 172	Traffic (49), Birds (43), WCC inaudible
E R12 Railway Cottage	5:13 pm	48	38	n/a	3.2 / 162	Traffic (47), birds (41), WCC inaudible
F R96 Talavera	2:05 pm	41	38	n/a	6.1 / 146	Wind (41), WCC inaudible
G R97	1:38 pm	46	35	n/a	6.1 / 146	Wind (44), Birds (40), WCC (<30)
H R98 Kyooma	3:11 pm	42	36	n/a	5 / 166	Wind 41, traffic (35), WCC inaudible
I R57 Kurrara St	5:01 pm	47	35	n/a	3.2 / 166	Traffic (43), trains (43), WCC (32)
J R57 Coronation Ave	4:42 pm	56	35	n/a	3.7 / 160	Traffic (54), birds (51), WCC inaudible
K R21 Alco Park	4:20 pm	48	39	n/a	5.3 / 160	Traffic (48), WCC inaudible
L R103	4:46 pm	45	35	n/a	3.7 / 160	Dog (42), traffic (42), WCC (30)

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 19 June 2013 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	8:48 pm	n/a	37	35	4.4	1.5 / 152	Traffic (36), insects (28), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	11:58 pm	n/a	30	37	5.6	0.6 / 145	Traffic (30), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	7:47 pm	n/a	32	37/36*	5.1	1.6 / 133	Traffic (30), horse (25), WCC inaudible
C R10 Meadholme/ R11 Glenara	9:09 pm	n/a	36	39	5.7	1.5 / 149	Traffic (35), frogs (27), WCC inaudible
D R24 Hazeldene	9:27 pm	n/a	42	37	5.5	1.6 / 137	Traffic (42), WCC inaudible
E R12 Railway Cottage	11:26 pm	n/a	38	38	6.2	1.9 / 161	Traffic (37), insects (28), WCC inaudible
F R96 Talavera	9:18 pm	28	30	37	5.5	1.5 / 149	Traffic (28), WCC (24)
G R97	8:26 pm	41	35	35	6.2	1.2 / 139	WCC (35)
H R98 Kyooma	8:51 pm	30	38	36	6.1	1.5 / 149	Dog (38), WCC (26)
I R57 Kurrara St	11:40 pm	43	44	35	6.1	1 / 167	Trains (43), WCC (34)
J R57 Coronation Ave	10:47 pm	<35	50	35	6.5	1.7 / 152	Train (49), traffic (41), WCC (<30)
K R21 Alco Park	10:23 pm	41	44	37	6.5	1.7 / 142	Trains (42), WCC (38)
L R103	7:52 pm	n/a	54	35	5.1	1.6 / 133	Dog (54), train (42), WCC inaudible

1. L1 (1 min) from mine noise only.
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels were below the relevant noise criterion at each monitoring location during each monitoring period except at R21 “Alco Park” where a mine noise contribution 1 dB above the noise criterion was recorded during the night time measurement. This noise level does not

constitute an exceedance or breach of a license condition since, in accordance with Condition 1 of Schedule 3 of PA10_0059, there is an agreement in place with this receiver allowing for mine noise levels up to 40dB(A).

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site. For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-minute calculated sound power level of 350m long sections of haul road. These values are typically 7-10 dB lower than the single pass-by level.

No plant noise tests were conducted during the June survey.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

Author:

Neil Pennington
Acoustical Consultant

Review:

Ross Hodge
Acoustical Consultant

Appendix I

Attended Noise Monitoring Locations

Appendix II

Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R7	83 Wadwells Lane	37	37	45	35	40
R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		EA SWLs		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.	Leq	Lmax			
Haul truck CAT 785C (unattenuated)	608	108	116	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	108	116	116	119	6/2/13
Haul truck CAT 785C (unattenuated)	614	108	116		120	17/7/12
Haul truck CAT 785C (unattenuated)	609	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	108	116	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	600	108	116	119		11/9/12
Haul truck CAT 785C (attenuated)	608	108	116	117	120	11/9/12
Water Cart	WA897	111	118	113		11/9/12
Scraper	SC882	118	121	113		11/9/12
Excavator (PC 3600)	EX551	116	120	115		11/9/12
Dozer	829	107	114	114		11/9/12
Crushing Plant	n/a	114	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	108	116		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	108	116		124	11/9/12
Haul truck CAT 793XQ	662	n/a	n/a	115	118	18/12/12
Excavator (PC4000)	EX837	116	120	115		18/12/12
Dozer D10T (2nd gear) (1st gear)	505	107 (1st)	114 (1st)	113 109	128 121	18/12/12
Dozer D10T on stockpile (2nd gear) (1st gear)		107 (1st)	114 (1st)	118 109	124 113	6/2/13
Dozer D9T on stockpile (2nd gear) (1st gear)		107 (1st)	114 (1st)	119 113	122 118	6/2/13

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

23 July 2013

Ref: 04035/4818

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: JULY 2013 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 11th July, 2013 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, C and K are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather station M2 which is located on top of the overburden emplacement.

WCC Operations

WCC operations on Thursday 11th July 2013 had the 5600 excavator in Strip 15 centre at RL390m, 3600 excavator in Strip 13 centre at RL350m; a 1900 excavator in Strip 15 east at RL370m and a 1900 excavator in Strip 12 centre at RL310m. Day and night shift initially had the overburden truck fleets running to the RL390m western (out of pit) dump and truck fleets coaling from Strip 12 were hauling coal to the ROM. After 10:30pm, the Noise Control Operator contacted the Open Cut Examiner (OCE) indicating that the 5 minute noise levels were over 35dBA due to mining noise with the OCE responding by directing all CAT 785 trucks to the in pit dump at RL300m and maintaining the attenuated CAT 793 trucks to the western dump. At 11pm, the 5 minute noise levels were again over 35dBA due to mining noise so the OCE called an early crib (night shift lunch break) and the entire operation was suspended for an hour. The crushing plant operated to 3:30am with no trains loaded.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 11 July 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed (m/s)/dir^{O}	Identified Noise Sources
A R5 Rosehill	1.22 pm	35	35	n/a	1.1/176	Birds & insects (35), traffic (20), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	1.20 pm	43	37	n/a	1.7/207	Birds & insects (40), traffic (37), domestic noise (36), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	1.41 pm	34	37/36*	n/a	1.9/244	Birds & insects (33), traffic (25), WCC (20)
C R10 Meadholme/ R11 Glenara	3.50 pm	39	39	n/a	3.7/191	Traffic (38), birds & insects (32), WCC inaudible
D R24 Hazeldene	2.44 pm	39	37	n/a	2.4/231	Traffic (38), birds & insects (30), WCC inaudible
E R12 Railway Cottage	4.57 pm	48	38	n/a	3.4/224	Traffic (48), birds & insects (30), WCC inaudible
F R96 Talavera	3.45 pm	38	38	n/a	3.4/200	Birds & insects (38), traffic (28), WCC inaudible
G R97	3.00 pm	33	35	n/a	2.2/203	Birds & insects (33), WCC inaudible
H R98 Kyooma	3.20 pm	36	36	n/a	2.1/225	Birds & insects (35), WCC (25)
I R57 Kurrara St	4.49 pm	45	35	n/a	3.1/223	Trains (43), traffic (40), birds & insects (33), WCC inaudible
J R57 Coronation Ave	2.33 pm	35	35	n/a	1.0/231	Traffic (34), birds (27), WCC inaudible
K R21 Alco Park	4.12 pm	42	39	n/a	3.5/203	Traffic (41), farm activities (35), WCC inaudible
L R103	4.30 pm	44	35	n/a	2.7/214	Train (44), WCC inaudible

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 11 July 2013 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed (m/s)/dir^{O}	Identified Noise Sources
A R5 Rosehill	9:24 pm	43	39	35	+3.6	1.6/200	WCC (36), insects (34), traffic (30)
B1 R7 83 Wadwells Lane/R8 Almawillee	9:50 pm	43	38	37	+4.9	1.4/197	WCC (37), traffic (31), insects (25)
B2 R9Gedhurst/ R22 Mountain View	9:44 pm	44	41	37/36*	+4.9	1.3/196	WCC (39), insects (34), traffic (33)
C R10 Meadholme/ R11 Glenara	11:07 pm	44	39	39	+6.7	1.0/256	WCC (38), traffic (30), insects (28)
D R24 Hazeldene	10:47 pm	40	34	37	+6.2	1.3/281	WCC (34)
E R12 Railway Cottage	11:06 pm	36	33	38	+6.1	1.5/264	Traffic (32), WCC (31), birds (18)
F R96 Talavera	8:30 pm	n/a	26	37	+4.2	1.8/207	Traffic (26), WCC barely audible
G R97	7:40 pm	n/a	22	35	+4.2	1.8/155	Insects (22), WCC inaudible
H R98 Kyooma	8:03 pm	n/a	31	36	+4.8	1.6/156	Insects (31), WCC inaudible
I R57 Kurrara St	8:03 pm	n/a	43	35	+4.7	1.7/193	Trains (43), traffic (32), WCC barely audible
J R57 Coronation Ave	7:20 pm	38	42	35	+3.0	2.1/159	Traffic (39), dogs (38), WCC (30), insects (28)
K R21 Alco Park	7:20 pm	36	40	37	+3.0	2.1/159	Traffic (39), WCC (33)
L R103	7:40 pm	n/a	49	35	+4.2	1.8/155	Train (49), WCC inaudible

1. L1 (1 min) from mine noise only.
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels were below the relevant noise criterion at each monitoring location during each monitoring period except at R5 “Rosehill” where a mine noise contribution 1 dB above the

noise criterion was recorded during the night time measurement and at R9/R22 where a mine noise contribution 2 to 3 dB above the noise criterion was recorded also during the night time measurement. That is, due to the close proximity of the residences at Gedhurst and Mountain View a single noise measurement is made which is considered representative of the noise environment at both. On the basis of the different criterion at each residence the exceedance is 2db at Gedhurst and 3 dB at Mountain View.

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

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site. For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working

throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-minute calculated sound power level of 350m long sections of haul road. These values are typically 7-10 dB lower than the single pass-by level.

No plant noise tests were conducted during the July survey.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

Author:

Neil Pennington
Acoustical Consultant

Review:

Ross Hodge
Acoustical Consultant

Appendix I

Attended Noise Monitoring Locations

Appendix II

Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R7	83 Wadwells Lane	37	37	45	35	40
R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		EA SWLs		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.	Leq	Lmax			
Haul truck CAT 785C (unattenuated)	608	108	116	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	108	116	116	119	6/2/13
Haul truck CAT 785C (unattenuated)	614	108	116		120	17/7/12
Haul truck CAT 785C (unattenuated)	609	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	108	116	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	600	108	116	119		11/9/12
Haul truck CAT 785C (attenuated)	608	108	116	117	120	11/9/12
Water Cart	WA897	111	118	113		11/9/12
Scraper	SC882	118	121	113		11/9/12
Excavator (PC 3600)	EX551	116	120	115		11/9/12
Dozer	829	107	114	114		11/9/12
Crushing Plant	n/a	114	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	108	116		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	108	116		124	11/9/12
Haul truck CAT 793XQ	662	n/a	n/a	115	118	18/12/12
Excavator (PC4000)	EX837	116	120	115		18/12/12
Dozer D10T (2nd gear) (1st gear)	505	107 (1st)	114 (1st)	113 109	128 121	18/12/12
Dozer D10T on stockpile (2nd gear) (1st gear)		107 (1st)	114 (1st)	118 109	124 113	6/2/13
Dozer D9T on stockpile (2nd gear) (1st gear)		107 (1st)	114 (1st)	119 113	122 118	6/2/13

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

12 August 2013

Ref: 04035/4818

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: AUGUST 2013 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 8th August, 2013 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, C and K are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather station M2 which is located on top of the overburden emplacement.

WCC Operations

WCC operations on Thursday 8th August 2013 had the 5600 excavator in Strip 13 centre at RL370m, 3600 excavator in Strip 15 west at RL390m; a 1900 excavator in Strip 15 centre at RL390m and a 1900 excavator in Strip 13 west at RL370m. Day and night shift initially had the overburden truck fleets running to the RL390m western (out of pit) dump and truck fleets coaling from Strip 15 were hauling coal to the ROM. After 7:30pm, the Noise Control Operator contacted the Open Cut Examiner (OCE) indicating that the 5 minute noise levels were approaching 35dBA due to mining noise with the OCE responding by directing all trucks to the in pit dump at RL300m. At 9pm, the entire operation was suspended due to noise levels approaching 35dBA. The crushing plant operated to 11:30pm with no trains loaded.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 8 August 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed (m/s)/dir^{O}	Identified Noise Sources
A R5 Rosehill	2:43 pm	43	35	n/a	5.9/262	Traffic (40), birds (38), wind (36), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	1:30 pm	43	37	n/a	5.6/276	Birds & insects (41), wind in trees (40), traffic (30), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	1:38 pm	47	37/36*	n/a	5.5/275	Wind in trees (46), birds (43), WCC inaudible
C R10 Meadholme/ R11 Glenara	3:05 pm	48	39	n/a	4.9/269	Wind in trees (46), birds & insects (44), traffic (30), WCC inaudible
D R24 Hazeldene	3:23 pm	46	37	n/a	4.2/275	Traffic (43), birds & insects (43), WCC inaudible
E R12 Railway Cottage	5:06 pm	47	38	n/a	3.3/290	Traffic (47), birds & insects (30), WCC inaudible
F R96 Talavera	2:48 pm	37	38	n/a	5.1/267	Traffic (35), birds (32), WCC (25)
G R97	4:10 pm	39	35	n/a	4.0/274	Birds (34), traffic (33), wind (32), WCC (32)
H R98 Kyooma	3:52 pm	40	36	n/a	3.8/282	Wind (37), birds & insects (35), traffic (30), WCC (26)
I R57 Kurrara St	4:48 pm	51	35	n/a	3.7/288	Traffic (51), birds (35), WCC inaudible
J R57 Coronation Ave	4:29 pm	54	35	n/a	3.8/262	Traffic (54), birds (37), wind in trees (35), WCC inaudible
K R21 Alco Park	4:46 pm	40	39	n/a	4.5/281	Traffic (40), birds (32), train (31), WCC inaudible
L R103	4:29 pm	40	35	n/a	3.8/262	Birds (36), train (36), traffic (33), WCC inaudible

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 8 August 2013 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m, Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	9:15 pm	n/a	33	35	+1.3,2.1,8	Traffic (32), frogs (25), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	10:42 pm	n/a	32	37	Lapse,4.8,4	Traffic (30), cattle (25), insects (23), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	8:12 pm	n/a	33	37/36*	+0.6,2,344	Traffic (33), insect (25), WCC inaudible
C R10 Meadholme/ R11 Glenara	9:36 pm	n/a	41	39	+1.9,2.1,359	Dog (40), traffic (35), WCC inaudible
D R24 Hazeldene	9:53 pm	n/a	39	37	+2.4,4.0,4	Traffic (39), WCC inaudible
E R12 Railway Cottage	10:56 pm	n/a	44	38	Lapse,4.6,3	Traffic (44), WCC inaudible
F R96 Talavera	7:28 pm	38	35	37	Lapse,2.9,320	Traffic (32), WCC (32)
G R97	8:50 pm	30	32	35	+0.8,2.0,2	Traffic (31), WCC (25)
H R98 Kyooma	8:32 pm	39	34	36	Lapse,2.1,322	WCC (32), traffic (28), insects (24)
I R57 Kurrara St	9:28 pm	n/a	38	35	+1.7,2.8,359	Trains (36), traffic (34), WCC inaudible
J R57 Coronation Ave	9:10 pm	n/a	34	35	+1.3,1.9,11	Traffic (34), trains (31), WCC inaudible
K R21 Alco Park	7:48 pm	42	36	37	Lapse,3.3,320	WCC (34), traffic (32)
L R103	7:29 pm	42	41	35	Lapse,3.3,312	Train (40), WCC (34)

1. L1 (1 min) from mine noise only.
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels did not exceed the relevant noise criterion at any monitoring location at any time during the monitoring.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site. For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-minute calculated sound power level of 350m long sections of haul road. These values are typically 7-10 dB lower than the single pass-by level.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

Author:

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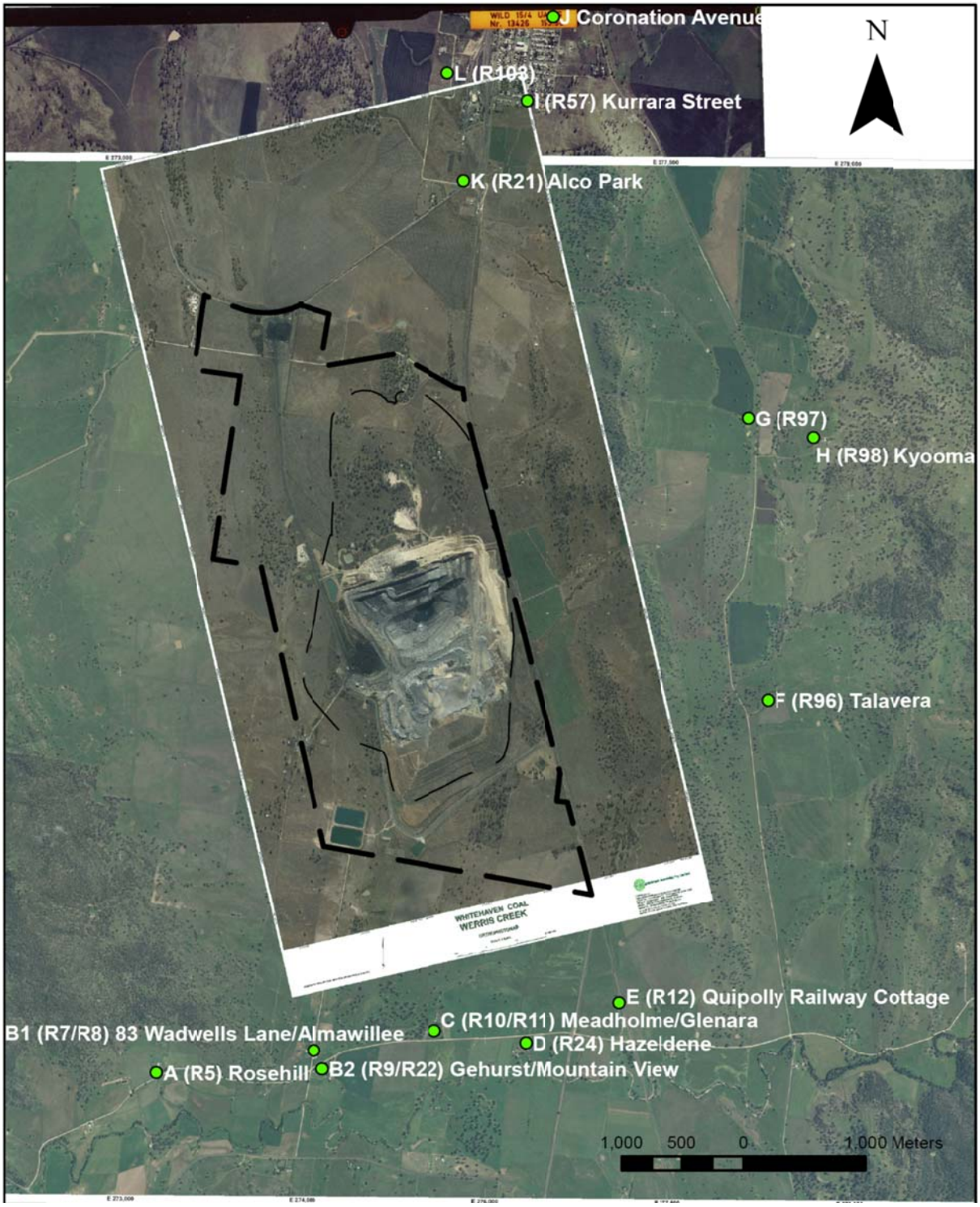
Acoustical Consultant

Review:

Ross Hodge
Acoustical Consultant

Appendix I



Attended Noise Monitoring Locations

Appendix II

Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R7	83 Wadwells Lane	37	37	45	35	40
R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		EA SWLs		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.	Leq	Lmax			
Haul truck CAT 785C (unattenuated)	608	108	116	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	108	116	115	118	8/8/13
Haul truck CAT 785C (unattenuated)	614	108	116		120	17/7/12
Haul truck CAT 785C (unattenuated)	609	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	108	116	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	600	108	116	119		11/9/12
Haul truck CAT 785C (unattenuated)	613	108	116	122		8/8/13
Haul truck CAT 785C (unattenuated)	624	108	116	121		8/8/13
Water Cart	WA897	111	118	113		11/9/12
Scraper	SC882	118	121	113		11/9/12
Excavator (PC 3600)	EX551	116	120	115		11/9/12
Dozer	829	107	114	114		11/9/12
Crushing Plant	n/a	114	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	108	116		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	108	116		124	11/9/12
Haul truck CAT 793XQ	662	n/a	n/a	115	118	18/12/12
Excavator (PC4000)	EX837	116	n/a	115		18/12/12
Dozer D10T (1st gear)	505	107 (1st)	114 (1st)	113 109	128 121	18/12/12
Dozer D10T on stockpile (2nd gear) (1st gear)	505	107 (1st)	114 (1st)	118 109	124 113	6/2/13
Dozer D9T on stockpile (2nd gear) (1st gear)	501	107 (1st)	114 (1st)	119 113	122 118	6/2/13
Excavator (EX 5600)	570	121	n/a	116	119	8/8/13
Haul truck CAT 793XQ	660	115	n/a	116	119	8/8/13
Haul truck CAT 793XQ	661	115	n/a	116	118	8/8/13
Haul truck CAT 793XQ	662	115	n/a	115	118	8/8/13
Haul truck CAT 793XQ	663	115	n/a	116	119	8/8/13
Haul truck CAT 793XQ	664	115	n/a	114	117	8/8/13
Haul truck CAT 793XQ	665	115	n/a	115	117	8/8/13
Haul truck CAT 793XQ	666	115	n/a	115	117	8/8/13

Haul truck CAT 793XQ	667	115	n/a	116	119	8/8/13
Hitachi Excavator	543	116	n/a	115	119	8/8/13
Grader	849	n/a	n/a	110	112	8/8/13
Warrior 2400 crusher	n/a	n/a	n/a	117	117	8/8/13
Kleeman screen	MCR401	n/a	n/a	111	112	8/8/13

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

27 September 2013

Ref: 04035/4912

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: SEPTEMBER 2013 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 19th September, 2013 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, C and K are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather station M2 which is located on top of the overburden emplacement.

WCC Operations

WCC operations on Thursday 19th September 2013 had the 5600 excavator in Strip 16 centre at RL395m, 3600 excavator in Strip 13 centre at RL330m; a 1900 excavator in Strip 15 west at RL385m and a 1900 excavator in Strip 13 east at RL340m. Day and night shift initially had the overburden truck fleets running to either the RL390m western (out of pit) dump or RL370m inpit dump and truck fleets coaling from Strip 13 were hauling coal to the ROM. At 8:30pm, all trucks were directed to the inpit dump. Between 9pm and 10pm, various trucks were shutdown and restarted to manage noise levels below 35dBA at Quipolly and Werris Creek. The crushing plant operated to 3:30am with one train loaded arriving at 2:02pm and departing 4:12pm.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 19 September 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed (m/s)/dir^{O}	Identified Noise Sources
A R5 Rosehill	2:35 pm	51	35	n/a	5.6/299	Birds & insects (51), cattle (40), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	1:30 pm	46	37	n/a	6.2/299	Birds & insects (44), wind in trees (41), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	1:30 pm	48	37/36*	n/a	6.2/298	Birds & insects (48), wind in trees (38), WCC inaudible
C R10 Meadholme/ R11 Glenara	2:26 pm	46	39	n/a	3.8/291	Wind in trees (46), birds & insects (36), WCC barely audible
D R24 Hazeldene	3:14 pm	44	37	n/a	4.7/292	Wind (43), birds & insects (37), WCC barely audible
E R12 Railway Cottage	2:34 pm	52	38	n/a	4.7/294	Traffic (52), birds & insects (43), WCC inaudible
F R96 Talavera	3:40 pm	38	38	n/a	5.5/294	Birds & insects (34), wind (34), cattle (28), traffic (28), WCC barely audible
G R97	5:07 pm	38	35	n/a	4.8/270	Sheep (34), birds & insects (33), wind (30), WCC barely audible
H R98 Kyooma	4:46 pm	43	36	n/a	5.2/268	Wind (43), birds & insects (30), WCC (27)
I R57 Kurrara St	5:00 pm	50	35	n/a	4.7/273	Traffic (46), trains (44), birds & insects (41), WCC inaudible
J R57 Coronation Ave	5:31 pm	43	35	n/a	4.5/274	Traffic (41), birds & insects (35), dogs (34), WCC inaudible
K R21 Alco Park	4:21 pm	44	39	n/a	6.2/295	Train (42), birds & insects (41), wind (33), WCC inaudible
L R103	4:40 pm	47	35	n/a	5.2/268	Train (45), wind (40), birds & insects (39), WCC inaudible

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 19 September 2013 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m, Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	8:07 pm	n/a	38	35	+0.1,5.0.272	Traffic (36), birds & insects (34), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	8:26 pm	n/a	34	37	+0.8,3.6,267	Traffic (33), birds & insects (28), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	8:15 pm	n/a	37	37/36*	+0.3,4.9,271	Traffic (36), birds & insects (31), WCC inaudible
C R10 Meadholme/ R11 Glenara	9:30 pm	n/a	32	39	+1.9,2.8,263	Traffic (32), WCC inaudible
D R24 Hazeldene	9:48 pm	n/a	33	37	+1.6,3.2,263	Traffic (33), birds & insects (21), WCC inaudible
E R12 Railway Cottage	12:35 am	n/a	37	38	+7.3,0.6,294	Traffic (37), WCC inaudible
F R96 Talavera	9:30 pm	43	38	37	+1.5,3.3,267	WCC (36), traffic (34), birds & insects (20)
G R97	11:11 pm	46	40	35	+3.7,0.2,280	WCC (39), sheep (33)
H R98 Kyooma	10:49 pm	48	42	36	+3.0,0.8,144	WCC (42), birds & insects (25), sheep (20)
I R57 Kurrara St	11:11 pm	42	38	35	+4.2,0.5,348	Traffic (36), WCC (34)
J R57 Coronation Ave	11:33 pm	41	40	35	+4.4,0.5,265	Traffic (38), WCC (34), dogs (30)
K R21 Alco Park	10:55 pm	n/a	40	37	+2.3,0.3,255	Traffic (40), dogs (30), WCC barely audible
L R103	12:02 am	38	35	35	+4.5,0.6,48	Traffic (33), WCC (31)

1. L1 (1 min) from mine noise only.
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels exceeded the relevant noise criterion at R97 and Kyooma during the evening/night time monitoring period.

There is no residence at R97. The monitoring is undertaken at the gate to the property off Black Gully Road. The mine has a private agreement with the resident at Kyooma.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the L1 (1 min) noise from WCC exceeded 45 dB(A) at the R97 and Kyooma monitoring locations. There is no residence at R97 and, therefore, the sleep disturbance criterion is not applicable. The mine has a private agreement with the resident at Kyooma.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site. For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-minute calculated sound power level of 350m long sections of haul road. These values are typically 7-10 dB lower than the single pass-by level.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

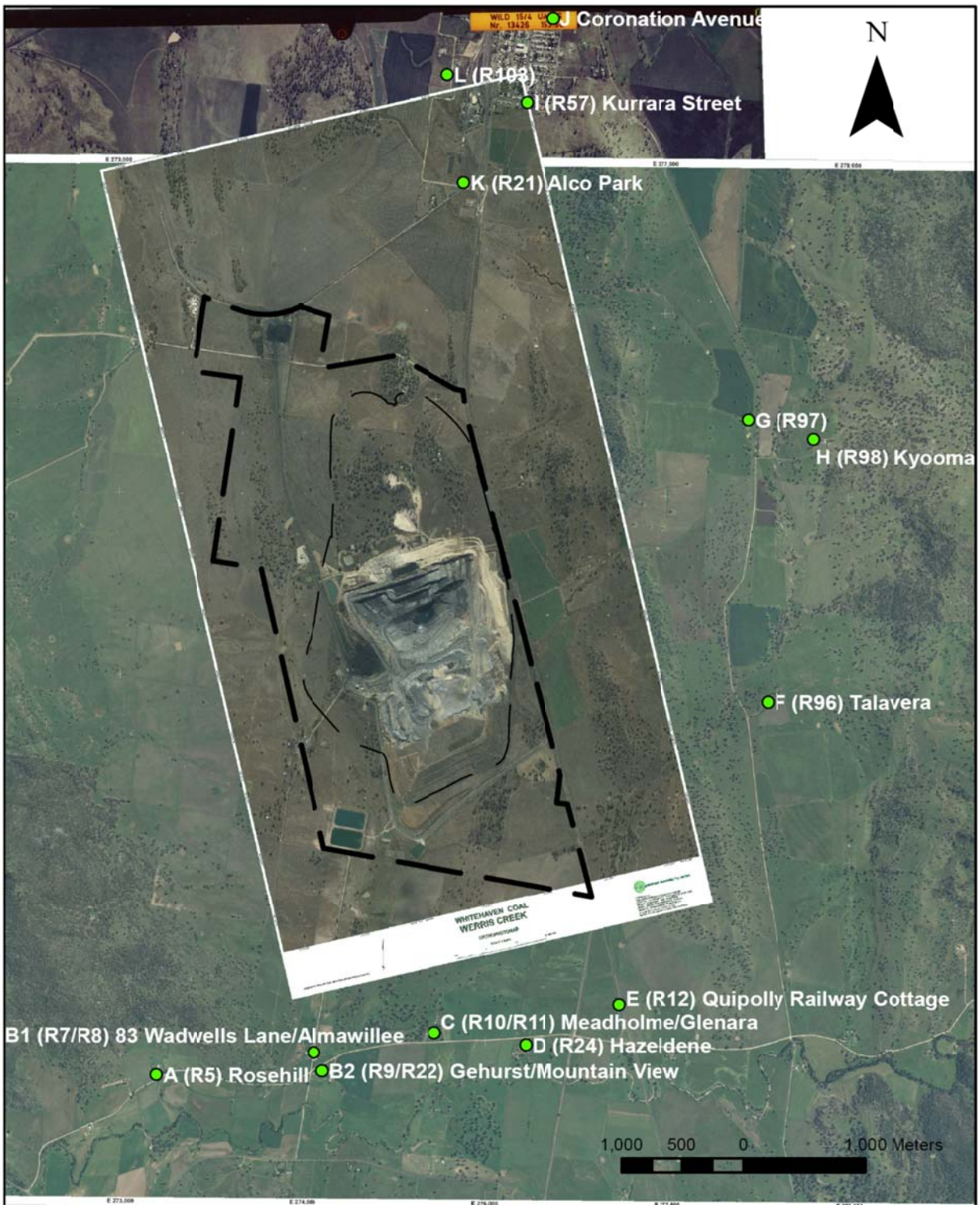
Author:

Ross Hodge
Acoustical Consultant

Review:

Neil Pennington
Acoustical Consultant

Appendix I



Attended Noise Monitoring Locations

Appendix II

Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R7	83 Wadwells Lane	37	37	45	35	40
R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		EA SWLs		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.	Leq	Lmax			
Haul truck CAT 785C (unattenuated)	608	108	116	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	108	116	115	118	8/8/13
Haul truck CAT 785C (unattenuated)	614	108	116		120	17/7/12
Haul truck CAT 785C (unattenuated)	609	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	108	116	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	600	108	116	119		11/9/12
Haul truck CAT 785C (unattenuated)	613	108	116	122		8/8/13
Haul truck CAT 785C (unattenuated)	624	108	116	121		8/8/13
Water Cart	WA897	111	118	113		11/9/12
Scraper	SC882	118	121	113		11/9/12
Excavator (PC 3600)	EX551	116	120	115		11/9/12
Dozer	829	107	114	114		11/9/12
Crushing Plant	n/a	114	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	108	116		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	108	116		124	11/9/12
Haul truck CAT 793XQ	662	n/a	n/a	115	118	18/12/12
Excavator (PC4000)	EX837	116	n/a	115		18/12/12
Dozer D10T (1st gear)	505	107 (1st)	114 (1st)	113 109	128 121	18/12/12
Dozer D10T on stockpile (2nd gear) (1st gear)	505	107 (1st)	114 (1st)	118 109	124 113	6/2/13
Dozer D9T on stockpile (2nd gear) (1st gear)	501	107 (1st)	114 (1st)	119 113	122 118	6/2/13
Excavator (EX 5600)	570	121	n/a	116	119	8/8/13
Haul truck CAT 793XQ	660	115	n/a	116	119	8/8/13
Haul truck CAT 793XQ	661	115	n/a	116	118	8/8/13
Haul truck CAT 793XQ	662	115	n/a	115	118	8/8/13
Haul truck CAT 793XQ	663	115	n/a	116	119	8/8/13
Haul truck CAT 793XQ	664	115	n/a	114	117	8/8/13
Haul truck CAT 793XQ	665	115	n/a	115	117	8/8/13
Haul truck CAT 793XQ	666	115	n/a	115	117	8/8/13

Haul truck CAT 793XQ	667	115	n/a	116	119	8/8/13
Hitachi Excavator	543	116	n/a	115	119	8/8/13
Grader	849	n/a	n/a	110	112	8/8/13
Warrior 2400 crusher	n/a	n/a	n/a	117	117	8/8/13
Kleeman screen	MCR401	n/a	n/a	111	112	8/8/13

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

24 October 2013

Ref: 04035/4956

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: OCTOBER 2013 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Tuesday 22nd and Wednesday 23rd October, 2013 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Programme

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Programme

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
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		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, C and K are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather station M2 which is located on top of the overburden emplacement.

WCC Operations

WCC operations on Tuesday 22nd October 2013 had the 5600 excavator in Strip 15 centre at RL370m, 3600 excavator in Strip 13 west at RL330m; a 1900 excavator in Strip 15 centre at RL370m and a 1900 excavator in Strip 15 centre at RL370m. Day and night shift had the overburden truck fleets from the centre pit running via the east to the western RL420m (out of pit) dump or the western overburden trucks to RL390m western inpit dump. Because of elevated noise levels to the east of WCC, both 1900 excavators (and trucks) were suspended at 7:05pm and 7:15pm respectively. The 5600 excavator (and trucks) was suspended intermittently after 7:25pm to manage noise levels below 35dBA.

A total of 18.1 hours of excavator production (across 3 excavators) and 56 hours of truck production (across 3x785 trucks and 7x793 trucks) were lost to manage noise impacts. The crushing plant and train load out operated to 3:30am with the dozers on the train load out suspended between 7:30pm and 9:20pm with no trains loaded.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

For logistical reasons the day time monitoring was completed on the morning of Wednesday 23rd October as noted in Table 2.

Table 2
WCC Noise Monitoring Results – 22/23 October 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	4:42 pm	43	35	n/a	5.2,288	Birds & insects (43), traffic (30), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	3:40 pm	49	37	n/a	4.4,282	Birds & insects (49), traffic (33), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	5:03 pm	45	37/36*	n/a	4.2,294	Birds & insects (45), traffic 925), WCC inaudible
C R10 Meadholme/ R11 Glenara	7:02 am**	43	39	n/a	2.0/336	Traffic (41), birds & insects (38), WCC (32)
D R24 Hazeldene	3:38 pm	44	37	n/a	4.2,284	Birds & insects (44), traffic (30), WCC barely audible
E R12 Railway Cottage	4:55 pm	49	38	n/a	4.2,294	Traffic (47), birds & insects (42), WCC inaudible
F R96 Talavera	2:33 pm	36	38	n/a	3.7,286	Birds & insects (34), traffic (30), WCC (27)
G R97	1:45 pm	38	35	n/a	4.2,305	Wind (36), birds & insects (34), WCC barely audible
H R98 Kyooma	2:04 pm	35	36	n/a	3.0,327	Birds & insects (32), wind (32), WCC (23)
I R57 Kurrara St	1:50 pm	46	35	n/a	3.9,298	Birds (43), trains (42), traffic (36), WCC inaudible
J R57 Coronation Ave	7:06 am**	52	35	n/a	3.9/357	Traffic (49), birds & insects (48), trains (40), domestic noise (35), WCC inaudible
K R21 Alco Park	2:55 pm	43	39	n/a	6.2,295	Train (42), traffic (33), birds & insects (30), WCC inaudible
L R103	3:13 pm	46	35	n/a	5.2,268	Birds & insects (42), cattle (41), traffic (40), WCC inaudible

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

** Monitoring on 23/10/13

Table 3
WCC Noise Monitoring Results – 22 October 2013 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m, Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	7:13 pm	n/a	41	35	Lapse,3.9/309	Insects (40), traffic (32), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	11:34 pm	39	36	37	+1.6,6.7,353	WCC (34), birds & insects (32)
B2 R9Gedhurst/ R22 Mountain View	7:34 pm	35	38	37/36*	+1.6,3.1,331	Birds & insects (35), traffic (32), WCC (28)
C R10 Meadholme/ R11 Glenara	8:37 pm	41	36	39	+2.6,3.6,314	Traffic (33), WCC (32), insects (28)
D R24 Hazeldene	8:55 pm	30	39	37	+4.2,4.6,351	Traffic (37), insects (31), WCC (25)
E R12 Railway Cottage	10:25 pm	36	42	38	+2.0,5.8,349	Traffic (41), WCC (32), birds & insects (30)
F R96 Talavera	9:11 pm	41	42	37	+4.7,4.8,352	Birds & insects (42), WCC (32)
G R97	8:20 pm	42	51	35	+2.6,3.3,342	Insects (51), WCC (33), train (30)
H R98 Kyooma	8:45 pm	42	38	36	+2.7,4.1,336	WCC (35), insects (35), traffic (25)
I R57 Kurrara St	10:42 pm	n/a	42	35	+1.8,5.8,349	Frogs & insects (40), traffic (36), trains (32), WCC inaudible
J R57 Coronation Ave	7:15 pm	n/a	50	35	Lapse,3.9,309	Traffic (47), birds & insects (46), trains (37), WCC inaudible
K R21 Alco Park	10:01 pm	n/a	44	37	+5.1,5.3,354	Insects (43), trains (33), WCC barely audible
L R103	10:20 pm	n/a	42	35	+4.4,6.6,355	Insects (41), trains (33), traffic (30), WCC inaudible

1. L1 (1 min) from mine noise only.

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels did not exceed the relevant noise criterion at any time or location.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the L1 (1 min) noise from WCC did not exceed the relevant criterion at any time or location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site. For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-minute calculated sound power level of 350m long sections of haul road. These values are typically 7-10 dB lower than the single pass-by level.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

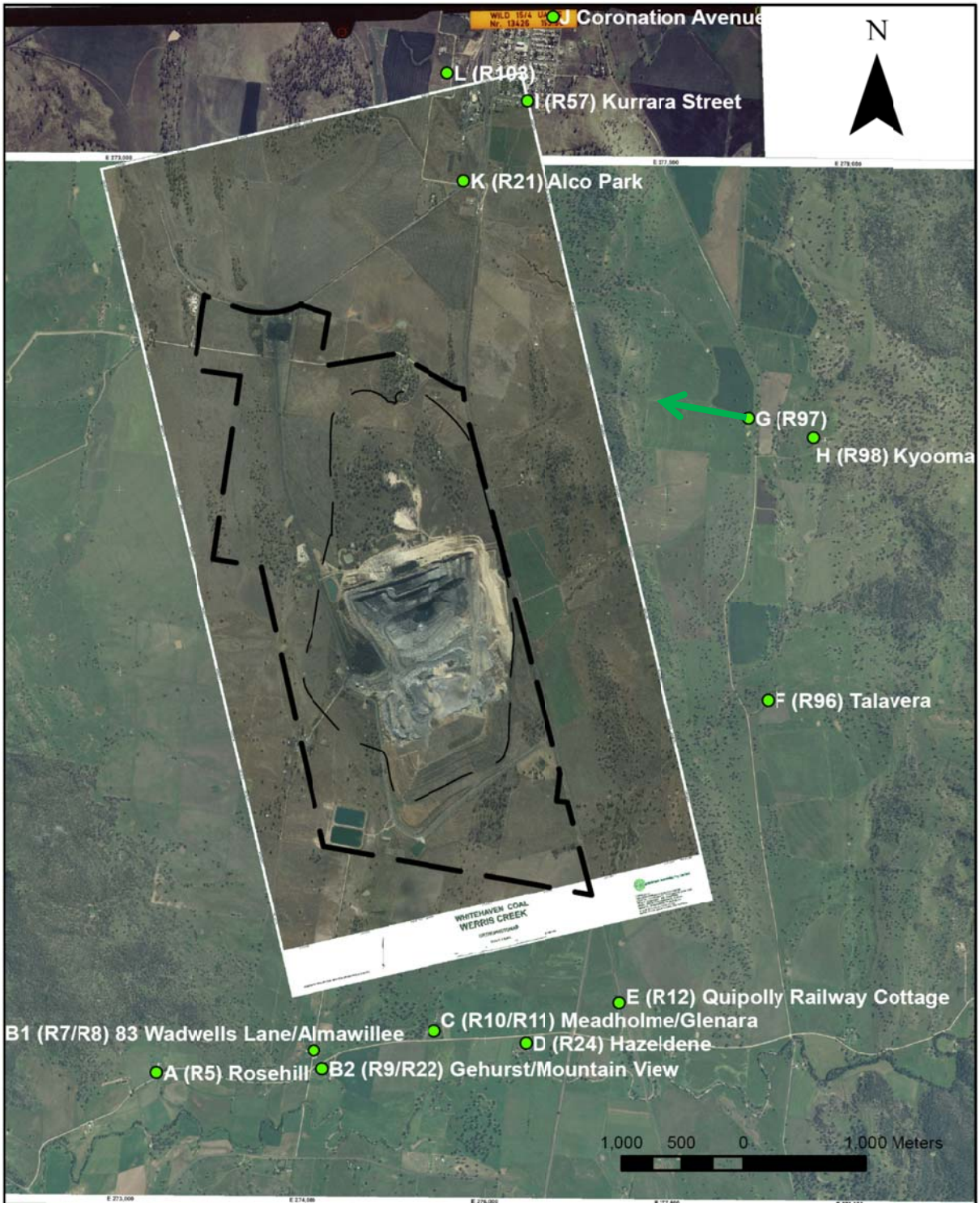
Author:

Ross Hodge
Acoustical Consultant

Review:

Neil Pennington
Acoustical Consultant

Appendix I



Attended Noise Monitoring Locations

Appendix II

Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R7	83 Wadwells Lane	37	37	45	35	40
R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		EA SWLs		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.	Leq	Lmax			
Haul truck CAT 785C (unattenuated)	608	108	116	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	108	116	115	118	8/8/13
Haul truck CAT 785C (unattenuated)	614	108	116		120	17/7/12
Haul truck CAT 785C (unattenuated)	609	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	108	116	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	600	108	116	119		11/9/12
Haul truck CAT 785C (unattenuated)	613	108	116	122		8/8/13
Haul truck CAT 785C (unattenuated)	624	108	116	121		8/8/13
Water Cart	WA897	111	118	113		11/9/12
Scraper	SC882	118	121	113		11/9/12
Excavator (PC 3600)	EX551	116	120	115		11/9/12
Dozer	829	107	114	114		11/9/12
Crushing Plant	n/a	114	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	108	116		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	108	116		124	11/9/12
Haul truck CAT 793XQ	662	n/a	n/a	115	118	18/12/12
Excavator (PC4000)	EX837	116	n/a	115		18/12/12
Dozer D10T (1st gear)	505	107 (1st)	114 (1st)	113 109	128 121	18/12/12
Dozer D10T on stockpile (2nd gear) (1st gear)	505	107 (1st)	114 (1st)	118 109	124 113	6/2/13
Dozer D9T on stockpile (2nd gear) (1st gear)	501	107 (1st)	114 (1st)	119 113	122 118	6/2/13
Excavator (EX 5600)	570	121	n/a	116	119	8/8/13
Haul truck CAT 793XQ	660	115	n/a	116	119	8/8/13
Haul truck CAT 793XQ	661	115	n/a	116	118	8/8/13
Haul truck CAT 793XQ	662	115	n/a	115	118	8/8/13
Haul truck CAT 793XQ	663	115	n/a	116	119	8/8/13
Haul truck CAT 793XQ	664	115	n/a	114	117	8/8/13
Haul truck CAT 793XQ	665	115	n/a	115	117	8/8/13
Haul truck CAT 793XQ	666	115	n/a	115	117	8/8/13

Haul truck CAT 793XQ	667	115	n/a	116	119	8/8/13
Hitachi Excavator	543	116	n/a	115	119	8/8/13
Grader	849	n/a	n/a	110	112	8/8/13
Warrior 2400 crusher	n/a	n/a	n/a	117	117	8/8/13
Kleeman screen	MCR401	n/a	n/a	111	112	8/8/13

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

25 November 2013

Ref: 04035/4999

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: NOVEMBER 2013 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 21st November, 2013 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, C and K are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather station M2 which is located on top of the overburden emplacement. Temperature inversion strength is extrapolated from gauges with 80m vertical separation.

WCC Operations

WCC operations on Thursday 21st November 2013 had the 5600 excavator in Strip 14 centre at RL330m, 3600 excavator in Strip 14 west at RL350m; a 1900 excavator in Strip 15 centre at RL370m and a 1900 excavator in Strip 15 west at RL370m. Day and night shift had the overburden truck fleets running to the western RL410m (out of pit) dump. There were no production delays due to noise impacts. The crushing plant and train load out operated to 3:30am with two trains loaded during night shift.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 21 November 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	2:33 pm	39	35	n/a	1.0,337	Birds & insects (39), traffic (22), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	2:53 pm	49	37	n/a	2.2,199	Birds & insects (49), tractor (24), WCC (22)
B2 R9Gedhurst/ R22 Mountain View	1:30 pm	47	37/36*	n/a	2.0,320	Birds & insects (47), traffic (25), WCC (23)
C R10 Meadholme/ R11 Glenara	2:58 pm	46	39	n/a	1.2,213	Birds & insects (46), traffic (20), WCC inaudible
D R24 Hazeldene	3:17 pm	41	37	n/a	1.1,115	Birds & insects (41), traffic (30), WCC inaudible
E R12 Railway Cottage	1:27 pm	50	38	n/a	2.0,320	Traffic (49), birds & insects (43), WCC inaudible
F R96 Talavera	2:33 pm	32	38	n/a	1.9,239	Birds & insects (31), traffic (24), WCC barely audible
G R97	3:40 pm	37	35	n/a	2.1,191	Birds & insects (37), WCC inaudible
H R98 Kyooma	4:05 pm	37	36	n/a	1.2,213	Birds & insects (37), WCC (19)
I R57 Kurrara St	4:48 pm	54	35	n/a	1.9,60	Traffic (54), birds & insects (43), WCC inaudible
J R57 Coronation Ave	4:29 pm	43	35	n/a	0.5,90	Birds & insects (43), trains (32), traffic (30), WCC inaudible
K R21 Alco Park	4:43 pm	39	39	n/a	2.6,7	Birds & insects (37), trains (34), WCC inaudible
L R103	4:23 pm	34	35	n/a	2.4,10	Train (34), insects (22), WCC inaudible

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 21 November 2013 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m, Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	8:21 pm	40	37	35	+3.6,6.1,66	Birds & insects (35), WCC (32), traffic (25)
B1 R7 83 Wadwells Lane/R8 Almawillee	8:41 pm	40	40	37	+1.6,6.6,47	Birds & insects (37), WCC (31), traffic (30)
B2 R9Gedhurst/ R22 Mountain View	7:08 pm	30	43	37/36*	Lapse,3.8,38	Birds & insects (43), traffic (32), WCC (27)
C R10 Meadholme/ R11 Glenara	9:45 pm	34	38	39	Lapse,2.6,284	Birds & insects (36), dog (32), traffic (30), WCC (26)
D R24 Hazeldene	10:12 pm	35	36	37	Lapse,3.9,88	Birds & insects (35), WCC (25), traffic (24)
E R12 Railway Cottage	10:32 pm	<25	32	38	Lapse,3.7,84	Traffic (30), insects (26), WCC (20)
F R96 Talavera	7:12 pm	n/a	33	37	+3.4,4.4,47	Birds & insects (33), WCC inaudible
G R97	8:17 pm	n/a	42	35	+0.3,6.3,71	Birds & insects (39), wind (39), WCC inaudible
H R98 Kyooma	8:42 pm	n/a	36	36	Lapse,5.4,54	Birds & insects (33), wind (33) WCC inaudible
I R57 Kurrara St	9:26 pm	n/a	48	35	Lapse,3.2,128	Traffic (45), insects (43), trains (40), WCC inaudible
J R57 Coronation Ave	9:05 pm	n/a	42	35	Lapse,7.7,50	Traffic (40), birds & insects (38), WCC inaudible
K R21 Alco Park	11:42 pm	n/a	47	37	Lapse,3.8,128	Insects (46), traffic (37), trains (37), WCC inaudible
L R103	11:20 pm	n/a	41	35	Lapse,2.7,98	Insects (40), trains (35), WCC inaudible

1. L1 (1 min) from mine noise only.
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels did not exceed the relevant noise criteria at any location during any monitoring period.

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In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the L1 (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site.

For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

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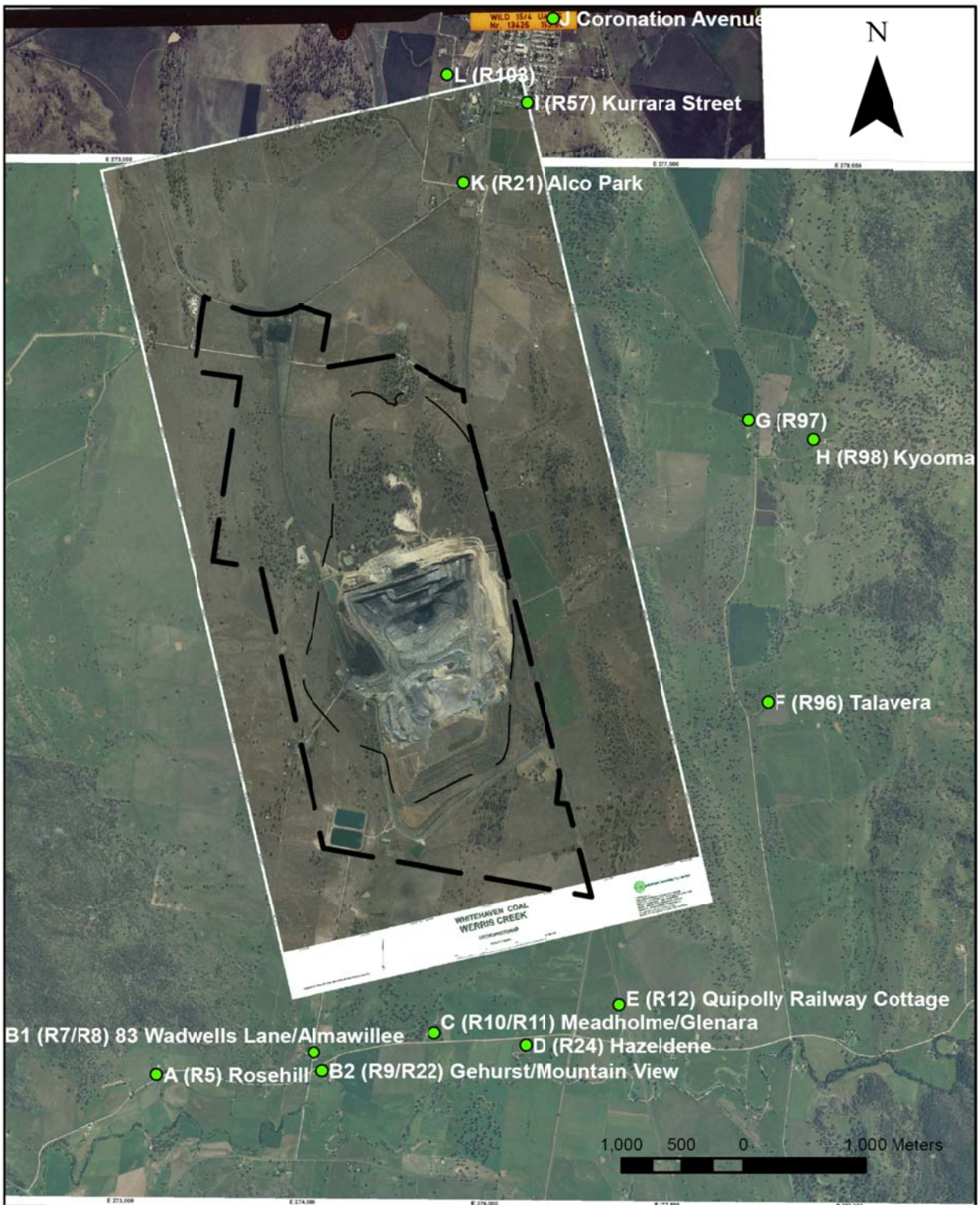
Appendix I



Attended Noise Monitoring Locations

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R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		EA SWLs		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.	Leq	Lmax			
Haul truck CAT 785C (unattenuated)	608	108	116	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	108	116	115	118	8/8/13
Haul truck CAT 785C (unattenuated)	614	108	116		120	17/7/12
Haul truck CAT 785C (unattenuated)	609	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	108	116	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	600	108	116	119		11/9/12
Haul truck CAT 785C (unattenuated)	613	108	116	122		8/8/13
Haul truck CAT 785C (unattenuated)	624	108	116	121		8/8/13
Water Cart	WA897	111	118	113		11/9/12
Scraper	SC882	118	121	113		11/9/12
Excavator (PC 3600)	EX551	116	120	115		11/9/12
Dozer	829	107	114	114		11/9/12
Crushing Plant	n/a	114	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	108	116		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	108	116		124	11/9/12
Haul truck CAT 793XQ	662	n/a	n/a	115	118	18/12/12
Excavator (PC4000)	EX837	116	n/a	115		18/12/12
Dozer D10T (1st gear)	505	107 (1st)	114 (1st)	113 109	128 121	18/12/12
Dozer D10T on stockpile (2nd gear) (1st gear)	505	107 (1st)	114 (1st)	118 109	124 113	6/2/13
Dozer D9T on stockpile (2nd gear) (1st gear)	501	107 (1st)	114 (1st)	119 113	122 118	6/2/13
Excavator (EX 5600)	570	121	n/a	116	119	8/8/13
Haul truck CAT 793XQ	660	115	n/a	116	119	8/8/13
Haul truck CAT 793XQ	661	115	n/a	116	118	8/8/13
Haul truck CAT 793XQ	662	115	n/a	115	118	8/8/13
Haul truck CAT 793XQ	663	115	n/a	116	119	8/8/13
Haul truck CAT 793XQ	664	115	n/a	114	117	8/8/13
Haul truck CAT 793XQ	665	115	n/a	115	117	8/8/13
Haul truck CAT 793XQ	666	115	n/a	115	117	8/8/13

Haul truck CAT 793XQ	667	115	n/a	116	119	8/8/13
Hitachi Excavator	543	116	n/a	115	119	8/8/13
Grader	849	n/a	n/a	110	112	8/8/13
Warrior 2400 crusher	n/a	n/a	n/a	117	117	8/8/13
Kleeman screen	MCR401	n/a	n/a	111	112	8/8/13

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

6 January 2014

Ref: 04035/5025

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: DECEMBER 2013 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Monday 16th and Tuesday 17th December, 2013 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, and C are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather station M2 which is located on top of the overburden emplacement. Temperature inversion strength is extrapolated from gauges with 80m vertical separation.

WCC Operations

The noise monitoring commenced with the daytime survey on Monday 16th December. Rain in the early evening caused disruptions to mining throughout the evening and night. The nighttime survey was, therefore, undertaken on Tuesday 17th December.

WCC operations on Monday dayshift 16th December and Tuesday night shift 17th December 2013 had the 5600 excavator in Strip 13 centre at RL300m, a 1900 excavator in Strip 13 centre at RL300m and a 1900 excavator in Strip 14 centre at RL340m. The 3600 excavator was not operating due to unplanned maintenance. Day and night shift had the two Strip 13 overburden truck fleets running to the in pit dump at RL330m and the Strip 14 truck fleet were dumping on the western (out of pit) dump at RL430m. There were no production delays due to noise impacts. The crushing plant and train load out operated to 3:30am with no trains loaded.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 16 December 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	11:30 am	38	35	n/a	1.8,78	Birds & insects (38), traffic (25), WCC (21)
B1 R7 83 Wadwells Lane/R8 Almawillee	1:22 pm	47	37	n/a	3.7,177	Birds & insects (47), domestic noise (30), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	10:25 am	45	37/36*	n/a	2.3,55	Birds & insects (45), tractor (30), WCC (26)
C R10 Meadholme/ R11 Glenara	11:51 am	38	39	n/a	1.4,134	Birds & insects (37), traffic (30), WCC inaudible
D R24 Hazeldene	12:12 pm	36	37	n/a	2.0,194	Birds & insects (33), traffic (33), WCC inaudible
E R12 Railway Cottage	9:15 am	37	38	n/a	2.6,11	Birds & insects (36), traffic (30), WCC inaudible
F R96 Talavera	10:28 am	33	38	n/a	2.3,55	Birds & insects (32), traffic (25), WCC (20)
G R97	11:40 am	34	35	n/a	0.6,67	Birds & insects (34), WCC (20)
H R98 Kyooma	12:08 pm	33	36	n/a	2.2,205	Birds & insects (33), WCC (<20)
I R57 Kurrara St	12:53 pm	45	35	n/a	2.9,181	Birds & insects (43), traffic (40), WCC inaudible
J R57 Coronation Ave	12:32 pm	48	35	n/a	1.7,204	Birds & insects (45), traffic (45), WCC inaudible
K R21 Alco Park	9:58 pm	37	39	n/a	2.2,22	Traffic (37), birds & insects (28), WCC inaudible
L R103	9:30 am	36	35	n/a	3.2,348	Traffic (34), birds & insects (31), WCC inaudible

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 17 December 2013 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m, Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	9:08 pm	n/a	37	35	+2.1,2.5,126	Traffic (36), birds & insects (30), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	9:28 pm	37	40	37	+1.0,2.8,113	Insects (39), WCC (31), traffic (30)
B2 R9Gedhurst/ R22 Mountain View	8:03 pm	n/a	34	37/36*	+1.7,3.6,120	Birds & insects (34), traffic (25), WCC inaudible
C R10 Meadholme/ R11 Glenara	10:32 pm	n/a	32	39	+0.6,3.4,106	Birds & insects (32), traffic (23), WCC faintly audible
D R24 Hazeldene	10:56 pm	30	40	37	+5.4,0.6,267	Birds & insects (38), traffic (35), WCC (25)
E R12 Railway Cottage	10:45 pm	n/a	36	38	+4.2,1.1,223	Traffic (35), insects (29), WCC inaudible
F R96 Talavera	7:06 pm	n/a	32	37	Lapse,5.6,143	Birds & insects (32), WCC inaudible
G R97	8:18 pm	n/a	36	35	+1.4,3.6,120	Insects (36), traffic (24), WCC inaudible
H R98 Kyooma	8:44 pm	n/a	29	36	+2.0,3.4,120	Birds & insects (29), WCC inaudible
I R57 Kurrara St	9:30 pm	n/a	40	35	+2.7,2.8,113	Frogs & insects (38), trains (35), traffic (30), WCC inaudible
J R57 Coronation Ave	9:11 pm	n/a	33	35	+2.1,2.2,138	Insects (31), traffic (29), WCC inaudible
K R21 Alco Park	7:37 pm	n/a	44	37	+0.4,5.0,140	Birds & insects (42), traffic (40), WCC inaudible
L R103	7:17 pm	n/a	42	35	Lapse,5.9,144	Birds & insects (39), trains (38), traffic (32), WCC inaudible

1. L1 (1 min) from mine noise only.
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels did not exceed the relevant noise criteria at any location during any monitoring period.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the L1 (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site.

For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-

minute calculated sound power level of 350m long sections of haul road. These values are typically 7-10 dB lower than the single pass-by level.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

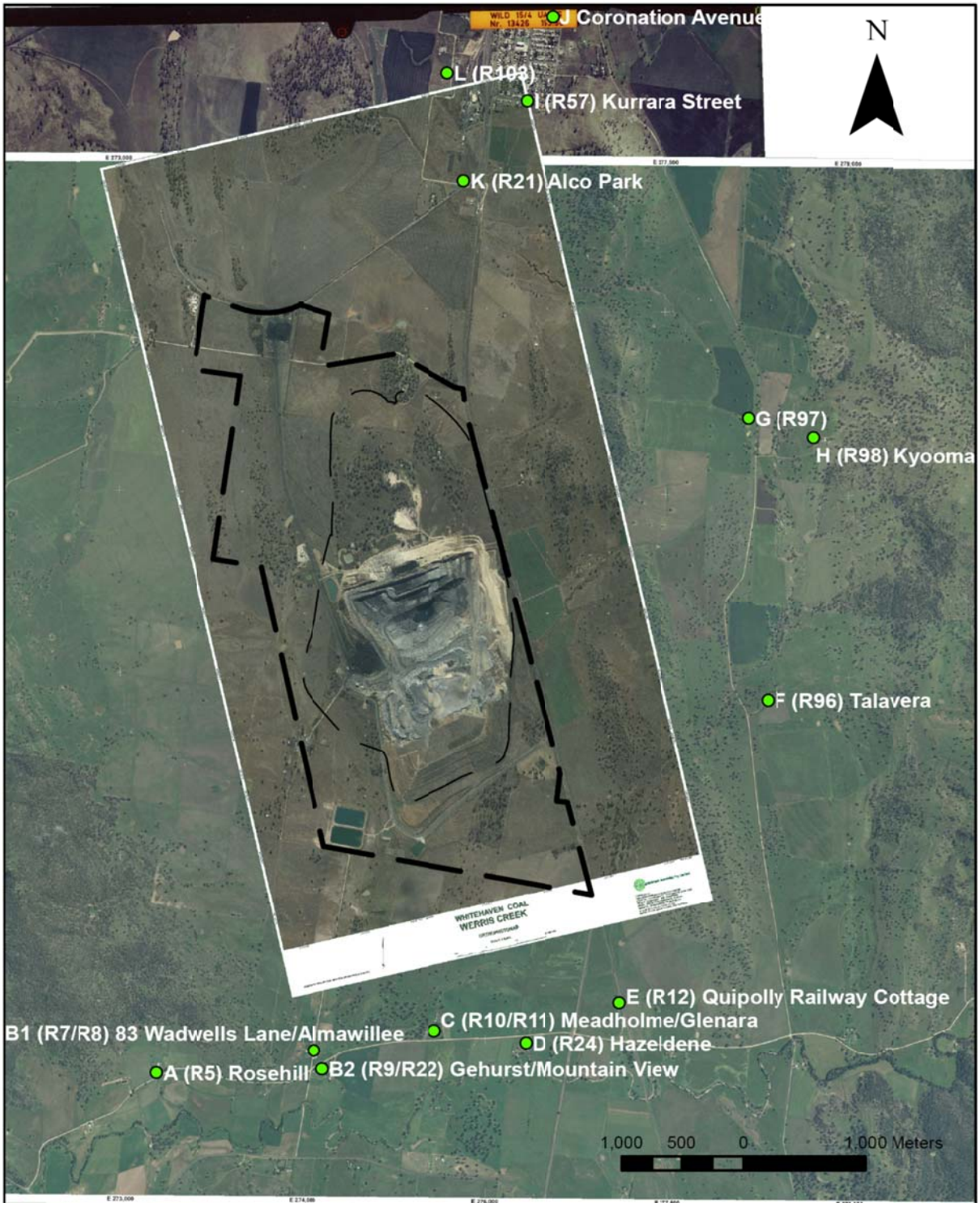
Author:

Ross Hodge
Acoustical Consultant

Review:

Neil Pennington
Acoustical Consultant

Appendix I



Attended Noise Monitoring Locations

Appendix II

Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R7	83 Wadwells Lane	37	37	45	35	40
R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		EA SWLs		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.	Leq	Lmax			
Haul truck CAT 785C (unattenuated)	608	108	116	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	108	116	115	118	8/8/13
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Haul truck CAT 785C (unattenuated)	609	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	108	116	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	108	116	120		11/9/12
Haul truck CAT 785C (unattenuated)	600	108	116	119		11/9/12
Haul truck CAT 785C (unattenuated)	613	108	116	122		8/8/13
Haul truck CAT 785C (unattenuated)	624	108	116	121		8/8/13
Water Cart	WA897	111	118	113		11/9/12
Scraper	SC882	118	121	113		11/9/12
Excavator (PC 3600)	EX551	116	120	115		11/9/12
Dozer	829	107	114	114		11/9/12
Crushing Plant	n/a	114	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	108	116		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	108	116		124	11/9/12
Haul truck CAT 793XQ	662	n/a	n/a	115	118	18/12/12
Excavator (PC4000)	EX837	116	n/a	115		18/12/12
Dozer D10T (1st gear)	505	107 (1st)	114 (1st)	113 109	128 121	18/12/12
Dozer D10T on stockpile (2nd gear) (1st gear)	505	107 (1st)	114 (1st)	118 109	124 113	6/2/13
Dozer D9T on stockpile (2nd gear) (1st gear)	501	107 (1st)	114 (1st)	119 113	122 118	6/2/13
Excavator (EX 5600)	570	121	n/a	116	119	8/8/13
Haul truck CAT 793XQ	660	115	n/a	116	119	8/8/13
Haul truck CAT 793XQ	661	115	n/a	116	118	8/8/13
Haul truck CAT 793XQ	662	115	n/a	115	118	8/8/13
Haul truck CAT 793XQ	663	115	n/a	116	119	8/8/13
Haul truck CAT 793XQ	664	115	n/a	114	117	8/8/13
Haul truck CAT 793XQ	665	115	n/a	115	117	8/8/13
Haul truck CAT 793XQ	666	115	n/a	115	117	8/8/13

Haul truck CAT 793XQ	667	115	n/a	116	119	8/8/13
Hitachi Excavator	543	116	n/a	115	119	8/8/13
Grader	849	n/a	n/a	110	112	8/8/13
Warrior 2400 crusher	n/a	n/a	n/a	117	117	8/8/13
Kleeman screen	MCR401	n/a	n/a	111	112	8/8/13

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

4 February 2014

Ref: 04035/5049

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: JANUARY 2014 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Tuesday 28th January, 2014 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, and C are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather station M2 which is located on top of the overburden emplacement. Temperature inversion strength is extrapolated from gauges with 80m vertical separation.

WCC Operations

WCC operations on Tuesday 28th January 2014 had the 5600 excavator in Strip 15 west at RL370m, a 1900 excavator in Strip 15 east at RL370m, a 1900 excavator in Strip 17 west at RL390m and a 1900 excavator in Strip 13 centre at RL310m. The 3600 excavator was not operating due to unplanned maintenance. The Strip 13 overburden truck fleet were running to the in pit dump at RL330m and the other truck fleets were running to the Western Out of Pit Dump at RL420m. There were no production delays due to noise impacts. The crushing plant and train load out operated to 3:30am with three trains loaded between 10:06pm and 12:49pm; 6:58pm and 8:54pm and 21:19 and 11:06pm.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 28 January 2014 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	2:15 pm	38	35	n/a	3.5,119	Traffic (37), birds & insects (30), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	2:35 pm	43	37	n/a	4.1,106	Birds & insects (41), domestic noise (39), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	1:10 pm	45	37/36*	n/a	3.7,122	Birds & insects (45), WCC (22)
C R10 Meadholme/ R11 Glenara	3:39 pm	37	39	n/a	2.9,103	Birds & insects (36), wind in trees (30), WCC inaudible
D R24 Hazeldene	3:58 pm	37	37	n/a	3.8,45	Traffic (36), birds & insects (32), WCC inaudible
E R12 Railway Cottage	4:40 pm	37	38	n/a	3.7,56	Birds & insects (36), traffic (30), WCC inaudible
F R96 Talavera	1:06 pm	33	38	n/a	3.7,122	Birds & insects (33), WCC inaudible
G R97	2:15 pm	32	35	n/a	3.5,119	Birds & insects (32), cattle (20), WCC faintly audible
H R98 Kyooma	4:15 pm	36	36	n/a	5.4,27	Birds & insects (34), wind (32), WCC inaudible
I R57 Kurrara St	3:05 pm	35	35	n/a	3.6,93	Birds & insects (34), traffic (28), WCC inaudible
J R57 Coronation Ave	2:47 pm	44	35	n/a	4.0,116	Birds & insects (44), traffic (35), WCC inaudible
K R21 Alco Park	5:26 pm	36	39	n/a	4.8,82	Traffic (36), birds & insects (25), WCC inaudible
L R103	5:07 pm	35	35	n/a	3.3,36	Traffic (32), birds & insects (32), WCC inaudible

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 28 January 2014 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m, Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	9:04 pm	n/a	33	35	Lapse,8.1,48	Birds & insects (30), traffic (29), pump (24), WCC faintly audible
B1 R7 83 Wadwells Lane/R8 Almawillee	9:24 pm	40	37	37	Lapse,7.0,46	Insects (36), WCC (29), traffic (23)
B2 R9Gedhurst/ R22 Mountain View	8:00 pm	30	34	37/36*	Lapse,5.7,44	Birds & insects (30), traffic (30), WCC (26)
C R10 Meadholme/ R11 Glenara	10:28 pm	n/a	37	39	Lapse,6.5,44	Traffic (37), insects (27), WCC faintly audible
D R24 Hazeldene	10:50 pm	25	38	37	Lapse,3.7,43	Traffic (35), insects (34), WCC (<20)
E R12 Railway Cottage	10:51 pm	n/a	36	38	Lapse,3.7,43	Traffic (35), insects (28), WCC inaudible
F R96 Talavera	7:10 pm	n/a	34	37	Lapse,5.1,43	Birds & insects (34), WCC faintly audible
G R97	8:21 pm	n/a	40	35	Lapse,5.4,46	Wind (40), WCC inaudible
H R98 Kyooma	8:55 pm	n/a	42	36	Lapse,8.1,48	Wind (42), insects (30), WCC inaudible
I R57 Kurrara St	9:40 pm	n/a	38	35	Lapse,6.8,45	Wind (37), frogs & insects (31), traffic (25), WCC inaudible
J R57 Coronation Ave	9:23 pm	n/a	40	35	Lapse,7.5,49	Wind (40), insects (30), WCC inaudible
K R21 Alco Park	7:35 pm	n/a	47	37	Lapse,5.6,43	Insects (46), traffic (40), WCC inaudible
L R103	7:15 pm	n/a	39	35	Lapse,5.9,144	Trains (37), traffic (34), insects (25), WCC inaudible

1. L1 (1 min) from mine noise only.
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels did not exceed the relevant noise criteria at any location during any monitoring period.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the L1 (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site.

For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-

minute calculated sound power level of 350m long sections of haul road. These values are typically 7-10 dB lower than the single pass-by level.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

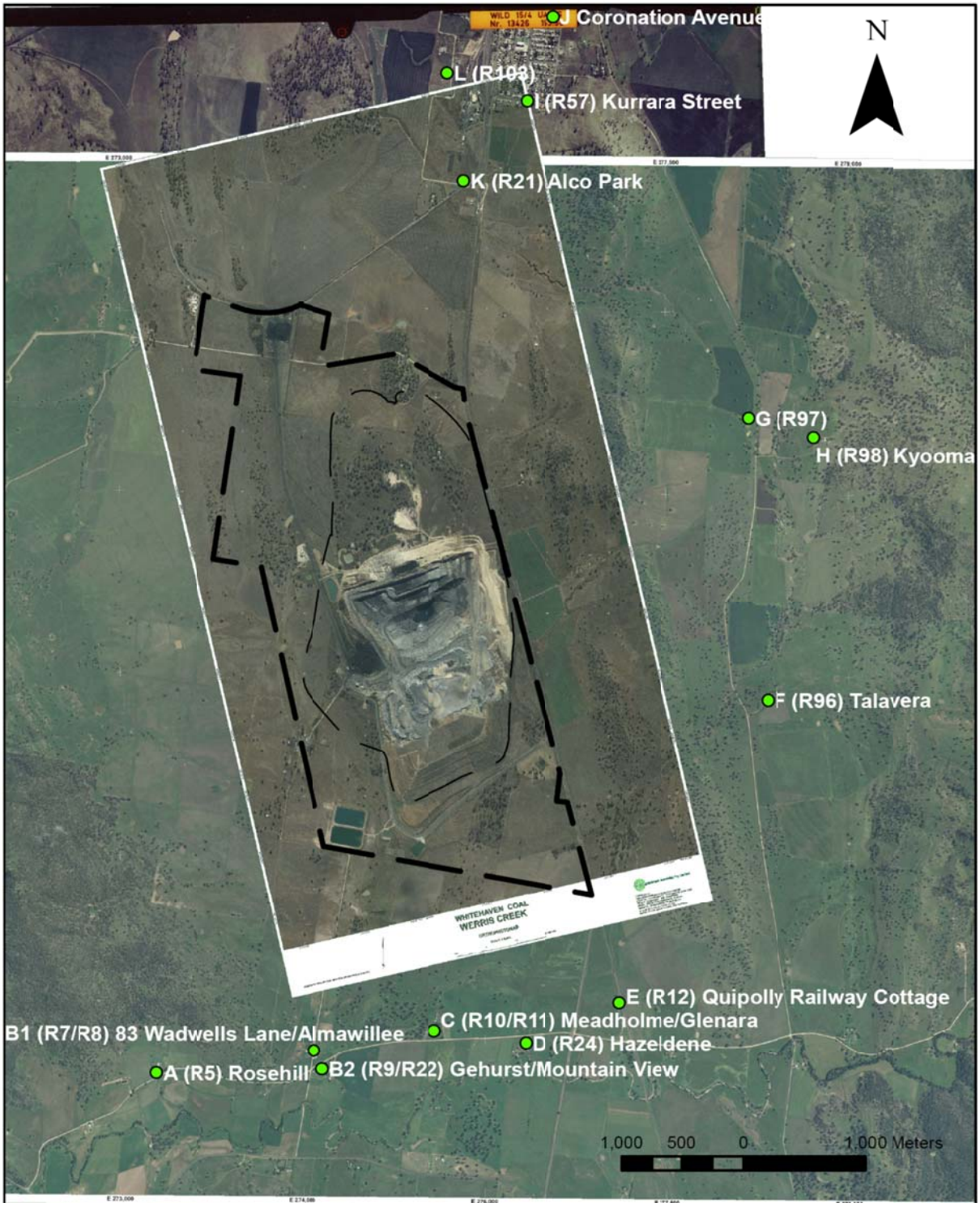
Author:

Ross Hodge
Acoustical Consultant

Review:

Neil Pennington
Acoustical Consultant

Appendix I



Attended Noise Monitoring Locations

Appendix II

Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R7	83 Wadwells Lane	37	37	45	35	40
R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		NMP SWL dB(A) Leq	Actual dB(A) Leq	Actual dB(A) Lmax	Date Measured
Type	No.				
Haul truck CAT 785C (unattenuated)	608	117.7	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	117.7	116	118	28/1/14
Haul truck CAT 785C (unattenuated)	614	117.7	119	121	28/1/14
Haul truck CAT 785C (unattenuated)	609	117.7	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	117.7	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	117.7	120		11/9/12
Haul truck CAT 785C (unattenuated)	612	117.7	120	122	28/1/14
Haul truck CAT 785C (unattenuated)	600	117.7	119		11/9/12
Haul truck CAT 785C (unattenuated)	613	117.7	122		8/8/13
Haul truck CAT 785C (unattenuated)	624	117.7	121		8/8/13
Haul truck CAT 789 (unattenuated)	875	117.7	119	121	28/1/14
Water Cart	WA897	113	113		11/9/12
Scraper	SC882	118	113		11/9/12
Excavator (PC 3600)	EX551	116	115		11/9/12
Dozer	829	118	114		11/9/12
Dozer (D10T)	832	118	113	118	28/1/14
Crushing Plant	n/a	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	117.7		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	117.7		124	11/9/12
Excavator (PC4000)	EX837	116	115		18/12/12
Dozer D10T (1^{st} gear)	505	118	113 109	128 121	18/12/12
Dozer D10T on stockpile (2^{nd} gear) (1^{st} gear)	505	118	118 109	124 113	6/2/13
Dozer D9T on stockpile (2^{nd} gear) (1^{st} gear)	501	118	119 113	122 118	6/2/13
Excavator (EX 5600)	570	121	116	119	28/1/14
Haul truck CAT 793XQ	660	115	116	119	28/1/14
Haul truck CAT 793XQ	661	115	115	118	28/1/14
Haul truck CAT 793XQ	662	115	116	119	28/1/14
Haul truck CAT 793XQ	663	115	116	119	8/8/13

Haul truck CAT 793XQ	664	115	114	117	8/8/13
Haul truck CAT 793XQ	665	115	115	118	28/1/14
Haul truck CAT 793XQ	666	115	116	118	28/1/14
Haul truck CAT 793XQ	667	115	115	118	28/1/14
Hitachi Excavator 1900	543	116	115	118	28/1/14
Grader	849	n/a	110	113	28/1/14
Warrior 2400 crusher	n/a	116	117	117	8/8/13
Kleeman screen	MCR401	116	111	112	8/8/13
Water Cart (Volvo)	863	113	114	118	28/1/14
Water Cart (Cat 773D)	869	113	119	123	28/1/14
Drill (Bucyrus)	524	116	107	-	28/1/14
Drill (Cat 6420)	526	116	108	-	28/1/14

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

19 February 2014

Ref: 04035/5069

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: FEBRUARY 2014 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Wednesday 12th February, 2014 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, and C are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather station M2 which is located on top of the overburden emplacement. Temperature inversion strength is extrapolated from gauges with 80m vertical separation.

WCC Operations

WCC operations on Wednesday 12th February 2014 had the 5600 excavator in Strip 13 centre at RL310m, a 3600 excavator in Strip 15 west at RL370m, a 1900 excavator in Strip 15 west at RL370m, a 1900 excavator in Strip 16 centre at RL390m and a 1900 excavator in Strip 13 east at RL310m. The Strip 13 east overburden truck fleet were running to the in pit dump at RL350m, the Strip 13 west overburden fleet were short hauling to another inpit dump at RL310m; while the other truck fleets were running to the Western Out of Pit Dump at RL445m on dayshift and RL430m on night shift. There were no production delays due to noise impacts. The crushing plant and train load out operated to 3:30am with one train loaded between 22:30 and 00:30.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 12 February 2014 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	2:08 pm	37	35	n/a	3.4,230	Birds (36), traffic (28), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	2:27 pm	32	37	n/a	3.9,145	Air conditioner (29), wind (27), birds (23), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	1:04 pm	40	37/36*	n/a	3.3,246	Birds (39), traffic (30), wind (30), WCC inaudible
C R10 Meadholme/ R11 Glenara	3:32 pm	39	39	n/a	2.9,254	Insects & birds (39), traffic (28), WCC inaudible
D R24 Hazeldene	4:55 pm	33	37	n/a	2.4,211	Traffic (29), wind (29), birds (25), WCC inaudible
E R12 Railway Cottage	1:03 pm	42	38	n/a	3.3,246	Traffic (40), birds (35), trains (32), WCC inaudible
F R96 Talavera	2:12 pm	38	38	n/a	2.1,147	Birds (34), traffic (32), planes (31), wind (29), WCC occasionally audible
G R97	3:20 pm	26	35	n/a	2.1,196	Wind (25), WCC (18)
H R98 Kyooma	3:48 pm	26	36	n/a	2.8,200	Birds (23), wind (20), WCC (20)
I R57 Kurrara St	4:35 pm	36	35	n/a	2.6,218	Traffic (34), insects (30), WCC inaudible
J R57 Coronation Ave	4:16 pm	34	35	n/a	2.4,242	Traffic (31), trains (27), insects (27), WCC inaudible
K R21 Alco Park	4:25 pm	33	39	n/a	1.8,229	Traffic (30), birds (30), WCC inaudible
L R103	4:03 pm	35	35	n/a	2.4,242	Train (34), wind (30), WCC inaudible

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 12 February 2014 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m, Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	9:09 pm	n/a	35	35	Lapse,3.3, 144	Insects (31), traffic (31), generator (25) WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	9:30 pm	n/a	35	37	Lapse,3.6,150	Insects (31), traffic (31). air conditioner (27), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	8:05pm	n/a	39	37/36*	Lapse,4.9,141	Birds (37), wind (32), domestic (27), traffic (27), WCC inaudible
C R10 Meadholme/ R11 Glenara	10:33 pm	n/a	35	39	Lapse,2.2,171	Traffic (33), insects (30), WCC inaudible
D R24 Hazeldene	10:50 pm	n/a	36	37	Lapse,2.4,192	Traffic (33), insects (33), WCC inaudible
E R12 Railway Cottage	7:11 pm	n/a	35	38	Lapse,5.4,137	Traffic (32), birds (30), trains (25), WCC inaudible
F R96 Talavera	8:22 pm	n/a	45	37	Lapse,5.5,143	Insects & birds (45), cows (30), WCC inaudible
G R97	9:35 pm	n/a	36	35	Lapse,3.8,145	Insects (35), wind (27), WCC inaudible
H R98 Kyooma	10:07 pm	n/a	37	36	Lapse,2.7,200	Insects (37), WCC inaudible
I R57 Kurrara St	10:57 pm	n/a	35	35	Lapse,2.4,202	Insects (31), Traffic (31), air conditioner (25), WCC inaudible
J R57 Coronation Ave	10:35 pm	n/a	32	35	Lapse,2.2,171	Traffic (28), Insects (26), trains (23), WCC (<20)
K R21 Alco Park	7:39 pm	n/a	42	37	Lapse,5.4,137	Traffic (38), birds (38), wind (33), WCC inaudible
L R103	7:18 pm	n/a	42	35	Lapse,7.2,139	Trains (42), wind (36), WCC inaudible

1. L1 (1 min) from mine noise only
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels did not exceed the relevant noise criteria at any location during any monitoring period.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the L1 (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site.

For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-

minute calculated sound power level of 350m long sections of haul road. These values are typically 7-10 dB lower than the single pass-by level.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

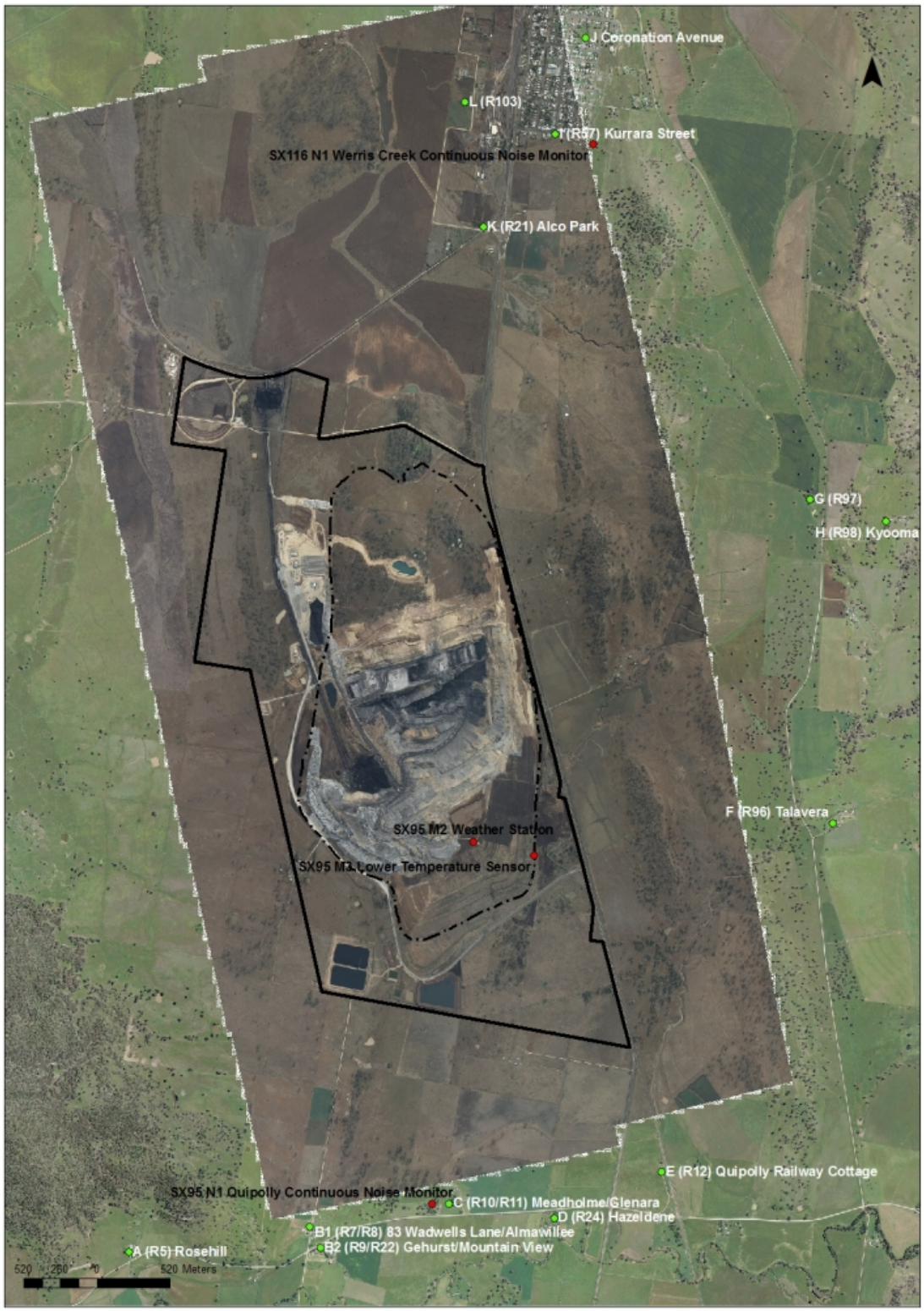
Author:

Ross Hodge
Acoustical Consultant

Review:

Neil Pennington
Acoustical Consultant

Appendix I



Attended Noise Monitoring Locations

Appendix II

Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
R7	83 Wadwells Lane	37	37	45	35	40
R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

Table 21: Properties with Private Agreements Noise Criteria

Location		Noise Works Criteria dB(A) Leq	Noise Acquisition Criteria dB(A) Leq
R8	"Almawillee"	40	45
R10	"Meadholme"	40	45
R11	"Glenara"	40	45
R20	"Tonsley Park"	40	45
R21	"Alco Park"	40	45
R98	"Kyooma"	40	45

Appendix III

Plant Sound Power Levels

Plant Item		NMP SWL dB(A) Leq	Actual dB(A) Leq	Actual dB(A) Lmax	Date Measured
Type	No.				
Haul truck CAT 785C (unattenuated)	608	117.7	120	122	17/7/12
Haul truck CAT 785C (attenuated)	608	117.7	116	118	28/1/14
Haul truck CAT 785C (unattenuated)	614	117.7	119	121	28/1/14
Haul truck CAT 785C (unattenuated)	609	117.7	120		11/9/12
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Haul truck CAT 785C (unattenuated)	624	117.7	121		8/8/13
Haul truck CAT 789 (unattenuated)	875	117.7	119	121	28/1/14
Water Cart	WA897	113	113		11/9/12
Scraper	SC882	118	113		11/9/12
Excavator (PC 3600)	EX551	116	115		11/9/12
Dozer	829	118	114		11/9/12
Dozer (D10T)	832	118	113	118	28/1/14
Crushing Plant	n/a	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	117.7		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	117.7		124	11/9/12
Excavator (PC4000)	EX837	116	115		18/12/12
Dozer D10T (1^{st} gear)	505	118	113 109	128 121	18/12/12
Dozer D10T on stockpile (2^{nd} gear) (1^{st} gear)	505	118	118 109	124 113	6/2/13
Dozer D9T on stockpile (2^{nd} gear) (1^{st} gear)	501	118	119 113	122 118	6/2/13
Excavator (EX 5600)	570	121	116	119	28/1/14
Haul truck CAT 793XQ	660	115	116	119	28/1/14
Haul truck CAT 793XQ	661	115	115	118	28/1/14
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Hitachi Excavator 1900	543	116	115	118	28/1/14
Grader	849	n/a	110	113	28/1/14
Warrior 2400 crusher	n/a	116	117	117	8/8/13
Kleeman screen	MCR401	116	111	112	8/8/13
Water Cart (Volvo)	863	113	114	118	28/1/14
Water Cart (Cat 773D)	869	113	119	123	28/1/14
Drill (Bucyrus)	524	116	107	-	28/1/14
Drill (Cat 6420)	526	116	108	-	28/1/14

*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

11 March 2014

Ref: 04035/5111

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: MARCH 2014 NOISE MONITORING RESULTS – WERRIS CREEK MINE

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 6th March, 2014 as required by the draft Noise Management Plan (NMP), Project Approval 10_0059 and the Environmental Protection Licence (EPL) 12290 and must be submitted to the Environment Protection Authority within 30 days of the completion of monitoring.

Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the WCC Noise Monitoring Programme as detailed below in **Table 1** (as adapted from the NMP). The monitoring locations and noise criteria for each are detailed in **Appendices I** and **II**.

Table 1
WCC Attended Noise Monitoring Program

Monitoring Point	Duration	ID	Receiver	Relevant Monitoring Requirements
A	15 minutes[1]	R5	Rosehill	PA10_0059 Private Property outside NMZ
B1	60 minutes[2]	R7	83 Wadwells Lane	60 minutes as per EPL 12290
		R8*	Almawillee	Private Agreement
B2	60 minutes[2]	R9	Gedhurst	60 minutes as per EPL 12290
		R22	Mountain View	60 minutes as per EPL 12290
C	15 minutes[1]	R10*	Meadholme	Private Agreement
		R11*	Glenara	
D	60 minutes[2]	R24	Hazeldene	60 minutes as per EPL 12290
E	60 minutes[2]	R12	Quipolly Railway Cottage	60 minutes as per EPL 12290
F	60 minutes[2]	R96	Talavera	60 minutes as per EPL 12290
G	15 minutes[1]	R97		PA10_0059 Private Property outside NMZ
H	15 minutes[1]	R98*	Kyooma	Private Agreement
I	60 minutes[2]	R57	Kurrara Street[@]	60 minutes as per EPL 12290
J	15 minutes[1]		Coronation Avenue[@]	PA10_0059 Private Property outside NMZ
K	15 minutes[1]	R21*	Alco Park	Private Agreement
L	15 minutes[1]	R103		PA10_0059 Private Property outside NMZ

Notes accompanying the table are on the following page

* - WCC has a private agreement for noise impacts with these property owners

@ - Kurrara Street is representative of sensitive receptors in southern Werris Creek while Coronation Avenue is representative of sensitive receptors in central Werris Creek.

NMZ - Noise Management Zone of properties with project specific noise criteria between 35dB(A) and 40dB(A);

Note 1: For each monthly monitoring event a total of 15 minutes (per location) during the day period, and 15 (per location) during the evening or night period;

Note 2: For each monthly monitoring event a total of 60 minutes (per location) during the day period, and 60 minutes (per location) during the evening or night period.

Monitoring points B1, B2, and C are considered representative of multiple receivers because they are sufficiently close together that therefore noise monitoring at the monitoring points are acoustically representative of individual receivers in accordance with EPL 12290 Condition L4.6.

EPL 12290 Condition L4.6 indicates that noise monitoring be conducted;

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

EPL 12290 Condition L4.3 indicates that the relevant noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Temperature inversion conditions of up to 12°/100m and wind speeds greater than 2m/s at 10m above ground level; or
3. Temperature inversion conditions greater than 12°/100m.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (15 or 60 minutes) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

Measurement Analysis

The operational noise criteria for compliance with Condition L4.1 of EPL 12290 are based on a 15 minute Leq noise level. The procedures detailed in Condition M8.2 of EPL 12290 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Condition L4.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from WCC was audible Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from WCC is shown in the tables in bold type. Where noise from WCC is listed as faintly audible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise shown.

When no mine noise was audible at a monitoring location during a one hour survey, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below.

Meteorological data used in this report were supplied by the mine from their automatic weather station M2 which is located on top of the overburden emplacement. Temperature inversion strength is extrapolated from gauges with 80m vertical separation.

WCC Operations

WCC operations on Thursday 6th March 2014 had the 5600, 3600 and two 1900 excavators in Strip 13 between RL310m and RL330m and one 1900 excavator in Strip 15 west at RL370m. The Strip 13 overburden truck fleets were running to the in pit dump at RL350m and the Strip 15 truck fleet were running to the Western Out of Pit Dump at RL420m. One truck fleet was hauling coal from Strip 13 to the ROM Pad. There were no production delays due to noise impacts, however there was a delay waiting for a blast between 4pm and 5pm. The crushing plant and train load out operated to 3:30am with one train loaded between 8:57pm and 10:50pm.

Noise Compliance Assessment

The results of the noise measurements are shown below in **Tables 2** and **3**.

Table 2
WCC Noise Monitoring Results – 6 March 2014 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	1:56 pm	39	35	n/a	4.3,182	Birds & insects (37), traffic (34), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	2:17 pm	39	37	n/a	4.3,192	Domestic noise (35), birds & insects (34), traffic (32), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	12:50 pm	38	37/36*	n/a	3.3,189	Birds & insects (36), traffic (33), WCC inaudible
C R10 Meadholme/ R11 Glenara	3:21 pm	45	39	n/a	5.6,186	Wind in trees (44), birds & insects (38), WCC inaudible
D R24 Hazeldene	3:40 pm	37	37	n/a	6.5,174	Traffic (34), birds & insects (34), WCC inaudible
E R12 Railway Cottage	4:47 pm	40	38	n/a	6.9,162	Wind (37), birds (35), traffic (33), WCC inaudible
F R96 Talavera	3:42 pm	41	38	n/a	6.5,174	Wind (39), birds (36), WCC inaudible
G R97	3:22 pm	36	35	n/a	5.6,186	Wind (36), WCC inaudible
H R98 Kyooma	2:58 pm	44	36	n/a	5.2,197	Birds (43), wind (36), WCC inaudible
I R57 Kurrara St	1:28 pm	40	35	n/a	3.5,191	Traffic (36), trains (35), birds (33), WCC inaudible
J R57 Coronation Ave	2:33 pm	44	35	n/a	4.1,181	Trains (40), traffic (38), birds (33), WCC inaudible
K R21 Alco Park	5:13 pm	43	39	n/a	7.1,165	Traffic (43), birds & insects (32), WCC inaudible
L R103	4:49 pm	40	35	n/a	6.9,164	Trains (36), wind (36), birds & insects (30), WCC inaudible

* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

Table 3
WCC Noise Monitoring Results – 6 March 2014 (Evening/Night)

Location	Time	dB(A), L1 (1min)[1]	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m, Wind speed (m/s),dir^{O}	Identified Noise Sources
A R5 Rosehill	8:58 pm	n/a	33	35	Lapse,3.5,139	Generator (29), insects (28), traffic (28), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	9:18 pm	30	41	37	+1.1,1.6,145	Insects (41), WCC (26)
B2 R9Gedhurst/ R22 Mountain View	7:55 pm	n/a	34	37/36*	Lapse,2.4,128	Traffic (33), birds & insects (28), WCC faintly audible
C R10 Meadholme/ R11 Glenara	10:23 pm	23	34	39	+2.6,1.7,166	Traffic (31), insects (31), WCC (20)
D R24 Hazeldene	10:43 pm	22	44	37	+2.4,2.0,145	Insects (44), traffic (32), WCC (18)
E R12 Railway Cottage	10:39 pm	30	34	38	+2.4,2.0,146	Traffic (32), insects (29), WCC (22)
F R96 Talavera	9:34 pm	n/a	45	37	+1.7,1.4,154	Insects (45), traffic (25), WCC inaudible
G R97	9:02 pm	n/a	35	35	Lapse,3.5,139	Insects (35), WCC inaudible
H R98 Kyooma	8:36 pm	n/a	37	36	Lapse,2.7,164	Insects (37), WCC inaudible
I R57 Kurrara St	7:10 pm	n/a	36	35	Lapse,4.5,124	Insects (32), traffic (32), domestic noise (30), WCC inaudible
J R57 Coronation Ave	8:15 pm	n/a	33	35	Lapse,1.5,109	Traffic (30), insects (29), dogs (25), WCC inaudible
K R21 Alco Park	7:30 pm	n/a	45	37	Lapse,5.7,132	Insects (43), traffic (40), trains (25), WCC barely audible
L R103	7:11 pm	n/a	42	35	Lapse,6.3,135	Trains (42), birds & insects (31), WCC inaudible

1. L1 (1 min) from mine noise only
* Gedhurst noise criterion is 37dB(A) Leq while Mountain View noise criterion is 36 dB(A) Leq.

The results in Tables 2 and 3 indicate that, under the operational and atmospheric conditions at the time, the measured noise levels did not exceed the relevant noise criteria at any location during any monitoring period.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations. It must be noted, however, that the sleep disturbance criterion is to be measured near a bedroom window. As the internal layout of each residence is not known, to consider a worst case, this is assumed to be facing the operational noise monitoring location.

As shown in Table 3, during the night time measurement circuit the L1 (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

Plant Sound Power Levels

In keeping with the NMP, the sound power levels of the major noise producing plant and equipment operating on the WCC site is to be determined from sound pressure level measurements. The measurement programme is to be undertaken progressively to capture noise levels from all plant over the period of a year.

The results of the sound power level calculations to date are shown in **Appendix III**. The table in Appendix III lists SWL's for plant items as taken from those used in the noise modelling for the latest EA for WCM. The SWL's from the EA, therefore, represent a calculated Leq (15 minute) noise level. For mobile plant this calculation is based on the length of time each noise source representing a plant item(s) is at a particular location on the mine site.

For example the noise model includes a number of noise sources located at intervals along the various haul roads to approximate the haul fleet working throughout a 15 minute operational period. The SWL for the point source is calculated based on the length of time any truck is expected to be passing that location during the assessment period.

For mobile plant, the measured Leq noise levels in the table in Appendix III represent a single passby for each plant item whereas the values adopted in the EA (particularly for haul trucks) are for the 15-

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We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

Author:

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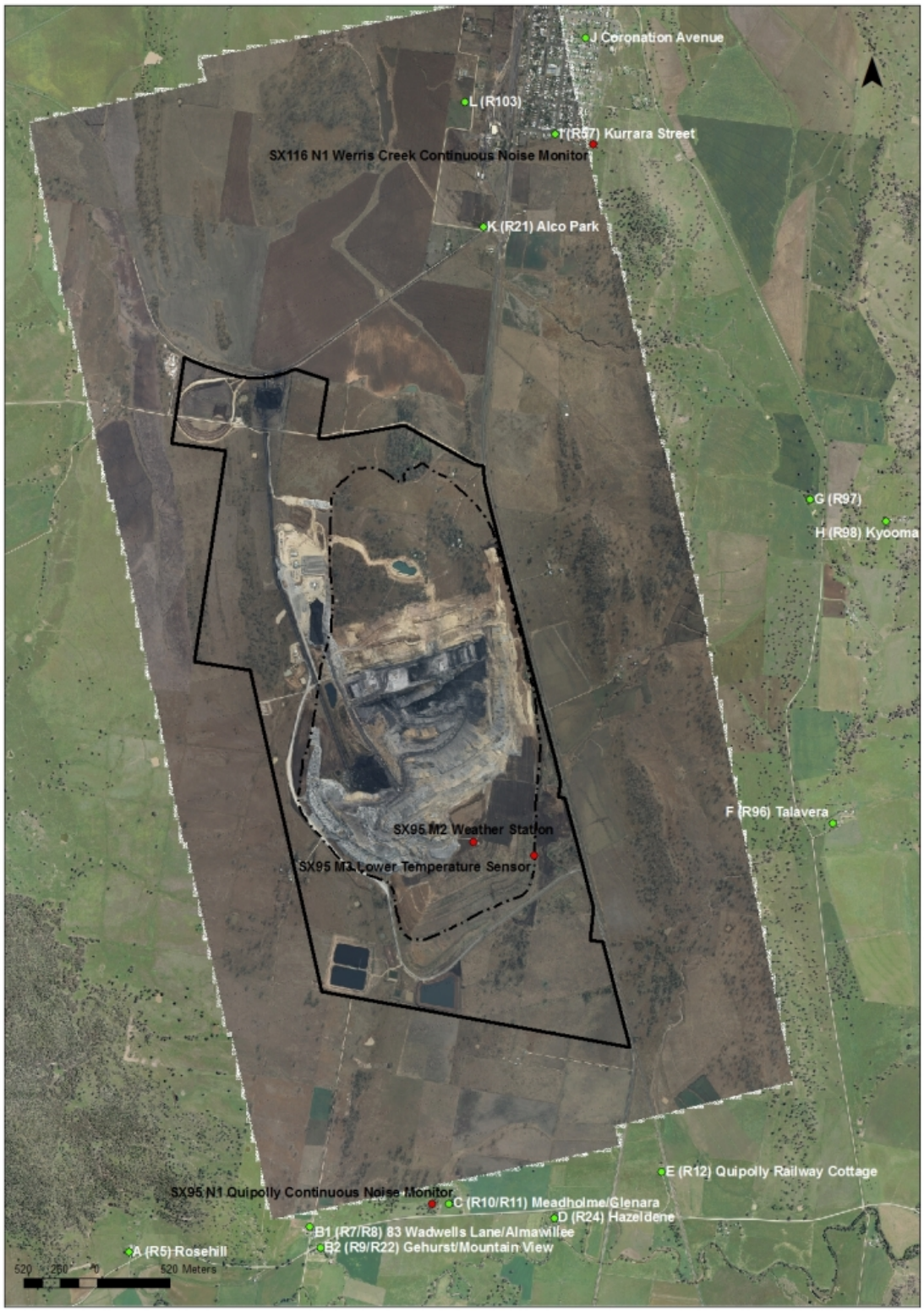
Appendix I



Attended Noise Monitoring Locations

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Noise Limits

LOM Project Revised Noise Criteria

Location		Day $L_{Aeq,15minute}$	Evening/Night $L_{Aeq,15minute}$	Night $L_{A1(1min)}$	Long Term $L_{Aeq,15minute}$	Acquisition $L_{Aeq,15minute}$
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R9	"Gedhurst"	37	37	45	35	40
R12	"Quipolly Railway Cottage"	38	38	45	35	40
R22	"Mountain View"	36	36	45	35	40
R24	"Hazeldene"	37	37	45	35	40
R96	"Talavera"#	38	37	45	35	40
All other privately-owned land		35	35	45	35	40

"Talavera" property was listed in the EA under its previous property name of "Millbank"

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Appendix III

Plant Sound Power Levels

Plant Item		NMP SWL dB(A) Leq	Actual dB(A) Leq	Actual dB(A) Lmax	Date Measured
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Dozer	829	118	114		11/9/12
Dozer (D10T)	832	118	113	118	28/1/14
Crushing Plant	n/a	116	118		11/9/12
Haul truck CAT 785C Horn pre attenuation	608	117.7		129	17/7/12
Haul truck Cat 785C Horn post attenuation	608	117.7		124	11/9/12
Excavator (PC4000)	EX837	116	115		18/12/12
Dozer D10T (1^{st} gear)	505	118	113 109	128 121	18/12/12
Dozer D10T on stockpile (2^{nd} gear) (1^{st} gear)	505	118	118 109	124 113	6/2/13
Dozer D9T on stockpile (2^{nd} gear) (1^{st} gear)	501	118	119 113	122 118	6/2/13
Excavator (EX 5600)	570	121	116	119	28/1/14
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Kleeman screen	MCR401	116	111	112	8/8/13
Water Cart (Volvo)	863	113	114	118	28/1/14
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*Leq noise level from vehicle pass by only (modelled levels in the EA for LOM are based on an Leq (15 min) for an attenuated haul truck.

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Report

Continuous Environmental Noise Monitoring

Werris Creek Coal

Whitehaven Coal

4 April, 2014
Rev 0 (Final)

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Continuous Environmental Noise Monitoring - Werris Creek Coal

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1. INTRODUCTION

Advitech Pty Limited (Advitech) was engaged by Werris Creek Coal (Whitehaven Coal Limited) to prepare quarterly assessment of noise monitoring results from continuous monitoring systems located in the receiving environment adjacent to the Werris Creek Coal mine.

It should be noted that this report was prepared by Advitech Pty Limited for Whitehaven Coal ("the customer") in accordance with the scope of work and specific requirements agreed between Advitech and the customer. This report was prepared with background information, terms of reference and assumptions agreed with the customer. The report is not intended for use by any other individual or organisation and as such, Advitech will not accept liability for use of the information contained in this report, other than that which was intended at the time of writing.

2. ENVIRONMENTAL MONITORING PROGRAM

Werris Creek Coal operates a network of SentineX continuous noise and meteorological monitoring systems in the receiving environment adjacent to the Werris Creek mine. The monitoring network includes:

- two trailer mounted (mobile) off-site noise monitoring systems, including:
  - SentineX95 (Quipolly);
  - SentineX116 (Werris Creek); and
- on-site meteorological monitoring (10m wind speed and direction, and direct measurement of temperate lapse).

2.1 Noise Monitoring and Reporting Objectives

The objective of continuous environmental noise assessment is to monitor potential mining noise impacts in the receiving environment adjacent to the Werris Creek mine, and determine if these impacts are consistent with the objectives of the NMP.

2.2 Noise Monitoring and Assessment Methodology

SentineX is a remote noise monitoring system which provides near real time data access via a dedicated website. The noise monitoring system records the following parameters:

- measured noise levels (L_{Aeq}, $L_{AeqLF(20\ to\ 630Hz)}$, and statistical levels L_{A1} to L_{A90}); and
- wind direction, wind speed, temperature, humidity and rainfall.

For the purposes of this assessment, analysis of monitoring results is undertaken to evaluate changes in day shift (6:00 to 17:00) and night shift (17:00 to 3:00) noise levels over time, and describes long term trends in terms of the following indicators:

- maximum $L_{A1,15minute}$ result during the day and night periods;
- $L_{Aeq,day}$ and $L_{Aeq,night}$ results;
- $L_{AeqLF,day}$ and $L_{AeqLF,night}$ results; and
- assessment background level (L_{A90}) results for the day and night assessment period.

Results for each calendar month are summarised to present the minimum, median and maximum observations for each of these descriptors, and reported on a quarterly basis. A summary of monitoring results for the period April 2012 to March 2014 is presented below.

3. RESULTS

3.1 April 2012 Results Summary

The continuous noise monitoring results summary for April 2012 is presented in **Table 1**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 1: Continuous monitoring results for April, 2012

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	39	42
		Median	61	61
		Maximum	82	80
	$L_{Aeq,period}$	Minimum	33	29
		Median	45	43
		Maximum	63	59
	$L_{AeqLF,period}$	Minimum	28	25
		Median	35	35
		Maximum	57	54
	$L_{A90,period}$	Minimum	25	17
		Median	37	34
		Maximum	56	41
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	50	52
		Median	72	57
		Maximum	82	64
	$L_{Aeq,period}$	Minimum	43	46
		Median	63	49
		Maximum	74	58
	$L_{AeqLF,period}$	Minimum	40	42
		Median	57	47
		Maximum	68	50
	$L_{A90,period}$	Minimum	41	29
		Median	54	46
		Maximum	63	52

3.2 May 2012 Results Summary

The continuous noise monitoring results summary for May 2012 is presented in **Table 2**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 2: Continuous monitoring results for May, 2012

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	59	43
		Median	68	53
		Maximum	75	60
	$L_{Aeq,period}$	Minimum	43	33
		Median	47	37
		Maximum	50	48
	$L_{AeqLF,period}$	Minimum	29	32
		Median	36	36
		Maximum	44	38
	$L_{A90,period}$	Minimum	27	21
		Median	36	32
		Maximum	43	46
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	52	43
		Median	56	52
		Maximum	76	74
	$L_{Aeq,period}$	Minimum	43	35
		Median	47	44
		Maximum	61	60
	$L_{AeqLF,period}$	Minimum	35	34
		Median	42	42
		Maximum	59	56
	$L_{A90,period}$	Minimum	30	23
		Median	35	34
		Maximum	49	39

3.3 June 2012 Results Summary

The continuous noise monitoring results summary for June 2012 is presented in **Table 3**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 3: Continuous monitoring results for June, 2012

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	59	43
		Median	69	52
		Maximum	79	58
	$L_{Aeq,period}$	Minimum	44	33
		Median	48	38
		Maximum	76	41
	$L_{AeqLF,period}$	Minimum	28	28
		Median	37	36
		Maximum	43	39
	$L_{A90,period}$	Minimum	31	22
		Median	37	31
		Maximum	75	35
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	50	44
		Median	54	54
		Maximum	57	57
	$L_{Aeq,period}$	Minimum	42	38
		Median	45	46
		Maximum	51	49
	$L_{AeqLF,period}$	Minimum	37	35
		Median	41	44
		Maximum	47	48
	$L_{A90,period}$	Minimum	35	33
		Median	39	39
		Maximum	44	43

3.4 July 2012 Results Summary

The continuous noise monitoring results summary for July 2012 is presented in **Table 4**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 4: Continuous monitoring results for July, 2012

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	58	34
		Median	72	54
		Maximum	77	62
	$L_{Aeq,period}$	Minimum	44	28
		Median	50	38
		Maximum	56	44
	$L_{AeqLF,period}$	Minimum	32	26
		Median	38	35
		Maximum	41	40
	$L_{A90,period}$	Minimum	30	22
		Median	37	31
		Maximum	44	40
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	51	44
		Median	54	53
		Maximum	59	57
	$L_{Aeq,period}$	Minimum	40	36
		Median	46	45
		Maximum	58	49
	$L_{AeqLF,period}$	Minimum	35	34
		Median	42	43
		Maximum	48	47
	$L_{A90,period}$	Minimum	33	31
		Median	39	40
		Maximum	45	43

3.5 August 2012 Results Summary

The continuous noise monitoring results summary for August 2012 is presented in **Table 5**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 5: Continuous monitoring results for August, 2012

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	54	43
		Median	64	54
		Maximum	76	68
	$L_{Aeq,period}$	Minimum	43	34
		Median	47	38
		Maximum	52	51
	$L_{AeqLF,period}$	Minimum	30	31
		Median	39	37
		Maximum	45	48
	$L_{A90,period}$	Minimum	31	23
		Median	37	32
		Maximum	44	44
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	52	44
		Median	55	54
		Maximum	72	59
	$L_{Aeq,period}$	Minimum	43	36
		Median	47	45
		Maximum	63	48
	$L_{AeqLF,period}$	Minimum	37	33
		Median	43	44
		Maximum	59	46
	$L_{A90,period}$	Minimum	35	30
		Median	40	37
		Maximum	56	42

3.6 September 2012 Results Summary

The continuous noise monitoring results summary for September 2012 is presented in **Table 6**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 6: Continuous monitoring results for September, 2012

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	51	44
		Median	62	57
		Maximum	71	72
	$L_{Aeq,period}$	Minimum	42	29
		Median	44	39
		Maximum	79	46
	$L_{AeqLF,period}$	Minimum	30	27
		Median	37	35
		Maximum	43	38
	$L_{A90,period}$	Minimum	28	18
		Median	35	33
		Maximum	79	38
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	51	47
		Median	54	52
		Maximum	58	55
	$L_{Aeq,period}$	Minimum	42	38
		Median	45	44
		Maximum	49	47
	$L_{AeqLF,period}$	Minimum	37	35
		Median	40	42
		Maximum	43	46
	$L_{A90,period}$	Minimum	34	29
		Median	38	37
		Maximum	41	42

3.7 October 2012 Results Summary

The continuous noise monitoring results summary for October 2012 is presented in **Table 7**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 7: Continuous monitoring results for October, 2012

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	53	40
		Median	65	51
		Maximum	74	71
	$L_{Aeq,period}$	Minimum	42	30
		Median	47	38
		Maximum	77	46
	$L_{AeqLF,period}$	Minimum	30	28
		Median	38	34
		Maximum	46	38
	$L_{A90,period}$	Minimum	31	24
		Median	36	31
		Maximum	77	34
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	50	44
		Median	55	52
		Maximum	83	57
	$L_{Aeq,period}$	Minimum	42	35
		Median	46	44
		Maximum	77	48
	$L_{AeqLF,period}$	Minimum	33	33
		Median	40	40
		Maximum	63	46
	$L_{A90,period}$	Minimum	34	29
		Median	38	37
		Maximum	53	41

3.8 November 2012 Results Summary

The continuous noise monitoring results summary for November 2012 is presented in **Table 8**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 8: Continuous monitoring results for November, 2012

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	52	42
		Median	68	67
		Maximum	73	74
	$L_{Aeq,period}$	Minimum	42	32
		Median	50	45
		Maximum	81	57
	$L_{AeqLF,period}$	Minimum	33	30
		Median	36	34
		Maximum	44	38
	$L_{A90,period}$	Minimum	32	24
		Median	36	34
		Maximum	81	53
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	51	40
		Median	56	53
		Maximum	74	61
	$L_{Aeq,period}$	Minimum	41	33
		Median	46	44
		Maximum	63	50
	$L_{AeqLF,period}$	Minimum	31	27
		Median	38	40
		Maximum	42	43
	$L_{A90,period}$	Minimum	32	25
		Median	37	39
		Maximum	40	45

3.9 December 2012 Results Summary

The continuous noise monitoring results summary for December 2012 is presented in **Table 9**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 9: Continuous monitoring results for December, 2012

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	50	40
		Median	67	48
		Maximum	87	73
	$L_{Aeq,period}$	Minimum	41	28
		Median	50	39
		Maximum	68	56
	$L_{AeqLF,period}$	Minimum	28	25
		Median	35	32
		Maximum	41	37
	$L_{A90,period}$	Minimum	33	21
		Median	39	34
		Maximum	54	47
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	45	44
		Median	56	51
		Maximum	69	61
	$L_{Aeq,period}$	Minimum	39	39
		Median	46	43
		Maximum	57	50
	$L_{AeqLF,period}$	Minimum	34	32
		Median	37	39
		Maximum	51	48
	$L_{A90,period}$	Minimum	33	32
		Median	36	38
		Maximum	44	42

3.10 January 2013 Results Summary

The continuous noise monitoring results summary for January 2013 is presented in **Table 10**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 10: Continuous monitoring results for January, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	57	44
		Median	66	62
		Maximum	76	69
	$L_{Aeq,period}$	Minimum	44	32
		Median	53	41
		Maximum	60	52
	$L_{AeqLF,period}$	Minimum	31	30
		Median	34	33
		Maximum	42	44
	$L_{A90,period}$	Minimum	35	24
		Median	46	31
		Maximum	55	46
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	49	45
		Median	54	53
		Maximum	67	61
	$L_{Aeq,period}$	Minimum	41	39
		Median	44	44
		Maximum	66	47
	$L_{AeqLF,period}$	Minimum	34	34
		Median	38	39
		Maximum	42	44
	$L_{A90,period}$	Minimum	33	35
		Median	35	37
		Maximum	40	40

3.11 February 2013 Results Summary

The continuous noise monitoring results summary for February 2013 is presented in **Table 11**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 11: Continuous monitoring results for February, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	57	44
		Median	65	48
		Maximum	71	73
	$L_{Aeq,period}$	Minimum	44	34
		Median	46	37
		Maximum	49	48
	$L_{AeqLF,period}$	Minimum	33	29
		Median	34	31
		Maximum	42	34
	$L_{A90,period}$	Minimum	32	28
		Median	34	31
		Maximum	37	41
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	49	47
		Median	55	51
		Maximum	62	54
	$L_{Aeq,period}$	Minimum	41	40
		Median	45	44
		Maximum	59	46
	$L_{AeqLF,period}$	Minimum	34	36
		Median	40	41
		Maximum	45	44
	$L_{A90,period}$	Minimum	33	30
		Median	36	37
		Maximum	42	41

3.12 March 2013 Results Summary

The continuous noise monitoring results summary for March 2013 is presented in **Table 12**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 12: Continuous monitoring results for March, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	56	41
		Median	66	48
		Maximum	73	68
	$L_{Aeq,period}$	Minimum	39	25
		Median	44	32
		Maximum	93	49
	$L_{AeqLF,period}$	Minimum	24	22
		Median	30	28
		Maximum	60	32
	$L_{A90,period}$	Minimum	26	17
		Median	30	27
		Maximum	54	36
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	52	45
		Median	56	51
		Maximum	81	56
	$L_{Aeq,period}$	Minimum	44	38
		Median	47	43
		Maximum	80	47
	$L_{AeqLF,period}$	Minimum	37	32
		Median	41	39
		Maximum	51	45
	$L_{A90,period}$	Minimum	35	30
		Median	38	38
		Maximum	79	43

3.13 April 2013 Results Summary

The continuous noise monitoring results summary for April 2013 is presented in **Table 13**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 13: Continuous monitoring results for April, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	58	43
		Median	66	48
		Maximum	78	64
	$L_{Aeq,period}$	Minimum	39	27
		Median	46	33
		Maximum	56	39
	$L_{AeqLF,period}$	Minimum	26	23
		Median	35	32
		Maximum	46	37
	$L_{A90,period}$	Minimum	26	19
		Median	32	26
		Maximum	42	34
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	51	48
		Median	56	52
		Maximum	67	56
	$L_{Aeq,period}$	Minimum	42	40
		Median	47	45
		Maximum	56	48
	$L_{AeqLF,period}$	Minimum	37	37
		Median	42	43
		Maximum	45	45
	$L_{A90,period}$	Minimum	35	31
		Median	39	39
		Maximum	43	43

3.14 May 2013 Results Summary

The continuous noise monitoring results summary for May 2013 is presented in **Table 14**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 14: Continuous monitoring results for May, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	56	39
		Median	73	53
		Maximum	87	60
	$L_{Aeq,period}$	Minimum	45	31
		Median	53	38
		Maximum	59	44
	$L_{AeqLF,period}$	Minimum	34	29
		Median	37	36
		Maximum	42	39
	$L_{A90,period}$	Minimum	34	24
		Median	39	32
		Maximum	45	40
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	52	45
		Median	58	51
		Maximum	80	55
	$L_{Aeq,period}$	Minimum	45	38
		Median	49	43
		Maximum	78	49
	$L_{AeqLF,period}$	Minimum	38	34
		Median	42	41
		Maximum	48	47
	$L_{A90,period}$	Minimum	36	33
		Median	40	37
		Maximum	78	42

3.15 June 2013 Results Summary

The continuous noise monitoring results summary for June 2013 is presented in **Table 15**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 15: Continuous monitoring results for June, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	66	44
		Median	73	54
		Maximum	79	68
	$L_{Aeq,period}$	Minimum	49	35
		Median	51	39
		Maximum	54	46
	$L_{AeqLF,period}$	Minimum	33	33
		Median	37	36
		Maximum	44	39
	$L_{A90,period}$	Minimum	35	27
		Median	39	30
		Maximum	46	40
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	55	47
		Median	62	54
		Maximum	79	56
	$L_{Aeq,period}$	Minimum	45	42
		Median	52	46
		Maximum	70	48
	$L_{AeqLF,period}$	Minimum	41	39
		Median	43	44
		Maximum	49	46
	$L_{A90,period}$	Minimum	35	33
		Median	40	39
		Maximum	45	41

3.16 July 2013 Results Summary

The continuous noise monitoring results summary for July 2013 is presented in **Table 16**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 16: Continuous monitoring results for July, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	55	44
		Median	70	54
		Maximum	79	57
	$L_{Aeq,period}$	Minimum	44	32
		Median	51	39
		Maximum	54	43
	$L_{AeqLF,period}$	Minimum	34	31
		Median	39	37
		Maximum	46	40
	$L_{A90,period}$	Minimum	35	22
		Median	39	32
		Maximum	47	39
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	55	51
		Median	62	54
		Maximum	80	59
	$L_{Aeq,period}$	Minimum	47	41
		Median	51	46
		Maximum	66	52
	$L_{AeqLF,period}$	Minimum	39	39
		Median	43	44
		Maximum	48	50
	$L_{A90,period}$	Minimum	36	32
		Median	41	39
		Maximum	45	45

3.17 August 2013 Results Summary

The continuous noise monitoring results summary for August 2013 is presented in **Table 17**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 17: Continuous monitoring results for August, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	54	47
		Median	65	53
		Maximum	78	71
	$L_{Aeq,period}$	Minimum	44	33
		Median	47	37
		Maximum	95	43
	$L_{AeqLF,period}$	Minimum	31	28
		Median	38	35
		Maximum	65	38
	$L_{A90,period}$	Minimum	31	18
		Median	37	30
		Maximum	45	34
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	49	45
		Median	57	53
		Maximum	75	57
	$L_{Aeq,period}$	Minimum	41	37
		Median	48	44
		Maximum	62	48
	$L_{AeqLF,period}$	Minimum	38	35
		Median	42	43
		Maximum	48	47
	$L_{A90,period}$	Minimum	34	29
		Median	39	36
		Maximum	46	40

3.18 September 2013 Results Summary

The continuous noise monitoring results summary for September 2013 is presented in **Table 18**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 18: Continuous monitoring results for September, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	53	38
		Median	63	54
		Maximum	68	76
	$L_{Aeq,period}$	Minimum	42	30
		Median	45	36
		Maximum	53	58
	$L_{AeqLF,period}$	Minimum	32	28
		Median	36	33
		Maximum	47	48
	$L_{A90,period}$	Minimum	31	22
		Median	36	29
		Maximum	45	50
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	50	41
		Median	54	51
		Maximum	65	62
	$L_{Aeq,period}$	Minimum	42	36
		Median	45	43
		Maximum	54	53
	$L_{AeqLF,period}$	Minimum	37	35
		Median	40	41
		Maximum	49	47
	$L_{A90,period}$	Minimum	34	33
		Median	37	36
		Maximum	48	44

3.19 October 2013 Results Summary

The continuous noise monitoring results summary for October 2013 is presented in **Table 19**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 19: Continuous monitoring results for October, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	50	39
		Median	66	53
		Maximum	84	70
	$L_{Aeq,period}$	Minimum	37	26
		Median	49	37
		Maximum	63	47
	$L_{AeqLF,period}$	Minimum	30	24
		Median	37	34
		Maximum	45	41
	$L_{A90,period}$	Minimum	29	18
		Median	36	29
		Maximum	45	37
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	50	44
		Median	56	50
		Maximum	66	54
	$L_{Aeq,period}$	Minimum	40	34
		Median	46	42
		Maximum	58	46
	$L_{AeqLF,period}$	Minimum	26	31
		Median	40	40
		Maximum	45	43
	$L_{A90,period}$	Minimum	30	25
		Median	36	37
		Maximum	42	41

3.20 November 2013 Results Summary

The continuous noise monitoring results summary for November 2013 is presented in **Table 20**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 20: Continuous monitoring results for November, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	59	45
		Median	69	62
		Maximum	79	76
	$L_{Aeq,period}$	Minimum	44	30
		Median	53	46
		Maximum	60	61
	$L_{AeqLF,period}$	Minimum	29	30
		Median	38	35
		Maximum	43	41
	$L_{A90,period}$	Minimum	32	23
		Median	38	43
		Maximum	56	54
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	47	46
		Median	55	51
		Maximum	79	57
	$L_{Aeq,period}$	Minimum	39	41
		Median	45	44
		Maximum	74	50
	$L_{AeqLF,period}$	Minimum	32	33
		Median	40	40
		Maximum	62	59
	$L_{A90,period}$	Minimum	31	35
		Median	37	39
		Maximum	48	45

3.21 December 2013 Results Summary

The continuous noise monitoring results summary for December 2013 is presented in **Table 21**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 21: Continuous monitoring results for December, 2013

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	60	42
		Median	74	61
		Maximum	86	80
	$L_{Aeq,period}$	Minimum	47	31
		Median	58	42
		Maximum	64	58
	$L_{AeqLF,period}$	Minimum	31	27
		Median	35	33
		Maximum	57	40
	$L_{A90,period}$	Minimum	36	21
		Median	45	32
		Maximum	59	49
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	47	44
		Median	54	49
		Maximum	78	57
	$L_{Aeq,period}$	Minimum	39	37
		Median	44	41
		Maximum	70	47
	$L_{AeqLF,period}$	Minimum	31	32
		Median	38	38
		Maximum	57	41
	$L_{A90,period}$	Minimum	31	32
		Median	36	35
		Maximum	40	44

3.22 January 2014 Results Summary

The continuous noise monitoring results summary for January 2014 is presented in **Table 22**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 22: Continuous monitoring results for January, 2014

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	59	44
		Median	70	53
		Maximum	81	72
	$L_{Aeq,period}$	Minimum	45	32
		Median	57	36
		Maximum	81	52
	$L_{AeqLF,period}$	Minimum	31	30
		Median	35	33
		Maximum	43	40
	$L_{A90,period}$	Minimum	34	27
		Median	50	30
		Maximum	81	43
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	49	40
		Median	53	48
		Maximum	86	52
	$L_{Aeq,period}$	Minimum	41	32
		Median	43	40
		Maximum	81	45
	$L_{AeqLF,period}$	Minimum	35	28
		Median	38	35
		Maximum	45	42
	$L_{A90,period}$	Minimum	31	27
		Median	34	34
		Maximum	80	40

3.23 February 2014 Results Summary

The continuous noise monitoring results summary for February 2014 is presented in **Table 23**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 23: Continuous monitoring results for February, 2014

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	51	43
		Median	71	54
		Maximum	85	75
	$L_{Aeq,period}$	Minimum	43	31
		Median	49	36
		Maximum	56	53
	$L_{AeqLF,period}$	Minimum	33	29
		Median	35	32
		Maximum	42	35
	$L_{A90,period}$	Minimum	31	24
		Median	35	29
		Maximum	40	34
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	45	41
		Median	54	48
		Maximum	97	70
	$L_{Aeq,period}$	Minimum	35	34
		Median	44	42
		Maximum	83	55
	$L_{AeqLF,period}$	Minimum	30	28
		Median	38	36
		Maximum	41	41
	$L_{A90,period}$	Minimum	29	27
		Median	35	38
		Maximum	39	40

3.24 March 2014 Results Summary

The continuous noise monitoring results summary for March 2014 is presented in **Table 24**. These results are calculated on the basis of available 15 minute monitoring data, following exclusion of results obtained under conditions to which the noise criteria do not apply (as defined in Condition L4.3 of EPL12290). It is noted that these results present analysis of raw monitoring data, and no evaluation of source contributions has been undertaken to validate whether the reported noise levels are representative of mining, or cumulative environmental noise impacts.

Table 24: Continuous monitoring results for March, 2014

Descriptor			Day (6:00 to 17:00)	Night (17:00 to 3:00)
SentineX95 Quipolly	$L_{A1,15minute}$	Minimum	63	51
		Median	74	63
		Maximum	80	77
	$L_{Aeq,period}$	Minimum	46	33
		Median	53	47
		Maximum	59	64
	$L_{AeqLF,period}$	Minimum	31	30
		Median	35	33
		Maximum	40	37
	$L_{A90,period}$	Minimum	28	23
		Median	36	29
		Maximum	56	58
SentineX116 Werris Creek	$L_{A1,15minute}$	Minimum	52	41
		Median	55	50
		Maximum	78	54
	$L_{Aeq,period}$	Minimum	42	34
		Median	46	42
		Maximum	73	46
	$L_{AeqLF,period}$	Minimum	36	27
		Median	39	39
		Maximum	43	45
	$L_{A90,period}$	Minimum	31	31
		Median	37	35
		Maximum	42	41

4. CONCLUSIONS

The assessment in this report seeks to provide a summary level analysis of results observed by continuous noise monitoring systems in the receiving environment adjacent to the Werris Creek Mine. While these data are filtered to exclude impacts associated with extraneous meteorological conditions, the report presents only the 'as measured' data, and does not attempt to validate mining noise contributions, or provide assessment of these impacts.

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/05/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind			Gust	Dir	Rain	Bar	Solar Rad	
	2m			10m			60m						Speed								
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/04/01 00:00:00	19.7	14.6	24.8	19.3	14.3	23.5	-99.0	-99.0	-99.0	57.6	44.0	71.6	1.9	0.0	5.5	8.5	174	0.0	1018.0	154.7	940.4
2013/04/02 00:00:00	20.3	13.8	26.4	20.0	14.0	25.5	-99.0	-99.0	-99.0	52.8	29.1	79.5	0.8	0.0	5.1	7.2	247	0.0	1017.8	196.0	819.6
2013/04/03 00:00:00	17.8	11.6	24.8	17.6	11.7	23.6	-99.0	-99.0	-99.0	60.9	43.8	78.0	3.2	0.0	9.9	12.5	170	0.0	1020.7	153.5	655.0
2013/04/04 00:00:00	18.0	12.4	25.3	17.6	12.5	24.2	-99.0	-99.0	-99.0	65.2	43.2	84.0	3.2	1.2	9.1	11.4	167	0.0	1026.7	187.2	822.2
2013/04/05 00:00:00	18.2	12.9	23.9	17.8	13.1	22.8	-99.0	-99.0	-99.0	59.1	39.5	77.5	2.8	0.1	7.1	10.9	146	0.0	1029.0	184.4	795.8
2013/04/06 00:00:00	17.7	11.8	23.4	17.4	12.2	22.5	-99.0	-99.0	-99.0	61.5	42.9	77.9	1.7	0.2	6.9	8.5	168	0.0	1026.8	142.8	691.6
2013/04/07 00:00:00	18.1	11.6	24.8	17.8	11.8	23.8	-99.0	-99.0	-99.0	60.7	38.3	83.3	1.3	0.0	5.3	8.5	191	0.0	1024.7	155.4	872.2
2013/04/08 00:00:00	18.3	11.0	25.4	18.1	10.9	24.0	-99.0	-99.0	-99.0	57.7	28.5	84.2	2.4	0.0	7.8	10.3	178	0.0	1025.3	190.3	709.3
2013/04/09 00:00:00	20.4	14.8	25.1	19.8	14.9	23.7	-99.0	-99.0	-99.0	55.2	39.7	72.9	2.9	0.7	8.2	10.3	176	0.0	1024.1	199.7	788.4
2013/04/10 00:00:00	18.2	11.1	25.7	18.0	11.3	24.7	-99.0	-99.0	-99.0	62.2	37.0	83.9	1.5	0.0	6.7	10.3	167	0.0	1024.0	175.8	778.9
2013/04/11 00:00:00	19.2	12.3	25.9	19.0	12.8	25.0	-99.0	-99.0	-99.0	53.8	28.2	76.9	1.5	0.1	6.7	8.1	165	0.0	1024.3	185.0	674.6
2013/04/12 00:00:00	19.4	13.4	25.7	19.2	13.6	24.7	-99.0	-99.0	-99.0	57.8	36.5	76.6	2.1	0.2	9.4	11.4	124	0.0	1024.5	140.7	840.5
2013/04/13 00:00:00	19.7	12.9	26.5	19.6	13.1	26.4	-99.0	-99.0	-99.0	52.7	33.3	71.2	1.3	0.0	4.5	5.6	162	0.0	1020.4	168.9	753.2
2013/04/14 00:00:00	20.1	13.6	26.4	20.0	13.8	25.9	-99.0	-99.0	-99.0	54.9	36.5	79.9	0.2	0.0	4.0	6.6	323	0.0	1016.0	160.0	693.2
2013/04/15 00:00:00	21.1	15.2	27.8	21.0	15.3	26.7	-99.0	-99.0	-99.0	48.6	31.6	66.8	1.3	0.0	4.4	6.6	328	0.0	1012.8	155.2	679.4
2013/04/16 00:00:00	18.6	14.5	25.5	18.5	14.7	24.3	-99.0	-99.0	-99.0	63.6	41.6	82.1	1.1	0.0	6.1	8.1	171	0.6	1014.3	116.2	800.5
2013/04/17 00:00:00	17.7	11.9	24.5	17.4	12.0	23.3	-99.0	-99.0	-99.0	66.3	35.5	85.5	0.9	0.2	5.0	7.6	206	0.2	1016.3	163.5	715.5
2013/04/18 00:00:00	18.4	12.1	24.7	18.1	12.4	23.8	-99.0	-99.0	-99.0	59.2	34.3	82.5	1.0	0.0	5.0	7.1	295	0.0	1016.0	165.1	692.4
2013/04/19 00:00:00	14.9	9.9	20.0	14.6	10.3	18.5	-99.0	-99.0	-99.0	51.5	29.3	72.5	1.5	0.1	7.6	9.7	189	0.0	1015.9	152.0	668.3
2013/04/20 00:00:00	12.8	7.3	17.6	12.3	8.0	16.3	-99.0	-99.0	-99.0	65.3	55.2	81.5	3.2	0.0	8.1	10.9	185	0.0	1016.0	120.6	781.6
2013/04/21 00:00:00	15.2	9.2	20.9	14.8	9.6	20.0	-99.0	-99.0	-99.0	57.4	30.9	82.7	0.9	0.0	4.2	5.8	184	0.0	1016.1	147.9	708.6
2013/04/22 00:00:00	18.5	13.2	24.1	18.2	13.4	23.3	-99.0	-99.0	-99.0	41.1	28.8	57.4	2.5	0.0	8.9	12.4	302	0.0	1013.4	150.7	636.2
2013/04/23 00:00:00	18.7	14.2	23.8	18.9	14.8	23.0	-99.0	-99.0	-99.0	43.6	32.1	55.2	1.3	0.0	4.8	6.9	219	0.0	1017.8	35.2	352.1
2013/04/24 00:00:00	16.6	13.1	20.4	17.2	14.3	20.7	-99.0	-99.0	-99.0	42.4	34.8	50.1	0.8	0.0	2.8	3.4	217	0.0	1021.2	0.0	0.0

Continued on next page

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad	
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						(%)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/04/25 00:00:00	15.5	8.3	22.3	15.4	8.8	21.5	-99.0	-99.0	-99.0	46.9	32.3	67.1	0.6	0.0	4.7	6.3	247	0.0	1023.6	151.9	587.8
2013/04/26 00:00:00	16.5	8.3	24.2	16.5	9.5	23.4	-99.0	-99.0	-99.0	45.7	29.0	63.9	0.4	0.0	3.7	6.6	286	0.0	1025.6	151.3	575.9
2013/04/27 00:00:00	18.9	10.9	26.1	18.8	11.7	25.0	-99.0	-99.0	-99.0	39.2	25.3	58.1	1.5	0.0	4.6	6.5	338	0.0	1023.5	151.4	577.3
2013/04/28 00:00:00	19.3	12.9	26.1	19.2	13.3	25.0	-99.0	-99.0	-99.0	40.7	28.6	51.6	2.2	0.0	5.6	7.6	346	0.0	1023.1	150.8	579.7
2013/04/29 00:00:00	19.9	12.2	27.7	19.9	13.0	26.6	-99.0	-99.0	-99.0	41.4	25.3	61.4	0.6	0.0	3.1	4.4	319	0.0	1024.9	145.1	561.4
2013/04/30 00:00:00	20.4	13.7	27.1	20.4	14.3	26.2	-99.0	-99.0	-99.0	43.4	29.3	58.6	0.2	0.0	3.4	5.2	270	0.0	1024.8	135.9	546.9

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/06/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad	
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/05/01 00:00:00	20.3	14.9	26.3	20.1	15.1	25.3	-99.0	-99.0	-99.0	54.8	38.1	69.4	2.3	0.0	6.6	11.4	342	0.0	1021.5	138.7	541.0
2013/05/02 00:00:00	15.8	10.1	20.3	15.6	10.3	19.3	-99.0	-99.0	-99.0	56.7	41.6	72.2	4.5	0.3	8.4	11.3	168	0.0	1023.9	106.5	555.7
2013/05/03 00:00:00	15.6	8.5	23.1	15.4	9.5	21.9	-99.0	-99.0	-99.0	55.2	36.6	77.0	0.6	0.0	3.7	6.0	284	0.0	1026.0	140.3	542.3
2013/05/04 00:00:00	17.1	10.7	25.5	17.1	10.3	24.4	-99.0	-99.0	-99.0	48.2	23.6	68.0	1.3	0.0	6.0	8.7	312	0.0	1022.9	134.0	536.9
2013/05/05 00:00:00	14.7	9.3	22.6	14.4	9.4	21.2	-99.0	-99.0	-99.0	62.9	33.3	83.8	2.5	0.4	6.0	7.1	185	0.0	1023.3	130.5	534.8
2013/05/06 00:00:00	17.0	11.3	21.9	16.5	11.1	21.1	-99.0	-99.0	-99.0	53.0	39.5	69.0	2.0	0.1	5.8	7.1	184	0.0	1024.7	155.8	551.1
2013/05/07 00:00:00	17.9	12.7	22.8	17.4	12.6	21.6	-99.0	-99.0	-99.0	52.8	36.8	71.0	2.2	0.3	6.4	8.5	171	0.0	1028.2	186.0	547.3
2013/05/08 00:00:00	16.1	9.2	22.4	15.8	8.8	21.1	-99.0	-99.0	-99.0	59.7	38.9	78.8	1.5	0.0	6.1	8.1	178	0.0	1030.4	116.2	642.4
2013/05/09 00:00:00	16.1	13.3	20.3	16.6	14.1	20.3	-99.0	-99.0	-99.0	56.5	44.3	65.0	1.7	0.5	4.3	5.0	155	0.0	1030.6	0.6	20.4
2013/05/10 00:00:00	18.7	13.7	23.6	18.4	12.5	23.0	-99.0	-99.0	-99.0	46.7	27.4	61.9	2.6	0.6	6.3	8.1	166	0.0	1030.0	183.0	513.2
2013/05/13 00:00:00	18.1	14.2	21.4	17.3	13.7	20.4	-99.0	-99.0	-99.0	63.4	44.6	86.9	2.9	0.1	5.8	8.5	342	1.4	1018.9	107.3	572.4
2013/05/14 00:00:00	14.3	9.5	17.6	13.8	9.5	16.7	-99.0	-99.0	-99.0	73.3	49.3	88.2	2.8	0.0	7.2	9.3	338	3.2	1016.1	89.0	663.2
2013/05/15 00:00:00	11.3	5.2	16.5	10.9	5.7	15.3	-99.0	-99.0	-99.0	63.1	49.0	78.1	2.9	0.0	5.3	7.3	357	0.0	1017.4	109.2	543.1
2013/05/16 00:00:00	12.8	10.3	17.9	12.3	10.0	16.4	-99.0	-99.0	-99.0	67.6	53.2	81.9	3.6	0.5	8.6	13.7	339	6.2	1016.3	78.2	604.9
2013/05/17 00:00:00	11.8	8.1	16.3	11.3	7.8	15.2	-99.0	-99.0	-99.0	66.0	44.5	84.1	3.6	0.8	7.5	10.8	312	0.0	1018.1	112.9	560.4
2013/05/18 00:00:00	10.2	5.4	14.9	9.8	4.8	13.4	-99.0	-99.0	-99.0	62.1	46.9	76.8	2.8	0.0	7.2	10.6	315	0.0	1019.3	89.3	549.2
2013/05/19 00:00:00	11.1	5.9	15.8	10.6	6.5	14.2	-99.0	-99.0	-99.0	56.7	43.4	69.1	2.8	0.0	6.6	9.3	306	0.0	1020.7	94.8	650.1
2013/05/20 00:00:00	9.6	2.7	16.6	9.4	2.9	15.3	-99.0	-99.0	-99.0	62.6	44.4	79.5	1.0	0.0	3.8	6.3	338	0.0	1021.6	107.6	466.2
2013/05/21 00:00:00	12.0	6.0	16.8	11.7	6.1	16.1	-99.0	-99.0	-99.0	60.4	47.0	75.0	2.5	0.0	5.2	6.9	355	0.0	1020.5	80.5	444.1
2013/05/22 00:00:00	11.2	9.8	14.0	10.8	9.2	13.3	-99.0	-99.0	-99.0	74.6	57.5	88.9	0.2	0.0	4.7	6.5	8	9.0	1014.2	23.4	179.0
2013/05/23 00:00:00	12.0	9.7	15.0	11.4	9.1	14.2	-99.0	-99.0	-99.0	81.3	67.8	90.0	3.3	0.0	7.2	9.3	181	0.2	1013.4	76.0	527.0
2013/05/24 00:00:00	13.4	11.6	16.9	13.0	11.3	15.8	-99.0	-99.0	-99.0	69.9	53.8	81.2	7.5	1.7	13.0	16.5	180	0.0	1018.1	69.6	508.5
2013/05/25 00:00:00	13.4	9.2	18.3	13.2	9.8	17.3	-99.0	-99.0	-99.0	65.4	47.2	82.8	3.4	0.0	10.2	13.6	169	0.0	1024.8	115.2	530.4
2013/05/26 00:00:00	12.0	5.5	19.2	11.9	5.9	18.7	-99.0	-99.0	-99.0	61.4	34.3	82.7	0.7	0.0	3.3	4.4	332	0.0	1027.5	117.0	481.5

Continued on next page

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad	
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						(%)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/05/27 00:00:00	12.1	-99.0	21.6	12.0	-99.0	21.0	-99.0	-99.0	-99.0	59.2	31.2	78.4	1.3	0.0	10.1	591.6	161	0.0	1029.0	115.6	478.8
2013/05/28 00:00:00	14.5	9.9	18.6	14.4	10.1	17.8	-99.0	-99.0	-99.0	68.9	57.7	78.6	0.9	0.2	4.8	6.4	166	0.0	1031.7	70.6	477.7
2013/05/29 00:00:00	16.7	13.3	21.9	16.5	13.4	20.5	-99.0	-99.0	-99.0	53.3	40.3	65.7	1.1	0.0	6.7	8.4	58	0.0	1031.4	102.9	583.6
2013/05/30 00:00:00	15.6	10.0	22.1	15.5	10.3	21.0	-99.0	-99.0	-99.0	57.3	40.1	74.8	0.1	0.0	3.9	4.7	57	0.0	1030.5	109.0	448.4
2013/05/31 00:00:00	16.6	12.1	22.6	16.4	12.0	21.5	-99.0	-99.0	-99.0	59.9	43.3	74.8	1.1	0.0	5.2	6.5	352	0.0	1028.9	105.0	505.7

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/07/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						(%)			(m/s)		(m/s)	(°)	(mm)	(hPa)	(W/m^2)	
2013/05/31 00:00:00	15.3	13.1	19.2	14.9	13.0	18.4	-99.0	-99.0	-99.0	66.7	50.4	83.9	3.3	1.2	6.9	8.5	353	3.2	1022.3	53.8	249.2
2013/06/02 00:00:00	12.2	3.9	15.6	12.1	3.2	14.7	-99.0	-99.0	-99.0	61.7	53.3	78.9	2.4	0.0	9.1	11.6	187	0.0	1023.6	156.0	619.8
2013/06/04 00:00:00	10.9	3.5	18.5	10.9	3.9	17.3	-99.0	-99.0	-99.0	65.6	44.6	83.9	0.3	0.0	3.2	5.3	280	0.0	1026.8	105.6	448.7
2013/06/05 00:00:00	12.9	8.0	17.9	12.9	8.3	16.9	-99.0	-99.0	-99.0	65.6	47.0	81.8	1.4	0.0	5.9	7.7	342	0.0	1027.4	89.0	603.7
2013/06/06 00:00:00	15.1	10.6	18.3	14.9	10.9	17.5	-99.0	-99.0	-99.0	68.1	62.1	75.7	2.1	0.1	4.0	5.5	343	0.0	1026.3	51.5	447.5
2013/06/07 00:00:00	15.7	13.3	18.0	15.4	13.2	17.4	-99.0	-99.0	-99.0	77.5	72.5	84.4	2.0	1.1	7.1	8.9	344	1.4	1025.8	35.3	358.8
2013/06/08 00:00:00	15.5	8.8	20.6	15.2	8.8	20.1	-99.0	-99.0	-99.0	62.4	40.1	80.2	1.8	0.9	4.2	6.0	161	0.0	1029.0	155.0	437.9
2013/06/09 00:00:00	14.7	10.4	20.4	14.7	10.3	20.1	-99.0	-99.0	-99.0	68.3	51.3	78.7	0.3	0.0	3.0	4.5	210	0.0	1027.5	92.1	446.7
2013/06/10 00:00:00	13.8	10.0	16.7	13.5	10.1	15.7	-99.0	-99.0	-99.0	77.8	65.4	88.2	2.2	0.0	6.1	7.9	1	3.8	1024.1	38.3	493.3
2013/06/11 00:00:00	15.1	7.6	19.7	14.8	7.2	18.7	-99.0	-99.0	-99.0	78.6	60.0	90.0	0.4	0.0	3.5	4.2	310	0.0	1021.4	137.4	541.1
2013/06/12 00:00:00	14.6	11.3	18.6	14.5	11.9	18.0	-99.0	-99.0	-99.0	82.3	74.8	87.0	2.9	0.0	12.6	18.6	5	12.8	1015.2	43.0	424.0
2013/06/15 00:00:00	11.5	7.4	14.8	11.0	6.9	14.0	-99.0	-99.0	-99.0	76.6	68.6	86.7	3.5	1.2	7.4	9.3	334	0.0	1016.1	113.8	597.2
2013/06/16 00:00:00	9.0	5.0	11.5	8.5	4.7	11.2	-99.0	-99.0	-99.0	81.5	71.9	89.5	0.7	0.0	3.2	5.0	235	0.0	1016.7	141.3	581.0
2013/06/17 00:00:00	8.0	2.5	98.6	7.7	2.7	96.3	-99.0	-99.0	-99.0	76.6	56.5	90.2	1.7	0.0	11.3	593.9	348	0.2	1014.4	103.4	431.3
2013/06/18 00:00:00	8.4	3.7	14.1	7.9	3.5	12.9	-99.0	-99.0	-99.0	68.5	40.4	87.2	1.7	0.0	6.0	7.7	329	0.0	1017.0	96.6	493.4
2013/06/19 00:00:00	8.1	3.1	13.4	7.9	3.4	12.5	-99.0	-99.0	-99.0	72.6	58.6	83.9	1.8	0.0	7.5	10.5	156	0.0	1023.0	75.0	503.3
2013/06/20 00:00:00	9.6	6.2	13.8	9.3	6.1	13.1	-99.0	-99.0	-99.0	72.9	60.3	81.9	1.9	0.0	5.3	6.5	171	0.0	1023.7	74.2	352.5
2013/06/21 00:00:00	10.4	6.6	16.6	10.1	6.8	15.2	-99.0	-99.0	-99.0	70.4	44.3	83.2	1.4	0.0	5.2	6.3	185	0.0	1021.5	97.1	489.2
2013/06/22 00:00:00	9.2	4.1	15.3	9.1	4.0	14.3	-99.0	-99.0	-99.0	69.3	43.7	85.5	2.4	0.0	6.2	7.5	173	0.0	1025.1	102.0	443.5
2013/06/23 00:00:00	9.3	4.4	16.3	9.1	4.6	15.0	-99.0	-99.0	-99.0	70.6	44.0	84.2	2.1	0.4	5.3	6.3	180	0.0	1027.0	105.5	435.1
2013/06/24 00:00:00	9.6	4.8	15.1	9.2	4.7	13.9	-99.0	-99.0	-99.0	70.2	44.3	87.1	2.1	0.0	7.5	10.4	310	0.8	1022.9	87.8	457.4
2013/06/25 00:00:00	8.0	4.8	11.8	7.4	5.0	11.0	-99.0	-99.0	-99.0	81.5	65.3	88.3	2.4	0.0	7.3	8.7	350	1.4	1018.6	46.7	284.8
2013/06/27 00:00:00	13.2	10.4	16.3	12.7	10.1	15.5	-99.0	-99.0	-99.0	85.8	73.6	90.0	2.4	0.0	5.0	6.8	166	17.8	1021.7	69.1	483.3
2013/06/28 00:00:00	14.4	10.6	17.8	14.0	10.2	17.0	-99.0	-99.0	-99.0	76.7	56.1	88.0	0.9	0.0	4.3	6.6	145	0.8	1023.2	117.8	535.5

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Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/06/29 00:00:00	12.3	10.4	15.0	12.1	10.0	14.2	-99.0	-99.0	-99.0	81.0	72.5	87.8	0.2	0.0	5.0	6.3	173	10.8	1024.2	49.3 507.7
2013/06/30 00:00:00	11.8	9.5	14.9	11.4	9.4	13.8	-99.0	-99.0	-99.0	81.0	67.2	89.1	4.2	1.0	7.8	9.8	180	0.0	1024.7	85.5 623.5

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/08/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind			Gust	Dir	Rain	Bar	Solar Rad	
	2m			10m			60m						Speed								
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/07/01 00:00:00	12.3	8.8	16.0	11.9	8.5	15.1	-99.0	-99.0	-99.0	77.6	67.7	85.0	4.6	0.0	9.4	11.7	182	0.0	1023.7	95.3	470.1
2013/07/02 00:00:00	12.6	8.5	18.0	12.4	8.5	17.2	-99.0	-99.0	-99.0	75.6	52.8	88.8	2.1	0.0	6.8	8.9	178	0.2	1024.0	106.9	449.0
2013/07/03 00:00:00	11.7	6.2	18.7	11.7	6.3	18.0	-99.0	-99.0	-99.0	68.8	40.7	89.4	0.9	0.0	4.3	5.2	342	0.0	1025.1	113.3	461.6
2013/07/04 00:00:00	14.4	8.4	19.5	14.3	9.1	18.7	-99.0	-99.0	-99.0	64.2	53.2	75.7	4.4	1.1	9.8	12.7	353	0.0	1020.7	83.4	492.7
2013/07/05 00:00:00	15.4	9.6	19.1	15.0	10.0	18.0	-99.0	-99.0	-99.0	55.3	37.6	70.5	4.1	0.6	10.7	13.5	321	0.0	1017.7	100.1	456.2
2013/07/06 00:00:00	9.2	4.1	14.1	9.0	4.6	13.0	-99.0	-99.0	-99.0	58.3	35.0	82.6	1.7	0.0	7.0	9.0	324	0.0	1024.4	112.4	471.6
2013/07/07 00:00:00	8.0	1.9	14.8	8.0	2.6	13.8	-99.0	-99.0	-99.0	60.0	41.2	79.2	0.9	0.0	4.6	6.9	202	0.0	1029.8	110.4	464.0
2013/07/08 00:00:00	8.4	2.5	15.2	8.4	2.8	14.1	-99.0	-99.0	-99.0	61.5	41.8	79.1	1.3	0.0	5.8	7.3	179	0.0	1032.7	111.5	465.9
2013/07/09 00:00:00	11.2	9.2	15.0	11.1	9.3	14.3	-99.0	-99.0	-99.0	58.5	45.0	66.6	2.8	0.5	5.8	8.2	148	0.0	1032.9	14.1	264.1
2013/07/10 00:00:00	11.6	9.2	16.0	11.2	8.9	15.2	-99.0	-99.0	-99.0	66.5	48.5	79.6	1.8	0.0	5.0	7.3	198	0.0	1032.9	52.6	349.5
2013/07/11 00:00:00	12.8	9.4	19.3	12.5	9.4	19.0	-99.0	-99.0	-99.0	70.6	46.5	82.1	1.3	0.1	4.3	5.2	199	0.0	1033.3	93.0	491.1
2013/07/12 00:00:00	11.7	7.7	15.9	11.6	7.7	15.0	-99.0	-99.0	-99.0	71.8	59.6	81.7	0.3	0.0	3.5	4.7	327	0.0	1031.5	61.2	388.3
2013/07/13 00:00:00	12.7	7.1	19.4	12.6	7.7	18.7	-99.0	-99.0	-99.0	71.3	49.0	86.7	0.6	0.0	3.0	4.4	189	0.0	1029.2	97.2	433.0
2013/07/14 00:00:00	13.5	9.0	19.2	13.4	8.9	17.9	-99.0	-99.0	-99.0	66.0	48.8	79.0	0.6	0.0	4.1	6.9	322	0.0	1027.9	97.9	466.6
2013/07/15 00:00:00	13.9	11.4	17.2	13.6	11.3	16.2	-99.0	-99.0	-99.0	74.8	62.1	83.3	1.5	0.0	5.5	7.1	355	1.6	1026.7	61.0	490.1
2013/07/16 00:00:00	13.6	11.7	15.8	13.3	11.4	15.4	-99.0	-99.0	-99.0	84.4	75.6	87.9	0.8	0.0	4.8	7.1	0	4.6	1026.8	47.2	311.3
2013/07/17 00:00:00	14.9	11.0	20.5	14.8	11.1	20.1	-99.0	-99.0	-99.0	74.0	55.4	86.6	1.2	0.0	4.4	6.1	354	0.0	1026.0	103.9	528.0
2013/07/18 00:00:00	15.2	11.0	19.7	15.2	10.8	18.9	-99.0	-99.0	-99.0	70.0	56.5	79.7	1.4	0.0	3.9	5.5	345	0.0	1023.8	93.8	478.3
2013/07/19 00:00:00	15.1	13.9	18.7	14.8	13.6	18.1	-99.0	-99.0	-99.0	76.1	62.6	87.9	4.7	0.0	9.9	13.3	2	20.4	1019.1	43.2	360.7
2013/07/20 00:00:00	13.4	9.6	16.3	13.0	9.3	15.8	-99.0	-99.0	-99.0	75.4	57.8	88.9	3.0	0.0	9.3	13.0	329	12.4	1014.5	68.6	541.1
2013/07/21 00:00:00	9.2	6.1	12.7	8.8	6.2	12.0	-99.0	-99.0	-99.0	65.3	48.5	79.1	2.9	1.4	5.4	7.7	345	0.0	1020.0	115.1	634.9
2013/07/22 00:00:00	9.0	3.2	14.0	8.9	3.9	13.1	-99.0	-99.0	-99.0	61.2	44.9	80.7	3.5	0.3	9.8	13.0	337	0.0	1023.0	101.8	584.4
2013/07/23 00:00:00	8.0	2.9	12.6	7.7	3.8	11.6	-99.0	-99.0	-99.0	66.9	55.2	76.1	2.3	0.2	7.7	10.5	315	0.0	1024.4	92.9	506.3
2013/07/24 00:00:00	8.7	2.7	14.1	8.4	3.1	13.1	-99.0	-99.0	-99.0	71.8	58.7	84.4	1.3	0.0	6.3	8.7	165	0.0	1028.2	98.3	687.4

Continued on next page

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad	
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($^\circ C$)						(%)			(m/s)		(m/s)	($^\circ$)	(mm)	(hPa)	(W/m^2)	
2013/07/25 00:00:00	10.2	4.0	16.8	10.2	4.4	15.8	-99.0	-99.0	-99.0	67.1	44.9	84.5	1.0	0.0	4.3	5.8	185	0.0	1029.9	117.0	484.6
2013/07/26 00:00:00	11.0	5.8	16.8	10.9	5.8	15.9	-99.0	-99.0	-99.0	64.7	42.7	81.5	1.1	0.0	4.0	5.7	343	0.0	1029.1	120.6	540.8
2013/07/27 00:00:00	11.8	3.5	19.0	12.0	4.7	18.8	-99.0	-99.0	-99.0	57.9	33.1	82.8	0.2	0.0	4.5	5.8	219	0.0	1030.1	121.0	498.5
2013/07/28 00:00:00	13.8	9.1	18.4	13.8	9.6	17.8	-99.0	-99.0	-99.0	58.6	36.7	73.3	1.7	0.0	4.7	6.6	0	0.0	1029.8	123.7	612.8
2013/07/29 00:00:00	14.2	9.9	18.6	14.1	10.7	17.6	-99.0	-99.0	-99.0	57.3	42.6	73.1	2.1	0.0	5.5	7.9	359	0.0	1026.4	82.8	485.3
2013/07/30 00:00:00	13.3	7.6	18.8	13.3	7.8	17.9	-99.0	-99.0	-99.0	60.4	42.0	74.0	1.0	0.0	4.9	6.4	210	0.0	1021.7	111.7	578.6
2013/07/31 00:00:00	11.8	8.1	16.9	11.6	8.3	15.8	-99.0	-99.0	-99.0	73.8	57.1	83.3	4.1	1.6	8.5	10.9	165	0.0	1022.9	106.8	607.7

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/09/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind			Gust	Dir	Rain	Bar	Solar Rad	
	2m			10m			60m						Speed								
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/08/01 00:00:00	12.1	6.3	19.0	12.0	6.7	18.3	-99.0	-99.0	-99.0	70.9	51.9	85.0	1.7	0.0	4.4	5.6	175	0.0	1022.3	124.4	515.7
2013/08/02 00:00:00	12.7	7.9	18.2	12.6	8.5	17.5	-99.0	-99.0	-99.0	68.6	47.3	84.5	2.5	0.0	7.0	8.8	319	0.0	1019.6	90.8	509.7
2013/08/03 00:00:00	11.3	6.1	16.4	11.0	6.4	15.7	-99.0	-99.0	-99.0	59.7	45.9	74.4	3.0	0.9	7.0	10.4	330	0.0	1019.7	120.4	594.6
2013/08/04 00:00:00	11.1	7.2	16.0	10.8	7.3	15.1	-99.0	-99.0	-99.0	63.0	52.4	74.1	2.9	0.0	7.4	10.3	323	0.0	1019.8	110.3	686.0
2013/08/05 00:00:00	10.4	3.0	15.9	10.3	3.4	15.1	-99.0	-99.0	-99.0	61.4	44.1	81.5	2.1	0.0	7.2	9.5	337	0.0	1021.6	131.6	524.4
2013/08/06 00:00:00	13.0	5.6	19.2	13.0	6.3	18.5	-99.0	-99.0	-99.0	55.3	39.5	74.8	4.9	0.0	10.5	13.8	349	0.0	1018.4	134.2	528.4
2013/08/07 00:00:00	15.5	12.5	19.8	15.2	12.6	19.2	-99.0	-99.0	-99.0	47.7	36.4	70.5	3.8	0.6	9.6	14.6	343	0.6	1013.9	97.4	606.6
2013/08/08 00:00:00	9.0	5.9	12.7	8.4	5.6	12.4	-99.0	-99.0	-99.0	69.7	57.4	81.6	4.9	1.5	9.5	13.7	304	0.0	1014.6	83.4	573.2
2013/08/09 00:00:00	9.7	3.0	15.6	9.3	2.8	14.9	-99.0	-99.0	-99.0	66.6	45.0	87.5	1.8	0.0	4.6	6.4	347	0.0	1020.1	136.9	582.5
2013/08/10 00:00:00	13.0	5.4	19.8	12.9	5.6	19.1	-99.0	-99.0	-99.0	53.1	35.2	74.7	1.9	0.0	4.6	6.1	349	0.0	1020.2	142.6	554.3
2013/08/11 00:00:00	14.2	6.8	22.0	14.3	7.4	21.4	-99.0	-99.0	-99.0	53.0	36.4	70.6	1.7	0.0	6.2	8.1	343	0.0	1019.1	132.6	558.6
2013/08/12 00:00:00	16.1	10.9	22.1	16.2	11.1	21.5	-99.0	-99.0	-99.0	50.2	34.9	70.4	3.3	0.3	10.5	14.0	312	0.0	1013.4	99.1	670.7
2013/08/13 00:00:00	11.6	3.2	18.5	11.6	3.4	17.5	-99.0	-99.0	-99.0	54.9	27.9	86.1	1.8	0.0	7.3	9.8	328	0.0	1018.9	153.3	585.1
2013/08/14 00:00:00	12.7	6.9	18.8	12.7	7.5	18.1	-99.0	-99.0	-99.0	42.9	27.1	60.0	2.4	0.0	7.0	9.3	349	0.0	1016.9	130.4	693.1
2013/08/15 00:00:00	10.9	5.5	16.0	10.7	5.5	15.0	-99.0	-99.0	-99.0	45.5	29.0	71.9	2.5	0.0	8.2	10.5	211	0.0	1021.5	155.2	601.6
2013/08/16 00:00:00	12.0	4.2	19.1	12.0	5.1	18.5	-99.0	-99.0	-99.0	39.7	25.0	51.9	1.9	0.0	6.0	9.0	1	0.0	1022.1	158.7	598.4
2013/08/17 00:00:00	14.0	10.9	16.0	13.8	11.3	15.5	-99.0	-99.0	-99.0	71.6	43.8	86.9	4.9	1.7	10.0	12.5	358	1.0	1016.5	41.0	392.7
2013/08/18 00:00:00	12.0	4.7	17.9	11.9	4.6	16.8	-99.0	-99.0	-99.0	61.3	38.0	87.0	2.6	0.4	6.3	8.5	356	0.2	1019.9	162.3	610.7
2013/08/19 00:00:00	12.7	7.0	20.2	12.4	7.7	18.9	-99.0	-99.0	-99.0	49.7	29.7	61.4	3.6	0.0	12.0	15.7	306	0.0	1016.0	146.7	650.8
2013/08/20 00:00:00	7.8	3.4	13.0	7.2	3.7	11.3	-99.0	-99.0	-99.0	52.8	34.7	71.6	3.2	0.0	8.2	12.1	266	0.0	1018.0	169.3	638.9
2013/08/21 00:00:00	7.3	-0.4	14.2	7.0	-0.2	13.3	-99.0	-99.0	-99.0	55.4	41.0	73.6	1.2	0.0	6.0	7.7	309	0.0	1019.5	156.9	636.8
2013/08/22 00:00:00	9.2	1.8	14.8	9.0	2.0	13.8	-99.0	-99.0	-99.0	54.2	39.6	75.5	3.5	0.4	8.4	12.9	339	0.0	1018.4	120.7	784.5
2013/08/23 00:00:00	12.3	7.3	16.8	11.7	6.9	15.9	-99.0	-99.0	-99.0	50.8	41.2	62.1	4.5	2.6	9.3	12.3	313	0.0	1018.6	114.9	607.5
2013/08/24 00:00:00	13.9	9.2	19.1	13.5	9.9	18.3	-99.0	-99.0	-99.0	59.5	44.8	71.1	1.8	0.0	6.0	7.3	323	0.0	1023.6	165.6	770.4

Continued on next page

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad	
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						(%)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/08/25 00:00:00	14.3	6.9	21.2	14.2	7.4	20.6	-99.0	-99.0	-99.0	56.6	33.2	79.8	1.7	0.0	5.2	9.2	338	0.0	1026.0	173.6	639.8
2013/08/26 00:00:00	14.9	7.2	21.7	14.7	7.4	20.5	-99.0	-99.0	-99.0	50.0	31.1	70.6	1.8	0.0	5.1	8.4	327	0.0	1025.3	175.6	655.0
2013/08/27 00:00:00	15.3	8.0	22.3	15.0	7.8	21.4	-99.0	-99.0	-99.0	49.6	31.4	71.0	1.7	0.0	7.0	9.0	326	0.0	1023.0	181.4	662.8
2013/08/28 00:00:00	16.2	9.0	23.0	16.3	9.8	22.2	-99.0	-99.0	-99.0	46.1	29.9	65.3	1.1	0.0	6.3	9.0	182	0.0	1022.8	176.0	660.2
2013/08/29 00:00:00	18.8	11.5	24.8	18.7	12.0	24.1	-99.0	-99.0	-99.0	41.5	28.5	58.4	2.9	0.1	7.0	8.7	26	0.0	1022.1	180.8	668.6
2013/08/30 00:00:00	19.9	14.9	24.8	19.7	15.7	24.3	-99.0	-99.0	-99.0	49.9	33.4	68.6	5.4	0.3	11.3	14.9	356	0.6	1019.5	175.6	663.6
2013/08/31 00:00:00	16.3	10.6	23.5	16.3	11.3	21.9	-99.0	-99.0	-99.0	50.3	29.6	72.5	1.1	0.0	6.6	9.3	320	0.0	1024.2	114.4	719.4

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/10/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad	
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						(%)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/09/01 00:00:00	16.9	10.2	24.9	16.9	10.5	24.4	-99.0	-99.0	-99.0	51.3	25.3	75.6	1.3	0.1	5.1	6.1	187	0.0	1027.9	190.8	698.5
2013/09/02 00:00:00	16.9	9.4	25.7	16.8	10.2	24.9	-99.0	-99.0	-99.0	48.6	22.5	72.1	1.4	0.0	6.3	8.0	193	0.0	1030.6	194.0	715.4
2013/09/03 00:00:00	17.5	10.2	25.6	17.3	10.1	24.4	-99.0	-99.0	-99.0	52.5	33.7	71.8	1.3	0.0	5.4	8.2	112	0.0	1032.4	192.4	698.0
2013/09/04 00:00:00	17.9	12.0	24.5	17.8	12.3	23.9	-99.0	-99.0	-99.0	47.1	28.2	67.6	1.1	0.0	8.1	9.3	13	0.0	1032.3	194.9	707.4
2013/09/05 00:00:00	17.3	10.6	23.7	17.2	11.7	22.8	-99.0	-99.0	-99.0	49.8	33.4	68.6	1.9	0.0	5.2	7.3	333	0.0	1030.7	194.1	701.7
2013/09/06 00:00:00	18.6	11.1	25.5	18.4	11.6	24.3	-99.0	-99.0	-99.0	48.3	33.6	65.7	1.4	0.0	4.3	6.8	338	0.0	1028.7	188.3	708.1
2013/09/07 00:00:00	20.3	12.1	28.0	20.5	13.2	27.0	-99.0	-99.0	-99.0	41.2	24.2	63.6	2.4	0.0	6.5	10.9	335	0.0	1026.2	199.1	728.3
2013/09/08 00:00:00	20.7	13.1	28.3	20.8	14.1	27.3	-99.0	-99.0	-99.0	38.0	25.6	55.3	1.3	0.0	6.6	8.5	331	0.0	1024.5	180.3	825.2
2013/09/09 00:00:00	20.8	11.3	27.9	20.5	12.2	26.8	-99.0	-99.0	-99.0	48.0	30.0	78.6	2.5	0.0	6.9	9.8	344	0.0	1020.3	197.1	757.8
2013/09/10 00:00:00	21.5	14.5	26.7	21.1	14.6	25.5	-99.0	-99.0	-99.0	40.7	31.1	56.3	5.4	0.5	12.5	16.5	345	0.0	1012.6	196.2	749.3
2013/09/11 00:00:00	17.7	11.6	24.4	17.5	12.1	22.8	-99.0	-99.0	-99.0	38.6	19.2	69.3	1.1	0.0	5.3	9.5	300	0.0	1014.8	217.9	771.9
2013/09/12 00:00:00	16.4	8.6	23.7	16.2	9.0	22.4	-99.0	-99.0	-99.0	38.6	25.9	52.3	1.1	0.0	5.6	8.4	256	0.0	1016.7	214.8	756.7
2013/09/13 00:00:00	16.8	11.3	21.7	16.3	10.8	20.8	-99.0	-99.0	-99.0	49.6	36.1	70.1	2.6	0.3	8.6	11.1	140	0.0	1017.1	185.8	735.2
2013/09/14 00:00:00	19.6	14.3	25.3	19.0	14.9	23.6	-99.0	-99.0	-99.0	47.8	25.9	70.3	4.6	1.0	11.4	15.4	329	0.0	1013.9	213.2	808.3
2013/09/15 00:00:00	17.2	9.5	23.4	16.9	10.3	21.8	-99.0	-99.0	-99.0	47.8	29.1	69.8	0.9	0.0	5.7	8.1	208	0.0	1017.9	205.2	779.9
2013/09/16 00:00:00	15.3	12.8	18.7	15.0	12.3	18.1	-99.0	-99.0	-99.0	74.4	56.6	87.1	2.2	0.0	9.6	14.0	13	34.2	1012.5	40.1	259.6
2013/09/17 00:00:00	14.4	11.9	18.3	13.9	11.8	17.1	-99.0	-99.0	-99.0	77.9	62.4	86.7	4.3	0.0	13.1	18.0	323	5.4	1007.2	124.3	924.5
2013/09/18 00:00:00	17.0	11.7	22.0	16.7	11.5	21.4	-99.0	-99.0	-99.0	60.3	40.0	83.3	5.1	2.4	10.5	14.4	338	0.0	1008.8	209.7	899.5
2013/09/19 00:00:00	16.0	10.8	20.8	15.5	11.1	19.6	-99.0	-99.0	-99.0	50.1	35.9	65.1	4.1	0.2	8.6	14.6	306	0.0	1010.7	223.5	762.1
2013/09/20 00:00:00	13.9	7.2	21.4	13.6	8.2	20.0	-99.0	-99.0	-99.0	51.7	27.2	77.1	2.6	0.0	10.2	14.1	301	0.0	1014.3	212.3	868.0
2013/09/21 00:00:00	14.0	6.2	20.6	13.8	6.7	19.7	-99.0	-99.0	-99.0	52.7	37.3	72.3	0.4	0.0	3.9	6.0	323	0.0	1016.5	210.4	719.4
2013/09/22 00:00:00	15.7	7.9	22.7	15.6	8.2	22.6	-99.0	-99.0	-99.0	50.2	31.4	72.8	0.6	0.0	3.3	5.5	342	0.0	1016.5	215.3	744.5
2013/09/23 00:00:00	23.2	19.4	28.2	23.9	20.6	28.4	-99.0	-99.0	-99.0	27.4	21.2	33.0	2.9	1.3	6.6	8.5	165	0.0	1012.8	37.5	258.2
2013/09/24 00:00:00	24.5	17.8	28.8	24.3	19.0	27.8	-99.0	-99.0	-99.0	30.1	21.6	40.1	5.5	0.0	11.6	15.4	305	0.0	1009.4	251.0	688.9

Continued on next page

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg Max
					($^\circ C$)						(%)			(m/s)		(m/s)	($^\circ$)	(mm)	(hPa)	(W/m^2)
2013/09/25 00:00:00	22.9	12.9	30.8	23.3	15.4	30.2	-99.0	-99.0	-99.0	35.1	22.5	56.3	1.2	0.0	5.6	7.6	353	0.0	1012.4	217.8 737.8
2013/09/26 00:00:00	22.3	12.2	32.1	22.2	12.8	30.7	-99.0	-99.0	-99.0	33.5	23.4	46.0	2.6	0.0	13.5	17.5	288	0.0	1013.5	216.0 717.1
2013/09/27 00:00:00	17.5	6.7	27.1	17.5	7.0	26.4	-99.0	-99.0	-99.0	34.1	15.2	60.2	1.5	0.1	5.2	7.6	202	0.0	1018.9	233.6 781.1
2013/09/28 00:00:00	20.3	13.5	28.8	20.1	14.7	27.1	-99.0	-99.0	-99.0	34.4	15.6	56.4	3.5	0.0	11.3	14.9	293	0.0	1015.9	226.5 767.1
2013/09/29 00:00:00	18.4	11.8	25.3	18.3	12.1	24.2	-99.0	-99.0	-99.0	35.2	22.4	52.1	1.1	0.0	5.2	7.9	202	0.0	1018.3	229.8 768.5
2013/09/30 00:00:00	20.7	10.3	28.1	20.6	10.6	27.3	-99.0	-99.0	-99.0	33.8	22.9	52.7	2.5	0.0	6.9	9.5	347	0.0	1018.3	232.5 777.4

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/11/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad	
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						(%)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/10/01 00:00:00	21.0	15.1	29.8	20.8	14.7	28.5	-99.0	-99.0	-99.0	57.7	31.6	84.2	5.4	0.1	17.0	22.2	353	10.4	1014.2	117.0	934.1
2013/10/02 00:00:00	17.7	12.2	23.8	17.2	12.3	22.9	-99.0	-99.0	-99.0	61.2	41.0	86.2	2.9	0.0	7.5	10.0	338	0.0	1016.6	228.9	995.1
2013/10/03 00:00:00	13.8	9.0	18.3	13.3	9.0	17.1	-99.0	-99.0	-99.0	51.2	32.8	67.9	3.1	0.0	11.3	13.7	255	0.2	1016.9	211.1	1090.4
2013/10/04 00:00:00	13.5	5.0	20.5	13.1	5.4	19.3	-99.0	-99.0	-99.0	50.1	31.2	80.5	2.1	0.0	6.8	9.5	196	0.0	1022.3	266.7	876.5
2013/10/05 00:00:00	18.0	8.5	26.5	18.2	9.1	25.6	-99.0	-99.0	-99.0	38.5	23.2	58.6	2.0	0.0	5.6	8.7	344	0.0	1018.5	241.2	953.3
2013/10/06 00:00:00	21.7	11.1	30.3	21.8	11.6	29.0	-99.0	-99.0	-99.0	31.2	17.3	54.6	2.6	0.0	7.2	9.8	333	0.0	1013.5	293.1	913.5
2013/10/07 00:00:00	20.3	12.2	28.0	20.2	12.5	26.2	-99.0	-99.0	-99.0	31.4	18.3	71.3	2.0	0.0	7.9	10.7	273	0.0	1011.1	270.0	938.8
2013/10/08 00:00:00	16.4	9.0	24.3	15.9	9.1	22.4	-99.0	-99.0	-99.0	53.0	26.7	83.8	2.4	0.0	7.4	9.8	219	0.0	1016.4	263.7	1012.5
2013/10/09 00:00:00	18.9	9.3	26.9	18.6	10.0	25.9	-99.0	-99.0	-99.0	44.8	24.9	75.6	1.2	0.0	4.7	7.9	339	0.0	1020.9	286.2	928.6
2013/10/10 00:00:00	28.5	25.1	30.7	28.1	25.6	30.1	-99.0	-99.0	-99.0	25.2	22.4	28.5	6.9	2.1	10.6	14.9	323	0.0	1011.1	265.9	887.9
2013/10/11 00:00:00	23.6	17.4	29.0	23.4	18.6	27.6	-99.0	-99.0	-99.0	28.4	16.7	44.0	1.6	0.4	10.0	14.0	204	0.0	1013.6	272.5	938.2
2013/10/12 00:00:00	23.4	13.3	31.8	23.1	13.5	30.5	-99.0	-99.0	-99.0	35.1	21.5	52.5	2.1	0.0	6.4	9.3	321	0.0	1014.5	285.1	927.7
2013/10/13 00:00:00	25.0	19.2	30.9	24.6	18.9	30.2	-99.0	-99.0	-99.0	43.5	24.0	55.0	7.9	4.9	15.5	22.8	333	0.4	1007.8	152.9	850.7
2013/10/14 00:00:00	15.3	10.4	21.3	14.3	9.8	19.7	-99.0	-99.0	-99.0	44.9	23.6	68.7	3.6	0.3	8.7	11.3	251	0.2	1017.3	253.7	842.4
2013/10/15 00:00:00	15.1	6.3	22.9	14.7	7.3	21.6	-99.0	-99.0	-99.0	38.1	23.0	59.1	0.8	0.0	4.2	6.5	199	0.0	1023.7	265.1	833.1
2013/10/16 00:00:00	19.4	9.6	27.1	19.0	10.2	25.9	-99.0	-99.0	-99.0	31.8	17.7	47.9	3.5	0.0	8.5	11.9	322	0.0	1020.5	267.0	859.6
2013/10/17 00:00:00	23.4	17.4	30.1	22.8	17.3	29.5	-99.0	-99.0	-99.0	35.9	15.3	54.5	5.6	3.0	14.3	19.4	328	0.0	1014.5	256.3	892.4
2013/10/18 00:00:00	17.9	13.4	23.4	17.3	13.8	21.6	-99.0	-99.0	-99.0	44.0	34.9	65.7	3.8	0.3	8.6	11.9	126	0.0	1023.4	198.3	911.4
2013/10/19 00:00:00	19.8	10.8	28.3	19.4	11.3	27.9	-99.0	-99.0	-99.0	44.6	21.7	69.2	1.4	0.1	6.9	8.7	87	0.0	1025.6	273.1	859.9
2013/10/20 00:00:00	22.8	14.7	29.9	22.4	15.4	29.0	-99.0	-99.0	-99.0	41.8	24.7	64.9	0.8	0.0	5.0	7.3	331	0.0	1021.8	267.5	835.5
2013/10/21 00:00:00	25.0	17.2	32.3	24.8	18.1	30.9	-99.0	-99.0	-99.0	37.2	26.3	51.0	2.6	0.3	5.8	9.3	313	0.0	1018.8	266.6	841.8
2013/10/22 00:00:00	27.3	17.6	34.0	26.9	18.6	32.3	-99.0	-99.0	-99.0	35.6	26.5	52.3	2.8	0.2	7.2	8.7	319	0.0	1015.5	251.4	853.3
2013/10/23 00:00:00	26.3	20.3	32.6	25.8	20.3	31.0	-99.0	-99.0	-99.0	38.4	28.4	64.4	4.1	0.1	11.9	15.7	304	0.0	1012.1	220.2	898.0
2013/10/24 00:00:00	19.3	12.1	24.8	18.5	12.9	22.6	-99.0	-99.0	-99.0	35.6	19.2	54.3	3.3	1.2	8.2	12.1	219	0.0	1017.5	272.7	869.1

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Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg Max
					($^\circ C$)						(%)			(m/s)		(m/s)	($^\circ$)	(mm)	(hPa)	(W/m^2)
2013/10/25 00:00:00	17.4	8.9	26.0	16.9	9.6	24.3	-99.0	-99.0	-99.0	29.3	13.8	43.6	1.5	0.5	6.1	9.8	194	0.0	1022.5	279.0 872.8
2013/10/26 00:00:00	18.4	10.0	26.0	18.0	11.4	24.5	-99.0	-99.0	-99.0	26.4	15.2	40.9	2.0	0.0	6.0	9.3	202	0.0	1022.5	279.4 977.6
2013/10/27 00:00:00	18.9	10.0	27.2	18.4	10.0	25.7	-99.0	-99.0	-99.0	33.8	15.3	64.7	1.1	0.0	5.0	8.4	196	0.0	1022.3	282.7 886.2
2013/10/28 00:00:00	21.3	12.8	29.4	20.9	12.5	28.0	-99.0	-99.0	-99.0	37.3	22.0	62.9	2.0	0.2	7.2	11.1	312	0.0	1018.2	234.9 858.3
2013/10/29 00:00:00	22.0	14.2	27.4	21.5	14.1	25.7	-99.0	-99.0	-99.0	46.9	24.1	70.9	4.0	2.6	14.7	18.6	321	0.0	1011.3	156.6 857.9
2013/10/30 00:00:00	17.9	11.6	24.5	17.1	11.7	22.9	-99.0	-99.0	-99.0	53.6	31.8	79.1	4.2	0.5	7.4	10.3	153	0.0	1018.4	275.9 942.2
2013/10/31 00:00:00	20.1	10.8	27.6	19.7	11.5	26.4	-99.0	-99.0	-99.0	35.1	16.3	64.3	0.7	0.0	5.4	7.6	150	0.0	1020.9	291.4 903.2

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/12/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad	
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/11/01 00:00:00	21.2	11.6	28.8	20.7	11.7	27.6	-99.0	-99.0	-99.0	41.5	23.3	77.8	0.9	0.2	5.1	9.8	189	0.0	1022.1	262.8	974.2
2013/11/02 00:00:00	24.5	17.1	31.5	24.1	17.1	30.2	-99.0	-99.0	-99.0	37.6	22.7	58.3	2.7	0.0	7.4	11.3	309	0.0	1019.7	246.6	918.4
2013/11/03 00:00:00	25.8	17.3	33.5	25.8	18.9	32.0	-99.0	-99.0	-99.0	28.2	16.8	45.4	3.8	0.2	11.3	16.8	263	0.0	1016.2	178.8	979.5
2013/11/04 00:00:00	17.3	10.9	24.4	16.4	10.9	22.3	-99.0	-99.0	-99.0	48.8	26.3	76.6	5.3	1.5	9.7	12.5	159	0.0	1021.3	292.4	884.0
2013/11/05 00:00:00	17.0	8.8	25.9	16.3	8.9	24.2	-99.0	-99.0	-99.0	44.9	27.4	63.8	3.4	0.4	9.9	11.7	142	0.0	1025.6	295.4	894.1
2013/11/06 00:00:00	20.5	10.7	29.2	20.0	10.7	28.1	-99.0	-99.0	-99.0	40.6	23.0	67.7	0.6	0.0	4.0	9.5	221	0.0	1021.8	293.6	887.7
2013/11/07 00:00:00	24.6	16.8	31.7	24.3	17.7	30.9	-99.0	-99.0	-99.0	34.8	23.2	53.6	2.1	0.1	5.4	9.1	328	0.0	1017.8	290.8	890.3
2013/11/08 00:00:00	27.4	19.1	34.5	26.9	19.6	33.0	-99.0	-99.0	-99.0	30.8	20.5	49.8	2.9	0.2	7.9	10.4	315	0.0	1013.9	290.9	885.4
2013/11/09 00:00:00	26.4	18.7	34.0	25.8	19.4	32.2	-99.0	-99.0	-99.0	38.0	26.1	51.8	3.5	0.2	12.2	16.7	275	0.0	1011.5	238.3	990.8
2013/11/10 00:00:00	20.2	13.8	29.3	19.5	13.8	26.9	-99.0	-99.0	-99.0	55.5	30.2	79.6	3.8	0.2	10.4	12.7	150	0.0	1013.8	238.9	1042.3
2013/11/11 00:00:00	18.6	13.6	27.5	17.9	13.3	25.3	-99.0	-99.0	-99.0	69.9	41.5	85.6	3.5	0.6	11.6	14.5	146	37.6	1015.0	220.7	1050.1
2013/11/12 00:00:00	20.0	15.7	25.7	19.7	15.3	25.7	-99.0	-99.0	-99.0	65.9	27.8	85.8	2.4	0.0	12.9	18.6	5	13.4	1014.3	178.5	1053.0
2013/11/13 00:00:00	21.5	12.2	29.6	21.3	12.4	28.3	-99.0	-99.0	-99.0	35.6	15.7	65.6	2.3	0.0	9.5	13.6	283	0.0	1016.0	311.4	933.2
2013/11/14 00:00:00	21.9	11.5	29.7	21.7	14.4	28.5	-99.0	-99.0	-99.0	30.3	17.0	62.4	1.6	0.0	6.8	9.5	267	0.0	1015.5	318.5	937.6
2013/11/15 00:00:00	21.2	12.0	28.6	20.8	12.1	27.4	-99.0	-99.0	-99.0	38.1	18.6	66.4	1.4	0.0	6.1	8.1	168	0.0	1014.6	313.7	936.6
2013/11/16 00:00:00	17.9	13.7	23.8	17.3	13.5	21.6	-99.0	-99.0	-99.0	61.7	44.5	80.3	4.0	1.0	10.4	13.0	150	0.0	1014.4	207.4	1083.4
2013/11/17 00:00:00	16.6	10.8	23.3	15.8	11.3	21.1	-99.0	-99.0	-99.0	61.1	39.0	81.9	5.3	0.4	11.9	15.0	153	0.0	1015.0	278.9	1147.0
2013/11/18 00:00:00	12.8	10.9	16.6	12.3	11.0	14.7	-99.0	-99.0	-99.0	81.2	62.7	88.8	2.2	0.0	8.9	10.3	165	24.2	1014.1	74.6	704.1
2013/11/19 00:00:00	17.9	10.4	25.1	17.5	10.2	24.0	-99.0	-99.0	-99.0	68.1	46.4	89.1	2.5	0.0	5.9	9.3	149	0.2	1012.9	277.4	1170.5
2013/11/20 00:00:00	22.7	13.8	30.3	22.5	14.5	29.0	-99.0	-99.0	-99.0	47.2	19.3	75.7	2.6	0.5	6.4	9.9	154	0.0	1012.2	324.0	1061.7
2013/11/21 00:00:00	25.9	17.4	33.5	25.6	18.0	33.2	-99.0	-99.0	-99.0	46.5	22.0	73.2	1.4	0.0	8.2	10.6	32	0.0	1011.0	297.7	986.4
2013/11/22 00:00:00	20.1	-99.0	24.5	19.7	-99.0	23.8	-99.0	-99.0	-99.0	68.9	53.7	88.0	4.1	0.0	10.9	13.6	25	32.8	1010.4	94.4	797.0
2013/11/23 00:00:00	19.6	17.0	23.3	19.4	17.0	22.4	-99.0	-99.0	-99.0	79.6	64.3	86.9	2.3	0.0	8.8	11.1	358	14.6	1008.1	140.1	937.1
2013/11/24 00:00:00	20.5	14.7	26.9	20.0	14.5	25.5	-99.0	-99.0	-99.0	58.1	28.0	89.7	1.8	0.0	8.3	12.2	258	0.0	1008.0	311.1	1040.1

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Record Time	Temperature									Humidity			Prevailing Wind			Gust	Dir	Rain	Bar	Solar Rad	
	2m			10m			60m						Speed								
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						(%)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/11/25 00:00:00	19.3	12.5	26.4	18.7	12.6	24.9	-99.0	-99.0	-99.0	54.1	32.2	77.4	3.4	0.2	12.7	15.7	155	0.0	1009.4	298.8	1103.5
2013/11/26 00:00:00	18.5	11.5	25.7	17.7	11.3	24.4	-99.0	-99.0	-99.0	53.3	29.3	73.1	5.2	1.5	8.2	10.8	148	0.0	1015.3	331.4	969.7
2013/11/27 00:00:00	20.1	10.0	28.4	19.7	9.9	27.2	-99.0	-99.0	-99.0	44.5	19.3	81.0	1.5	0.2	6.3	9.5	151	0.0	1017.5	335.5	976.4
2013/11/28 00:00:00	25.6	16.4	33.7	25.2	17.3	32.1	-99.0	-99.0	-99.0	35.5	21.5	58.0	2.7	0.0	6.5	9.3	327	0.0	1012.4	325.5	951.8
2013/11/29 00:00:00	20.3	14.3	27.3	20.1	14.4	27.4	-99.0	-99.0	-99.0	72.3	31.5	86.2	1.5	0.4	11.5	19.0	322	14.0	1009.9	58.9	396.9
2013/11/30 00:00:00	18.2	12.9	24.5	17.6	13.2	22.9	-99.0	-99.0	-99.0	61.5	42.8	81.6	4.7	1.4	10.0	12.1	144	0.0	1017.9	284.1	1093.3

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2014/01/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind			Gust	Dir	Rain	Bar	Solar Rad	
	2m			10m			60m						Speed								
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/12/01 00:00:00	18.6	11.4	25.6	18.0	11.5	24.4	-99.0	-99.0	-99.0	56.5	34.2	78.1	2.6	0.0	7.7	9.8	138	0.0	1024.0	327.5	1084.1
2013/12/02 00:00:00	20.2	12.8	27.8	19.7	12.6	26.4	-99.0	-99.0	-99.0	48.8	21.2	73.3	2.0	0.2	6.9	8.7	158	0.0	1021.6	327.6	1110.4
2013/12/03 00:00:00	22.8	12.8	31.1	22.6	13.3	30.8	-99.0	-99.0	-99.0	41.1	17.2	76.7	0.8	0.0	4.0	5.8	149	0.0	1016.5	346.3	995.3
2013/12/04 00:00:00	26.3	17.6	33.2	26.0	18.3	32.1	-99.0	-99.0	-99.0	37.1	22.1	58.8	4.2	1.2	9.9	14.1	326	0.4	1008.5	304.1	1060.1
2013/12/05 00:00:00	18.9	12.2	26.4	18.3	12.1	26.2	-99.0	-99.0	-99.0	60.2	34.9	87.1	5.5	1.0	13.7	17.9	279	12.0	1005.4	191.6	1090.3
2013/12/06 00:00:00	16.1	9.4	22.9	15.3	9.4	21.7	-99.0	-99.0	-99.0	40.1	22.9	61.8	2.2	0.3	8.2	10.9	238	0.0	1016.7	338.3	960.3
2013/12/07 00:00:00	19.3	8.9	27.8	19.2	9.7	26.5	-99.0	-99.0	-99.0	36.7	20.5	63.3	0.2	0.0	4.3	7.1	195	0.0	1020.7	335.8	1026.7
2013/12/08 00:00:00	24.4	15.0	31.6	24.0	15.3	31.0	-99.0	-99.0	-99.0	36.7	19.6	59.9	1.7	0.0	5.4	7.1	350	0.0	1017.9	338.8	962.8
2013/12/09 00:00:00	27.0	20.4	33.7	26.6	20.7	32.4	-99.0	-99.0	-99.0	38.5	24.3	70.9	3.7	0.0	9.2	12.9	326	0.4	1011.8	266.9	976.8
2013/12/10 00:00:00	25.1	19.9	33.3	24.8	19.5	32.2	-99.0	-99.0	-99.0	54.9	27.1	82.6	2.6	0.2	11.1	15.7	278	4.8	1009.0	214.2	995.4
2013/12/11 00:00:00	23.3	15.3	30.8	23.2	15.5	29.4	-99.0	-99.0	-99.0	32.2	17.4	53.9	1.9	0.0	7.9	11.3	222	0.0	1010.2	274.1	1062.6
2013/12/12 00:00:00	23.9	16.0	30.7	23.7	16.5	30.3	-99.0	-99.0	-99.0	39.0	23.4	56.2	2.0	0.1	4.9	9.0	141	0.0	1011.0	323.9	950.9
2013/12/13 00:00:00	26.1	18.5	33.0	25.8	19.1	32.2	-99.0	-99.0	-99.0	43.9	22.1	69.7	0.2	0.0	4.7	7.2	335	0.0	1012.5	291.7	1090.2
2013/12/14 00:00:00	26.2	19.9	33.4	25.8	20.2	32.5	-99.0	-99.0	-99.0	43.6	19.5	67.6	1.2	0.0	8.9	11.1	162	0.0	1014.1	315.9	1083.4
2013/12/15 00:00:00	24.2	16.0	31.9	23.6	16.2	30.6	-99.0	-99.0	-99.0	53.0	28.5	79.2	2.2	0.5	8.5	12.0	152	0.0	1016.7	313.3	1058.5
2013/12/16 00:00:00	22.6	16.3	31.0	22.1	16.4	29.2	-99.0	-99.0	-99.0	59.1	37.6	81.1	1.7	0.8	11.5	16.2	112	5.0	1018.9	253.1	1121.2
2013/12/17 00:00:00	23.3	16.2	30.0	22.9	16.4	29.1	-99.0	-99.0	-99.0	51.8	27.7	79.0	2.3	0.1	8.3	10.9	137	0.0	1020.8	335.4	980.7
2013/12/18 00:00:00	24.6	17.3	31.3	24.2	17.6	30.2	-99.0	-99.0	-99.0	45.2	24.6	71.6	2.5	0.0	8.8	11.7	155	0.0	1022.4	335.6	965.1
2013/12/19 00:00:00	25.9	17.1	33.8	25.5	17.3	32.8	-99.0	-99.0	-99.0	41.1	23.9	68.6	0.7	0.0	6.6	10.8	145	0.0	1021.8	337.3	957.3
2013/12/20 00:00:00	28.8	20.2	35.6	28.5	21.7	35.2	-99.0	-99.0	-99.0	33.3	24.4	47.3	0.6	0.0	6.4	8.2	300	0.0	1019.1	332.2	954.4
2013/12/21 00:00:00	30.7	24.5	37.2	30.2	25.1	36.4	-99.0	-99.0	-99.0	32.7	22.8	44.6	1.3	0.0	11.2	14.0	21	0.0	1016.1	326.2	938.6
2013/12/22 00:00:00	31.0	23.7	36.6	30.7	24.4	35.7	-99.0	-99.0	-99.0	36.3	25.8	57.1	2.3	0.1	6.7	9.3	325	0.0	1014.6	294.6	1003.1
2013/12/23 00:00:00	29.9	25.2	35.6	29.5	25.0	34.3	-99.0	-99.0	-99.0	35.0	26.6	45.6	5.2	0.9	10.9	15.6	327	0.0	1012.6	239.3	1119.2
2013/12/24 00:00:00	25.0	20.2	30.0	24.4	19.8	28.6	-99.0	-99.0	-99.0	57.5	37.9	72.2	3.7	0.6	8.0	9.7	185	0.0	1016.1	133.3	667.0

Continued on next page

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg Max
					($^\circ C$)						(%)			(m/s)		(m/s)	($^\circ$)	(mm)	(hPa)	(W/m^2)
2013/12/25 00:00:00	21.4	19.2	26.0	21.0	18.6	24.7	-99.0	-99.0	-99.0	72.8	58.7	85.3	0.5	0.2	6.0	7.9	71	2.2	1017.4	71.4 476.5
2013/12/26 00:00:00	23.8	19.0	30.8	23.2	18.7	30.2	-99.0	-99.0	-99.0	68.8	43.9	87.7	0.7	0.0	7.2	10.6	334	2.4	1013.1	229.4 1142.2
2013/12/27 00:00:00	25.1	15.9	33.2	24.7	16.0	32.4	-99.0	-99.0	-99.0	52.6	27.1	83.1	1.9	0.2	5.6	8.9	150	0.0	1011.2	320.3 1028.0
2013/12/28 00:00:00	27.4	18.8	35.7	26.9	18.9	34.6	-99.0	-99.0	-99.0	47.4	24.3	74.8	0.7	0.0	6.4	10.7	312	0.0	1010.0	319.4 1047.7
2013/12/29 00:00:00	28.1	18.7	39.8	27.7	19.0	38.0	-99.0	-99.0	-99.0	41.4	17.3	63.7	1.7	0.0	11.5	14.5	184	0.0	1009.0	329.6 1001.0
2013/12/30 00:00:00	23.8	14.8	32.1	23.2	14.9	30.9	-99.0	-99.0	-99.0	43.8	27.5	63.9	2.9	0.4	7.9	9.3	166	0.0	1012.5	312.5 1011.7
2013/12/31 00:00:00	26.1	17.2	34.6	25.8	17.6	33.4	-99.0	-99.0	-99.0	37.1	15.4	64.8	1.7	0.0	6.8	9.3	169	0.0	1012.3	337.5 994.2

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2014/02/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind			Gust	Dir	Rain	Bar	Solar Rad	
	2m			10m			60m						Speed								
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2014/01/01 00:00:00	27.1	17.6	34.7	26.6	17.0	33.8	-99.0	-99.0	-99.0	44.3	24.1	76.1	0.8	0.0	7.0	11.6	282	0.0	1013.5	305.6	964.5
2014/01/02 00:00:00	29.9	25.2	35.1	29.8	25.1	34.8	-99.0	-99.0	-99.0	34.6	21.9	45.9	1.9	0.1	9.5	12.5	315	0.0	1009.1	142.9	1017.7
2014/01/03 00:00:00	33.8	23.4	43.6	33.8	24.6	43.0	-99.0	-99.0	-99.0	31.5	14.7	44.0	3.2	0.0	15.0	20.2	304	0.0	1001.4	254.7	1066.0
2014/01/04 00:00:00	28.9	22.1	34.4	28.4	23.2	32.7	-99.0	-99.0	-99.0	33.8	14.0	59.6	2.8	1.0	8.9	12.9	220	0.0	1004.3	345.0	1004.5
2014/01/05 00:00:00	27.1	16.5	35.8	26.6	16.8	34.8	-99.0	-99.0	-99.0	33.3	13.8	73.9	1.9	0.1	8.2	11.9	276	0.0	1008.3	339.6	968.9
2014/01/06 00:00:00	26.3	17.3	33.4	25.9	18.5	31.6	-99.0	-99.0	-99.0	22.5	13.9	35.4	2.5	0.0	8.4	11.6	222	0.0	1011.0	344.5	984.6
2014/01/07 00:00:00	22.5	15.2	32.0	21.7	15.3	30.3	-99.0	-99.0	-99.0	46.6	23.4	66.6	3.5	0.6	10.6	14.8	133	0.0	1015.9	330.1	1119.8
2014/01/08 00:00:00	21.9	15.9	28.7	21.1	16.0	27.1	-99.0	-99.0	-99.0	53.8	38.5	69.4	4.1	1.5	8.9	11.4	114	0.0	1019.9	210.7	1194.9
2014/01/09 00:00:00	21.7	17.0	26.1	21.0	16.8	24.9	-99.0	-99.0	-99.0	51.9	40.1	63.3	2.6	0.0	5.5	7.6	114	0.0	1022.3	155.5	868.5
2014/01/10 00:00:00	23.4	17.9	30.5	22.7	18.1	28.8	-99.0	-99.0	-99.0	49.9	33.0	62.8	0.8	0.0	8.6	10.6	115	0.0	1021.2	241.6	1115.0
2014/01/11 00:00:00	26.5	20.1	33.4	25.9	20.3	32.3	-99.0	-99.0	-99.0	44.9	22.7	66.0	1.1	0.0	8.3	10.6	143	0.0	1018.8	279.3	1229.6
2014/01/12 00:00:00	28.8	22.1	36.5	28.2	22.1	34.5	-99.0	-99.0	-99.0	38.9	22.8	58.3	2.3	0.0	8.4	13.0	148	0.0	1017.0	313.8	1028.0
2014/01/13 00:00:00	26.4	18.7	34.4	25.6	18.8	32.8	-99.0	-99.0	-99.0	49.2	28.6	73.8	3.2	0.2	8.3	11.1	154	0.0	1019.0	326.7	971.3
2014/01/14 00:00:00	26.7	16.8	35.0	26.2	17.2	33.8	-99.0	-99.0	-99.0	44.6	23.8	72.9	2.0	0.0	8.5	11.2	139	0.0	1020.5	328.4	949.1
2014/01/15 00:00:00	28.7	20.0	37.1	28.1	20.1	36.1	-99.0	-99.0	-99.0	39.4	18.7	60.8	1.7	0.3	7.0	9.3	63	0.0	1021.1	325.9	948.9
2014/01/16 00:00:00	29.8	22.2	38.2	29.2	22.3	36.9	-99.0	-99.0	-99.0	40.6	20.1	63.8	1.3	0.2	7.6	10.9	80	0.0	1018.3	325.9	940.8
2014/01/17 00:00:00	30.1	22.9	37.5	29.7	23.0	36.4	-99.0	-99.0	-99.0	33.4	20.5	51.5	0.8	0.0	7.9	10.6	92	0.0	1015.1	317.3	961.5
2014/01/18 00:00:00	29.7	20.6	37.8	29.2	20.8	37.1	-99.0	-99.0	-99.0	30.9	16.3	55.7	1.3	0.0	8.7	11.9	14	0.0	1012.8	331.7	960.9
2014/01/19 00:00:00	30.0	23.0	37.4	29.5	23.6	36.6	-99.0	-99.0	-99.0	35.2	20.5	49.0	0.5	0.0	10.3	14.5	199	0.0	1009.2	311.0	926.9
2014/01/20 00:00:00	28.2	21.4	38.3	27.8	21.0	36.7	-99.0	-99.0	-99.0	48.6	23.3	70.7	1.4	0.3	10.5	21.4	202	2.8	1007.3	265.9	981.4
2014/01/21 00:00:00	28.9	20.6	38.0	28.5	20.8	37.4	-99.0	-99.0	-99.0	49.5	22.5	75.9	2.6	0.0	6.7	8.7	190	21.8	1007.6	259.3	913.8
2014/01/22 00:00:00	25.5	20.8	32.4	24.8	20.9	30.5	-99.0	-99.0	-99.0	59.1	40.2	82.5	5.5	2.0	10.2	14.1	143	0.0	1015.2	227.2	1077.5
2014/01/23 00:00:00	24.6	19.1	32.5	23.8	18.8	30.3	-99.0	-99.0	-99.0	52.8	33.7	66.6	2.2	0.4	9.2	11.3	95	0.0	1019.6	263.7	1077.6
2014/01/24 00:00:00	24.8	20.2	30.7	24.1	20.2	28.9	-99.0	-99.0	-99.0	55.1	37.9	83.3	3.3	0.3	9.3	13.0	324	1.2	1014.2	183.0	923.5

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Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad	
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2014/01/25 00:00:00	23.1	16.7	30.9	22.4	17.0	29.4	-99.0	-99.0	-99.0	56.9	29.2	82.7	3.1	0.3	9.2	11.5	169	0.2	1013.9	300.0	944.9
2014/01/26 00:00:00	21.6	14.4	29.1	20.8	14.5	27.1	-99.0	-99.0	-99.0	51.2	34.2	74.3	3.9	1.2	8.3	10.4	119	0.0	1021.7	317.4	1017.0
2014/01/27 00:00:00	23.2	15.0	31.3	22.5	14.9	29.8	-99.0	-99.0	-99.0	46.9	30.2	67.4	2.2	0.5	8.0	11.4	107	0.0	1022.4	316.3	940.3
2014/01/28 00:00:00	25.4	18.3	33.3	24.6	18.4	31.9	-99.0	-99.0	-99.0	42.3	23.6	61.1	2.9	0.4	8.5	11.2	60	0.0	1020.1	316.9	938.4
2014/01/29 00:00:00	27.0	18.1	36.2	26.4	18.2	35.2	-99.0	-99.0	-99.0	39.0	19.2	62.4	1.9	0.4	7.6	10.5	84	0.0	1017.5	317.1	939.5
2014/01/30 00:00:00	27.3	17.5	36.2	27.0	17.8	35.2	-99.0	-99.0	-99.0	35.2	18.7	60.6	1.5	0.0	6.7	8.7	81	0.0	1017.1	321.9	960.5
2014/01/31 00:00:00	27.7	18.8	37.8	27.2	18.6	36.6	-99.0	-99.0	-99.0	34.7	9.6	59.3	2.0	0.3	8.2	10.9	94	0.0	1014.4	319.7	939.0

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2014/03/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind			Gust	Dir	Rain	Bar	Solar Rad	
	2m			10m			60m						Speed								
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2014/02/01 00:00:00	29.6	19.3	38.5	29.3	19.7	37.3	-99.0	-99.0	-99.0	32.4	17.4	52.0	1.4	0.0	8.1	11.1	150	0.0	1012.7	308.8	929.4
2014/02/02 00:00:00	29.7	22.3	36.5	29.3	23.7	34.7	-99.0	-99.0	-99.0	33.8	19.5	50.9	2.1	0.0	10.3	14.8	148	0.0	1013.1	307.6	911.3
2014/02/03 00:00:00	26.4	17.9	34.4	25.9	18.3	33.4	-99.0	-99.0	-99.0	39.3	21.7	63.1	0.9	0.3	4.8	7.9	105	0.0	1013.9	308.9	920.8
2014/02/04 00:00:00	25.7	19.3	33.0	24.9	18.7	31.0	-99.0	-99.0	-99.0	46.8	29.0	70.0	4.4	0.1	15.5	18.4	150	0.0	1015.5	287.2	967.7
2014/02/05 00:00:00	21.3	15.4	28.6	20.3	15.5	26.8	-99.0	-99.0	-99.0	52.7	34.6	71.7	6.4	2.3	9.9	15.7	141	0.0	1020.4	299.6	954.7
2014/02/06 00:00:00	21.9	14.5	30.1	21.2	14.3	28.8	-99.0	-99.0	-99.0	48.0	28.5	66.8	3.4	0.7	7.3	10.1	158	0.0	1018.0	301.5	1073.3
2014/02/07 00:00:00	24.4	15.6	32.9	23.9	16.0	32.1	-99.0	-99.0	-99.0	43.7	21.6	69.6	1.6	0.0	6.7	8.5	174	0.0	1016.8	303.8	911.3
2014/02/08 00:00:00	27.7	19.0	36.7	27.3	19.0	35.2	-99.0	-99.0	-99.0	36.0	15.9	62.4	1.7	0.0	8.6	11.6	134	0.0	1017.5	304.3	911.7
2014/02/09 00:00:00	29.3	20.4	36.9	29.0	21.3	36.1	-99.0	-99.0	-99.0	34.5	13.6	59.4	0.5	0.0	5.3	8.1	340	0.0	1018.2	301.1	909.6
2014/02/10 00:00:00	30.3	22.1	38.1	30.0	22.4	36.8	-99.0	-99.0	-99.0	32.5	16.7	56.1	2.5	0.0	8.8	12.1	166	0.0	1015.9	296.0	893.8
2014/02/11 00:00:00	27.5	19.8	36.4	26.8	19.7	35.5	-99.0	-99.0	-99.0	49.7	27.3	78.1	1.8	0.2	9.6	12.5	195	0.0	1015.7	259.1	928.4
2014/02/12 00:00:00	28.4	19.8	37.2	27.8	19.6	36.3	-99.0	-99.0	-99.0	48.2	25.7	79.2	2.2	0.3	8.0	10.0	174	0.0	1014.6	280.0	868.3
2014/02/13 00:00:00	28.3	22.1	35.2	27.7	22.1	34.3	-99.0	-99.0	-99.0	48.7	31.4	76.9	0.4	0.2	11.9	16.9	125	1.2	1013.0	220.0	913.3
2014/02/14 00:00:00	23.9	20.4	27.1	23.5	20.1	26.6	-99.0	-99.0	-99.0	71.9	60.0	86.2	1.9	0.0	8.1	10.3	141	2.0	1009.1	100.2	666.6
2014/02/15 00:00:00	26.3	21.3	33.2	26.3	21.5	32.7	-99.0	-99.0	-99.0	60.2	35.3	82.0	2.2	0.2	9.9	14.1	8	1.6	1003.8	96.5	708.8
2014/02/16 00:00:00	24.4	18.5	31.4	24.1	18.0	30.2	-99.0	-99.0	-99.0	65.5	46.0	87.7	0.5	0.0	15.9	20.1	174	14.0	1005.3	88.3	495.0
2014/02/17 00:00:00	21.9	17.9	26.5	21.4	17.9	25.1	-99.0	-99.0	-99.0	68.9	52.4	88.1	4.4	0.6	7.4	10.1	140	0.0	1012.1	143.3	864.2
2014/02/18 00:00:00	25.2	17.8	33.1	24.7	17.6	32.6	-99.0	-99.0	-99.0	62.9	39.7	83.6	1.0	0.3	8.2	10.7	345	0.0	1011.3	193.5	1024.3
2014/02/19 00:00:00	23.9	21.7	29.1	23.6	21.5	27.7	-99.0	-99.0	-99.0	78.7	60.4	88.0	5.0	0.2	10.3	13.2	350	10.6	1008.0	115.6	875.6
2014/02/20 00:00:00	24.1	20.7	27.8	23.6	20.2	26.7	-99.0	-99.0	-99.0	64.0	41.1	87.7	2.6	0.7	6.7	9.0	308	0.0	1010.9	163.3	817.4
2014/02/21 00:00:00	22.8	15.0	31.1	22.2	15.1	29.1	-99.0	-99.0	-99.0	50.5	25.3	75.5	1.8	0.0	5.6	7.7	178	0.0	1015.9	270.5	921.1
2014/02/22 00:00:00	23.2	17.3	30.6	22.6	17.3	28.5	-99.0	-99.0	-99.0	52.6	37.0	67.3	3.8	0.2	7.9	10.6	148	0.0	1018.6	257.7	1097.7
2014/02/23 00:00:00	21.7	15.3	28.6	21.0	15.6	26.9	-99.0	-99.0	-99.0	53.7	32.1	76.3	4.2	2.0	7.7	10.5	123	0.0	1021.5	274.3	861.5
2014/02/24 00:00:00	23.1	16.1	30.2	22.5	16.1	28.6	-99.0	-99.0	-99.0	52.4	31.6	74.1	2.2	0.2	6.8	9.8	175	0.0	1019.8	265.7	873.2

Continued on next page

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg Max
					($^\circ C$)						(%)			(m/s)		(m/s)	($^\circ$)	(mm)	(hPa)	(W/m^2)
2014/02/25 00:00:00	25.0	17.1	31.8	24.6	17.4	30.6	-99.0	-99.0	-99.0	47.1	25.4	74.1	0.4	0.1	4.0	6.4	47	0.0	1016.8	220.4 953.6
2014/02/26 00:00:00	26.0	21.0	31.2	25.4	21.0	29.1	-99.0	-99.0	-99.0	47.2	35.1	63.7	2.7	0.0	6.9	10.0	334	0.0	1015.4	208.7 927.3
2014/02/27 00:00:00	26.4	20.1	33.6	26.0	20.5	32.3	-99.0	-99.0	-99.0	47.3	29.2	62.4	1.9	0.0	10.7	13.1	149	0.0	1016.9	209.6 906.3
2014/02/28 00:00:00	21.6	19.1	25.8	21.1	18.9	24.5	-99.0	-99.0	-99.0	69.0	53.9	82.8	4.2	1.5	8.6	10.6	155	0.8	1020.9	89.9 461.0

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2014/04/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature									Humidity			Prevailing Wind			Gust	Dir	Rain	Bar	Solar Rad	
	2m			10m			60m						Speed								
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg	Max
					($°C$)						(%)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2014/03/01 00:00:00	20.4	17.9	26.5	20.0	17.7	25.5	-99.0	-99.0	-99.0	76.5	51.9	87.8	2.5	0.0	8.1	10.1	151	12.6	1019.3	87.0	659.1
2014/03/02 00:00:00	21.1	17.2	26.9	20.5	16.8	25.1	-99.0	-99.0	-99.0	72.5	55.3	85.7	4.3	1.4	9.0	11.1	171	0.0	1019.4	170.1	930.6
2014/03/03 00:00:00	22.1	16.7	28.3	21.7	16.8	27.3	-99.0	-99.0	-99.0	65.2	46.1	83.6	3.2	0.2	7.4	9.3	142	0.0	1023.5	142.3	874.7
2014/03/04 00:00:00	22.7	17.5	28.3	22.3	17.9	27.2	-99.0	-99.0	-99.0	56.6	41.0	75.1	1.8	0.0	5.5	7.1	97	0.0	1024.5	187.2	1014.2
2014/03/05 00:00:00	23.5	18.3	30.0	23.0	18.6	29.2	-99.0	-99.0	-99.0	55.0	36.5	81.0	1.1	0.0	9.3	13.6	186	1.0	1019.9	192.2	858.4
2014/03/06 00:00:00	23.4	17.3	30.4	22.8	17.3	28.4	-99.0	-99.0	-99.0	64.6	40.8	86.3	2.0	0.0	8.6	10.5	169	0.2	1018.9	242.8	845.4
2014/03/07 00:00:00	23.5	18.8	31.2	23.2	19.3	29.1	-99.0	-99.0	-99.0	60.2	37.6	76.8	1.6	0.0	10.5	14.2	134	0.6	1020.7	189.2	945.0
2014/03/08 00:00:00	24.1	18.3	30.8	23.7	18.9	28.9	-99.0	-99.0	-99.0	52.0	33.0	74.0	1.9	0.0	8.4	11.3	105	0.0	1021.2	214.8	871.8
2014/03/09 00:00:00	23.7	17.2	30.4	23.2	17.5	29.0	-99.0	-99.0	-99.0	49.0	29.5	66.1	1.8	0.0	6.8	9.0	98	0.0	1021.8	227.2	847.9
2014/03/10 00:00:00	23.8	17.3	31.1	23.3	17.5	29.6	-99.0	-99.0	-99.0	49.0	29.3	66.6	1.8	0.2	9.0	13.0	122	0.0	1022.6	220.3	851.1
2014/03/11 00:00:00	23.5	16.6	30.4	23.1	16.4	29.4	-99.0	-99.0	-99.0	49.0	28.4	73.3	2.1	0.0	6.4	9.7	110	0.0	1022.2	237.7	791.1
2014/03/12 00:00:00	23.8	16.7	29.9	23.3	17.1	28.8	-99.0	-99.0	-99.0	49.0	33.2	69.5	1.3	0.0	6.5	9.0	150	0.0	1019.8	217.4	948.0
2014/03/13 00:00:00	24.3	17.6	31.6	23.8	17.6	29.8	-99.0	-99.0	-99.0	51.0	30.7	71.2	2.1	0.1	8.3	11.3	146	0.0	1018.8	235.7	836.4
2014/03/14 00:00:00	22.3	18.0	28.0	21.8	17.7	26.5	-99.0	-99.0	-99.0	57.8	41.9	77.3	1.2	0.0	8.8	11.7	8	0.0	1018.5	122.2	789.2
2014/03/15 00:00:00	22.6	16.2	28.3	22.0	16.2	27.2	-99.0	-99.0	-99.0	59.3	42.1	82.8	1.7	0.0	5.0	6.9	323	0.0	1015.1	164.0	853.7
2014/03/16 00:00:00	22.4	16.7	30.6	22.2	16.9	29.1	-99.0	-99.0	-99.0	59.7	35.8	83.0	3.3	0.1	15.3	26.5	304	5.2	1011.7	142.1	792.9
2014/03/17 00:00:00	19.4	11.8	26.4	19.1	12.3	25.5	-99.0	-99.0	-99.0	50.7	31.1	77.3	0.9	0.0	3.9	5.2	187	0.0	1019.3	227.8	764.8
2014/03/18 00:00:00	22.4	14.4	30.1	22.2	14.7	28.9	-99.0	-99.0	-99.0	47.6	28.9	67.3	1.4	0.0	5.5	6.9	164	0.0	1022.3	213.6	746.1
2014/03/19 00:00:00	24.8	17.7	32.3	24.5	18.0	31.1	-99.0	-99.0	-99.0	45.1	24.8	71.5	3.2	0.0	9.7	11.7	126	0.0	1023.6	206.8	765.9
2014/03/20 00:00:00	23.1	17.9	28.0	22.6	18.0	26.4	-99.0	-99.0	-99.0	50.7	35.5	63.7	2.9	0.1	6.9	8.9	106	0.0	1025.2	149.2	780.4
2014/03/21 00:00:00	21.1	18.0	26.1	20.9	17.9	25.3	-99.0	-99.0	-99.0	64.6	48.9	83.4	1.0	0.0	4.8	5.8	66	1.4	1022.6	101.0	689.8
2014/03/22 00:00:00	23.5	16.2	31.0	23.2	16.5	29.8	-99.0	-99.0	-99.0	51.4	26.4	78.0	0.5	0.0	4.6	7.7	181	0.0	1019.3	206.3	836.5
2014/03/23 00:00:00	23.2	18.5	30.3	22.8	19.0	28.9	-99.0	-99.0	-99.0	54.0	33.3	69.4	0.5	0.0	9.6	12.0	285	0.0	1018.2	155.6	796.9
2014/03/24 00:00:00	19.6	16.2	23.7	19.2	15.6	22.9	-99.0	-99.0	-99.0	72.7	59.6	89.0	0.7	0.1	7.1	8.9	46	22.0	1017.4	117.9	818.0

Continued on next page

Record Time	Temperature									Humidity			Prevailing Wind							
	2m			10m			60m						Speed			Gust	Dir	Rain	Bar	Solar Rad
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max					Avg Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2014/03/25 00:00:00	20.3	16.2	25.0	20.0	16.1	23.9	-99.0	-99.0	-99.0	70.1	55.3	86.8	0.5	0.0	4.1	5.3	101	1.8	1020.7	108.2 590.8
2014/03/26 00:00:00	18.8	17.0	21.1	18.5	16.7	20.5	-99.0	-99.0	-99.0	84.7	76.7	88.1	1.4	0.0	7.2	10.3	145	17.2	1022.8	37.9 184.6
2014/03/27 00:00:00	18.3	17.4	20.3	17.9	16.9	19.3	-99.0	-99.0	-99.0	87.6	80.2	90.1	0.8	0.0	8.8	12.2	172	24.6	1022.0	31.9 338.0
2014/03/28 00:00:00	19.3	16.9	23.4	18.9	16.8	22.6	-99.0	-99.0	-99.0	80.9	64.4	89.2	0.1	0.0	10.0	13.3	269	4.2	1017.8	58.6 694.1
2014/03/29 00:00:00	20.0	15.3	25.5	19.5	15.3	24.8	-99.0	-99.0	-99.0	76.7	56.0	91.0	0.6	0.0	3.3	4.7	314	0.2	1018.8	139.3 701.6
2014/03/30 00:00:00	22.0	15.9	28.9	21.6	15.7	27.1	-99.0	-99.0	-99.0	68.5	40.9	87.4	2.2	0.0	7.5	9.3	168	0.0	1020.3	164.3 662.5
2014/03/31 00:00:00	21.6	16.2	28.3	21.2	16.2	27.2	-99.0	-99.0	-99.0	68.7	41.2	86.7	2.0	0.2	6.9	10.1	168	0.0	1021.3	149.5 779.1

2013-2014 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
1	279	03/04/2013 10:51am	Dust (Mine)	Y Werris Creek	Phone to EO	Big dust cloud sitting over the top of the coal mine on Wednesday 3rd April 2013 morning.	Inversion present trapping dust emissions. Werris Creek real time PM10 dust levels <30µg/m3 and in compliance.	Written response provided to complainant.
2-3	280-281	08/04/2013 Various	Blast (Overpressure or Vibration)	Various Werris Creek	Phone to EO	Blast caused significant ground movement and shaking houses.	WCC shot #23-2013 (S11_6-10_Gcoal) was fired at 12:12pm on Monday 8th April 2013 was in compliance. Blast in bottom of pit previously caused complaints.	Written response provided to complainant. Visited complainant during next blast event.
4-6	282-284	11/04/2013 Various	Blast (Overpressure or Vibration)	Various Werris Creek	Phone to EO	Blast caused significant ground movement and shaking houses.	WCC shot #24-2013 (S11_12-17_Gcoal) was fired at 1:17pm on Thursday 11th April 2013 was in compliance. Blast in bottom of pit previously caused complaints. Orica could not identify cause of complaints.	Written response provided to complainant. Independent blast consultant engaged to review Orica blast designs for G Coal interburden.
7	285	19/04/2013 11:39am	Noise (Train Load Out/ Train)	EPA/ Anonymous Werris Creek	Email to EO	Noise from coal train shunting on Thursday 18th April 2013 between 20:00 hrs and 03:00 hrs.	Wind direction not towards Werris Creek so TLO noise would not be propagated or enhanced.	Written response provided to EPA.
8	286	28/04/2013 9:15am	Dust (Mine)	Z Quipolly	Phone to Mine Office	Mine has been dusty since day break.	Inversion present trapping dust emissions. Werris Creek real time PM10 dust levels <15µg/m3 and in compliance.	Written response provided to EPA.
9	287	01/05/2013 5:03pm	Noise (Train Load Out)	Anonymous/ EPA Werris Creek	Email to EO	Excessive noise experienced on Saturday and Sunday night (27th and 28th April 2013) after 10.30pm, Saturday night was particularly bad.	Wind directions from the north and west do not propagate or enhance noise emissions from WCC TLO which is south west of Werris Creek.	Written response provided to EPA.
10	288	01/05/2013 5:03pm	Light (Train Load Out)	Anonymous/ EPA Werris Creek	Email to EO	Intrusive lighting from the coal loader on Saturday and Sunday night (27th and 28th April 2013).	Lighting camera was reviewed for Saturday and Sunday night and did not identify any intrusive lights from Werris Creek Coal (both open cut and train load out facility). The only time light was visible was when the trains arrived and started being loaded with the dozers operating on the coal stockpile.	Written response provided to EPA.
11	289	17/05/2013 7:30am	Noise (Mine)	U Werris Creek	Phone to EO	Mine noise is loud Thursday and Friday morning (16th & 17th May 2013) and can hear dump trucks.	Background noise levels are similar or higher than LF (mining) noise levels indicating that urban and traffic noises were dominant although mining was audible.	EO met with complainant. Written response provided to complainant.
12	290	5/06/2013 10:33am	Odour (Spon Comb)	Q Quipolly	Phone to EO	Sulphurous Odour present this morning (5th June 2013) and noticeable for the last week.	Spontaneous combustion of waste material present in pit that had not been covered, unrelated to former underground mine. Gases from spon comb unlikely to contain high levels of SO_2 or H_2S due to low sulphur levels in WCC coal. If odour from spon comb, the odour would be more bituminous and if present offsite only due to temperature inversion/low winds trapping rather than dissipating gases. No alarms from personal gas detectors of employees during the same period, therefore unlikely to be at a harmful level.	Dumping in pit recommenced with priority given to burying areas of overburden with spon comb. EO met with complainant. Written response provided to complainant.

2013-2014 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
13 & 14	291 & 292	17/06/2013 6:49am & 8:23am	Odour (Spon Comb	AD & AP Quipolly	Phone to EO	Sulphurous Odour present this morning (17th June 2013) and concerned about air quality and health impacts.	Spontaneous combustion of waste material present in pit that had not been covered, unrelated to former underground mine. Gases from spon comb unlikely to contain high levels of SO_2 or H_2S due to low sulphur levels in WCC coal. If odour from spon comb, the odour would be more bituminous and if present offsite only due to temperature inversion/low winds trapping rather than dissipating gases. No alarms from personal gas detectors of employees during the same period, therefore unlikely to be at a harmful level.	Dumping in pit recommenced with priority given to burying areas of overburden with spon comb. EO met with complainant. Written response provided to complainant.
15 & 16	293 & 294	18/06/2013 1:12pm & 1:18pm	Blast (Overpressure or Vibration)	AI & AL Werris Creek	Phone to EO	Blast experienced in two waves with the first shaking the house and the second lesser wave just rattling the cupboards.	WCC shot #44-2013 (S16_8-11_385 Pt2) was fired at 1:11pm on Tuesday 18th June 2013 was in compliance. Blast in upper horizon of pit and had a high MIC.	WCC to review whether to reduce size of RL385 shots. Written response provided to complainant.
17	295	18/06/2013 7:30pm	Lights (Mine)	A Werris Creek	Phone to EO	Bright light shining at house but stopped by mid evening.	Lighting camera not operational on 18/19 June due to modem error. Maintenance building new drill on northern end of MIA with lighting plant shining to the east but works finished at 9pm and light turned off.	Lighting plant relocated next night. MIA bund to be constructed to provide a barrier for future workshop to prevent further recurrence. Written response provided to complainant.
18	296	02/07/2013 12:40am	Lights (Mine)	A Werris Creek	Email to EO	Spotlight south of coal loader shining on house evening 1st July 2013.	Mining operations constructing MIA Bund. Lighting plant set up orientated westward and barely visible. Werris Creek lighting camera shows that dozer and truck headlights were intermittently visible but in accordance with PA10_0059.	Written response provided to complainant.
19 to 29	297 to 307	08/07/2013 Various	Blast (Overpressure or Vibration)	Various Werris Creek	Phone to EO	Blast caused significant shaking of house and community amenity impact.	WCC shot #48-2013 (S16_12-18_Blackseam) was fired at 1:35pm on Monday 8th July 2013 was in compliance with PA10_0059 and EPL12290. Significant air blast due to energy released into atmosphere from old bore and surface of shot resulting in elevated air blast >115dB(L) in Werris Creek.	WCC and Orica to develop blast protocols to reduce potential air blast from above RL385m. Improved communication and signoff process. Written response provided to complainants.
30	308	08/07/2013 4:31pm	Dust (Mine)	EPA/A Werris Creek	Email to EO	General dust problem from mining operations and coal stockpile.	Average dust levels for previous fortnight were PM10 9.2µg/m^3 and PM2.5 6.3µg/m^3. PM10 air quality less than 30µg/m^3 is considered good air quality.	Written response provided to EPA and complainant. Offer to swab/sample dust rejected.
31	309	15/07/2013 11:48pm	Noise (Train Load Out)	A Werris Creek	Email to EO	Noise from coal loader deafening evening 15th July 2013.	Open cut and Train Load Out operated to 3:30am. Northerly wind did not enhance noise from WCC. Review of audio indicates significant noise from trains passing through Werris Creek.	Written response provided to complainant.
32	310	15/07/2013 11:58pm	Dust (Train Load Out)	A Werris Creek	Email to EO	Dust from coal loader with pictures of alleged coal dust on tiles in house.	Average PM10 dust levels for previous day were less than 20µg/m^3. PM10 air quality less than 30µg/m^3 is considered good air quality.	Written response provided to complainant. Offer to swab/sample dust rejected.

WHITEHAVEN COAL

2013-2014 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
33 to 36	311 to 314	17/07/2013 Various	Blast (Overpressure or Vibration)	Various Werris Creek	Phone to EO	Blast rattled houses with three complaints alleging damage.	WCC shot #49-2013 (S13_18-23_350TSB35) was fired at 3:32pm on Wednesday 17th July 2013 was in compliance with PA10_0059 and EPL12290. Large blast with 888 holes performed as expected but complaints from dominant vibration wave frequency of 12-13Hz.	WCC and Orica to develop blast protocols to reduce potential air blast from above RL385m. Improved communication and signoff process. Written response provided to complainants. Undertake Property Investigations in accordance with PA10_0059.
37	315	17/07/2013 1:45pm	Dust (Mine)	W Werris Creek	Phone to EO	Black dust on outdoor tables and under veranda believed to be coal.	Average dust levels for previous fortnight were PM10 9.2µg/m^3 and PM2.5 6.3µg/m^3. PM10 air quality less than 30µg/m^3 is considered good air quality.	Written response provided to complainant. Offer to swab/sample dust.
38	316	26/07/2013 4:20pm	Blast (Other)	EPA/A Werris Creek	Email to EO	Alleged that WCC fired two blasts both with significant dust.	WCC only fired one shot #50-2013 (S13_22-23_350TSB36) at 1:36pm on Friday 26th July 2013 was in compliance with PA10_0059 and EPL12290. Second dust cloud was from material caught on highwall falling into the pit after the blast onto ash like material.	Written response provided to EPA and complainant.
39	317	27/07/2013 12:07am	Light (Train Load Out)	A Werris Creek	Email to EO	Bright spotlights shining on home evening 26th, 27th and 28th July 2013.	Rail Loop construction was undertaking night works on 26th & 27th July only. Light plants orientated westward. Werris Creek lighting camera shows that construction works were visible as well as Train Load Out on 28th July but in accordance with PA10_0059.	Written response provided to complainant.
40	318	29/07/2013 8:53pm	Noise (Train Load Out)	A Werris Creek	Email to EO	Noise from coal loader morning 29th July 2013 between 12am & 1am.	Open cut and Train Load Out did not operate. Northerly wind did not enhance noise from WCC. Review of audio indicates significant noise from trains passing through Werris Creek.	Written response provided to complainant.
41	319	01/08/2013 11:55am	Noise (Train Load Out)	EPA/A Werris Creek	Email to EO	Noise from coal loader morning 30th July 2013 between 12:45am & 1am.	Open cut and Train Load Out operated to 3:30am. No trains loaded. North westerly wind did not enhance noise from WCC. Review of audio indicates significant noise from trains passing through Werris Creek.	Written response provided to complainant.
42 & 43	320 & 321	30/07/2013 12:13pm & 12:36pm	Blast (Overpressure or Vibration)	AL & S Werris Creek	Phone to EO	Blast shook house but not as bad as previous blasts.	WCC shot #51-2013 (S13_10-13_330) was fired at 12:12pm on Tuesday 30th July 2013 was in compliance with PA10_0059 and EPL12290. Large blast performed as expected, however larger blasts to produce enough material for EX5600 excavator increases risk of complaints from dominant vibration wave frequency of 15Hz.	Written response provided to complainant.
44 to 46	322 to 324	06/08/2013 Various	Blast (Overpressure or Vibration)	Various Werris Creek	Phone to EO	Blast shook house and impacted amenity.	WCC blast #52-2013 (S13_3-7_330 TS37) at 13:15 Tuesday 6th August 2013 was in compliance with PA10_0059 and EPL12290.	Written response provided to complainants.
47	325	08/08/2013 10:16pm	Dust (Mine)	A Werris Creek	Email to EO	Dust from visual bund dump covering washing.	OCE inspections did not identify dust off the visual bund dump. Wind from north west blowing (if any dust was generated) away from Werris Creek township.	Written response provided to complainant.

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YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
48	326	12/08/2013 9:02am	Light (Train Load Out)	A Werris Creek	Email to EO	Bright lights shining in back room from bottom of conveyor at TLO until 1:35am.	Train loaded on 11th August 2013 from 11:15pm to 1:39am from high ash coal stockpile pushing north east towards Werris Creek. Lighting plants were set up correctly and in accordance with Project Approval 10_0059 requirements.	Written response provided to complainant.
49	327	22/08/2013 1:46pm	Blast (Overpressure or Vibration)	AQ Werris Creek	Phone to EO	Blast shook house and impacted amenity.	WCC blast #56-2013 (S13_8-10_DE Coal UG Collapse) at 13:41 Thursday 22nd August 2013 was in compliance with PA10_0059 and EPL12290.	Written response provided to complainants.
50	328	25/08/2013 9:58pm	Blast (Overpressure or Vibration)	A Werris Creek	Email to EO	Blast shook house and impacted amenity.	WCC blast #57-2013 (S13_8-10_DE Coal) at 13:14 Friday 23rd August 2013 was in compliance with PA10_0059 and EPL12290.	Written response provided to complainants.
51	329	02/09/2013 11:11pm	Light (Train Load Out)	A Werris Creek	Email to EO	Bright lights from TLO impacting on their house preventing them from having a decent night.	Two dozers working at TLO and one train loaded. All lighting plants appropriately set up and in compliance with PA10_0059.	Written response provided to complainants.
52	330	09/09/2013 10:16am	Dust (Mine)	Q Quipolly	Phone to EO	Visible dust coming off mine site and beyond a reasonable haze.	Visual inspection did not observe excessive or visual dust off the mine site. General conditions very hazy and PM10 levels in Werris Creek were in compliance.	Written response provided to complainant.
53	331	11/09/2013 12:17pm	Blast (Overpressure or Vibration)	U Werris Creek	Phone to EO	The blast caused the front windows to rattle.	WCC blast #68A-2013 (S13_330_Cap Rocks) at 12:16 Wednesday 11th September 2013 was in compliance with PA10_0059 and EPL12290.	Written response provided to complainant.
54	332	18/09/2013 1:50pm	Blast (Overpressure or Vibration)	U Werris Creek	Phone to EO	Blast shook house and concerned about impacts to residence however no damage.	WCC blast #69-2013 (S15_2-6_DE Coal UG Collapse & TSB40) at 13:49 Wednesday 18th September 2013 was in compliance with PA10_0059 and EPL12290.	Written response provided to complainants.
55	333	4/10/2013 3:50pm	Blast (Overpressure or Vibration)	AQ Werris Creek	Phone to EO	If blast can be felt must be too big and impacting on amenity.	WCC blast #75-2013 (S13_18-21_350-330_TSB41 Part 1) at 15:41 Friday 4th October 2013 was in compliance with PA10_0059 and EPL12290.	Written response provided to complainant.
56	334	4/10/2013 3:50pm	Noise (Mine)	AY East of Mine	Email to EO	Owner wanted to make formal complaint regarding noise exceedance on property R97.	Noise Exceedance of R97 recorded 39dBA +4dBA above the noise criteria on 19th September 2013 due to westerly source to receiver winds.	Written response provided to complainant.
57	335	10/10/2013 10:49am	Blast (Overpressure or Vibration)	AX Werris Creek	Phone to EO	Blast shook house and rattled windows. Concerned over how often this is now occurring.	WCC blast #76-2013 (S13_18-21_350-330_TSB42) at 10:47 Thursday 10th October 2013 was in compliance with PA10_0059 and EPL12290.	Written response provided to complainant.
58	336	22/10/2013 10:21am	Dust (Train Load Out)	A/EPA Werris Creek	Email to EO	Dust from Coal Stockpile at 2:30pm on 17th October 2013.	Strong north westerly wind resulted in all operations except water carts suspended between 11:30am and 1:30pm on Thursday 17th October. Visual inspections did not observe dust offsite although conditions were hazy. Real time dust monitoring was elevated but considered to be good air quality PM10 25.9µg/m3.	Written response provided to EPA.

WHITEHAVEN COAL

2013-2014 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
59	337	22/10/2013 10:21am	Dust (Train Load Out)	A/EPA Werris Creek	Email to EO	Dust from Coal Stockpile between 2:30pm and 4pm on 19th October 2013.	Light westerly wind not dusty. TLO worked half shift on Saturday 19th October finishing at 12:30pm. Visual inspections did not observe dust offsite. Real time dust monitoring was considered to be good air quality PM10 13.0µg/m3.	Written response provided to EPA.
60	338	24/10/2013 2:44pm	Dust (Mine)	A/EPA Werris Creek	Email to EO	Dust from Overburden area between 2pm and 2:45pm on 23rd October 2013.	Strong westerly wind prevailing on 23rd October. Visual inspections did not observe dust offsite although conditions were hazy. Real time dust monitoring was elevated but considered to be good air quality PM10 26.1µg/m3.	Written response provided to EPA.
61	339	28/10/2013 2:28pm	Blast (Dust)	Anonymous/ EPA	Phone to EO	Dust cloud from blast visible from Kamilaroi Highway.	WCC blast #80-2013 (S13_7_DE Coal Wedge) at 13:08 Monday 28th October 2013 was in compliance with PA10_0059 and EPL12290. Shot was small but dusty due to prevailing dry conditions.	Written response provided to EPA.
62	340	11/11/2013 1:25pm	Light (Train Load Out)	A/EPA Werris Creek	Email to EO	Lights from Coal Load Out Facility still on at 3am on 5th November 2013.	Review of lighting camera shows no visual impact from lighting at Train Load Out facility.	Written response provided to EPA.
63	341	11/11/2013 1:25pm	Noise (Train Load Out)	A/EPA Werris Creek	Email to EO	Loud noise from Coal Load Out Facility at 10:08pm on 10th November 2013.	Source of loud noise due to train in Werris Creek rail yards and unrelated to WCC activities.	Written response provided to EPA.
64	342	12/11/2013 4:26pm	Light (Mine)	A Werris Creek	Email to Executive Director	Lights from the pit are directed at complainant's residence only after 11:30pm.	Monday night 11th November 2013 lighting video did not identify any lighting impacts beyond normal operation of the Train Load Out facility lighting and lights from dozers. No lights from the Open Cut were directly visible. An inspection of lighting plants at the Train Load Out Facility confirm that the lights were set up correctly in accordance with PA10_0059 and AS4282.	Verbal response provided to complainant.
65	343	20/11/2013 12:09pm	Blast (Overpressure or Vibration)	AL Werris Creek	Phone to EO	Complainant said that they had just felt the blast and caused his house to shake and he does not appreciate the intrusive nature of blasting.	WCC blast #88-2013 (S13_4-9_TSB41 Pt1) at 12:08pm 20th November 2013 was in compliance with PA10_0059 and EPL12290. Blast #88 was designed to minimise potential for community complaints and performed as expected.	Written response provided to complainant.
66	344	20/11/2013 1:30pm	Blast (Overpressure or Vibration)	AT Werris Creek	Phone to EO	Complainant indicated that he had felt the blast last Wednesday 13th November which rattled the shutters on the southern side of his house.	WCC blast #87-2013 (S13_4-9_TSB43_Presplit and Rock Pops) at 13:27 13th November 2013 was in compliance with PA10_0059 and EPL12290. Blast #87 was designed to minimise potential for community complaints and performed as expected.	Written response provided to complainant.
67	345	4/12/2013 1:50pm	Blast (Dust)	AZ Werris Creek	Phone to Mine Office	Complainant indicated could see dust cloud and smell odour from blast when driving past mine on 4th December 2013.	WCC blast #92-2013 (S16_12-15_370) at 13:09 4th December 2013 was in compliance with PA10_0059 and EPL12290. Blast #92 performed as expected. Blast video shows dust generated blowing to the east but video ends and no fume generated.	Written response provided to complainant.
68 & 69	346 & 347	9/12/2013 9:30am 13/12/2013 8:20am	Odour (Spontaneous Combustion)	AD Quipolly	Phone to EM	Complainant alleged strong sulphur smell that causes breathing difficulties. Odour similar to previous event.	Possible source of odour on 9th December 2013 from ROM Stockpile spontaneous combustion event which had been addressed by time of complaint. Possible source of odour on 13th December 2013 due to uncovering former underground workings close to previously active fire.	WCC to review and monitor for spontaneous combustion events to minimise off-site impacts. No written follow up required.

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70	348	13/12/2013 3:45pm	Blast (Overpressure or Vibration)	U Werris Creek	Phone to EM	Complainant indicated that the 13th December 2013 blast caused vibration in his house.	WCC blast #95-2013 (S12_12-16_Gcoal) at 15:12 13th December 2013 was in compliance with PA10_0059 and EPL12290. Blast #95 was designed to minimise potential for community complaints and performed as expected.	No written follow up required.
71 to 76	349 to 354	19/12/2013 Various	Blast (Overpressure or Vibration)	Various	Phone to EO	Complainants indicated that the 19th December 2013 blast shook their houses.	WCC blast #96-2013 (S17_Trim_Pt2) at 12:17 19th December 2013 was in compliance with PA10_0059 and EPL12290 although Werris Creek vibration was >1mm/s design limit due deeper than normal >20m holes to create flat bench horizon in pit.	Blast contract with Orica finishes at end of month. Engineering Manager to review initiation sequence. Written response provided to complainants.
77	355	24/12/2013 1:50pm	Blast (Damage)	A Werris Creek	Email to Executive Director	Complainant indicated that the mine cracked four new tiles for Christmas.	The nearest WCC blast to the complaint #97/#98-2013 (S13_Wedge and S17_Trim_Pt3) at 13:05 24th December 2013 was in compliance with PA10_0059 and EPL12290. Blast #97/#98 was designed to minimise potential for community complaints and performed as expected with levels well below damage threshold.	No written response required. Previous allegations of blast damage by this complainant have been referred to Department of Planning and are currently being independently assessed.
78	356	13/01/2014 8:50am	Blast (Damage)	BA Werris Creek	Phone to EO	Complainant indicated concern that recent cracking in their home was due to mine blasting having felt the blast on Christmas Eve.	The nearest WCC blast to the complaint #97/#98-2013 (S13_Wedge and S17_Trim_Pt3) at 13:05 24th December 2013 was in compliance with PA10_0059 and EPL12290. Blast #97/#98 was designed to minimise potential for community complaints and performed as expected with levels well below damage threshold.	EO met with complainant on 13th January 2014 and a Property Inspection by a Structural Engineer undertaken on 21st January 2014. Written response provided to complainants.
79 to 81	357 to 359	23/01/2014 Various	Blast (Overpressure or Vibration)	Various/EPA Werris Creek	Phone to EO	Complainants indicated that the 23rd January 2014 blast was intrusive and shook their houses.	WCC blast #02-2014 (S15_13-16_370-350) at 1:02pm 23rd January 2014 was in compliance with PA10_0059 and EPL12290. Blast #02 was designed to minimise potential for community complaints and performed as expected except for minor fume generated by the blast.	WCC to analyse blast frequencies and undertake frequency testing of Werris Creek houses. Investigate cause of minor fume. Written response provided to complainants and EPA.
82	360	28/01/2014 10:15am	Noise (Train Load Out)	A/EPA Werris Creek	Email to EO	Noise from Coal Loader on both nights Saturday 11/12th January 2014 and the following night Sunday 12/13th January 2014	Noise levels found to be below 35dB(A) and no mining noise audible. Source of complaint unknown. Wind direction would not propagate noise from TLO towards Werris Creek.	Written response provided to EPA.
83 & 84	361 & 362	31/01/2014 Various	Blast (Overpressure or Vibration)	U and AI Werris Creek	Email to EO	Complainants indicated that the 31st January 2014 blast had two strong shocks about 5 seconds apart and whole blast lasted 10 seconds.	WCC blast #04-2014 (S15_17-18_370-350) at 2:08pm 31st January 2014 was in compliance with PA10_0059 and EPL12290. Blast #04 was designed to minimise potential for community complaints and performed as expected.	WCC to analyse blast frequencies and undertake frequency testing of Werris Creek houses. Written response provided to complainants.
85	363	08/02/2014 12:48pm	Blast (Dust)	U Werris Creek	SMS to EO	Large dust cloud generated by blast on 8th February 2014 that the complainant thought the dust was going to fall out over his house.	WCC blast #06-2014 (S15_19-23_370-350) at 12:39pm 8th February 2014 was in compliance with PA10_0059 and EPL12290. Wind direction at time of blast was a southerly (171o) but not towards Werris Creek (182o to 204o). Operations Manager confirmed that dust cloud had dispersed before left site. Ground conditions dry due to low rainfall.	Written response provided to complainant.

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86 & 87	364 & 365	10/02/2014 7:50am	Dust (Mine)	U & M Werris Creek	SMS to EO and In Person with EO	Huge dust cloud just sitting over the mine and moving west towards the Gap.	Strong temperature inversion (peaked at +8.6oC/100m at 6am) prevented any dust from dispersing until 8am when the haze disappeared as the wind picked up and lapse rate became positive. Real time dust monitoring did not spike during this period indicating that the dust cloud was limited to the mine site. Limited water carts in operation due to maintenance issues.	Operations stopped to allow extra road watering. Lost production included 2 hours for excavators, 7.5 hours for trucks, 11 hours for drills, 2 hours for crushing plant, 2 hours for train load out. Ensure water carts as practice start an hour before shift to water down active areas. Written response provided to complainant.
88 & 89	366 & 367	20/02/2014 12:47pm & 4:36pm	Dust (Mine)	BB & BC Werris Creek	Email to EO	Complainant indicates that dust is the worst in Werris Creek for 12 years.	Dust levels are 5% to 40% higher in 2013/2014 than 2012/2013 due to rain being 53% lower associated with dry conditions locally as well as from western NSW. Highest dust levels recorded are during bush fire periods. Dust monitoring results in Werris Creek are considered good quality because PM10 is below 30µg/m3.	Written response provided to complainant.
90	368	21/02/2014 2:50pm	Noise (Train Load Out)	A/EPA Werris Creek	Email to EO	Deafening shunting noise from train on Friday 1:05am 21st February 2014 lasting for 10 minutes.	Train arrived at Train Load Out at 1:24am on Friday 21st February 2014. The shunting noise could have been from the train bound for WCC Train Load Out as it requires the locomotives to be transferred from the northern end to the southern end in the Werris Creek rail yard (not on WCC managed land) so that the train can be propelled down the rail spur and around the loop.	Written response provided to EPA.
91 & 92	369 & 370	25/02/2014 11:53am	Blast (Dust)	U & BD Werris Creek	Phone to EO	Large dust cloud generated by blast on Monday 25th February 2014.	WCC blast #10-2014 (S13_8-10_310+S14_Ramp_Remnant) at 11:43pm 25th February 2014 was in compliance with PA10_0059 and EPL12290. Wind direction at time of blast was a north westerly (307o) and blowing away from Werris Creek (182o to 204o). Video confirmed that dust cloud had dispersed before left site. Ground conditions dry due to low rainfall.	Written response provided to complainant.
93	371	25/03/2014 10:36pm	Noise (Train Load Out)	A Werris Creek	Email to Executive Director	Loud noise from the Coal Loader woke the husband from the "sound of throwing very large rocks into an empty barrel" at 4am on 25th March 2014.	A review of the audio and lighting camera records show that the only significant noise source was the sound of a train (most likely the train that finished being loaded at 3:28am) moving into Werris Creek Rail Yard and after leaving WCC's premise. WCC is not responsible for activities undertaken in the Werris Creek Rail Yard.	Written response provided to EPA.