WERRIS CREEK COAL

ANNUAL ENVIRONMENTAL MANAGEMENT REPORT

2012-2013

Eastern Rehabilitation Completed by WCC during 2012-2013

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 2012 31 March 2013
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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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 2012 to 31st March 2013 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 (formerly Office of Environment and Heritage and Department of Environment, Climate Change and Water); 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: www.whitehavencoal.com.au.

iii REPORT DISTRIBUTION

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

Mr Simon Lund
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 Water & Energy Att: **Ms Christie Jackson**
PO Box 550
TAMWORTH NSW 2340

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

1. INTRODUCTION

This Annual Environmental Management Report (AEMR) is the eighth 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 2013.

WCC is located approximately 4 km south of Werris Creek and 11 km north-northwest of Quirindi in central northern 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.

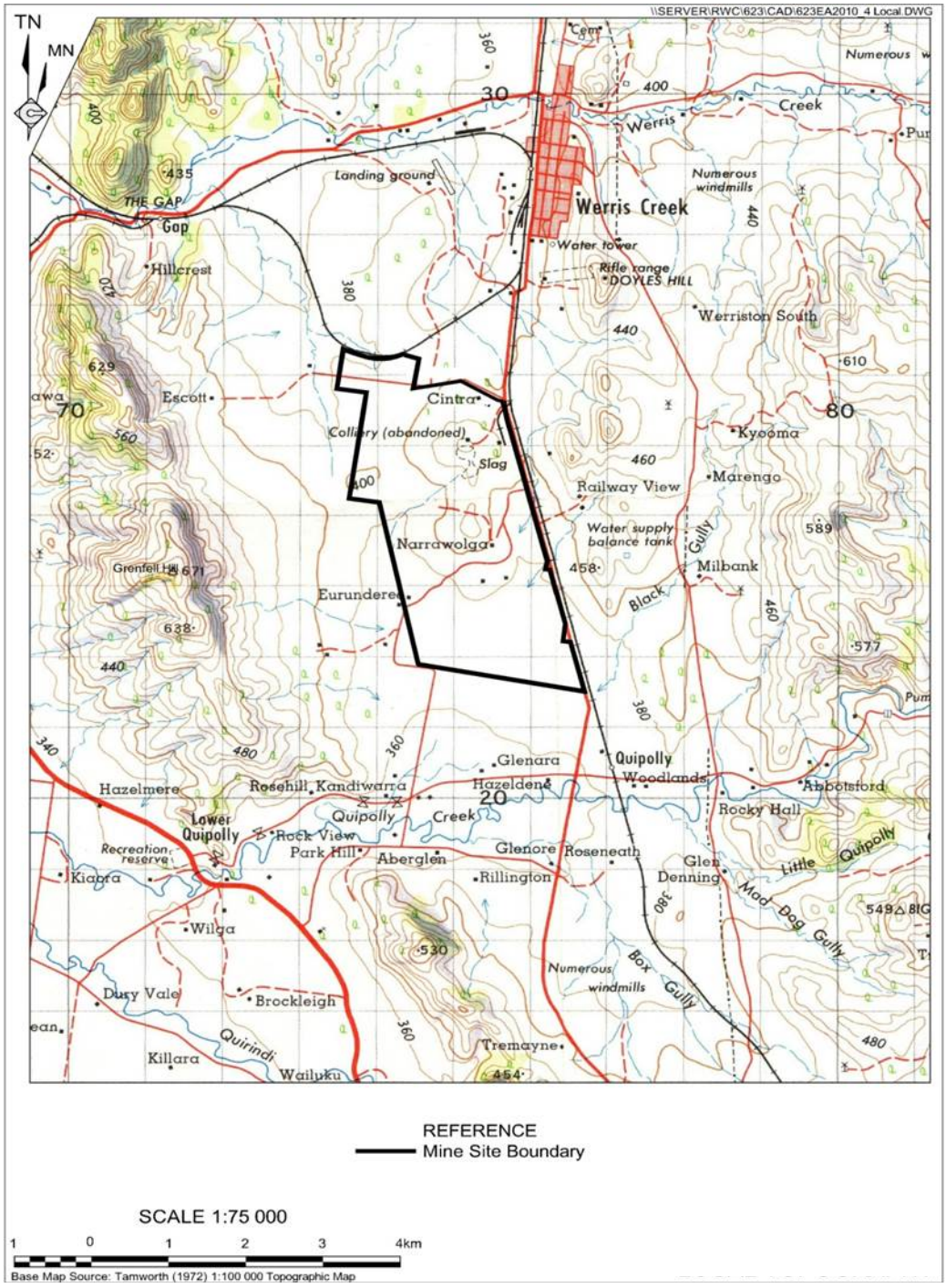


Figure 1.1 WCC Mine Site and Locality

1.1 CONSENT, LEASES AND LICENCES

All applicable consents, leases and licences held by WCC for the 2012-2013 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 1 May 2013
	Radiation Licence	RL41800		8 February 2013	
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	5/12/2012	26/11/2013	3 x 62000L Above Ground Diesel Tanks held by Werris Creek Coal Pty Limited
		35/037161	20/09/2011	27/11/2013	35000kg Above Ground Amonium Nitrate Tank; 80000kg Above Ground Oxidizing Liquid Tank; 130000 units Detonator assemblies; 10000kg Boosters and Detonating Cord held by Orica Australia Pty Limited
	Licence to Store	07-100181-002	20/09/2011	28/11/2013	Orica Australia Pty Limited authorised to possess and store explosives
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 104/2005	23/12/2010 30/05/2005	Perpetuity Perpetuity	Explosive Precursor Facility – Orica 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 2012-2013

Date Issued	Title	Details
30th August 2012	PA10_0059 MOD1	Modification of Biodiversity Offset Area to allow for augmentation of VWD1 to 250ML.
21st March 2013 1st May 2013	EPL12290	Amendments to EPL to include new Pollution Reduction Programs for monitoring Wheel Generated and Overburden Handling dust. Also temperature inversion formula updated.
15th May 2013	Onsite Sewage System 16/13	Approval on new septic system for Northern Mine Infrastructure Area
18th October 2012 13th December 2012	Werris VWD1 Werris VWD3 Werris VWD4	Void Water Dams prescribed
5th December 2012	NDG037966	Update Dangerous Goods Notification for third Diesel Tank
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 Peter Wilkinson	WHC General Manager – Open Cut	02 6741 9300	12/03/2012 – Present
Mr Brian Cullen	WHC General Manager – Technical Services	02 6741 9300	11/1/2008 – Present
Mr Danny Young	WHC Environmental Group Manager	02 6741 9300	11/1/2008 – Present
Mr Peter Easey	WCC Operations Manager	02 6763 6000	01/10/2012 – 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;

- Orica Mining Services Pty Limited;
- ENVIRON Pty Ltd;
- TME Earthmoving Pty Ltd; and
- Spectrum Acoustics.

1.3 ANNUAL AEMR REVIEW & INSPECTION

The WCC AEMR for 2011-2012 was reviewed by DRE and found that WCC was in compliance with its environmental requirements of the Mining Lease, MOP and the AEMR. In correspondence dated 4th May 2012, DRE noted that there was a shortfall in the rehabilitation completed for the year and was due to the timing of the arrival of earthmoving equipment just outside the reporting period and therefore, rehabilitation targets are on track.

2. OPERATIONS DURING THE REPORTING PERIOD

The extent of operations at the WCC mine is presented in **Figure 2.1** for the beginning of the 2012-2013 period and **Figure 2.2** for the end of the 2012-2013 period.

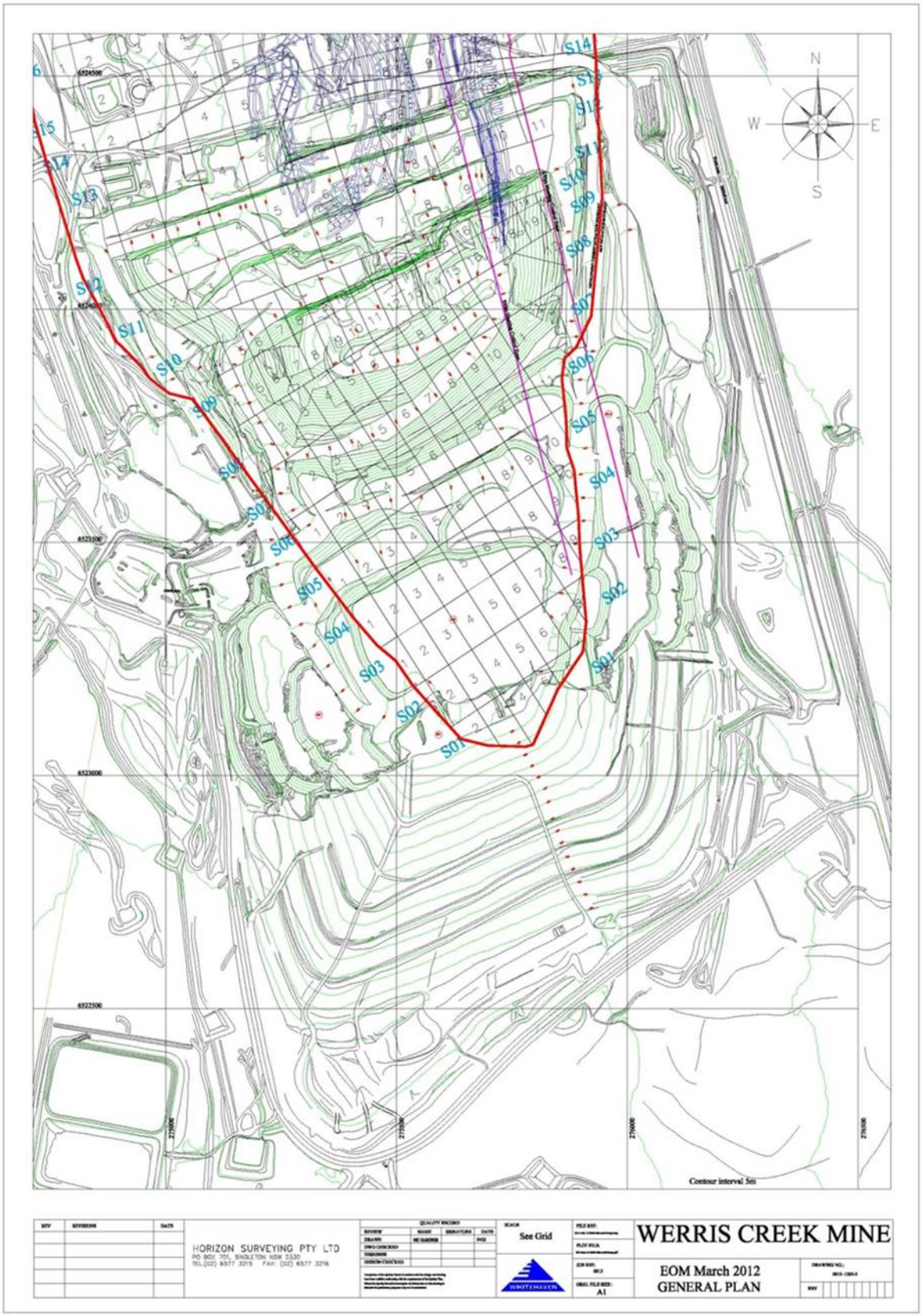


Figure 2.1 Werris Creek Coal Mining Operations as at the start of April 2012

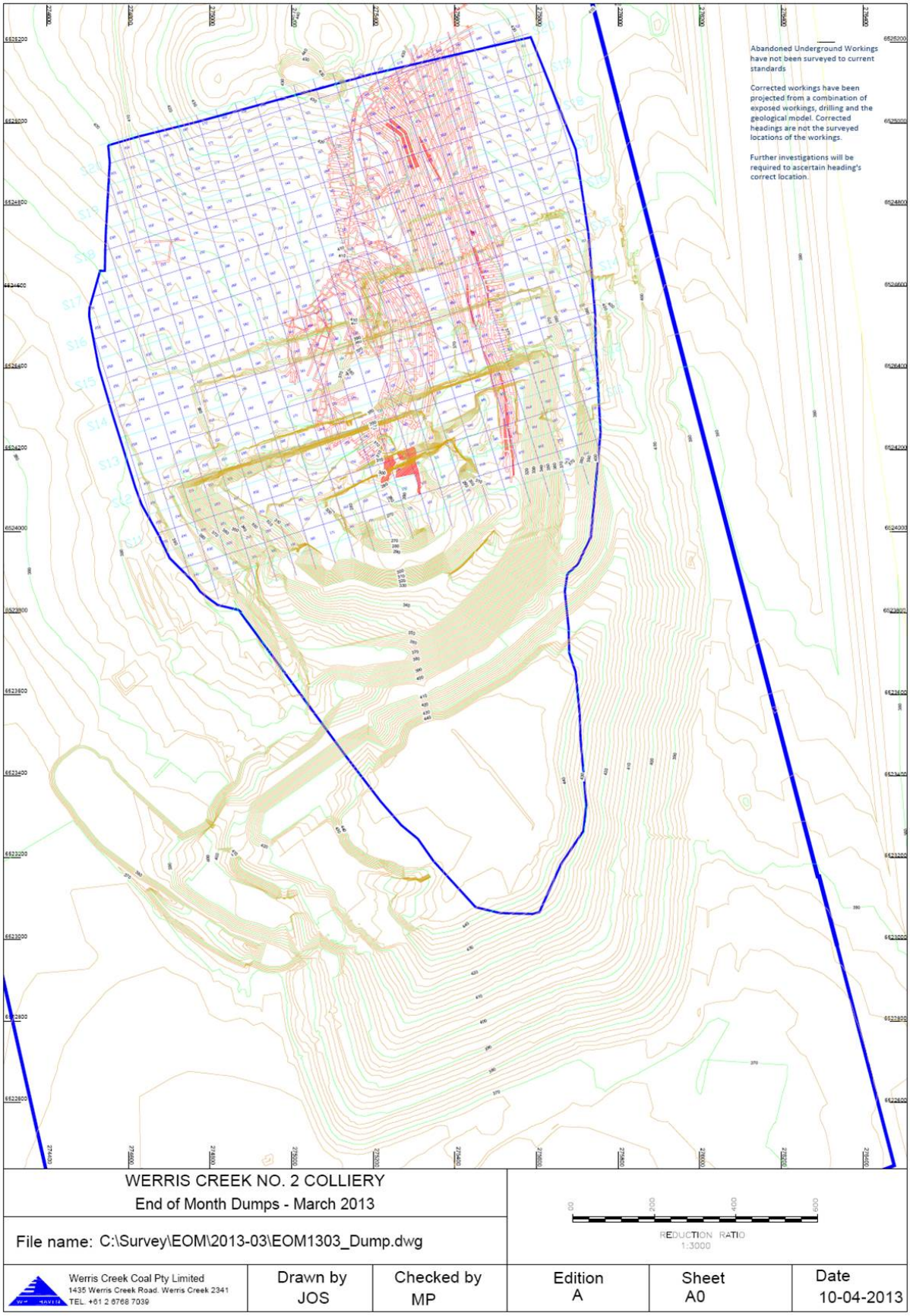


Figure 2.2 Werris Creek Coal Mining Operations as at the end of March 2013

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, 2013) and verify the location of the former underground workings. The WCC drilling program during the year ending March 2013 achieved a total meterage of 2,800m focussed in front of the highwall (Coxhead, 2013). Seventeen open holes were drilled for a total of 1,830m, including redrills. Six partly cored HQ wireline holes were drilled for a total of 969.71m. Thirteen boreholes were drilled in ML1563, and 10 in ML1672. All boreholes were geologically logged. Three of the cored holes were sampled and tested for seam gas content and composition, to enable fugitive GHG emissions to be estimated. Raw coal quality parameters were determined for all coal cored. The location of drilling for 2012-2013 is outlined in **Figure 2.3**.

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°, 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.

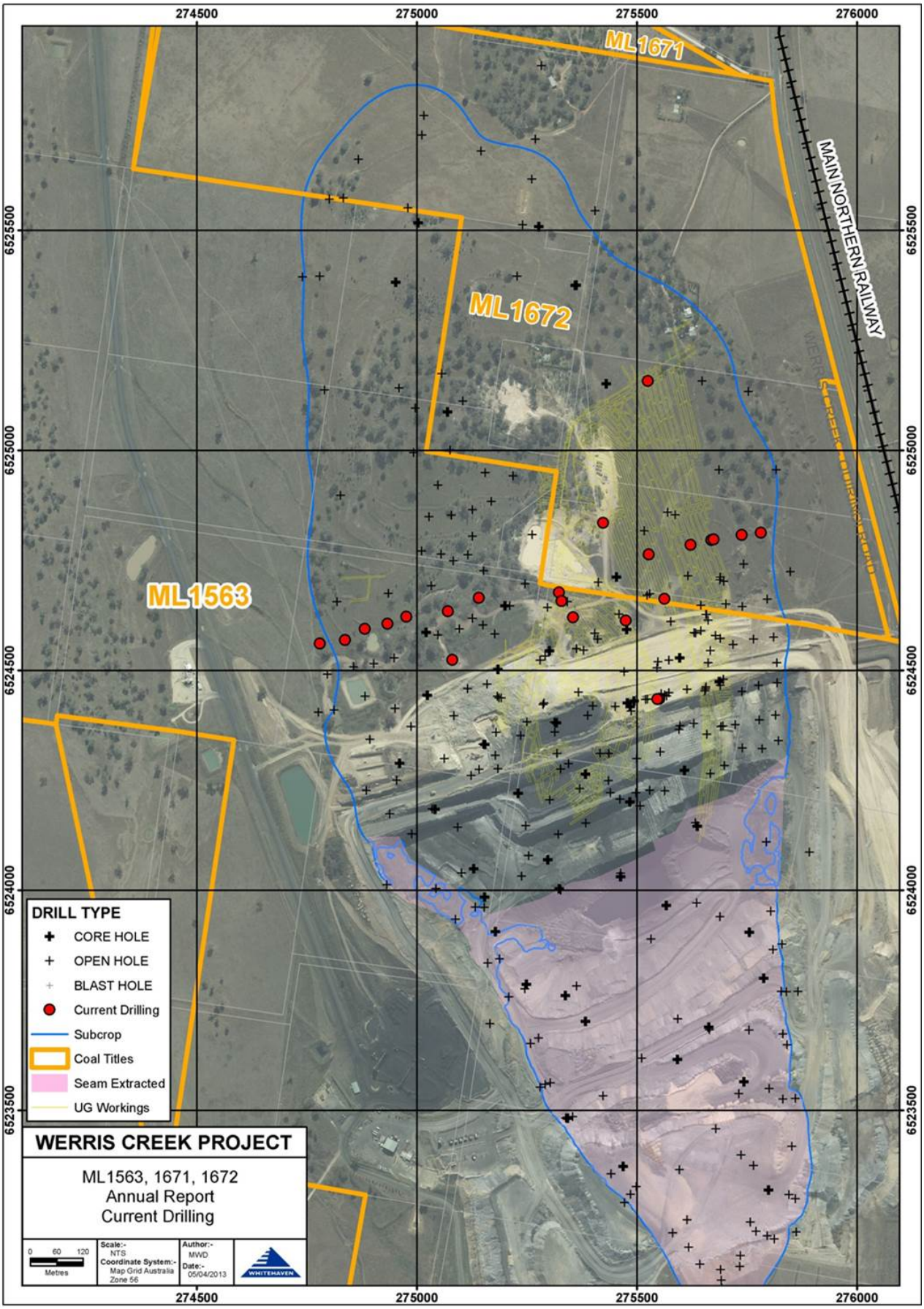


Figure 2.3 Annual Drilling Program for WCC Mine as at the end of March 2013

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, 2012) identified the coal resource as 31.5 million tonnes (Mt) (**Table 2.2**).

Table 2.2 Werris Creek Coal Resource Summary

Category	ML 1563 / ML 1671 / ML 1672
Measured	21.8Mt
Indicated	7.7Mt
Inferred	2.0Mt
TOTAL	**31.5Mt**

The most recent reserve statement (Minarco-Mineconsult, 2012) identified a proved and probable reserve of 27.2Mt 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	20.1Mt
Probable Reserves	7.1Mt
Proved + Probable	**27.2Mt**

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 draft Biodiversity and Offset Management Plan (BOMP).

Surface disturbance throughout the 2012-2013 reporting period increased due to required clearing activities associated with one-off expansion of the Western Dump, Rail Loop and Mine Infrastructure Area (MIA) construction in accordance with PA10_0059; in addition to the annual advancement of the open cut pit.

A total of 148.1ha of land was disturbed (**Figure 2.4**) during 2012-2013. A total of 162 mature trees, of which 138 were hollow bearing (less than one hollow bearing tree per hectare) were cleared because most of the disturbance was of grassland/former agriculture paddocks to mitigate impacts to biodiversity. 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 draft BOMP.

Stripping of topsoil was undertaken ahead of the MIA construction, western dump extension and the pre-strip area in advance of the open cut with varying soil depths stripped from 0 to 50cm depending on the amount of viable soil available. The MOP indicatively nominates 0.3m of soil should be stripped. At the end of the reporting period, the total volume of soil stockpiled increased from 1,064,790m^3 to 1,162,109m^3 with a total of 273,319m^3 soil handled during the period. The increase in soil stockpile volumes was because of the increased area of disturbance for 2012-2013. Rehabilitation completed during the period respread 176,000m^3 of topsoil and subsoil, with a quarter of the topsoil directly placed from stripping areas onto rehabilitation while the rest of the topsoil and subsoil was sourced from existing soil stockpiles. **Figure 2.5** displays the locations of the soil stockpile areas as at March 2013.

2.3 CONSTRUCTION

During the reporting period, WCC undertook a significant amount of construction activities approved as part of the Life of Mine (LOM) Project including the construction of a new northern MIA area for the relocation of the administration, workshop and crushing plant which was required to allow the western dump (out of pit) to expand. The new northern MIA was constructed over a 40ha site (**Figure 2.6**) with the material used to build the MIA pad sourced from gravel material won from within the open cut. The construction of the northern access from Escott Road and the upgrade to Escott Road was indefinitely deferred during the period because of the coal industry downturn, with the existing southern access road extended around the western dump to link with the northern MIA.

The other major construction activity during the period included the augmentation of the previous 20ML Void Water Dam 1 (VWD1) to a capacity of 250ML. PA10_0059 MOD1 was approved to allow the extension of the existing facility into 5ha of the previous Biodiversity Offset Area (BOA). A qualified dam engineer designed and reviewed the construction as per the design in accordance with Schedule 3 Condition 23a (PA 10_0059 MOD1). A reputable earthmoving contractor constructed the augmented VWD1 as a “turkey nest” using scrapers, compactors, dozers and a water cart and was completed in December 2012. The middle of the dam footprint has the dimensions 350m by 250m and was constructed to a permeability standard of $1x10^{-9}$m/s.

Other minor construction activities for 2012-2013 included the new Explosive Magazine and replacement dirty water dams (SB11 and SB12) for those that were being consumed by the western dump extension. The new Explosive Magazine location was approved by PA10_0059 MOD1 requiring a minor modification to the BOA because of the prohibitive constraints for the original location proposed in the LOM Environmental Assessment.

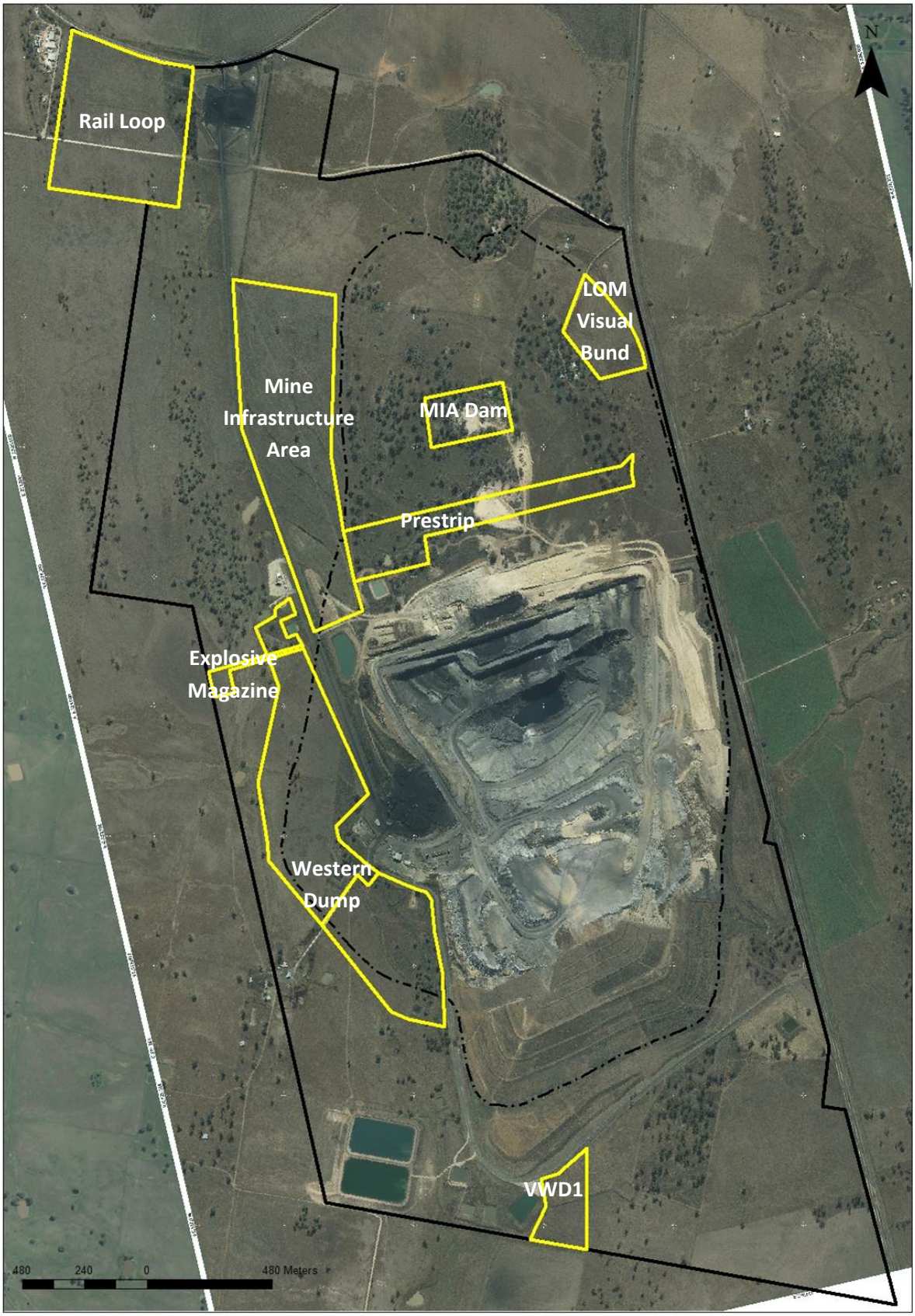
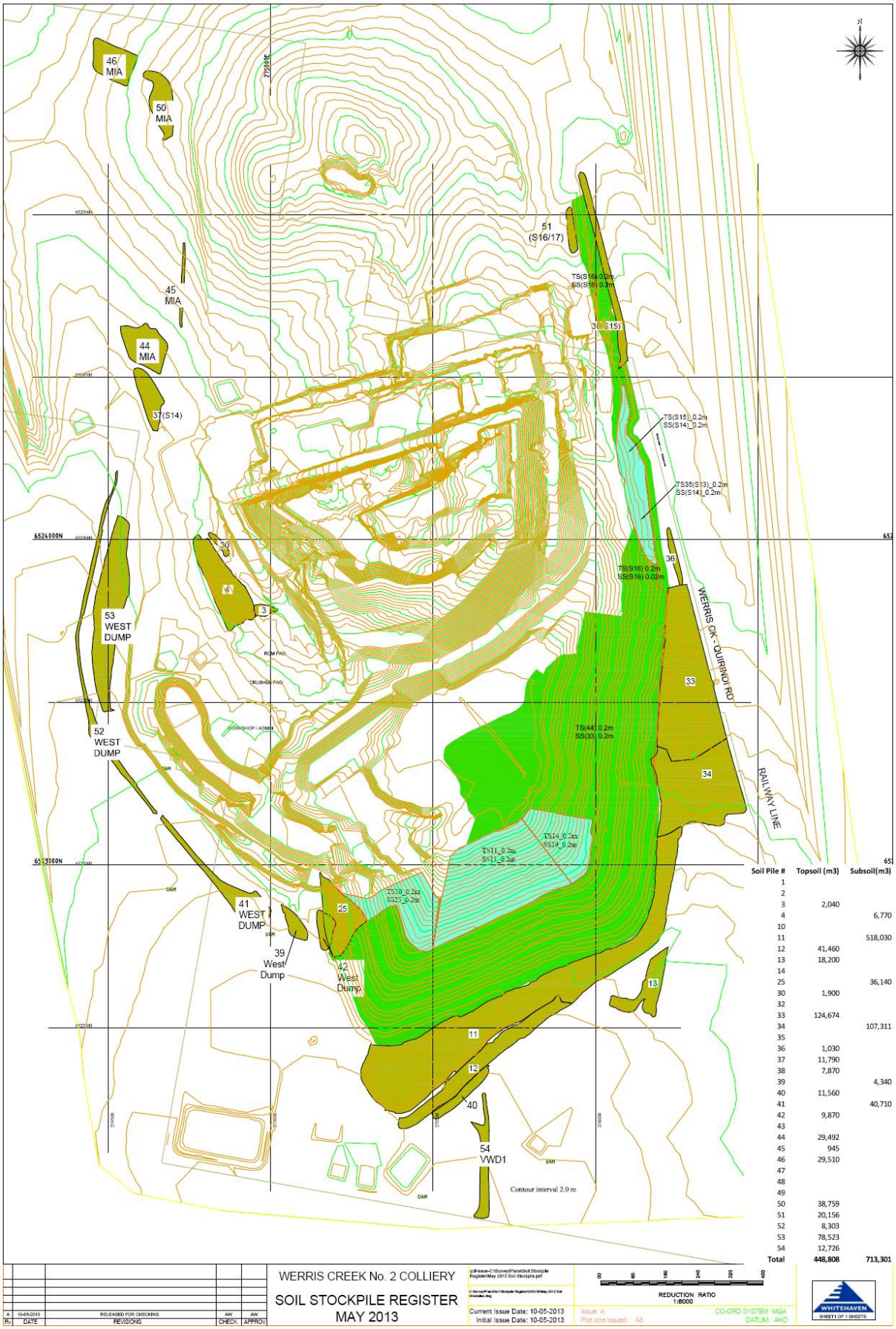


Figure 2.4 Land Disturbance and Vegetation Clearing at WCC Mine for 2012-2013



Soil Pile #	Topsoil (m3)	Subsoil(m3)
1		
2		
3	2,040	
4		6,770
10		
11		518,030
12	41,460	
13	18,200	
14		
25		36,140
30	1,900	
32		
33	124,674	
34		107,311
35		
36	1,030	
37	11,790	
38	7,870	
39		4,340
40	11,560	
41		40,710
42	9,870	
43		
44	29,492	
45	945	
46	29,510	
47		
48		
49		
50	38,759	
51	20,156	
52	8,303	
53	78,523	
54	12,726	
Total	448,808	713,301

Figure 2.5 WCC Soil Register and Stockpiles

Figure 2.6 Design of WCC Northern Mine Infrastructure Area

Planned construction activities for the next reporting period:

- Completion of the Northern MIA including the Workshop and Crushing Plant;
- Rail Loop off the existing Werris Creek Rail Spur Line to the west of the existing Train Load Out Facility; and
- Deepening of VWD1.

2.4 MINING

During the 2012-2013 reporting period, a total of 12,162,195 bcm of overburden was removed to produce 1,463,704t of ROM coal at an average overburden to coal stripping ratio of 8.3:1 (**Table 2.4**). Compared to the previous period, coal production decreased by 100,490t however the quantity of overburden removed increased by 284,891 bcm.

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

	Start of Reporting Period 1st April 2012	At end of Reporting Period 31st March 2013	End of next Reporting Period 31st March 2014
Soil Stripped (m^3)	1,189,990	1,646,798	1,721,000
Soil Used/Spread(m^3)	308,689	484,689	525,000
Waste Rock (bcm)	55,099,611	67,261,806	88,512,000
ROM coal (t)	8,212,037	9,675,741	12,175,000
Product coal (t)	8,212,037	9,675,741	12,175,000

For the 2013-2014 (financial period), Whitehaven Coal management have set the budget coal production target to 2.5Mtpa (up from the previous budget of 2Mtpa) to offset lower production from its other operations as well as WCC being Whitehaven Coal's lowest cost producer. To achieve this production increase, WCC will utilise the equipment initially purchased for the deferred Whitehaven Coal Vickery Project. The proposed fleet of 1 x Hitachi 5600 Excavator and 10 x CAT 793XQ trucks will partially replace an existing Hitachi 1900 Excavator and 11 x CAT 785 trucks to maximise operational efficiencies enabling 2.5Mtpa coal production despite the increasing strip ratios/overburden thicknesses as mining progresses through the syncline (deepest point) of the coal deposit.

2.5 PROCESSING AND PRODUCT COAL TRANSPORT

Processing, involving crushing and screening, is undertaken 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. The ROM coal 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. The processing plant also incorporates a divergater to enable the separation of particular sized materials to suit specific customer requirements. 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 1,439,487t coal was processed through the crusher. Domestic coal produced includes 14,930t transported by 501 trucks by road and 147,161t railed offsite. Total coal railed offsite (domestic and export) was 1,381,053t from 243 trains.

Figure 2.7 Coal Movements and Production Summary for 2012-2013 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 fortnightly basis.

- The WCC offices and workshop collect all recyclable shredded paper and cardboard which is deposited in specified recycling bins and are collected by the Quirindi Aboriginal Corporation for sorting and recycling at their depot.

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 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 of by Gunnedah Windscreens and Batteries.
- Waste tyres are disposed of by Browns Tyre Service.

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 (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 2012-2013 period.

Table 2.5 Quantities of Waste Generated for 2012-2013

2012-2013	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
General Waste (m^3)	97	98	98	90	114	90	108	93	90	114	90	90	1172
Scrap Metal (t)	31.3	0	0	0	0	31.3	0	0	0	0	31.3	0	93.9
Waste Oil (kL)	18	7	11*	11*	14	7	11*	11*	9	11*	11	9	130

* Estimate of monthly Waste Oil disposed based on annual average of 11kL

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 250,000t ROM coal. At the end of the March 2013, there was 110,661t of Product coal stored at the Rail Load-out Facility and 30,012t 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 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 both rainfall runoff and groundwater 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 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). 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. Clean water and dirty water is separated and diverted using a series of contours, diversion drains and dams and appropriate erosion and sediment control.

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 11 discharge events during this AEMR period as a result of wet weather and controlled discharges which reflects the above average rainfall experienced in

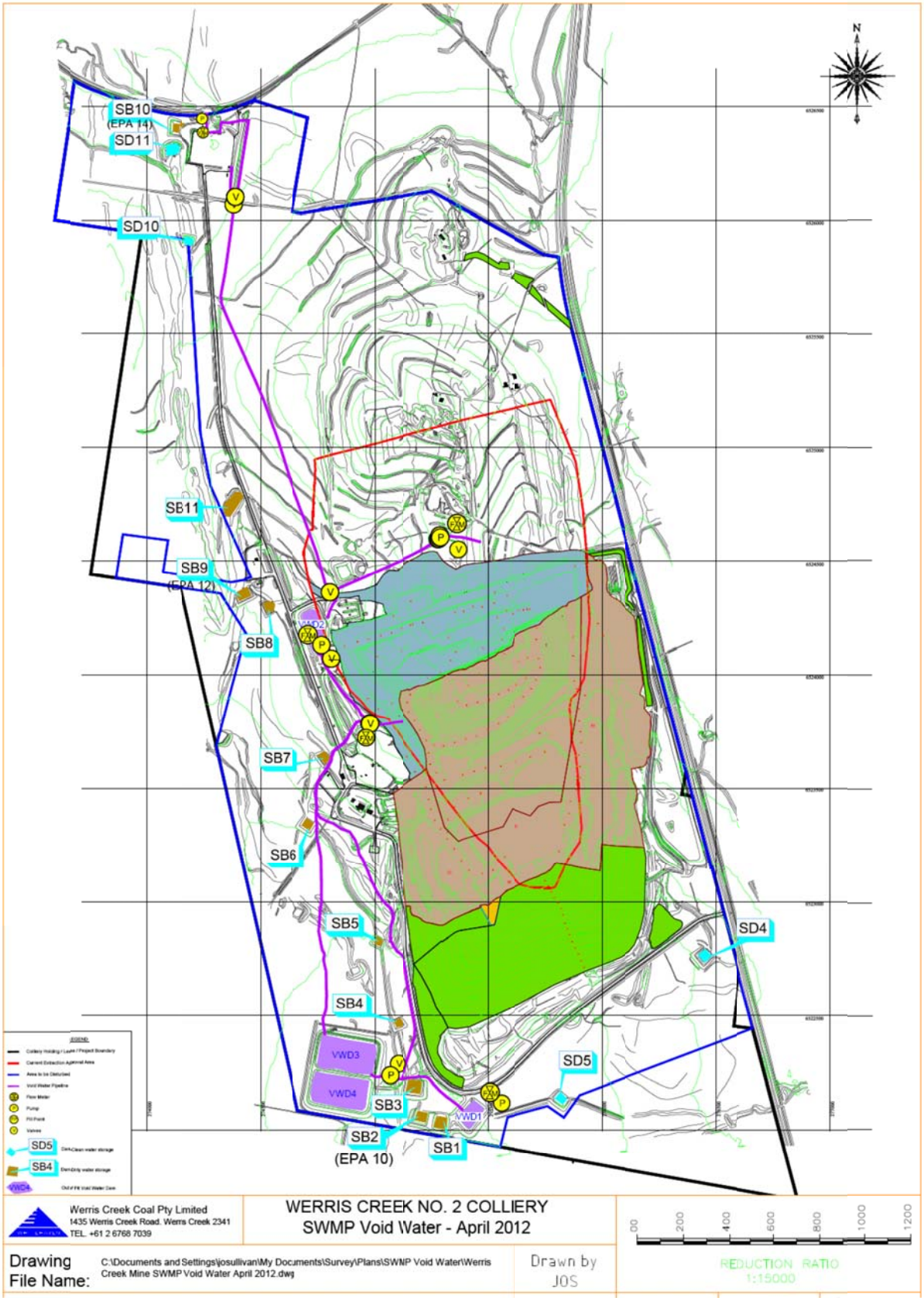


Figure 2.8 WCC Void Water Management System for 2012-2013 Period

the 12 months to the 31st March 2013 (**Table 2.6**). All controlled and wet weather discharge events from the dirty water system were in compliance with the conditions of EPL 12290 and PA 10_0059. An estimated 5.5ML of water was discharged during controlled discharge events during the period. There were a number of discharge events that recorded TSS levels above the 50mg/L criteria. However, these events occurred following rainfall in excess of 39.2mm over the preceding 5 days, with all practicable measures taken to dewater the storage dams in advance of the rainfall. As a consequence, the discharge was in accordance with Condition L2.5 of EPL12290.

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
13/7/2012	**SB9**	7.79	346	100	<5	Wet Weather	56.0mm	Compliant
31/7/2012	**SB2**	8.26	507	10	<5	Controlled	Not Applicable	Compliant
6/08/2012	**SB9**	7.97	732	33	<5	Controlled	Not Applicable	Compliant
25/09/2012	**SB9**	8.49	353	<5	<5	Controlled	Not Applicable	Compliant
24/12/2012	**SB2**	7.99	368	110	<5	Wet Weather	63.0	Compliant
24/12/2012	**SB9**	7.20	166	1530	<5	Wet Weather	63.0	Compliant
29/01/2013	**SB2**	7.40	199	298	<5	Wet Weather	148.6	Compliant
29/01/2013	**SB9**	6.88	169	198	<5	Wet Weather	148.6	Compliant
29/01/2013	**SB10**	7.32	202	508	<5	Wet Weather	148.6	Compliant
25/02/2013	**SB2**	7.97	281	62	<5	Wet Weather	116.4	Compliant
25/02/2013	**SB9**	7.28	158	82	<5	Wet Weather	116.4	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	122	173
	Total	**271**	**256**	**307**
	Excess (+ve) or Deficit (-ve)	**0**	**0**	**+29**

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

		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

During the reporting period, VWD1 and VWD3 capacity was augmented, with the construction of the new MIA Dam (VWD5) within the open cut footprint providing additional water supply to the new northern MIA. This has increased the void water storage (operating) capacity to 722ML (VWD1 – 238ML, VWD2 – 25ML, VWD3 – 214ML, VWD4 – 145ML and VWD5 – 100ML). Modification of the clean and dirty water system mainly due to the MIA and Rail Loop construction saw the clean water system capacity reduce by 5ML; while the dirty water system capacity increased by 6ML with two new dams constructed (SB11 and SB12), four renamed (SD11, SD10, Farm 5 and Farm 4 renamed to SB13, SB14, SB15 and SB16 respectively) and five dirty water dams removed (SB6, SB7, Farm 2, Farm 3 and Farm 6). The exact quantity of water within the former underground workings cannot be estimated anymore with the monitoring bore being mined through, however, most of the former underground workings are maintained saturated up to the level that they are intersected in the open cut pit to mitigate the risk of fire due to spontaneous combustion. **Table 2.9** presents an estimate of the volume of stored water at the beginning and end of the 2012-2013 reporting period. Details for individual storages are presented in **Table 2.10**.

Table 2.9 Summary of WCC Onsite Water Storage

	Volumes Held (ML)		
	Start of Reporting Period	At end of Reporting Period	Nominal Storage Capacity
Clean Water (in Storage Dams)	10.5	9.0	9.1
Dirty Water (in Sediment Basins)	42.0	36.9	65.3
Void Water (in Void Water Dams)	262.0	547.0	722.0

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

Label	Function	Capacity (ML)	Source of Capacity	Storage @ March 2013 (ML)
Clean Water Storage Dams				
SD4	Clean water capture and use Diversion of Clean water around mine	5.1	Surveyed	5.0
SD5	Clean water capture and use Diversion of Clean water around mine	4.0	Surveyed	4.0
Total Capacity of All Clean Water Dams		**9.1**		**9.0**
Dirty Water Sediment Basins				
SB13	Northern Area – Dirty water capture, treatment and use	3.0	Estimated	3.0
SB14	Northern Area – Dirty water capture, treatment and use	1.9	Surveyed	1.9
SB10	Northern Area – Dirty water capture, treatment and use EPL discharge point (NO. 14)	2.85	Surveyed	2.5
SB11	Middle Area – Dirty water capture, treatment and use	11.0	Surveyed	0.0
SB15	Middle Area – Dirty water capture, treatment and use	0.45	Estimated	0.45
SB16	Middle Area – Dirty water capture, treatment and use	4.2	Estimated	4.0
SB8	Middle Area – Dirty water capture, treatment and use	3.0	Estimated	3.0
SB9	Middle Area – Dirty water capture, treatment and use EPL discharge point (NO. 12)	4.0	Partially Surveyed	3.0
SB1	Southern Area – Dirty water capture, treatment and use	7.0	Estimated	6.0
SB3	Southern Area – Dirty water capture, treatment and use	6.5	Estimated	6.0
SB4	Southern Area – Dirty water capture, treatment and use	2.5	Estimated	2.0
SB5	Southern Area – Dirty water capture, treatment and use	1.4	Estimated	1.0
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	4.0
Total Capacity of All Dirty Water Dams		**65.3**		**36.9**
Void Water Dams				
VWD1	Void water storage	238.0	Surveyed	185
VWD2	Void water storage	25.0	Surveyed	12
VWD3	Void water storage	214.0	Surveyed	210
VWD4	Void water storage	145.0	Surveyed	140
VWD5	Void water storage and MIA Water Supply	100.0	Surveyed	0
Total Capacity of Void Water Dams		**722.0**		**547.0**

2.8.4 Water Usage and Consumption

Site water usage and consumption is monitored monthly using water meters on key pipelines and observation of void water stored onsite. **Table 2.11** summarises total water usage and consumption for 2012-2013 reporting period.

Table 2.11 WCC Void Water Usage April 2012 to March 2013

WATER INPUTS				**+882.3ML**
Void Water	**Total Bore Extraction**		**53.8ML**	
		Groundwater Bore (WAL29506)*	53.8ML	
	Total Pit Dewatering		**828.5ML**	
		Rainfall Interception	454.1ML	
		Groundwater Excavation (WAL32224)*	103.6ML	
		In Pit Water Fill Point	103.7ML	
		Overburden Recharge	2.1ML	
		Water Pumping In Pit from VWD1/3	165.0ML	
WATER OUTPUTS				**-766.2ML**
Void Water	**Total Dust Suppression**		**388.5ML**	
		Haul Roads	376.3ML	
		Crushing Plant	5.3ML	
		Rail Load Out	6.9ML	
	Other		**377.7ML**	
		Workshop	41.6ML	
		Recycled Underground/Water Curtain	336.1ML	
NET WATER				**+116.1ML**

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.

A direct comparison between the water balance for the 2011-2012 period and for 2012-2013 is presented in **Table 2.11** and shows:

- Total water inputs for 2012-2013 increased by 472.8ML (excluding recycled water underground/water curtain) from the previous period;
- Total water outputs for 2012-2013 increased by 196.2ML (excluding recycled water) from the previous period;
- Recycled void water into the underground workings occurred either through a spear directly into the underground or a water curtain infiltrating from above the workings. Recycled void water underground for 2012-2013 increased by 218.8ML. The treatment of recycled water was changed from a Water Input to a Water Output in 2012-2013 because while the water technically does not leave the system, it is not immediately available to be pumped out of pit. The purpose of recycling water into the former underground workings is to mitigate potential fires due to spontaneous combustion while the former underground workings are being actively mined within the open cut. The reason for the increased water recycled underground was primarily due to larger areas of the former underground workings being intercepted in pit requiring management compared to the previous period;
- Rainfall intercepted in pit increased from 260.2ML in 2011-2012 (from 793.6mm) to 454.1ML (from 785.8mm) in 2012-2013. Rainfall intercepted is calculated as the residual volume from the total pit dewatering mass balance. December to February accounted for 59% of the rainfall for the 2012-2013, with the majority of the rain for those three months falling in

three high intensity rainfall events that would have resulted in higher than normal rainfall being intercepted in pit. However, the intensity of rainfall alone would not account for the 193.9ML difference in rainfall intercepted between 2012-2013 and 2011-2012;

- Groundwater extracted from the former underground workings decreased by 68.5ML for 2012-2013 because of the extra pit dewatering required and the need to maintain the former underground workings flooded to manage spontaneous combustion. Total groundwater pumped via the bore was 53.8ML for the period, however this in not comparable with WAL29506 allocation of 50ML which is for the period July to June;
- Pit dewatering increased by 496.3ML for 2012-2013. The extra water encountered in pit was problematic for mining the lowest benches in pit and was sourced from additional rainfall interception (as described above); groundwater interception (below) and water pumped back into the pit to allow construction to occur to VWD1 and VWD3;
- Environ Pty Ltd (ENVIRON, 2013 – **Appendix 4b**) reviewed the above water usage calculations for WCC and determined through running the groundwater model that 105.8ML of groundwater was sourced from the former underground mine workings (93.0ML), seepage from the Werris Basalt aquifer (10.6ML) and seepage from the overburden (2.1ML). 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 predicted to be 13ML/year by Year 3 (2014). 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 and does not account for the substantial increase in void water (input) encountered in pit for 2012-2013; and
- Dust suppression use increased for 2012-2013 due to increased focus on water carts for dust management. Haul road dust suppression increased by 187.3ML as the hours that water carts were operated increased by 86%.

In summary, WCC for 2012-2013 has had to manage 882.3ML of void water which is a significant increase from the previous period. This increase in void water is not reasonably explained by the estimated rainfall interception or groundwater intercepted for the period. In accordance with the draft Site Water Management Plan and annual review processes, WCC has engaged Environ to investigate and remodel the WCC groundwater model based on the actual quantity of water found in pit for the period. This additional void water encountered can be observed by the increase of 272ML stored in out of pit Void Water Dams comparative to the 2011-2012 period.

2.9 HAZARDOUS AND EXPLOSIVE MATERIAL MANAGEMENT

ANFO-based bulk explosives are used at the mine with electronic detonators used for blast initiation. The components of the bulk explosives, ammonium nitrate prill (AN) and emulsion are transported to and stored onsite by the mine blasting contractor at a dedicated precursor facility. At the precursor facility, emulsion is stored in a 80t over head tank and AN is stored in a 35t over head tank to allow quick filling of the explosive trucks. The blasting contractor holds two Dangerous Goods Notifications for the precursor facility and the explosives magazine. There are two magazines, one for storage of

detonators and the other for boosters. Both the precursor facility and explosives magazine are within ML 1563 and are shown on **Plan 4** (see Appended Plans).

WCC holds a Dangerous Goods notification for the three 60,000L diesel tanks. The tanks have double skinned bunding to mitigate any spills and are located in accordance with AS1940.

Materials Safety Data Sheets (MSDS) are retained on-site for all hazardous materials, independent of the quantity held. 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 blasting contractors Security Plan.

2.10 OTHER INFRASTRUCTURE MANAGEMENT

WCC only acquired one additional property during the reporting period. The acquisition of "Tonsley Park" occurred through private negotiation to alleviate future impacts mainly related to rail transport on the Werris Creek rail spur for these residents. **Table 2.12** details the properties purchased by the company and the subsequent dates of purchase since mining commenced at WCC.

Table 2.12 Project Related Properties

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".

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.

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**. A draft Air Quality and Greenhouse Gas Management Plan (AQGHGMP)(Advitech/WCC, 2012) has been submitted to DP&I for approval. 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) are 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 $PM_{2.5}$ is not a DECCW adopted assessment criterion, a $PM_{2.5}$ background concentration was not 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 2012-2013 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**. During the period, WCC expanded the air quality monitoring network by including an additional 13 dust deposition gauges, relocated HVAS (High Volume Air Samplers) to privately owned properties north/south/east and west of the mine and included a TEOM (Tapered Element Oscillating Microbalance) to measure real time PM_{10} and $PM_{2.5}$ in Werris Creek town.

Table 3.2 Air Quality Monitoring Program

Pollutant	Frequency	Method	Locations
$PM_{2.5}$ & PM_{10}	Continuous	TEOM	"Werris Creek Centre"(R92)
TSP	6 Days	HVAS	"Kyooma" (R98)
PM_{10}	6 Days	HVAS	"Kyooma" (R98), "Escott", "Glenara" (R11), "Tonsley Park" (R20)
>PM_{30} (Fallout)	Monthly	Deposited Dust	"Cintra", "Railway View", "Tonsley Park", "Plain View", "Marengo", "Mountain View", "Glenara", "Hazeldene", "Woodlands", "Talavera", "Kyooma", "Greenslopes", Werris Creek South, Werris Creek Centre, "Westfall", West Street, "Escott", "Eurunderee", 8 Kurrara Street, "Villamagna"

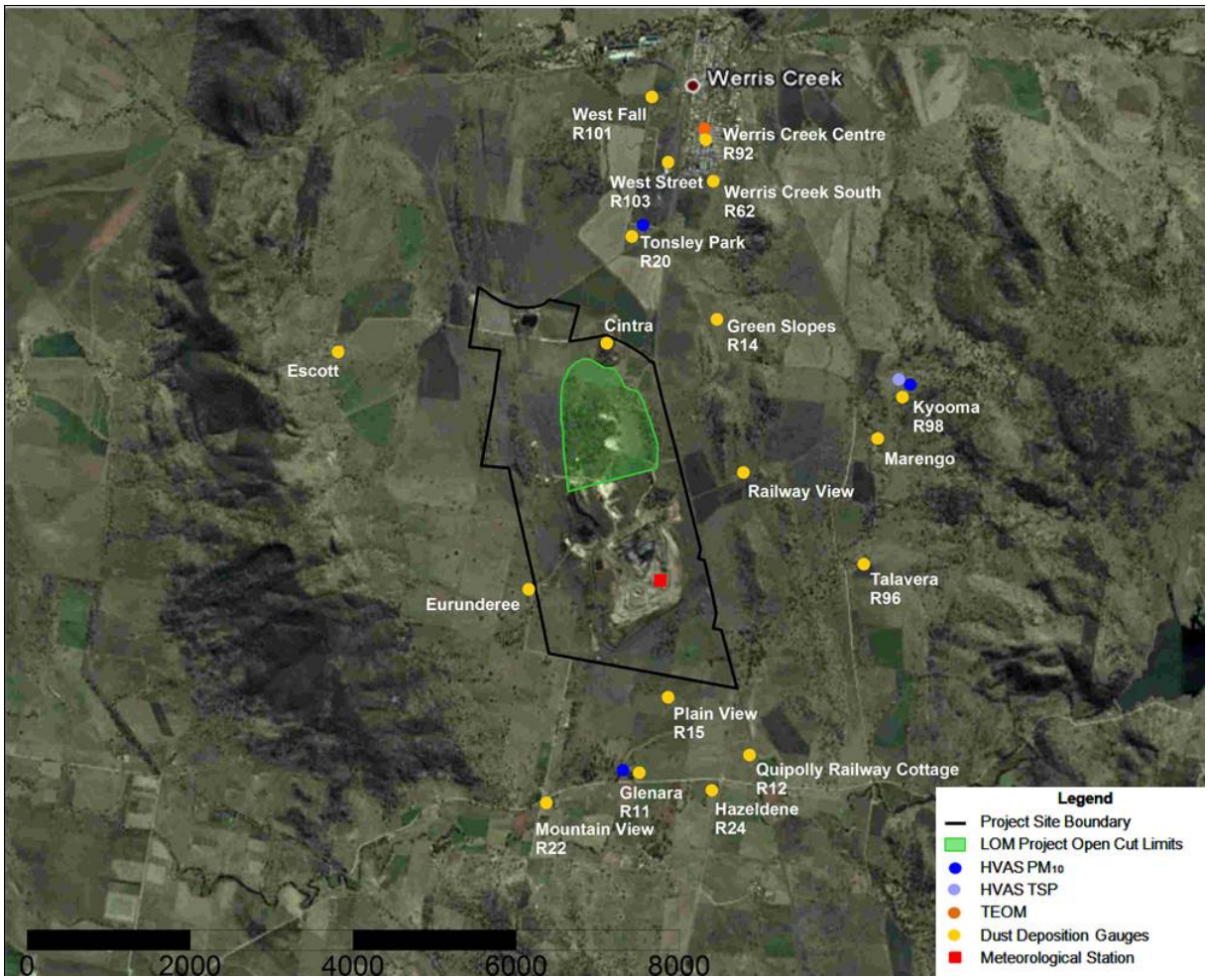


Figure 3.1 Air Quality Monitoring Network for 2012-2013

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 maintain its "*operations and activities ... in a manner that will minimise the emission of dust*" in accordance with EPL 12290. 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 two 30,000L Volvo wobbly, one 36,000L capacity semi-trailer, one 15,000L hire truck, one 12,000L water cart and one extra water cart dedicated to the active mining operations area and the coal processing and product coal stockpile areas. Compared to the 2011-2012 reporting period, where 189.7ML (15.5ML per month) of water was used for dust suppression activities, water usage in the 2012-2013 reporting period increased 105% to a total of 388.5ML (32.4ML per month). This rise in water usage for dust suppression was due to the additional 30,000L water cart available for use in the open cut as well as a focus on dust suppression as a means to manage excess water in pit.

The draft 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 high winds or dry conditions causing significant dust lift-off. If these activities cannot be adequately managed, they will be suspended until conditions improve.

- 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. All drill rigs also utilise curtains, vacuum extraction and spray water on the cuttings.
- Blasting will not be undertaken if on a 5 minute average, wind direction occurs between 182° and 204° (direction of Werris Creek township) or over 6m/s as 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 provided, 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 such as local farmers ploughing paddocks, fires or regional dust storms.

Table 3.3 provides 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 DG11 ("Glenara") which was affected by one extremely high dust result in July 2012 (as discussed below) and when this result is excluded, the average is below criteria. DG22, DG11, DG24, DG17, DG98 and DG15 recorded annual averages slightly above the levels predicted in the LOM Environmental Assessment and can be explained by the fact that all properties are managed as agricultural businesses and that the additional ambient dust recorded is from these properties being managed as grazing and cultivation enterprises. DG15 ("Plain View") is owned by WCC. Detailed monthly individual 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 2012: DG9 dust result was not representative of mining dust levels as organics were greater than 50% of the sample;
- June 2012: DG11 dust result was not representative of mining dust levels as organics were greater than 50% of the sample;
- July 2012: DG15 dust result was not representative of mining dust levels as organics were greater than 50% of the sample;

- July 2012: DG11 recorded 425g/m^2/month. “Glenara” was substantially higher than the other two dust deposition gauge results south of the mine, the dust recorded is not representative of WCC operations;
- August 2012: DG15 recorded 5g/m^2/month. “Plain View” could have been affected by dust from mining operations given that there was a north westerly wind for 25% of the month however the other four dust deposition gauges further to the south in Quipolly did not record a similar increase. “Plain View” is owned by WCC;
- August 2012: DG98, DG14, DG92, DG62, DG101, DG1, and DG3 dust results were not representative of mining dust levels as organics were greater than 50% of the sample;
- September 2012: DG11 recorded 4.5g/m^2/month; “Glenara” unlikely to have been impacted by mining operations given that the other five dust deposition gauge results in Quipolly and south of the mine did not record a similar increase;
- September 2012: DG20 dust result was not representative of mining dust levels as organics were greater than 50% of the sample;
- October 2012: DG9, DG22, DG98 and DG34 dust results were not representative of mining dust levels as organics were greater than 50% of the sample;
- November 2012: DG106 recorded 13.1g/m^2/month. Given that “Villamagna” is greater than 5km and was substantially higher than any of the five closer dust deposition gauge results in Quipolly and south of the mine, the dust recorded is not representative of WCC operations;
- November 2012: DG92, DG62 and DG98 dust results were not representative of mining dust levels as organics were greater than 50% of the sample;
- December 2012: DG11, DG24, DG92 and DG17 dust results were not representative of mining dust levels as organics were greater than 50% of the sample;
- January 2013: DG2 dust result was not representative of mining dust levels as organics were greater than 50% of the sample;
- February 2013: DG34 recorded 11.9g/m^2/month. 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;
- February 2013: DG103 dust result was not representative of mining dust levels as organics were greater than 50% of the sample;
- March 2013: DG17, DG96, DG98, DG14, DG62, DG92 and DG103 dust results were not representative of mining dust levels as organics were greater than 50% of the sample;

Table 3.3 Dust Deposition Monitoring Results April 2011 to March 2012 (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^	1.6	1.5	0.4	3.3*	4.0	-	1
-	DG5	Railway View^	1.2	1.2	0.3	3.2	4.0	-	0
#1	DG20	Tonsley Park^	0.9	0.9	0.3	3.3	4.0	1.1	1
-	DG15	Plain View^	1.8	1.8	0.6	5.0	4.0	1.0	1
-	DG9	Marengo^	0.7	0.8	0.2	1.6	4.0	-	2
-	DG22	Mountain View	1.3	1.3	0.1	3.5	4.0	0.7	1
#29	DG11	Glenara	37.1	1.6	0.3	425.0@	4.0	0.8	3
-	DG24	Hazeldene	1.1	0.8	0.4	3.6*	4.0	0.8	1
-	DG17	Woodlands	1.5	1.5	0.3	2.8	4.0	0.7	2
-	DG96	Talavera	0.7	0.7	0.2	1.4	4.0	0.8	1
#28	DG98	Kyooma	0.8	0.7	0.3	1.9	4.0	0.7	4
-	DG14	Greenslopes^	0.7	0.8	0.3	1.5	4.0	1.0	2
-	DG62	Werris Creek South	0.6	0.6	0.3	0.9	4.0	-	3
#30	DG92	Werris Creek Centre	0.9	0.6	0.2	2.5*	4.0	-	3
-	DG101	Westfall	1.1	1.2	0.3	2.7	4.0	-	1
-	DG103	West Street	1.1	0.9	0.5	3.2*	4.0	-	2
-	DG1	Escott^	0.8	0.8	0.3	1.6	4.0	-	1
-	DG3	Eurunderee^	0.7	0.7	0.2	1.6	4.0	-	1
-	DG34	8 Kurrara Street	2.5	1.0	0.4	11.9@	4.0	-	2
-	DG106	Villamagna	2.6	0.9	0.4	13.1@	4.0	-	1

^ 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)

WCC has undertaken dust deposition monitoring since 2005 and the annual averages since that time are presented in **Table 3.4**. The 2012-2013 average dust deposition results were higher than the previous years for those locations with longer term records. While the dust levels are well within criteria, an explanation for this could be the expansion of the western dump and additional disturbance associated with LOM project including the relocation of the Mine Infrastructure Area (MIA) in accordance with PA10_0059. The annual monitoring results do not identify any trend of increasing dust levels since 2005, however, it is likely that dust levels in the immediate area would have increased since the mine commenced. Nevertheless, the variations in the annual average levels more reflect the prevailing environmental conditions than specifically increasing dust levels associated with WCC. For example, drought conditions in 2005-2006 resulted in higher deposited dust levels when compared to recent reporting periods where relatively low levels of deposited dust where experienced due to the above average rainfall.

Table 3.4 Dust Deposition Monitoring Results from 2005 to 2012 (g/m^2/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	AQGHG MP Criteria
DG1	**Escott^**	0.6	-	0.6	0.8	0.7	0.5	0.7	-	-	0.8	4.0
DG2	**Cintra^**	0.6	-	1.2	1.4	1.1	1.3	1.6	1.4	1.4	1.5	4.0
DG3	**Old Colliery/ Eurunderee^**	0.6	-	1.5	2.3	2.9	3.7	2.5	-	-	0.7	*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	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	4.0
DG15	**Plain View^**	0.6	1.0	-	-	-	-	1.9	0.9	0.9	1.8	4.0
DG9	**Marengo^**	0.6	-	-	-	-	-	1.5	0.7	0.6	0.8	4.0
DG22	**Mountain View**	0.6	0.7	-	-	-	-	-	0.9	0.7	1.3	4.0
DG11	**Glenara**	0.6	0.8	-	-	-	-	-	1.3	1.2	1.6	4.0
DG24	**Hazeldene**	0.6	0.8	-	-	-	-	-	-	-	0.8	4.0
DG17	**Woodlands**	0.6	0.7	-	-	-	-	-	-	-	1.5	4.0
DG96	**Talavera**	0.6	0.8	-	-	-	-	-	-	-	0.7	4.0
DG98	**Kyooma**	0.6	0.7	-	-	-	-	-	-	-	0.7	4.0
DG14	**Greenslopes^**	0.6	1.0	-	-	-	-	-	-	-	0.8	4.0
DG62	**Werris Creek South**	0.6	-	-	-	-	-	-	-	-	0.6	4.0
DG92	**Werris Creek Centre**	0.6	-	-	-	-	-	-	-	-	0.6	4.0
DG101	**Westfall**	0.6	-	-	-	-	-	-	-	-	1.2	4.0
DG103	**West Street**	0.6	-	-	-	-	-	-	-	-	0.9	4.0
DG1	**Escott^**	0.6	-	-	-	-	-	-	-	-	0.8	4.0
DG3	**Eurunderee^**	0.6	-	-	-	-	-	-	-	-	0.7	4.0
DG34	**8 Kurrara Street**	0.6	-	-	-	-	-	-	-	-	1.0	4.0
DG106	**Villamagna**	0.6	-	-	-	-	-	-	-	-	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 3.5**. 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. Unlike 2011-2012, 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. It is unclear why the percentage of coal is higher on the western side of the rail line compared to the eastern. Also for 2012-2013 the outer dust gauges regularly recorded higher dust levels than the inner gauges, possibly indicating that urban/road and park (vegetation) ambient dust fall out is greater than from the rail corridor however this is unlikely to be statistically significant.

Table 3.5 Quirindi Train Dust Deposition Monitoring Results 2012-2013

	DDW30	DDW20	DDW13	DDE13	DDE20	DDE30	Guideline
Annual Average	1.1	0.9	1.0	0.9	1.1	1.5	4.0
Average Coal %	20.8%	22.5%	25.8%	25.9%	13.3%	13.3%	-
Average Coal g/m^2/month	0.22	0.20	0.25	0.24	0.15	0.20	-
Minimum	0.3	0.2	0.3	0.5	0.4	0.2	-
Maximum	1.8	1.5	1.7	2.4	2.4	3.6	4.0

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

3.1.5 TEOM and HVAS Monitoring

During the reporting period, WCC installed 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 3.6** 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 impact on Werris Creek so background was adopted for the annual PM_{10} predicted and background plus 10µg/m^3 for the daily PM_{10} predicted levels). The maximum the PM_{10} daily dust level during the period was 41.4µg/m^3 (30th October 2013), which is below the daily criteria of 50µg/m^3. The $PM_{2.5}$ annual average (for seven months) was below the annual criteria adopted in the draft AQGHGMP based on the interim guideline published by NEPM. There was one elevated daily $PM_{2.5}$ level of 29.1µg/m^3 recorded on 30th October 2013 due to a westerly wind indicating that WCC operations were not the source of dust measured in Werris Creek. The first two monthly results (September and October) that recorded a $PM_{2.5}$ monthly mean above 8µg/m^3 was when the prevailing wind direction was from the north west and unrelated to dust emissions from WCC.

Table 3.6 $PM_{2.5}$ and PM_{10} Monthly Results monitored by Werris Creek TEOM 2012 to 2013

	PM_{10} (µg/m^3)					$PM_{2.5}$ (µg/m^3)				
	Min	**Mean**	**Max**	**Daily Criteria**	**Annual Criteria**	**Min**	**Mean**	**Max**	**Daily Criteria**	**Annual Criteria**
April 2012	6.2	15.9	23.0	50	30	-	-	-	25	8
May 2012	11.4	15.3	25.8			-	-	-		
June 2012	3.7	12.1	18.7			-	-	-		
July 2012	6.3	8.6	10.7			-	-	-		
August 2012	7.1	10.4	17.0			-	-	-		
September 2012	7.3	15.3	26.5			3.1	8.9	16.4		
October 2012	4.6	18.1	41.4			2.3	10.7	**29.1**		
November 2012	2.7	14.3	33.8			0.0	6.8	20.5		
December 2012	2.3	13.1	28.3			0.8	6.5	17.9		
January 2013	0.1	14.2	36.1			0.0	7.8	23.0		
February 2013	3.6	8.3	15.2			2.1	4.7	8.4		
March 2013	2.7	10.3	25.9			1.5	5.4	16.9		
ANNUAL MEAN	13.0					7.3				
PREDICTED DAILY	25.1					Background + 10				
PREDICTED ANNUAL	15.1					Background + 2				

Bold = elevated result

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 3.7** summarizing the monthly results. The HVAS monitors were relocated at the end of the previous period from mine owned properties to neighbouring properties (Glenara and Kyooma are privately owned, while Tonsley Park was only acquired by Whitehaven Coal in November 2012) while maintaining the HVAS locations in a north/east/south/west structure around WCC to measure dust emissions representative of mining operations regardless of the prevailing wind direction. Consistent with the good PM10 air quality measured in Werris Creek during the reporting period, all four PM10 and one TSP HVAS averaged below the relevant annual criteria and no daily result for any monitoring location exceeding the 50µg/m^3 daily criteria during the reporting period.

Table 3.7 TSP and PM_{10} Monthly Average as monitored by HVAS 2012 to 2013

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 2012	15.1	15.3	15.1	22.6	50	30	55.3	90
May 2012	14.2	17.9	14.2	19.9			51.3	
June 2012	7.0	9.4	7.0	10.8			24.5	
July 2012	6.6	8.5	8.4	4.5			6.1	
August 2012	9.6	10.9	12.0	8.6			13.9	
September 2012	18.8	20.5	20.5	18.0			28.5	
October 2012	15.7	14.6	15.8	11.6			23.2	
November 2012	21.7	24.1	18.5	15.3			24.0	
December 2012	8.9	9.2	13.8	7.4			13.0	
January 2013	11.9	21.0	16.2	10.3			19.7	
February 2013	6.0	8.7	12.2	5.7			11.0	
March 2013	9.3	9.1	9.5	7.1			16.9	
MEAN	11.9	13.7	13.4	11.6			23.5	
MINIMUM	3.2	4.7	3.2	2.4			4.8	
MAXIMUM	33.0	36.0	34.3	48.8			114.0	
PREDICTED DAILY	-	41.8	37.8	32.6			-	
PREDICTED ANNUAL	-	19.4	16.7	16.0			32.8	

WCC has undertaken PM_{10} dust monitoring since 2005 and the annual averages since that time are presented in **Table 3.8** including the former HVAS monitoring locations. Comparing annual averages since 2005, there is a slight increasing trend of PM_{10} dust levels and is most evident at Tonsley Park. Increasing dust emissions from WCC is to be expected as WCC increases production rates, increases the area of disturbance plus the reduced distance to neighbouring properties over that time. All HVAS sites annual average dust levels for 2012-2013 were below the predicted levels in the LOM EA for Year 3 (Scenario 1) and below the estimated background levels.

Table 3.8 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	Annual Criteria
HVP11	**Glenara**	15.1	16.7	-	-	-	-	-	-	-	13.4	
HVP98	**Kyooma**	15.1	16.0	-	-	-	-	-	-	-	11.6	
HVP1	**Escott/Eurunderee**	15.1	-	13.5	15.4	16.8	16.9	17.7	12.2	11.7	11.9	**30**
HVP20	**Tonsley Park**	15.1	19.4	12.1	11.4	12.1	12.1	16.4	11.2	14.0	13.7	**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**

During the period, WCC missed a couple of 6 day HVAS as required by EPL 12290 Condition 5 M2.2. The HVAS sampled PM_{10} at "Tonsley Park" on 59 out of 61 required occasions and "Kyooma" on 60 out of 61 required occasions for 24 hour periods every 6 days. The PM_{10} samples were missed on 15th and 21st January 2013 at "Tonsley Park" was due to a locally significant wind storm on 13th January 2013 damaging the HVAS unit. The damage to the unit was reported by the property owners on 15th January 2013 and couldn't be fixed before the next run. The PM_{10} sample was missed on 4th December 2012 at "Kyooma" due to an overnight thunderstorm and lighting strike on the 3rd December 2012 tripping the major breaker switch on the actual power pole to the HVAS unit.

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 3.9**. There has been a significant increase in all complaints since 2010 from blasting and noise issues due to the increase in scale of mining operations and as a consequence of operations moving closer to the town of Werris Creek. Dust related complaints have also been slightly increasing since 2010, with Quipolly and Werris Creek residents evenly accounting for the number of complaints over that period. 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 air quality is good and even during January 2013 with the prolonged heat wave and Coonabarabran fire; air quality was still considered to be fair (four dust complaints in January 2013). Other dust complaints have occurred around the start and end of Winter because of the strong temperature inversions (warm days, cool nights) causing a haze over WCC. The complainants are explained that this is due to weather conditions, that the inversions trap dust generated by the mine instead of being dispersed under normal weather conditions and by mid-morning when the wind strength increases, the inversion lifts and the dust cloud dissipates. WCC is aware that the community perception of dust and air quality is a sensitive topic and management action planned for the next period is to expand the visual amenity bund along Werris Creek Road to reduce perception issues, implementation of wheel generated dust and material handing pollution reduction programs (in accordance with EPL12290) and acquisition a larger capacity water cart (80,000L) to improve dust suppression efficiency through less time spent refilling and more time on the road.

Table 3.9 Dust related Complaints since 2005

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

WCC performance against the Environmental Management System air quality related objectives and targets developed from the draft AQGHGMP for the period 1st April 2012 to 31st March 2013 is outlined in **Table 3.10**. WCC achieved three out of the four targets set for air quality related objectives. The number of dust related complaints and complainants increased for 2012-2013 period and while the complaints are not vexatious; as described above the majority of dust related complaints are related to community perception and weather conditions that WCC cannot manage. Implementation of the real time dust monitoring and management during the period has confirmed, as predicted in the Environmental Assessment, that Werris Creek has good air quality but it has not given WCC the expected reduction in community complaints.

Table 3.10 Dust Objectives and Targets 2012-2013

Activity	Objective	Indicator	Actual 2012-2013	Target 2012-2013	Actual 2011-2012
Dust	Complaint	# Complaints	**12**	7	7
		# Complainants	**11**	-	7
	Trafficable Dust	# Exceedances	**0**	0	0
	Overburden Emplacement	# Exceedances	**0**	0	0
	Dust Criteria	# Exceedances	**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 2012-2013. **Table 3.11** summarises the air quality annual review from the discussion above.

Table 3.11 AQGHG Annual Review 2012-2013

Annual Review	Discussion
Monitoring Results	• Criteria All dust monitoring results representative of WCC operations were with the criteria outlined in AQGHGMP. • Previous Year As expected, dust emissions have slightly increased for 2012-2013 period. • EA Predictions Dust monitoring results are generally within the predictions outlined in Environmental Assessment. Six dust deposition gauges recorded annual averages slightly above the levels predicted in the LOM Environmental Assessment and that the additional ambient dust recorded is from these properties being managed as grazing and cultivation enterprises.

Annual Review	Discussion
Complaints	• This Year Majority of dust complaints are related to community perception and weather events rather than specific dust events. • Previous Year Dust complaints increased from the previous year driven by increasing community awareness of WCC operations.
Compliance	• Criteria and other All dust monitoring results representative of WCC operations were within the criteria outlined in AQGHGMP. However HVAS samples were missed at Tonsley Park and Kyooma during the period not in accordance with EPL 12290 Condition 5 M2.2. • Objectives & Targets WCC achieved three out of the four targets set for air quality related objectives – WCC did not achieve a 10% reduction on complaints from 2011-2012.
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 2013-2014, there are five air quality improvement projects: • Larger capacity water cart (80,000L) • Wheel Generated Dust Pollution Reduction Program • Material Handled Dust Pollution Reduction Program • SAIL Coal Train Dust Mitigation • Extension of Visual Amenity Bund along Werris Creek Road
Management Plan Review	All management strategies and actions were implemented during 2012-2013.
Management Plan Revision	Update draft AQGHGMP to reflect: • Current Air Quality Monitoring Program. • New Pollution Reduction Program Projects. • Revised Energy/GHG Programs.

3.1.7 Greenhouse Gas (GHG)

Diesel combustion during the reporting period decreased 5% to 12,908,722L of fuel used at WCC possibly due to WCC truck fleet reducing the number of off highway trucks used in preference for larger and more efficient CAT XQ793 trucks. 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 3.12**.

Table 3.12 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

Electricity usage slightly increased to 1,303,860kWh for 2012-2013. 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 3.13**.

Table 3.13 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

During the Reporting Period, a total of 7,537 tonnes of explosives were used at WCC due to a change in the type of explosive product used at WCC to mitigate fume issues. 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 3.14**.

Table 3.14 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

The total GHG emissions for WCC decreased 5.8% for 2012-2013 mainly due to reduced diesel consumption. **Table 3.15** presents the total CO_2 equivalent GHG emissions and emissions per unit of production levels since 2005.

Table 3.15 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

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 2012-2013 GHG emissions are relatively in line with this estimation albeit at lower production levels.

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 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, 2012) 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 impermeable ($<1x10^{-9}$m/s) storage dams that are designed for zero discharge. Because all void water dams are prescribed dams by the NSW Dam Safety Committee, they have been designed to have 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 with the oil-water separator. Any oil collected is placed within the waste oil tank, while the water drains to the dirty water system.

The WCC surface water monitoring program is summarised in **Table 3.16** and **Figure 3.2**.

Table 3.16 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) BGD (Black Gully)	Quarterly & Within 12 hours after any overflow off-site from a sediment dam(s) on the premises occurring.	
Clean and Void Water Dams SD4 &SD5 VWD1, VWD2, VWD3 & VWD4	Quarterly	
Contaminated Water SB6	Quarterly	

3.2.2 Performance

Quarterly sampling of the water stored within the clean, dirty and void water dams (not including discharge water quality) and within Quipolly and Werris Creeks' was undertaken by WCC. The locations of the monitoring sites are presented on **Figure 3.3** with the detailed monitoring results included in **Appendix 4(a)**. **Table 3.17** presents the annual average results recorded at each location.

Table 3.17 Surface Water for Clean, Dirty & Void Water Dams and Quipolly & Werris Creeks'

Dam/ Creek	Monitoring Site (EPA No)	Number of Samples	pH	Conductivity (µS/cm)	Suspended Solids (mg/L)	Grease & Oil (mg/L)
VWD1	16	3	8.35	958	17	<5
VWD2	27	4	8.23	946	15	<5
VWD3	-	4	8.30	994	66	<5
VWD4	-	4	8.56	901	29	<5
SB2	10	4	8.36	507	28	<5
SB6	15	4	7.73	431	37	<5
SB9	12	3*	8.08	326	118	<5
SB10	14	4	7.90	343	65	<5
SD4	-	4	8.47	259	92	<5
SD5	-	4	8.20	286	40	<5
QCU	25	4	7.74	468	28	<5
QCD	26	4	7.96	822	19	<5
WCU	23	1*	8.06	868	8	<5
WCD	24	4	8.32	1223	29	<5

Dam/ Creek	Monitoring Site (EPA No)	Number of Samples	pH	Conductivity (µS/cm)	Suspended Solids (mg/L)	Grease & Oil (mg/L)
BGD	-	4	7.69	415	109	<5

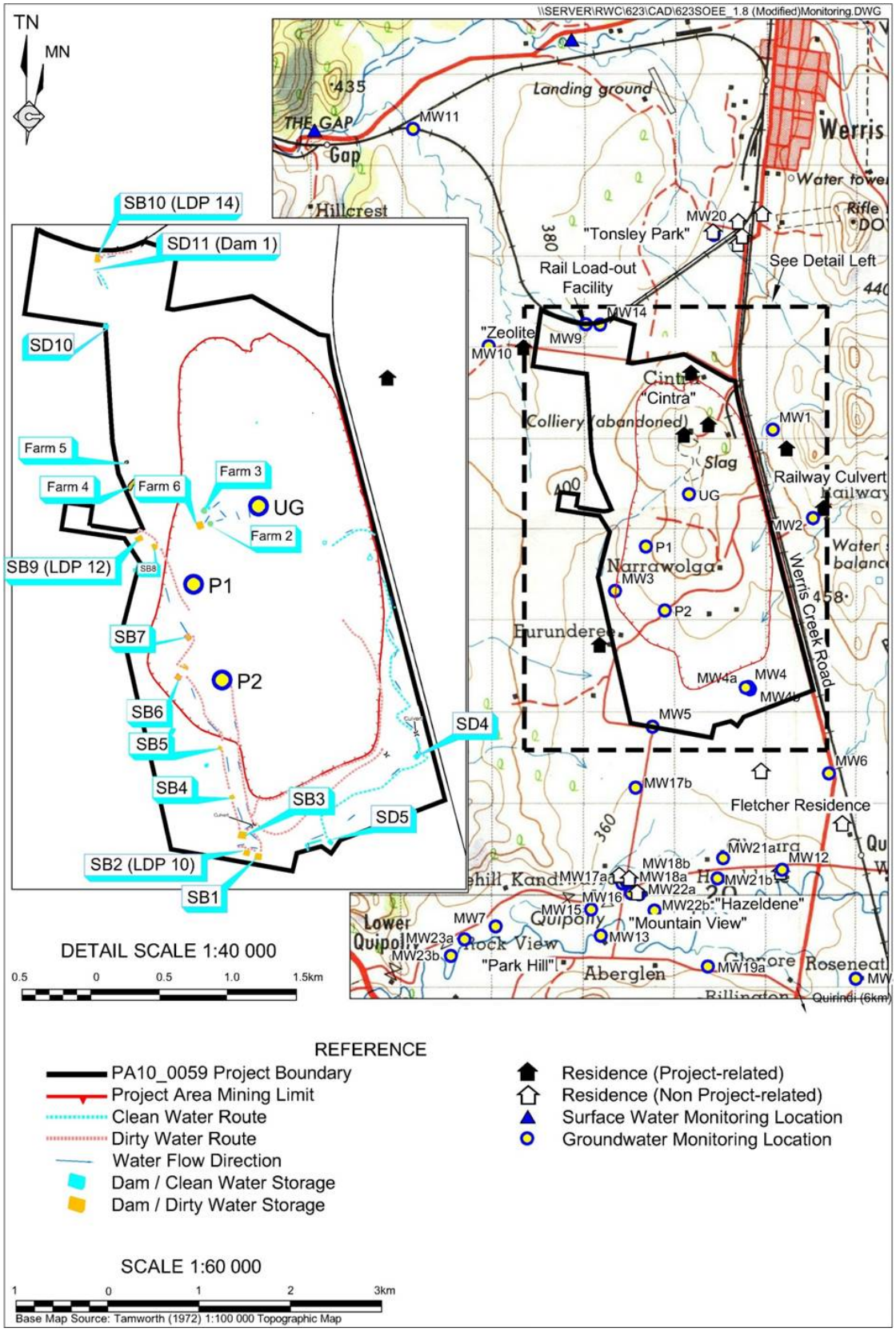


Figure 3.3 WCC Water Monitoring Network

The quarterly water quality was generally consistent with the previous reporting period, reflecting the above average wet weather conditions with slightly lower electrical conductivity and slightly higher turbidity, within the historical range of results monitored by WCC. Missed quarterly water samples for the period were because VWD1 was 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 11 offsite discharges from 8 events in accordance with EPL12290 with the results of sampling in Quipolly Creek and Werris Creek presented in **Table 3.18.** 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 and Werris Creeks. 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. The total dirty water discharged from controlled discharges during the reporting period was 5.5ML while Quipolly Creek flow rate is estimated to average 46ML per day (RCA, 2010). Therefore WCC discharges are only a minor contribution to both Quipolly and Werris 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 3.18 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	7	Minimum	6.94	97	16	<5
			Average	7.64	422	55	<5
			Maximum	8.36	528	102	<5
Quipolly Downstream	26	7	Minimum	7.02	112	6	<5
			Average	7.94	731	35	<5
			Maximum	8.55	926	182	<5
Werris Upstream	23	1	Minimum	7.78	452	<5	<5
			Average	7.78	452	<5	<5
			Maximum	7.78	452	<5	<5
Werris Downstream	24	1	Minimum	7.34	210	202	<5
			Average	7.34	210	202	<5
			Maximum	7.34	210	202	<5

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.

Void water management was discussed previously in detail in **Section 2.8.**

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 3.4** 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).

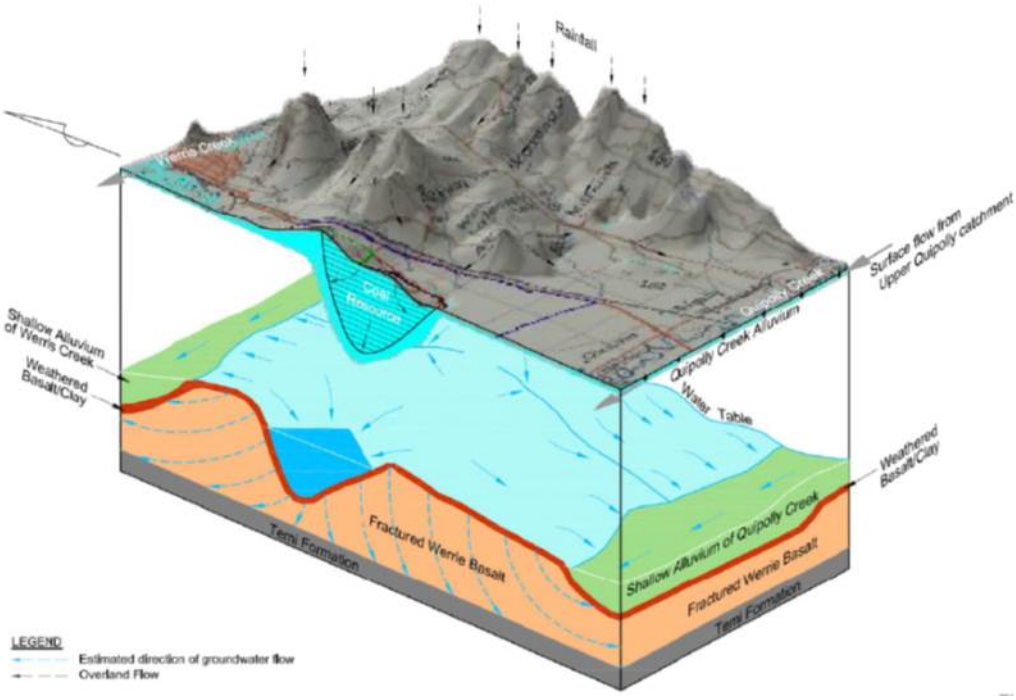


Figure 3.4 Conceptual Hydrogeological Model at WCC (taken from RCA, 2010)

Table 3.19 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 3.20**. **Figure 3.3** illustrates the locations of the six key piezometers that must be monitored under EPL 12290 (MW1 to MW6 corresponding to EPL ID 17 to 22).

Table 3.19 Aquifer Monitoring Locations

Aquifer	Bore/Piezometer
Coal Measures	UG Bore
Werrie Basalt	MW1, MW2, MW3, MW4B, MW5, MW5B, MW6, MW8, MW9, MW10, MW14, MW14B, MW19A, MW20, MW24A, MW25A, MW25B, P1, P2
Quipolly Creek Alluvium*	MW7, MW7B, MW12, MW13, MW13B, MW13D, MW15, MW16, MW17A, MW18A, MW18B, MW21A, MW21B, MW22A, MW22B, MW23A, MW23B, MW26
Currabubula Formation**	MW11

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

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

Table 3.20 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, MW26
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, MW26

WCC received approval from NOW and DP&I in 2005 for the Groundwater Contingency Plan which outlines the following trigger levels in **Table 3.21** which are regularly compared with actual monitoring results during the reporting period.

Table 3.21 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.

y a NATA accredited laboratory.

Table 3.22 presents monitoring data from the last 12 months for selected bores within each aquifer. 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 2012-2013 period. All groundwater sampling and analyses were undertaken by a NATA accredited laboratory.

Table 3.22 Selected Werrie Basalt and Quipolly Creek Alluvium Analysis 2012-2013

Site	Date	Level (mbgl*)	Field pH	Field EC (µS/cm)	Total Petroleum (C10-C36) Hydrocarbons (µg/L)
Quipolly Creek Alluvium Aquifer					
MW12	Long Term Average	7.82	7.21	753	<50
	3/07/2012	8.13	-	-	-
	13/09/2012	8.11	-	-	-
	16/11/2012	8.55	-	-	-
	24/01/2013	8.61	-	-	-
	26/03/2013	7.03	7.1	462	<50
	Average	**8.09**	**7.1**	**462**	**<50**
MW7	Long Term Average	4.40	7.1	521	<50
	25/03/2012	4.20	7.70	476	<50
	Average	**4.20**	**7.70**	**476**	**<50**
Werris Basalt Aquifer					
MW5	Long Term Average	8.34	7.13	2368	<50
	3/07/2012	8.63	-	-	-
	13/09/2012	8.41	7.43	2030	-
	21/11/2012	8.75	-	-	-
	25/01/2013	8.76	-	-	-
	25/03/2013	7.69	7.57	2260	<50
	Average	**8.45**	**7.50**	**2145**	**<50**
MW14	Long Term Average	15.79	7.11	1128	<50
	3/07/2012	16.09	-	-	-
	13/09/2012	16.36	-	-	-
	21/11/2012	16.75	-	-	-
	25/01/2013	17.05	-	-	-
	25/03/2013	16.71	7.28	1100	<50
	Average	**15.64**	**7.28**	**1100**	**<50**

* mbgl – meters below ground level; # incorrect field meter reading not used in the average; @water level reading taken when pump was running

The bi-monthly groundwater level monitoring results indicated that no groundwater water levels fell greater than 15% within the Quipolly Creek Alluvium and Werrie Basalt aquifer bores and piezometers. The changes in groundwater levels closely follow rainfall with all bores showing a decline until January 2013 due to the below average rainfall for the first nine months of the period before a rapid rise in response to the heavy rainfall across the Summer months. Groundwater levels are close to long term average levels measured since 2005.

There were no sustained changes in pH or EC greater than 15% within the groundwater response trigger values. The annual average for MW12's electrical conductivity reflects a change when compared to the long term average indicating a freshening of groundwater quality due most likely to consistent above average years of rainfall. 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.

No drawdown beyond natural fluctuations in any of the aquifers monitored by WCC was identified. 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.

Environ Pty Ltd updated the WCC groundwater model (ENVIRON, 2013 – **Appendix 4b**) based on actual water volumes encountered in 2012-2013 and estimated that a total of 105.8ML of groundwater was intercepted in pit with the former underground mine workings accounting for 93.0ML; seepage from the Werris Basalt aquifer was 10.6ML and seepage from the overburden emplacement was 2.1ML. 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 which was predicted to be 13ML/year by Year 3 (2014). 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. As discussed in **Section 2.8**, the additional groundwater make from the flooded former underground workings is outside that predicted in the LOM EA and does not account for the substantial increase in void water required to be dewatered from the pit for 2012-2013. In accordance with the draft Site Water Management Plan and annual review processes, WCC has engaged Environ Pty Ltd to investigate and recalibrate the WCC groundwater model based on the actual water volumes.

3.3.3 Review of Site Water Complaints and Site Water Annual Review

A summary of surface and ground water complaints received by WCC since operations commenced in 2005 is presented in **Table 3.23**. During the period there was one community complaint due to alleged surface water impacts and another complaint for groundwater level decline (associated impacts on Quipolly Creek level and water quality). The surface water complaint (August 2012) was related to a neighbour of a property owned by WCC (off the mine site) who alleged that a spillway of dam adjacent to the boundary fence had been modified and that turbid water from the mine was washing onto their property. WCC maintained that the spillway had not been modified as the property is managed by an agistee (not WCC), however WCC organised for the spillway to be modified to appease the neighbours' concerns. The source of turbid water was found to be from the cultivated paddock and not from WCC. The groundwater level complaint (January 2013) alleged that the mine had caused Quipolly Creek (and aquifer) water level to drop at their property 7km downstream of the mine. The investigation identified that rainfall year to date only had reached 64% compared to average and that the whole Quipolly alluvium aquifer water level had declined due to the reduced rainfall recharge. Subsequent to the complaint, heavy summer rainfall occurred resulting in a natural algal bloom in the complainants section of Quipolly Creek due to excess nutrients that had built up prior to the heavy rain. Independent water quality testing and analysis demonstrated that there were no water quality or health impacts and that the algal bloom was unrelated to WCC.

Table 3.23 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
Surface Water	1	0	2	0	0	0	0	1
Groundwater	1	0	0	0	0	3	0	1
All Complaints (inc Water)	**8**	**10**	**7**	**16**	**12**	**52**	**117**	**56**

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 2012 to 31st March 2013 is outlined in **Table 3.24**. WCC achieved both targets set for water related objectives. While the number of water related complaints increased for 2012-2013 period, this was to be expected given the long range forecast at the start of the period was for a return to El Nino (dry) conditions, which usually generate water related complaints.

Table 3.24 Water Objectives and Targets 2012-2013

Activity	Objective	Indicator	Actual 2012-2013	Target 2012-2013	Actual 2011-2012
Water	Discharge	# Exceedances	**0**	0	0
	Groundwater Level	# Complaints	**2**	2	0

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 2012-2013. **Table 3.25** summarises the site water management annual review from the discussion above.

Table 3.25 Site Water Management Annual Review 2012-2013

Annual Review	Discussion
Monitoring Results	• Criteria All dirty water discharge results were within compliance, although some discharges had elevated TSS due to excessive rain. • Previous Year Water results are consistent with the results from the previous period. • EA Predictions No surface water or groundwater impacts outside of those predicted in the Environmental Assessment.
Complaints	• This Year Two water related complaints for the period as expected. • Previous Year Water related complaints slightly increased from zero complaints the previous period.
Compliance	• Criteria and other All water monitoring was in compliance. WCC submitted an “works as executed” report to DP&I and EPA as required by PA10_0059MOD1. • Objectives & Targets WCC achieved both targets set for water related objectives.
Data Trends & Predicted Impacts	WCC is maintaining the former underground working flooded to manage spontaneous combustion. The groundwater model assumed the former underground workings would be pumped dry and WCC would encounter less water in pit than actual 2012-2013.

Annual Review	Discussion
Improvement Actions	For 2013-2014, WCC has engaged a hydrogeologist to revise and recalibrate the groundwater model to account for flooded underground workings and excess in pit water.
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 to expansion of western dump and construction of rail loop.
Management Plan Revision	Update draft SWMP to reflect: • Modified void water management system. • Modified dirty water management system. • Revised groundwater model.

3.4 CONTAMINATED LAND

The situation in regard to potentially contaminated or polluted land remains unchanged to date and at this stage there is no reason to suspect that contaminated lands would be present within ML 1563, 1671 and 1672 areas.

3.5 BIODIVERSITY

3.5.1 Management

A draft Biodiversity and Offset Management Plan (BOMP) has been prepared for the LOM Project in accordance with PA10_0059 Schedule 3 Condition 28 and the EPBC Act Approval 2010/5571. **Figure 3.5** 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 draft 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 aid to minimise the effect of key threatening processes that may impact upon vegetation communities and the known or potential threatened species that inhabit the site. The management actions specified within the BOMP include:

- Placing a caveat on the relevant land titles to conserve the offset area in perpetuity;
- Management of human disturbance;
- Management of grazing;
- Weed control;
- Bushfire management;
- Retention of regrowth and remnant native vegetation;
- In fill planting;
- Retention of dead timber;
- Erosion and sediment control;
- Soil and water management;
- Retention of rock; and
- Control of feral and overabundant native species.

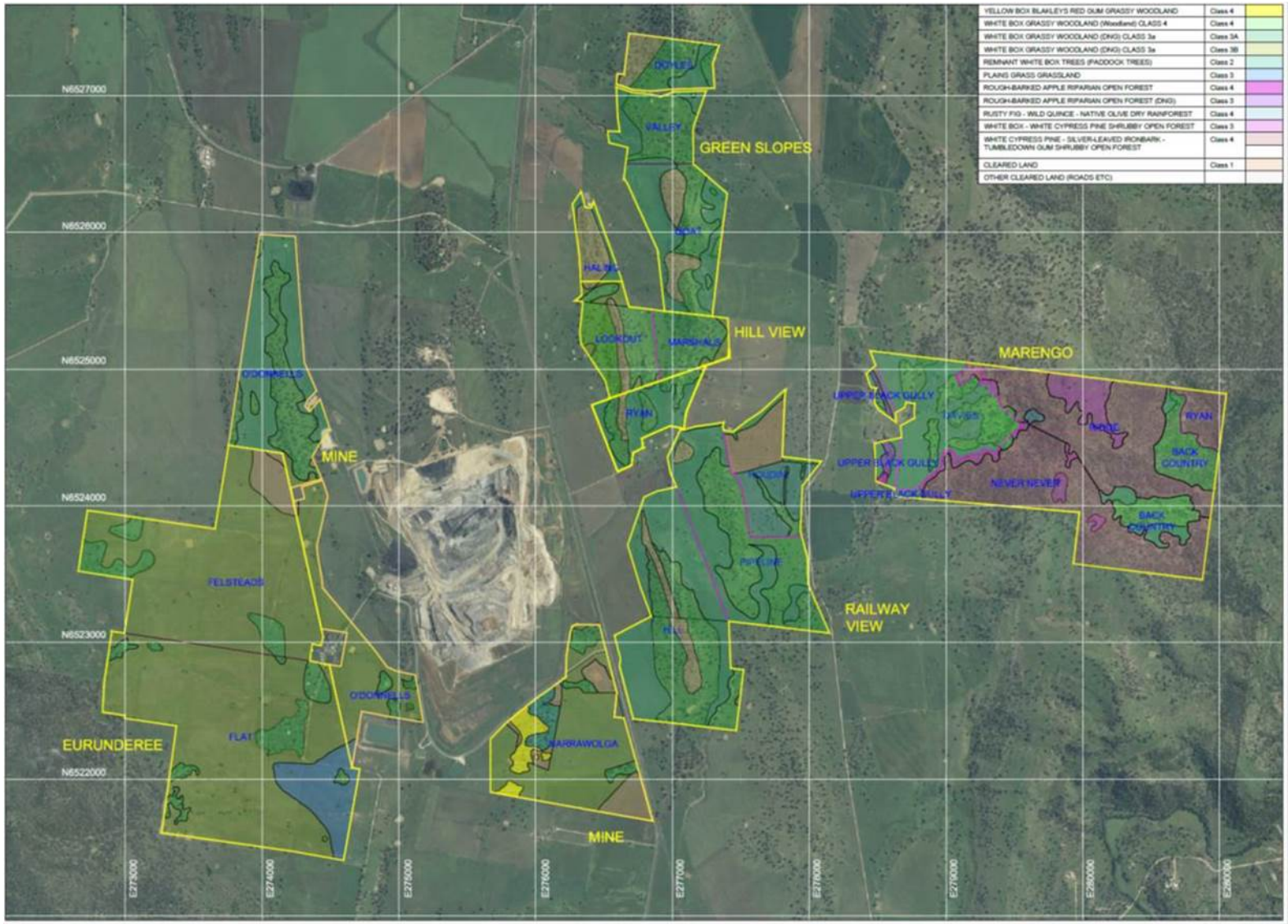


Figure 3.5 WCC Biodiversity Offset Area

3.5.2 Implementation and Performance

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

- In September 2012, WCC took control over the whole BOA discontinuing grazing and destocking those properties. This required some new fencing to be constructed on Railway View, Hillview and Greenslopes BOAs and limited removal of redundant internal fencing (mostly on Marengo BOA);
- From December 2012 to March 2013, extensive weed control program particularly focusing on the Eurunderee BOA (former agricultural property) targeting St Johns Wort and other broadleaf weeds with an area greater than 300ha treated during the period;
- In February 2013, over 200 tubestock of overstorey species (White Box) were planted within the Marengo BOA across Condition Class 3 White Box Woodland (native understorey present but no overstorey) to form corridors linking isolated paddocks and remnant vegetation with Black Gully riparian vegetation;
- In July and August 2012, construction of rocky and woody debris habitat in corridors on Marengo BOA;
- In July 2012 and March 2013, two feral pest control programs undertaken during 2012-2013 focusing on Foxes, Rabbits and feral Pigs;
- In March 2013, fire breaks installed around the perimeter of the Marengo BOA. Maintenance of existing tracks and construction of new access tracks around Marengo, Greenslopes, Hillview and Railway View BOAs;
- The removal of grazing pressure in the older BOA sections in 2010 and the ongoing maintenance of the remnant native vegetation has aided regrowth and increased survival of seedlings with good growth rates occurring in areas adjacent to existing mature trees; and
- In February 2013, two large hay sheds within the Eurunderee BOA were demolished and waste metal recycled offsite.

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 24th November 2012 to 30th November 2012 in accordance with the flora and fauna monitoring program in the BOMP. With WCC taking management control over the entire BOA during this period, the monitoring program was expanded from the 12 sites monitored in 2010 and 2011 to 25 sites across the entire BOA in **Figure 3.6**. Data was collected from a total of 24 sites; 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 2012. Vegetation monitoring methodology consisting of a nested 50m transect and a 50m x 20m plot established for the two vegetation assessment methodologies used, being Landscape Function Analysis (LFA) and a modified Biometric Assessment Methodology (modified BAM) at each monitoring site.

The results of the modified BAM are presented in **Table 3.26** and represent the baseline conditions for monitoring sites 13 to 24 established during the 2012 and the third round monitoring for sites 1 to 12 (excluding Site 4) initially established in 2010. Comparison of the data collected in the 2010, 2011 and 2012 monitoring periods indicates that the unusually dry weather conditions in the lead up to the 2012 survey and the wetter conditions in the lead up to the 2011 survey impacted on the number and composition of exotic and native plant species recorded (ELA, 2013). Exotic species diversity decreased across the BOA by approximately 20 species from 2011 to 2012 while the total number of native species recorded did not vary from 2011 to 2012 (ELA, 2013). Native grass cover has increased over the same period with only three sites remaining dominated by exotic vegetation in 2012. Along with seasonal variation between the years, management actions undertaken in 2010, 2011 and 2012 are expected to have contributed to improved native groundcover such the removal of grazing and the combination of weed spraying/slashing of the Eurunderee/Mine Site BOAs and rehabilitation areas.

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 a near pristine example. The rehabilitation site (Site 6) has decreased in the proportion of patches by over 50% since 2010, while over the same period, Site 11 (analogue) has also decreased in the proportion of patches by 12% since 2010 (ELA, 2013). This suggests that ground cover and the associated stability of these sites is decreasing over time and may be due to environmental or climatic conditions, with the lead up conditions to 2012 monitoring being somewhat dryer than previous years (ELA, 2013). However, one explanation for the marked drop in Site 6 is possibly the senescence of the cover crop initially established to stabilise the soil within the rehabilitation area. Cover crop senescence is expected in the process of rehabilitation, and may be emphasized in a dry period. Improving the cover of perennial native ground cover species will be important to secure soil and promote the success of the rehabilitation and, whilst biometric understorey cover scores do indicate an increase in native cover from previous years, the drop in the proportion of patches in 2012 may be representative of the lag time between cover crop senescence and native ground cover establishment (ELA, 2013). Sites 14 and 17 were monitored for the first time in 2012.

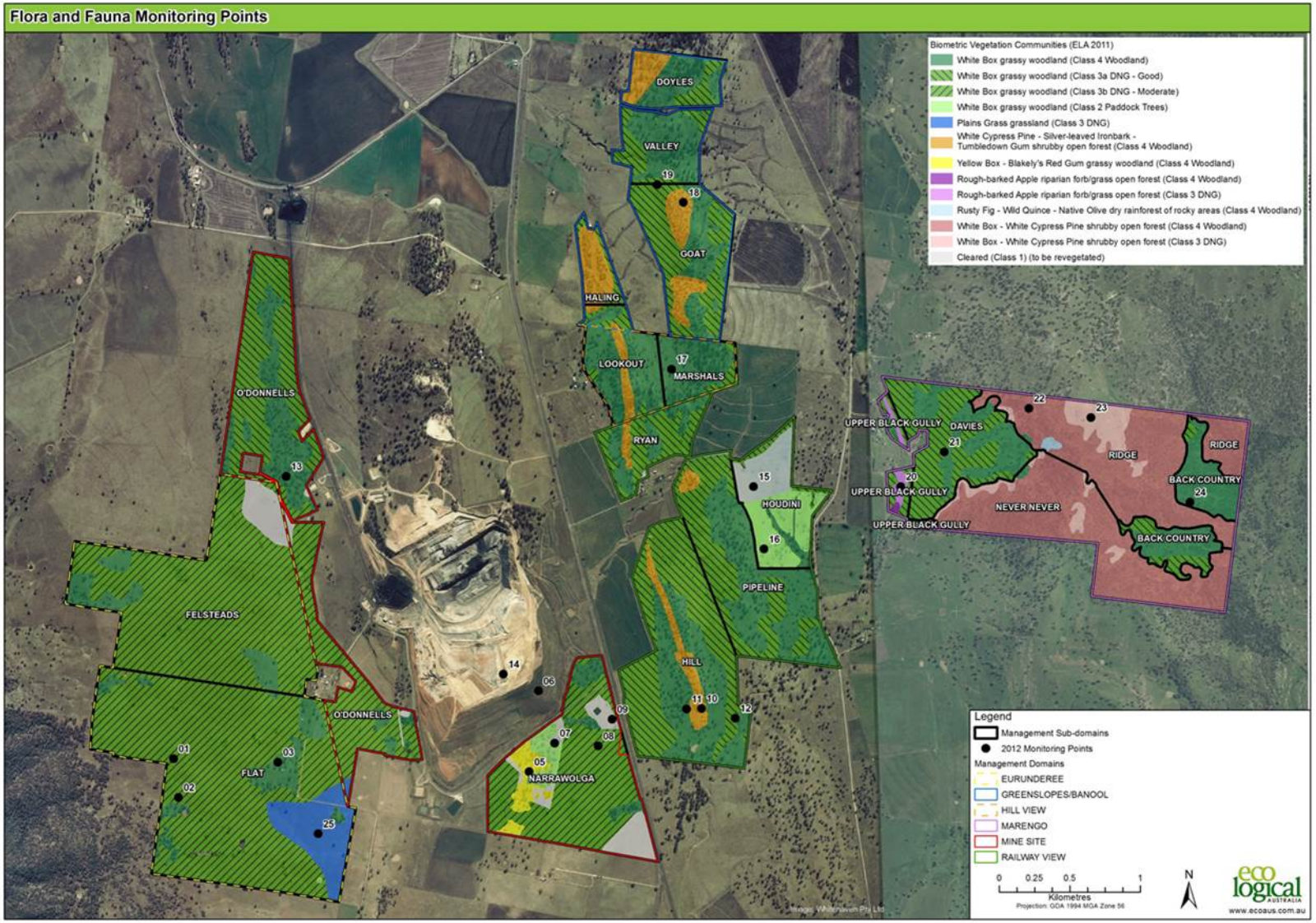


Figure 3.6 Biodiversity Offset Area Annual Monitoring Program Sites

Table 3.26 Vegetation Monitoring Results compared to Benchmark/Completion Criteria

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

3.5.4 Fauna Monitoring

The fauna monitoring program was run concurrently with the flora monitoring between 26th to 30th November 2012 and 10th to 14th December 2012 by Eco Logical Australia Pty Ltd. Twenty-four sites were selected for fauna monitoring (aligned with flora monitoring). Data collected included birds, herpetofauna (reptiles), microchiropteran bats and nocturnal fauna, though all opportunistic observations were also recorded, including introduced species. 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 3.27** summaries the fauna monitoring methods and intensity for 2012.

Table 3.27 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
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/ha count morning and dusk over 2 days
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.

A summary of the monitoring results for bats and birds follows, however full details on the 2012 flora and fauna monitoring (ELA, 2013) are provided in **Appendix 5**.

Microbats displayed a general increase in species richness from 2010 through to 2012 (**Figure 3.7**) (ELA, 2013). The total number of species recorded in 2012 represents 15 (including five threatened species) out of 18 being the total number of species recorded at WCC since 2004 (ELA, 2013). The number of microbat species increased at all sites surveyed in 2011 and 2012, except for one site that only decreased by one (ELA, 2013). The increase in microbat species diversity from 2010 through to 2012 suggests that habitat suitability is increasing across the BOA (ELA, 2013).

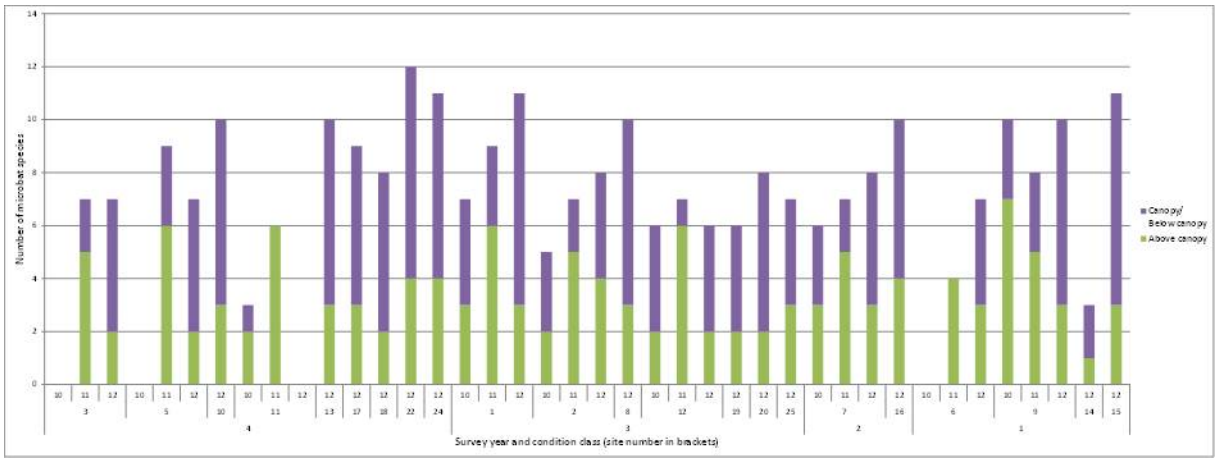


Figure 3.7 Microbat species abundance across BOA, presented in terms of 'guilds'

A total of 75 birds species (including three threatened species and five exotic species) were recorded during the monitoring period. Thirteen new bird species were recorded that had not previously been recorded due primarily to the new monitoring sites (13-25), of which eight had never been recorded at WCC before including EPBC Act migratory species (Rainbow Bea-eater and White Throated Needletail) and TSC Act vulnerable species (Hooded Robin). Despite this, there was a general decrease in bird species diversity from 2011 to 2012 as seen in bird guilds (**Figure 3.8**). The reduction in species diversity from 2011 to 2012 may be due to a reduction in resource availability associated with the drier conditions of 2012 prevailing at the time of the monitoring (ELA, 2013).

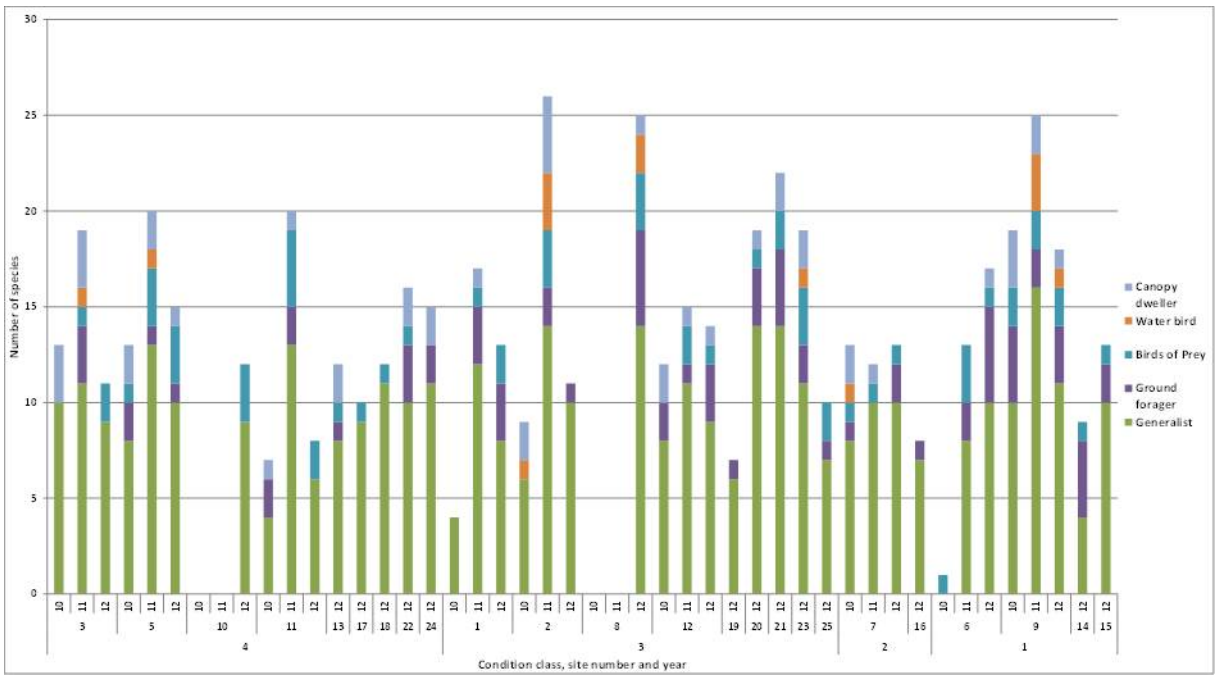


Figure 3.8 Abundance of species from selected bird guilds of the BOA

3.5.5 Biodiversity and Rehabilitation Management Annual Review

WCC performance against the Environmental Management System biodiversity and rehabilitation related objectives and targets developed from the draft Biodiversity and Offset Management Plan for the period 1st April 2012 to 31st March 2013 is outlined in **Table 3.28**. WCC achieved both targets set

for biodiversity and rehabilitation related objectives with WCC exceeding the required rehabilitation target and the number of sites meeting high quality woodland increased by one indicating that restoration progress is on track. One biodiversity related complaint was received for the period from DP&I on behalf of WIRES. WCC undertook vegetation clearing in November 2012 due the need to start construction of the new Mine Infrastructure Area (ancillary activity not directly related to mining). In accordance with the draft BOMP, an ecologist assessed the trees and did not identify any animals present, however a number of nestlings (from non-threatened species) were found unharmed. WCC transferred these birds to WIRES in accordance with the BOMP and covered the cost of food.

Table 3.28 Biodiversity and Rehabilitation Objectives and Targets 2012-2013

Activity	Objective	Indicator	Actual 2012-2013	Target 2012-2013	Actual 2011-2012
Rehab & Biodiversity	Rehabilitation	Area (ha)	**47.5**	25.7	24.8
	Completion Criteria	# Criteria Met	**3**	3	2

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 2012-2013. **Table 3.29** summarises the biodiversity and rehabilitation management annual review from the discussion above.

Table 3.29 Biodiversity Management Annual Review 2012-2013

Annual Review	Discussion
Monitoring Results	• Criteria Only 3 out of 25 sites meet completion criteria. • Previous Year The number of sites meeting completion criteria increase by one from 2011-2012. • EA Predictions The status of biodiversity restoration is within that predicted in the Environmental Assessment.
Complaints	• This Year One biodiversity related complaint for the period. • Previous Year Biodiversity related complaints slightly increased from zero complaints the previous period.
Compliance	• Criteria and other Biodiversity and rehabilitation management was in compliance. • Objectives & Targets WCC achieved both targets set for biodiversity related objectives.
Data Trends & Predicted Impacts	The number of sites meeting completion criteria is as expected with restoration progressing in the right direction increasing by one site.
Improvement Actions	For 2013-2014, WCC will finalise BOA security, undertake winter bird survey, undertake an ecological burn and a kangaroo control program.
Management Plan Review	BOA security, winter bird survey and hazard reduction burn not completed during the period. New threatened flora species (*Digitaria porrecta* Finger Panic Grass) was identified during monitoring this period. Clearing procedure revised to differentiate mining related and ancillary activities.

Annual Review	Discussion
Management Plan Revision	Draft BOMP was recently updated. However DP&I have requested further revisions to be made to BOMP and will include reference to new threatened flora species identified onsite.

3.6 WEED MANAGEMENT

WCC weed management strategy focuses control works/programs for noxious weeds as a priority and when resources/budget allows, control other environmental weeds present onsite will be controlled as well. 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 3.9**. Surveillance of weed infestations is undertaken by informal (observation) and formal methods such as the quarterly inspections and weed surveys. 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.

WCC implemented an extensive weed control program during the reporting period. WCC prioritised its weed control program by focusing on the noxious weeds within the Liverpool Plains Local Government Area such St John's Wort, Paterson's Curse, Noogoora and Bathurst Burrs. **Table 3.30** outlines the weeds targeted by WCC, including location and timing for 2012-2013 reporting period.

Table 3.30 WCC Weed Control Program by Location

Weed Name	Scientific Name	Noxious	Date	Location						
				Rehab	Mine Site	Hill view	Green slopes	Eurunderee	Railway View	Marengo
Spiny Burr Grass	*Cenchrus incertus*	W4	Dec 2012	2ha	2ha					
St John's Wort	*Hypericum perforatum*	W4	Dec 2012 to Feb 2013		30ha		20ha	50ha	30ha	10ha
Prickly Pear	*Opuntia stricta*	W4	Nov 2012							1ha
Noogoora Burr	*Xanthium pungens*	W4	Jan 2012 to Mar 2012	50ha	10ha					
Bathurst Burr	*Xanthium spinosum*	W4		50ha	10ha					
Patersons Curse	*Echium plantagineum*	W4	Dec 2012					5ha		
Scotch Thistle	*Onopordum acanthium*	W4	Oct 2012	15ha						
Saffron Thistle	*Cathamus lanatus*	-	Sep 2012					20ha		
African Box Thorn	*Lycium ferocissimum*	W4	Mar 2013							1ha
St Barnabys Thistle	*Centaurea soltitialis*	-	July 2012 to Mar 2013	60ha	20ha			10ha		
Turnip Weed	*Rapistrum rugosum*	-	Nov 2012	30ha	30ha					

Weed Name	Scientific Name	Noxious	Date	Location						
				Rehab	Mine Site	Hill view	Green slopes	Eurunderee	Railway View	Marengo
Johnson Grass	*Sorghum Halepense*	W4	Jan 2013	5ha	10ha				5ha	

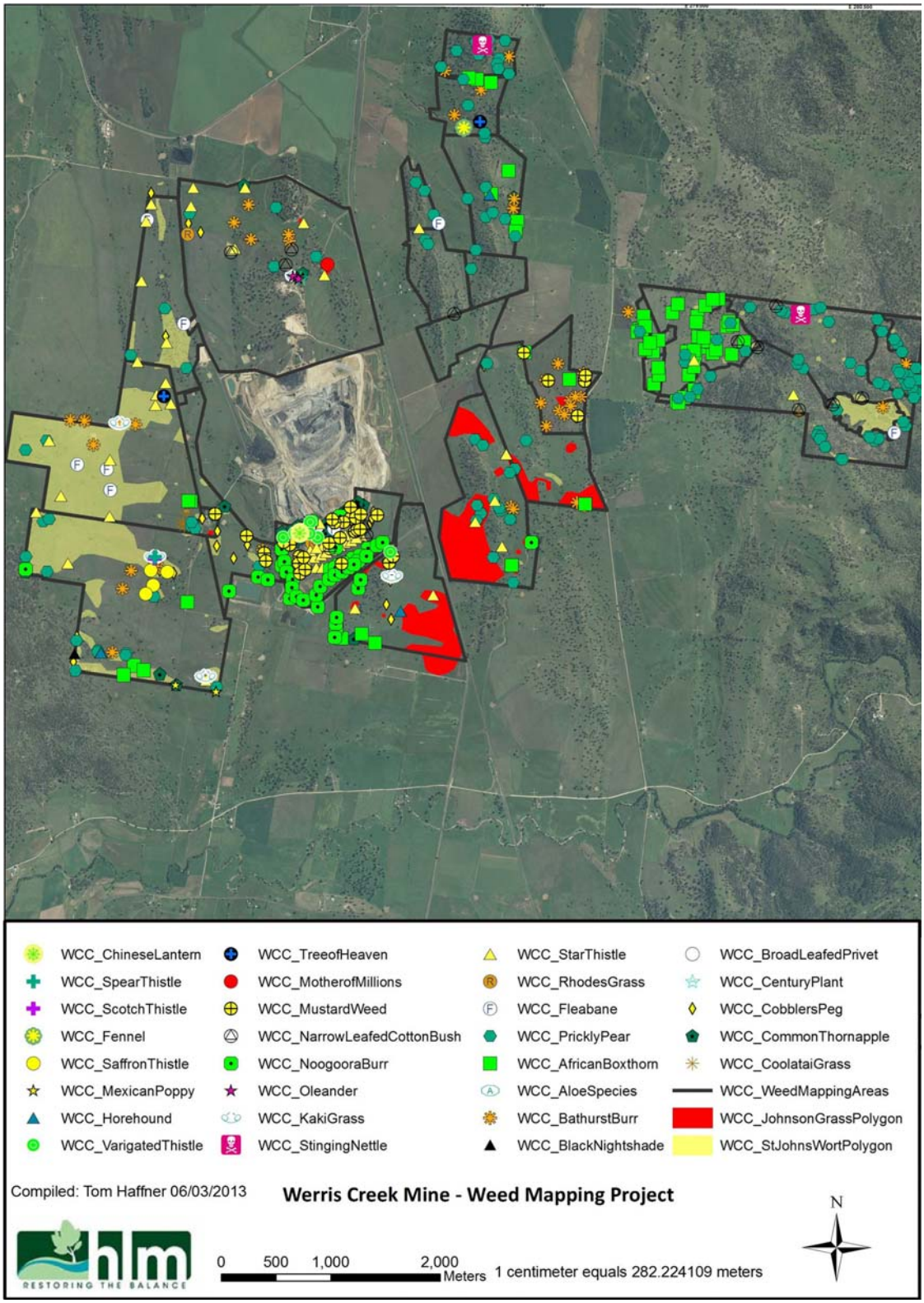


Figure 3.9 2013 Weed Survey showing the distribution of weeds across WCC

3.7 BLASTING

3.7.1 Blast Criteria and Control Procedures

The revised blast criteria for WCC outlined in **Table 3.31** 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 3.31 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 draft Blast Management Plan.

The draft Blast Management Plan summarises a number of blast management controls implemented by WCC and the blasting contractor for the LOM Project which are summarised in **Table 3.32** in order to mitigate the risks associated with blasting.

Table 3.32 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	Prior to and

Measure	Timing
drilling the drillers log subsurface information such as coal seam, broken ground and underground locations to prevent overpressure or fume impacts	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 conditions such as wet/water, broken and or soft ground and length of time the product will be in the ground.	Prior to Loading
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-inforcement 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

The locations of blast monitoring were determined in accordance with the Blast Monitoring Program as outlined in **Table 3.33** and locations identified in **Figure 3.10**.

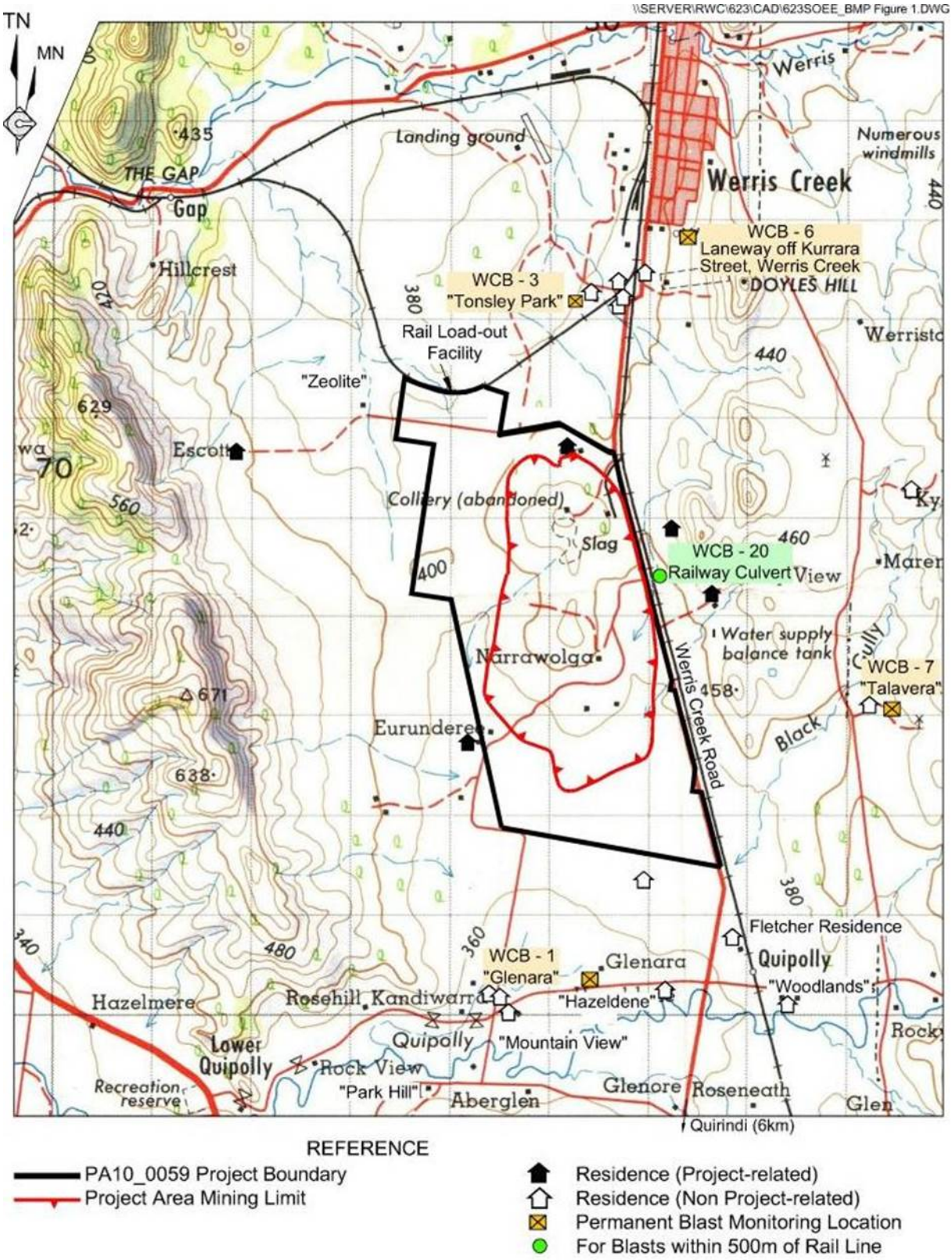


Figure 3.10 WCC Blast Monitoring Program

Table 3.33 WCC Blast Monitoring Program

Monitor Type	Site ID	Purpose	Property/Location Description	Frequency	Direction from WCC	Distance (km)
Portable	WCB - 1	Community	R11 "Glenara"	Every Blast	South	3.8
Portable	WCB - 3	Community	R20 "Tonsley Park"	Every Blast	North	2.9
Portable	WCB – 6	Community	R62 43 Kurrara Street, Werris Creek	Every Blast	North East	3.7
Portable	WCB – 7	Community	R96 "Talavera"	Every Blast	South East	2.7
Portable	WCB - 4	Contractual	"Cintra"	Occasional	North	1.6
Portable	WCB – 20	Infrastructure	Railway Culvert	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 82 blasts were fired by the blasting contractor, Orica Mining Services. The number of blasts has reduced from the previous reporting period as WCC is firing larger shots to improve production efficiency. There were no elevated blast results greater than 5mm/s or 115dB(L) for the period at any residence (**Table 3.34**). All monitoring results at privately owned properties were consistent with the levels predicted in the LOM Environmental Assessment (R.W. Corkery and Co Pty Limited, 2010) and the blast criteria for WCC. Detailed blast monitoring results are included in **Appendix 6**.

WCC fired a blast on Wednesday 31st October 2012 at 12:13pm (#60 S15_2-6_385) with no result recorded at "R62" Werris Creek, which was a recently installed new permanent blast monitor. Since installation, the permanent blast monitors were operating in parallel with the portable blast monitors for each blast during a commissioning phase. As no issues had been identified during the commissioning phase, Orica did not set the portable monitors on the 31st October 2012 with only the permanent blast monitors operating. Orica's investigation found that a factory connection was only intermittently operating within the Werris Creek monitor resulting in the monitor not adequately charging causing the blast event to be missed. While this incident should have been avoided, it was unexpected that a factory component in the new permanent blast monitor would fail after successfully operating during the commissioning period. Given that the Werris Creek monitor blast vibration level has on average been 54% of the Tonsley Park monitor gives assurance that the blast (S15_2-6_385) on 31st October 2012 did not exceed any blasting criteria outlined in EPL 12290 Condition L5. Actions undertaken to date include an Orica Technician fixing the intermittent connection in the Werris Creek monitor, and checking all other permanent blast monitors. The EPA were satisfied that the blast did not exceed the overpressure and vibration criteria at the Werris Creek monitor given the data from the Tonsley Park monitor and the EPA will not be taking this matter further.

Table 3.34 WCC 2012-2013 Blast Monitoring Results Summary

Month	Blasts		Glenara		Tonsley Park		Werris Creek		Talavera	
			mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)
April 2012	5	Ave	0.18	108.9	0.91	99.8	0.31	99.0	0.10	113.4
		Max	0.18	108.9	1.17	102.4	0.31	105.1	0.10	113.4
May 2012	6	Ave	<0.25	<109.9	0.61	88.9	0.32	96.2	0.16	96.7
		Max	<0.25	<109.9	0.70	99.0	0.34	98.2	0.16	102.9
June 2012	3	Ave	<0.25	<109.9	0.86	101.3	0.30	100.6	<0.25	<109.9
		Max	<0.25	<109.9	1.30	106.2	0.34	104.9	<0.25	<109.9
July 2012	8	Ave	0.38	105.0	1.26	111.9	0.70	104.3	0.39	109.9
		Max	0.48	106.9	1.85	114.9	1.05	107.3	0.67	113.0
August 2012	7	Ave	<0.25	<109.9	0.54	101.6	<0.25	<109.9	<0.25	<109.9
		Max	<0.25	<109.9	0.57	112.9	<0.25	<109.9	<0.25	<109.9
September 2012	10	Ave	0.25	109.0	1.02	103.1	0.37	100.6	0.24	104.3
		Max	0.35	111.0	1.40	108.6	0.47	107.5	0.30	109.0
October 2012	7	Ave	0.17	101.7	1.37	101.5	0.39	99.0	0.26	103.6
		Max	0.25	106.0	2.14	106.0	0.56	102.6	0.41	111.0
November 2012	9	Ave	0.14	103.0	0.64	105.3	0.32	101.8	0.23	103.9
		Max	0.22	106.0	0.93	115.0	0.62	111.0	0.43	107.0
December 2012	6	Ave	0.21	103.0	0.66	100.5	0.44	87.8	0.53	102.4
		Max	0.33	104.0	0.87	103.0	0.61	97.5	0.66	106.3
January 2013	7	Ave	0.16	101.0	0.97	104.3	0.55	99.7	0.39	109.4
		Max	0.21	108.0	1.15	106.0	0.87	101.5	0.41	110.8
February 2013	7	Ave	<0.25	<109.8	1.40	105.8	0.44	101.8	<0.25	<109.8
		Max	<0.25	<109.8	1.83	106.6	0.58	103.0	<0.25	<109.8
March 2013	7	Ave	<0.25	<109.8	0.64	102.3	0.45	106.8	0.52	104.2
		Max	<0.25	<109.8	0.98	113.9	0.69	109.3	0.55	107.5
Annual	**82**	**Ave**	0.21	104.5	0.91	102.2	0.42	99.8	0.31	105.3
		Max	0.48	111.0	2.14	114.9	0.87	111.0	0.67	113.4

A summary of blasting complaints received by WCC since operations commenced in 2005 is presented in **Table 3.35**. Blasting related complaints have been the most common community complaint resulting from WCC operations since the mine commenced in 2005.

Table 3.35 WCC Complaint Issues from 2005 to 2013

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

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 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.

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 3.36** 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 RL350m and including the A and Black Seam) are resulting in overpressure complaints. Blasts deeper in pit (RL350m and below including the basal G Coal) have resulted in vibration complaints. WCC is continuing to work with our blast contractor 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 3.36 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

3.7.3 Blast Management Annual Review

WCC performance against the Environmental Management System blasting related objectives and targets developed from the draft Blast Management Plan for the period 1st April 2012 to 31st March 2013 is outlined in **Table 3.37**. While WCC achieved a significant reduction in blasting complaints, there was one blast that was measured with a vibration >1mm/s at the Werris Creek monitor and one blast exceedance (related to a missed blast result at Werris Creek monitor) during the period. WCC only achieved two out of four targets related to blasting objectives.

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 2012-2013. **Table 3.38** summarises the blasting management annual review from the discussion above.

Table 3.37 Blasting Objectives and Targets 2012-2013

Activity	Objective	Indicator	Actual 2012-2013	Target 2012-2013	Actual 2011-2012
Blasting	Complaint	# Complaints	**14**	56	71
		# Complainants	**11**	-	35
	Overpressure	All >115dBL	**0**	0	2
	Vibration	Werris >1mm/s	**1**	0	1
	All Exceedance	# Exceedances	**1**	0	1

Red – Exceeded Target.

Table 3.38 Blasting Management Annual Review 2012-2013

Annual Review	Discussion
Monitoring Results	• Criteria All blast monitoring results <115dB(L) and <5mm/s. • Previous Year Blasting levels are consistent with levels previously measured by WCC. • EA Predictions Blasting levels below that predicted in the Environmental Assessment.
Complaints	• This Year 14 blasting related complaints for the period. All complaints claiming damage had Property Investigations completed during period. • Previous Year Significant reduction in blasting complaints from 2011-2012.
Compliance	• Criteria and other One blasting non-compliance with a missed blast result at the Werris Creek monitor. • Objectives & Targets WCC achieved only two of the four targets related to blasting objectives.
Data Trends & Predicted Impacts	While the number of complaints reduced this period, WCC is aware that as mining progresses closer to Werris Creek town, that residents are highly sensitive to blast impacts.
Improvement Actions	For 2013-2014 improvement in blast design process between the blasting contractor and WCC to enable review and sign off of blast designs by WCC prior to loading and firing to mitigate community complaint.
Management Plan Review	All blast management strategies and actions were implemented during the period.
Management Plan Revision	Draft Blast Management Plan to be revised to take into account review of blast design process.

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 3.39** outlines the noise criteria for private properties without private agreements while **Table 3.40** displays the noise criteria for private properties with private agreements.

Table 3.39 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 3.40 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

* "Tonsley Park" was acquired by Whitehaven Coal in November 2012.

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 monitors at locations representative of 14 private properties in proximity to WCC plus monitoring locations in southern and central Werris Creek as outlined in **Figure 3.11**.

The draft Noise Management Plan 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;
- Regular and preventative maintenance scheduling of mining equipment to ensure that sound power levels specified in the Noise Management Plan are achieved;

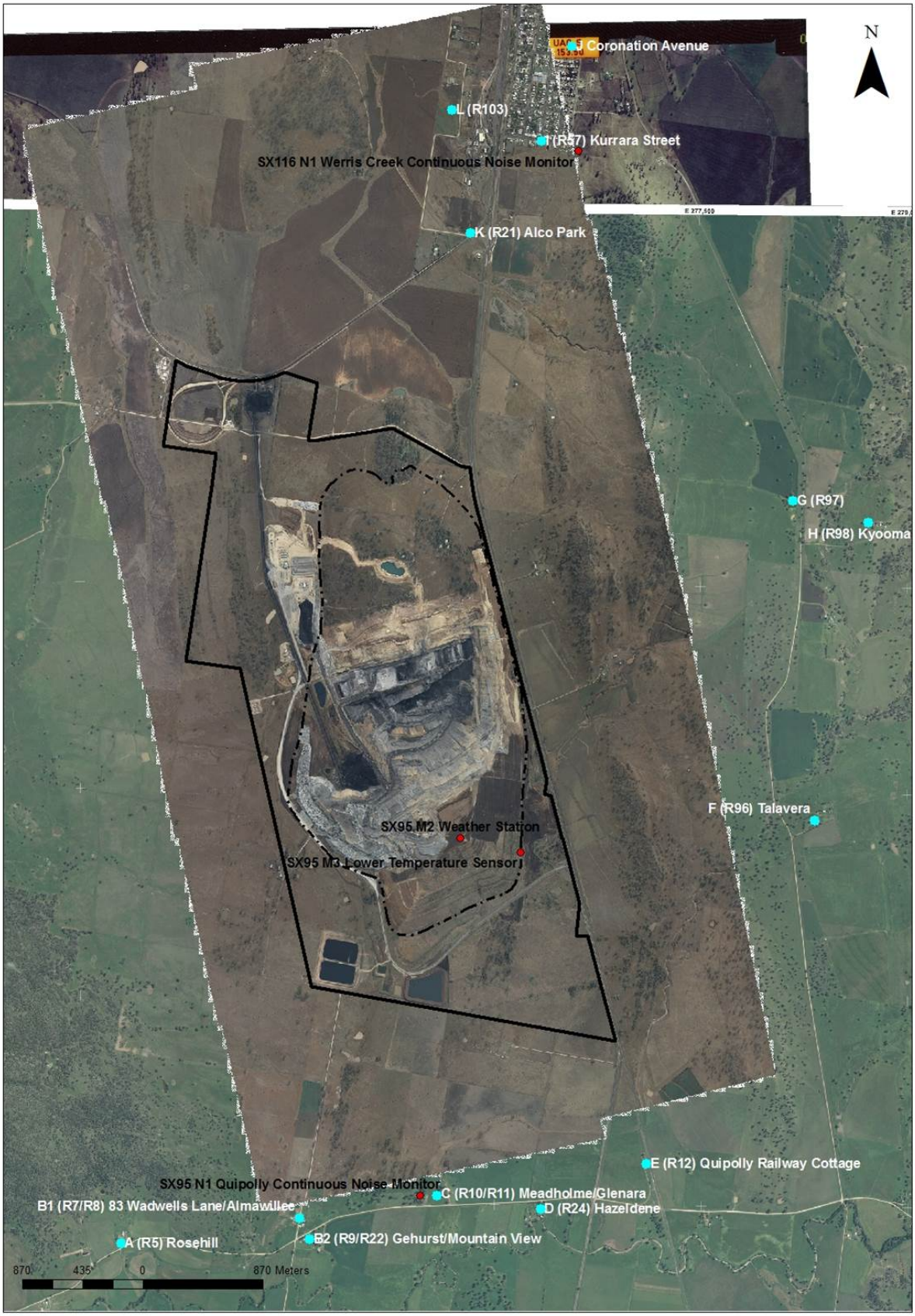


Figure 3.11 WCC Attended and Continuous Noise Monitoring and Weather Station Locations

- Noise attenuation of haul trucks so that CAT XQ793s achieve a sound power level of 115dB(L) and CAT 785s achieve 117dB(L). The remaining CAT 785s will require specialist engineering to

design and install after manufacture fitments by non-Original Equipment Manufacturers to achieve the required noise reduction;

- Bunding or other physical barriers close to noise sources to create obstructions to the noise propagation towards receivers (i.e. earthen bund at rail load out facility, excavators working adjacent to highwalls in pit on night shift where possible);
- Ongoing use of a mobile continuous noise monitoring system that can be set up at neighbouring properties to monitor operational noise levels and provide real time feedback to operations;
- Monitoring of adverse weather conditions (source to receiver winds or temperature inversions) between the onsite weather station at RL445m and a lower temperature sensor at RL375m;
- Truck operators trained in lowering engine noise (revolutions per minute) to minimise unnecessary noise emissions from truck haulage; 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.
- A dedicated 'Noise Control Operator' to continually monitor real time noise levels (via SentineX system) and to work in tandem with the OCE to determine if the dominant noise source is mine related and if so, to modify or cease mining operations at the OCE's discretion.

WCC regularly consults with the surrounding neighbours seeking feedback on the mining activities.

3.8.2 Operational Noise Monitoring

The results of routine attended noise monitoring conducted on a monthly basis by Spectrum Acoustics Pty Limited are outlined in **Table 3.41** with full reports provided in **Appendix 7**. The noise levels are for WCC noise sources only and exclude other ambient noises. Throughout the reporting period, adverse weather conditions at WCC resulted in some instances of elevated noise levels above the 35dB(A); however, noise levels measured under adverse weather conditions that enhance noise emissions are not assessable against the noise criteria.

For the reporting period, there were no noise exceedances recorded as a result of WCC operations. The strategic acquisition of additional properties associated with the predicted impacts from the LOM Project and the effective implementation of real time noise monitoring by the Noise Control Operator have been effective at mitigating noise impacts from operations. This is the second annual reporting period in a row that WCC has not recorded any noise non-compliance (**Table 3.42**). There was only one elevated noise level measured under adverse weather conditions during the period. "Mountain View" recorded a 37dB(A) elevated result at 8:07pm on 16th January 2013 due to wind speeds greater than 3m/s.

Table 3.41 WCC Noise Monitoring Results for 2012-2013

Receiver	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 #	IA #	IA	IA	IA
	Night	35	IA	26#	IA	35#	29	24	22	IA	IA #	28#	IA #	IA
R8"Almawillee"*	Day	40/37[2]	IA#	<20	IA#	24	IA	<25#	BA#	BA	IA #	IA	IA #	IA
R7 83 Wadwells Ln	Night	40/37[2]	33	36#	IA#	34	33	34	37	37	<25#	35#	34	25
R9 "Gedhurst"	Day	37/36[1]	<25#	IA	IA#	<20	IA	30#	25#	25	IA	IA	IA #	22
R22 "Mountain View"	Night	37/36[1]	31	35#	28	32	34	33	IA #	IA	IA #	**37#**	IA #	25
R10 "Glenara"*	Day	40	IA	30	IA#	BA	IA	27#	25#	30	30#	<25	IA	IA
R11 "Meadholme"*	Night	40	30	32#	IA	25	33	37	20	32	IA #	34#	IA #	32
R24 "Hazeldene"	Day	37	IA	27	IA#	34	IA	30	25	30	IA	25	IA #	IA
	Night	37	32	25#	25	30#	32	32	<20	28	IA #	32#	IA #	25
R12	Day	38	IA	IA	IA#	30	IA	<25	BA	IA	IA	IA	IA #	IA
"Railway Cottage"	Night	38	30	26#	30	31	34	32#	30	30	<25#	28#	BA	20#
R96 "Talavera"	Day	38	28	29	BA#	IA	<25	22	32	<25	<20#	20	IA	15
	Night	37	25	<20#	25	<25	33#	#	IA	IA	<30#	30#	IA #	30
R97	Day	35	25	26	<25#	<25	26	28	<20	22	<25	17	IA #	20
	Night	35	22	20#	31#	24	34	IA	34	22	<25#	32#	20#	17
R98 "Kyooma"*	Day	40	31#	28	BA#	BA	28	25	29	25	32#	19	BA#	20
	Night	40	31	25#	38#	IA	36	22	36	<20	<30#	32#	23#	15
R57	Day	35	IA	IA	IA#	IA	IA	BA	IA	IA	IA #	IA	IA #	IA
Kurrara St	Night	35	<25	<20#	34#	34	IA	IA	IA	IA	<25#	IA #	IA	IA
Coronation Ave	Day	35	IA #	IA	IA#	IA	IA	IA	IA	IA	IA	IA	IA #	IA
	Night	35	IA	IA #	<30#	<30#	BA	IA	IA	IA	<30#	IA #	IA #	32
R20 "Tonsley Park"*	Day	40	IA	IA	IA#	IA	BA	IA	IA	26	IA #	IA	IA #	IA
R21 "Alco Park"*	Night	40	IA	32#	35#	37	<25	IA	IA #	IA #	<25#	IA #	IA	32
R103	Day	35	IA	IA	IA#	IA	IA	IA	IA	26#	IA #	IA	#	IA
	Night	35	IA	33#	IA#	IA	#	IA	IA	IA	IA #	IA #	IA	IA

1 – Gedhurst noise criteria is 37dB(A) while Moutain 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 audible <20dB; **Bold** – elevated result.

Table 3.42 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
Number of Non-compliance events	2	46	23	3	1	1	0	0

A summary of noise complaints received by WCC since operations commenced in 2005 is presented in **Table 3.43**. Noise complaints represent over a quarter of all complaints received by WCC since 2005. Until 2010, the majority of complaints relating to the mine (including noise) 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 comprising over 80% of complaints. It is considered that both the number of complaints and number of complainants have increased because WCC operations have moved closer to Werris Creek, which has a higher population density compared to the rural Quipolly area.

Table 3.43 WCC Noise Complaints since 2005

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

The total number of noise complaints in 2012-2013 reduced from 2011-2012 mainly due to a reduction in complaints from one individual Werris Creek complainant registering less noise complaints in regards to the Rail Load-Out Facility. All Rail Load-Out Facility noise complaints were thoroughly investigated and on further review identified that a number of the complaints for alleged noise from the Rail Load-Out Facility were in relation to train shunting and other activities at the Werris Creek Rail Yard, which is a separate facility within Werris Creek township itself and is unrelated to WCC operations.

The two complainants (one from Werris Creek and one from Quipolly) still account for over 80% of the noise complaints made since 2010. While the two complainants have biased the analysis of the noise complaint data, WCC does recognise that there is a slight increase in the number of complainants making noise complaints. However this trend was not as noticeable this period with the two complainants accounting for 18 of the 21 noise complaints. WCC believes that a combination of implementing the noise attenuation measures on the trucks together with real time noise monitoring by the Noise Control Operator will mitigate additional bona fide noise complaints from both Quipolly and Werris Creek residents.

3.8.3 Noise Management Annual Review

WCC performance against the Environmental Management System noise related objectives and targets developed from the draft NMP for the period 1st April 2012 to 31st March 2013 is outlined in **Table 3.44**. WCC achieved three out of the four targets set for noise related objectives. The number of noise complaints related to the mining operations was 15 compared to the target of 13 (a 10% reduction on 2011-2012), which is equal with 2011-2012 performance of 15 complaints. Implementation of the real time noise monitoring and the noise control process has been successful in preventing noise exceedances and additional noise complaints, 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_0059MOD1 Schedule 3 Condition 4d.

Table 3.44 Noise Objectives and Targets 2012-2013

Activity	Objective	Indicator	Actual 2012-2013	Target 2012-2013	Actual 2011-2012
Noise	Noise Criteria	# Exceedances	**0**	0	0
	OC Complaint	# Complaints	**15**	13	15
	RLF Complaint	# Complaints	**6**	14	16

Activity	Objective	Indicator	Actual 2012-2013	Target 2012-2013	Actual 2011-2012
	Complaints	# Complainants	**4**	-	5
	Noise Criteria	# Exceedances	**0**	0	0

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 2012-2013. **Table 3.45** summarises the noise annual review from the information above.

Table 3.45 Noise Management Annual Review 2012-2013

Annual Review	Discussion
Monitoring Results	• Criteria All attended noise monitoring results representative of WCC operations were with criteria outlined in NMP. • Previous Year Mining noise levels are consistent with noise levels previously measured at WCC. • EA Predictions Mining noise levels are within the project specific noise levels predicted in the Environmental Assessment.
Complaints	• This Year Noise complaints were dominated by one Quipolly resident and one Werris Creek resident representing 18 out of the 21 total noise complaints in the period. • Previous Year WCC reduced the total number of noise complaints from 2011-2012 due to lower Train Load Out related noise complaints. The same two complainants dominated noise complaints in 2011-2012.
Compliance	• Criteria and other Noise monitoring results representative of WCC operations were within the criteria outlined in NMP. • Objectives & Targets WCC achieved three out of the four targets set for noise related objectives – WCC did not achieve a 10% reduction on mining related noise complaints from 2011-2012.
Data Trends & Predicted Impacts	Mining noise levels are consistent with noise levels previously measured at WCC and within the project specific noise levels predicted in the Environmental Assessment.
Improvement Actions	The significant improvement project for noise management in 2013-2014 is receiving attenuated 10xCATXQ793 trucks and retrofitting attenuation to the remaining 5xCAT785 trucks.
Management Plan Review	Attenuation of remaining 785 trucks not yet completed. Noise Control Operator procedure providing superior noise mitigation compared to various commitments in Environmental Assessment. All other management strategies and actions were implemented during 2012-2013.
Management Plan Revision	Draft NMP was recently updated. No revision required because 10xCATXQ793s and 6xCAT785(partial attenuation) will generate lower noise emissions compared to 6xCATXQ793s and 11xCAT785(partial attenuation) modelled.

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 an additional 47ha of rehabilitation bringing the total area of rehabilitation completed at WCC to 94ha which means the entire southern and lower eastern faces of the rehabilitation/overburden emplacement has now been rehabilitated. Werris Creek Road users view towards WCC is now of a green hill rather than unshaped grey spoil (**Figure 3.12**).

Figure 3.12 View of WCC Eastern Rehabilitation from Werris Creek Road

The continuing maintenance of the previously installed tree screens and visual bunds 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. 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 3.13**).

Since WCC increased the height of the overburden emplacement in February 2010 from RL410m to RL445m, the upper 15m has become visible from the southern and elevated sections of Werris Creek township. 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. In September 2010, WCC planted a tree screen to the east of the “Cintra” property that will partially screen the construction of a visual amenity bund as committed to in the LOM Environmental Assessment (R.W. Corkery & Co., 2010). The visual amenity bund will provide a visual and acoustic barrier to mining operations in the later years of the LOM Project. As above, the tree screen was planted with a combination of wattles and White Box and to date growth rates have been excellent over the 30 months since being planted (**Figure 3.14**).

Figure 3.13 Werris Creek Road Tree Screen and Visual Screen view towards the north

Figure 3.14 WCC LoM Visual Bund and Tree Screen planted to the east of "Cintra"

During the reporting period, WCC received 6 complaints relating to lighting impacts which is another reduction on the number of visual amenity complaints from the previous period (**Table 3.46**). 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 3.15**). Of the 34 complaints received since 2010, 32 complaints have come from the one complainant located in Werris Creek.

Table 3.46 Summary of Visual Amenity Complaints since 2010

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

Figure 3.15 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 HMP, WCC undertakes quarterly inspections of known heritage items onsite – currently comprising only the "Narrawolga" Axe Grinding Grooves. PA10_0059 Schedule 3 Condition 33 required a one off Historical Heritage Investigation and archival photo record of the former Deputy Mine Managers residence and a former coal loading chute related to the former underground mine onsite. This was completed and submitted to NSW Heritage Office in April 2012.

3.10.3 Management Measures

The HMP 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 HMP outlines additional management actions related to items associated with the former underground colliery recommending that the following items be salvaged:

- Old mileage marker for Werris Creek within the gardens of the former Deputy Mine Managers residence; and
- Former steel coal loading chute.

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 are identified, 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. WCC also completed the additional Historical Heritage works in accordance with PA 10_0059 Schedule 3 Condition 30 (and discussed below).

WCC delivered the mileage marker to the Quirindi Historical Society Cottage & Museum in September 2012 and discovered the relic is in fact a topographic marker with north, east, south and west labelled on the four sides of the object. Given that the former Deputy Mine Managers residence is located on the crest of the "Old Colliery Hill", the description as a topographic marker would fit with the geographic context of the site. WCC organised for the coal loading chute to be delivered to the Quirindi Rural Heritage Village in September 2012 (**Figure 3.16**).

Figure 3.16 Former Coal Loading Chute associated with Former Underground Mine

There was no change in the condition of the "Narrawolga" axe grinding grooves during the period with no aboriginal groups requesting to inspect the site. The perimeter fencing of the site was replaced and upgraded (**Figure 3.17**).

Figure 3.17 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 no reported instances of spontaneous combustion (sponcom) on site during the reporting period. The former underground workings have a potential for sponcom issues when the workings are uncovered however management controls such as minimising the period of time the workings are exposed and maintaining the workings in a saturated/flooded condition minimising the potential for sponcom incidents to occur (**Section 2.8.4**).

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 sponcom, the preventative actions to reduce occurrences of sponcom, the correct handling and remediation procedures and reporting of sponcom. All incidents are reported to the Coal Processing Manager and/or Project Manager as required.

3.12 FIRE 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 during the period to develop a Fire Management Strategy (FMS) to quantify current BOA fuel loads and determine what management actions are required. Fire management to be implemented by WCC

over the next three years will include hazard reduction, ecological burns and maintenance of fire fighting capabilities.

During 2012-2013, management measures included the installation of fire breaks on the Marengo BOA and improved tracks/access across the BOA. The first ecological burn in accordance with the draft BOMP is planned to be undertaken in Winter 2013 and will be following the recommendations of the FMS (**Figure 3.18**).

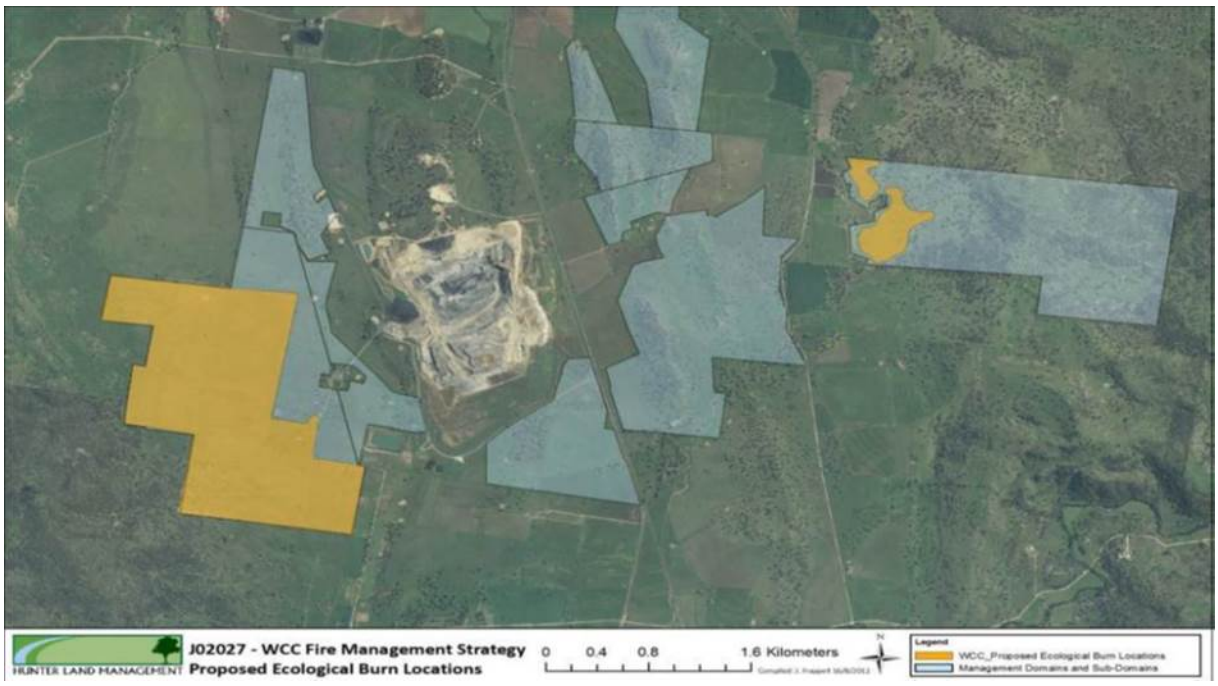


Figure 3.18 WCC BOA Proposed Ecological Burn Locations

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 with **Figure 2.2** displaying the most accurate sub-surface locations (shown in blue). 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.

3.14 HYDROCARBON CONTAMINATION

3.14.1 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**;
- All fixed or portable equipment (pumps etc) incorporate self-contained bunding;

- 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 or transferred off-site to an appropriately licensed waste disposal area;
- Liquid from the truck wash area is currently captured in a sump and pumped through an oil separator where hydrocarbons are drawn out of suspension and taken off site for disposal.
- WCC test the residual materials in the sump of the wash bay quarterly for hydrocarbons. If the results are low then the remaining solids are classed as general solids waste and can be buried within the pit. If the solids are above the threshold for general solid waste classification, bioremediation of this waste product may be required before on site disposal;
- A concrete apron has been installed in front of the diesel bowsers on site. This bunded area contains spills around the fill point draining back to the wash bay sump;
- The concrete bunded area for bulk oil storage was installed in May 2010 containing any spills within the wash bay sump; and
- WCC regularly reviews hydrocarbon storage and bunded areas.

3.14.2 Performance

There were no reported hydrocarbon spills onsite during the period. With the relocation of the Mine Infrastructure Area, WCC will need undertake a hydrocarbon assessment of the former workshop site and determine if any soil remediation is required.

3.15 METHANE DRAINAGE / VENTILATION

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

3.16 PUBLIC SAFETY

3.16.1 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 at the mine. The site is fenced and appropriate signs are installed with regular security patrols present on weekends.

Trucks carrying product coal to the Rail Siding are required to travel at low speed through the intersection with Escott Road, after giving way to any approaching traffic travelling along Escott Road. Signs are installed along Escott Road and adjacent to the rail load-out road at the intersection. 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.

3.16.2 Performance

There have been no incidences of unauthorised access on site with all procedures in place being effective throughout the reporting period.

3.17 FERAL ANIMAL CONTROL

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 draft 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. Any pest control undertaken onsite will be in accordance with industry guidelines and the relevant legislation as outlined below in the relevant sections.

During 2012-2013, WCC undertook one sand pad monitoring program (June 2012) and two vertebrate pest control programs (June 2012 and March 2013) focusing on 1080 baiting targeting Foxes across the BOA. The results from the baiting programs was that in June 2012 there was a 40% bait uptake rate, improving to 23% bait uptake for March 2013. Based on the results from the 2013 program and assumption of 1 bait per kill, the maximum abundance of foxes per km² is 2.2 animals and below the DPI estimation of 4/km² across NSW and an improvement on the 2012 result. The sand pad monitoring and bait uptakes indicate that the preferred habitat areas for foxes are Marengo, Eurunderee and Greenslopes (**Figure 3.19** - Red Dots show bait taken from station).

3.18 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 70m 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 3.47**.

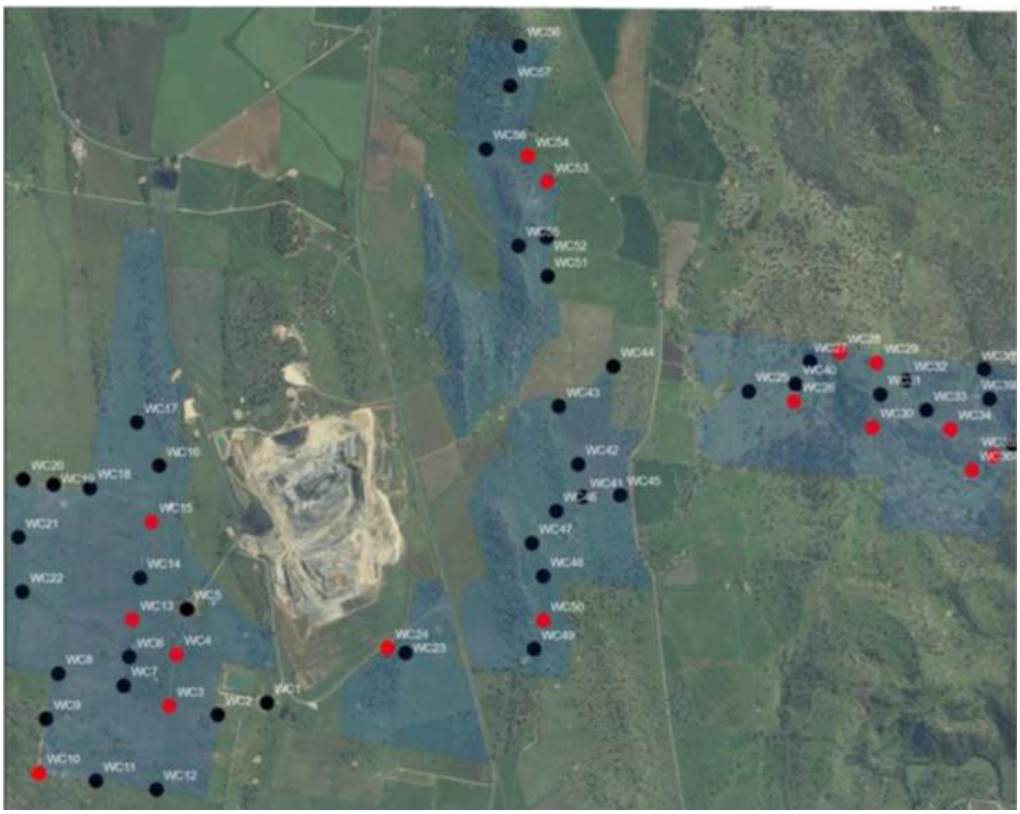


Figure 3.19 WCC Fox 1080 Baiting Program for March 2013

Table 3.47 WCC "M2" Weather Station Meteorological Parameters

Parameter	Unit	Frequency	Period	Method	Calibrated
Rainfall	mm/h	Continuous	15 minute	AM-4	22/11/2011
Wind Speed @ 10m	m/s	Continuous	15 minute	AM-2 & AM-4	22/11/2011
Wind Direction @ 10m	^{o}*	Continuous	15 minute	AM-2 & AM-4	22/11/2011
Temperature @ 2m	^{o}C	Continuous	15 minute	AM-4	22/11/2011
Temperature @ 10m	^{o}C	Continuous	15 minute	AM-4	22/11/2011
Sigma Theta @ 10m	-	Continuous	15 minute	AM-2 & AM-4	22/11/2011
Solar Radiation	W/m^2	Continuous	15 minute	AM-4	22/11/2011
Barometer	hPa	Continuous	15 minute	-	22/11/2011
Humidity	%	Continuous	15 minute	-	22/11/2011
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.*

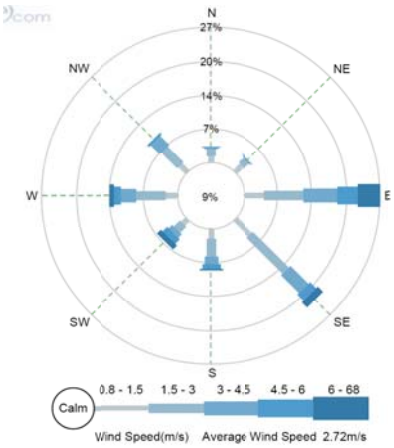
Table 3.48 summarises the rainfall and temperature records measured at WCC and compares the results with the longer term meteorological records for the Quirindi Post Office (1882-2010) approximately 11km away. **Figure 3.20** provides the monthly wind roses measured at WCC.

Over the 12 month period to the end of March 2013, WCC was well above the mean rainfall for Quirindi historically, 786mm versus 684mm respectively and only 8mm less rain than the previous reporting period (794mm). The temperatures recorded onsite were consistent with the long-term winter average with July recording the coldest temperature. The hottest month within the reporting period was January consistent with the long-term average. The 90th percentile night time lapse rates (worst case temperature inversions) are also presented below.

Table 3.48 Rainfall and Temperature Records for 2012-2013 Period

		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
Rainfall* (mm)		14.8	32.8	34.4	92.0	10.4	22.6	6.2	43.8	141.8	173.0	148.2	63.8	785.8
BOM Average (mm)		41.6	44.2	51.1	48.4	45.1	46.5	60.1	65.4	80.5	81.1	65.9	53.3	683.5
Temperature	**WCC Min (°C)**	6.5	4.8	1.1	0.9	1.5	4.9	4.9	10.3	13.1	15.1	12.4	12.0	-0.1
	WCC Avg (°C)	18.0	13.5	10.9	10.5	11.5	15.6	18.5	22.4	23.3	26.3	21.8	21.3	16.8
	WCC Max (°C)	29.5	24.6	18.4	18.8	23.5	27.1	32.4	37.5	35.6	40.0	31.9	30.3	35.5
	Q BOM 9am (°C)	18.1	13.1	8.8	7.9	10.4	14.8	19.0	20.9	23.0	23.9	22.7	21.1	17.0
	Q BOM 3pm (°C)	24.2	18.7	15.1	14.9	16.6	19.6	23.9	27.0	29.7	30.3	29.7	27.8	23.1
90% Lapse (°C/100m)		+7.3	+15.8	+10.3	+9.0	+10.6	+9.3	+11.4	+5.5	+5.1	+5.4	+5.4	+6.4	-

Note: BOM Average is the Quirindi Post Office Bureau of Meteorology long term monthly and annual rainfall average for 1907 to 2013. Q BOM 9am and 3pm are Quirindi Post Office Bureau of Meteorology long term monthly averages for 1967 to 2010. * Rainfall is a compositive of the Sentinex meterology stations of onsite with noise trailer data.



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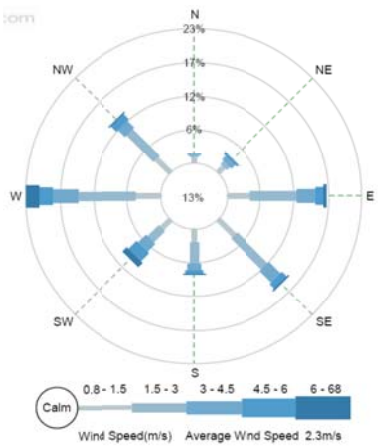

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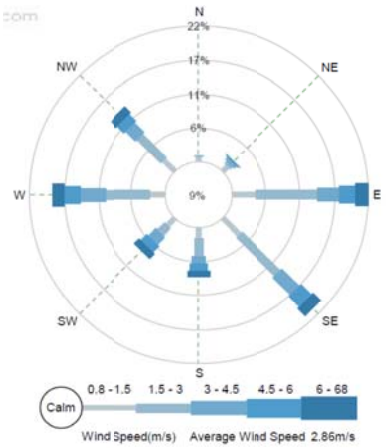

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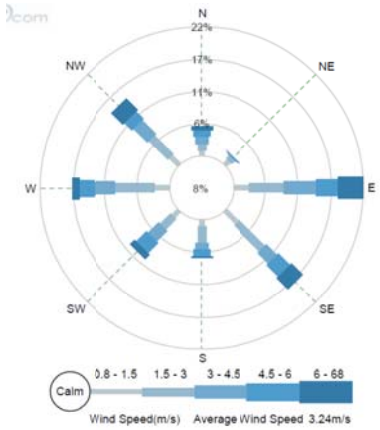

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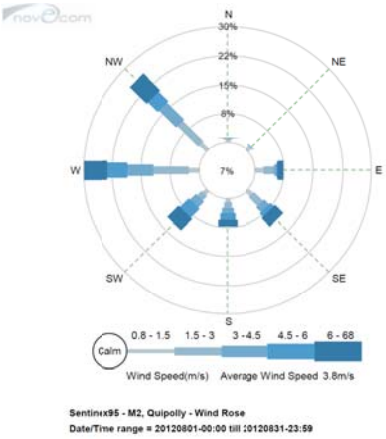

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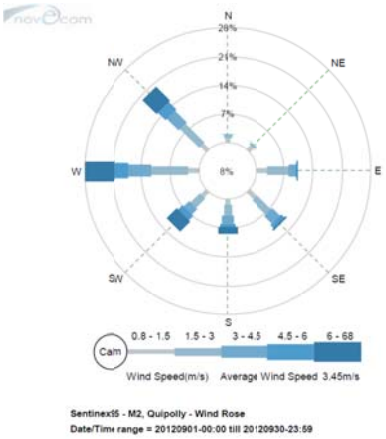

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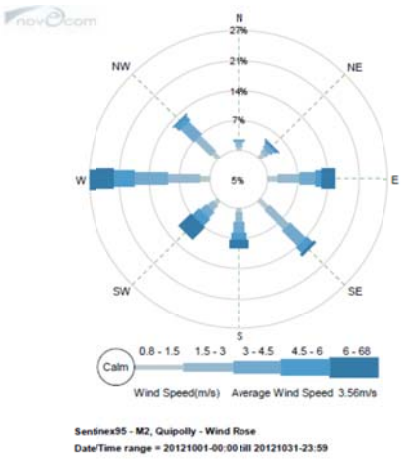

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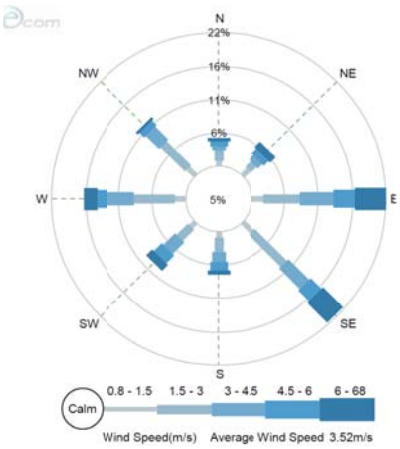

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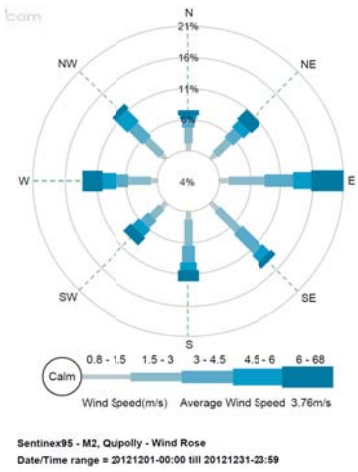

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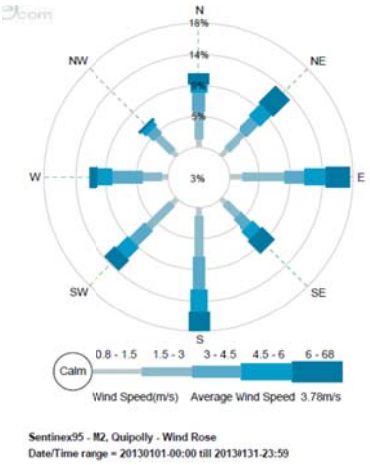

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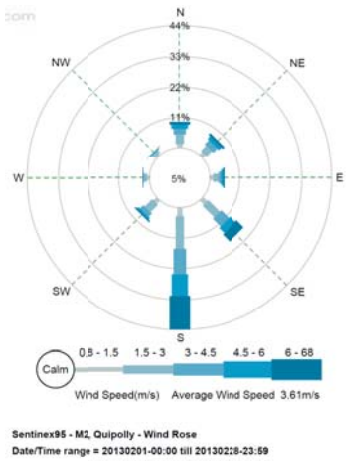

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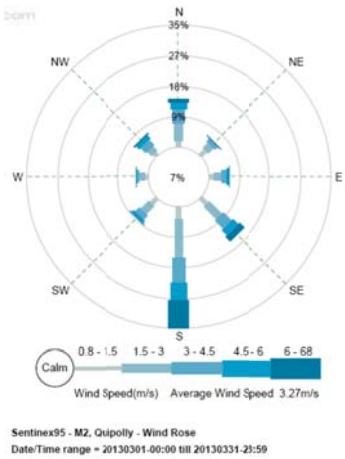


March 2013

Figure 3.20 WCC Windroses for April 2012 to March 2013

4. COMMUNITY RELATIONS

4.1 COMMUNITY COMPLAINTS

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

For the 2012-2013 period there were 56 complaints received by WCC, which is a significant decrease from the previous year (**Figure 4.1**). Since the mine commenced in 2005, the trend of complaints has increased due to the increase in the scale of mining operations and decreasing distance to the nearest major town of Werris Creek with a population of nearly 1800 people. Since PA 10_0059 was approved in November 2011, the resulting increase in the height of the overburden emplacement dump by 35m and the expansion of the proposed dump footprint towards Werris Creek Road, has resulted in increasing the awareness of Werris Creek residents to WCC operations. The decrease in the total number of complaints is due entirely to a reduction in the number of blasting complaints from 71 in 2011-2012 to 14 complaints in 2012-2013.

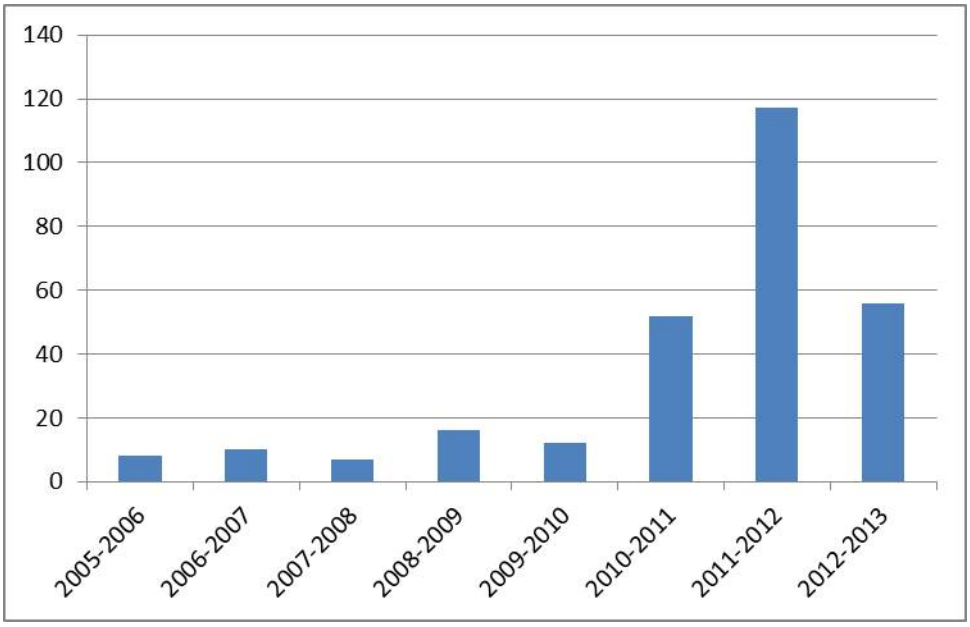


Figure 4.1 Total Number of Complaints Received by WCC from 2005 to 2013

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 (**Figure 4.2**). 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. All immediately adjacent properties have been acquired by WCC and hence, no complaints from immediately adjacent properties have been recorded since 2008.

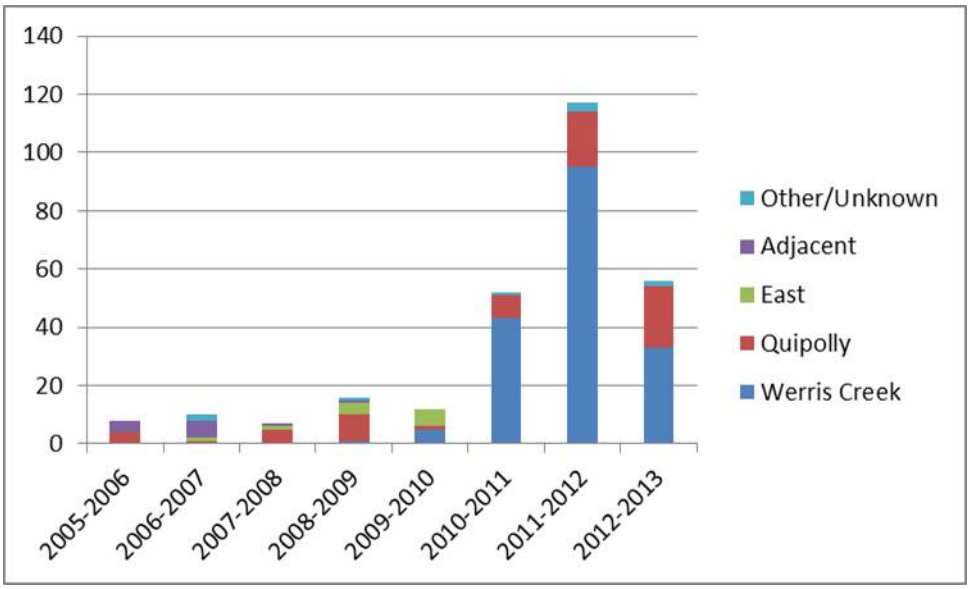


Figure 4.2 Locations of Complaints Received by WCC 2005 to 2013

As discussed above, there was a significant reduction in the number of blasting related complaints from the previous period. This is believed to be due to an improvement in blasting processes around the mitigation of overpressure impacts, but also there were no blasts fired in the G Coal Interburden during the period that had resulted in 23 complaints during 2011-2012. Processes that were improved included, increased stemming height in the weathered overburden material, and using video cameras to identify sub-surface ground conditions with voids, cavities and cracks that are now filled with stemming to prevent these areas from having shallow burden that can result in rifling or cratering of blasts that result in overpressure impacts. A pre-blast weather check process has also been implemented that avoids blasting when winds are towards Werris Creek or during high wind periods.

Table 4.1 WCC Complaint Issues from 2005 to 2013

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

* Number of complaints does not equal the number of issues raised as one complaint can raised multiple issues; RLO – Rail (or Train) Load Out Facility

Complaints for lighting (from the open cut) and noise (from the Rail Load Out facility) also decreased during the period. Real time monitoring of lighting and noise impacts have assisted in the management of these impacts. The only area of community complaints that increased during the period was dust complaints from mining operations. The majority of these complaints occurred during January 2013 during the three week heat wave and the large Coonabarabran fire where atmospheric visibility was reduced due to pollution from non-mining sources. Real time dust monitoring showed that PM10 peaked at 36µg/m3 at this time, which is considered to be fair air quality and only just outside the good range.

In 2011-2012 of the 117 complaints, 33 originated from one Werris Creek resident and 12 complaints came from one Quipolly resident. Of the 42 individual complainants during 2011-2012, 36 complainants resided in Werris Creek and 28 were first time complainants. In 2012-2013 of the 56 complaints, over half the complaints came from two people - 17 from one Werris Creek resident and 12 complaints from one Quipolly resident. The number of individual complainants reduced this period to 24, of which 17 complainants resided in Werris Creek and only 9 were first time complainants in 2012-2013.

WCC has endeavoured to address 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 2012-2013 in **Appendix 9**.

4.2 COMMUNITY LIAISON

There have been 26 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 13 December 2007 21 February 2008	7 (2 community representatives) 6 (1 community representatives) 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)

The frequency of meetings during the 2012-2013 reporting period was held every quarter for a total of four CCC meetings. The meetings were generally well attended with no less than 3 community representatives at every meeting. The meetings continue to have strong representation from the Liverpool Plains Shire Council (a Councillor and 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 2012-2013 reporting period, WCC released a community newsletter updating the community on the status of WCC operations including:

- Change of Production Activities;
- Life of Mine Project Construction Works;
- 2013 Whitehaven Coal University Scholarship;
- Outcomes of Blasting Investigations;
- Articles by the Operations Manager and CCC Chairperson; and
- WCC Environmental Monitoring Program.

4.3 EMPLOYMENT STATUS, DEMOGRAPHY, SOCIO-ECONOMIC CONTRIBUTIONS

4.3.1 Employment Status and Demography

WCC currently employees 154 full-time equivalent personnel; of which 63 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. This increase in permanent work is beneficial to the community as an extra 22 locals or new people have moved into the local area to seek employment from a reliable employer with positive flow on effects felt throughout the local community.

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 $20,000 to events and services in the local area including:

- Westpac Rescue Helicopter;
- Spring Ridge Rural Fire Brigade;
- Werris Creek Pre-School;
- Werris Creek Lions Club;
- Quirindi Show;
- Currabubula Red Cross Art Show;
- Quirindi Relay for Life Cancer Council;
- Quirindi NAIDOC Week; and
- Werris Creek Public School.

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.

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 and activities and conceptual decommissioning relating to rehabilitation management at WCC and the following summarises the rehabilitation status for 2012-2013.

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 BUILDINGS

No new buildings were constructed or commissioned during the reporting period, however in the next period the relocation and construction of the new northern MIA will include the administration, workshop and crushing plant facilities and offices.

5.2 REHABILITATION PERFORMANCE AND STATUS

The focus of rehabilitation during the period was to continue shaping and revegetate along the eastern side of the overburden emplacement to improve visual mitigation of WCC from Werris Creek Road. In total 40.74ha of final rehabilitation to GWBW Woodland and 6.72ha of temporary (cover crop sown) rehabilitation was established for 2012-2013 (**Figure 5.1**). **Table 5.2** outlines the annual progress of rehabilitation by WCC with a total of 93.89ha completed since the mine commenced in 2005. **Table 5.2** also provides a comparison with the actual rehabilitation achieved for 2012-2013 and the target/commitment given in the LOM MOP and RMP. WCC was able to exceed the rehabilitation target for 2012-2013 of 25.7ha by 21.76ha. This places WCC +13.27ha ahead of the rehabilitation commitments after Year 1 (first full year) of the LOM MOP period. A summary of the individual rehabilitation programs and methodology implemented for those areas completed in 2012-2013 are outlined in **Table 5.3** and **Figure 5.1**.

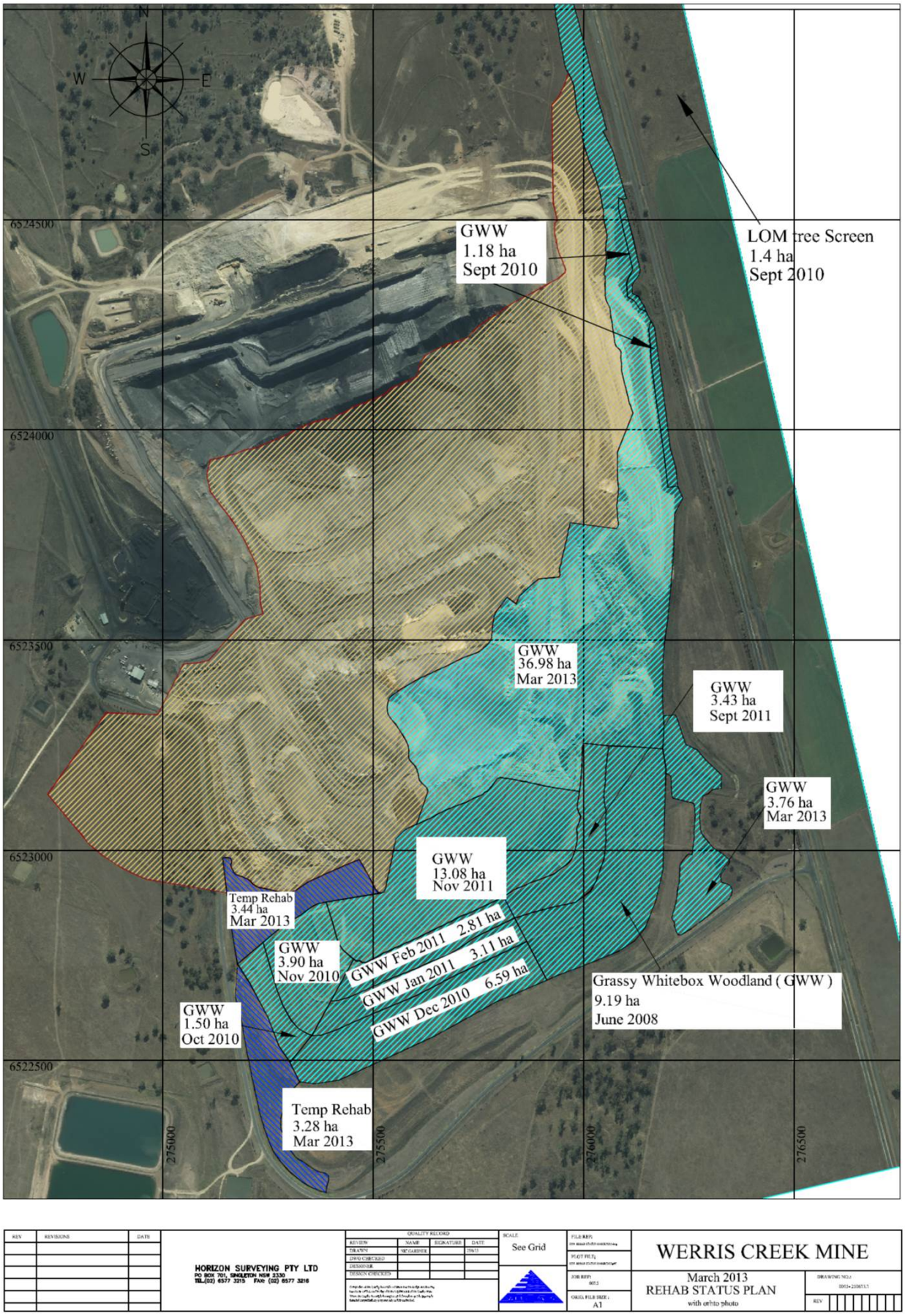


Figure 5.1 WCC Rehabilitation Status as at the end March 2013

Table 5.2 WCC Rehabilitation Program

Period*			Woodland Vegetation Community			Agriculture Class 3 (ha)	Temporary Rehab (ha)	ANNUAL TOTAL (ha)	CUMULATIVE TOTAL (ha)
			GWBW(ha)	SWBW(ha)	Brigalow (ha)				
Actual/Pre-MOP	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		20.49	0.0	0.0	0.0	-	20.49	29.68
	2011-2012		16.51	0.0	0.0	0.0	-	16.51	46.19
	2012-2013		**40.74**	**0.0**	**0.0**	**0.0**	**6.72**	**47.46**	**93.65**
Target/LOM MOP	Year 1	**2012 - 2013**	**22.0**	**0.0**	**3.7**	**0.0**	**-**	**25.7**	**80.38**
	Year 2	2013 - 2014	21.6	0.0	0.0	0.0	-	21.6	101.98
	Year 3	2014 - 2015	22.4	0.0	0.0	0.0	-	22.4	124.38
	Year 4	2015 - 2016	23.5	0.0	0.0	0.0	-	23.5	147.88
	Year 5	2016 - 2017	15.1	0.0	0.0	0.0	-	15.1	162.98
	Year 6	2017 - 2018	24.0	0.0	0.0	0.0	-	24.0	186.98
	Year 7	2018 - 2019	14.3	0.0	0.0	0.0	-	14.3	201.28
TOTAL			189.3	0.0	3.7	0.0	-	-	201.28
REMAINING***			188.1	180.0	0.0	47.9	-	-	404.0

* 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. The grey shading compares the actual 2012-2013 rehabilitation with the LOM MOP targets for 2012-2013.

Table 5.3 WCC Rehabilitation Program Summary 2012-2013

Domain:	3	**Sub Domain:**	GWW	**Reveg Date:**	March 2013	**Area:**	36.98ha
Name:	Eastern Rehabilitation Zone A to F	**Land Use:**	Vegetation Community	**Seed/Plant:**	Grassy White Box Woodland species		
Description/Methodology: The area had been shaped progressively from July 2012 through to March 2013. Topsoil and subsoil was applied to 0.2m depth each using principally scrapers from January to March 2013. D6 dozer undertook final trim and contour bank construction in March 2013. The southern 2.5ha portion of the rehab site was ripped and sown with a cover crop of Oats and Dixy Red Clover at 20kg/ha and mycorrhizae fungi inoculated in zeolite at 2kg/ha in March 2013. The remainder of the site had only Oats cover crop sown at 20kg/ha. Native grass seed harvested onsite, passed through a hammer mill (to improve spread ability) and broadcast spread at 4kg/ha at the same time as the cover crop was sown. **Status/Progress:** March to May was dry, so cover crop germination did not occur until steady rainfall in June 2013. No erosion present however thistle weed control will be required. Overstorey revegetation (tubestock) will need to be planted.							
Domain:	3	**Sub Domain:**	GWW	**Reveg Date:**	March 2013	**Area:**	3.76ha
Name:	Former Topsoil Stockpile 14	**Land Use:**	Vegetation Community	**Seed/Plant:**	Grassy White Box Woodland species		
Description/Methodology: The former topsoil stockpile 14 was exhausted with the soil spread over the eastern rehabilitation zone A to F. The site required minor shaping and final trim with a D6 dozer in March 2013. Topsoil thickness is not known as the soil stockpile was removed back down to natural surface. An Oats cover crop was sown at 20kg/ha with native grass seed harvested onsite, passed through a hammer mill (to improve spread ability) and broadcast spread at 4kg/ha in March 2013. **Status/Progress:** March to May was dry, so cover crop germination did not occur until steady rainfall in June 2013. No erosion present. Overstorey revegetation (tubestock) will need to be planted.							

Table 5.4 and **Table 5.5** outline the disturbance status (**Figure 5.2)** and maintenance works undertaken by WCC for 2012-2013. Following the heavy rain events in December, January and February, all contour drains on the rehabilitation and eastern dirty water drains required maintenance. Seven contour drains were extended across the new eastern rehabilitation area. Weed control and fox baiting was undertaken as required across the rehabilitation and the Biodiversity

Offset Areas. Annual soil stockpile maintenance was undertaken with stockpiles ripped and reseeded.

Table 5.4 Rehabilitation Summary

	Area Affected (hectares)			
	This Report Period (as of 31/3/2013)	**Last Report Period (as of 31/3/2012)**	**Next Report Period (estimated) (as at 31/03/2014)**	
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)	113.6	89.3	161.6	
B2 Active Mining Area (excluding items B3 - B5 below)	65.2	49.4	70.0	
B3 Waste emplacements, (active/unshaped/in or out-of-pit)	108.3	114.4	143.0	
B4 Tailings emplacements, (active/unshaped/uncapped)	0	0	0	
B5 Shaped waste emplacement (awaits final vegetation)	0	0.6	0	
ALL DISTURBED AREAS	287.1	253.7	374.6	F1
C: REHABILITATION PROGRESS				
C1 Total Rehabilitated area (except for maintenance)	93.7	54.7	102.0	F2
D: REHABILITATION ON SLOPES				
D1 Less than or equal to 10 degrees	93.7	54.7	102.0	
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	87.0	46.43	97.0	
E3 Plantations and crops	0	0	0	
E4 Other (include nonvegetative outcomes)	6.7	8.25	5.0	

* Includes Infrastructure (25.1ha), Sediment Dams and Basins (20.1ha) and Topsoil / Subsoil stockpile areas (68.4ha)

Figure 5.2 WCC Disturbance Status as at March 2013

Table 5.5 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)	20.0	As required	Eastern Drainage Diversion, Rehabilitation Contour Banks (**Section 5.3**)
Re-covering (detail - further topsoil, subsoil sealing etc)	6.7	0	Temporary Rehabilitation (**Section 5.3**)
Soil treatment (detail - fertilizer, lime, gypsum etc)	0	As required	
Treatment/Management (detail - grazing, cropping, slashing etc)	15	As required	Soil stockpile management (**Section 3.6** and **5.3**)
Re-seeding/Replanting (detail - species density, season etc)	15	As required	Reseeding soil stockpiles (**Section 5.3**)
Adversely Affected by Weeds (detail - type and treatment)	300	As required	St Johns Wort, Patterson Curse, St Barnabys Thistle (**Section 3.6**)
Feral animal control (detail - additional fencing, trapping, baiting etc)	1000	As required	Fox baiting (**Section 3.17**)

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 a 10mx10m aiming to replicate a 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 5.6** 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 5.8.

Table 5.6 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 to 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. Given the increase in area of rehabilitation, a second monitoring site was established in 2012.

Annual soil analysis monitoring was completed during the period with 13 samples taken from soil stockpiles, rehabilitation and biodiversity offset areas. **Table 5.7** summarises soil analysis results and where applicable whether the Rehabilitation/BOA met the completion criteria. Sampling of soil stockpiles and rehabilitation areas found the soil to be moderately alkaline and generally outside the target range identified in the completion criteria of pH 5 to 8.5. Annual monitoring will determine whether rehabilitation and stockpiled soil will trend closer to natural/in situ soils such as those tested from the BOA. If not, a sulphur based fertiliser could be applied in time to ameliorate soils and lower pH.

Table 5.7 Annual Soil Analysis Results

Soil	Sample ID	pH		Completion Criteria	Criteria Met?
		2013	2011		
Stockpile	33 (Subsoil)	8.3	8.9	-	-
Stockpile	34 (Topsoil)	9.0	8.7	-	-
Stockpile	RL445 (Topsoil)	7.5	-	-	-
BOA	4	6.6	7.2	5.0 - 8.5	YES
BOA	5	6.7	-	5.0 - 8.5	YES
BOA	8	7.7	-	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	8.8	8.9	5.0 - 8.5	No
BOA/Rehab	14/South Zone E	8.9	-	5.0 - 8.5	No
Rehab	East Zone A	8.7	-	5.0 - 8.5	No
Rehab	East Zone F	8.5	-	5.0 - 8.5	YES
Rehab	West Zone A	8.7	8.7	5.0 - 8.5	No

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 5.3a** displays the photopoint (south east) one month after planting in July 2008 and **Figure 5.3b** shows progress after 45 months in March 2011. From **Figure 5.4** the key change to the rehabilitation has been the advancement of the White Box tubestock planted nearly 5 years ago.

Figure 5.3 South East Rehabilitation Area a (left) July 2008 and b (right) March 2012

Figure 5.4 South East Rehabilitation Area at end of March 2013

Figure 5.5a displays the photopoint (south west) during contour and erosion maintenance in March 2010 and **Figure 5.5b** shows the status in March 2012. From **Figure 5.6**, not much change is visible in 2013 and hopefully in the next 12 months, the tubestock planting from 2010 will start to become evident.

Figure 5.5 South West Rehabilitation Area a (left) March 2010 and b (right) March 2012

Figure 5.6 South West Rehabilitation Area at end of March 2013

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 5.8** summarises the completion criteria for each Woodland land use Ecological Community. The completion criteria have been partially based on NSW EPA biometric vegetation community benchmark indices. **Table 5.8** also compares against the data from **Table 3.26** and **Table 5.7** 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 5.8 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 3/24
	Appropriate density/structure of native overstorey species is present.	Over Storey cover range between: • Box Gum Woodland: 0-25% • Other Woodland: 6-40% • Brigalow Woodland: 0-25%	Partial 10/24
	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 21/24
	Appropriate native groundcover is present.	Bare ground and litter does not exceed: • Box Gum Woodland: 55% • Other Woodland: 55% • Brigalow Woodland: 65%	Partial 20/24
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 or Brigalow Rehabilitation
	There are no potential hazards that are inconsistent with the 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
	The 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.	Partial 6/10
	Exotic weeds or vegetation is not competing or impacting on the intended land use.	Noxious weeds are not present within rehabilitation or biodiversity offset areas until data from analogue sites is available.	No
	Feral pests are not impacting on the intended land use.	Feral pests are not present within rehabilitation or biodiversity offset areas until data from analogue sites is available.	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

One rehabilitation trial was undertaken in March 2013 on the new rehabilitation completed on the eastern rehabilitation area. A local zeolite processing business had developed a new product called VAM, which are zeolite containing fungi. The fungi (vesicular arbuscular mycorrhizae = VAM) is known to naturally occur in soils that forms networks beneath the surface linking and improving the flow of nutrients and moisture to plant roots. Soil stripping and cultivation is known to break the networks reducing the ability of plants to access nutrients for growth. Zeolite is crystalline and porous with the variable porosity sizes that give it the ability to absorb, filter, hold, release, and exchange different chemicals, nutrients, toxins and ions according to the required task. Zeolite is used as the transport medium to protect the VAM as it is highly susceptible to damage. Zeolite can hold its shape and form when handled and when wet enabling the VAM to broadcast spread at the same time as sowing. This was the first trial in the world of VAM ameliorant for woodland vegetation community restoration and on coal mining rehabilitation. VAM was applied at 2kg/ha with a combination of oats and dixy red clover at 20kg/ha and native grass seed (mixture of species harvested onsite) at 4kg/ha over a 5ha trial site. While the rehabilitation area has germinated, it is too early to determine if there is an improvement in grass growth or coverage, however in the next reporting period soil tests of the trial and control site will be undertaken to confirm the presence of VAM in the soil.

5.7 MINE CLOSURE

The LOM MOP/RMP discusses at a high level the rehabilitation and management procedures for the ultimate closure of WCC and the final void. Currently, WCC is approved to cease mining operations in 2031 and therefore both mine closure planning at this stage 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 conceptually 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 5.9**.

Table 5.9 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

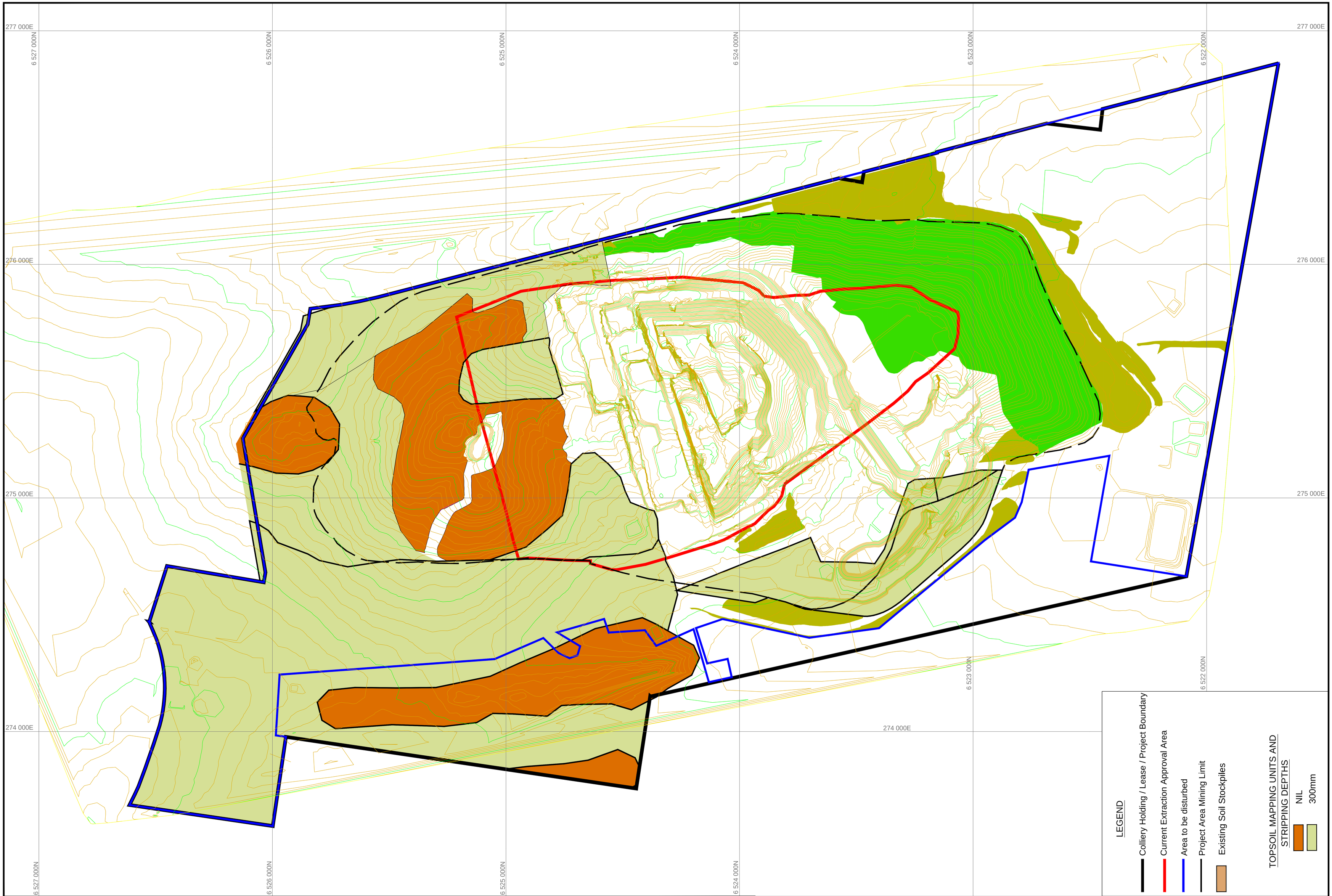
WCC had made progress during the 2012-2013 period by maintaining a focus on continuous improvement of environmental management, maintaining compliance and improving consultation with neighbouring properties and the local community. Achievements documented for the 2012-2013 period:

- Community consultation included four WCC CCC meetings and two community newsletters distributed to Quipolly and Werris Creek residents. A number of bus tours were held of the mine site during the year for various community groups and schools;
- The Community Enhancement Fund was established in consultation with Liverpool Plains Shire Council and WCC CCC to provide $300,000 over 6 years for local community projects with a minimum of $200,000 to be spent within the Werris Creek township;
- The following Management Plans were approved:
    - Heritage Management Plan
    - Rehabilitation Management Plan
    - Community Enhancement Fund
- Completed 47.6ha of additional rehabilitation and WCC took management control over the entire 1500ha Biodiversity Offset Area which required additional fencing;
- Upgrade air quality monitoring network with 13 additional dust deposition gauges and a TEOM to measure real time PM10 and PM2.5 dust levels in Werris Creek;
- WCC has gone 29 months (two full AEMR periods) without any noise exceedances;
- Reduction in blasting complaints due to improve blasting practices by reducing the likelihood of overpressure related impacts;

WCC targets for the 2013-2014 period:

- Obtain approval for the various Management Plans as required under PA10_0059;
- Secure the tenure of the LOM BOA onto the land title with the approval of DP&I and DSEWPaC;
- Complete recalibration and review of WCC Groundwater model to account for flooded underground workings and water in pit;
- Implement dust related pollution reduction programs in accordance with EPL12290;
- Undertake first ecological burn of BOA;
- Continue attenuation of truck fleet receiving CATXQ793 trucks and retrofit attenuation to the remaining CAT785 trucks;
- Improve blast design approval process between WCC and blasting contractor;
- Complete an additional 21ha of GWBW rehabilitation and strategic BOA plantings to improve restoration of endangered ecological communities and threatened species onsite;

- 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.



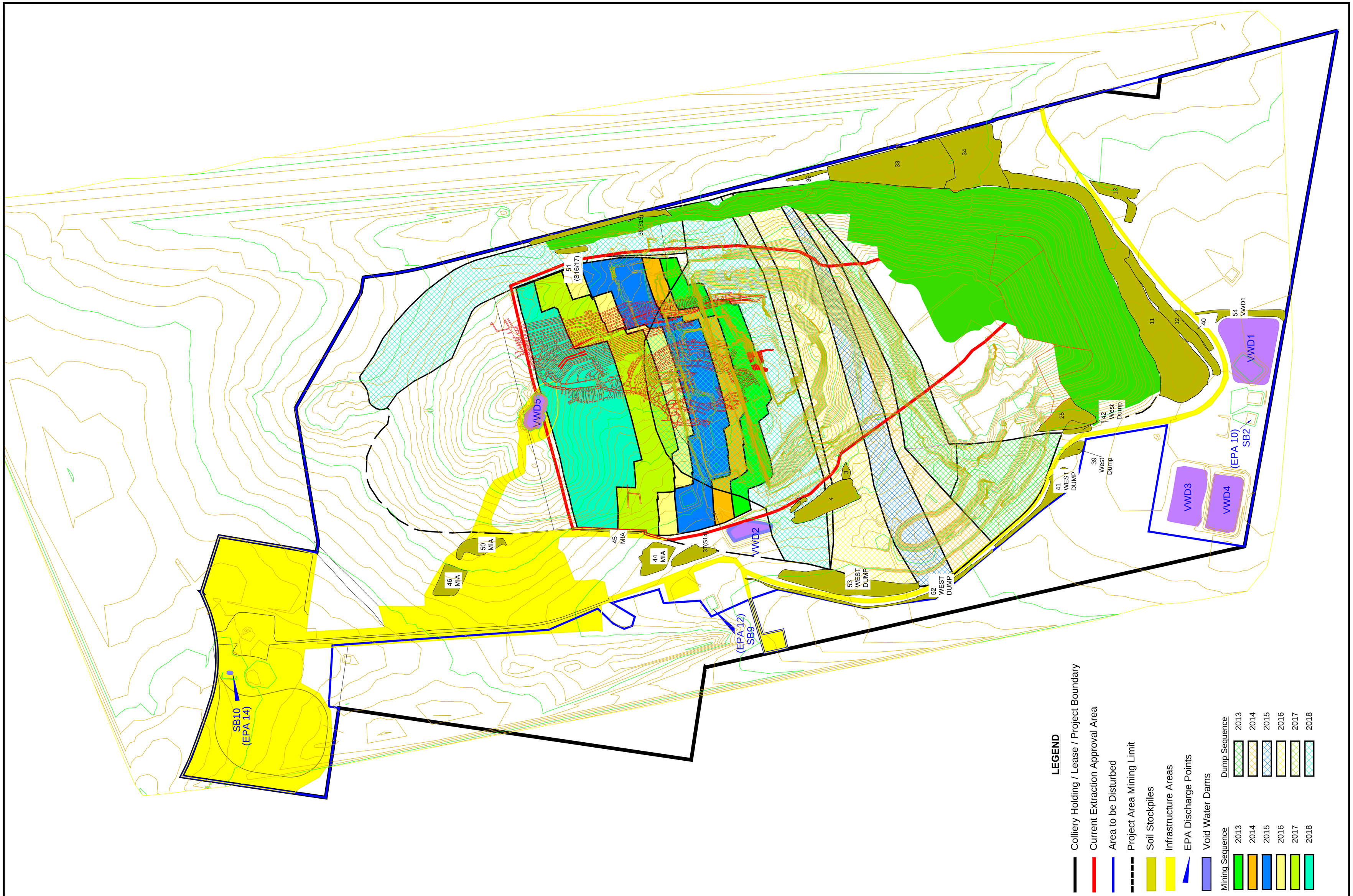
REVISIONS			
REV.	DATE	BY	

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	Scale:	Drawn	Checked	Approved
30-05-2013	1:5000	JOS	AW	NW

Drawing No. 000000-1
Revision No. 1
Sheet Size A0



REVISIONS					
REV.	DATE	BY	DESCRIPTION	CHK.	REV.

Werris Creek Coal Pty Limited
WHITEHAVEN
1435 Werris Creek Road. Werris Creek 2341

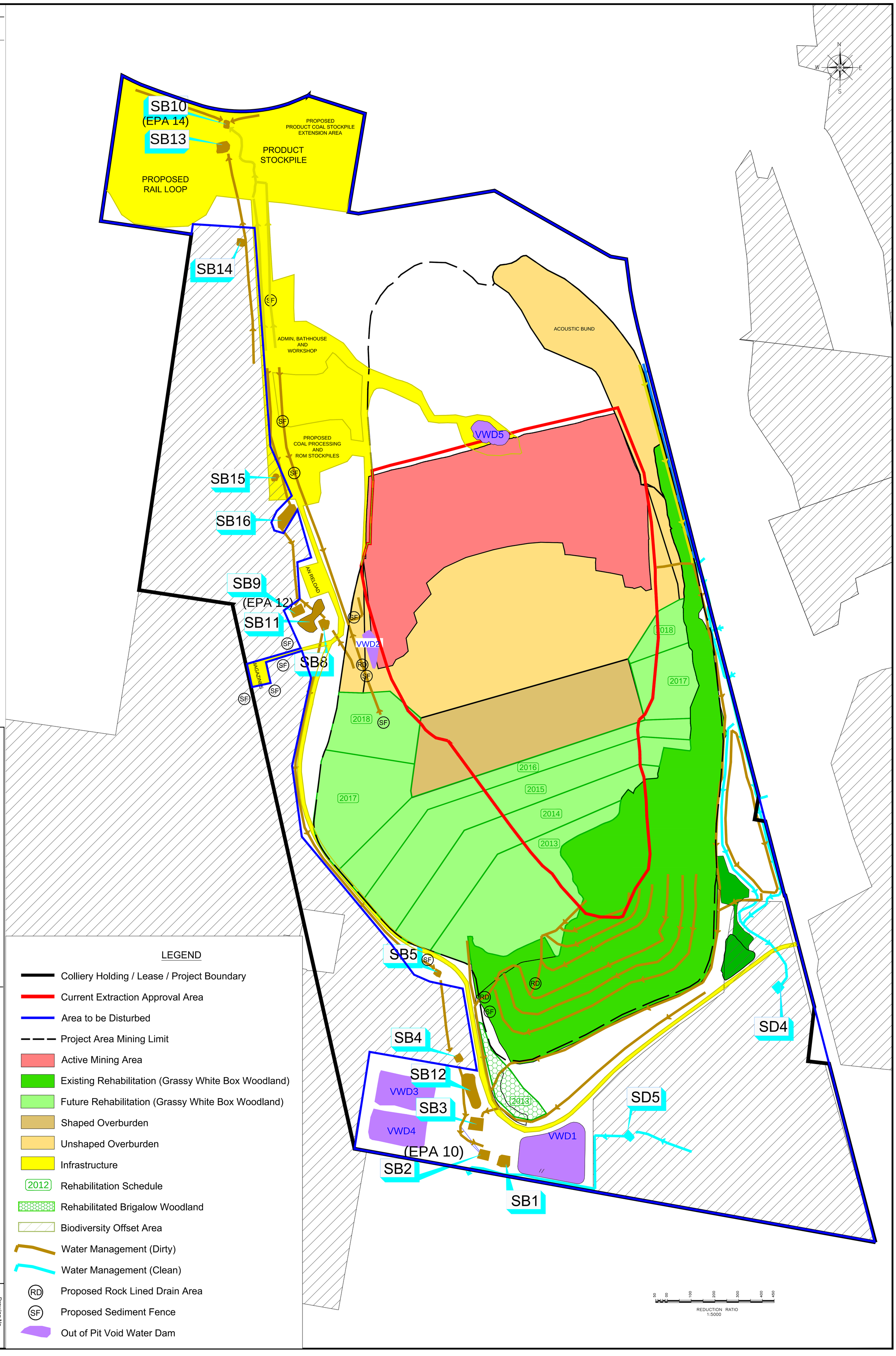
WERRIS CREEK MINE - AEMR PLAN
PROPOSED MINING ACTIVITIES - PLAN 4

Date	Scale:	Drawn	Checked	Approved
30-05-2013	1:5000	JOS	AW	MP

Drawing No. 000000-1
Revision No. 1
Sheet Size A0

REVISIONS

REV.	DATE



LEGEND

- Colliery Holding / Lease / Project Boundary
- Current 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 (Dirty)
- Water Management (Clean)
- RD Proposed Rock Lined Drain Area
- SF Proposed Sediment Fence
- Out of Pit Void Water Dam

WHITEHAVEN

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WERRIS CREEK MINE - AEMR PLAN

PROPOSED MINING ACTIVITIES - PLAN 5

Date	Scale:	Drawn	Checked	Approved	Sheet Size	Revision No.	Drawing No.
30-05-2013	1:5000	JOS	AW	MP	A0	1	000000-1

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

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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

- o 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.	

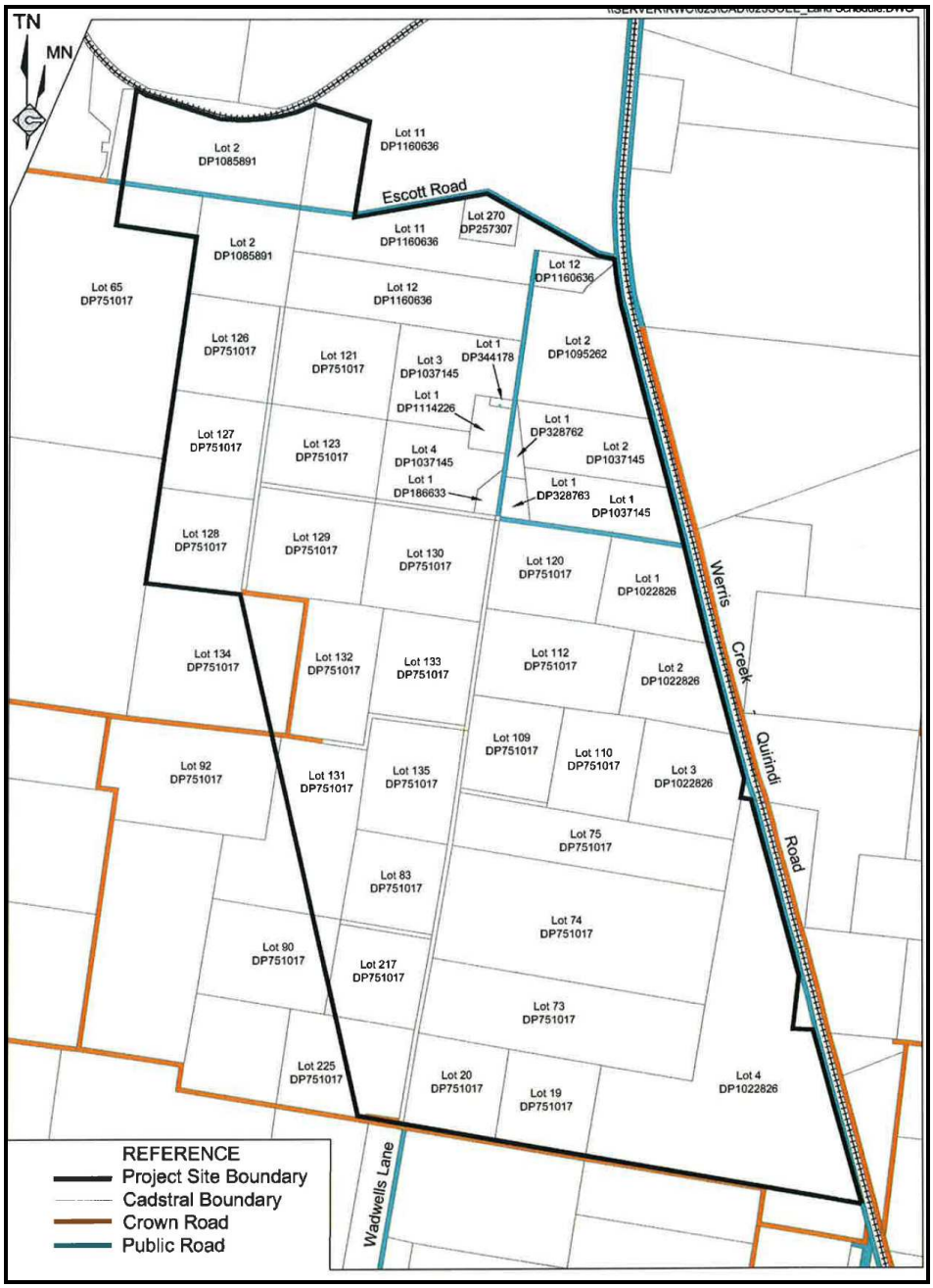

Figure 1: *Schedule of Land*

APPENDIX 2
PROJECT LAYOUT PLAN

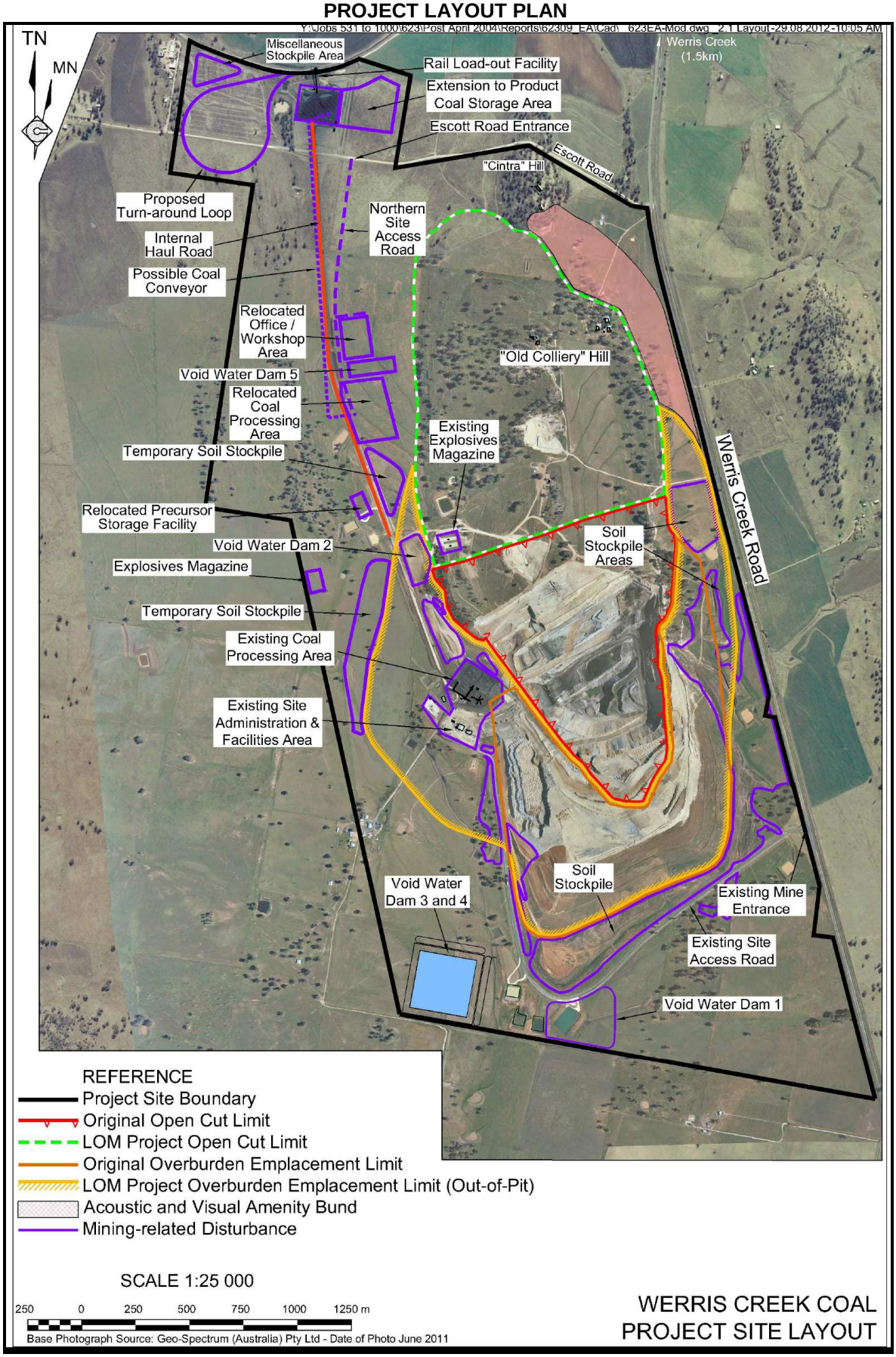

Figure 1: *Project General Arrangement*

APPENDIX 3
NOISE RECEIVER LOCATIONS

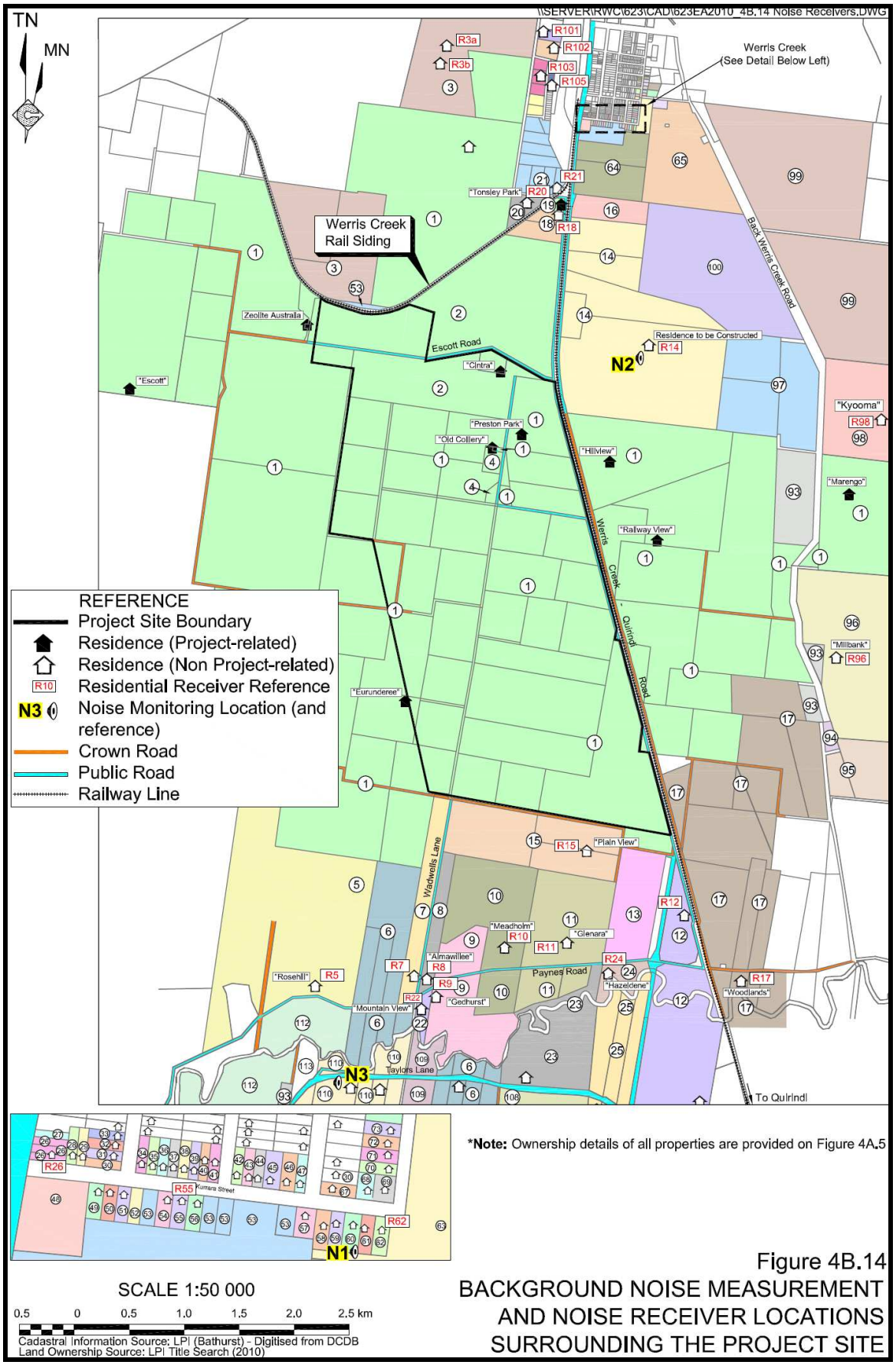

Figure 1 *Noise receiver locations*

APPENDIX 4
BIODIVERSITY OFFSET STRATEGY

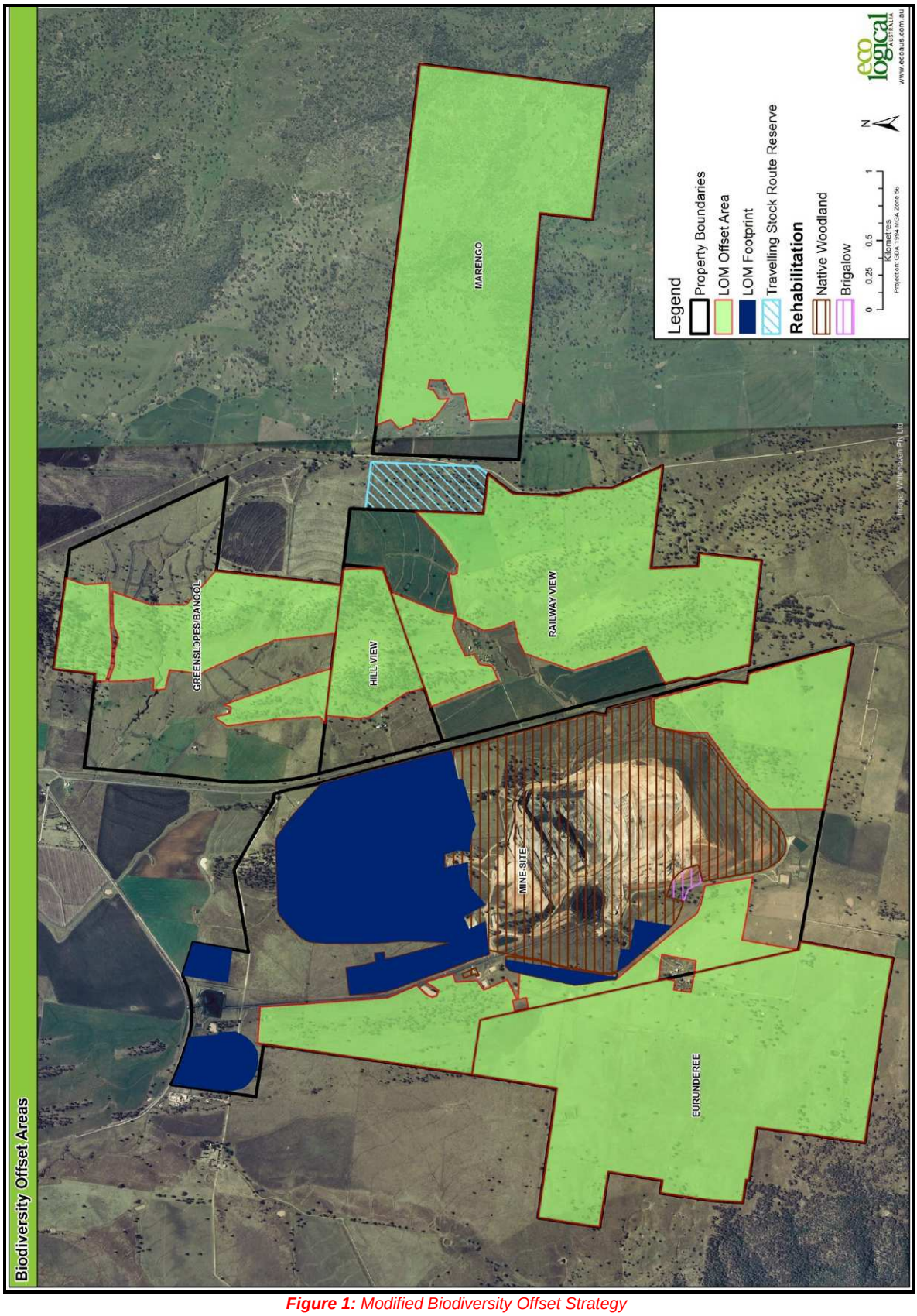

Figure 1: *Modified Biodiversity Offset Strategy*

APPENDIX 5
CONCEPTUAL FINAL LANDFORM PLAN

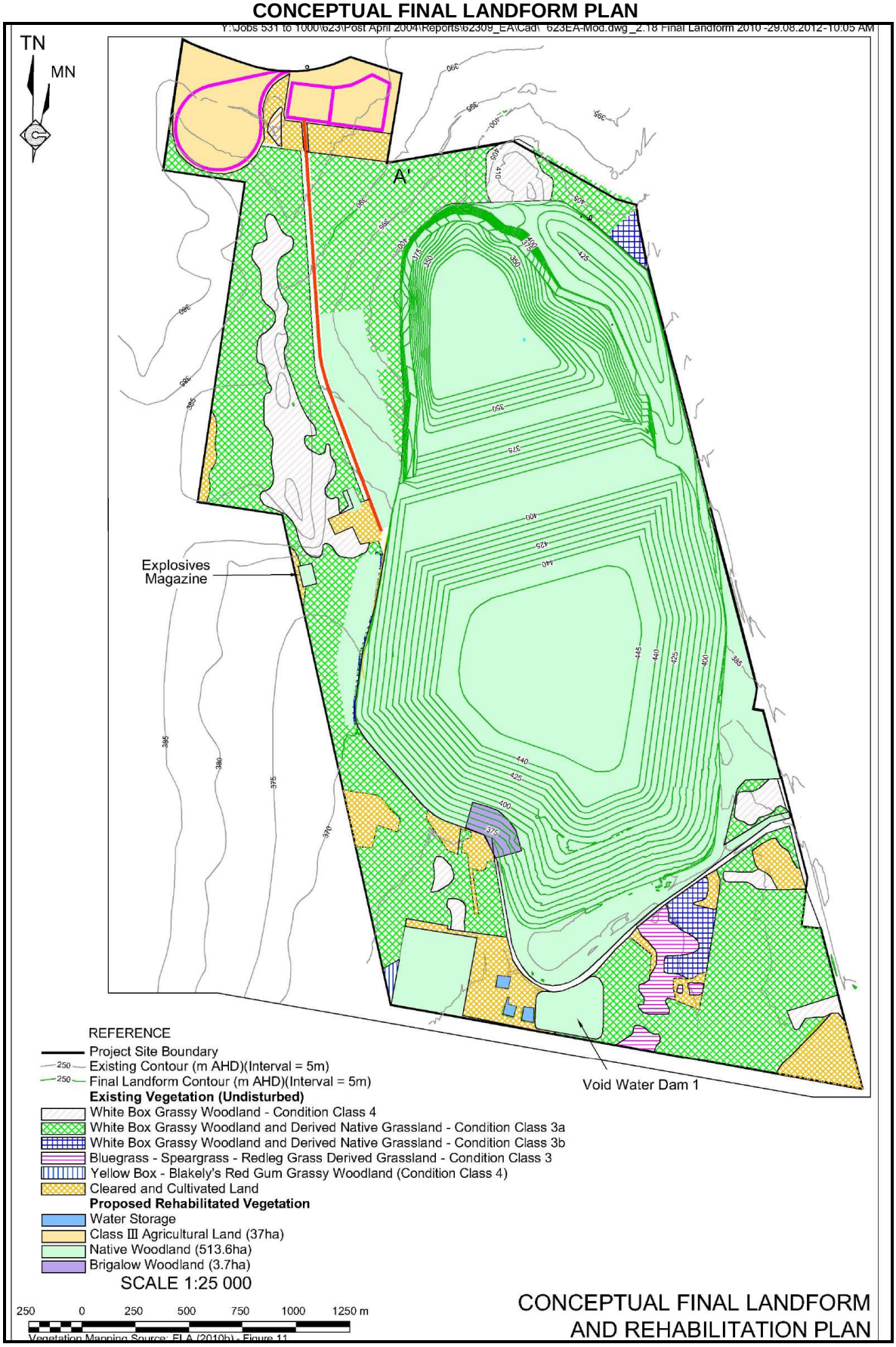

Figure 1: *Conceptual Final Landform*

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.	Ongoing
	• 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
	• Construct a 5m high barrier around the northeastern perimeter of the relocated coal processing infrastructure.	Within 6 months of Project Approval
	• Ensure that all equipment exhibits sound power levels consistent with the schedules in *Appendix D* of Spectrum Acoustics (2010).	Ongoing
	• Limit the number of operating drills (non exploration) on the Project Site to two at any one time.	Ongoing
	• 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.	During adverse meteorological conditions during the night-time period
	• 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.	Ongoing until the coal crushing and screening infrastructure are relocated
	• Ensure that during periods of noise enhancing winds, overburden emplacement activities are preferentially undertaken 'in-pit'.	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° 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
Level 1, NSW Govt Offices, 85 Faulkner Street ARMIDALE NSW 2350
Phone: (02) 6773 7000
Fax: (02) 6772 2336
PO Box 494 ARMIDALE
NSW 2350

Environment Protection Licence

Licence - 12290

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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).

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.

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
SEE FULL DESCRIPTION IN CONDITION A2.2 OF THIS LICENCE. GRENFELL PARISH, BUCKLAND COUNTY, LIVERPOOL PLAINS SHIRE

A2.2 For the purposes of this licence, the premises comprises all the land bound by the Project Site Boundary as shown in the maps provided as Appendix 2 and Appendix 3 in the Werris Creek Mine Extension Project Approval 10_0059 issued by the Minister for Planning and Infrastructure on 25 October 2011. The project site comprises the following land allotments and any other land not listed below that is bound by the Project Site Boundary as shown on the maps referenced above:

Lots 19, 20, 73, 74, 75, 83, 109, 110, 112, 120, 121, 123, 126, 127, 128, 129, 130, 132, 133 & 135 DP

751017;
Part Lots 65, 90, 92, 131, 134, 217 & 225 DP 751017
Lot 2 DP 431951;
Lot 1 DP 186633;
Lot 270 DP 257307;
Lot 2 DP 1095262;
Lot 1 DP 344178;
Lot 1 DP 1114226;
Lot 1 DP 328762;
Lot 1 DP 328763;
Part Lot 11 & Lot 12 DP 1160636;
Part Lot 2 DP 1085891;
Lots 1, 2, 3 & Part Lot 4 DP 1022826;
Lots 1, 2 3 & 4 DP1037145; and
all Crown and Public roads within the Project boundary.

In addition to the lands shown above, the premises also includes the land allotments traversed by rail spur line including:

Lots 2 & 3 DP 431951;
The unsurveyed land forming the rail corridor between Lots 2 & 3 DP 431951;
The unsurveyed land forming the rail corridor between Lot 3 DP 431951 and Lot 41 DP 1126436. Lot 41 DP 1126436 does not form part of the premises; and
The unsurveyed land forming the rail corridor between Lot 1 and Lot 2 DP 431951. Lot 1 DP 431951 does not form part of the premises.

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 identi-fication no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Ambient Air Monitoring / Air Discharge Quality	Ambient Air Monitoring / Air Discharge Quality	Within 100 metres of the residence marked as "Tonsley Park" identified as "R20" in Appendix 3 of Project Approval 10_0059.
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 Identi-fication no.	Type of Monitoring Point	Type of Discharge Point	Location Description
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.

15		Discharge to Utilisation Area	Waste Water Utilisation Area marked on Figure 3 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.
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.
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.

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
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 purpose 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 Effluent application to land

O4.1 Waste water must only be applied to the following areas: Point 15 defined in condition P1.3 of this licence.

O4.2 Spray from waste water application must not drift beyond the boundary of the waste water utilisation area to which it is applied.

O4.3 Waste water utilisation areas must effectively utilise the waste water applied to those areas. This includes the use for pasture or crop production, as well as ensuring the soil is able to absorb the nutrients, salts, hydraulic load and organic materials in the solids or liquids. Monitoring of land and receiving waters to determine the impact of waste water application may be required by the EPA.

O5 Other operating conditions

O5.1 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.

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 1,28,29,30

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
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.

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 "R20" ("Tonsley Park"), "R96" ("Talavera" listed as "Millbank"), "R11" ("Glenara") and "R62" (43 Kurrara Street, Werris Creek) on Appendix 3 of Project Approval 10_0059.

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.

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 17 May 2013.

Control efficiency is calculated as:

$$CE = \frac{E\ (\text{uncontrolled}) - E\ (\text{controlled})}{E\ (\text{uncontrolled})} \times 100$$

Where E = the emission rate of the activity

U1.2 The Licensee must prepare a Monitoring Program to assess its compliance with Condition U1.1 under varying meteorological conditions. The Monitoring Program must detail the following:

- parameters to be monitored;
- methods to be used to monitor each parameter;
- locations where each parameter will be monitored;
- frequency at which each parameter will be monitored;
- Key Performance Indicators that will be used to determine compliance with Condition U1.1; and
- detailed justification for each parameter and Key Performance Indicator selected.

As a guide, the EPA anticipates that the following parameters will be monitored:
- moisture and silt contents of haul roads;
- frequency, duration, rate and quantity of water applied to haul roads;

- frequency, duration, rate and quantity of suppressant applied to haul roads in comparison to manufacturer's specifications;
- vehicle kilometres travelled;
- haul truck weight;
- haul truck speed;
- number of vehicle movements;
- meteorological conditions; and
- dust levels on haul roads.

The Monitoring Program must be submitted by the Licensee to the Environment Protection Authority Regional Manager Armidale, at PO Box 494, ARMIDALE by 31 May 2013.
The EPA intends to require the licensee to implement the Monitoring Program once it is approved by the EPA.

U1.3 The Licensee must submit a written report to the EPA providing the results of the Monitoring Program. The report must include an assessment of the dust control effectiveness, dust levels and the Licensee's compliance with Condition U1.1. 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 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 The Licensee must prepare a Monitoring Program to assess its compliance with Condition U2.1. The Monitoring Program must detail the following:

- parameters to be monitored;
- methods to be used to monitor each parameter;
- locations where each parameter will be monitored;
- frequency at which each parameter will be monitored;
- way in which changes to operational activities will be documented;
- Key Performance Indicators that will be used to determine compliance with Condition U2.1; and
-
- detailed justification for each parameter and Key Performance Indicator selected.

As a guide, the EPA anticipates that the following parameters will be monitored:
- wind speed and direction;
- temperature;
- rainfall/humidity;
- evaporation rate;
- solar radiation;
- operational activities; and
- dust levels.

The Monitoring Program must be submitted by the Licensee to the Environment Protection Authority

Regional Manager Armidale, at PO Box 494, ARMIDALE by 31 May 2013.

The EPA intends to require the licensee to implement the Monitoring Program once it is approved by the EPA.

U2.3 The Licensee must submit a written report to the EPA providing the results of the Monitoring Program. The report must detail the following:

- weather conditions during which activities were ceased or altered;
- changes made to operational activities as a result of adverse weather; and
- resultant dust levels when activities were altered or ceased.

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.

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.

Environment Protection Licence

Licence - 12290

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

Environment Protection Licence

Licence - 12290

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*.

Environment Protection Licence

Licence - 12290

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

Environment Protection Licence

Licence - 12290

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

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)

CREEK RESOURCES PTY LTD A.C.N. 100 228 886 COMMON SEAL

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
WHITTON - 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.

Office of State Revenue
NSW Treasury
Client No: 1846988 2372
Duty: N/A Trans No: ML 1671
Asst details: PURPOSES

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

1. Notice to Landholders
2. Environmental Harm
3. Mining Operations Plan
4. Environment Management Report
5. Environmental Incident Report
6. Additional Environmental Reports
7. Rehabilitation
10. Blasting
11. Safety
12. Prevention of Soil Erosion and Pollution
13. Transmission lines, Communication lines and Pipelines
14. Roads and Tracks
15. Trees and Vegetation
18. Indemnity
20. Single Security
24. Cooperation Agreement

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).

Office of State Revenue
NSW Treasury
Client No: 1846988
Duty: N/A Trans No: ML 1672 2372
Asst details: COAL

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

.....

in the presence of

.....
Witness

MINING LEASE CONDITIONS 2010

Content

Definition

1. Notice to Landholders
2. Environmental Harm
3. Mining Operations Plan
4. Environment Management Report
5. Environmental Incident Report
6. Additional Environmental Reports
7. Rehabilitation
8. Subsidence Management
9. Working Requirement
10. Blasting
11. Safety
12. Prevention of Soil Erosion and Pollution
13. Transmission lines, Communication lines and Pipelines
14. Roads and Tracks
15. Trees and Vegetation
17. Resource Recovery
18. Indemnity
20. Single Security
23. Suspension of Mining Operations
24. Cooperation Agreement

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.

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 2012-2013

MONTH (g/m2/month)				April 2012	May 2012	June 2012	July 2012	August 2012	September 2012	October 2012	November 2012	December 2012	January 2013	February 2013	March 2013	ANNUAL AVERAGE	AVERAGE - EXCLUDED	MINIMUM	MAXIMUM	AQGHGMP Criteria
-	DG2	Cintra	Total Matter	2.5	1.2	1.0	1.5	0.4	1.3	2.3	1.7	1.4	3.3	1.9	1.1	1.6	1.5	0.4	3.3	4.0
			Ash Content	1.4	0.8	0.8	1.0	0.3	0.7	1.2	1.0	0.7	1.6	1.2	0.7					
-	DG5	Railway View	Total Matter	1.1	1.0	0.5	0.7	2.5	1.0	1.2	1.2	1.6	3.2	0.6	0.3	1.2	1.2	0.3	3.2	4.0
			Ash Content	0.6	0.7	0.5	0.5	1.5	0.7	0.8	1.0	1.4	2.7	0.6	0.2					
EPL #1	DG20	Tonsley Park	Total Matter	0.6	0.4	0.3	0.5	0.3	1.2	1.0	1.0	1.2	3.3	0.9	0.4	0.9	0.9	0.3	3.3	4.0
			Ash Content	0.3	0.4	0.3	0.4	0.2	0.5	0.5	0.6	0.8	2.5	0.5	0.2					
-	DG15	Plain View	Total Matter	1.0	2.1	3.5	1.8	5.0	0.6	0.7	0.7	1.0	2.0	1.5	1.2	1.8	1.8	0.6	5.0	4.0
			Ash Content	0.6	1.2	2.5	0.6	2.8	0.5	0.5	0.4	0.8	1.5	1.0	0.7					
-	DG9	Marengo	Total Matter	0.7	1.3	0.8	0.2	0.6	0.7	0.7	0.5	0.6	1.6	1.0	0.2	0.7	0.8	0.2	1.6	4.0
			Ash Content	0.3	0.7	0.5	0.2	0.3	0.5	0.3	0.3	0.5	1.4	0.6	0.2					
-	DG22	Mountain View	Total Matter	3.5	0.5	0.5	1.2	0.5	0.6	0.3	0.1	3.2	3.0	1.2	0.4	1.3	1.3	0.1	3.5	4.0
			Ash Content	2.6	0.5	0.4	1.0	0.3	0.5	0.1	0.1	1.6	1.5	0.8	0.3					
EPL#29	DG11	Glenara	Total Matter	1.5	2.1	2.6	425.0	2.4	4.5	1.2	0.7	3.7	1.2	0.3	0.5	37.1	1.6	0.3	425.0	4.0
			Ash Content	0.8	0.9	0.9	391.0	1.2	4.0	0.8	0.5	1.6	0.9	0.3	0.4					
-	DG24	Hazeldene	Total Matter	NS	NS	NS	NS	0.5	0.5	0.7	0.6	3.6	1.8	0.8	0.4	1.1	0.8	0.4	3.6	4.0
			Ash Content	NS	NS	NS	NS	0.3	0.5	0.5	0.5	1.6	1.4	0.6	0.2					
-	DG17	Woodlands	Total Matter	NS	NS	NS	NS	0.3	0.5	2.8	1.8	2.5	2.7	0.6	0.5	1.5	1.5	0.3	2.8	4.0
			Ash Content	NS	NS	NS	NS	0.3	0.5	1.5	1.0	0.9	1.8	0.6	0.2					
-	DG96	Talavera	Total Matter	NS	NS	NS	NS	0.2	0.6	0.8	0.6	0.9	1.4	0.7	0.4	0.7	0.7	0.2	1.4	4.0
			Ash Content	NS	NS	NS	NS	0.2	0.4	0.6	0.4	0.5	0.3	0.6	0.2					
EPL#28	DG98	Kyooma	Total Matter	NS	NS	NS	NS	0.3	0.4	1.1	0.7	1.0	1.9	0.3	0.4	0.8	0.7	0.3	1.9	4.0
			Ash Content	NS	NS	NS	NS	0.1	0.3	0.5	0.3	0.6	1.2	0.3	0.1					
-	DG14	Greenslopes	Total Matter	NS	NS	NS	NS	0.3	0.5	0.6	0.8	1.0	1.5	0.6	0.4	0.7	0.8	0.3	1.5	4.0
			Ash Content	NS	NS	NS	NS	0.1	0.4	0.5	0.4	0.5	1.2	0.6	0.1					
-	DG62	Werris Creek South	Total Matter	NS	NS	NS	NS	0.7	0.5	0.3	0.7	0.5	0.9	0.6	0.3	0.6	0.6	0.3	0.9	4.0
			Ash Content	NS	NS	NS	NS	0.3	0.3	0.3	0.3	0.3	0.7	0.6	0.1					
EPL#30	DG92	Werris Creek Centre	Total Matter	NS	NS	NS	NS	0.6	0.5	0.7	2.5	1.1	1.2	0.5	0.2	0.9	0.6	0.2	2.5	4.0
			Ash Content	NS	NS	NS	NS	0.2	0.3	0.4	0.5	0.5	0.9	0.5	0.1					
-	DG101	Westfall	Total Matter	NS	NS	NS	NS	0.6	0.6	0.8	1.1	1.5	2.7	1.1	0.3	1.1	1.2	0.3	2.7	4.0
			Ash Content	NS	NS	NS	NS	0.2	0.4	0.4	0.6	0.8	2.2	0.9	0.2					
-	DG103	West Street	Total Matter	NS	NS	NS	NS	1.0	0.5	1.1	1.1	1.1	0.6	3.2	0.5	1.1	0.9	0.5	3.2	4.0
			Ash Content	NS	NS	NS	NS	0.5	0.5	0.7	0.6	0.7	0.6	1.5	0.2					
-	DG1	Escott	Total Matter	NS	NS	NS	NS	0.5	0.3	0.5	0.6	0.8	1.3	1.6	0.5	0.8	0.8	0.3	1.6	4.0
			Ash Content	NS	NS	NS	NS	0.2	0.3	0.3	0.3	0.4	1.0	1.4	0.4					
-	DG3	Eurunderee	Total Matter	NS	NS	NS	NS	0.6	0.4	0.4	0.8	1.2	1.6	0.2	0.6	0.7	0.7	0.2	1.6	4.0
			Ash Content	NS	NS	NS	NS	0.2	0.3	0.3	0.4	0.7	1.4	0.2	0.3					
-	DG34	8 Kurrara Street	Total Matter	NS	NS	NS	NS	0.5	1.2	1.9	1.1	1.2	1.4	11.9	0.4	2.5	1.0	0.4	11.9	4.0
			Ash Content	NS	NS	NS	NS	0.3	0.5	0.7	0.6	0.6	1.0	8.7	0.2					
-	DG106	Villamagna	Total Matter	NS	NS	NS	NS	NS	0.4	0.6	13.1	1.1	2.2	0.7	0.4	2.6	0.9	0.4	13.1	4.0
			Ash Content	NS	NS	NS	NS	NS	0.3	0.3	11.4	0.7	1.9	0.7	0.2					

Note: All results are in the form of Insoluble Matter (g/m2/month); NS - Not sampled

RED - indicates sample is contaminated from a Non-Werris Creek Coal dust source and is not counted in the average

YELLOW - sample contaminated with excessive organic matter (>50%) from non-mining source (i.e bird droppings and insects) and is excluded from the average

Werris Creek Coal
HVAS TEOM Dust Monitoring
2012-2013

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
02-Apr-12				22	6.2		19	7.5	19.0	29	12.2	28.6	18	8.2	17.6	18	8.2	17.6	66	22.0	66.4	50	30	90
08-Apr-12				12	**15.9**	15.9	16	**15.3**	17.6	23.2	**22.6**	25.9	20	**15.1**	18.8	20	**15.1**	18.8	53	**55.3**	59.6	50	30	90
14-Apr-12				6	17.2		8	17.4	14.2	12	24.8	21.3	8	16.0	15.3	8	16.0	15.3	22	59.6	47.0	50	30	90
20-Apr-12				23	23.0		19	19.0	15.3	26	28.6	22.6	14	20.0	15.1	14	20.0	15.1	80	79.9	55.3	50	30	90
26-Apr-12				12			13		14.9	17		21.5	13		14.7	13		14.7	54		55.0	50	30	90
02-May-12				11	11.4		13	12.6	14.5	8	8.4	19.4	14	11.8	14.6	14	11.8	14.6	27.5	27.5	50.4	50	30	90
08-May-12				26	**15.3**	15.6	20	**17.9**	15.3	49	**19.9**	23.6	18	**14.2**	15.0	18	**14.2**	15.0	114	**51.3**	59.5	50	30	90
14-May-12				15	12.4		27	17.1	16.7	12	12.8	22.2	15	14.0	15.0	15	14.0	15.0	33	33.0	56.2	50	30	90
20-May-12				12	25.8		17	26.7	16.8	13	48.8	21.1	12	17.7	14.6	12	17.7	14.6	28	114.0	53.0	50	30	90
26-May-12				4			5		15.6	4		19.4	3		13.5	3		13.5	6		48.3	50	30	90
01-Jun-12				19			12		15.2	8		18.4	4		12.6	4		12.6	20		45.7	50	30	90
07-Jun-12				12	3.7		7	4.8	14.5	3	3.3	17.1	3	3.2	11.8	3	3.2	11.8	7	5.5	42.5	50	30	90
13-Jun-12				11	**12.1**	14.4	9	**9.4**	14.1	5	**10.8**	16.2	6	**7.0**	11.4	6	**7.0**	11.4	16	**24.5**	40.5	50	30	90
19-Jun-12				10	11.8		9	9.1	13.7	13	6.6	16.0	8	5.2	11.2	8	5.2	11.2	31	18.3	39.8	50	30	90
25-Jun-12				17	18.7		15	15.4	13.8	31	31.2	17.0	17	17.4	11.6	17	17.4	11.6	67	66.6	41.6	50	30	90
01-Jul-12				10			9		13.5	4		16.2	5		11.2	5		11.2	7		39.5	50	30	90
07-Jul-12				8	6.3		8	6.3	13.2	5	3.0	15.5	7	4.8	10.9	14	5.2	11.4	5	4.8	37.5	50	30	90
13-Jul-12				8	**8.6**	13.0	8	**8.5**	12.9	5	**4.5**	14.9	5	**6.6**	10.6	6	**8.4**	11.0	5	**6.1**	35.6	50	30	90
19-Jul-12				11	8.3		11	8.3	12.8	6	4.5	14.4	5	5.2	10.3	9	7.9	10.9	8	5.2	34.2	50	30	90
25-Jul-12				6	10.7		6	10.7	12.5	3	5.8	13.9	10	10.4	10.3	8	14.2	10.8	5	8.2	32.7	50	30	90
31-Jul-12				17			18		12.8	11		13.7	15		10.5	16		11.0	15		31.9	50	30	90
06-Aug-12				10	7.1		10	7.1	12.6	6	5.3	13.4	7	4.8	10.4	9	8.6	10.9	13	10.7	31.0	50	30	90
12-Aug-12				9	**10.4**	12.5	10	**10.9**	12.5	10	**8.6**	13.2	9	**9.6**	10.3	11	**12.0**	10.9	15	**13.9**	30.3	50	30	90
18-Aug-12				7	9.0		7	9.8	12.3	5	10.1	12.9	5	9.0	10.1	11	10.8	10.9	11	14.6	29.5	50	30	90
24-Aug-12				9	17.0		10	17.8	12.2	11	10.6	12.8	12	15.0	10.2	14	16.3	11.0	16	16.3	29.0	50	30	90
30-Aug-12							17		12.4	20		13.1	15		10.4	19		11.3	30		29.0	50	30	90
05-Sep-12		3.1			7.3		23	10.8	12.8	19	10.8	13.3	30	6.9	11.1	29	9.1	12.0	30	17.3	29.1	50	30	90
11-Sep-12		**8.9**	8.9		**15.3**	13.0	29	**20.5**	13.4	23	**18.0**	13.6	26	**18.8**	11.6	28	**20.5**	12.6	36	**28.5**	29.3	50	30	90
17-Sep-12		8.1			14.6		22	21.9	13.6	17	19.1	13.8	16	16.4	11.8	17	19.2	12.7	29	30.0	29.3	50	30	90
23-Sep-12		16.4			26.5		11	29.2	13.6	11	23.1	13.7	7	29.8	11.6	9	29.2	12.6	17	35.8	28.9	50	30	90
29-Sep-12							14		13.6	8		13.5	15		11.7	13		12.6	16		28.5	50	30	90
05-Oct-12		2.3			4.6		17	7.3	13.7	12	5.6	13.5	19	11.2	11.9	20	9.7	12.9	21	14.4	28.2	50	30	90
11-Oct-12		**10.7**	9.8		**18.1**	13.7	7	**14.6**	13.5	6	**11.6**	13.2	11	**15.7**	11.9	10	**15.8**	12.8	14	**23.2**	27.8	50	30	90
17-Oct-12		10.1			17.7		22	14.4	13.8	23	9.1	13.5	18	15.3	12.1	25	13.2	13.1	47	17.8	28.4	50	30	90
23-Oct-12		29.1			41.4		12	22.0	13.7	9	22.6	13.4	15	19.2	12.2	11	24.9	13.1	18	46.9	28.1	50	30	90
29-Oct-12							27		14.1	19		13.5	16		12.3	15		13.1	28		28.1	50	30	90
04-Nov-12		0.0			2.7		23	8.9	14.3	19	5.7	13.7	23	8.7	12.6	25	7.7	13.4	27	10.4	28.0	50	30	90
10-Nov-12		**6.8**	8.8		**14.3**	13.8	9	**24.1**	14.2	6	**15.3**	13.4	9	**21.7**	12.5	8	**18.5**	13.3	10	**24.0**	27.6	50	30	90
16-Nov-12		6.6			14.2		25	25.1	14.5	13	18.6	13.4	27	23.3	12.9	20	20.3	13.4	24	26.9	27.5	50	30	90
22-Nov-12		20.5			33.8		36	36.0	15.0	21	20.5	13.6	33	33.0	13.4	26	25.6	13.7	32	31.7	27.6	50	30	90
28-Nov-12							11		14.9	13		13.6	14		13.4	20		13.9	15		27.3	50	30	90
04-Dec-12		0.8			2.3		5	4.7	14.7		3.1	13.6	8	5.5	13.3	10	3.2	13.8		8.6	27.3	50	30	90
10-Dec-12		**6.5**	8.2		**13.1**	13.7	15	**9.2**	14.7	3	**7.4**	13.3	6	**8.9**	13.1	3	**13.8**	13.5	10	**13.0**	26.8	50	30	90
16-Dec-12		5.5			13.5		9	9.2	14.5	9	6.9	13.2	9	8.4	13.0	26	9.9	13.8	19	12.4	26.7	50	30	90
22-Dec-12		17.9			28.3		7	14.9	14.4	5	12.6	13.0	8	13.8	12.9	10	26.3	13.7	9	18.7	26.2	50	30	90
28-Dec-12							20		14.5	5		12.9	7		12.8	9		13.6	10		25.9	50	30	90
03-Jan-13		0.0			0.1		13	13.3	14.5	10	4.5	12.8	12	6.7	12.7	16	9.0	13.7	16	9.6	25.7	50	30	90
09-Jan-13		**7.8**	8.1		**14.2**	13.7	30	**21.0**	14.8	23	**10.3**	13.0	22	**11.9**	12.9	34	**16.2**	14.1	41	**19.7**	26.0	50	30	90
15-Jan-13		6.8			13.9			19.9	14.8	6	7.8	12.9	11	11.3	12.9	12	12.3	14.1	17	15.8	25.8	50	30	90
21-Jan-13		23.0			36.1			29.8	14.8	8	22.6	12.8	7	22.3	12.8	10	34.2	14.0	14	41.4	25.6	50	30	90
27-Jan-13							6		14.6	4		12.6	4		12.6	5		13.8	10		25.3	50	30	90
02-Feb-13		2.1			3.6		5	4.8	14.4	3	3.1	12.4	4	3.9	12.4	3	3.2	13.6	6	6.0	24.9	50	30	90
08-Feb-13		**4.7**	7.6		**8.3**	13.2	14	**8.7**	14.4	13	**5.7**	12.4	9	**6.0**	12.4	34	**12.2**	14.0	21	**11.0**	24.8	50	30	90
14-Feb-13		4.4			8.1		12	7.2	14.3	5	4.5	12.2	7	6.0	12.3	9	8.6	13.9	8	9.9	24.5	50	30	90
20-Feb-13		8.4			15.2		7	13.9	14.2	5	12.7	12.1	6	8.7	12.2	10	34.3	13.8	10	21.2	24.2	50	30	90
26-Feb-13							5		14.0	2		11.9			12.2	4		13.6	6		23.9	50	30	90
04-Mar-13							5		13.9	6		11.8	6		12.0	7		13.5	11		23.7	50	30	90
10-Mar-13		1.5			2.7		12	5.1	13.8	6	2.4	11.7	7	5.7	12.0	12	3.7	13.5	13	5.5	23.5	50	30	90
16-Mar-13		**5.4**	7.3		**10.3**	13.0	14	**9.1**	13.8	18	**7.1**	11.8	14	**9.3**	12.0	8	**9.5**	13.4	45	**16.9**	23.8	50	30	90
22-Mar-13		4.5			9.2		9	9.4	13.8	5	5.6	11.7	11	8.9	12.0	9	8.8	13.3	12	12.7	23.6	50	30	90
28-Mar-13		16.9			25.9		10	13.7	13.7	6	17.7	11.6	9	13.5	11.9	17	17.2	13.4	15	44.8	23.5	50	30	90
Min		**0.0**			**0.1**		**4.7**			**2.4**			**3.2**			**3.2**			**4.8**					
Max		**29.1**			**41.4**		**36.0**			**48.8**			**33.0**			**34.3**			**114.0**					
Capture							**97%**			**98%**			**98%**			**100%**			**98%**					

Deposited Dust - Quirindi Trains 2012-2013

	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 2012	0.8	25%	50%	25%	0.3	25%	50%	25%	0.3	30%	40%	30%	0.7	25%	50%	25%	1.0	10%	60%	30%	0.5	25%	50%	25%	4.0
May 2012	1.1	30%	40%	30%	0.7	35%	25%	40%	0.6	20%	50%	30%	0.6	40%	40%	20%	0.4	10%	60%	30%	0.7	25%	50%	25%	4.0
June 2012	1.0	35%	45%	20%	0.8	45%	35%	20%	0.9	35%	55%	10%	0.5	45%	40%	15%	1.9	20%	60%	20%	1.3	15%	65%	20%	4.0
July 2012	1.2	40%	30%	30%	0.8	40%	30%	30%	1.2	40%	30%	30%	0.7	40%	30%	30%	2.4	10%	60%	30%	1.5	25%	50%	25%	4.0
August 2012	0.6	30%	30%	40%	0.6	30%	30%	30%	0.5	30%	50%	20%	0.5	30%	50%	20%	0.7	20%	50%	30%	2.7	15%	20%	60%	4.0
September 2012	1.7	20%	20%	60%	1.2	20%	50%	30%	1.3	15%	55%	30%	0.9	20%	50%	30%	0.7	20%	60%	20%	0.6	10%	60%	30%	4.0
October 2012	1.5	15%	50%	35%	1.4	15%	50%	35%	0.9	20%	40%	40%	1.0	25%	50%	25%	0.6	20%	40%	40%	1.6	10%	50%	40%	4.0
November 2012	1.2	10%	60%	10%	1.5	15%	50%	10%	0.8	15%	40%	25%	0.9	15%	15%	40%	2.4	5%	50%	25%	1.5	10%	35%	25%	4.0
December 2012	1.0	15%	60%	25%	1.4	5%	65%	30%	1.7	60%	25%	15%	2.4	15%	65%	20%	1.4	20%	60%	20%	3.6	5%	85%	10%	4.0
January 2013	1.8	10%	50%	30%	1.3	10%	70%	20%	1.5	10%	60%	30%	1.3	15%	65%	20%	1.0	10%	60%	30%	2.5	5%	70%	10%	4.0
February 2013	0.7	10%	35%	55%	0.6	15%	40%	45%	1.0	20%	40%	40%	0.5	15%	45%	40%	0.4	10%	45%	30%	1.0	10%	50%	20%	4.0
March 2013	0.3	10%	50%	40%	0.2	15%	50%	25%	0.7	15%	60%	25%	-	-	-	-	0.4	5%	65%	30%	0.2	5%	65%	15%	4.0
ANNUAL AVERAGE	**1.1**				**0.9**				**1.0**				**0.9**				**1.1**				**1.5**				**4.0**
Average Coal %	**20.8%**				**22.5%**				**25.8%**				**25.9%**				**13.3%**				**13.3%**				**-**
Average Coal g/m2	**0.22**				**0.20**				**0.25**				**0.24**				**0.15**				**0.20**				**-**
MINIMUM	**0.3**				**0.2**				**0.3**				**0.5**				**0.4**				**0.2**				**-**
MAXIMUM	**1.8**				**1.5**				**1.7**				**2.4**				**2.4**				**3.6**				**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	507.00	10.00	<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	

SB3 EPL ID:

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
14-Aug-07	Unknown	8.4	790	7		4.4			5	0.08	0.04	<2
11-Oct-07	Unknown	8.5	505	18		1.9			2.6	0.07	<0.01	<2

SB4 EPL ID:

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
19-Jun-07	Unknown	7.3	370				1.4		1.9	0.95	0.06	
11-Oct-07	Unknown	8.3	395	29		0.08			0.66	0.04	0.02	<2

SB5 EPL ID:

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
11-Oct-07	Unknown	8.2	450	131		0.63			1.9
27-Oct-08	Unknown	7.6	318	76		0.38			1.8
15-Jan-09	Unknown	7.6	290	48		0.44			1.2

Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
0.07	0.04	<2
0.65	0.09	<1
0.18	0.05	<2

SB6

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
14-Aug-07	Unknown	6.9	590	16	45			51	0.41	0.03	<2	
11-Oct-07	Unknown	7.6	460	217	30			34	0.69	0.2	<2	
15-Jan-09	Unknown	7.9	435			5.8					<2	
6/05/2009	Quarterly	8.24	493	12	0.09	6.08	6.17	1.4	7.6	<0.01	<0.01	<5
26/08/2009	Quarterly	7.63	835	88	0.03	0.01	0.04	23.2	23.2	1.12	<0.01	<10
10/11/2009	Quarterly	7.61	1980	92	<0.01	0.06	0.06	9.7	9.8	1.09	0.32	<5
23/02/2010	Quarterly	7.61	350	11	2.36	7.45	9.82	3.9	13.7	0.07	<0.01	<5
11/05/2010	Quarterly	8.01	515	60	0.03	9.71	9.74	1.9	11.6	0.14	0.05	<5
19/08/2010	Quarterly	7.69	476	20		11.8	12.1	4.3	16.4	0.08	<0.01	<5
8/12/2010	Quarterly	8.16	582	8	1.13	17.8	18.9	4.3	23.2	0.09	<0.01	<5
3/03/2011	Quarterly	7.76	434	20	0.24	9.94	10.2	3.1	13.3	0.05	<0.01	<5
12/05/2011	Quarterly	**Dry**	**Dry**	**Dry**	**Dry**	**Dry**	**Dry**	**Dry**	**Dry**	**Dry**	**Dry**	**Dry**
18/08/2011	Quarterly	8.07	778	78	0.08	25.3	25.4	<1.0	25.4	<0.1	<0.01	<5
23/11/2011	Quarterly	7.79	622	50	0.18	19.5	19.7	6.4	26.1	0.1	0.02	<5
23/02/2012	Quarterly	8.41	277	<5	0.07	1.53	1.6	1.5	3.1	0.02	<0.01	<5
10/05/2012	Quarterly	7.75	338	20	<0.01	0.04	0.04	1.1	1.1	0.1	<0.01	<5
27/08/2012	Quarterly	7.52	502	38	0.33	14.9	15.2	3.1	18.3	0.18	0.03	<5
19/11/2012	Quarterly	7.97	617	53	0.09	1.7	1.79	1.6	3.4	0.07	<0.01	<5
12/03/2013	Quarterly	7.69	265	35	<0.01	<0.01	<0.01	0.7	0.7	0.04	<0.01	<5

SB7 EPL ID:

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	Unknown	7.3	1460	93		10			12	0.1	0.05	<2

SB8

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	Unknown	7.7	1300	132		0.64			5.7	0.07	<0.01	<2
18/01/2012	Non-routine	8.07	344	18	<0.01	0.03	0.03	0.7	0.7	0.1	<0.01	<5
3/09/2012	Non-routine	8.33	560	14	0.02	0.43	0.45	0.5	1	0.06	<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
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

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

SB12 EPL ID:

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
10/11/2009	Quarterly	8.24	639	160	<0.01	<0.01	<0.01	1.1	1.1	0.1	0.03	<5

SD1 **EPL ID:**

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
SD1	16-Aug-07	Unknown	7.1	60	5	0.17			2.1	0.48	0.3	2
SD1	11-Oct-07	Unknown	8	100	11	0.02			1.6	0.61	0.36	<2
SD1	14-Jan-08	Unknown	7.4	175	22	3.1			3.1	0.43	0.05	<2
SD1	09-Apr-08	Unknown	7.5	165	21		<0.01		1.5	0.22	0.04	<2
SD1	08-Jul-08	Unknown	7.4	165	7		0.01		1.1	0.07	0.03	<2

SD2 EPL ID:

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	7.1	190	18		0.19			1.6	0.43	0.29	<2
11-Oct-07	Unknown	7.6	200	14		<0.01			1.2	0.57	0.45	<2
14-Jan-08	Unknown	7.4	260	10		1.1			1.1	0.29	0.2	<2
09-Apr-08	Unknown	7.7	225	24		0.02			1.2	0.54	0.13	<2
08-Jul-08	Unknown	8.7	260	8		<0.01			1	0.07	0.01	<2
10/11/2009	Quarterly					0.02		1.4	1.4	0.13		<5

SD3 EPL ID:

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											
11-Oct-07	Unknown	8.8	260	7		<0.01			1.2	0.17	0.05	<2
14-Jan-08	Unknown	8.3	360	5		1.4			1.4	0.3	0.21	<2
09-Apr-08	Unknown	8.3	375	13		<0.01			1.2	0.43	0.09	<2
08-Jul-08	Unknown	8.6	385	11		<0.01			0.93	0.08	<0.01	<2

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	Unknown	8.2	200	15		0.04			1.1	0.8	0.74	<2

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

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

SB3 **EPL ID:**

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
SD6	16-Aug-07	Unknown	8.8	780	100	0.01			1.2	0.25	0.06	<2
SD6	11-Oct-07	Unknown	8.5	500	217	0.02			1.3	0.99	0.62	<2
SD6	14-Jan-08	Unknown	9.5	630	220	0.01			3	0.7	0.15	<2
SD6	09-Apr-08	Unknown	8.2	990			0.34				<0.01	<2
SD6	08-Jul-08	Unknown	7.9	1070	318		5.4		4.4	0.46	<0.01	<2

SB3 EPL ID:

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
SD7	10-Jan-07	Unknown			57		<0.01		1.1	0.19	0.06	<2
SD7	08-Mar-07	Unknown			46		5.90		6.4	0.43	0.24	
SD7	19-Jun-07	Unknown	7.1	375			1.3		1.9	0.2	0.16	
SD7	27-Jun-07	Unknown	7	510			5.3		5.6	0.25	0.02	
SD7	16-Jul-07	Unknown	8.2	0.84	68							
SD7	17-Jul-07	Unknown	8.3	0.6	52							<5
SD7	18-Jul-07	Unknown	7.5	750	143					0.08	0.04	<2
SD7	14-Aug-07	Unknown	8.7	550	25	1.4			2.4	0.15	0.09	<2
SD7	20-Aug-07	discharge	8.3	0.61	60	2.3			2.9	0.16		<5
SD7	11-Oct-07	Unknown	8.7	475	11	0.51			1.2	0.21	0.08	<2
SD7	14-Jan-08	Unknown	8.5	430	21	0.02			0.66	0.7	0.54	<2
SD7	09-Apr-08	Unknown										
SD7	08-Jul-08	Unknown	9.3	630			<0.01				0.18	<2

SB3 EPL ID:

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
SD8	20-Aug-07	discharge	7.3	34		0.02			1.7	0.71		<5
SD8	09-Apr-08	Unknown		<2					3.4	0.41		
SD8	08-Jul-08	Unknown		36					2	0.42		

SB3 EPL ID:

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
SD9	08-Mar-07	Unknown		207		1.00			1.6	0.60	0.18	
SD9	16-Aug-07	Unknown	6.4	120	17	0.75			2.3	0.52	0.16	<2
SD9	20-Aug-07	discharge	7.5	0.11	110	0.3			1	0.64		<5
SD9	11-Oct-07	Unknown	7.8	180	42	0.83			2.4	0.15	0.07	<2
SD9	14-Jan-08	Unknown	7.4		22	0.31			1.4	0.7	0.17	<2
SD9	09-Apr-08	Unknown	7.9	270			<0.01				0.23	<2
SD9	08-Jul-08	Unknown	8.2	330			<0.01				0.02	<2

SB3 EPL ID:

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
SD10	08-Mar-07	Unknown		120			0.20		0.90	1.9	0.22	
SD10	16-Aug-07	Unknown										
SD10	21-Aug-07	Unknown	7.4	125	0.06	0.016			0.5	0.55		<5
SD10	14-Jan-08	Unknown		170								
SD10	09-Apr-08	Unknown		67					2.8	1.2		
SD10	10-Jul-08	Unknown		32					2	0.58		

SD11 **EPL ID:**

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
SD11	08-Mar-07	Unknown			518		7.60		8.5	1.5	0.73	
SD11	27-Jun-07	Unknown	7	95			2.8		4.6	0.7	0.36	
SD11	16-Aug-07	Unknown	7.1	70	31	2.8			3.8	0.68	0.38	<2
SD11	11-Oct-07	Unknown	7.7	110	5	1.6			2.7	0.74	0.66	<2
SD11	14-Jan-08	Unknown	7.3	110	129	0.47			2.8	0.95	0.95	<2
SD11	09-Apr-08	Unknown	7.5	155			0.29				0.28	<2
SD11	10-Jul-08	Unknown	7.9	150			0.28				0.17	<2

SB3 EPL ID:

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
08-Mar-07	Unknown			182			0.64		1.2	3.0	0.24	
27-Jun-07	Unknown	6.8	250				0.53		1.4	0.6	0.08	
14-Jan-08	Unknown	7.5	110	328		0.26			1.4	0.49	0.03	<2
09-Apr-08	Unknown			8								
10-Jul-08	Unknown			22								

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

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

SB3 EPL ID:

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
MV1	11-Oct-07	Unknown	7.6	1150	38	1.3			1.3	0.03	<0.01	<2
MV1	14-Jan-08	Unknown	7.6	1090	<2	3.2			3.2	0.03	<0.01	<2
MV1	09-Apr-08	Unknown	8.2	1055	36		0.2		1.4	0.88	<0.01	<2
MV1	08-Jul-08	Unknown			28				1.9	0.21		

VWD EPL ID:

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-Oct-08	Unknown	8.2	867	27		1.2			1.4	0.19	0.04	<1

MV Dewatering Dam **EPL ID:**

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	8.3	780	97		4.6			7.4	0.56	0.16	<2
10-Oct-07	Unknown	7.8	1020	13		6.6			7.8	0.02	<0.01	<2
14-Jan-08	Unknown	8.1	860	2		3			3.2	0.13	<0.01	<2

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

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	

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

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

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

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

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

EPA14 EPL ID:

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-Oct-08	Unknown	7.5	243	78		<0.01			2	0.26	0.1	<1

Potable Water Villamagna 773 Werris Creek Road

Sample Date	pH - lab	TDS	Turbidity	Total Hardness as CaCO3	Sulfate as SO4	Chloride	arsenic	Barium	Cadmium	Chromium	Copper	Nickel	Lead	Zinc	Manganese	Boron	Iron	Mercury	Ammonia as N	Nitrite as N	Nitrate as N	Nitirte + Nitrate	Heterotrphic Plate Count 21C	Heterotrphic Plate Count 36c	Faecal Coliforms	E Coli	Coliforms
HEALTH					500			0.7	0.002	0.05	2	0.02	0.01		0.5	4		0.001									
AESTHETIC	6.5-8.5	500	5NTU	200	250						1			3	0.1		0.3		0.5								
19/04/2011	7.22	19	1.4	<1	<1		<0.001	0.005	<0.0001	<0.001	0.057	<0.001	0.001	0.04	0.006	<0.05	0.06	<0.0001	<0.01	<0.01	0.51	0.51	~54000	~68000	~5	~5	~170
4/07/2011	4.95	7	0.4	<1	<1	<1	<0.001	0.006	<0.0001	<0.001	0.069	0.001	<0.001	0.068	0.011	<0.05	0.06	<0.0001	<0.01	<0.01	0.44	0.44	600	1300	<1	<1	~1
8/08/2012	5.77	<10	0.2	<1	<1	<1	<0.001	0.005	<0.0001	<0.001	0.311	0.001	0.001	0.063	0.003	<0.05	<0.05	<0.0001	0.01	<0.01	0.34	0.34	340	340	<1	<1	~7

ORICA DAM

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
1/06/2011	Controlled	7.46	198	494	0.42	9.2	9.62	5.7	15.3	0.15	<0.01	<5

Farm Dam 2 **EPL ID:**

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	Unknown	8	1190	45		7.7			9.8	0.09	0.01	<2

Farm Dam 3 **EPL ID:**

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	Unknown	7.6	180	37		0.12			1.5	0.45	0.01	<2

Paynes Lane Causeway **EPL ID:**

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-Jul-07	Unknown	7.7	0.4	38								

Farm Dam 4 **EPL ID:**

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	Unknown	9.8	130	122		0.03			1.4	0.56	0.25	<2

Wadwells Lane **EPL ID:**

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-Jul-07	Unknown	7.9	0.56	30								

14th June 2013 AS130334_2

Werris Creek Coal Pty Limited

Andrew Wright

By email: AWright@whitehavencoal.com.au

Prediction of groundwater contribution to mine inflow for the period April 2012 to March 2013

ENVIRON has undertaken modelling to predict the volume of groundwater in-flow to the Werris Creek Coal Mine void. Rainfall for the period was measured to be 786mm.

Modelling was undertaken using the existing groundwater model developed for the Life of Mine (LOM) study. The model was developed using Modflow.

Mine configurations were adopted to represent the mining void at the end of each quarter namely June 2012, September 2012, December 2012 and March 2013. Simulations were achieved by implementing constant head boundaries within the model to represent the depth of mining achieved over the period.

For the modelled period the underground workings had not been fully dewatered. Through the period, water levels within the underground workings were maintained at a water level just below the working seam. Generally this equates to the level of the leading (northern) bench. To simulate the groundwater within the mine workings a constant heads was set equal to the leading bench elevation, typically between 310mAHD and 370mAHD. Water was recirculated throughout the workings during the period however it was assumed that 100% of this water recirculated to the void.

Recharge across the model domain was altered to represent the average rainfall observed over the period. The volume of water discharging from the overburden was also estimated by assigning zone boundaries to represent the groundwater zones.

The model output for each quarter is presented in the following table.

Quarter Ending	June 2012	September 2012	December 2012	March 2013	Totals
Total Groundwater inflow to void	21.2ML	22.2ML	23.9ML	38.5ML	105.8ML
Contribution of seepage from basalt (ie outside of basin)	2.4ML	2.9ML	1.9ML	3.4ML	10.6ML
Seepage from Coal Measures and workings	18.5ML	18.7ML	21.3ML	34.5ML	93.0ML
Seepage to void from overburden	0.3ML	0.5ML	0.7ML	0.5ML	2.1ML

The groundwater discharge estimates for the period April 2012 to March 2013 are above the inflow estimates for 2011/2012. The increased inflow can be attributed to the management of the underground workings which have not been dewatered and are now contributing to void inflows. As mining encroaches on the workings, inflow to the pit increases and this is observed by the increase in flow between December 2012 and March 2013.

Monitoring of groundwater wells surrounding the void showed water table fluctuations with the range of seasonable variation. The exception is well P1 which shows a declining trend since May 2011. Further excavation of this decline should be undertaken to assess if recalibration of the model or other investigations are required.

Kind Regards

Fiona Robinson
Senior Manager

Piezo ID	MW1				Other Name		Hillview Bore	
Aquifer	Werrie Basalt				Ground RL		418.692	
Coordinates	276322.66		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%						

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	29.32		Water Depth Only Monitored					
5/09/2012	25.09	17%	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						

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	78%	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%						

Piezo ID	MW4			Other Name		South Narrawolga	
Aquifer	Werrie Basalt			Ground RL		364.921	
Coordinates	275940.3	6522469				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
1/06/2005	Site Not Sampled - Managers Request						
1/07/2005	Site Not Sampled - Managers Request						
1/08/2005	8.94	7.9	820	0	0.66	0.08	0.06
1/09/2005	8.40	7.6	910	0	0.74	0.26	0.02
1/10/2005	8.52	7.8	1010	0.01	0.71	0.34	0.06
1/11/2005	7.90	7.4	1020	0	4.40	3.50	0.24
1/12/2005	7.89	7.0	560	1.20	1.30	0.14	0.14
1/01/2006	8.19	8.0	1090	0.07	21.00	1.10	0.94
1/02/2006	8.33	7.5	1280	0.02	40.00	1.90	1.80
1/03/2006	9.27	7.4	1310	0.08	41.00	2.50	2.30
1/04/2006	Piezo Blocked, additional bore drilled MW4B						
5/07/2006	Borehole blocked for sampling						
9/01/2007	8.94	Bore hole blocked for sampling					
4/04/2007	Borehole blocked for sampling						
3/07/2007	Sampling postponed due to unsafe access following wet weather						
14/08/2007	Borehole blocked for sampling						
1/11/2007	8.52	Borehole blocked for sampling					
1/01/2008	Borehole blocked for sampling						
1/04/2008	Borehole blocked for sampling						
1/07/2008	Borehole blocked for sampling						
1/10/2008	Borehole blocked for sampling						
1/01/2009	Borehole blocked for sampling						
1/04/2009	No sample taken - contract change over						
1/06/2009	8.78	7.2	4110	N/T	546	26.3	20.5
1/08/2009	Not sampled due to contamination						
1/11/2009	Not sampled due to contamination						
1/02/2010	Not sampled due to contamination						
1/05/2010	Not sampled due to contamination						
15/09/2010	9.24	Water Depth Only Monitored					
3/07/2012	10.43						
13/09/2012	Dry						
21/11/2012	Dry	blocked 8m down					
25/03/2013	Not found as stick up slashed						

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
Jun-05								
Jul-05								
Aug-05								
Sep-05								
Oct-05								
Nov-05								
Dec-05								
Jan-06								
Feb-06								
Mar-06								
Apr-06								
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%						
30/05/2013	10.56	-6%	Water Depth Only Monitored					

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					

Piezo ID	MW5B				Other Name			
Aquifer					Ground RL		360.187m	
Coordinates	274889.8		6522051				Stick Up	0.810m
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
30/09/2011	7.22		Water Depth Only Monitored					
3/07/2012	7.78		Water Depth Only Monitored					
13/09/2012	7.96	-2%	Water Depth Only Monitored					
21/11/2012	8.3	-4%	Water Depth Only Monitored					
25/01/2013	8.32	0%	Water Depth Only Monitored					
25/03/2013	7.28	14%	Water Depth Only Monitored					
9/05/2013	7.12	2%						
30/05/2013	7.14	0%	Water Depth Only Monitored					

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%						

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

Piezo ID	MW7b			Other Name		Anderson Windmill	
Aquifer	Alluvium (Black Gully)			Ground RL			
Coordinates	273 318	6 520 157				Stick Up	0.69m
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	4.5	Water Depth Only Monitored					
15/09/2010	3.99	Water Depth Only Monitored					
8/11/2010	4.41	Water Depth Only Monitored					
19/01/2011	4.04	Water Depth Only Monitored					
7/04/2011	4.22	Water Depth Only Monitored					
7/09/2011	4.39	Water Depth Only Monitored					
25/03/2013	4.25	Water Depth Only Monitored					

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%						

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%						

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%						

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	0.01	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				

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	-0.01	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%						

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%						

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%						

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
Jun-05	Site Not Installed							
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				

Piezo ID	MW14B				Other Name			
Aquifer					Ground RL			
Coordinates	274318.6		6526451	Elevation			Stick Up	0.728m
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
3/07/2012	15.86		Water Depth Only Monitored					
13/09/2012	16.14	-2%	Water Depth Only Monitored					
21/11/2012	16.52	-2%	Water Depth Only Monitored					
25/01/2013	16.82	-2%	Water Depth Only Monitored					
25/03/2013	16.47	2%	Water Depth Only Monitored					
9/05/2013	16.72	-1%						

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%						

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
30/06/2010	6.07		Water Depth Only Monitored					
8/07/2010	6.1	0%	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	**4.96**		**7.12**	**835.00**	**11.75**	**14.40**	**0.12**	**0.10**
Number of samples	**8**		**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%						

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
Ancedotal	3.6		Water Depth Only Monitored					
8/07/2010	5.18	-31%	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	**3.95**		**7.15**	**837.67**	**0.94**	**1.20**	**0.09**	**0.08**
Number of samples	**8**		**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%						

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%						

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
Ancedotal	2.7		Water Depth Only Monitored					
23/07/2010	4.99	-46%	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		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%						

Piezo ID	MW18b				Other Name		Hird Irrigation	
Aquifer	Alluvium (Black Gully)				Ground RL		353.04	
Coordinates	274641		6520364				Stick Up	0.05m
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
Ancedotal	2.7		Water Depth Only Monitored					
23/07/2010	5	-46%	Water Depth Only Monitored					
6/08/2010	4.39	14%	Water Depth Only Monitored					
15/09/2010	3.27	34%	Water Depth Only Monitored					
8/11/2010	3.08	6%	Water Depth Only Monitored					
19/01/2011	2.51	23%	Water Depth Only Monitored					
6/04/2011	2.7	-7%	Water Depth Only Monitored					
Lowest	**2.51**		**0**	**0**	**0**	**0**	**0**	**0**
Highest	**5**		**0**	**0**	**0**	**0**	**0**	**0**
Mean	**3.38**							
Number of samples	**7**		**0**	**0**	**0**	**0**	**0**	**0**
13/05/2011	2.75	-2%	Water Depth Only Monitored					
30/09/2011	3.21	-14%	Water Depth Only Monitored					

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%						

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%						

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	15.616		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%						

Piezo ID	MW21b				Other Name		Ryans Paddock	
Aquifer	Quipolly Alluvium				Ground RL		357.516	
Coordinates	275607.6		6520386				Stick Up	0.58m
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	18.304		Water Depth Only Monitored					
6/08/2010	8.83		Water Depth Only Monitored					
8/09/2010	6.78	30%	Water Depth Only Monitored					
15/10/2010	6.73	1%	Water Depth Only Monitored					
8/11/2010	6.47	4%	Water Depth Only Monitored					
11/01/2011	5.35	21%	Water Depth Only Monitored					
28/01/2011	5.55	-4%	Water Depth Only Monitored					
6/04/2011	5.72	-3%	Water Depth Only Monitored					
13/05/2011	5.92	-3%	Water Depth Only Monitored					
15/09/2011	6.7	-12%	Water Depth Only Monitored					
19/01/2012			Bill Ryan said that pump now in bore and does not need it to be monitored					

Piezo ID	MW22a				Other Name		Smith House	
Aquifer	Quipolly Alluvium				Ground RL		353.661	
Coordinates	274750.2		6520214.3				Stick Up	0.57m
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	5.55		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%						

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%						

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%						

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%						

Piezo ID	MW24a				Other Name		Marengo - pressure pump bore	
Aquifer					Ground RL			
Coordinates							Stick Up	m
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
28/09/2010					3.05	3.6	0.01	<0.01
29/06/2012	12.94		Water Depth Only Monitored					
13/09/2012	12.78	1%	Water Depth Only Monitored					
16/11/2012	13.12	-3%	Water Depth Only Monitored					
24/01/2013	13.49	-3%	Water Depth Only Monitored					
26/03/2013	13.27	2%	Water Depth Only Monitored					
7/05/2013	13.24	0%						

Piezo ID	MW25a				Other Name		Branga - Road Side	
Aquifer					Ground RL			
Coordinates							Stick Up	m
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
28/09/2010					5.52	6.8	<0.01	<0.01
26/03/2013	No Access							

Piezo ID	MW25b				Other Name		Branga - Tank Side	
Aquifer					Ground RL			
Coordinates							Stick Up	m
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
28/09/2010					7.4	8.2	0.06	<0.01
26/03/2013	No Access							

Piezo ID	MW26				Other Name		Blackwells	
Aquifer	Quipolly Alluvium				Ground RL			
Coordinates							Stick Up	0.6m
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
7/10/2010	5.18		Water Depth Only Monitored					
8/11/2010	5.02		Water Depth Only Monitored					
19/01/2011	4.07	23%	Water Depth Only Monitored					
6/04/2011	4.32	-6%	Water Depth Only Monitored					
13/05/2011	4.46	-3%	Water Depth Only Monitored					
30/09/2011	5.2	-14%	Water Depth Only Monitored					
19/01/2012	5.15	1%	Water Depth Only Monitored					

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%						

Piezo ID	P2				Other Name			
Aquifer	Werrie Basalt				Ground RL		376.307	
Coordinates	275027.5		6523324				Stick Up	1.00m
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
30/04/2010	21.79		Water Depth Only Monitored					
20/05/2010	21.91		7.63	2100	5.01	5.7	2.14	0.08
23/07/2010	21.75	1%	Water Depth Only Monitored					
9/09/2010	20.2	8%	7.28	1065	4.25	5.8	0.21	0.19
6/01/2011	19.92	1%	7.23	929	3.25	4.4	0.07	<0.01
15/03/2011	19.67	1%	7.25	889	3.4	5.2	0.09	<0.01
7/04/2011	19.79	-1%	Water Depth Only Monitored					
Lowest	**19.67**		**7.23**	**889**	**3.25**	**4.4**	**0.07**	**0.08**
Highest	**21.91**		**7.63**	**2100**	**5.01**	**5.8**	**2.14**	**0.19**
Mean	**20.72**		**7.35**	**1245.75**	**3.97**	**5.28**	**0.63**	**0.14**
Number of samples	**7**		**4**	**4**	**4**	**4**	**4**	**2**
17/05/2011	20.05	-1%	7.3	970	3.2	4.3	0.09	0.01
7/09/2011	20.94	-4%	Water Depth Only Monitored					
13/09/2011	21.02	0%	7.13	1050	5.3	6.0	0.08	<0.01
14/12/2011	21.28	-1%	7.14	1050	5.9	7.2	0.12	<0.01
27/03/2012	21.6	-2%	7.39	1070	5.9	7.1	0.25	<0.01
Lowest	**20.05**		**7.13**	**970**	**3.2**	**4.3**	**0.08**	**0.01**
Highest	**21.28**		**7.40**	**1070**	**5.9**	**7.2**	**0.25**	**0.01**
Mean	**20.97**		**7.24**	**4140**	**5.1**	**6.2**	**0.14**	**0.01**
Number of samples	**5**		**4**	**4**	**4**	**4**	**4**	**1**
27/07/2012	21.74		Water Depth Only Monitored					
13/09/2012	22.54	-4%	Water Depth Only Monitored					
Dumped over/removed								

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	-3%	Water Depth Only Monitored					
24/01/2013	40.75	-1%	Water Depth Only Monitored					
25/03/2013	41.43	-3%	Water Depth Only Monitored					
7/05/2013	42.04	-3%						

Piezo ID	MW28a				Other Name		Woodlands Windmill Northside of Lowes Ck 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
29/06/2012	10.25		Water Depth Only Monitored					
13/09/2012	8.45	9%	Water Depth Only Monitored					
16/11/2012	10.07	-8%	Water Depth Only Monitored					
24/01/2013	11.2	-6%	Water Depth Only Monitored					
26/03/2013	8.97	11%	Water Depth Only Monitored					
7/05/2013	9.97	-5%						

Piezo ID	MW28b				Other Name		Woodlands Southside of Lowes Ck 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
26/03/2013	dry							

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	-55%	Water Depth Only Monitored					
25/09/2012	12.52	-3%	Water Depth Only Monitored					
16/11/2012	16.89	-22%	Water Depth Only Monitored					
24/01/2013	16.5	2%	Water Depth Only Monitored					
25/03/2013	11.57	5%	Water Depth Only Monitored					
7/05/2013	11.51	0%						

Piezo ID	MW31				Other Name		Talavera	
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	Dry							
13/09/2012	Dry							
16/11/2012	Dry	down to 8.5m						
24/01/2013	Dry							
25/03/2013	Dry							

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	4.12	-11%						

Piezo ID	MW33				Other Name		Creek View	
Aquifer	Alluvium (Quipolly 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
5/02/2013			7.21	1120	0.95	1.4	0.03	0.03

WERRIS CREEK COAL MINE – BIODIVERSITY OFFSET AREA

Annual Monitoring Report (Spring 2012)

Prepared for
Werris Creek Coal Pty. Ltd.

29 July 2013

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Abbreviations

ABBREVIATION	DESCRIPTION
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
DoP&I	Department of Planning and Infrastructure
ELA	Eco Logical Australia Pty Ltd
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
HBT	Hollow Bearing Tree
LOM	Life of Mine
LFA	Landscape Function Analysis
MDS	Non-metric Multidimensional Scaling
TSC Act	NSW *Threatened Species Conservation Act 1995*
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SSA	Soil Surface Assessment
WCC	Werris Creek Coal Pty Ltd
WONS	Weeds of National Significance

Executive Summary

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 Draft Biodiversity Offset Strategy, as detailed in the Biodiversity Offset Management Plan (BOMP) (ELA 2012), as well as Schedule 3 Condition 41 of DA-172-7-2004 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 third BOA AMR, with monitoring having been completed on sites 1-12 on The Flat, Narrawolga, the mine rehabilitation area and The Hill in spring 2010 and 2011. In 2012, the monitoring program was modified in accordance with the Draft BOMP (ELA 2012), 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 three for sites 1 to 3 and 5 to12 and year one for sites 13 to 25.

The methods employed at the monitoring sites were consistent with the Draft BOMP (ELA 2012) and included floristic monitoring, biometric monitoring, Landscape Function Analysis on the rehabilitation and analogue sites and fauna monitoring (targeting herpetofauna, birds, microbats and nocturnal fauna).

A total of 171 flora species were recorded during the spring 2012 survey (102 natives and 69 exotics). The threatened grass species, *Digitaria porrecta* (Finger Panic Grass), listed as endangered under both the *Threatened Species Conservation Act* (TSC Act) and the *Environment Protection and Biodiversity Conservation Act* (EPBC Act) was recorded at Site 5.

Biometric results indicated that only one site (Condition Class 4 Site 13) meets 4 of 5 performance criteria, and is close to meeting the remaining criteria for native ground cover. Of the remaining sites, 13 of the 24 sites moderately satisfied the performance criteria for the respective biometric vegetation types, while the remaining 10 sites displayed poor progression (**Table 1**). **Table 1** evaluates each site against the performance criteria and identifies which sites need management intervention. The number of sites that meet each performance criteria is summarised below:

- Site 13 was the only site to meet all performance criteria
- One site meets the performance criteria for the number of native species
- 10 sites meet the performance criteria for native overstorey cover
- 21 sites meet the performance criteria for native midstorey cover
- 20 sites meet the performance criteria for native ground cover (this includes sites that exceeded the performance criteria benchmark bracket)
- 11 sites meet the performance criteria for control of weed species

LFA monitoring was completed at four sites, two rehabilitation sites and two analogue sites, for the purposes of monitoring soil surface condition on the rehabilitation area and comparing this to a near pristine example. In terms of comparison between rehabilitation sites and analogue sites in 2012, as expected both the analogue sites performed better that than the rehabilitation sites, with Site 11 (analogue) having 47% higher proportion of patches than Site 6 (rehab) and Site 17 (analogue) having 45% higher proportion of patches than Site 14 (rehab).

In terms of trends from previous monitoring, only sites 6 and 11 have been monitored in previous years, with results indicating that the rehabilitation site (Site 6) has decreased in the proportion of patches by over 50% since 2010. Site 11 (analogue) has also decreased in the proportion of patches by 12% since 2010. This suggests that ground cover and the associated stabaility of these sites is decreasing over time. This may be due to environmental or climatic conditions, with the spring of 2012 being somewhat dryer than previous years. However, one explanation for the marked drop in Site 6 is possibly the scensence of the cover crop initially established to stabilise the soil within the rehabilitation area. Cover crop scenesence is expected in the process of rehabilitation, and may be emphasized in a dry period. Improving the cover of perennial native ground cover species will be important to secure soil and promote the success of the rehab and, whilst biometric understorey cover scores do indicate an increase in native cover from previous years, the drop in the proportion of patches in 2012 may be representative of the lag time between cover crop senescence and native ground cover establishment.

In terms of the Soil Surface Assessment, not much can be said by way of trends for sites 14 and 17, which were sampled for the first time in 2012. However, rehabilitation Site 6 appears to be trending downwards in all soil surface indicators. This downward trend for infiltration and nutrient cycling is also consistent in analogue Site 11, though stability seems to be improving at this analogue site. It is difficult to say exactly what is driving this change, and longer term monitoring will provide greater clarity, though climatic/environmental (ie a dry 2012 spring) may provide some explanation along with the scenesence of the cover crop on the rehab site.

The fauna results revealed fifteen microbat species, including five threatened species listed under the NSW TSC Act, *Chalinolobus dwyeri* (Large-eared Pied Bat), *Falsistrellus tasmaniensis* (Eastern Falsistrelle), *Miniopterus orianae oceanensis* (Eastern Bentwing Bat), *Saccolaimus flaviventrus* (Yellow-bellied Sheathtail Bat) and *Vespadelus troughtoni* (Eastern Cave Bat), were identified through ultra-sonic call. A total of 75 bird species (70 native species including 3 threatened species, and 5 exotic species) were recorded, including the Commonwealth EPBC Act migratory listed species, *Merops ornatus* (Rainbow Bea-eater) and *Hirundapus caudacutus* (White Throated Needletail) and the NSW TSC Act vulnerable species, *Melanodryas cucullata* (Hooded Robin).

Twelve reptile and six amphibian species were recorded in the 2012 survey. Spotlighting and call playback surveys recorded *Tyto alba* (Barn Owl), *Ninox novaeseelandiae* (Southern Boobook), *Podargus strigoides* (Tawny Frogmouth) and *Aegotheles cristatus* (Australian Owlet Nightjar). Mammals recorded through spotlighting surveys included *Bos taurus** (Cow), *Lepus capensis* * (Brown Hare), *Macropus giganteus* (Eastern Grey Kangaroo), *Macropus robustus* (Wallaroo), *Trichosurus vulpecula* (Common Brush Tail Possum) and *Phascolarctos cinereus* (Koala) (listed as vulnerable under the NSW TSC Act and the Commonwealth EPBC Act).

Table 1: Monitoring sites, performance criteria and overall evaluation of performance

(Note: Overall performance criterion – High = All Performance criteria met and requires minimal intervention; Moderate = 3-4 performance criteria met - some performance criteria has been met and or/results indicate criteria is almost met but site requires some improvement in the performance criteria indicated in brackets to progress towards these criteria; Low = 1-2 performance criteria met - requires considerable management improvement to trend towards performance criteria indicated in brackets).

Biometric vegetation type	Condition class and (Site No.)	Overall site performance	Relevant performance criteria																		
			1) No. Of native species			2) Native Over-storey cover			3) Native Mid-storey cover			4) Native ground cover (sum of shrubs, gasses and other)			5) Fauna (No. of native species)		6) Weed species (Cover and No. of weed species and species of concern)				
																		2012 results			
			Criteria	2012 results	Criteria met?	Criteria	2012 results	Criteria met?	Criteria	2012 results	Criteria met?	Criteria	2012 results	Criteria met?	Criteria	2012 results	Criteria	Exotic Cover	No. of Exotic Species (Annuals)	Noxious Weeds*	Criteria met?
White Box grassy woodland	4 (3)	Moderate (1, 4)	23	15	No	6-25%	17.5	Yes	0-5%	0	Yes	33-45%	98	Yes	N/A	21	Noxious and environmental weeds are under control within rehabilitation or biodiversity offset areas	4	13 (10)	-	Yes
	4 (11)	Moderate (1, 4, 6)		19	No		10	Yes		0	Yes		80	Yes	N/A	12		6	10 (8)	XS	No
	3 (1)	Moderate (1, 2, 6)		9	No		0	No		0	Yes		36	Yes	N/A	27		70	15 (10)	-	No
	3 (2)	Low (1, 2, 4, 6)		9	No		0.5	No		0	Yes		74	Yes	N/A	27		28	12 (9)	-	No
	3 (8)	Low (1, 2, 4, 6)		9	No		0	No		0	Yes		72	Yes	N/A	34		46	9 (6)	-	No
	3 (12)	Low (1, 2, 4, 6)		10	No		0	No		0	Yes		54	Yes	N/A	22		82	16 (10)	-	No
	3a (19)	Moderate (1, 2, 4)		13	No		0	No		0	Yes		98	Yes	N/A	16		8	11 (9)	-	Yes
	3a (21)	Moderate (1, 2, 4)		11	No		0	No		0	Yes		82	Yes	N/A	21		20	14 (12)	-	Yes
	2 (7)	Low (1, 2, 4, 6)		14	No		1.7	No		0	Yes		26	No	N/A	23		26	12 (8)	-	No
	2 (16)	Low (1, 2, 4)		3	No		0	No		0	Yes		0	No	N/A	19		8	10 (10)	-	Yes
	4 (13)	Moderate - high (4)		23	Yes		8.5	Yes		0	Yes		58	Yes	N/A	28		8	6 (4)	-	Yes
	4 (17)	Moderate (1, 4)		19	No		6	Yes		0	Yes		56	Yes	N/A	21		2	2 (2)	-	Yes
	4 (24)	Moderate (1, 4)		19	No		19.5	Yes		1.5	Yes		80	Yes	N/A	32		0	1 (0)	-	Yes
Plains Grass grassland on basaltic black earth soils	3 (25)	Moderate (1, 6)	17	7	No	0	0	Yes	0-0%	0	Yes	38-50%	42	Yes	N/A	18		72	14 (8)	-	No
Rough-barked Apple riparian forb/grass open forest	3 (20)	Moderate (1,2, 6)	25	6	No	6-25%	0	No	0-5%	0	Yes	36-55%	52	Yes	N/A	31		70	9 (6)	OS	No
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	Moderate (1, 4, 6)	23	17	No	6-25%	15	Yes	0-5%	0	Yes	33-45%	74	Yes	N/A	26		30	12 (7)	-	No
White Cypress Pine – Silver-leaved Ironbark – Tumbledow	4 (10)	Low (1, 2, 3, 4, 6)	30	14	No	6-25%	0	No	6-25%	0	No	26-45%	96	Yes	N/A	26		30	12 (10)	-	No
	4 (18)	Low (1, 3, 4, 6)		22	No		22	Yes		0	No		92	Yes	N/A	31		0	0	XS	No

Biometric vegetation type	Condition class and (Site No.)	Overall site performance	Relevant performance criteria																		
			1) No. Of native species			2) Native Over-storey cover			3) Native Mid-storey cover			4) Native ground cover (sum of shrubs, gasses and other)			5) Fauna (No. of native species)		6) Weed species (Cover and No. of weed species and species of concern)				
																		2012 results			
			Criteria	2012 results	Criteria met?	Criteria	2012 results	Criteria met?	Criteria	2012 results	Criteria met?	Criteria	2012 results	Criteria met?	Criteria	2012 results	Criteria	Exotic Cover	No. of Exotic Species (Annuals)	Noxious Weeds*	Criteria met?
n Red Gum open shrubby forest																					
White Box-White Cypress Pine shrubby open forest	4 (22)	Moderate (1, 4)	26	25	No	6-25%	27.5	Yes	6-25%	8.5	Yes	26-45%	64	Yes	N/A	32		0	1 (0)	-	Yes
	3 (23)	Moderate (1, 3, 4)		13	No		8.5	Yes		0	No		92	Yes	N/A	23		6	7 (6)	-	Yes
Cleared land (Mine Rehab Site)	1 (6)	Moderate (1, 2, 4)	23	14	No	6-25%	0	No	0-5%	4	Yes	33-45%	54	Yes	N/A	26		18	15 (10)	-	Yes
	1 (14)	Low (1, 2, 4, 6)		6	No		0	No		0	Yes		28	No	N/A	13		24	19 (14)	HP	No
Cleared land (formerly cultivated land)	1 (9)	Low (1, 2, 6)	23	5	No	6-25%	0	No	0-5%	0	Yes	33-45%	34	Yes	N/A	27		64	12 (5)	HP	No
	1 (15)	Low (1, 2, 4)		2	No		0	No		0	Yes		2	No	N/A	25		12	9 (7)	-	Yes

* HP = *Hypericum perforatum* (St Johns Wort), OS = *Opuntia stricta* (Smooth Pest Pear), XP = *Xanthium spinosum* (Bathurst Burr)

1 Introduction

Development Consent DA 172-7-2004 was approved on the 18 February 2005 and the Mining Lease (ML) 1563 was granted on 23 March 2005. The construction and operation of the Werris Creek Coal Mine required WCC, under Condition 40 of DA 172-7-2004, to prepare and subsequently implement a Biodiversity Offset Strategy and Management Plan (BOSMP). The BOSMP (ELA 2010) outlined the methods under which monitoring of the BOA should occur.

WCC was granted Project Approval (PA 10_0059) on 25 October 2011 from the Department of Planning and Infrastructure (DoP&I) and on 21 December 2011 (EPBC 2010/5571) from the Commonwealth Department of Sustainability, Environment, Water and Communities (SEWPaC) for the Life of Mine (LOM) project. The LOM Project involves a northerly extension of the current mine footprint, increasing the projected mine life by approximately 15 to 20 years (WCC 2012a). Under the terms of the modified approval, WCC were required to update the Biodiversity Offset Strategy in the form of a Biodiversity Offset Management Plan (BOMP) (WCC 2012a). The BOMP relates to management of biodiversity within the LOM footprint and the 1316.88ha of land identified for management under the BOS, including the former Eurunderee, Hillview, Marengo and Railway View properties, the Mine Site and Additional Offset Area (Greenslopes) (WCC 2012a).

Eco Logical Australia (ELA) was commissioned by Werris Creek Coal Pty Ltd (WCC) to undertake spring flora and fauna monitoring in 2012. This included a third year of biodiversity monitoring at all, except one (Site 4), monitoring sites established in 2010 within the WCC Biodiversity Offset Area (BOA) (DA 172-7-2004), as well as to establish and monitor a further 13 monitoring sites to accommodate for the approved mine extension (PA 10_0059) and subsequent increase in the BOA, as outlined the BOMP (WCC 2012a).

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 2012a).

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 of the Werris Creek Biodiversity Offset Management Plan (BOMP) (WCC 2012a) and to assess the progressive trajectory of the BOA towards self sustainability
- Report the findings from the 2010, 2011 and current survey (2012)

1.1 MANAGEMENT ACTIVITIES IN THE BOA BETWEEN APRIL 2011 AND MARCH 2012

The Werris Creek Annual Environmental Monitoring Report (WCC 2012b) reported the following management activities in the BOA between 1 April 2011 and 31 March 2012:

- In September 2012, WCC took control over the whole BOA discontinuing grazing and destocked. This required some new fencing to be constructed on Railway View, Hillview and Greenslopes BOAs and limited removal of internal fencing now redundant (mostly on Marengo BOA);
- From December 2012 to March 2013, extensive weed control program particularly focusing on the Eurunderee BOA (former agricultural property) targeting St Johns Wort and other broadleaf weeds with an area greater than 300ha treated during the period;
- In February 2013, over 200 tubestock of overstorey species (White Box) were planted within the Marengo BOA across Condition Class 3 White Box Woodland (native understorey present but no overstorey) to form corridors linking isolated paddocks and remnant vegetation with Black Gully riparian vegetation;
- In July and August 2012, construction of rocky and woody debris habitat in corridors on Marengo BOA;
- In July 2012 and March 2013, two feral pest control programs undertaken during 2012-2013 focusing on Foxes, Rabbits and feral Pigs;
- In March 2013, fire breaks installed around the perimeter of the Marengo BOA. Maintenance of existing tracks and construction of new access tracks around Marengo, Greenslopes, Hillview and Railway View BOAs;
- The removal of grazing pressure in the older BOA sections in 2010 and the ongoing maintenance of the remnant native vegetation has aided regrowth and increased survival of seedlings with good growth rates occurring in areas adjacent to existing mature trees; and
- In February 2013, two large hay sheds within the Eurunderee BOA demolished and waste metal recycled offsite.

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 OEH. Vegetation types were mapped across the entire property, and trimmed to the boundary of the offset site after the mapping was completed. The offset site largely consists of the threatened ecological community, 'White Box - Yellow Box - Blakely's Red Gum Woodland' (**Figure 1**).

Three vegetation types have been added to the WCC BOA with the expansion of the BOA. These include, 'Rough-barked Apple Riparian forb/grass open forest of the Nandewar Bioregion', 'Rusty Fig – Wild Quince – Native Olive dry rainforest of the Nandewar and Brigalow Belt South Regions' and 'White Box- White Cypress Pine shrubby open forest of the Nandewar and Brigalow Belt South Bioregions'. Floristic/biometric and fauna monitoring sites have been increased in accordance with this expansion (see **Section 2.1**)

A description of the vegetation communities supported within the BOA, including their area covered, is provided in the Biodiversity Offset Management Plan (WCC 2012a).

Flora and LFA field investigations for the current survey were conducted between the 26 and 30 November 2012 by ELA ecologists, Lachlan Copeland and Daniel McKenzie. Data was collected from a total of 24 sites; 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 2012 (**Table 2**; **Figure 1**).

Fauna field investigations were undertaken between 26 to 30 November and 10 to 14 December by ELA ecologists, Peter Knock and Rebecca McCue. Twenty-four fauna monitoring sites were selected for spring fauna monitoring (in alignment with floristic and biometric monitoring) (**Table 2**; **Figure 1**). Data collected included birds, herpetofauna, microchiropteran bats and nocturnal fauna, though all opportunistic observations were also recorded, including introduced species.

2.1 FLORA AND BIOMETRIC

The vegetation monitoring methods were identical to the 2010 baseline survey and included subsequent changes to monitoring methods recommended for the 2011 monitoring period. In accordance with the approved Life of Mine Project (PA 10_0059) and subsequent expansion to the BOA, as well as an increase in the area of mine rehabilitation to the north, Site 4 was removed from the monitoring program and an additional 13 floristic/biometric monitoring sites have been established; 1 within the rehabilitation area and 12 within the BOA (**Table 2**; **Figure 1**). These sites have been established in accordance with the BOMP (WCC 2012a):

Mine rehabilitation:

- One site per 30 ha of rehabilitated land (to allow for the expansion of rehabilitation areas over time). Thus a total of 2 replicated sites have been established across the rehabilitation area (an addition of 1 site in 2012) (**Table 2**; **Figure 1**).

Biodiversity Offset Area:

- A minimum of one site in each management vegetation type class for each broad domain. Thus a total of 23 replicated sites have been established across the BOA (an addition of 13 sites in 2012). The sites established in Condition Class 4 for each vegetation type are referred to as 'analogue' sites (**Table 2**; **Figure 1**).

2.2 LANDSCAPE FUNCTION ANALYSIS

In accordance with the BOMP (WCC 2012a), two Landscape Function Analysis (LFA) sites were undertaken within the rehabilitation area at the same transects established for floristic and biometric monitoring. Two additional sites (also concurrent with floristic and biometric monitoring) were also monitored within Condition Class 4 vegetation of the target vegetation type for the rehabilitation areas (the analogue sites). Landscape Function Analysis methods followed the method for Landscape Organisation and the Soil Surface Assessment, as provided in Tongway and Hindley (2004).

2.3 FAUNA

Fauna monitoring methods were also identical to the 2010 baseline survey and included subsequent changes to monitoring methods recommended for the 2011 secondary monitoring, as outlined in the

BOMP (WCC 2012a), including the removal of surveys for ground mammals. Fauna monitoring methods included bird census, microbat surveys using Anabat call recording, herpetofauna surveys and nocturnal spotlighting and call play back. Birds and microbats were targeted in particular to provide more information on the progress of woodland restoration than other fauna groups, particularly in the first 10 years of restoration activity.

Modifications to the monitoring program in the BOMP (WCC 2012b) included both winter and spring season monitoring, with winter monitoring targeting seasonal migrants to the Liverpool Plains region, such as the *Xanthomyza phrygia* (Regent Honeyeater) and *Lathamus discolor* (Swift Parrot). Spring fauna monitoring will continue to target key fauna assemblages, containing indicator species typical of the local region.

2.4 DATA ANALYSIS

This report presents the baseline conditions for monitoring sites 13 to 25 established during the spring 2012 monitoring period, and presents the data collected from the third year of annual monitoring for the sites 1 to 12 (excluding Site 4). Due to the absence of measureable performance criteria for fauna in the BOMP, data analysis in the form of a non-metric multidimensional scaling (MDS) 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, 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 MDS 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).

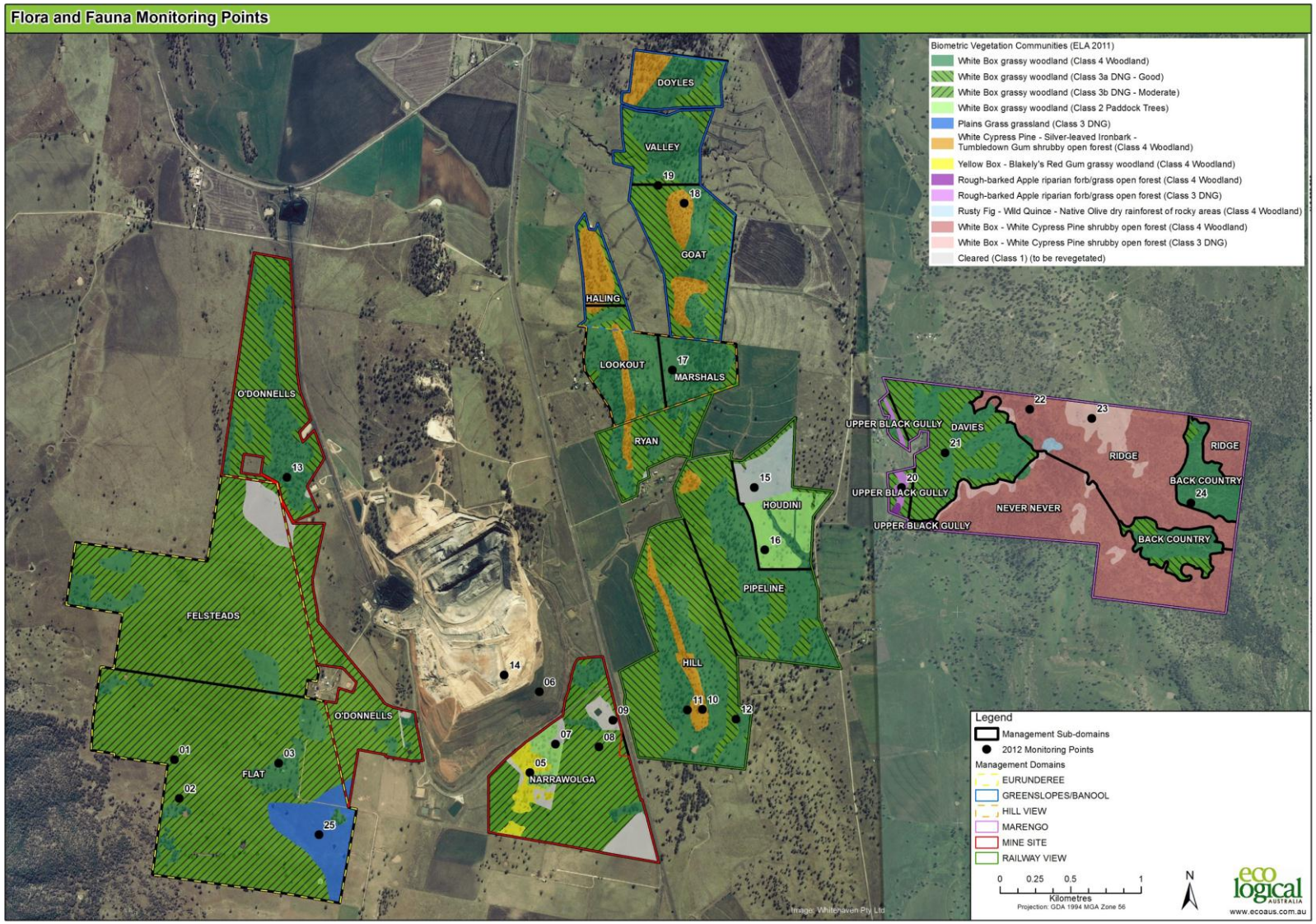

Figure 1: Location of sub domains, vegetation communities and monitoring sites

Table 2: Flora and fauna monitoring sites of the BOA

Biometric Vegetation Type	Condition Class (Site No.)	Sub-domain	Year Site Established
White Box grassy woodland	4 (3)	Flat	2010
	4 (11)	Hill	2010
	4 (13)	O'Donnell's	2012
	4 (17)	Marshalls	2012
	4 (24)	Back Country	2012
	3 (1)	Flat	2010
	3 (2)	Flat	2010
	3 (8)	Narrawolga	2010
	3 (12)	Hill	2010
	3a (19)	Goat	2012
	3a (21)	Upper Black Gully	2012
	2 (7)	Narrawolga	2010
	2 (16)	Houdini	2010
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	Narrawolga	2010
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	Hill	2010
	4 (18)	Goat	2012
White Box-White Cypress Pine shrubby open forest	4 (22)	Ridge	2012
	3 (23)	Ridge	2012
Plains Grass grassland on basaltic black earth soils	3 (4)	Flat	2010 (no longer being monitored)
	3 (25)	Flat	2012
Rough-barked Apple riparian forb/grass open forest	3 (20)	Upper Black Gully	2012
Cleared land (Mine Rehab Site)	1 (6)	Mine Rehabilitation	2010
	1 (14)	Mine Rehabilitation	2012
Cleared land (formerly cultivated land)	1 (9)	Narrawolga	2010
	1 (15)	Houdini	2012

2.5 WEATHER CONDITIONS

The average daily temperatures in the three months preceding the monitoring period were mild to warm and were slightly higher than historical averages. Below average rainfall occurred in the four months from September through to December, particularly during September, October and November. A total of 141.6 mm fell during the four months, just over half of the long term average of 252.5 mm for the same period (**Table 3**). A total of 281.2 mm of rain fell in 2011 during the same months (records from the nearest weather station, Quirindi, NSW; BoM 2012).

Table 3: Mean weather conditions preceding and during the monitoring period (BoM 2012)

Month	Actual Monthly Mean*			Historical Averages (1882-2013)		
	Min Temp (°c)	Max Temp (°c)	Rainfall (mm)	Min Temp (°c)	Max Temp (°c)	Rainfall (mm)
Sept-12	4.6	23.9	19.8	5	21.5	46.5
Oct-12	7	27.0	11	8.7	25.2	60.1
Nov-12	13.2	31.7	67.8	12	28.5	65.4
Dec-12	15.8	33.1	73.4	14.7	31.1	80.5

Data from Quirindi Post Office (station 055049)

Source:http://www.bom.gov.au/climate/dwo/IDCJDW0209.shtml

Weather conditions during the monitoring period were considered adequate for the biodiversity surveys. There was a significant rainfall event on the night of day 1, week 1 (37.4 mm) of the monitoring period, which stimulated frog activity, particularly during the first survey week. Temperatures leading up to and during the survey were warm to hot. A number of days in week 2 had moderate winds. **Table 4** shows the weather conditions two days leading up to the survey and during the survey (records from the nearest weather station, Quirindi, NSW; BoM 2012).

Table 4: Daily weather conditions during the spring monitoring period (BoM 2012)

Date	Min Temp (°C)	Max Temp (°C)	Rainfall (mm)	Wind (km/h)	9am Temp (°C)	3pm Temp (°C)
Week 1						
24/11/2012	12.8	35.4	0	Calm	25.4	n/a
25/11/2012	13.0	37.0	0.1	Calm	25.8	n/a
26/11/2012	14.0	36.8	2.2	Calm	26.4	n/a
27/11/2012	16.0	29.2	37.4	Calm	24.2	n/a
28/11/2012	15.6	33.4	0	Calm	26.4	n/a
29/11/2012	15.0	36.9	0	Calm	26.2	n/a
30/11/2012	21.0	39.8	0	Calm	30.0	n/a
Week 2						
8/12/2012	17.0	33.8	0	Calm	23.9	n/a
9/12/2012	14.2	35.4	0	Calm	26.4	n/a

Date	Min Temp (^oC)	Max Temp (^oC)	Rainfall (mm)	Wind (km/h)	9am Temp (^oC)	3pm Temp (^oC)
10/12/2012	17.0	26.0	2.0	4	20.8	n/a
11/12/2012	14.0	27.4	0.0	Calm	20.4	n/a
12/12/2012	13.2	30.4	0.0	4	22	n/a
13/12/2012	17.2	32.6	0.0	Calm	21.4	n/a
14/12/2012	17.4	36.2	0.0	Calm	24.4	n/a

Data from Quirindi Post Office (station 055049)

Source:http://www.bom.gov.au/climate/dwo/IDCJDW0209.shtml

3 Results and discussion

The results and discussion section presents the results of the 2012 monitoring survey as well as previous monitoring years (2010 and 2011) and provides a comparison of the data against the performance criteria established in the BOMP (WCC 2012b). Photo points and detailed results are provided in the appendices.

3.1 FLORA AND BIOMETRIC

The floristic and biometric data collected during monitoring is summarised below, with the full floristic plot data provided in **Appendix B**. The data presented also addresses how each site is tracking against the performance criteria established in the BOMP (WCC 2012b).

3.1.1 Flora species richness

Species richness is a measureable performance criteria established in the BOMP. The following provides a description of the results from the 2012 monitoring event, as well as a comparison of these results with previous years of monitoring and the performance criteria (**Table 5**).

Current Survey (2012) – Sites 1-3 and 5-25

A total of 171 species were recorded during the spring 2012 survey (102 natives and 69 exotics); 64 of these species were recorded at the newly established sites 13 to 25 only (46 natives and 18 exotics).

The threatened grass species, *Digitaria porrecta* (Finger Panic Grass), listed as endangered under both the *Threatened Species Conservation Act* (TSC Act) and the *Environment Protection and Biodiversity Conservation Act* (EPBC Act) was recorded at Site 5.

There was a large variation in native species diversity between monitoring sites across the BOA in 2012. The lowest native species diversity recorded was 2 native species (recorded at Condition Class 1 Site 15) and the highest native species diversity recorded was 25 (recorded at Condition Class 4 Site 22) (**Table 5**; **Figure 2**). Monitoring sites of Condition Class 4 had the highest native species richness, although sites 6 and 7 of condition classes 1 and 2 shared a similar native species richness of 14 with Condition Class 4 Site 10. Condition Class 3 sites 1, 2, 8, 12, 19, 21 and 23 had a native species richness of 9 to 13, with the remaining six sites having a native species richness ranging from 2 to 7 (sites 9, 14 and 15 of Condition Class 1, Site 16 of Condition Class 2 and sites 20 and 25 of Condition Class 3) (**Table 5**; **Figure 2**).

Condition Class 4 Site 13 was the only site to reach the performance criteria for native species richness in the 2012 monitoring year. An additional seven sites, representative of condition classes 1 (Site 6), 2 (Site 7) and 4 (Site 5, 17, 18, 22 and 24) had close to benchmark or at least greater than 50% of the performance criteria for native species richness. The remaining sites, representative of all condition classes, had a native species richness below 50% of the benchmark/ performance criteria (**Table 5**; **Figure 2**).

Thirteen of the 24 monitoring sites had a native species diversity equal to or greater than exotic species diversity, including all nine Condition Class 4 sites, four of nine Condition Class 3 sites, one of two Condition Class 2 sites and one of three Condition Class 1 sites (sites 3, 5, 7, 8, 10, 11, 13, 17, 18, 19,

22, 23 and 24). The remaining site of condition classes 1, 2 and 3 were dominated by exotic species diversity (1, 2, 6, 9, 12, 14, 15, 16, 20, 21 and 25) (**Table 5**; **Figure 2**; **Figure 3**).

Comparison between years (2010, 2011 and 2012) – Sites 1-12 (excluding Site 4)

A total of 106 species (55 natives and 51 exotics) were recorded in 2012 at monitoring sites 1 to 12 (excluding Site 4). Exotic species decreased from 2011 to 2012 at all 11 sites surveyed in 2012; a total reduction of 19 exotic species from 2011 to 2012 (**Table 5**; **Figure 2**; **Figure 3**; **Table 9**). Over the same period, native species diversity remained similar between 2011 (54 species) and 2012 (55 species); however, diversity decreased at six of 11 sites surveyed (Condition Class 4 sites 3, 11 and 5, and Condition Class 3 sites 2, 8 and 12) and either increased or remained the same at the remaining five sites (Condition Class 4 Site 10, Condition Class 3 Site 1, Condition Class 2 Site 7, and Condition Class 1 sites 6 and 9).

Native and exotic species composition varied at monitoring sites between monitoring years (2010, 2011 and 2012):

- A total of 55 species (26 natives and 29 exotics) were recorded in the current survey that were not recorded in the 2011 survey, while 80 species (25 natives and 55 exotics) were recorded in 2011 but not in the 2012 survey. A total of 107 species overlapped between 2011 and 2012.
- A total of 62 species (30 natives and 32 exotics) were recorded in the current survey that were not recorded in the 2010 survey, while 69 species (29 natives and 40 exotics) were recorded in 2010 but not in the 2012 survey. A total of 45 species overlapped between 2010 and 2012.
- A total of 47 species (22 natives and 25 exotics) were recorded in the current survey and were not recorded in either the 2010 or the 2011 survey periods.

It should be noted that differences in species composition between survey years can partly be a result of difficulties associated with species identification, e.g. depending on the availability of fruit and flowering material, some individual plants can be identified to the species level (e.g. *Digitaria porrecta*) while others can only be identified to genus (e.g. *Digitaria* sp.).

In the current survey, monitoring sites 1 to 12 (excluding Site 4) did not record a native species richness equal to or above that of the equivalent performance criteria conditions. This is a reduction from 2011 where two plots representative of Condition Class 4 (sites 3 and 11) had a native species richness above the performance criteria for White Box grassy woodlands (**Table 5**). These sites had a native species richness of 29 (Site 3) and 24 (Site 11) in 2011 and a native species diversity of 15 and 19 respectively in 2012. Fluctuations in species diversity between seasons and years is common and often associated with climatic or natural environmental variables.

Table 5: Floristic summary as compared to Biometric Benchmarks and Performance Criteria

Biometric Vegetation Type	Condition Class (Site No.)	No. Natives Species			Performance Criteria	Performance Criteria Met?	
		2010	2011	2012		2011	2012
White Box grassy woodland	4 (3)	8	29	15	23	Yes	No
	4 (11)	19	24	19		Yes	No
	3 (1)	2	8	9		No	No
	3 (2)	10	12	9		No	No
	3 (8)	2	14	9		No	No
	3 (12)	5	13	10		No	No
	3a (19)	-	-	13		-	No
	3a (21)	-	-	11		-	No
	2 (7)	10	10	14		No	No
	2 (16)	-	-	3		-	No
	4 (13)	-	-	23		-	Yes
	4 (17)	-	-	19		-	No
	4 (24)	-	-	19		-	No
Plains Grass grassland on basaltic black earth soils	3 (25)	-	-	7	17	-	No
Rough-barked Apple riparian forb/grass open forest	3 (20)	-	-	6	25	-	No
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	9	18	17	23	No	No
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	7	12	14	30	No	No
	4 (18)	-	-	22	30	-	No
White Box-White Cypress Pine shrubby open forest	4 (22)	-	-	25	26	-	No
	3 (23)	-	-	13	26	-	No
Cleared land (Mine Rehab Site)	1 (6)	3	5	14	23	No	No
	1 (14)	-	-	6		-	No
Cleared land (formerly cultivated land)	1 (9)	5	5	5	23	No	No
	1 (15)	-	-	2		-	No

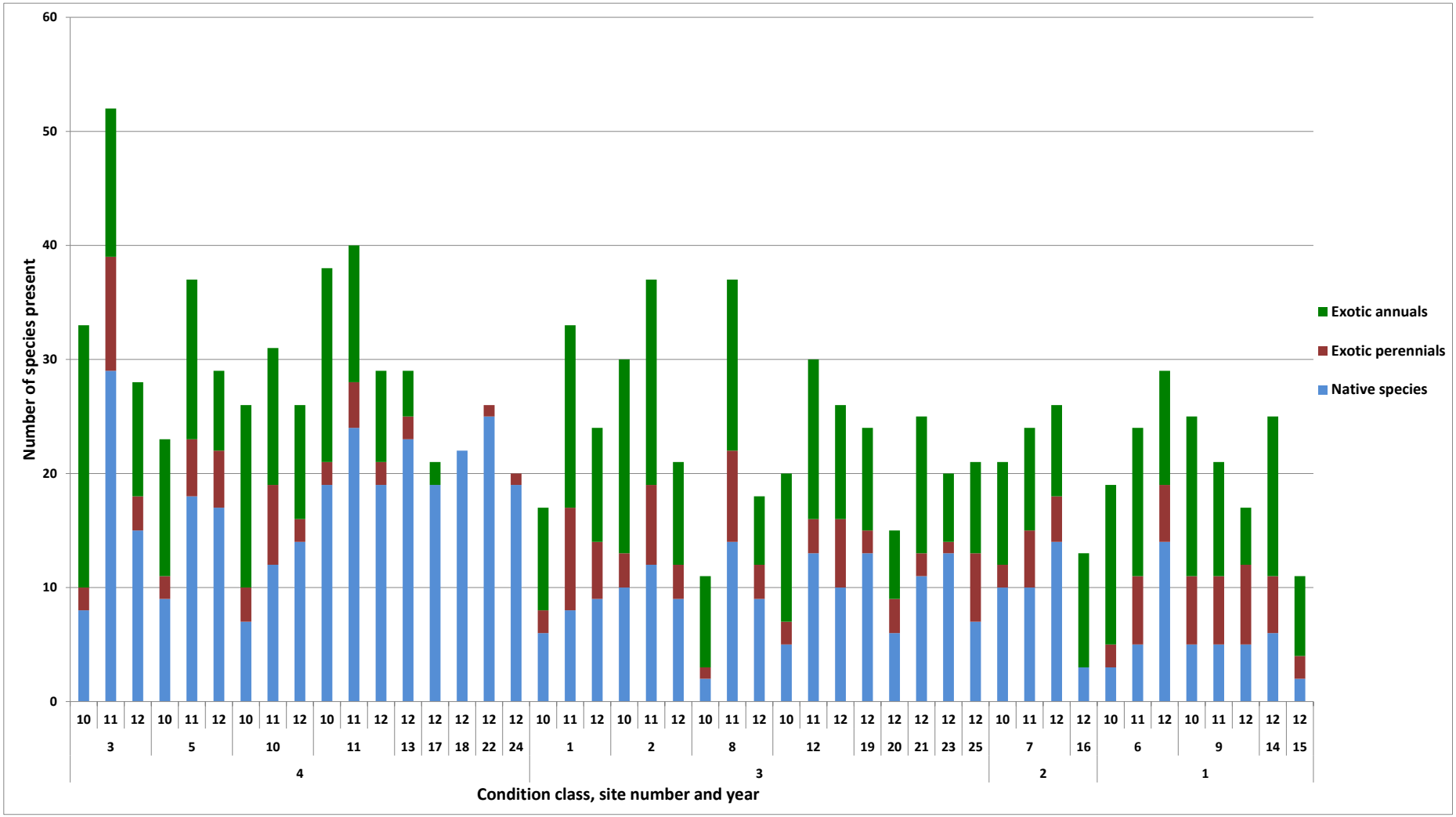

Figure 2: Number of native and exotic species identified at each monitoring site during the 2010, 2011 and 2012 monitoring periods

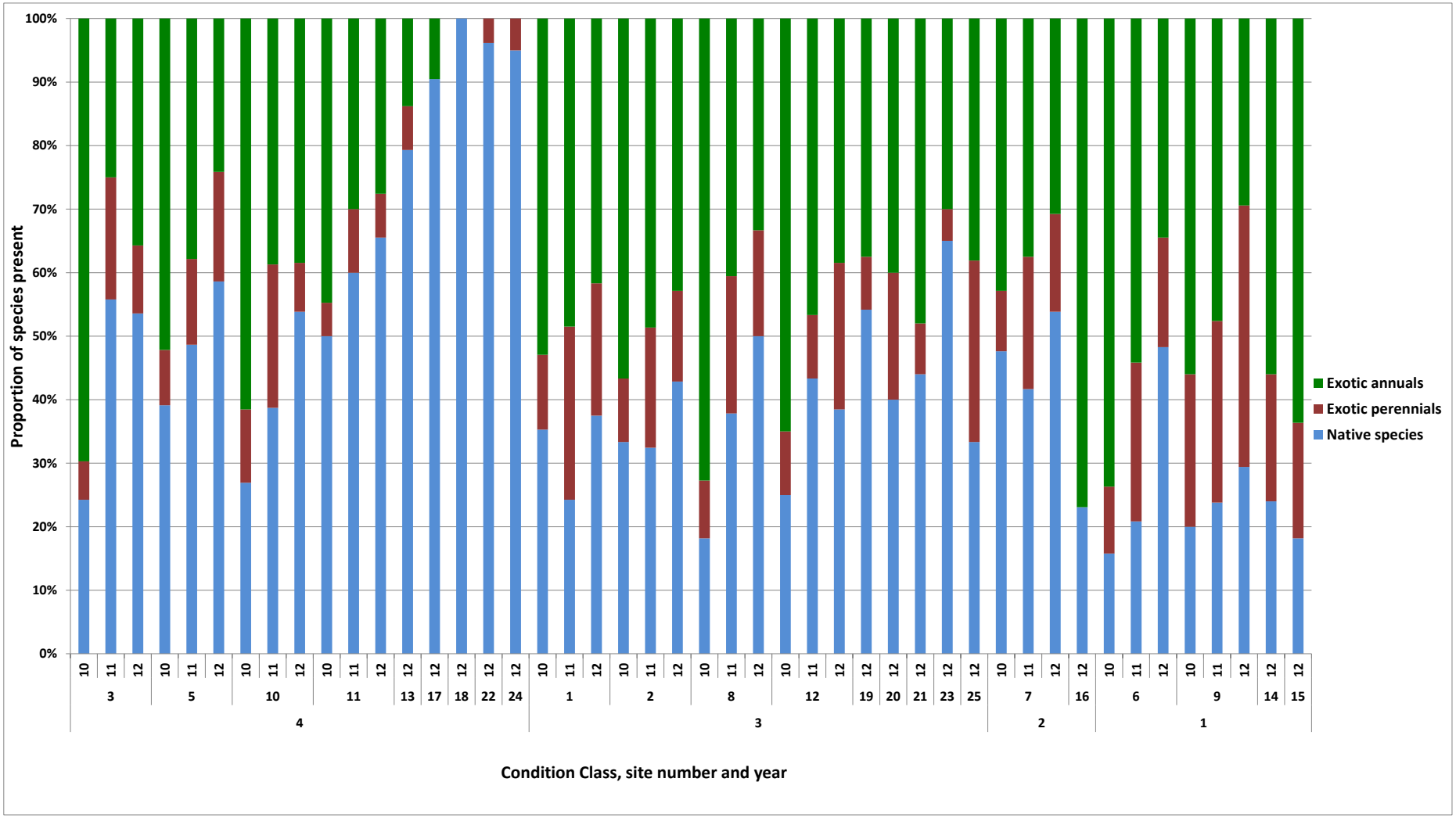

Figure 3: Proportion of native versus exotic species within each monitoring site during the 2010, 2011 and 2012 monitoring periods

3.1.2 Native overstorey cover

Native overstorey is a performance criteria established in the BOMP (WCC 2012b). The following provides a description of the results from the 2012 monitoring event, as well as a comparison of these results with previous years of monitoring and the performance criteria (**Table 6)**.

Current Survey (2012) – Sites 1-3 and 5-25

Native overstorey vegetation was present and recorded within eight of nine Condition Class 4 sites (3, 5, 11, 13, 17, 18, 22 and 24); all eight sites being equal to or greater than the performance criteria for projected foliage cover (PFC). The ninth monitoring plot in Condition Class 4 vegetation (Site 10) occurred within a gap in the canopy. Site 23 and 25 of Condition Class 3 also met the native overstorey vegetation performance criteria for White Box-White Cypress Pine shrubby open forest and Plains Grass grassland on basaltic black earth soils, respectively (**Table 6**).

Comparison between years (2010, 2011 and 2012) – Sites 1 to 12 (excluding Site 4)

Condition Class 4 sites within White Box grassy woodland (sites 3 and 11) and within Yellow Box – Blakely's Red Gum grassy woodland (Site 5) continued to meet the performance criteria from 2011 to 2012; however, there was an increase from 12.5% in 2011 to 17.5% in 2012 at Site 3, a decrease from 24.5% in 2011 to 10% in 2012 at Site 11 and a minor increase from 12% in 2011 to 15% in 2012 at Site 5. Native overstorey cover was recorded in sites 2 and 7 for the first time in 2012 at only 0.5% and 1.7%, respectively (**Table 6**). The remaining sites (sites 6, 9 and 10) recorded no native overstorey from 2010 to 2012.

It is possible that the 2012 results reflect real changes in the PFC of native canopy, although is also possible that estimations differed between the monitoring events/observers conducting the surveys across the survey period, as canopy cover is estimated by the observer rather than measured.

Table 6: Native overstorey cover (%) in comparison to Biometric Benchmarks and Performance Criteria

Biometric Vegetation Type	Condition Class (Site No.)	Native Overstorey Cover			Performance criteria	Performance Criteria Met?	
		2010	2011	2012		2011	2012
White Box grassy woodland	4 (3)	5	12.5	17.5	6-25	No except for Sites 3 and 11	No except for Sites 3, 11, 13, 17 and 24
	4 (11)	26	24.5	10			
	3 (1)	0	0	0			
	3 (2)	0	0	0.5			
	3 (8)	0	0	0			
	3 (12)	0	0	0			
	3a (19)	-	-	0			
	3a (21)	-	-	0			
	2 (7)	0	0	1.7			
	2 (16)	-	-	0			
	4 (13)	-	-	8.5			
	4 (17)	-	-	6			
	4 (24)	-	-	19.5			
Yellow Box – Blakely's	4 (5)	5	12	15	6-25	Yes	Yes

Biometric Vegetation Type	Condition Class (Site No.)	Native Overstorey Cover			Performance criteria	Performance Criteria Met?	
		2010	2011	2012		2011	2012
Red Gum grassy woodland							
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	0	0	0	6-40	No	No
	4 (18)	-	-	22		-	Yes
White Box-White Cypress Pine shrubby open forest	4 (22)	-	-	27.5	6-25	-	Yes
	3 (23)	-	-	8.5		-	Yes
Plains Grass grassland on basaltic black earth soils	3 (25)	-	-	0	0	-	Yes
Rough-barked Apple riparian forb/grass open forest	3 (20)	-	-	0	6-25	-	No
Cleared land (Mine Rehab Site)	1 (6)	0	0	0	6-25	No	No
	1 (14)	-	-	0	6-25	-	No
Cleared land (formerly cultivated land)	1 (9)	0	0	0	6-25	No	No
	1 (15)	-	-	0		-	No

3.1.3 Native midstorey cover

Native midstorey cover is a performance criteria established in the BOMP (WCC 2012b). The following provides a description of the results from the 2012 monitoring event, as well as a comparison of these results with previous years of monitoring and the performance criteria (**Table 7)**.

Current Survey (2012) – Sites 1-3 and 13- 25

A native midstorey cover was only recorded at sites 6 (Condition Class 1), 22 and 24 (Condition Class 4) (**Table 7**; **Figure 4**). 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 also met the native midstorey vegetation cover performance criteria of 6 – 25% for White Box-White Cypress Pine shrubby open forest (**Table 7**).

Comparison between years (2010, 2011 and 2012) – Sites 1 to 12 (excluding Site 4)

All sites located within the vegetation types, White Box grassy woodland (sites 1, 2, 3, 7, 8, 11, 12) Yellow Box – Blakely's Red Gum grassy woodland (Site 5) and cleared land (sites 6 and 9) met the native midstorey vegetation cover performance criteria in 2010, 2011 and 2012, as these vegetation types only require a native midstorey cover between 0 and 5%. Native midstorey cover was recorded at Condition Class 1 Site 6 in 2012 for the first time at 4% (**Table 7**). The remaining sites (sites 1, 2, 3, 5, 7, 8, 9, 10, 11 and 12) recorded no native midstorey from 2010 to 2012.

Table 7: Native midstorey cover (%) in comparison to Biometric Benchmarks and Performance Criteria

Biometric Vegetation Type	Condition Class (Site No.)	Native Midstorey Cover			Performance criteria	Performance Criteria Met?	
		2010	2011	2012		2011	2012
White Box grassy woodland	4 (3)	0	0	0	0-5%	Yes	Yes
	4 (11)	0	0	0			
	3 (1)	0	0	0			
	3 (2)	0	0	0			
	3 (8)	0	0	0			
	3 (12)	0	0	0			
	3a (19)	-	-	0			
	3a (21)	-	-	0			
	2 (7)	0	0	0			
	2 (16)	-	-	0			
	4 (13)	-	-	0			
	4 (17)	-	-	0			
	4 (24)	-	-	1.5			
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	0	0	0	0-5%	Yes	Yes
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	0	0	0	6-25%	No	No
	4 (18)	-	-	0		-	No
White Box-White Cypress Pine shrubby open forest	4 (22)	-	-	8.5	6-25%	-	Yes
	3 (23)	-	-	0		-	No
Plains Grass grassland on basaltic black earth soils	3 (25)	-	-	0	0-0%	-	Yes
Rough-barked Apple riparian forb/grass open forest	3 (20)	-	-	0	0-5%	-	Yes
Cleared land (Mine Rehab Site)	1 (6)	0	0	4	0-5%	Yes	Yes
	1 (14)	-	-	0		-	Yes
Cleared land (formerly cultivated land)	1 (9)	0	0	0	0-5%	Yes	Yes
	1 (15)	-	-	0		Yes	Yes

3.1.4 Native understorey cover

Native understorey cover is a performance criteria established in the BOMP (WCC 2012b). The following provides a description of the results from the 2012 monitoring event, as well as a comparison of these results with previous years of monitoring and the performance criteria (**Table 7**).

Current Survey (2012) – Sites 1-3 and 5 - 25

Native understorey cover (shrubs < 1m, native grasses and native herbs) was present at all sites. The majority of sites exceeded the performance criteria for native understorey cover, including all Condition Class 4 sites, Condition Class 3 sites 2, 8, 12, 19, 21, 23, and Condition Class 1 Site 6. Four sites were within the respective performance criteria, including Condition Class 3 sites 1, 20 and 25, as well as Condition Class 1 Site 9. Sites that fell within or exceeded the performance criteria lower and upper limit for PFC of cover were considered to have met the performance criteria. It should be noted that many of the sites well exceeded the performance criteria bracket and, whist these sites have not been penalised for exceeding the bracket, it is thought that this may be a response to grazing removal and high rainfall seasons and a levelling off of cover may occur in subsequent monitoring events. Native understorey cover was marginally below the performance criteria at Condition Class 1 Site 14 and Condition Class 2 Site 7, and Condition Class 1 Site 15 only recorded a native understorey cover of 2% (**Table 8**).

The ground layer was dominated by native grass cover at all Condition Class 4 sites (3, 5, 10, 11, 13, 17, 18, 22 and 24); five of nine Condition Class 3 sites (2, 8, 19, 21 and 23); as well as at one Condition Class 1 site (Site 6) (**Figure 4**). Site 7 (Condition Class 2) had an equal cover of native and exotic species (26%) and Site 15 (Condition Class 1) and 16 (Condition Class 2) were marginally dominated by exotic species cover (by 10% or less). All of the remaining sites were dominated by exotic species, including sites 1, 12, 20 and 25 (Condition Class 3) and 9 and 14 (Condition Class 1) (**Figure 4**). Native shrub cover (< 1m) was only recorded at sites 3, 28, 22 and 24 (Condition Class 4) (**Figure 4**).

Comparison between years (2010, 2011 and 2012) – Sites 1 to 12 (excluding Site 4)

There was a general increase in native understorey cover from 2010 to 2012 at seven of the 11 sites surveyed in all three years, including 3, 10 (Condition Class 4), 2, 8 (Condition Class 3), 7 (Condition Class 2), 6 and 9 (Condition Class 1) (**Figure 4**; **Table 8**). The remaining four sights either remained the same or similar to 2011 (Condition Class 4 Site 11 and Condition Class 4 Site 5) or decreased from 2011 to 2012 (Condition Class 3 sites 1, and 12) (**Figure 4**; **Table 8**).

Native grass cover was the main contributor to the overall increase in native understorey cover at the majority of sites, and also increased at Site 5. Of the remaining three sites, 11 and 1 displayed a maximum decrease of only 8% in native grass cover from 2011 to 2012, while Site 12 decreased from 80% cover in 2011 to 46% in 2012. Conversely, there was a general decrease in native herb cover from 2010 to 2012 at all sites; with the exception of sites 6 and 8, which displayed minor increases between 2011 and 2012 (**Figure 4**).

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Table 8: Native understorey cover (%) in comparison to Biometric Benchmarks and Performance Criteria

Biometric Vegetation Type	Condition Class (Site No.)	Native Understorey Cover			Performance criteria	Performance Criteria Met?	
		2010	2011	2012		2011	2012
White Box grassy woodland	4 (3)	32	90	98	33-45%	Yes for all sites except Site 7	Yes for all sites except Site 7 and 16
	4 (11)	40	80	80			
	3 (1)	4	46	36			
	3 (2)	32	58	74			
	3 (8)	4	64	72			
	3 (12)	33	80	54			
	3a (19)	-	-	98			
	3a (21)	-	-	82			
	2 (7)	20	18	26			
	2 (16)	-	-	0			
	4 (13)	-	-	58			
	4 (17)	-	-	56			
	4 (24)	-	-	80			
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	50	78	74	33-45%	Yes	Yes
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	36	80	96	26-45%	Yes	Yes
	4 (18)	-	-	92		-	Yes
White Box-White Cypress Pine shrubby open forest	4 (22)	-	-	64	26-45%	-	Yes
	3 (23)	-	-	92		-	Yes
Plains Grass grassland on basaltic black earth soils	3 (25)	-	-	42	38-50%	-	Yes
Rough-barked Apple riparian forb/grass open forest	3 (20)	-	-	52	36-55%	-	Yes
Cleared land (Mine Rehab Site)	1 (6)	0	8	54	33-45%	No	Yes
	1 (14)	-	-	28		-	No
Cleared land (formerly cultivated land)	1 (9)	8	20	34	33-45%	No	Yes
	1 (15)	-	-	2		-	No

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 performance criteria established in the BOMP (WCC 2012b). The following provides a description of the results from the 2012 monitoring event, as well as a comparison of these results with previous years of monitoring and the performance criteria (**Table 9**).

Current Survey (2012) – Sites 1-3 and 5 to 25

Exotic species cover was present at all sites, with the exception of three sites (Condition Class 4 sites 18, 22 and 24). Condition Class 3 Site 12 had the highest exotic species cover (82%), followed by Condition Class 3 sites 25 (75%), 1 (70%) and 20 (70%). Condition Class 1 Site 15 had a relatively low exotic cover score (12%), while Condition Class 1 Site 9 had a relatively high exotic cover score (64%). The remaining two Condition Class 1 sites (6 and 14) had an exotic cover score between 18% and 24%.

Exotic species composition was dominated by annual species by at least 50% at all sites, with the exception of Condition Class 4 sites 18, 22 and 24 where either no or one exotic species was recorded and Condition Class 1 Site 9, where annual exotics comprised 41% of exotic species (**Table 9**; **Figure 4**).

Three Class 4 noxious weeds were recorded in the current survey, including *Hypericum perforatum* (St Johns Wort) (sites 9 and 14), *Opuntia stricta* (Smooth Pest Pear) (Site 20) and *Xanthium spinosum* (Bathurst Burr) (sites 11 and 18). Smooth Pest Pear is also listed as a Weed of National Significance (WoNS). Both Bathurst Burr and Smooth Pear Pest were not recorded in the 2010 or 2011 surveys.

Comparison between years (2010, 2011 and 2012) – Sites 1 to 12 (excluding Site 4)

Exotic species decreased from 2011 to 2012 at all 11 sites surveyed in 2012; a total reduction of 19 exotic species from 2011 to 2012 (**Table 5**; **Figure 2**; **Figure 3**; **Table 9**). Additionally, exotic species cover displayed a decrease in trend from 2010 through to 2012 at all sites, except sites 9 and 12 (**Table 9**; **Figure 4**). The smallest decrease in exotic plant cover (20%) from 2010 to 2012 was recorded at Site 1, while the largest decrease (74%) for the same period was recorded at Site 11. Groundcover was dominated by exotic species for all monitoring years at Site 9, although at Site 12 it changed from native dominated in 2011 to exotic dominated in 2012. Groundcover at Site 7 was exotic dominated in 2010 and 2011 and had an even exotic and native cover (26%) in 2012. As such, only three sites remained dominated by exotic vegetation in 2012 (1, 3 and 12, representing vegetation classes 1 and 3), compared to all sites (11) in 2010 and four sites in 2011 (**Table 9**; **Figure 4**).

Additionally, the noxious weed Paterson's Curse was not recorded in the 2012 survey. Weed spraying in 2011 focused on this weed in the Eurunderee BOA and rehabilitation areas (**Table 9**).

An increase in native grass cover and a decrease in exotic species cover and native herb cover are most likely attributed to a range of factors. The drier than average weather conditions of the spring/summer season of 2012 would have resulted in a decrease in exotic species cover and reduced the number of native ephemeral herbs. Weed spraying in focus areas Eurunderee and the rehabilitation area and slashing in the vicinity of Narrawolga/Mine Site would have impacted groundcover composition in sites located within the vicinity of these areas. The continued removal of grazing across the BOA in 2011/2012 may have increased native grass cover at some sites.

Table 9: Exotic species cover, richness and problem species in comparison to Performance Criteria. Note: If exotic cover was below 10% and noxious species were absent, the performance criteria is considered met.

Biometric Vegetation Type	Condition Class (Site No.)	No. Exotic Species (Annual)			Exotic Species Cover			Noxious Species*			Performance Criteria	Performance Criteria Met?	
		2010	2011	2012	2010	2011	2012	2010	2011	2012		2011	2012
White Box grassy woodland	4 (3)	25 (23)	23 (13)	13 (10)	70	22	4	EP, HP	-	-	Noxious and environmental weeds are under control within rehabilitation or biodiversity offset areas	No	Yes
	4 (11)	19 (17)	16 (12)	10 (8)	80	40	6	EP	-	XS		No	No
	3 (1)	11 (9)	25 (16)	15 (10)	90	72	70	-	-	-		No	No
	3 (2)	20 (17)	25 (18)	12 (9)	88	36	28	-	XO			No	No
	3 (8)	9 (8)	23 (15)	9 (6)	94	50	46	-	-	-		No	No
	3 (12)	15 (13)	17 (14)	16 (10)	76	67	82	-	-	-		No	No
	3a (19)	-	-	11 (9)	-	-	8	-	-	-		-	Yes
	3a (21)	-	-	14 (12)	-	-	20	-	-	-		-	No
	2 (7)	11 (9)	14 (9)	12 (8)	88	84	26	-	-	-		No	No
	2 (16)	-	-	10 (10)	-	-	8	-	-	-		-	Yes
	4 (13)	-	-	6 (4)	-	-	8	-	-	-		-	Yes
	4 (17)	-	-	2 (2)	-	-	2	-	-	-		-	Yes
	4 (24)	-	-	1 (0)	-	-	0	-	-	-		-	Yes

Biometric Vegetation Type	Condition Class (Site No.)	No. Exotic Species (Annual)			Exotic Species Cover			Noxious Species*			Performance Criteria	Performance Criteria Met?	
		2010	2011	2012	2010	2011	2012	2010	2011	2012		2011	2012
Plains Grass grassland on basaltic black earth soils	3 (25)	-	-	14 (8)	-	-	72	-	-	-		-	No
Rough-barked Apple riparian forb/grass open forest	3 (20)	-	-	9 (6)	-	-	70	-	-	OS		-	No
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	14 (12)	19 (14)	12 (7)	78	32	30	-	-	-		No	No
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	19 (16)	19 (12)	12 (10)	88	70	30	EP	EP	-		No	No
	4 (18)	-	-	0	-	-	0	-	-	XS		-	No
White Box-White Cypress Pine shrubby open forest	4 (22)	-	-	1 (0)	-	-	0	-	-	-		-	Yes
	3 (23)	-	-	7 (6)	-	-	6	-	-	-		-	Yes
Cleared land (Mine Rehab Site)	1 (6)	16 (14)	19 (13)	15 (10)	50	94	18	-	-	-		-	No
	1 (14)	-	-	19 (14)	-	-	24	-	-	HP		-	No
Cleared land (formerly cultivated land)	1 (9)	20 (14)	16 (10)	12 (5)	94	40	64	-	-	HP		-	No
	1 (15)	-	-	9 (7)	-	-	12	-	-	-		-	No

* EP = *Echium plantagineum* (Patterson's Curse), HP = *Hypericum perforatum* (St Johns Wort), OS = *Opuntia stricta* (Smooth Pest Pear), XO = *Xanthium occidentale* (Noogoora Burr), XP = *Xanthium spinosum* (Bathurst Burr).

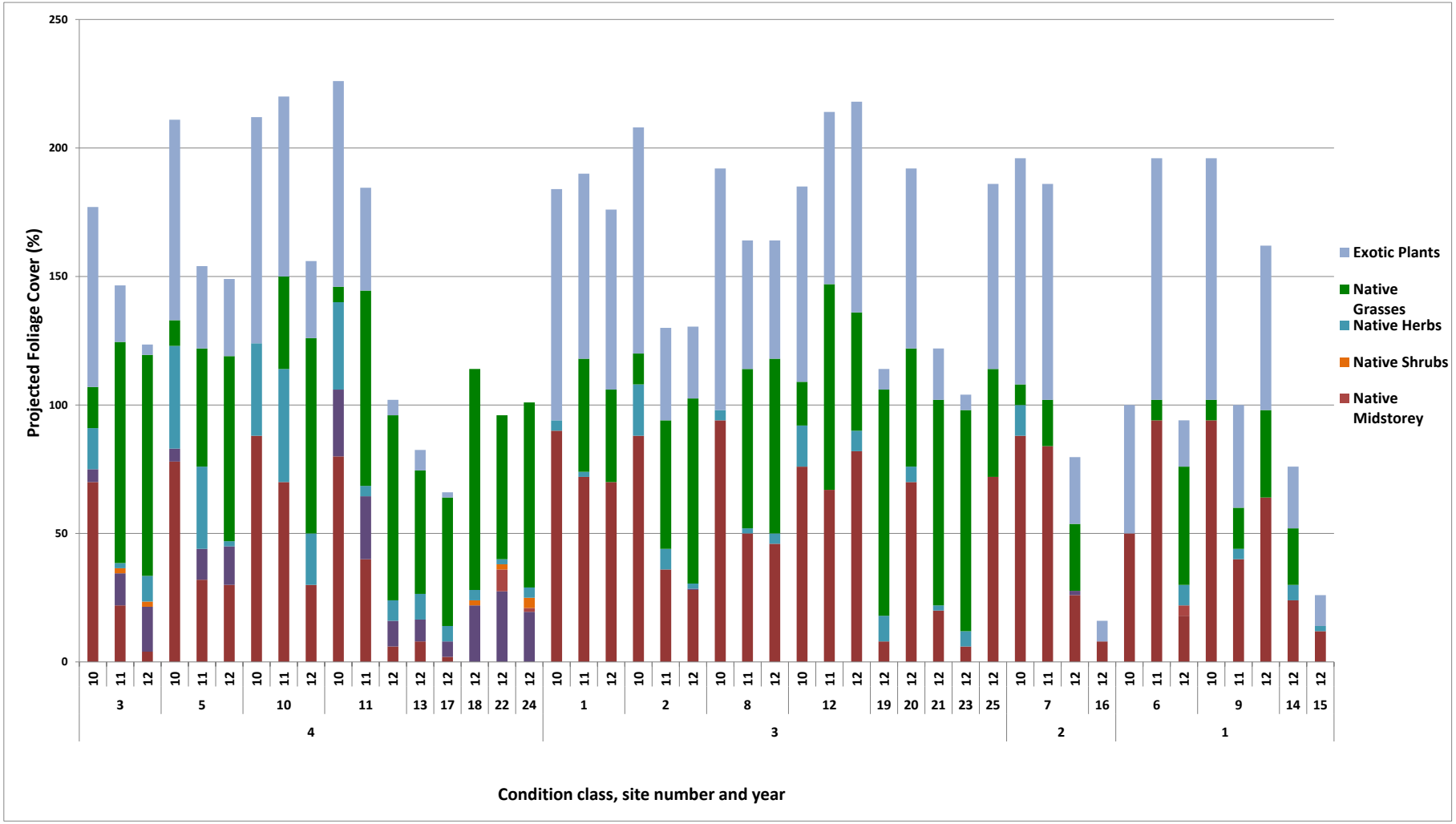

Figure 4: Projected foliage cover of each vegetation stratum at each monitoring site during the 2010, 2011 and 2012 monitoring periods

3.1.6 Other biometric attributes

The following attributes provide a representation of the ecological resources and condition of the vegetation across the BOA. These are not associated with the performance criteria for the BOA, but represent important ecological resources relating to ecosystem functioning. They have been summarised here with a complete inventory of the Biometric field variables recorded are provided in **Appendix B**.

Overstorey regeneration

A score of 100% regeneration of the overstorey species present was recorded for seven of the 24 monitoring sites (Sites 2, 3, 10, 11, 17, 22, 24), with no regeneration of overstorey species observed for zones in which sites 13, 16 and 18 occurred.

Of the sites mointored in 2010, 2011 and 2012 (1 – 12, excluding Site 4), regeneration of native overstorey species was recorded at 10 of the 11 sites monitored in 2012, eight of the 12 sites monitored in 2011 and four of the 12 sites monitored in 2010. While the results suggest that higher levels of recruitment were occurring in the BOA in 2011 and 2012 compared to 2010, the 2010 survey recorded regeneration within the monitoring plots, rather than for the entire zone. Therefore, the 2011 and 2012 survey results are not directly comparable to the 2010 results. However, from 2011 to 2012 rehabilitation site (6) remains to be the only site yet to have a natural recruitment of native overstorey (**Appendix B**).

Coarse Woody Debris

Coarse woody debris (CWD) was recorded at 12 of the 24 monitoring sites, largely reflecting those sites with an overstorey (Condition Class 4 sites 11, 13, 17, 18 and 22). Stags and CWD had been relocated to Site 8 of Condition Class 3 and sites 9 and 14 of Condition Class 1 for habitat purposes, while stockpiles of CWD were located at sites 5 and 7 of Condition Class 4 for re-location to rehabilitation and offset sites. The substantial increases and decreases in CWD recorded at sites 5, 7, 8 and 9 between 2010/2011 and 2012 are a result of these management actions (**Appendix B**).

Hollow-bearing trees

Hollow-bearing trees (HBTs) were recorded within nine of the 24 monitoring plots (3, 5, 10, 11, 13, 17 and 18 of Condition Class 4, Site 2 of Condition Class 3 and Site 16 of Condition Class 2). One HBT was recorded at sites 2, 10, 11, 16 and 17, while two HBTs were recorded at sites 3, 5 and 13, and four HBTs were recorded at Site 18 (**Appendix B**).

An increase or decrease in the number of HBTs between 2011 and 2012 at monitoring sites 2, 3, 5 and 10 is unlikely to accurately reflect real life change. Hollows often take many years to form, and therefore it is most likely the differences in hollow visibility between surveyors that have resulted in the increase/decrease in HBTs. Additionally, habitat trees from disturbance areas are used as stag trees in rehabilitation and offset areas, and an increase in the number of HBTs at some sites may be a reflection of this.

3.2 LANDSCAPE FUNCTION ANALYSIS

Landscape function analysis has been used to monitor the soil surface condition of the rehabilitation sites (Sites 6 and 14) and compare these against two analogue sites (Sites 11 and 17). The following presents the landscape organisation and soil surface assessment results for these sites for spring 2012, as well as data from previous years where this data has been collected.

3.2.1 Landscape Organisation

The Landscape Organisation index has been presented for each of the sites monitoried through LFA in **Table 10** below, with the results of previous years monitoring also provided. In terms of comparison between rehabilitation sites and analogue sites in 2012, as expected both the analogue sites performed better that than the rehabilitation sites, with site 11 having 47% higher proportion of patches than site 6 and site 17 having 45% higher proportion of patches than site 14.

In terms of trends from previous monitoring, only sites 6 and 11 have been monitored in previous years, with results indicating that the rehabilitation site (Site 6) has decreased in the proportion of patches by over 50% since 2010. Site 11 has also decreased in the proportion of patches, though by only 12% since 2010. This suggests that ground cover and the associated stability of these sites is decreasing over time. This may be due to environmental or climatic conditions, with the spring of 2012 being somewhat dryer than previous years. However, one explanation for the marked drop in Site 6 is possibly the scensence of the cover crop initially established to stabilise the soil within the rehab. Cover crop scenesence is expected in the process of rehabilitation, and this reduction in patches may be emphasised in a dry period. Improving the cover of perennial native ground cover species will be important to secure soil and promote the success of the rehab and, whilst biometric understorey cover scores do indicate an increase in native cover from previous years, the drop in the proportion of patches in 2012 may be representative of the lag time between cover crop senescence and native ground cover establishment.

Table 10: Landscape organisation for rehabilitation sites 6 and 14 and analogue sites 11 and 17.

Site	6			14			11			17		
Year	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
Landscape organisation index	1	0.96	0.47			0.44	1	0.96	0.88			0.8

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 **Figure 5**, provides a more accurate picture of how these transects are functioning by way of soil surface stability, infiltration and nutrient cycling.

Not much can be said by way of trends for sites 14 and 17, which were sampled for the first time in 2012. However, rehabilitation Site 6 appears to be trending downwards in all three soil surface indices. This downward trend for infiltration and nutrient cycling is also consistent in analogue Site 11, though stability seems to be improving at this analogue site. It is difficult to say exactly what is driving this change, and longer term monitoring will provide greater clarity, though climatic/environmental (ie a dry 2012 spring) may provide some explanation along with the scenesence of the cover crop on the rehab site.

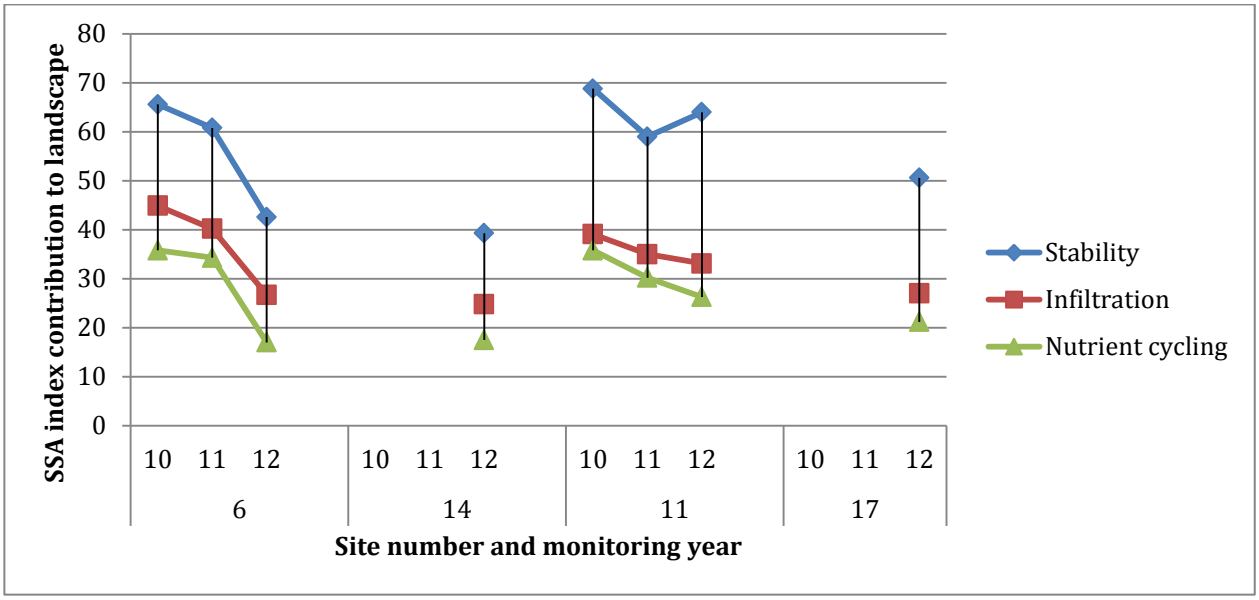

Figure 5: Soil Surface Assessment results for rehabilitation sites (6 and 14) and analogue sites (11 and 17)

3.3 FAUNA

Due to the absence of measurable performance criteria for fauna, as per the BOMP (WCC 2012b), the results of the current and previous years fauna monitoring results are presented below, with all fauna species recorded during monitoring and opportunistically provided in **Appendix C**. Due to the dynamics of fauna monitoring and the absence of measurable performance criteria for fauna, an MDS plot has been developed to compare the similarity of fauna assemblages between monitoring sites. This allows for comparisons to be made between sites and years, in particular between sites that are undergoing management actions (ie rehabilitation sites) and the analogue sites.

3.3.1 Microchiroptera bat surveys

Due to technical malfunctions, site 11, 21 and 23 were not sampled by anabat call detection in the 2012 monitoring period, however, all other sites were monitored (**Table 11**).

Table 11: Sites surveyed for microbats in the 2010, 2011 and 2012 monitoring periods

Biometric Vegetation Type	Condition Class (Site No.)	Surveyed in 2010	Surveyed in 2011	Surveyed in 2012
White Box grassy woodland	4 (3)	Yes	Yes	Yes
	4 (11)	Yes	Yes	Anabat malfunction
	3 (1)	Yes	Yes	Yes
	3 (2)	Yes	Yes	Yes
	3 (4)	Yes	Yes	No
	3 (8)	No	No	Yes
	3 (12)	Yes	Yes	Yes
	3a (19)	No	No	Yes
	3a (21)	No	No	Anabat malfunction

Biometric Vegetation Type	Condition Class (Site No.)	Surveyed in 2010	Surveyed in 2011	Surveyed in 2012
	2 (7)	Yes	Yes	Yes
	2 (16)	No	No	No
	4 (13)	No	No	No
	4 (17)	No	No	Yes
	4 (24)	No	No	Yes
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	Yes	Yes	Yes
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	No	No	Yes
	4 (18)	No	No	Yes
White Box-White Cypress Pine shrubby open forest	4 (22)	No	No	Yes
	3 (23)	No	No	Anabat malfunction
Plains Grass grassland on basaltic black earth soils	3 (25)	No	No	Yes
Rough-barked Apple riparian forb/grass open forest	3 (20)	No	No	Yes
Cleared land (Mine Rehab Site)	1 (6)	Yes	Yes	Yes
	1 (14)	No	No	Yes
Cleared land (formerly cultivated land)	1 (9)	Yes	Yes	Yes
	1 (15)	No	No	Yes

Current Survey (2012) – Sites 1-3 and 5-25

Fifteen microbat species, including five threatened species listed under the NSW TSC Act, *Chalinolobus dwyeri* (Large-eared Pied Bat), *Falsistrellus tasmaniensis* (Eastern Falsistrelle), *Miniopterus orianae oceanensis* (Eastern Bentwing Bat), *Saccolaimus flaviventrus* (Yellow-bellied Sheathtail Bat) and *Vespadelus troughtoni* (Eastern Cave Bat), were identified through ultra-sonic call detection (i.e. Anabat recordings) across the 24 fauna monitoring sites during the 2012 monitoring period (**Table 12**). The 2011 survey did not record the Yellow-bellied Sheathtail Bat or the Eastern False Pipistrelle, although these species were recorded in the 2010 survey (**Table 12**).

The 2012 survey recorded species at all sites with functioning Anabats (excluding sites 11, 21 and 23). The total number of species recorded in 2012 represents 70% (15 of 18) of the total number of species recorded across the Werris Creek mine site since 2004 (see **Table 12**). Three new bat species for the Werris Creek Mine Site were recorded, including *Scotorepens* sp. (Central-eastern Broad-nosed Bat) (recorded at Site 24) and the two threatened species, Eastern Cave Bat (recorded at all sites except 11, 12, 14 and 21) and the Large-eared Pied Bat (recorded at Site 1). Only the Central Eastern Broad-nosed Bat was an additional species to the WCC site record as a result of the newly established sites (13-25). Site 2 (Condition Class 4) recorded the most species (12), followed closely by Condition Class 4 Site 24, Condition Class 3 Site 1 and Condition Class 1 Site 15, which all recorded a species diversity of 11. Condition Class 1 Site 14 recorded the lowest species diversity (3 species). A full summary of the Anabat analysis is included in **Appendix D**.

The 2012 survey recorded an additional 4 species to the 2010 survey and an additional 5 species to the 2011 survey (**Table 12**). The 2011 and 2012 surveys also recorded microbats at all monitoring sites, while the 2010 survey recorded microbats at 7 out of 10 monitoring sites (**Figure 6**).

In terms of the number of microbat calls, signifying bat activity (not to be equated to bat abundance), the highest number of calls was recorded at Site 22 in the current survey, with the majority of calls recorded for *Mormopterus* species 3 followed by *Mormopterus* species 4 (**Figure 7**). Site 1 also had a relatively high number of calls. The lowest number of calls was recorded at Site 6 in the current survey, with only 10 calls; however it recorded a species diversity of 6. Overall, *Mormopterus* species 3 recorded the highest number of calls across all sites (1460 calls), followed by the *Vespadelus vulturnus* (Little Forest bat) (600 calls) and the Eastern Cave Bat (546 calls), while the large-eared Pied Bat and the Central eastern Broad-nosed Bat had the least amount of calls (2 calls each).

Comparison between years (2010, 2011 and 2012) – Sites 1-12 (excluding sites 4, 8 and 10)

Five sites recorded microbat data in all three monitoring years (Condition Class 3 sites 1, 2 and 12, Condition Class 2 Site 7 and Condition Class 1 Site 9) (**Figure 6**). Of these, the number of microbat species recorded increased from 2011 to 2012 at all sites except for Site 12, which decreased by 1 species. This compares to 2011, where species increased at all sites monitored from 2010 to 2011, except Site 9. Site 6 had the greatest increase in species number between 2011 and 2012 (3 species). Site 1 and 5 recorded the most number of species in both 2011 and 2012.

The number of microbat calls increased at all sites from 2010 to 2011, other than for Site 12, where the number of calls decreased (mostly for Gould's Wattled Bat and White-striped Freetail Bat). However, in 2012 four of eight sites with data decreased in the number of calls (sites 3, 7, 12 and 9) and four of the eight sites increased in the number of calls (sites 1, 2, 5 and 6) (**Figure 7**).

Habitat use (guilds)

In order to provide a perspective on habitat niche availability and use by particular species, microbats were separated into 'guilds' by allocating them to their preferred foraging niche. Many microbats will use more than one niche when foraging (e.g. sub-canopy, forest edges and below canopy); however, they can be broadly delineated into 'above canopy' and 'below canopy' foragers for assignment into foraging guilds. The range of habitat niches used by the species when foraging can be found in the 2010 baseline report (ELA 2011).

The 2012 survey found that majority of the bat species were canopy/below canopy foragers. All sites that recorded bat data had both above canopy foragers and canopy/below canopy foragers, with canopy/below canopy foragers dominating at all sites except for Site 2 where the two foraging guilds were equal. This is consistent with both the 2010 and 2011 surveys (**Figure 8**). Overall, there were 10 bat species classed as canopy/below canopy foragers and only five that were classed as above canopy foragers. This is an increase from 2011 where there were six canopy/below canopy foragers and three above canopy foragers. Microbats of the above canopy guild did not show a preference for vegetation with a canopy (Classes 2, 3 and 4), with all sites recording between 1 and 4 above canopy foragers.

Table 12: Bat species recorded at the Werris Creek Coal Mine site and during the 2010, 2011 and 2012 monitoring periods

Family	Species	Common Name	Present in the BOA		
			2010	2011	2012
Emballonuridae	***Saccolaimus flaviventris***	**Yellow-bellied Sheathtail Bat**	Yes	No	Yes
Molossidae	*Tadarida australis*	White-striped Freetail Bat	Yes	Yes	Yes

Family	Species	Common Name	Present in the BOA		
			2010	2011	2012
	Mormopterus species3	Undescribed Little Mastiff Bat @ 25KHz	Yes	Yes	Yes
	Mormopterus species4	Undescribed Little Mastiff Bat @ 30KHz	Yes	Yes	Yes
Vespertilionidae	***Chalinolobus dwyeri^***	**Large-eared Pied Bat**	No	No	Yes
	Chalinolobus gouldii	Gould's Wattled Bat	Yes	Yes	Yes
	Chalinolobus morio	Chocolate Wattled Bat	Yes	Yes	Yes
	Falsistrellus tasmaniensis	**Eastern False Pipistrelle**	Yes	No	Yes
	Miniopterus orianae oceanensis	**Eastern Bent-wing Bat**	Yes	Yes	Yes
	Nyctophilus geoffroyi	Lesser Long-eared Bat	No	No	No
	Nyctophilus sp.		Yes	Yes	Yes
	Scoteanax rueppellii	**Greater Broad-nosed Bat**	No	No	No
	Scotorepens balstoni	Inland Broad-nosed Bat	Yes	Yes	Yes
	Scotorepens greyii	Little Broad-nosed Bat	No	No	Yes
	*Scotorepens sp.^*	Central-eastern Broad-nosed Bat	No	No	Yes
	Vespadelus troughtoni^	**Eastern Cave Bat**	No	No	Yes
	Vespadelus darlingtoni	Large Forest Bat	No	No	No
	Vespadelus vulturnus	Little Forest Bat	Yes	Yes	Yes

^ New species for the Werris Creek Mine Site

Bold text denotes a threatened species

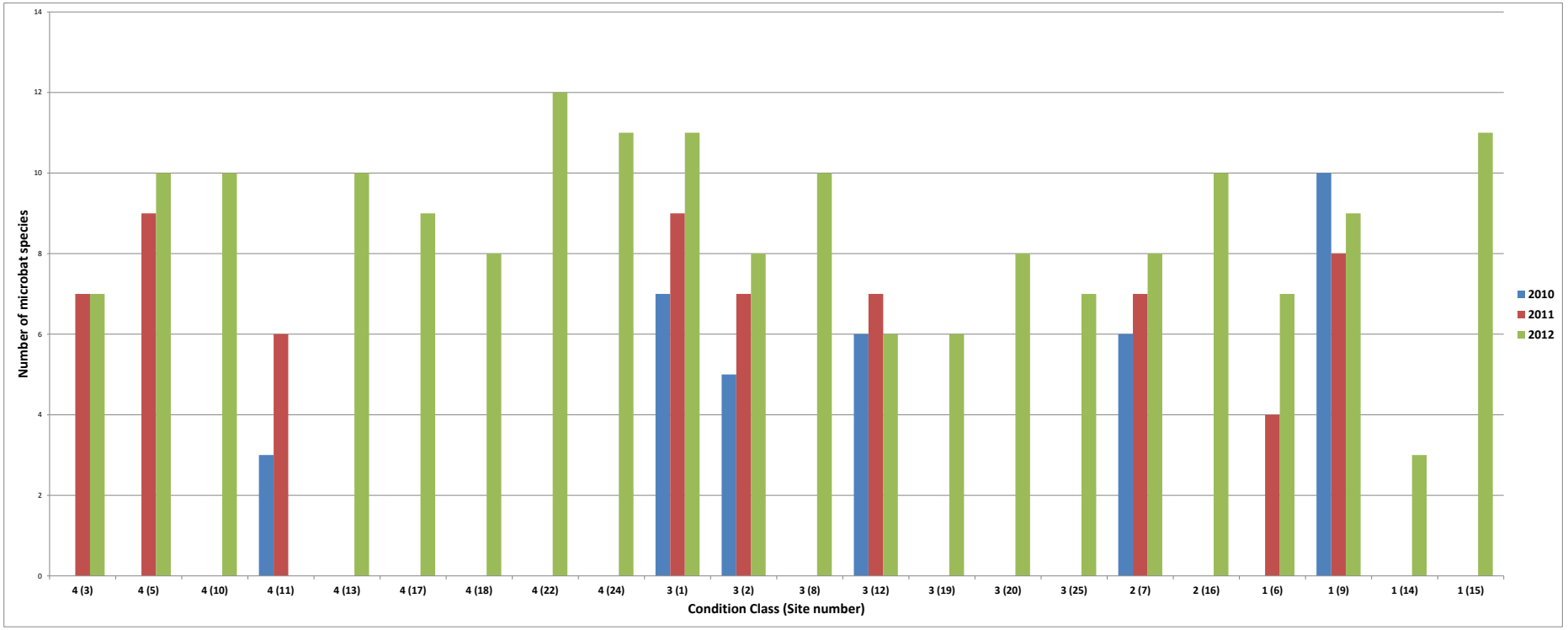

Figure 6: Number of micorbat species recorded at each fauna monitoring site during the 2010, 2011 and 2012 monitoring periods. Anabats malfunctioned at sites 4 (11), 3 (21) and 3 (23) (the latter two sites were not included in the graph).

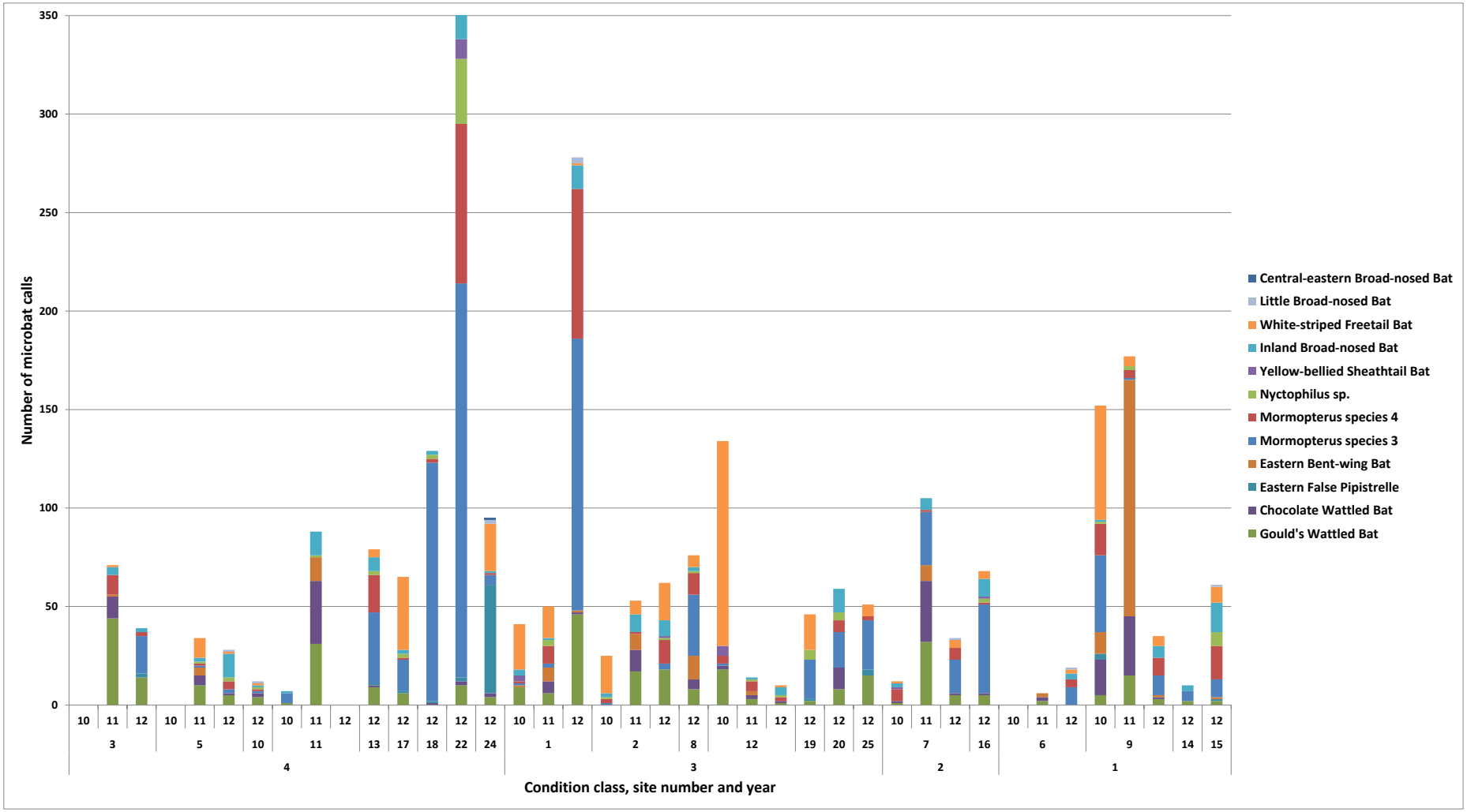

Figure 7: Microbat calls recorded across the BOA during the 2010, 2011 and 2012 monitoring period. Anabats malfunctioned at sites 4 (11), 3 (21) and 3 (23) (the latter two sites were not included in the graph).

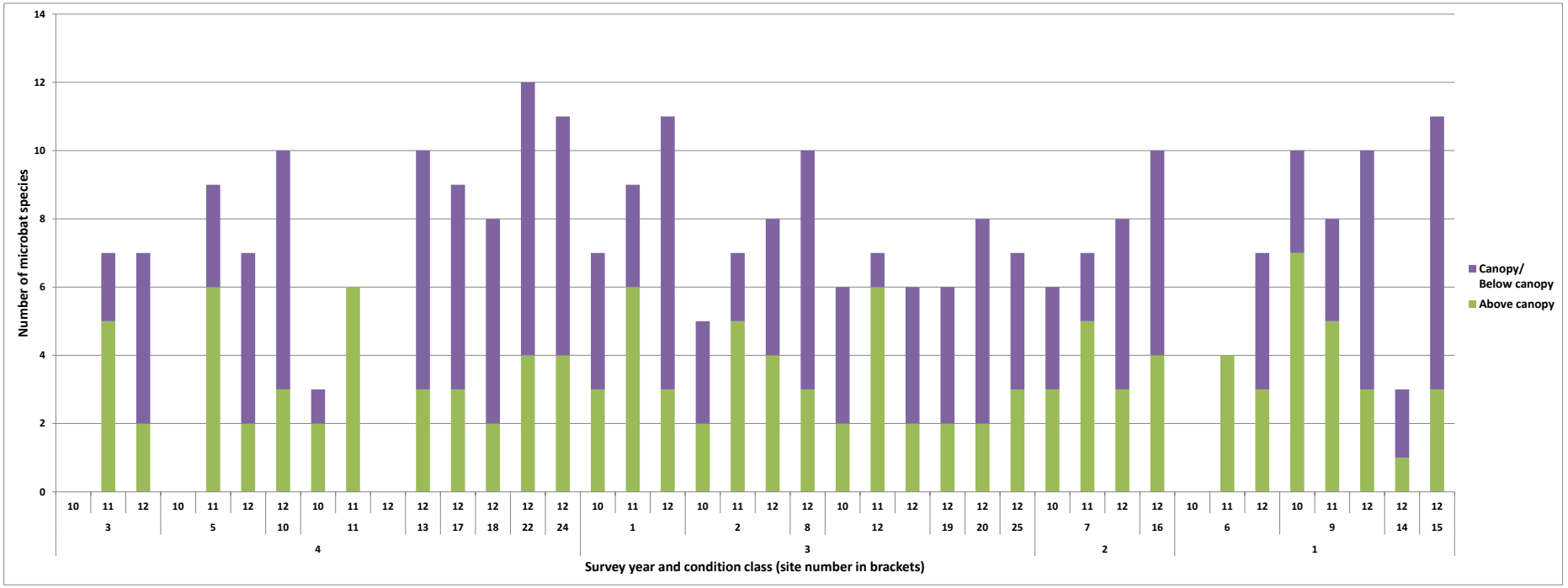

Figure 8: Species richness across the BOA, presented in terms of 'guilds' during the 2010, 2011 and 2012 monitoring periods. Anabats malfunctioned at sites 4 (11), 3 (21) and 3 (23) (the latter two sites were not included in the graph).

3.3.2 Diurnal bird census

Species richness

Current Survey (2012) – Sites 1-3 and 5-25

An inventory of bird species recorded within each monitoring site and for the BOA is presented in **Appendix E**. A total of 75 bird species (70 native species including 3 threatened species, and 5 exotic species) were recorded during the 2012 monitoring survey for the BOA. Of these, 58 were diurnal species which were recorded within the monitoring sites during formal bird censuses, while the remainder were either diurnal species recorded outside of formal census times for the entire BOA or were nocturnal bird species (see **Appendix E and F**).

Results from the formal bird census showed that Condition Class 3 Site 8 recorded the highest diurnal bird species richness (24 species), while Condition Class 4 Site 11 recorded the lowest diurnal bird species richness (7 species). Sites 6 and 9 of Condition Class 1 also had relatively high diurnal bird species richness (17-18 species).

The high number of diurnal bird species recorded for sites 6, 8 and 9 reflected their positions adjacent to a dam, where species of all guilds would utilise these watering points. The high number of species recorded for sites 20, 21 and 23 reflected their proximity to remnant vegetation of high species richness and structural complexity. Additionally, sites 20 and 21 are located within and adjacent to a riparian corridor. The low diurnal species richness recorded at sites 14 and 16 is a reflection of the comparatively poor condition of these sites – Site 14 being recently rehabilitated and Site 16 being a cultivated paddock. The poor species diversity of Condition Class 4 Site 11 is most likely attributed to strong winds during one of the monitoring sessions.

Collectively, Condition Class 3 sites had the highest species richness, with four of nine sites (sites 8, 20, 21, and 23) having the highest species richness of all sites (19-24 species). The additional Condition Class 3 sites (1, 2, 12, 19 and 25) recorded a species richness between 7 and 14. Condition Class 4 sites recorded variable numbers of diurnal bird species, with all sites being comparatively low; sites 3, 10, 11, 17 and 18 had a species richness between 7 and 11, and sites 5, 13, 22 and 24 had a species richness between 12 and 15.

Thirteen new species were recorded near to or in the newly established monitoring sites (13 to 25) during the formal bird census, nocturnal surveys and opportunistically (**Table 13**). Eight of these species were new to the WCC site, including the EPBC Act migratory species, *Merops ornatus* (Rainbow Bea-eater) and *Hirundapus caudacutus* (White Throated Needletail) (**Table 13**; **Appendix E**). *Gerygone fusca* (Western Gerygone) was also recorded at Site 9 (**Table 14**). The *Melanodryas cucullata* (Hooded Robin) was also recorded at Site 23, which is listed as vulnerable on the TSC Act.

Table 13: Bird species recorded in the 2012 survey at sites 13 to 25 which were not recorded during the 2010 survey or the 2011 survey (both in the formal bird census and outside of formal bird censuses)

Family	Species	Common Name	Nov/Dec 2012
Accipitridae	*Accipiter cirrocephalus*^	Collared Sparrowhawk	Sites 20 and 23
Aegothelidae	*Aegotheles cristatus*^	Australian Owlet-nightjar	Sites 15 and 20
Pardalotidae	*Aphelocephala leucopsis*^	Southern Whiteface	Opportunistic (Site 23)
Climacteridae	*Cormobates leucophaea*^	White-throated treecreeper	Opportunistic (Site 22)
Pardalotidae	*Falcunculus frontatus*^	Crested Shrike-tit	Opportunistic (Morengo)
Geopelia	*Geopelia placida*	Peaceful Dove	Sites 22 and opportunistic (Site 20)
Acanthizidae	*Gerygone fusca* ^	Western Gerygone	Site 23
Apodidae	***Hirundapus caudacutus***^	**White Throated Needletail (Migratory – EPBC Act)**	Opportunistic (Morengo)
Petroicidae	***Melanodryas cucullata***	**Hooded Robin (Vulnerable – TSC Act)**	Site 23
Meropidae	***Merops ornatus***^	**Rainbow bee-eater (Migratory – EPBC Act)**	Site 20
Columbidae	*Phaps chalcoptera*^	Common Bronzewing	Opportunistic (Site 24)
Podargidae	*Podargus strigoides*	Tawny Frogmouth	Site 18
Estrildidae	*Taeniopygia bichenovii*^	Double-barred Finch	Site 20 and 21

^ New species for the Werris Creek Mine Site

Bold text denotes threatened and migratory species

Comparison between years (2010, 2011 and 2012) – Sites 1 – 12 (excluding sites 4, 8 and 10)

The 2012 formal bird censuses recorded 11 bird species that were not recorded during the 2011 survey and 23 bird species that were not recorded during the 2010 survey – six of these species were not recorded during either the 2010 or 2011 surveys (**Table 14**). Of the additional species recorded, three species were new species to the Werris Creek mine site; the remaining three species had been previously recorded for the Werris Creek mine site in previous surveys (**Table 14**; **Appendix E**). No additional threatened species were recorded, although the introduced species, *Alauda arvensis* (Skylark) was recorded in 2012.

Table 14: Diurnal bird species recorded at sites 1 to 12 (excluding Site 4) in the 2012 formal bird census that were not recorded in 2010 survey or the 2011 survey

Family	Species	Common Name	Nov/Dec - 12	Nov-10	Oct-11
Locustellidae	*Cincloramphus cruralis*^	Brown Songlark	x		
Coraciidae	*Eurystomus orientalis*	Dollarbird	x		
Artamidae	*Strepera graculina*	Pied Currawong	x		

Family	Species	Common Name	Nov/Dec - 12	Nov-10	Oct-11
Columbidae	*Columba livia*	Rock Dove *	x		
Alaudidae	*Alauda arvensis*^	Skylark*	x		
Acanthizidae	*Gerygone fusca* ^	Western Gerygone	x		

^ New species for the Werris Creek Mine Site

* Denotes an exotic species

Of the nine sites monitored in 2010, 2011 and 2012, there was a decrease in diurnal bird species diversity at seven of the sites from 2011 to 2012 (Condition Class 4 sites 3, 5, 10 and Condition Class 3 sites 1 2 and 12, and Condition Class 1 Site 9). At three of these sites species diversity peaked in 2011 and was generally higher in 2012 compared to 2010 (sites 1, 2 and 12) (**Figure 9**). The high number of diurnal bird species recorded in the 2011 censuses and the subsequent decrease in species diversity at majority of the sites in 2012 is most likely a result of a reduction in available resources. Resource availability would have been comparatively abundant in the wetter conditions experienced in 2011 (281.2 mm rain) compared to the unusually dry season of 2012 (141.6 mm rain). The remaining two sites, Condition Class 1 Site 6 and Condition Class 2 Site 7, displayed an increase in species diversity from 2011 to 2012. Both of these sites also increased in native plant species diversity and/or native cover over the same period.

Aside from the bird species recorded during the formal bird censuses, the 2012 survey recorded six additional diurnal bird species to those recorded in the 2010 survey and/or the 2011 survey (recorded opportunistically). Three of these species are also new species for the Werris Creek mine site; the remaining three species have previously been recorded for the Werris Creek mine site (**Appendix E**).

Table 15: Sites surveyed for bird species in 2010, 2011 and 2012

Biometric Vegetation Type	Condition Class (Site No.)	Surveyed in 2010	Surveyed in 2011	Surveyed in 2012
White Box grassy woodland	4 (3)	Yes	Yes	Yes
	4 (11)	Yes	Yes	Yes
	3 (1)	Yes	Yes	Yes
	3 (2)	Yes	Yes	Yes
	3 (4)	Yes	Yes	No
	3 (8)	No	No	Yes
	3 (12)	Yes	Yes	Yes
	2 (7)	Yes	Yes	Yes
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	Yes	Yes	Yes
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	No	No	Yes
Cleared land (Mine Rehab Site)	1 (6)	Yes	Yes	Yes
Cleared land (formerly cultivated land)	1 (9)	Yes	Yes	Yes

Habitat use (Guilds)

For consideration of habitat usage, avifauna were separated into the following guilds identified within the BOA:

- Canopy dwellers
- Waterbirds
- Birds of Prey
- Ground foragers
- Generalists

Current Survey (2012) – Sites 1-3 and 5-25

The prevalence of these guilds measured in terms of number of species is presented in **Figure 10**. Note that **Figure 10** presents data for all species recorded at monitoring sites during the formal diurnal and nocturnal surveys, i.e. it excludes incidental sightings (**Appendix E** and **Appendix F**).

All guilds were represented within the BOA in the current survey. Generalists were the most common species across the BOA, with all sites except Condition Class 1 Site 14 being dominated by species within this guild. At sites 22 (Condition Class 4), 1, 2, 8, 12, 19, 20, 21 (Condition Class 3), 7, 16 (Condition Class 2), 6, 9 and 15 (Condition Class 1) ground foragers recorded the second highest species diversity. All of these sites had highly suitable habitat for ground foragers, with either no overstorey, minimal overstorey or a relatively sparse overstorey. Sites 8, 23 (Condition Class 3) and 9 (Condition Class 1) were the only sites to record species from all five guilds (**Figure 10)**.

Comparison between years (2010, 2011 and 2012) – Sites 1 – 12 (excluding sites 4, 8 and 11)

All guilds were represented within the BOA in all survey periods (2010, 2011 and 2012). However, the range of guilds represented at five of nine sites surveyed in all three years (**Table 13**) (1, 2, 3, 5 and 11) decreased by 1 to 3 between 2011 and 2012. Sites 6, 7, 9 and 12 either remained the same or increased by 1. This is in contrast to the 2011 monitoring year compared to the 2010 monitoring year, where a larger range of birds representative of different guilds were recorded at all monitoring sites, except for Site 7 (**Figure 10)**.

The overall decrease in species representative of different guilds in 2012 compared to 2011 is most likely attributed to a reduction in available resources from the wetter conditions experienced in 2011 to the drier conditions of 2012. However, in some cases, the presence of birds within monitoring plots may have reflected species flying over monitoring plots rather than using the plots. Such species would include waterbirds and canopy dwellers.

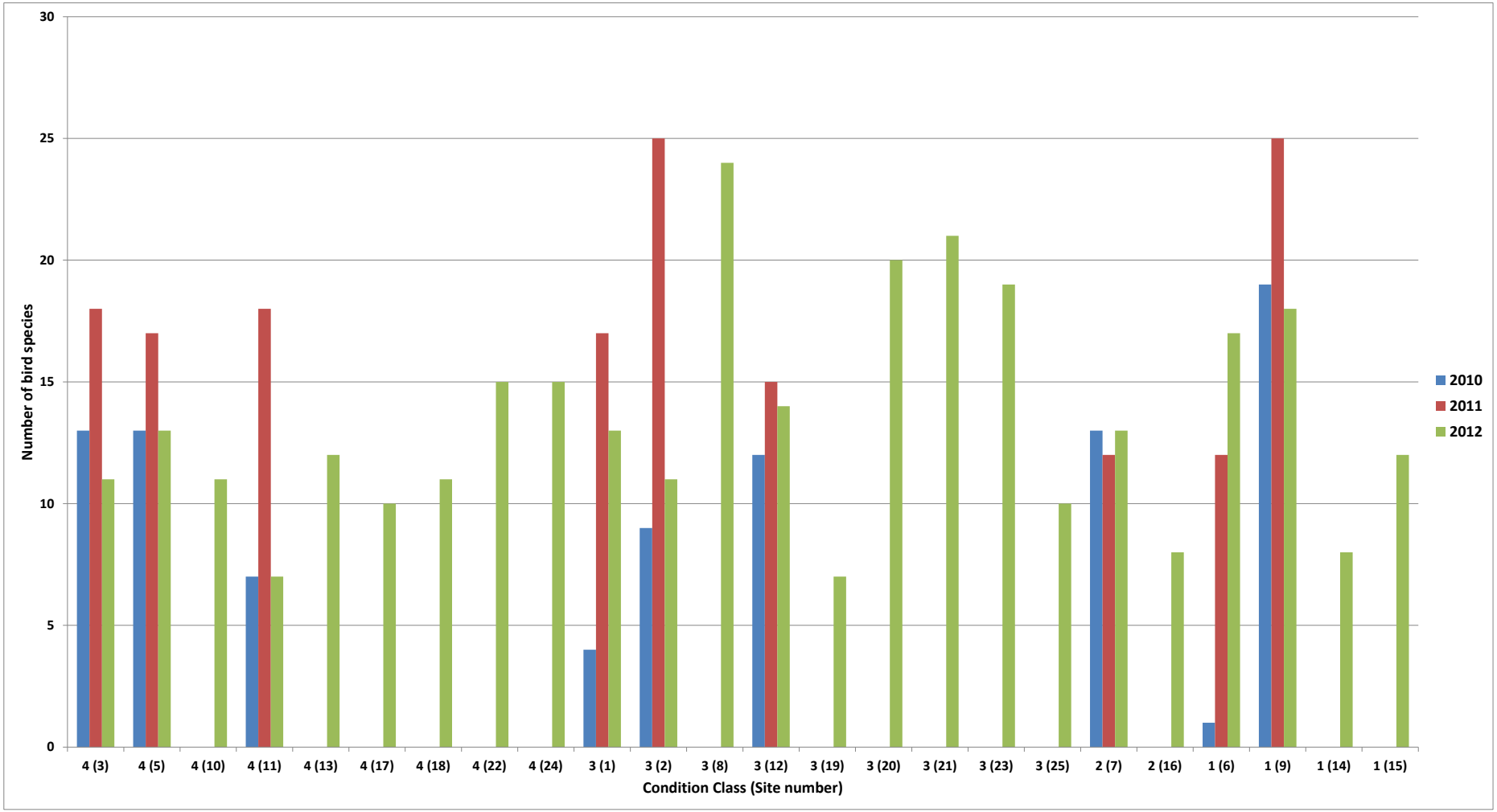

Figure 9: Number of bird species recorded during the formal diurnal bird census at each site during the 2010, 2011 and 2012 monitoring periods

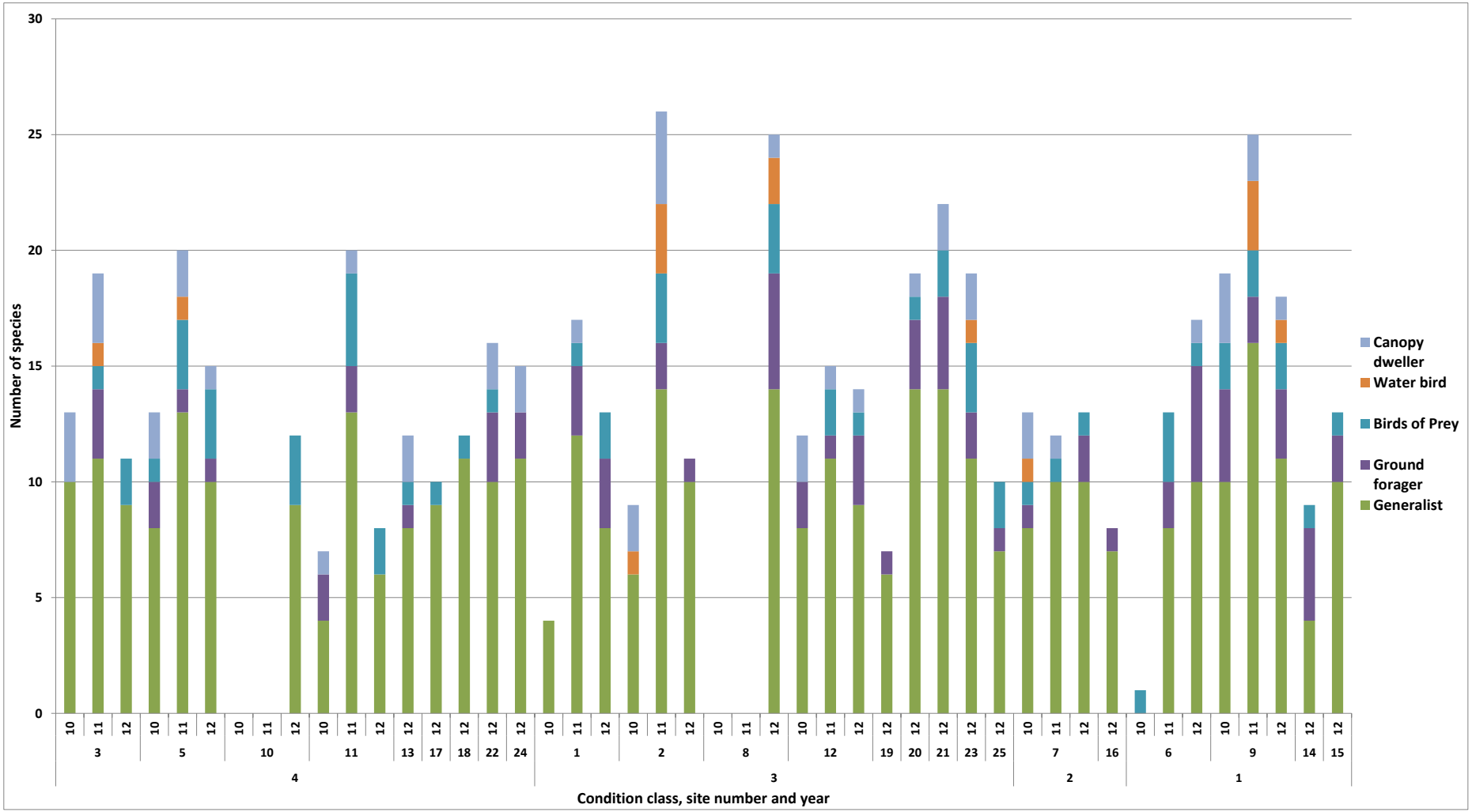

Figure 10: Abundance of species from selected bird guilds of the BOA during the 2010, 2011 and 2012 monitoring periods (data in 2011 and 2012 shows bird species recorded during both the diurnal and nocturnal formal bird censuses only)

3.3.3 Spotlighting and nocturnal call playback

Current Survey (2012) – Sites 1-3 and 5-25

Spotlighting and call playback surveys recorded *Tyto alba* (Barn Owl) at sites 5, 10/11 (sites 10 and 11 were treated as one site), 14, as well as at Site 15. A rodent was observed in the claws of the Barn Owl at Site 5. *Ninox novaeseelandiae* (Southern Boobook) was recorded at Site 8. A *Podargus strigoides* (Tawny Frogmouth) was recorded at sites 5 and 18. *Aegotheles cristatus* (Australian Owlet Nightjar) was recorded at Site 22 and Site 15 (**Appendix F**).

Mammals recorded during spotlighting surveys were *Bos taurus** (Cow) (Site 12), *Lepus capensis* * (Brown Hare) (sites 2, 56, 16 23, and 25), *Macropus giganteus* (Eastern Grey Kangaroo) (sites 1, 2, 17, 18, 19, 22, 23, 24 and 25), *Macropus robustus* (Wallaroo) (2, 18, 19, 20, 22, 23, 24). A *Phascolarctos cinereus* (Koala) and a *Trichosurus vulpecula* (Common Brush Tail Possum) were both spotlighted a Site 18 and a Common Brush Tail Possum was also recorded at Site 17. The Koala is listed as vulnerable under the TSC Act and the EPBC Act and has not been recorded on the Werris Creek site previously (**Appendix C**).

Call playback undertaken for the nocturnal birds, *Ninox connivens* (Barking Owl), *Tyto tenebricosa* (Sooty Owl), *Tyto novaehollandiae* (Masked Owl), *Ninox strenua* (Powerful Owl), along with the Koala, did not elicit any responses for these species. Southern Boobook responded to the calls of Masked Owl at Site 8 and a Barn Owl responded to the calls of the Masked Owl at Site 15.

Opportunistic records of mammals were made during the survey period. Mammals observed in the BOA were *Macropus rufogriseus* (Red Necked Wallaby) and *Vulpes vulpes** (Fox). A *Tachyglossus aculeatus* (Short-beak Echidna) was also sighted.

Comparison between years (2010, 2011 and 2012) – Sites 1 – 12 (excluding sites 4, 8 and 11)

In 2010, spotlighting and call playback surveys only recorded two species across the BOA, Eastern Grey Kangaroo and the Wallaroo. In 2011, spotlighting and call playback surveys recorded a Barn Owl at (Condition Class 4 sites: Sites 3, 5 and 10/11), and a Southern Boobook was recorded at Sites 10/11 through call playback. Spotlighting also recorded a White-striped Freetail Bat, which was recorded at all sites surveyed, while European Red Fox was recorded at Sites 3 and 5.

3.3.4 Herpetofauna surveys

Frog and reptile species were recorded during both the diurnal hereptofauna survey as well as during the spotlighting survey. Most of the frogs were recorded during the spotlighting survey, while most of reptiles were recorded during the diurnal hereptofauna survey (see **Appendix G**).

Current Survey (2012) – Sites 1-3 and 5-25

A total of 18 herpetofauna were recorded in 2012, including six amphibians and 12 reptiles. Condition Class 4 Site 18 recorded the highest number of herpetofauna (7 species), followed by Dam 1, Condition Class 3 Site 2 and Condition Class 4 Site 13 (6 species). Condition Class 4 Site 17 and Condition Class 3 Site 25 recorded no species in the 2012 survey.

A total of eight reptile species were recorded in 2012 that were not recorded in 2010 or in 2011. Additional species included *Acritoscincus platynotum* (Red-throated Skink), *Liopholis whitii* (White's Skink), *Oedura robusta* (Robust Velvet Gecko), *Gehyra variegata* (Common Dtella) and *Tiliqua scincoides scincoides* (Eastern Blue-tongued Lizard). The Red-throated Skink, Robust Velvet Gecko, Blue Tongued Lizard and the White's Skink were all recorded at the new monitoring sites (sites 21, 19,

19 and (22 and 24), respectively), and the Red-throated Skink, Blue Tongued Lizard and the White's Skink not been recorded on the Werris Creek site in previous surveys (**Appendix C**; **Appendix G**).

One amphibian species recorded in 2012, *Litoria rubella* (Desert Tree Frog), had not been recorded in 2010 or in 2011. It was recorded at sites 10, 13, 18, 2, 12, 6 and Dam 1.

Comparison between years (2010, 2011 and 2012) – Sites 1 – 12 (excluding sites 4, 8 and 11)

Eleven reptile and six amphibian species were recorded in the 2012 survey. This is an increase from eight reptile and five amphibian species recorded during the spring 2011 monitoring period and the four reptile and one amphibian species recorded during the spring 2010 monitoring period (**Figure 11**). Five species recorded in 2011 were not recorded in 2012 and four species recorded in 2010 were not recorded in 2012. *Gehyra variegata* (Common Dtella), Desert Tree Frog, *Litoria latopalmata* (Broad-palmed Frog) and *Pseudophryne bibronii* (Bibron's Toadlet) were not recorded in the 2010 or the 2011 survey. Of these, Broad-palmed Frog and Bibron's toadlet have not been recorded on the BOA previously (**Appendix C**). These were both recorded nearby to Dam 1, and the Broad-palmed Frog was also recorded at Site 9.

Of the nine sites and three dams surveyed in 2012, six sites (1, 2, 6, 7, 9, and 12) and 1 dam (Dam 1) increased in the number of herpetofauna species from 2011 to 2012, one site and two dams (5, dams 2 and 3) decreased, and two sites (3 and 11) remained the same. Higher numbers of herpetofauna were recorded in the 2011 survey compared to the 2010 survey, except for Dam 1 where two species were recorded in 2011 and four species were recorded in 2010 (**Figure 11**). Patterns of species diversity between sites were different between years (**Figure 11**). Details of the numbers of individuals of species recorded for each monitoring site are provided in **Appendix G**.

Reptiles can be difficult to detect during survey. As such, the differences in species recorded during the 2010, 2011 and 2012 surveys may not reflect changes in the reptile assemblage at the monitoring plots.

Table 16: Sites surveyed for herpetofauna in 2012, 2011 and 2012

Biometric Vegetation Type	Condition Class (Site No.)	Surveyed in 2010	Surveyed in 2011	Surveyed in 2012
White Box grassy woodland	4 (3)	Yes	Yes	Yes
	4 (11)	Yes	Yes	Yes
	3 (1)	Yes	Yes	Yes
	3 (2)	Yes	Yes	Yes
	3 (4)	Yes	Yes	No
	3 (8)	No	No	Yes
	3 (12)	Yes	Yes	Yes
	2 (7)	Yes	Yes	Yes
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	Yes	Yes	Yes
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	No	No	Yes
Cleared land (Mine Rehab Site)	1 (6)	Yes	Yes	Yes
Cleared land (formerly cultivated land)	1 (9)	Yes	Yes	Yes
Dams	Dam 1	Yes	Yes	Yes
	Dam 2	Yes	Yes	Yes

	Dam 3	Yes	Yes	Yes

Table 17: Herpetofauna recorded at sites 1 to 25 during the 2010, 2011 and 2012 monitoring periods

Class	Family	Species	Common Name	Present in the BOA		
				2010	2011	2012
AMPHIBIA	Myobatrachidae	*Crinia signifera*	Common Eastern Froglet		x	
	Myobatrachidae	*Limnodynastes tasmaniensis*	Spotted Marsh Frog		x	x
	Hylidae	*Litoria caerulea*	Green Tree Frog		x	x
	Hylidae	*Litoria latopalmata*^	Broad-palmed Frog			x
	Hylidae	*Litoria peronii*	Peron's Tree Frog		x	x
	Hylidae	*Litoria rubella*	Desert Tree Frog			x
	Myobatrachidae	*Neobatrachus sudelli*	Painted Burrowing Frog	x		
	Myobatrachidae	*Pseudophryne bibronii*^	Bibron's toadlet			x
	Myobatrachidae	*Uperoleia laevigata*	Smooth Toadlet		?	
REPTILIA	Scincidae		Unidentified worm skink			x
	Scincidae	*Acritoscincus platynotum*^	Red-throated Skink			x
	Scincidae	*Anomalopus leuckartii*	Two-clawed Worm-skink		x	
	Cheluidae	*Chelodina longicolli*	Eastern Snake-necked Turtle		x	x
	Scincidae	*Cryptoblepharus pulcher*	Elegant Snake-eyed Skink	x		x
	Scincidae	*Cryptoblepharus virgatus*	Wall Lizard		x	
	Scincidae	*Ctenotus* sp. ^				x
	Scincidae	*Egernia sp.* ^				x
	Scincidae	*Egernia striolata*	Tree skink		x	x
	Gekkonidae	*Gehyra variegata*	Common Dtella			x
	Scincidae	*Lampropholis delicata*	Garden Sunskink		x	x
	Scincidae	*Lampropholis guichenoti*	Pale-flecked / Grass Garden Sunskink	x		
	Scincidae	*Liopholis whitii*^	White's Skink			x
	Scincidae	*Menetia greyii*	Dwarf Skink	x		
	Scincidae	*Morethia boulengeri*	Boulenger's Morethia		?	
	Gekkonidae	*Oedura robusta*	Robust Velvet Gecko			x
	Agamidae	*Pogona barbata*	Eastern Bearded Dragon		x	
	Elapidae	*Pseudonaja textilis*	Eastern Brown Snake	x		
	Scincidae	*Tiliqua scincoides scincoides*^	Eastern Blue-tongued Lizard			x

	Scincidae	Unknown Reptile eggshells			x	

^ New species for the Werris Creek Mine Site

Bold text denotes a threatened species

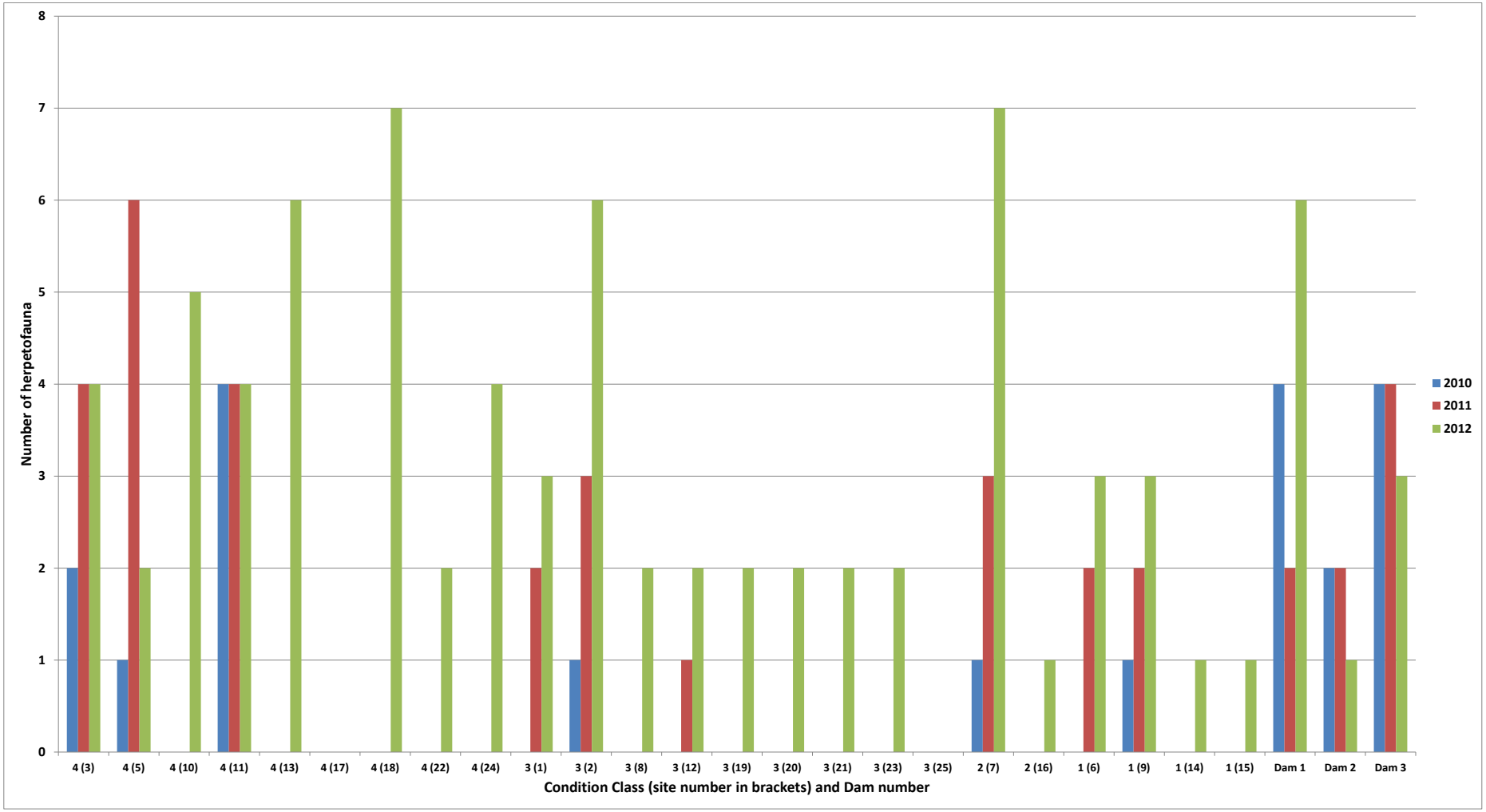

Figure 11: Number of herpetofauna recorded at fauna monitoring sites during the 2010, 2011 and 2012 monitoring periods

3.3.5 Comparisons of fauna communities

Two MDS 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 12**) and one with all sites monitored in all three monitoring years, including the 12 sites added in 2012 and sites 8 and 10 (**Figure 13**). The MDS plots included all bird, amphibian and reptile data for all sites surveyed in 2010, 2011 and 2012. Condition Class 4 Site 11 was monitored in all three years but was excluded from the analysis because the Anabat detector malfunctioned in 2012. Likewise, Condition Class 3 sites 21 and 23 were monitored in 2012 only, but were also excluded from the analysis because the Anabat detectors malfunctioned.

Condition Classes

In general, the clustering of sample points into year groups in the MDS plots suggest that the faunal communities (and Condition Classes) changed with each year of the survey (**Figure 12)**. It also suggests that Condition Class 4 sites had a much different community to all other sites in 2010 than they did in 2011 and 2012 (**Figure 13**). For sites 1, 2, 3, 5, 6, 7, 9 and 12, monitored in 2010, 2011 and 2012 (**Figure 12**):

- Condition Class 1 sites (sites 6 and 9) increased from 42% similarity to Condition Class 4 sites in 2010 to 58% in 2011 and to 63% in 2012
- Condition Class 2 sites (Site 7) increased from 49% similarity to Condition Class 4 sites in 2010 to 70% in 2011 and to to 74% in 2012
- Condition Class 3 sites (sites 1, 2 and 12) increased from 44% similarity to Condition Class 4 sites in 2010 to 64% in 2011, and declined slightly to 53% in 2012

The MDS plot for the eight sites monitored in 2010, 2011 and 2012 indicates that faunal communities are becoming more similar to each other through time (**Figure 12**), though further monitoring will increase the rigour of this trend. These sites displayed a similarity of 52% in the species present in 2010, 61% in 2011 and 58% in 2012 (**Table 18; Figure 12**). Species that contributed most to the similarity between sites, i.e. those that were recorded the most frequently at sites between years, are listed in **Table 18**. These species were mostly birds that are generalist foragers and microbats that forage above and below the canopy (**Table 18**).

Of all sites surveyed in 2012 alone (excluding sites 4, 11, 21 and 23), Condition Class 2 sites were the most similar to Condition Class 4 sites (3, 5, 10, 13, 17, 18, 22 and 24):

- Condition Class 1 sites (sites 6, 9, 14 and 15) showed 53% similiarity to Condition Class 4 sites
- Condition Class 2 sites (sites 7 and 16) showed 63% similarity to Condition Class 4 sites
- Condition Class 3 sites (sites 1, 2, 8, 12, 19, 20 and 25) showed 55% similarity to Condition Class 4 sites

Condition Class 1 Sites

- Condition Class 1 sites 6 and 9 have progressed towards each other and Condition Class 4 sites through time from 2010 to 2012, indicating that the number of fauna species recorded has increased and that species present are more similar to Condition Class 4 sites over time.
- In 2012, Condition Class 1 Site 15 is in close proximity to Condition Class 4 sites 3, 13 and 17, indicating that Site 15 has a similar fauna community to these sites. Site 15 showed an average similarity of 67% with these sites (**Figure 12**; **Figure 13**).
- In 2012, Condition Class 1 Site 14 had a low species diversity. This site was recently rehabilitated and is yet to reach a faunal assemblage similar to that of Condition Class 4 sites (**Figure 13**).

Condition Class 2 Sites

- Condition Class 2 Site 7 had a similar faunal community to Condition Class 3 Sites 1 and 12 in 2010, Condition Class 4 Site 3 in 2011 and Condition Clas 4 Site 5 in 2012. Species composition of this site has remained relatively similar (62%) over the three years of surveys (**Figure 12**).
- In 2012, Condition Class 2 Site 16 had similar species to Condition Class 4 sites 17, 22 and 24 in 2012 (an average of 68.1% similarity) (**Figure 13**).

Condition Class 3 Sites

- Condition Class 3 sites 1, 2 and 12 remained relatively similar between 2010 and 2011 (58% in 2010 and 60% in 2011), but were comparatively dissimilar in 2012 (52%). In 2012, sites 2 and 12 were the two sites least similar to the remaining sites in species composition, with both points being plotted away from the centre of MDS space. Site 2 had a comparatively high number of amphibians, while Site 12 had no reptiles. However, Site 2 had a species composition similar to Condtion Class 4 Site 18 in 2012 (57% similarity), with 15 species in common (including 2 amphibians, 6 birds, 5 bats and 2 reptiles) (**Figure 12**; **Figure 13**).
- In 2012, Condition Class sites 8, 20 and 25 displayed similarities with Condition Class 4 sites, with all three sites beng in close proximity to one or more Condtion Class 4 sites (**Figure 13**).
- In 2012, the derived native grassland Condition Class 3 Site 19 had a low species diversity, and this is reflected in the MDS plot, with the point being plotted away from the centre of MDS space (**Figure 13**).

Condition Class 4 Sites

- Condition Class 4 sites 3 and 5 have remained stable over 2010, 2011 and 2012, with similarities of 73%, 67% and 65% in each year, respectively (**Figure 12**; **Figure 13**).
- In 2012, Condition Class 4 sites 3, 5, 10, 13, 17, 18, 22 and 24 were relatively similar in 2012, with all points in the MDS plot being plotted in close proximity to one another. Similarity between these sites in 2012 was 62 % (**Figure 13**).

Summary

Aside from the sites 11, 12, 14, 19, 21 and 23, the MDS plots suggest that fauna species, particularly generalist species, have started to use sites they were less likely to use in 2010. The slight decrease in similarity between Condition Class 1, 2 and 3 sites with Condition Class 4 sites from 2011 to 2012 is partly attributed to the increase in the number of sites in surveyed. In 2012, three additional vegetation communities were included in the survey. A further explanation may be changes to the community in response to reduced resource availability following drier conditions of 2012, and an associated reduction in the spread of fauna species across the BOA.

Table 18: Species that contributed the most to the average similarity between sites 1, 2, 3, 5, 6, 7 and 9 in each monitoring year (2010, 2011, 2012)

Class	Species	Common Name	Foraging Guild	2010 (%) (excluding site 11)	2011 (%) (excluding site 11)	2012 (%) (excluding sites 8, 10, 11)
Aves	*Eolophus roseicapillus*	Galah	Generalist	12.62	6.16	-
	Grallina cyanoleuca	Magpie-lark	Ground forager	6.84	-	-
	Gymnorhina tibicen	Australian Magpie	Generalist	-	6.16	6.72
	Manorina melanocephala	Noisy Miner	Generalist	7.96	-	5.08
	Pardalotus striatus	Striated Pardalote	Canopy dweller	12.62	-	-
	Platycercus adscitus eximius	Eastern Rosella	Generalist	-	-	6.72
	Sturnus vulgaris *	European Starling*	Generalist	12.62	4.57	-
Mammalia	*Chalinolobus gouldii*	Gould's Wattled Bat	Canopy/below canopy	-	6.16	5.08
	Chalinolobus morio	Chocolate Wattled Bat	Canopy/below canopy	-	6.16	-
	Miniopterus schreibersii oceanensis	**Eastern Bentwing Bat**	**Canopy/below canopy**	-	6.16	-
	Mormopterus species 4	Southern Freetail Bat	Above canopy	-	-	6.72
	Vespadelus vulturnus	Little Forest Bat	Canopy/below canopy	-	6.16	-
			Average similarity between sites per year	**52.15%**	**60.64**	**58.04**

***** Denotes an exotic species

Bold text denotes a threatened species

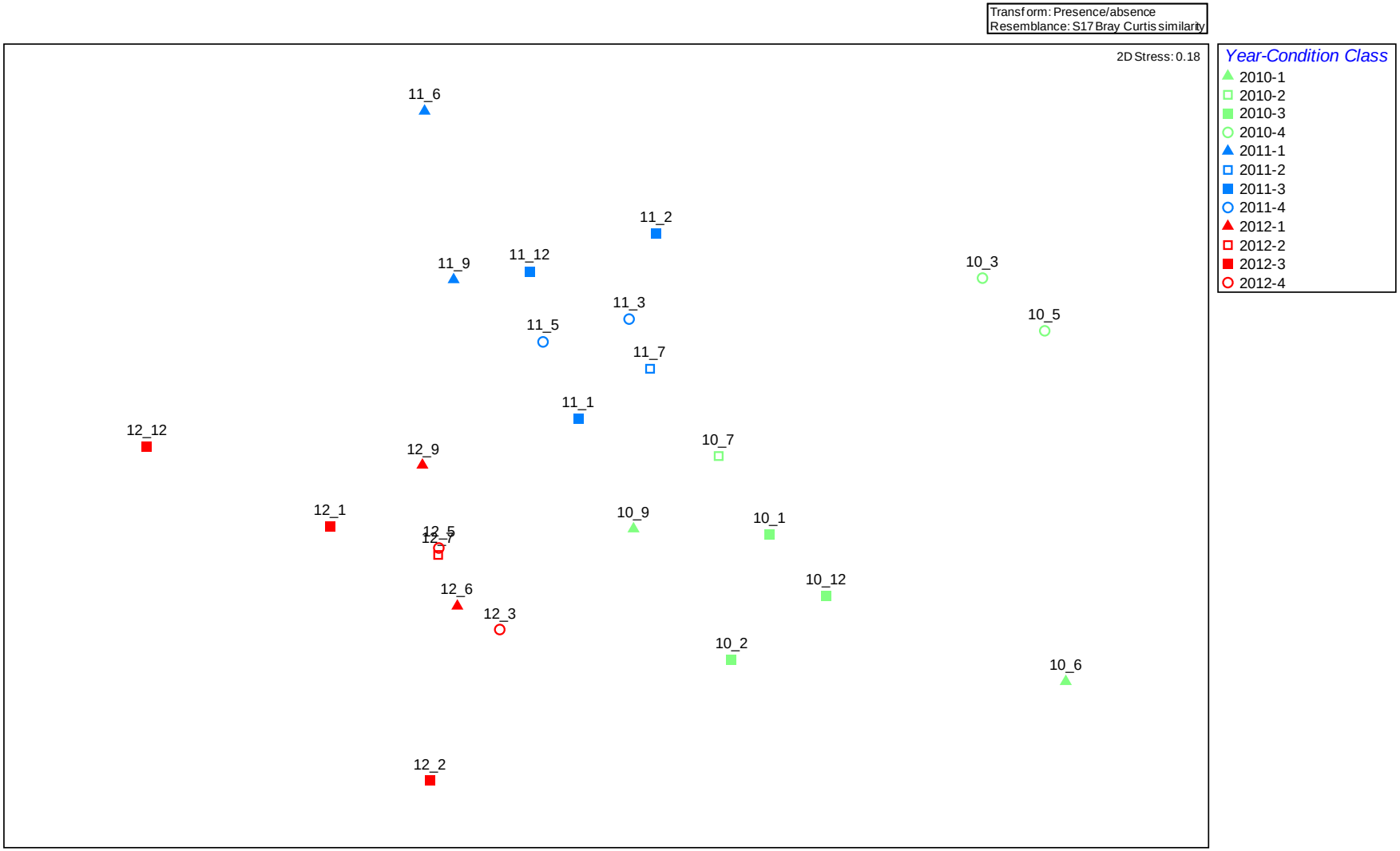

Figure 12: MDS plot of sites 1, 2, 3, 5, 6, 7, 9 and 12, monitored in 2010, 2011 and 2012. The first two digits of the plot labels denote the year of survey, while the last digit indicates site number. Shapes are coloured by year, with different shapes for each of the vegetation classes (see legend).

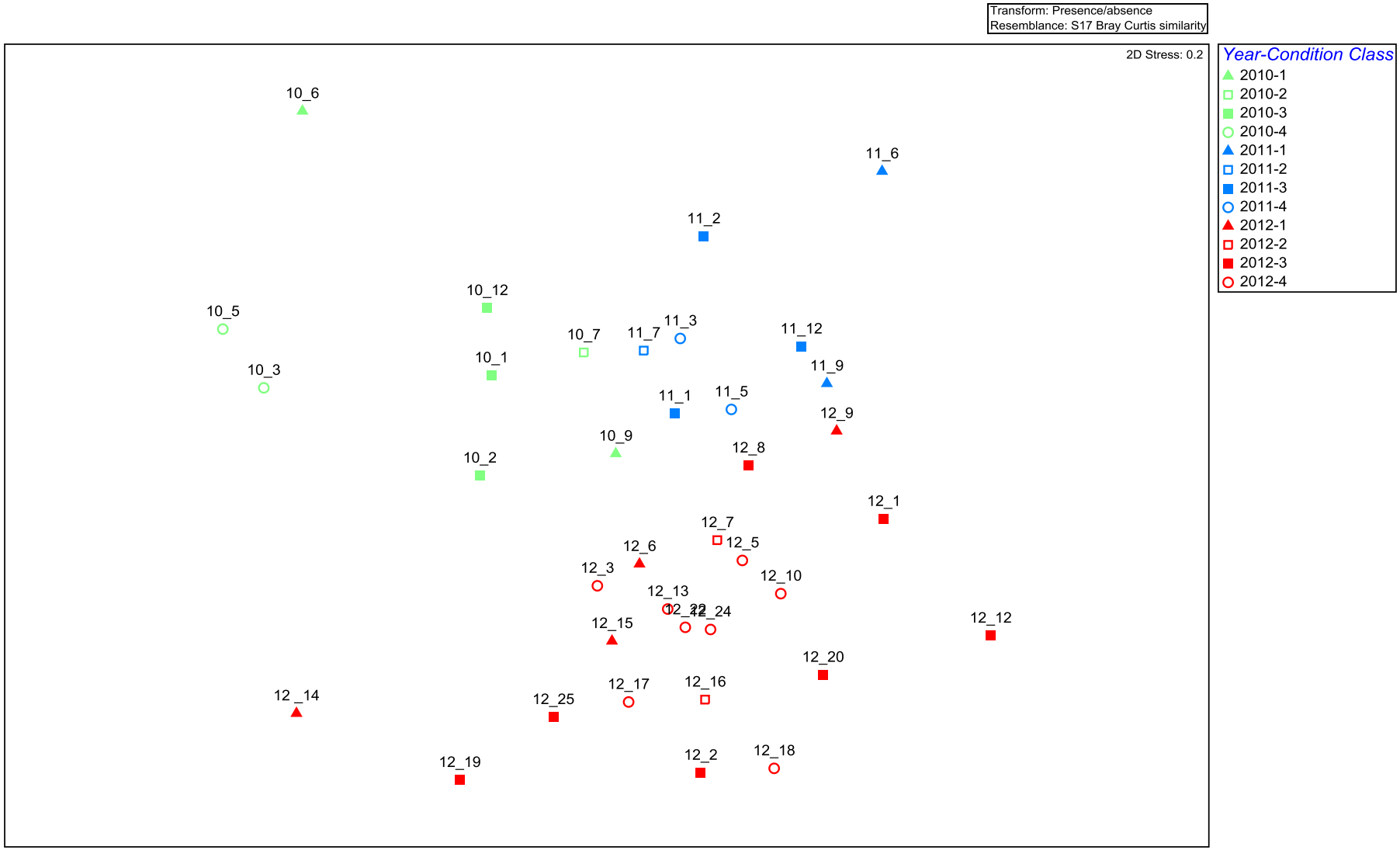

Figure 13: MDS plot of sites 1, 2, 3, 5, 6, 7, 9 and 12, monitored in 2010 and 2011 and all sites monitored in 2012 (excluding sites 11, 21 and 23). The first two digits of the plot labels denote the year of survey, while the last digit indicates site number. Shapes are coloured by year, with different shapes for each of the vegetation classes (see legend).

4 Conclusion and Recommendations

This report has presented the baseline conditions for monitoring sites 13 to 24, established during the spring 2012 monitoring period. It has also provided the data for the third monitoring period (2012) of sites 1 to 12 (excluding Site 4) and compared this data with previous monitoring events.

4.1 FLORISTIC MONITORING

Comparison of the data collected in the 2010, 2011 and 2012 monitoring periods indicated that native and exotic flora species composition has varied over the years. The unusually dry weather conditions in the lead up to the 2012 survey and the wetter conditions in the lead up to the 2011 survey, evidentially impacted on the number and composition of exotic and native plant species recorded (141.6 mm in 2012 and 281.2 mm in 2011). Exotic species diversity decreased across the BOA by approximately 20 species from 2011 to 2012, and while the total number of native species recorded did not vary from 2011 to 2012, native species diversity did decrease at six of the eleven sites monitored from 2011 to 2012. This included the two sites that had reached performance criteria for species richness for White Box grassy woodlands in 2011 that did not reach the criteria in 2012.

Species diversity will fluctuate in response to seasonal variation through the years, although it is expected that species composition will be better understood when viewed as a long term average over the life of the mine and compared with the analogue sites and performance criteria for the respective vegetation types.

4.2 BIOMETRIC MONITORING

In terms of biometric attributes that were recorded, the results from the 2012 monitoring period suggested that groundcover composition has improved since 2010 (**Table 1**). Although the majority of monitoring sites exceeded the performance criteria for native understorey cover (16 of 24 sites), exotic groundcover has consistently decreased from 2010 through to 2012 at all but two monitoring plots. Native grass cover has increased over the same period at eight of the eleven sites. As such, only three sites remained dominated by exotic vegetation in 2012. Along with seasonal variation between the years, management actions undertaken in 2010, 2011 and 2012 are expected to have contributed to these results. In 2011/2012 these included, a reduction in grazing across the BOA, as well as weed spraying of the Eurunderee property and rehabilitation areas, slashing of groundcovers in the area of Narawolga/Mine site and tubestock planting in areas across the BOA.

A native midstorey was only recorded at three sites; however, 21 of 24 sites met the performance critera for native midstorey (**Table 1**). All but one of these sites occurred within vegetation types that exist with a native midstorey cover between 0 and 5%, including 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. Similarly, at 10 of 11 sites that recorded a native overstorey, 10 met the performance criteria for the respective vegetation communities (**Table 1**).

4.3 LFA MONITORING

LFA monitoring was completed at four sites, two rehabilitation sites and two analogue sites, for the purposes of monitoring soil surface condition on the rehabilitation area and comparing this to a near

pristine example. In terms of comparison between rehabilitation sites and analogue sites in 2012, as expected both the analogue sites performed better that than the rehabilitation sites, with Site 11 (analogue) having 47% higher proportion of patches than Site 6 (rehab) and site 17 (analogue) having 45% higher proportion of patches than site 14 (rehab).

In terms of trends from previous monitoring, only sites 6 and 11 have been monitored in previous years, with results indicating that the rehabilitation site (Site 6) has decreased in the proportion of patches by over 50% since 2010. Site 11 (analogue) has also decreased in the proportion of patches by 12% since 2010. This suggests that ground cover and the associated stabaility of these sites is decreasing over time. This may be due to environmental or climatic conditions, with the spring of 2012 being somewhat dryer than previous years. However, one explanation for the marked drop in Site 6 is possibly the scensence of the cover crop initially established to stabilise the soil within the rehabilitation area. Cover crop scenesence is expected in the process of rehabilitation, and may be emphasized in a dry period. Improving the cover of perennial native ground cover species will be important to secure soil and promote the success of the rehab and, whilst biometric understorey cover scores do indicate an increase in native cover from previous years, the drop in the proportion of patches in 2012 may be representative of the lag time between cover crop senescence and native ground cover establishment.

In terms of the Soil Surface Assessment, not much can be said by way of trends for sites 14 and 17, which were sampled for the first time in 2012. However, rehabilitation Site 6 appears to be trending downwards in stability. This downward trend for infiltration and nutrient cycling is also consistent in analogue Site 11, though stability seems to be improving at this analogue site. It is difficult to say exactly what is driving this change, and longer term monitoring will provide greater clarity, though climatic/environmental (ie a dry 2012 spring) may provide some explanation along with the scenesence of the cover crop on the rehab site.

4.4 FAUNA MONITORING

The MDS plots indicate that fauna species, particularly generalist foragers, are increasingly utilising greater areas across the BOA, with fauna species assemblage (microbats, birds and amphibians) displaying more similarity in 2011 and 2012 compared to 2010. The recently rehabilitated Condition Class 1 Site 14 and Condition Class 3 sites 12 and 19 are yet to reach a faunal assemblage similar to that of Condition Class 4 sites. The overall site performance for sites 12 and 14 were low and at Site 19 it was moderate (**Table 1**).

There was a decrease in bird species diversity from 2011 to 2012. Species diversity peaked in 2011 and was generally slightly higher in 2012 compared to 2010. The reduction in species diversity from 2011 to 2012 may be due to a reduction in resource availability associated with the drier conditions of 2012.

However, microbats and herpetofauna both displayed a general increase in species from 2010 through to 2012. In the 2012 survey alone, six of nine sites and one of three dams surveyed increased in the number of herpetofauna species recorded from 2011 to 2012. Similarly, the number of microbat species increased at all sites surveyed in 2011 and 2012, except for one site that decreased by 1 (although the number of microbat calls decreased at half of the sites and increased in the other half). The increase in microbat and herpetofauna species diversity from 2010 through to 2012 suggests that habitat suitability is increasing for native fauna species across the BOA, as suggested by the MDS plot. The continued removal of cattle across the BOA is also likely to have encouraged fauna movement into areas not previously unoccupied.

4.5 RECOMMENDATIONS

This monitoring report makes the following recommendations for the BOA monitoring:

- Future monitoring planning is to include a review of the final BOMP to ensure that data is collected and compared against final performance criteria. This includes:
  - Fauna species abundance measures and an indication of proximity of observations from monitoring sites
  - Identifying key fauna species, indicative of site condition/improvement, and/or improving data analysis to allow comparisons between analogue sites and rehabilitation and DNG sites. It may include measures of vertebrate pest and native herbivore measures
  - Recording additional information on exotic flora species presence and distribution

- Introduction of nest boxes into appropriate habitat should be considered to encourage microbats and native avifauna (as per the 2010 report (ELA 2010))
- Statistical analysis of data every five years. The comparative method used in this report is considered appropriate for determining changes on an annual basis. However, comprehensive statistical analysis should be conducted every five years to more comprehensively determine changes (to both single and multiple variables) over time (as per the previous monitoring report (ELA 2011b))
- The continued removal of internal fences to encourage fauna movement between areas

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Appendix A: Photo Monitoring Points, Spring 2012

See disc supplied with report

Appendix B: Biometric Condition Assessment and Flora Inventory, 2010, 2011 and 2012

Summary of Biometric Condition Assessment variables

	Class (Site Number)	Native Overstorey (%)			Native Midstorey (%)			Native Shrubs (%)			Native Grasses (%)			Native Herbs (%)			Exotic Plant Cover (%)			Native Species (No.)			Exotic Species (No.)			Exotic Perennials (No.)			Exotic Annuals (No.)			Hollow Bearing Trees (HBTs) (No.)			Overstorey Regeneration (%)			Coarse woody Debris (CWD) (m)		
		10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10 (no. of species)	11	12	10	11	12
Sites 1-12 (Excluding Site 4)	4 (3)	5	12.5	17.5	0	0	0	0	2	2	16	86	86	16	2	10	70	22	4	8	29	15	25	23	13	2	10	3	23	13	10	0	0	2	0	100	100	0	26	22
	4 (5)	5	12	15	0	0	0	0	0	0	10	46	72	40	32	2	78	32	30	9	18	17	14	19	12	2	5	5	12	14	7	3	1	2	2	100	100	43	43	19
	4 (11)	26	24.5	10	0	0	0	0	0	0	6	76	72	34	4	8	80	40	6	19	24	19	19	16	10	2	4	2	17	12	8	0	1	1	1	50	100	142	52	54
	4 (10)	0	0	0	0	0	0	0	0	0	0	36	76	36	44	20	88	70	30	7	12	14	19	19	12	3	7	2	16	12	10	0	0	1	0	100	100	0	0	0
	3 (1)	0	0	0	0	0	0	0	0	0	0	44	36	4	2	0	90	72	70	6	8	9	11	25	15	2	9	5	9	16	10	0	0	0	0	0	100	0	0	0
	3 (2)	0	0	0.5	0	0	0	0	0	0	12	50	72	20	8	2	88	36	28	10	12	9	20	25	12	3	7	3	17	18	9	0	0	1	0	50	100	0	2	0
	3 (8)	0	0	0	0	0	0	0	0	0	0	62	68	4	2	4	94	50	46	2	14	9	9	23	9	1	8	3	8	15	6	0	0	0	0	0	100	0	0	18
	3 (12)	0	0	0	0	0	0	0	0	0	17	80	46	16	0	8	76	67	82	5	13	10	15	17	16	2	3	6	13	14	10	0	0	0	0	0	100	0	0	0
	2 (7)	0	0	1.7	0	0	0	0	0	0	8	18	26	12	0	0	88	84	26	10	10	14	11	14	12	2	5	4	9	9	8	2	0	0	2	100	100	18	16	48.5
	1 (6)	0	0	0	0	0	4	0	0	0	0	8	46	0	0	8	50	94	18	3	5	14	16	19	15	2	6	5	14	13	10	0	0	0	0	0	0	0	7	0
	1 (9)	0	0	0	0	0	0	0	0	0	8	16	34	0	4	0	94	40	64	5	5	5	20	16	12	6	6	7	14	10	5	0	0	0	0	50	100	0	0	28.5
New BOA Sites 12-25	4 (13)	-	-	8.5	-	-	0	-	-	0	-	-	48	-	-	10	-	-	8	-	-	23	-	-	6	-	-	2	-	-	4	-	-	2	-	-	0	-	-	19
	4 (17)	-	-	6	-	-	0	-	-	0	-	-	50	-	-	6	-	-	2	-	-	19	-	-	2	-	-	0	-	-	2	-	-	1	-	-	100	-	-	19
	4 (18)	-	-	22	-	-	0	-	-	2	-	-	86	-	-	4	-	-	0	-	-	22	-	-	1	-	-	0	-	-	0	-	-	4	-	-	0	-	-	41
	4 (22)	-	-	27.5	-	-	8.5	-	-	2	-	-	56	-	-	6	-	-	0	-	-	25	-	-	1	-	-	1	-	-	0	-	-	0	-	-	100	-	-	27.5
	4 (24)	-	-	19.5	-	-	1.5	-	-	4	-	-	72	-	-	4	-	-	0	-	-	19	-	-	1	-	-	1	-	-	0	-	-	0	-	-	100	-	-	49
	3a (19)	-	-	0	-	-	0	-	-	0	-	-	88	-	-	10	-	-	8	-	-	13	-	-	11	-	-	2	-	-	9	-	-	0	-	-	100	-	-	0
	3 (20)	-	-	0	-	-	0	-	-	0	-	-	46	-	-	6	-	-	70	-	-	6	-	-	9	-	-	3	-	-	6	-	-	0	-	-	100	-	-	0
	3a (21)	-	-	0	-	-	0	-	-	0	-	-	80	-	-	2	-	-	20	-	-	11	-	-	14	-	-	2	-	-	12	-	-	0	-	-	100	-	-	0
	3 (23)	-	-	0	-	-	0	-	-	0	-	-	86	-	-	6	-	-	6	-	-	13	-	-	7	-	-	1	-	-	6	-	-	0	-	-	100	-	-	0
	3 (25)	-	-	0	-	-	0	-	-	0	-	-	42	-	-	0	-	-	72	-	-	7	-	-	14	-	-	6	-	-	8	-	-	0	-	-	100	-	-	0
	2 (16)	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	8	-	-	3	-	-	10	-	-	0	-	-	10	-	-	1	-	-	0	-	-	0
	1 (14)	-	-	0	-	-	0	-	-	0	-	-	22	-	-	6	-	-	24	-	-	6	-	-	19	-	-	5	-	-	14	-	-	0	-	-	0	-	-	28
	1 (15)	-	-	0	-	-	0	-	-	0	-	-	0	-	-	2	-	-	12	-	-	2	-	-	9	-	-	2	-	-	7	-	-	0	-	-	100	-	-	0

Summary of plot data

Family	Scientific Name	Common name	Growth Form	Native / Exotic	Annual/ Perennial	Important Species	Condition Class and Site																								
							4									3								2		1				
							3	5	10	11	13	17	18	22	24	1	2	8	12	19	20	21	23	25	7	16	6	9	14	15
Fabaceae (Mimosoideae)	*Acacia implexa*	Hickory Wattle	Shrub	Native	Perennial									1																
Lamiaceae	*Ajuga australis*	Austral Bugle	Herb	Native	Perennial										1															
Amaranthaceae	*Alternanthera* sp. A		Grass	Native	Perennial							1																		
Apiaceae	*Ammi majus*	Bishop's Weed	Herb	Exotic	Annual				1										4							2		1	2	1
Boraginaceae	*Amsinckia* sp.		Herb	Exotic	Annual				1																					
Loranthaceae	*Amyema miquelii*	Box Mistletoe	Shrub	Native	Perennial									1																
Myrsinaceae	*Anagallis arvensis*	Scarlet Pimpernel	Herb	Exotic	A or P		1																							
Poaceae	*Aristida leptopoda*	White Speargrass	Grass	Native	Perennial			2																						
Poaceae	*Aristida ramosa var. speciosa*	Purple Wiregrass	Grass	Native	Perennial				3	2		3	3	3	3	3	4		3	4		3		3	2					
Rubiaceae	*Asperula conferta*	Common Woodruff	Herb	Native	Perennial			2																						
Rubiaceae	*Asperula cunninghamii*	Twining Woodruff	Herb	Native	Perennial		2					1																		
Poaceae	*Austrodanthonia bipartita*	Wallaby Grass	Grass	Native	Perennial					2																	3			
Poaceae	*Austrodanthonia* sp.	A Wallaby Grass	Grass	Native	Perennial		2	2				2								2				3			1			
Poaceae	*Austrostipa aristiglumis*	Plains Grass	Grass	Native	Perennial			3		4									3		1				3	1	3	4		
Poaceae	*Austrostipa ramosissima*	Stout Bamboo Grass	Grass	Native	Perennial					2																				
Poaceae	*Austrostipa scabra*	Speargrass	Grass	Native	Perennial		2		3	3	3	2	3	2	2								3		2					
Poaceae	*Avena* sp.	Oats	Grass	Exotic	Annual			1								2		3	3		2			2	2	2	3	3	2	3
Asteraceae	*Bidens subalternans*	Greater Beggar's Ticks	Herb	Exotic	Annual			1																	1				1	
Nyctaginaceae	*Boerhavia dominii*	Tarvine	Herb	Native	Perennial		2	2										2	1				1		2		1			
Poaceae	*Bothriochloa macra*	Red Grass	Grass	Native	Perennial		4	2	3	3	4	4	2			3	3	2	4	4	1	4	4	4	2		2			
Poaceae	*Bothriochloa* sp.	Redgrass, Bluegrass	Grass	Native	Perennial										2															
Sterculiaceae	*Brachychiton populneus*	Kurrajong	Tree	Native	Perennial									1	1															
Poaceae	*Briza minor*	Shivery Grass	Grass	Exotic	Annual																			1						
Poaceae	*Bromus catharticus*	Praire Grass	Grass	Exotic	A or P			1		1									2		2				1		2	3	1	
Poaceae	*Bromus hordeaceus* subsp. *molliformis*	Soft Brome	Grass	Exotic	A or B		2	1	3	2	1					3	3		2	3	2	3	3	3	2		2			
Poaceae	*Bromus* sp.	A Brome	Grass	Exotic	A or P			2								3	2		2	2		2		4				2		
Acanthaceae	*Brunoniella australis*	Blue Trumpet	Herb	Native	Perennial								2																	
Pittosporaceae	*Bursaria spinosa*	Native Blackthorn	Shrub	Native	Perennial									1																
Cupressaceae	*Callitris glaucophylla*	White Cypress Pine	Shrub	Native	Perennial									3	1															
Asteraceae	*Calotis cuneifolia*	Purple Burr-Daisy	Herb	Native	Perennial						1																			
Asteraceae	*Calotis lappulacea*	Yellow Burr-daisy	Herb	Native	Perennial				2	1	2	2								2										
Cyperaceae	*Carex inversa*	Knob Sedge	Herb	Native	Perennial				2	2	1					2			2			2	2		2		1			
Asteraceae	*Carthamus lanatus*	Saffron Thistle	Herb	Exotic	Annual				2		2					2	2			1	1	2	1	2		1				2
Asteraceae	*Centaurea melitensis*	Maltese Cockspur	Herb	Exotic	Annual						2											1								
Asteraceae	*Centaurea solstitialis*	St Barnabys Thistle	Herb	Exotic	A or B			1	2	2						2	3		2			1	1				2		2	
Gentianaceae	*Centaurium erythraea*	Common Centaury	Herb	Exotic	Biennial																			1						
Euphorbiaceae	*Chamaesyce* sp.		Herb	Native	Perennial																					1				
Adiantaceae	*Cheilanthes distans*	Bristly Cloak Fern	Fern	Native	Perennial						1																			
Adiantaceae	*Cheilanthes sieberi*	Rock Fern	Fern	Native	Perennial				2		2	1	2				1						1							
Poaceae	*Chloris truncata*	Windmill Grass	Grass	Native	Perennial												1	2							1					
Poaceae	*Chloris ventricosa*	Tall Chloris	Grass	Native	Perennial					1		3																		

Family	Scientific Name	Common name	Growth Form	Native / Exotic	Annual/ Perennial	Important Species	Condition Class and Site																							
							4									3								2		1				
							3	5	10	11	13	17	18	22	24	1	2	8	12	19	20	21	23	25	7	16	6	9	14	15
Asteraceae	*Chondrilla juncea*	Skeleton Weed	Herb	Exotic	Perennial												2	1						1						2
Asteraceae	*Chondrilla* sp.		Herb	Exotic	B or P																									1
Asteraceae	*Chrysocephalum apiculatum*	Common Everlasting	Herb	Native	Perennial		1												1											
Asteraceae	*Cirsium vulgare*	Spear Thistle	Herb	Exotic	Biennial		1	1		1						2	2		2		1		1		1	1				
Convolvulaceae	*Convolvulus graminetinus*		Herb	Native	Perennial													1		1										1
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	Herb	Exotic	Annual		1		2	1							2		2			1					2		2	
Fabaceae (Faboideae)	*Cullen tenax*	Emu-foot	Herb	Native	Perennial																								2	
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	Herb	Exotic	Annual		2									2			2	2		1	2		1		1		1	
Asteraceae	*Cymbonotus lawsonianus*	Bear's Ear	Herb	Native	Annual		1																							
Poaceae	*Cymbopogon refractus*	Barbed Wire Grass	Grass	Native	Perennial						2			2	2					2										
Poaceae	*Cynodon dactylon*	Common Couch	Grass	Native	Perennial																4				1			2		
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge	Sedge	Native	Perennial							2	2		1															
Cyperaceae	*Cyperus rotundus*	Nutgrass	Sedge	Exotic	Perennial																								1	
Solanaceae	*Datura ferox*	Fierce Thornapple	Herb	Exotic	Annual																				3				1	
Apiaceae	*Daucus carota*	Wild Carrot	Herb	Exotic	Biennial				1																					
Apiaceae	*Daucus glochidiatus*	Native Carrot	Herb	Native	Annual															1	1									
Fabaceae (Faboideae)	*Desmodium brachypodum*	Large Tick-trefoil	Herb	Native	Perennial						2		1	2	2															
Phormiaceae	*Dianella longifolia*	A Blue Flax Lily	Herb	Native	Perennial						1																			
Phormiaceae	*Dianella* sp.		Herb	Native	Perennial									1																
Poaceae	*Dichanthium sericeum*	Queensland Bluegrass	Grass	Native	Perennial			3										4				2		2	2		3	2		
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass	Grass	Native	Perennial												1													
Convolvulaceae	*Dichondra repens*	Kidney Weed	Herb	Native	Perennial			2																						
Convolvulaceae	*Dichondra* sp. A	Kidney Weed	Herb	Native	Perennial					1	2	2	2	2	2		1			2										
Anthericaceae	*Dichopogon fimbriatus*	Nodding Chocolate Lily	Herb	Native	Perennial						1																			
Poaceae	***Digitaria porrecta***	**Finger Panic Grass**	**Grass**	**Native**	**Perennial**	**Endangered (TSC Act & EPBC Act)**		2																						
Poaceae	*Digitaria* sp.	A Finger Grass	Grass	Native	A or P										1															
Chenopodiaceae	*Einadia polygonoides*	Knotweed Goosefoot	Herb	Native	A or P			1		2		1	1										1							
Chenopodiaceae	*Einadia trigonos*	Fishweed	Herb	Native	Perennial		2			1	2																			
Poaceae	*Elymus scaber*	Common Wheatgrass	Grass	Native	Perennial		2				2					2	3					2		3						
Myoporaceae	*Eremophila debilis*	Amulla	Shrub	Native	Perennial			1																						
Myrtaceae	*Eucalyptus albens*	White Box	Tree	Native	Perennial		1			3		3	3	4	4															
Myrtaceae	*Eucalyptus blakelyi*	Blakely's Red Gum	Tree	Native	Perennial																								1	
Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark	Tree	Native	Perennial									1																
Myrtaceae	*Eucalyptus dealbata*	Tumbledown Red Gum	Tree	Native	Perennial				1		3		3																	
Myrtaceae	*Eucalyptus melliodora*	Yellow Box	Tree	Native	Perennial																						2			
Asteraceae	*Euchiton sphaericus*	Star Cudweed	Herb	Native	Annual																								1	
Polygonaceae	*Fallopia convolvulus*	Black Bindweed	Herb	Exotic	Annual																						1		1	1
Rubiaceae	*Galium aparine*	Goosegrass	Herb	Exotic	Annual																				1					
Rubiaceae	*Galium* sp.		Herb	Exotic	A or P																							2		
Geraniaceae	*Geranium solanderi*	Native Geranium	Herb	Native	Perennial				1	2													1							

Family	Scientific Name	Common name	Growth Form	Native / Exotic	Annual/ Perennial	Important Species	Condition Class and Site																							
							4									3									2		1			
							3	5	10	11	13	17	18	22	24	1	2	8	12	19	20	21	23	25	7	16	6	9	14	15
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine	Herb	Native	Perennial								1									1								
Apocynaceae	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush	Herb	Exotic	Perennial									1													1			
Goodeniaceae	*Goodenia pinnatifida*	Scrambles Eggs	Herb	Native	Perennial																	1								
Asteraceae	*Hedypnois rhagadioloides*	Cretan Weed	Herb	Exotic	Annual															1										
Dilleniaceae	*Hibbertia obtusifolia*	Hoary guinea flower, Grey Guinea Flower	Shrub	Native	Perennial									1																
Clusiaceae	*Hypericum gramineum*	Small St John's Wort	Herb	Native	Perrenial									1																
Clusiaceae	*Hypericum perforatum*	St. Johns Wort	Herb	Exotic	Perennial	Class 3 Noxious Weed	1		1		2					1	2		1			1	1	1						
Asteraceae	*Hypochaeris radicata*	Catsear	Herb	Exotic	Perennial																			2						
Oleaceae	*Jasminum lineare*	Desert Jasmine	Shrub	Native	Perennial								1																	
Juncaceae	*Juncus usitatus*		Sedge	Native	Annual		1		1			1									2			1						
Poaceae	*Lachnagrostis filiformis*		Grass	Native	A or P																						1	2		
Asteraceae	*Lactuca saligna*	Willow-leaved Lettuce	Herb	Exotic	A or B																							1	1	
Asteraceae	*Lactuca serriola*	Prickly Lettuce	Herb	Exotic	Biennial		1		1	2	2					1	1			1		1				1				
Asteraceae	*Leiocarpa panaetioides*	Wooly Buttons	Herb	Native	Perennial													1												
Brassicaceae	*Lepidium africanum*	Common Peppercress	Herb	Exotic	A or P						1					1								1						
Brassicaceae	*Lepidium* sp.	A Peppercress	Herb	Exotic	A or P					1																				
Scrophulariaceae	*Linaria* sp.		Herb	Exotic	A or P															2										
Poaceae	*Lolium rigidum*	Wimmera Ryegrass	Grass	Exotic	Annual		2	3									2	3			2	2				2	2		3	2
Poaceae	*Lolium* sp.	A Ryegrass	Grass	Exotic	A or P				2							3									2					
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush	Herb	Native	Perrenial			1					1	2	2															
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush	Herb	Native	Perrenial						1																			
Lomandraceae	Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush	Herb	Native	Perrenial						1																			
Chenopodiaceae	*Maireana microphylla*	Small-leaf Bluebush	Shrub	Native	Perennial		2									1														
Fabaceae (Faboideae)	*Medicago sativa*	Lucerne	Herb	Exotic	Perennial			1										2									1			
Lamiaceae	*Mentha satureioides*	Native Pennyroyal	Herb	Native	Perennial			2				1							2				2							
Poaceae	*Microlaena stipoides*	Weeping Grass	Grass	Native	Perennial							1																		
Scrophulariaceae	*Misopates orontium*	Lesser Snapdragon	Herb	Exotic	Annual															1										
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	Herb	Exotic	Annual											1														
Fabaceae (Mimosoideae)	*Neptunia gracilis f. gracilis*	Sensitive Plant	Herb	Native	Perennial																						1			
Oleaceae	*Notelaea microcarpa*	Native Olive	Tree	Native	Perrenial								1	2	2															
Asteraceae	*Olearia* sp. aff. *Elliptica*		Shrub	Native	Perrenial										1															
Lamiaceae	*Oncinocalyx betchei*		Herb	Native	Perrenial									1																
Cactaceae	*Opuntia stricta*	Smooth Pest Pear	Shrub	Exotic	Perennial	WONS/Class 4 Noxious Weed									1															
Oxalidaceae	*Oxalis perennans*		Herb	Native	Perennial			1				1										2	1		1			1		
Oxalidaceae	*Oxalis* sp.		Herb	Native	Perennial					1			1																	
Poaceae	*Panicum decompositum*		Grass	Native	Perennial																						2		3	
Poaceae	*Panicum effusum*	Poison or Hairy Panic	Grass	Native	Perennial											1														
Poaceae	*Paspalidium* sp.		Grass	Native	A or P									1													1			

Family	Scientific Name	Common name	Growth Form	Native / Exotic	Annual/ Perennial	Important Species	Condition Class and Site																							
							4									3								2		1				
							3	5	10	11	13	17	18	22	24	1	2	8	12	19	20	21	23	25	7	16	6	9	14	15
Poaceae	*Paspalum dilatatum*	Paspalum	Grass	Exotic	Perennial			1																				2		
Poaceae	*Pennisetum clandestinum*	Kikuyu Grass	Grass	Exotic	Perennial																4									
Caryophyllaceae	*Petrorhagia nanteuilii*	Proliferous Pink	Herb	Exotic	Annual		2		1			1				2	2			2		2		2						
Poaceae	*Phalaris* sp.		Grass	Exotic	A or P																							2	1	
Phyllanthaceae	*Phyllanthus subcrenulatus*		Shrub	Native	Perennial									1																
Thymelaeaceae	*Pimelea neo-anglica*	Poison Pimelea	Shrub	Native	Perrenial							1	1	2	2															
Plantaginaceae	*Plantago debilis*	Shade Plantain	Herb	Native	A or P		1		1				1																	
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	Herb	Exotic	A or B		1											2	2					1				1		
Caryophyllaceae	*Polycarpon tetraphyllum*	Four-leaved Allseed	Herb	Exotic	Annual							1																		
Polygonaceae	*Polygonum aviculare*	Wireweed	Herb	Exotic	Annual			1																						
Convolvulaceae	*Polymeria calycina*		Herb	Native	Perrenial																		1		1	2			3	
Portulacaceae	*Portulaca oleracea*	Pigweed	Herb	Native	Annual							1																		
Lobeliaceae	*Pratia concolor*	Poison Pratia	Herb	Native	Perennial																				2					
Brassicaceae	*Rapistrum rugosum*	Turnip Weed	Herb	Exotic	A or B					1									1							1	1			
Fabaceae (Faboideae)	*Rhynchosia minima*		Herb	Native	Perrenial																					1				2
Acanthaceae	*Rostellularia adscendens*	Pink Tongues	Herb	Native	A or P						2																			
Polygonaceae	*Rumex brownii*	Swamp Dock	Herb	Native	Perennial				1																					
Polygonaceae	*Rumex crispus*	Curled Dock	Herb	Exotic	Perennial														1		2				1			1		
Chenopodiaceae	*Salsola kali* var. *kali*	Buckbush	Herb	Native	A or B																								2	
Lamiaceae	*Salvia reflexa*	Mintweed	Herb	Exotic	Annual																								2	
Lamiaceae	*Salvia verbenaca*	Vervain	Herb	Exotic	Perennial														2											
Cyperaceae	*Scleria mackaviensis*		Sedge	Native	Perrenial									1																
Asteraceae	*Senecio quadridentatus*	Cotton Fireweed	Herb	Native	Perrenial				2	2	1					2	2	1	2	1		1	2	2	1		1			
Malvaceae	*Sida corrugata*	Corrugated Sida	Herb	Native	Perennial			1		1	1		2				1		2						1					
Malvaceae	*Sida spinosa*		Shrub	Exotic	Perrenial				1		1			1	1					1	2	2	2							
Asteraceae	*Silybum marianum*	Variegated Thistle	Herb	Exotic	Biennial																					1				1
Solanaceae	*Solanum esuriale*	Quena	Herb	Native	Perennial																				1					
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	Shrub	Exotic	Perennial																								1	
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	Herb	Exotic	Annual		1																			1			1	1
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass	Grass	Native	Perennial		3		3	2						3			3	3		3	4							
Fabaceae (Faboideae)	*Swainsona galegifolia*	Smooth Darling Pea	Herb	Native	Perrenial								1	1	1															
Asteraceae	*Taraxacum officinale*	Dandelion	Herb	Exotic	Annual																				1			1		
Fabaceae (Faboideae)	*Templetonia stenophylla*	Leafy Templetonia	Shrub	Native	Perennial									1																
Apiaceae	*Torilis nodosa*	Knotted Hedge-parsley	Herb	Exotic	Annual																1									
Asteraceae	*Tragopogon porrifolius*	Salsify	Herb	Exotic	Biennial			1		1									1								1			
Zygophyllaceae	*Tribulus terrestris*	Cat-head	Herb	Exotic	Annual																						1			
Fabaceae (Faboideae)	*Trifolium arvense*	Haresfoot Clover	Herb	Exotic	Annual													1				2								
Fabaceae (Faboideae)	*Trifolium campestre*	Hop Clover	Herb	Exotic	Annual		2									2				1		1								
Fabaceae	*Trifolium fragiferum*	Strawberry Clover	Herb	Exotic	Perennial																						1			

Family	Scientific Name	Common name	Growth Form	Native / Exotic	Annual/ Perennial	Important Species	Condition Class and Site																							
							4									3								2		1				
							3	5	10	11	13	17	18	22	24	1	2	8	12	19	20	21	23	25	7	16	6	9	14	15
(Faboideae)																														
Fabaceae (Faboideae)	*Trifolium glomeratum*	Clustered Clover	Herb	Exotic	Annual													2												
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	Herb	Exotic	Perennial													1												
Urticaceae	*Urtica incisa*	Stinging Nettle	Herb	Native	Perrenial						1		1																	
Scrophulariaceae	*Verbascum virgatum*	Twiggy Mullein, Green Mullein	Herb	Exotic	Biennial				1	1							1													
Verbenaceae	*Verbena bonariensis*	Purpletop	Herb	Exotic	Perennial														2									1		
Verbenaceae	*Verbena incompta*		Herb	Exotic	Perennial		1									1								1						
Fabaceae (Faboideae)	*Vicia* sp.	Vetch	Herb	Exotic	A, B or P			1																			2		2	
Asteraceae	*Vittadinia cuneata*	A Fuzzweed	Herb	Native	A or P								1														1		1	
Asteraceae	*Vittadinia dissecta*		Herb	Native	Perennial		1											1					1							
Asteraceae	*Vittadinia muelleri*	A Fuzzweed	Herb	Native	Perennial										1					2										
Poaceae	*Vulpia* sp.	Rat's-tail Fescue	Grass	Exotic	Annual															2		2		2						
Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell	Herb	Native	Perennial			1		2	2					2		1		1										
Asteraceae	*Xanthium spinosum*	Bathurst Burr	Herb	Exotic	Annual	Class 4 Noxious Weed																							1	
						Total Number of Species per Monitoring Site	28	29	26	29	29	21	22	26	20	24	21	17	26	24	15	25	20	21	26	13	29	17	25	11

Bold text denotes a threatened species

* Denotes an Exotic species

Green text denotes new species recorded during the 2011 survey which were not recorded previously

Red text denotes species recorded during the 2012 survey which have not been recorded previously

Appendix C: Fauna of the Werris Creek Coal Mine and BOA (2004 to 2012)

Class	Family	Species	Common Name	Apr-04	May-04	Jul-04	Oct-04	Mar-06	Feb-07	Mar-08	Dec-08	Mar-09	Oct-09	Nov-09	Jan-10	Apr-10	Jul-10	Nov-10	Oct-11	Nov-12
Amphibia	Hylidae	*Litoria caerulea*	Green Tree Frog	x				x											x	x
	Hylidae	*Litoria latopalmata*	Broad-palmed Frog																	x
	Hylidae	*Litoria peronii*	Peron's Tree Frog	x					x					x				x	x	x
	Hylidae	*Litoria rubella*	Desert Tree Frog	x										x						x
	Myobatrachidae	*Crinia signifera*	Common Eastern Froglet													x		x	x	
	Myobatrachidae	*Limnodynastes dumerilii*	Eastern Banjo Frog	x																
	Myobatrachidae	*Limnodynastes salmini*	Salmon-striped Frog	x																
	Myobatrachidae	*Limnodynastes tasmaniensis*	Spotted Marsh Frog	x															x	x
	Myobatrachidae	*Neobatrachus sudelli*	Painted Burrowing Frog	x														x		
	Myobatrachidae	*Pseudophryne bibronii*	Bibron's toadlet																	x
	Myobatrachidae	*Uperoleia laevigata*	Smooth Toadlet	x										x				x	x ?	
Aves	Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumpedThornbill														x		x	x
	Acanthizidae	*Western Gerygone*	Gerygone fusca																	x
	Acanthizidae	*Gerygone olivacea*	White-throated Gerygone																x	x
	Accipitridae	*Accipiter fasciatus*	Brown Goshawk																x	
	Accipitridae	*Aquila audax*	Wedge-tailed Eagle																x	x
	Accipitridae	*Elanus axillaris*	Black-shouldered Kite							x		x				x	x		x	x
	Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk																	x
	Accipitridae	***Hieraaetus morphnoides***	**Little Eagle**									x				x		x		
	Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar																	x
	Alaudidae	*Alauda arvensis**	Skylark																	x
	Anatidae	*Anas gracilis*	Grey Teal													x			x	x
	Anatidae	*Anas superciliosa*	Pacific Black Duck			x	x			x						x	x	x	x	x
	Anatidae	*Aythya australis*	Hardhead																x	x
	Anatidae	*Chenonetta jubata*	Australian Wood Duck		x	x	x			x		x				x	x		x	x
	Anatidae	***Oxyura australis***	**Blue-billed Duck**																x	
	Anatidae	*Dendrocygna eytoni*	Plumed Whistling-Duck													x				
	Apodidae	***Hirundapus caudacutus***	**White-throated Needletail**																	x
	Ardeidae	*Egretta novaehollandiae*	White-faced Heron			x	x			x		x				x	x	x	x	x
	Ardeidae	*Ardea pacifica*	White-necked Heron																	x
	Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		x	x	x			x	x	x				x			x	x
	Artamidae	*Cracticus nigrogularis*	Pied Butcherbird		x	x	x				x	x				x	x	x	x	x
	Artamidae	*Cracticus torquatus*	Grey Butcherbird							x	x					x		x	x	x
	Artamidae	*Gymnorhina tibicen*	Australian Magpie		x	x	x			x	x	x				x	x	x	x	x
	Artamidae	*Strepera graculina*	Pied Currawong				x									x				x
	Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo			x	x			x	x	x				x		x	x	x
	Cacatuidae	*Cacatua tenuirostris*	Long-billed Corella																x	x
	Cacatuidae	*Eolophus roseicapillus*	Galah		x	x	x			x	x	x				x	x	x	x	x

Class	Family	Species	Common Name	Apr-04	May-04	Jul-04	Oct-04	Mar-06	Feb-07	Mar-08	Dec-08	Mar-09	Oct-09	Nov-09	Jan-10	Apr-10	Jul-10	Nov-10	Oct-11	Nov-12
	Cacatuidae	*Nymphicus hollandicus*	Cockatiel								x					x		x		
	Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		x	x	x			x						x		x	x	x
	Campephagidae	*Coracina papuensis*	White-bellied Cuckoo-shrike													x				
	Campephagidae	*Lalage tricolor*	White-winged Triller																x	x
	Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel																x	
	Charadriidae	*Vanellus miles*	Masked Lapwing			x	x			x									x	x
	Climacteridae	***Climacteris picumnus***	**Brown Treecreeper**													x				
	Climacteridae	*Cormobates leucophaea*	White-throated treecreeper																	x
	Columbidae	*Columba livia**	Rock Dove									x				x				x
	Columbidae	*Geopelia placida*	Peaceful Dove			x	x													x
	Columbidae	*Phaps chalcoptera*	Common Bronzewing																	x
	Columbidae	*Ocyphaps lophotes*	Crested Pigeon								x	x				x		x	x	x
	Coraciidae	*Eurystomus orientalis*	Dollarbird			x	x													x
	Corvidae	*Corvus bennetti*	Little Crow			x	x			x										
	Corvidae	*Corvus coronoides*	Australian Raven		x	x	x					x				x	x		x	x
	Corvidae	*Corvus mellori*	Little Raven															x		x
	Cuculidae	*Scythrops novaehollandiae*	Channel-billed Cuckoo															x	x	x
	Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird													x				
	Dicruridae	*Grallina cyanoleuca*	Magpie-lark									x				x	x	x	x	x
	Dicruridae	*Rhipidura albiscapa*	Grey Fantail																x	
	Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		x	x	x					x				x	x	x	x	x
	Estrildidae	***Stagonopleura guttata***	**Diamond Firetail**																x	x
	Estrildidae	*Taeniopygia bichenovii*	Double-barred Finch																	x
	Falconidae	*Falco berigoga*	Brown Falcon									x					x	x		x
	Falconidae	*Falco cenchroides*	Nankeen Kestrel		x	x	x			x		x				x	x	x	x	x
	Falconidae	*Falco peregrinus*	Peregrine Falcon			x	x					x								
	Falconidae	*Falco subniger*	Black Falcon																x	x
	Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra			x	x			x		x				x	x	x	x	x
	Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher																x	
	Hirundinidae	*Cheramoeca leucosternus*	White-backed Swallow									x				x				
	Hirundinidae	*Hirundo ariel*	Fairy Martin															x		x
	Hirundinidae	*Hirundo neoxena*	Welcome Swallow													x	x		x	x
	Hirundinidae	*Petrochelidon nigricans*	Tree Martin			x	x									x	x	x	x	x
	Locustellidae	*Cincloramphus cruralis*	Brown Songlark																	x
	Maluridae	*Malurus cyaneus*	Superb Fairy-wren													x			x	x
	Maluridae	*Malurus lamberti*	Variegated Wren									x								
	Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater															x		
	Meliphagidae	*Lichenostomus chrysops*	Yellow-faced Honeyeater													x				
	Meliphagidae	*Lichenostomus penicillatus*	White-plumed Honeyeater													x		x		x
	Meliphagidae	*Manorina melanocephala*	Noisy Miner		x	x	x			x	x	x				x	x	x	x	x
	Meliphagidae	*Philemon corniculatus*	Noisy Friarbird		x	x	x									x			x	x
	Meliphagidae	*Plectorhyncha lanceolata*	Striped Honeyeater																x	
	Meropidae	***Merops ornatus***	**Rainbow bee-eater**																	x

Class	Family	Species	Common Name	Apr-04	May-04	Jul-04	Oct-04	Mar-06	Feb-07	Mar-08	Dec-08	Mar-09	Oct-09	Nov-09	Jan-10	Apr-10	Jul-10	Nov-10	Oct-11	Nov-12
	Motacillidae	*Anthus australis*	Australian (Richard's) Pitpit									x							x	x
	Oriolidae	*Sphecotheres vieilloti*	Australasian Figbird																	x
	Pachycephalidae	*Falcunculus frontatus*	Crested Shrike-tit																	x
	Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush															x		x
	Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler															x		x
	Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote		x	x	x										x	x		
	Pardalotidae	*Pardalotus striatus*	Striated Pardalote		x	x	x									x		x	x	x
	Pardalotidae	*Aphelocephala leucopsis*	Southern Whiteface																	x
	Passeridae	*Passer domesticus**	House Sparrow													x				x
	Petroicidae	***Melanodryas cucullata***	**Hooded Robin**				x													x
	Petroicidae	*Microeca fascinans*	Jacky Winter													x			x	
	Phalacrocoracidae	*Phalacrocorax melanoleucos*	Little Pied Cormorant																x	x
	Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant																x	x
	Phasianidae	*Coturnix pectoralis*	Stubble Quail		x	x	x			x		x								
	Phasianidae	*Coturnix ypsilophora*	Brown Quail													x	x		x	x
	Podargidae	*Podargus strigoides*	Tawny Frogmouth		x	x	x					x								x
	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe													x	x	x	x	x
	Psittacidae	*Alisterus scapularis*	Australian King-Parrot															x	x	x
	Psittacidae	*Glossopsitta concinna*	Musk Lorikeet							x						x	x	x	x	x
	Psittacidae	*Glossopsitta pusilla*	Little Lorikeet			x	x													
	Psittacidae	*Platycercus adscitus eximius*	Eastern Rosella		x	x	x			x	x	x				x	x	x	x	x
	Psittacidae	*Psephotus haematonotus*	Red-rumped Parrot			x	x			x	x	x				x	x	x	x	x
	Psittacidae	*Psephotus varius*	Mulga Parrot			x	x													
	Strigidae	*Ninox novaeseelandiae*	Southern Boobook			x	x			x		x							x	x
	Sturnidae	*Sturnus vulgaris* *	European Starling			x						x				x	x	x	x	x
	Sturnidae	*Turdus merula* *	Common Myna									x						x	x	x
	Sylviidae	*Cincloramphus mathewsi*	RufousSonglark																x	
	Sylviidae	*Cisticola exilis*	Golden-headed Cisticola																x	x
	Threskiornithidae	*Threskiomis molucca*	Australian White Ibis		x	x	x												x	
	Tytonidae	*Tyto alba*	Barn Owl									x				x			x	x
Mammalia	Bovidae	*Bos taurus**	Cow			x				x						x			x	x
(Non-flying)	Canidae	*Canis (lupis) familiaris* *	Dog			x				x						x				
	Canidae	*Vulpes vulpes* *	European Red Fox			x				x						x	x	x	x	x
	Felidae	*Felis catus**	Feral Cat			x				x										
	Leporidae	*Lepus capensis* *	Brown Hare																x	x
	Leporidae	*Oryctolagus cuniculus* *	European Rabbit			x				x						x	x			
	Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo			x				x	x					x			x	x
	Macropodidae	*Macropus robustus*	Wallaroo			x										x	x			x
	Macropodidae	*Macropus rufogriseus*	Red-necked Wallaby			x														x
	Muridae	*Mus musculus**	House Mouse			x				x						x		x		
	Muridae	*Rattus rattus**	Black Rat			x										x				
	Muridae	*Rattus* sp.	Rat species																x	
	Phalangeridae	*Trichosurus velpecula*	Common Brushtail Possum			x				x						x	x			x

Class	Family	Species	Common Name	Apr-04	May-04	Jul-04	Oct-04	Mar-06	Feb-07	Mar-08	Dec-08	Mar-09	Oct-09	Nov-09	Jan-10	Apr-10	Jul-10	Nov-10	Oct-11	Nov-12
	Phascolarctidae	***Phascolarctos cinereus***	**Koala**																	x
	Tachyglossidae	*Tachyglossus aculeatus*	Short-beak Echidna			x										x				x
(Bats)	Emballonuridae	*Saccolaimus flaviventrus*	Yellow-bellied Sheathtail Bat															x		x
	Emballonuridae	***Saccolaimus flaviventrus***	**Yellow-bellied Sheath-tail Bat**							x		x				x		x		
	Molossidae	*Mormopterus species 3*	Undescribed Little Mastiff-bat @ 25KHz			x				x		x	x			x		x	x	x
	Molossidae	*Mormopterus species 4*	Undescribed Little Mastiff-bat @ 30KHz							x		x	x			x		x	x	x
	Molossidae	*Tadarida australis*	White-striped Free-tail (or Mastiff-bat) Bat			x				x		x				x		x	x	x
	Vespertilionidae	***Chalinolobus dwyeri***	**Large-eared Pied Bat**																	x
	Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat			x				x		x	x			x		x	x	x
	Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat							x			x			x		x	x	x
	Vespertilionidae	***Falsistrellus tasmaniensis***	**Eastern False Pipistrelle**										x			x		x		x
	Vespertilionidae	***Miniopterus orinaeoceanensis***	**Eastern Bent-wing Bat**			x							x			x		x	x	x
	Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat			x														
	Vespertilionidae	*Nyctophilus sp.*										x				x		x	x	x
	Vespertilionidae	***Scoteanax rueppellii***	**Greater Broad-nosed Bat**			x							x			x				
	Vespertilionidae	*Scotorepens balstoni*	Inland Broad-nosed Bat									x	x			x		x		x
	Vespertilionidae	*Scotorepens greyii*	Little Broad-nosed Bat										x						x	x
	Vespertilionidae	*Scotorepens* sp.	Central-eastern Broad-nosed Bat																	x
	Vespertilionidae	*Vespadelus darlingtoni*	Large Forest Bat			x				x		x								
	Vespertilionidae	***Vespadelus troughtoni***	**Eastern Cave Bat**																	x
	Vespertilionidae	*Vespadelus vulturnus*	Little Forest Bat							x			x	x	x	x	x	x	x	x
Reptilia	Agamidae	*Pogona barbata*	Eastern Bearded Dragon											x	x				x	
	Cheluidae	*Chelodina longicolli*	Eastern Snake-necked Turtle	x											x	x		x	x	x
	Elapidae	*Demansia psammophis*	Yellow-faced Whipsnake	x								x		x	x	x				
	Elapidae	*Pseudechis guttatus*	Blue-bellied Black Snake													x				
	Elapidae	*Pseudonaja textilis*	Eastern Brown Snake									x						x		
	Gekkonidae	*Gehyra dubia*	Dubious Dtella													x				
	Gekkonidae	*Gehyra variegata*	Common Dtella	x					x			x				x				x
	Gekkonidae	*Gehyra variegata* (egg shells)	Common Dtella																	
	Gekkonidae	*Oedura robusta*	Robust Velvet Gecko													x				x
	Gekkonidae	*Strophurus williamsi*	Eastern Spiny-tailed Gecko	x						x				x						
	Gekkonidae	*Underwoodisaurus milii*	Barking Gecko	x				x												
	Pygopodidae	*Delma inornata*	Plain Snake-lizard											x						
	Pygopodidae	*Delma plebeia*	Basalt Snake-lizard	x																
	Pygopodidae	*Lialis burtonis*	Burton's Snake-lizard	x				x												
	Scincidae	*Acritoscincus platynotum*	Red-throated Skink																	x
	Scincidae	*Anomalopus leuckartii*	Two-clawed Worm-skink	x								x		x		x			x	
	Scincidae	*Carlia tetradactyla*	Southern Rainbow Skink											x						
	Scincidae	*Cryptoblepharus pannosus*	Ragged Snake-eyed Skink																	
	Scincidae	*Cryptoblepharus pulcher*	Elegant Snake-eyed Skink	x						x		x		x	x	x		x		x
	Scincidae	*Cryptoblepharus virgatus*	Wall Lizard																x	
	Scincidae	*Ctenotus robustus*	Eastern Striped Skink	x								x		x		x				
	Scincidae	*Ctenotus* sp.																		x

Class	Family	Species	Common Name	Apr-04	May-04	Jul-04	Oct-04	Mar-06	Feb-07	Mar-08	Dec-08	Mar-09	Oct-09	Nov-09	Jan-10	Apr-10	Jul-10	Nov-10	Oct-11	Nov-12
	Scincidae	*Egernia striolata*	Tree skink						x							x		x	x	x
	Scincidae	*Egernia* sp.																		x
	Scincidae	*Eulamprus tenuis*	Greater Bar-sided Skink	x						x				x	x	x				
	Scincidae	*Lampropholis delicata*	Garden Sunskink																x	x
	Scincidae	*Lampropholis guichenoti*	Pale-flecked / Grass Garden Sunskink															x		
	Scincidae	*Liopholis whitii*	White's Skink																	x
	Scincidae	*Menetia greyii*	Dwarf Skink	x				x	x							x		x		
	Scincidae	*Morethia boulengeri*	Boulenger's Morethia	x						x		x		x	x	x			x ?	
	Scincidae	*Tiliqua scincoides scincoides*	Eastern Blue-tongued Lizard																	x
	Scincidae	Unknown Reptile eggshells	(Possibly *M. boulengeri*)					x	x							x				
	Scincidae	Unknown Reptile eggshells																	x	
	Scincidae	Unidentified worm skink																		x
	Typhlobidae	*Ramphotyphlops wiedii*	Blind Snake	x																

Bold text denotes a threatened species

* Denotes an Exotic species

Green text denotes new species recorded during the 2011 survey which were not recorded previously

Red text denotes species recorded during the 2012 survey which have not been recorded previously

Appendix D: Anabat Results, Spring 2012

Number of Definite, Probable, and Possible calls for Microbat species per condition class and monitoring plot for the 2012 monitoring survey undertaken across the BOA. Categories of confidence in species identification follow Mills *et. al* (1996).

Family	Species	Foraging Guild (Above or Canopy/ Below Canopy)	Condition Class and Site																							
			4									3									2		1			
			3	5	10	11	13	17	18	22	24	1	2	8	12	19	20	21	23	25	7	16	6	9	14	15
Molossidae	*Mormopterus species 3* Inland Freetail Bat	Above	19	2	1	ANABAT MALFUNCTION	36	16	121	200	5	138	3	31		20	18	ANABAT MALFUNCTION	ANABAT MALFUNCTION	25	17	45	9	10	5	9
Molossidae	*Mormopterus species 4* Southern Freetail Bat	Above	2	4	1		19	1	2	81	1	76	12	11	2		6			2	6	1	4	9		17
Emballonuridae	***Saccolaimus flaviventrus*** **Yellow-bellied Sheathtail Bat**	**Above**								10			1									1				
Vespertilionidae	*Scotorepens sp* Central-eastern Broad-nosed Bat	Above									1															
Molossidae	*Tadarida australis* White-striped Freetail Bat	Above		1	1		4	37		53	24	1	19	6	1	18				6	4	4	2	5		8
	Total above canopy species		2	3	3		3	3	2	4	4	3	4	3	2	2	2			3	3	4	3	3	1	3
Vespertilionidae	***Chalinolobus dwyeri*** **Large-eared Pied Bat**	**Canopy/ Below**										**1**														
Vespertilionidae	*Chalinolobus gouldii* Gould's Wattled Bat	Canopy/ Below	14	5	4		9	6		10	4	46	18	8	1	2	8			15	5	5		3	2	2
Vespertilionidae	*Chalinolobus morio* Chocolate Wattled Bat	Canopy/ Below		1	2		1		1	2	2	1		5	1		11				1	1		1		

Family	Species	Foraging Guild (Above or Below Canopy/ Canopy)	Condition Class and Site																							
			4									3									2		1			
			3	5	10	11	13	17	18	22	24	1	2	8	12	19	20	21	23	25	7	16	6	9	14	15
Vespertilionidae	***Falsistrellus tasmaniensis*** **Eastern Falsistrelle**	**Canopy/ Below**	**2**				**1**	**1**	**1**	**2**	**55**					**1**				**3**						**1**
Vespertilionidae	***Miniopterus orinaeocenensis**** **Eastern Bentwing Bat**	**Canopy/ Below**										**1**		**12**										**1**		**1**
Vespertilionidae	*Nyctophilus* spp. A long-eared bat	Canopy/ Below		2	1		2	2	2	33			1	1	1	5	4					2				7
Vespertilionidae	*Scotorepens balstoni* Inland Broad-nosed Bat	Canopy/ Below	2	12	1		7	2	2	17	1	12	8	2	4		12					9	3	6	3	15
Vespertilionidae	*Scotorepens greyii* Little Broad-nosed Bat	Canopy/ Below		1	1					1	2	3									1		1			1
Vespertilionidae	***Vespadelus troughtoni**** **Eastern Cave Bat**	**Canopy/ Below**	2	3	170		10	4	25	5	6	6	8	1		3	7			15	2	2	2	1		1
Vespertilionidae	*Vespadelus vulturnus* Little Forest Bat	Canopy/ Below	19	13	6		17	8	22	39	6	3		3			14			83	3	57	1	3		3
	Total canopy/below canopy species		**5**	**7**	**7**		**7**	**6**	**6**	**8**	**7**	**8**	**4**	**7**	**4**	**4**	**6**			**4**	**5**	**6**	**4**	**6**	**2**	**8**

Bold text denotes a threatened species

Shaded blue denotes species recorded in 2012 and not recorded in the 2010 or 2011 surveys, but have been recorded previously on the WCC mine site

Red text denotes species recorded during the 2012 survey which have not been recorded previously

Appendix E: Bird Census Results, Spring 2012

Family	Scientific Name	Guild	Condition Class Site Number; A = A.M.; B = P.M																																																		Incidental
			4																		3																		2				1								Dam			
			3		5		10		11		13		17		18		22		24		1		2		8		12		19		20		21		23		25		7		16		6		9		14		15		1	2	3	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B				
Acanthizidae	*Acanthiza chrysorrhoa* Yellow-rumped Thornbill	Generalist													x																	x			x	x					x								x					
Acanthizidae	*Gerygone fusca* Western Gerygone	Generalist																																	x											x								
Acanthizidae	*Gerygone olivacea* White-throated Gerygone	Generalist																	x	x											x	x	x			x																		
Accipitridae	*Accipiter cirrocephalus* Collared Sparrowhawk	Bird of Prey																													x	x			x																			
Accipitridae	*Aquila audax* Wedge-tailed Eagle	Bird of Prey												x							x														x		x																	Site 15
Accipitridae	*Elanus axillaris* Black-shouldered Kite	Bird of Prey		x			x	x																	x																				x									
Alaudidae	*Alauda arvensis** Skylark	Ground forager																							x																					x						x		
Anatidae	*Anas gracilis* Grey Teal	Water bird																																																		x	x	
Anatidae	*Anas superciliosa* Pacific Black Duck	Water bird																																																				Dam 3
Anatidae	*Aythya australisa* Hardhead	Water bird																																																		x	x	
Anatidae	*Chenonetta jubata* Australian Wood Duck	Water bird																																																			x	
Apodidae	***Hirundapus caudacutus*** **White-throated Needletail**	**Canopy dweller**																																																				Morengo
Ardeidae	*Ardea pacifica* White-necked Heron	Water bird																																																				Near mine
Ardeidae	*Egretta novaehollandiae* White-faced Heron	Water bird																																	x																		x	
Artamidae	*Artamus cyanopterus* Dusky Woodswallow	Generalist																																																				Site 24

Family	Scientific Name	Guild	Condition Class Site Number; A = A.M.; B = P.M																																																			Incidental
			4																	3																	2				1								Dam			
			3		5		10		11		13		17		18		22		24		1		2		8		12		19		20		21		23		25		7		16		6		9		14		15		1	2	3	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B				
Artamidae	*Cracticus nigrogularis* Pied Butcherbird	Generalist	x	x		x	x		x	x	x	x	x	x	x	x	x		x	x							x		x	x	x	x	x	x				x	x		x		x						x		x				
Artamidae	*Cracticus torquatus* Grey Butcherbird	Generalist															x	x		x					x													x		x														
Artamidae	*Gymnorhina tibicen* Australian Magpie	Generalist		x		x	x		x	x	x		x	x	x	x	x		x	x	x	x		x	x		x				x		x		x		x		x	x	x	x	x		x	x			x	x				
Artamidae	*Strepera graculina* Pied Currawong	Generalist											x						x	x													x		x	x																	
Cacatuidae	*Cacatua galerita* Sulphur-crested Cockatoo	Generalist	x	x																			x	x																										x				
Cacatuidae	*Cacatua tenuirostris* Long-billed Corella	Generalist																							x																													
Cacatuidae	*Eolophus roseicapillus* Galah	Generalist	x	x	x	x	x			x	x	x	x			x	x		x		x		x		x				x	x	x		x		x		x	x	x	x			x	x		x		x	x	xx			x	
Campephagidae	*Coracina novaehollandiae* Black-faced Cuckoo-shrike	Generalist						x	x	x			x		x	x	x		x	x			x			x	x								x	x	x												x				
Charadriidae	*Vanellus miles* Masked Lapwing	Ground forager																																			x	x															
Climacteridae	*Cormobates leucophaea* White-throated treecreeper	Canopy dweller																																																				Site 22
Columbidae	*Columba livia* Rock Dove	Generalist	x	x	x																			x																				x							
Columbidae	*Geopelia striata* Peaceful Dove	Ground forager																	x																																				Site 20
Columbidae	*Ocyphaps lophotes* Crested Pigeon	Generalist										x			x														x					x																					x	Site 17
Columbidae	*Phaps chalcoptera* Common Bronzewing	Ground forager																																																				Site 24
Coraciidae	*Eurystomus orientalis* Dollarbird	Generalist			x																																					x												
Corvidae	*Corvus bennetti* Little Raven	Generalist											x		x																x												x	x						x				
Corvidae	*Corvus coronoides* Australian Raven	Generalist																			x				x		x	x			x		x		x	x									x			x							
Cuculidae	*Scythrops novaehollandiae* Channel-billed Cuckoo	Generalist																	x																																				Site 20
Dicruridae	*Grallina cyanoleuca* Magpie-lark	Ground forager										x					x			x					x					x	x		x												x			x		x			x	x	Near mine

Family	Scientific Name	Guild	Condition Class Site Number; A = A.M.; B = P.M																																																			Incidental
			4																		3																		2				1								Dam			
			3		5		10		11		13		17		18		22		24		1		2		8		12		19		20		21		23		25		7		16		6		9		14		15		1	2	3	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B				
Dicruridae	*Rhipidura leucophrys* Willie Wagtail	Generalist															x		x	x					x						x	x	x	x		x					x		x						x					
Estrildidae	***Stagonopleura guttata*** **Diamond Firetail**	Generalist																																																				Site 20
Estrildidae	*Taeniopygia bichenovii* Double-barred Finch	Ground forager																													x		x																					
Falconidae	*Falco berigora* Brown Falcon	Bird of Prey						x																				x																										Site 15
Falconidae	*Falco cenchroides* Nankeen Kestrel	Bird of Prey	x	x	x				x		x											x				x								x	x			x	x					x	x	x						x		Near mine
Halcyonidae	*Dacelo novaeguineae* Laughing Kookaburra	Generalist				x									x					x		x			x		x																											
Hirundinidae	*Hirundinidae* Fairy Martin	Generalist									x													x							x		x	x																	x			
Hirundinidae	*Hirundo neoxena* Welcome Swallow	Canopy dweller									x						x										x						x		x																			
Hirundinidae	*Petrochelidon nigricans* Tree Martin	Canopy dweller																															x																					
Locustellidae	*Cincloramphus cruralis* Brown Songlark	Ground forager																			x		x																												x			
Maluridae	*Malurus cyaneus* Superb Fairywren	Generalist															x				x	x					x	x			x	x		x		x								x										
Melanodryas	***Melanodryas cucullata*** **Hooded Robin**	**Ground forager**																																	x	x																		
Meliphagidae	*Manorina melanocephala* Noisy Miner	Generalist	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x		x	x	x	x	x		x				x	x	x	x	x	x	x		x		x		x	x	x		x	
Meliphagidae	*Philemon corniculatus* Noisy Friarbird	Canopy dweller																																																				
Meliphaidae	*Lichenostomus penicillatus* White-plumed Honeyeater	Generalist																					x								x		x																		x			
Meropidae	***Merops ornatus*** **Rainbow bee-eater**	**Generalist**																													x																							Black Gully Rd
Motacillidae	*Anthus australis* Richard's Pipit	Ground forager																				x				x		x																x	x		x	x						
Oriolidae	*Sphecotheres vieilloti*	Canopy dweller																																																				Site 7

Family	Scientific Name	Guild	Condition Class Site Number; A = A.M.; B = P.M																																																			Incidental
			4																		3																		2				1								Dam			
			3		5		10		11		13		17		18		22		24		1		2		8		12		19		20		21		23		25		7		16		6		9		14		15		1	2	3	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B				
	Australasian Figbird																																																				
Pachycephalidae	*Colluricincla harmonica* Grey Shrike-thrush	Ground forager																																																			Morengo
Pachycephalidae	*Falcunculus frontatus* Crested Shrike-tit	Canopy dweller																																																			Morengo
Pachycephalidae	*Pachycephala rufiventris* Rufous Whistler	Canopy dweller																	x	x											x				x	x																			Morengo
Pardalotidae	*Aphelocephala leucopsis* Southern Whiteface	Generalist																																																			Site 23
Pardalotidae	*Pardalotus striatus* Striated Pardalote	Canopy dweller				x					x						x		x						x																		x			x								
Passeridae	*Passer domesticus** House Sparrow	Generalist																																																			Mine Offices
Petroicidae	*Microeca fascinans* Jacky Winter	Generalist																																																			
Phalacrocoracidae	*Phalacrocorax melanoleucos* Little Pied Cormorant	Water bird																							x																												
Phalacrocoracidae	*Phalacrocorax varius* Pied Cormorant	Water bird																																																			
Phasianidae	*Coturnix ypsilophora* Brown Quail	Ground forager																										x					x							x			x	x				x			x			Morengo
Podicipedidae	*Tachybaptus novaehollandiae* Australasian Grebe	Water bird																								x																				x						x	x	
Psittacidae	*Alisterus scapularis* Australian King-Parrot	Generalist				x	x																					x												x						x								
Psittacidae	*Glossopsitta concinna* Musk Lorikeet	Generalist					x																												x																			Mine Offices
Psittacidae	*Platycercus adscitus eximius* Eastern Rosella	Generalist	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x		x	x	x		x	x	x	x	x	
Psittacidae	*Psephotus haematonotus* Red-rumped Parrot	Generalist	x		x	x					x	x	x			x	x	x		x	x	x	x			x				x	x		x	x					x	x	x			x	x		x	x	x					
Sturnidae	*Sturnus vulgaris ** European Starling	Generalist		x			x														x			x	x	x							x							x				x	x	x						x		
Sturnidae	*Turdus merula ** Common Myna	Generalist																																										x										Site 16

Family	Scientific Name	Guild	Condition Class Site Number; A = A.M.; B = P.M																																																			Incidental
			4																		3																		2				1								Dam			
			3		5		10		11		13		17		18		22		24		1		2		8		12		19		20		21		23		25		7		16		6		9		14		15		1	2	3	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B				
Sylviidae	*Cincloramphus mathewsi* Rufous Songlark	Generalist															x														x		x																					Site 24
Sylviidae	*Cisticola exilis* Golden-headed Cisticola	Generalist				x																x			x	x	x	x											x				x	x		x	x	x						
Total for AM/PM			8	10	7	10	9	4	6	6	10	7	9	5	9	7	14	6	11	13	9	8	7	6	18	9	10	9	4	7	19	6	19	6	16	10	7	7	8	10	7	4	11	9	9	13	6	5	11	5	7	8	10	
Total for Site			18		17		13		12		17		14		16		20		24		17		13		27		19		11		24		25		26		14		18		11		20		22		11		16					
Total Species for Site			11		13		11		7		12		10		11		15		15		13		11		24		14		7		20		21		19		10		13		8		17		18		8		12					

Bold text denotes a threatened species

* Denotes an Exotic species

Shaded blue denotes species recorded in 2012 and not recorded in the 2010 or 2011 surveys, but have been recorded previously on the WCC mine site

Red text denotes species recorded during the 2012 survey which have not been recorded previously

Appendix F: Nocturnal Bird & Mammal Survey Results, Spring 2012

Class	Family	Scientific Name	Condition Class																											
			Site Number																											
			4									3								2		1				CPB1	CPB2	CPB3
			3	5	10	11	13	17	18	22	24	1	2	8	12	19	20	21	23	25	7	16	6	9	14	15			
Aves	Podargidae	*Podargus strigoides* Tawny Frogmouth		x					x																					
	Aegothelidae	Aegotheles cristatus Australian Owlet-nightjar								x								x								x			x
	Strigidae	*Ninox novaeseelandiae* Southern Boobook												x														x	
	Tytonidae	*Tyto alba* Barn Owl		x	x	x																			x	x			x
Mammalia	Bovidae	*Bos taurus* * Cow													x														
	Leporidae	*Lepus capensis* * Hare											x						x	x		x				x			
	Macropodidae	*Macropus giganteus* Eastern grey Kangaroo	x					x	x	x	x	x	x			x			x	x									
	Macropodidae	*Macropus robustus* Wallaroo							x	x	x		x			x	x		x										
	Phalangeridae	*Trichosurus velpecula* Common Brushtail Possum						x	x																				
	Phascolarctidae	***Phascolarctos cinereus*** **Koala**							x																				
		Total Species	**1**	**2**	**1**	**1**	**0**	**2**	**4**	**3**	**2**	**1**	**3**	**1**	**1**	**2**	**1**	**1**	**3**	**2**	**0**	**1**	**0**	**0**	**1**	**3**	**0**	**1**	**2**

Bold text denotes a threatened species

* Denotes an Exotic species

Shaded blue denotes species recorded in 2012 and not recorded in the 2010 or 2011 surveys, but have been recorded previously on the WCC mine site

Red text denotes species recorded during the 2012 survey which have not been recorded previously

Appendix G: Herpetofauna Search Results, Spring 2012

Class	Family	Scientific Name	Condition Class and Site Number x = recorded during the diurnal hereptofauna survey o = recorded during the spotlighting survey N = recorded nearby site																									Dam		
			4									3										2		1						
			3	5	10	11	13	17	18	22	24	1	2	8	12	19	20	21	23	25	7	16	6	9	14	15	1	2	3
Amphibia	Hylidae	*Litoria caerulea* Green Tree Frog	o						o			o	o	o									o		o		o x		
	Hylidae	*Litoria latopalmata* Broad-palmed Frog																						o			N		o
	Hylidae	*Litoria peronii* Peron's Tree Frog					o			o	o	o	o		o							x					o x		o
	Hylidae	*Litoria rubella* Desert Tree Frog			x		o		o				o		ox								o				o		
	Myobatrachidae	*Limnodynastes tasmaniensis* Spotted Marsh Frog					o						o													o	o		
	Myobatrachidae	*Pseudophryne bibronii* Bibron's toadlet																									N		
Reptilia	Cheluidae	*Chelodina longicolli* Eastern Snake-necked Turtle																										o	o
	Gekkonidae	*Gehyra variegata* Common Dtella			ox	o	o		o																				
	Gekkonidae	*Oedura robusta* Robust Velvet Gecko														x													

Class	Family	Scientific Name	Condition Class and Site Number x = recorded during the diurnal hereptofauna survey o = recorded during the spotlighting survey N = recorded nearby site																									Dam		
			4									3									2		1					1	2	3
			3	5	10	11	13	17	18	22	24	1	2	8	12	19	20	21	23	25	7	16	6	9	14	15			
	Scincidae	*Acritoscincus platynotum* Red-throated Skink																x											
	Scincidae	*Cryptoblepharus pulcher* Elegant Snake-eyed Skink	x	x	x	x			x				x	x			x				x		x	x					
	Scincidae	*Ctenotus* sp.			x				x																				
	Scincidae	*Egernia* sp.									x																		
	Scincidae	*Egernia striolata* Tree skink	x	x	x	ox			x		x	x	x				x		x		x								
	Scincidae	*Lampropholis delicata* Garden Sunskink	x			x	x		x										x		x			x					
	Scincidae	Liopholis whitii White's Skink								x	x																		
	Scincidae	*Tiliqua scincoides scincoides* Eastern Blue-tongued Lizard														x													
	Scincidae	Unidentifued worm skink					x																						
	Total Species		4	2	5	4	6	0	7	2	4	3	6	2	2	2	2	2	2	0	3	1	3	3	1	1	6	1	3

Shaded blue denotes species recorded in 2012 and not recorded in the 2010 or 2011 surveys, but have been recorded previously on the WCC mine site

Red text denotes species recorded during the 2012 survey which have not been recorded previously

HEAD OFFICE
Suite 4, Level 1
2-4 Merton Street
Sutherland NSW 2232
T 02 8536 8600
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SYDNEY
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299 Sussex Street
Sydney NSW 2000
T 02 8536 8650
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8/128 Island Point Road
St Georges Basin NSW 2540
T 02 4443 5555
F 02 4443 6655

CANBERRA
Level 2
11 London Circuit
Canberra ACT 2601
T 02 6103 0145
F 02 6103 0148

NEWCASTLE
Suites 28 & 29, Level 7
19 Bolton Street
Newcastle NSW 2300
T 02 4910 0125
F 02 4910 0126

NAROOMA
5/20 Canty Street
Narooma NSW 2546
T 02 4476 1151
F 02 4476 1161

COFFS HARBOUR
35 Orlando Street
Coffs Harbour Jetty NSW 2450
T 02 6651 5484
F 02 6651 6890

ARMIDALE
92 Taylor Street
Armidale NSW 2350
T 02 8081 2681
F 02 6772 1279

MUDGEE
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Mudgee NSW2850
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F 02 6372 9230

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Cullen Bay NT 0820
T 08 8989 5601

BRISBANE
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T 0400 494 366

WERRIS CREEK COAL
BLASTING DATABASE

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results April 2012									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2012-15	4/04/2012	13.15	S11_10_350 TSB18	TSB	<0.20	<109.9	1.17	100.7	0.31	105.1	<0.20	<109.9	10.00	120.0
2012-16	5/04/2012	13.15	S10_8-10 Decoal	IB	<0.20	<109.9	0.95	102.4	<0.20	<109.9	<0.20	<109.9	10.00	120.0
2012-17	12/04/2012	13.01	S11_6-7_Ccoal	IB	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	10.00	120.0
2012-18	19/04/2012	13.14	S11-12_9-10_350	OB	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	10.00	120.0
2012-19	27/04/2012	13.13	Black Seam Shot 4	OB	0.18	108.9	0.6	96.4	0.31	92.9	0.1	113.4	10.00	120.0
TOTALS	**APRIL 2012**	**# BLAST**	**5**	**AVERAGE**	**0.18**	**108.9**	**0.91**	**99.8**	**0.31**	**99.0**	**0.10**	**113.4**	**5.00**	**115.0**
TOTALS	**APRIL 2012**	**# BLAST**	**5**	**HIGHEST**	**0.18**	**108.9**	**1.17**	**102.4**	**0.31**	**105.1**	**0.10**	**113.4**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**5**	**AVERAGE**	**0.18**	**108.9**	**0.91**	**99.8**	**0.31**	**99.0**	**0.10**	**113.4**	**5.00**	**115.0**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results May 2012									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2012-20	2/05/2012	13:10	Black Seam #5	OB	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	0.16	102.9	10	120
2012-21	9/05/2012	13:16	Black Seam #3	OB	<0.20	<109.9	0.62	79.5	<0.20	<109.9	<0.20	<109.9	10	120
2012-22	16/05/2012	13:09	S11_8_Fcoal TSB20	TSB	<0.20	<109.9	0.70	91.5	0.29	94.2	0.16	90.5	10	120
2012-23	22/05/2012	10:45	S11_5-7_Decoal	IB	<0.20	<109.9	0.37	95.2	<0.20	<109.9	<0.20	<109.9	10	120
2012-24	25/05/2012	12:53	S12_8-9_A2B2Coal RL350 TSB19	TSB	<0.20	<109.9	0.70	79.5	<0.20	<109.9	<0.20	<109.9	10	120
2012-25	30/05/2012	13:17	S13_10-11_350 TSB21	TSB	<0.20	<109.9	0.67	99.0	0.34	98.2	<0.20	<109.9	10	120
TOTALS	**MAY 2012**	**# BLAST**	**6**	**AVERAGE**	**<0.20**	**<109.9**	**0.61**	**88.9**	**0.32**	**96.2**	**0.16**	**96.7**	**5.00**	**115.0**
TOTALS	**MAY 2012**	**# BLAST**	**6**	**HIGHEST**	**<0.20**	**<109.9**	**0.70**	**99.0**	**0.34**	**98.2**	**0.16**	**102.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**11**	**AVERAGE**	**0.18**	**108.9**	**0.76**	**94.4**	**0.31**	**97.6**	**0.13**	**105.1**	**5.00**	**115.0**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results June 2012									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2012-26	6/06/2012	13:13	S13_2-3_385	OB	<0.20	<109.9	0.68	106.2	0.34	104.9	<0.20	<109.9	10.00	120.0
2012-27	15/06/2012	13:14	S13_10-11_370	OB	<0.20	<109.9	1.3	103.1	<0.20	<109.9	<0.20	<109.9	10.00	120.0
2012-28	28/06/2012	13:05	S11S12_1-4_312 TSB22	TSB	<0.20	<109.9	0.6	95.0	0.26	96.3	<0.20	<109.9	10.00	120.0
TOTALS	**JUNE 2012**	**# BLAST**	**3**	**AVERAGE**	**<0.20**	**<109.9**	**0.86**	**101.4**	**0.30**	**100.6**	**<0.20**	**<109.9**	**5.00**	**115.0**
TOTALS	**JUNE 2012**	**# BLAST**	**3**	**HIGHEST**	**<0.20**	**<109.9**	**1.30**	**106.2**	**0.34**	**104.9**	**<0.20**	**<109.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**14**	**AVERAGE**	**0.18**	**108.9**	**0.79**	**96.7**	**0.31**	**98.6**	**0.13**	**105.1**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**14**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

WERRIS CREEK COAL
BLASTING DATABASE

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results July 2012									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2012-29	4/07/2012	16:04	S11_5-7_Decoal	TSB	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	10.00	120.0
2012-30	10/07/2012	12:13	S13_8-9_UG Collapse	TSB	0.28	103.1	<0.20	<109.9	<0.20	<109.9	0.1	113	10.00	120.0
2012-31	17/07/2012	14:48	S14_9_385	OB	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	0.67	106.8	10.00	120.0
2012-32	20/07/2012	12:10	S14_10-11_385	OB	0.48	106.9	1.85	114.9	1.05	107.3	<0.20	<109.9	10.00	120.0
2012-33	25/07/2012	12:12	S12_12-13_350	OB	<0.20	<109.9	<0.20	<109.9	0.49	100.4	<0.20	<109.9	10.00	120.0
2012-34	27/07/2012	12:12	S14.1_3-5_385	OB	<0.20	<109.9	0.67	108.8	0.55	105.1	<0.20	<109.9	10.00	120.0
2012-35	31/07/2012	12:08	S12_9_UG Decoal RL350 Secondary	TSB	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	10.00	120.0
2012-36	31/07/2012	12:08	S13_trim shot RL385	IB	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	<0.20	<109.9	10.00	120.0
TOTALS	**JULY 2012**	**# BLAST**	**8**	**AVERAGE**	**0.38**	**105.0**	**1.26**	**111.9**	**0.70**	**104.3**	**0.39**	**109.9**	**5.00**	**115.0**
TOTALS	**JULY 2012**	**# BLAST**	**8**	**HIGHEST**	**0.48**	**106.9**	**1.85**	**114.9**	**1.05**	**107.3**	**0.67**	**113.0**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**22**	**AVERAGE**	**0.28**	**107.0**	**0.91**	**100.5**	**0.41**	**100.0**	**0.22**	**106.7**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**22**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results August 2012									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2012-37	10/08/2012	12:10	S13_blackseam secondary_385	OB	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	10.00	120.0
2012-38	17/08/2012	14:25	S12_7_350	OB	<0.30	<112.0	0.57	112.9	<0.30	<112.0	<0.30	<112.0	10.00	120.0
2012-39	17/08/2012	14:25	S13_10-11_385	OB	<0.30	<112.0	0.57	112.9	<0.30	<112.0	<0.30	<112.0	10.00	120.0
2012-40	22/08/2012	12:05	S13_8-9_385	OB	<0.30	<112.0	0.51	101.2	<0.30	<112.0	<0.30	<112.0	10.00	120.0
2012-41	24/08/2012	12:12	S13_6-7_385	OB	<0.30	<112.0	0.50	79.3	<0.30	<112.0	<0.30	<112.0	10.00	120.0
2012-42	28/08/2012	12:03	S12_10-17_Decoal PS pt1	OB	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	10.00	120.0
2012-43	31/08/2012	12:13	S12_10-14_330 Ramp	OB	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	10.00	120.0
TOTALS	**AUGUST 2012**	**# BLAST**	**7**	**AVERAGE**	**<0.30**	**<112.0**	**0.54**	**101.6**	**<0.30**	**<112.0**	**<0.30**	**<112.0**	**5.00**	**115.0**
TOTALS	**AUGUST 2012**	**# BLAST**	**7**	**HIGHEST**	**<0.30**	**<112.0**	**0.57**	**112.9**	**<0.30**	**<112.0**	**<0.30**	**<112.0**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**29**	**AVERAGE**	**0.28**	**107.0**	**0.84**	**100.7**	**0.41**	**100.0**	**0.22**	**106.7**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**29**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	WERRIS CREEK COAL BLASTING RESULTS SEPTEMBER 2012									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2012-44	3/09/2012	12:13	S12_trim TSB22_312	TSB	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	10.00	120.0
2012-45	5/09/2012	15:20	S12_10-17_Decoal PS pt2	OB	0.35	106.9	1.34	101.2	0.47	97.5	<0.30	<112.0	10.00	120.0
2012-46	5/09/2012	15:20	S12_7_350 hard dig pt2	IB	0.35	106.9	1.34	101.2	0.47	97.5	<0.30	<112.0	10.00	120.0
2012-47	6/09/2012	12:41	S11_4_312 pt1	IB	<0.30	<112.0	0.45	108.6	<0.30	<112.0	<0.30	<112.0	10.00	120.0
2012-48	7/09/2012	12:09	S11_4_312 pt2	IB	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	10.00	120.0
2012-49	11/09/2012	12:07	S13_10-13_370	OB	<0.30	<112.0	0.80	100.8	0.32	99.0	0.30	102.8	10.00	120.0
2012-50	14/09/2012	12:22	S14_12-15_385	OB	<0.30	<112.0	0.72	105.3	0.34	107.5	0.28	100.4	10.00	120.0
2012-51	14/09/2012	12:22	S13.1_10-13_370	OB	<0.30	<112.0	0.72	105.3	0.34	107.5	0.28	100.4	10.00	120.0
2012-52	28/09/2012	12:15	S12_5-8_330 TSB23	TSB	0.14	111.0	1.40	101.0	0.32	97.5	0.18	109.0	10.00	120.0
2012-53	28/09/2012	12:15	S11_14-18_F Frcoal	IB	0.14	111.0	1.40	101.0	0.32	97.5	0.18	109.0	10.00	120.0
TOTALS	**SEPTEMBER**	**# BLAST**	**10**	**AVERAGE**	**0.25**	**109.0**	**1.02**	**103.1**	**0.37**	**100.6**	**0.24**	**104.3**	**5.00**	**115.0**
TOTALS	**SEPTEMBER**	**# BLAST**	**10**	**HIGHEST**	**0.35**	**111.0**	**1.40**	**108.6**	**0.47**	**107.5**	**0.30**	**109.0**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**39**	**AVERAGE**	**0.27**	**107.6**	**0.87**	**101.1**	**0.40**	**100.1**	**0.22**	**106.1**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**39**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

WERRIS CREEK COAL
BLASTING DATABASE

Shot number	Date fired	Time Fired	Location	Type	WERRIS CREEK COAL BLASTING RESULTS OCTOBER 2012									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2012-54	5/10/2012	12:41	S12_5-7_330 TSB24	TSB	<0.30	<112.0	1.35	96.3	0.50	102.6	<0.30	<112.0	10.00	120.0
2012-55	9/10/2012	12:20	S13_14-16_370	OB	0.14	104.0	1.32	105.0	<0.30	<112.0	0.21	102.0	10.00	120.0
2012-56	11/10/2012	12:47	S12_12-15_B2coal	IB	0.18	104.0	1.75	97.5	0.56	94.5	0.34	104.0	10.00	120.0
2012-57	15/10/2012	12:03	S11_16_Fcoal	IB	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	<0.30	<112.0	10.00	120.0
2012-58	19/10/2012	12:13	S11_16-19_302 TSB25	TSB	0.10	99.0	0.38	102.0	0.12	100.0	0.12	99.0	10.00	120.0
2012-59	25/10/2012	12:10	S12_15-18_B2coal	IB	0.25	106.0	1.27	102.0	<0.30	<112.0	0.23	111.0	10.00	120.0
2012-60	31/10/2012	12:13	S15_2-6_385	OB	0.18	95.5	2.14	106.0			0.41	102.0	10.00	120.0
TOTALS	**OCTOBER**	**# BLAST**	**7**	**AVERAGE**	**0.17**	**101.7**	**1.37**	**101.5**	**0.39**	**99.0**	**0.26**	**103.6**	**5.00**	**115.0**
TOTALS	**OCTOBER**	**# BLAST**	**7**	**HIGHEST**	**0.25**	**106.0**	**2.14**	**106.0**	**0.56**	**102.6**	**0.41**	**111.0**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**46**	**AVERAGE**	**0.24**	**106.1**	**0.94**	**101.2**	**0.40**	**99.9**	**0.23**	**105.6**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**46**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	WERRIS CREEK COAL BLASTING RESULTS NOVEMBER 2012									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2012-61	2/11/2012	12:08	S14_8-10_370	OB	<0.08	<109.0	0.51	103.0	<0.08	<109.0	0.11	101.0	10.00	120.0
2012-62	5/11/2012	12:11	S14_3-5_375	OB	<0.08	<109.0	0.93	100.0	0.26	99.0	0.16	102.0	10.00	120.0
2012-63	9/11/2012	12:17	S14_11-14_370	OB	0.11	102.0	0.67	105.0	<0.08	<109.0	0.23	102.0	10.00	120.0
2012-64	13/11/2012	12:13	S11_17-18_302	IB	<0.08	<109.0	0.13	115.0	<0.08	<109.0	<0.08	<109.0	10.00	120.0
2012-65	14/11/2012	12:26	S13_15-18_370	OB	0.13	106.0	<0.08	<109.0	0.29	99.5	0.28	104.0	10.00	120.0
2012-66	14/11/2012	12:26	S14_12_385	OB	0.13	106.0	<0.08	<109.0	0.29	99.5	0.28	104.0	10.00	120.0
2012-67	19/11/2012	10:17	S13_14-16_370	OB	0.08	103.0	0.68	102.0	0.20	102.0	0.13	107.0	10.00	120.0
2012-68	22/11/2012	12:13	S13_17-21_370	OB	0.14	99.0	0.71	100.2	0.26	99.5	0.23	105.0	10.00	120.0
2012-69	30/11/2012	12:28	S11_12-17_Fcoal east + Gcoal PS pt1	TSB	0.22	102.0	0.83	111.9	0.62	111.0	0.43	106.0	10.00	120.0
TOTALS	**NOVEMBER**	**# BLAST**	**9**	**AVERAGE**	**0.14**	**103.0**	**0.64**	**105.3**	**0.32**	**101.8**	**0.23**	**103.9**	**5.00**	**115.0**
TOTALS	**NOVEMBER**	**# BLAST**	**9**	**HIGHEST**	**0.22**	**106.0**	**0.93**	**115.0**	**0.62**	**111.0**	**0.43**	**107.0**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**55**	**AVERAGE**	**0.22**	**105.5**	**0.90**	**101.7**	**0.39**	**100.2**	**0.23**	**105.3**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**55**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

WERRIS CREEK COAL
BLASTING DATABASE

Shot number	Date fired	Time Fired	Location	Type	WERRIS CREEK COAL BLASTING RESULTS DECEMBER 2012									
					Glenala R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2012-70	5/12/2012	9:06	S12_11_Decoal	IB	<0.08	<109.0	<0.08	<109.0	<0.08	<109.0	<0.08	<109.0	10.00	120.0
2012-71	7/12/2012	12:17	S11_12-17_Fcoal west + S11 G coal PS pt2	IB	0.33	103.0	0.87	99.5	0.61	97.5	0.44	102.0	10.00	120.0
2012-72	12/12/2012	12:35	S12_18_Ccoal pt1	IB	0.13	104.0	0.66	103.0	0.35	82.9	0.66	102.1	10.00	120.0
2012-73	12/12/2012	12:35	S14_19-21_370	OB	0.13	104.0	0.66	103.0	0.35	82.9	0.66	102.1	10.00	120.0
2012-74	14/12/2012	12:21	S14_7_Decoal UG collapse	TSB	<0.08	<109.0	0.43	96.3	<0.08	<109.0	0.57	106.3	10.00	120.0
2012-75	21/12/2012	12:35	S12_5-7_310 TSB26	TSB	0.24	101.0	<0.08	<109.0	<0.08	<109.0	0.32	99.5	10.00	120.0
TOTALS	**DECEMBER**	**# BLAST**	**6**	**AVERAGE**	**0.21**	**103.0**	**0.66**	**100.5**	**0.44**	**87.8**	**0.53**	**102.4**	**5.00**	**115.0**
TOTALS	**DECEMBER**	**# BLAST**	**6**	**HIGHEST**	**0.33**	**104.0**	**0.87**	**103.0**	**0.61**	**97.5**	**0.66**	**106.3**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**61**	**AVERAGE**	**0.22**	**105.1**	**0.87**	**101.5**	**0.39**	**98.6**	**0.27**	**104.9**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**61**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	WERRIS CREEK COAL BLASTING RESULTS JANUARY 2013									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2013-01	4/01/2013	15:10	S14_22-23_385	OB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0
2013-02	8/01/2013	12:33	S11_12-17_280 pt1	IB	<0.25	<109.8	1.15	102.6	0.87	101.5	0.41	110.8	10.00	120.0
2013-03	11/01/2013	13:35	S12_9-11_Fcoal	IB	<0.25	<109.8	<0.25	<109.8	0.29	101.5	<0.25	<109.8	10.00	120.0
2013-04	17/01/2013	12:13	S11_12-17_280 pt2	IB	0.21	108.0	0.79	106.0	0.63	101.5	0.37	108.0	10.00	120.0
2013-05	21/01/2013	13:01	S12_15-17_Ccoal	IB	<0.25	<109.8	<0.25	<109.8	0.40	94.4	<0.25	<109.8	10.00	120.0
2013-06	24/01/2013	13:09	S15_6_385 DE coal UG collapse	IB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0
2013-07	30/01/2013	16:52	S12_13-14_Ccoal pt1	IB	0.10	94.0	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0
TOTALS	**JANUARY**	**# BLAST**	**7**	**AVERAGE**	**0.16**	**101.0**	**0.97**	**104.3**	**0.55**	**99.7**	**0.39**	**109.4**	**5.00**	**115.0**
TOTALS	**JANUARY**	**# BLAST**	**7**	**HIGHEST**	**0.21**	**108.0**	**1.15**	**106.0**	**0.87**	**101.5**	**0.41**	**110.8**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**68**	**AVERAGE**	**0.21**	**104.5**	**0.88**	**101.8**	**0.41**	**98.8**	**0.29**	**105.4**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**68**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

WERRIS CREEK COAL
BLASTING DATABASE

Shot number	Date fired	Time Fired	Location	Type	WERRIS CREEK COAL BLASTING RESULTS FEBRUARY 2013									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2013-08	1/02/2013	12:38	S12_13-14_Ccoal pt2	IB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0
2013-09	8/02/2012	13:16	S16_2-4_385	OB	<0.25	<109.8	1.83	106.0	0.58	102.6	<0.25	<109.8	10.00	120.0
2013-10	14/02/2013	12:11	S13_8-10_350 +PS	OB	<0.25	<109.8	0.90	106.0	<0.25	<109.8	<0.25	<109.8	10.00	120.0
2013-11	20/02/2013	16:29	S12_13_Decoal	IB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0
2013-12	21/02/2013	13:18	S13_10-12_A1coal +PS	OB	<0.25	<109.8	1.45	106.6	0.34	99.7	<0.25	<109.8	10.00	120.0
2013-13	27/02/2013	13:10	S13_3-9_350 TSB27	TSB	<0.25	<109.8	1.43	104.5	0.40	103.0	<0.25	<109.8	10.00	120.0
2013-14	28/02/2013	13:37	S12_13_DEcoal	IB	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	<0.25	<109.8	10.00	120.0
TOTALS	**FEBRUARY**	**# BLAST**	**7**	**AVERAGE**	**<0.25**	**<109.8**	**1.40**	**105.8**	**0.44**	**101.8**	**<0.25**	**<109.8**	**5.00**	**115.0**
TOTALS	**FEBRUARY**	**# BLAST**	**7**	**HIGHEST**	**<0.25**	**<109.8**	**1.83**	**106.6**	**0.58**	**103.0**	**<0.25**	**<109.8**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**75**	**AVERAGE**	**0.21**	**104.5**	**0.93**	**102.2**	**0.41**	**99.1**	**0.29**	**105.4**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**75**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	WERRIS CREEK COAL BLASTING RESULTS MARCH 2013									
					Glenara R11		Tonsley Park R20		Werris Creek R62		Talavera R96		COMPLIANCE	
					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)
2013-15	5/03/2013	13:39	S12_11-12_Gcoal	IB	<0.25	<109.8	0.98	113.9	0.69	109.3	0.55	107.5	10.00	120.0
2013-16	7/03/2013	13:30	S12_14-17_Decoal	IB	<0.25	<109.8	0.43	98.9	<0.25	<109.8	<0.25	<109.8	10.00	120.0
2013-17	11/03/2013	12:15	S13_13-21_A1coal	OB	<0.25	<109.8	0.93	104.7	0.37	104.3	<0.25	<109.8	10.00	120.0
2013-18	13/03/2013	12:18	S13_22-23_370TSB25	TSB	<0.25	<109.8	0.48	103.2	<0.25	<109.8	<0.25	<109.8	10.00	120.0
2013-19	20/03/2013	9:45	Hill Dam (Strip 21)	OB	<0.25	<109.8	0.75	107.5	0.29	106.7	<0.25	<109.8	10.00	120.0
2013-20	25/03/2013	12:15	S12_18-21_290TSB30	TSB	<0.25	<109.8	0.58	91.4	<0.25	<109.8	<0.25	<109.8	10.00	120.0
2013-21	26/03/2013	12:17	S11_12-17_Gcoal pt1	IB	<0.25	<109.8	0.33	96.3	<0.25	<109.8	0.48	100.8	10.00	120.0
TOTALS	**MARCH**	**# BLAST**	**7**	**AVERAGE**	**<0.25**	**<109.8**	**0.64**	**102.3**	**0.45**	**106.8**	**0.52**	**104.2**	**5.00**	**115.0**
TOTALS	**MARCH**	**# BLAST**	**7**	**HIGHEST**	**<0.25**	**<109.8**	**0.98**	**113.9**	**0.69**	**109.3**	**0.55**	**107.5**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**82**	**AVERAGE**	**0.21**	**104.5**	**0.91**	**102.2**	**0.42**	**99.8**	**0.31**	**105.3**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**82**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

2 May 2012

Ref: 04035/4357

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: APRIL 2012 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 26th April, 2012 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 Table 25 of the NMP). The monitoring locations and noise criteria for each are detailed in **Appendix 1**.

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]	R20*	Tonsley Park	Private Agreement
		R21*	Alco Park	
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. 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.

WCC Operations

Mining operations on Thursday dayshift and nightshift 26th April 2012 had the 3600 excavator in Strip 11 centre at RL320m, a 1900 excavator in Strip 12 centre at RL350m, a 1900 excavator in Strip 12 west at RL320m and a 1900 excavator coaling in Strip 12 east at RL370m. The eastern 1900 coal trucks were running over RL410m dump to the ROM while the two lower trucks fleets were running in pit to RL300m dump and the higher 1900 trucks were running to RL445m dump on dayshift and the RL430m centre dump on night shift. The crushing plant was not running on nightshift and no trains were loaded.

Noise Compliance Assessment

The results shown in **Tables 2** and **3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC did not exceed the relevant criterion at any monitoring locations at any time during the survey.

Table 2
WCC Noise Monitoring Results – 26 April 2012 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	1:54 pm	33	35	n/a	2.1/154	Traffic, (30), birds (29), plane (25), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	2:12 pm	39	37	n/a	3.3/127	Birds (35), traffic (34), domestic noise (32), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	2:12 pm	37	37/36*	n/a	3.3/127	Birds (35), traffic (31), WCC (<25)
C R10 Meadholme/ R11 Glenara	1:51 pm	39	35	n/a	2.1/154	Birds (39), traffic (31), WCC inaudible
D R24 Hazeldene	3:25 pm	38	37	n/a	2.2/125	Traffic (37), birds (32), WCC inaudible
E R12 Railway Cottage	5:00 pm	45	38	n/a	1.6/105	Traffic (45), birds (32), WCC inaudible
F R96 Talavera	4:58 pm	36	38	n/a	1.6/105	Birds (34), traffic (30), WCC (28)
G R97	1:30 pm	35	35	n/a	1.8/160	Birds (35), WCC (25)
H R96 Kyooma	4:40 pm	35	35	n/a	3.2/133	Birds (33), WCC (31)
I R57 Kurrara St	3:18 pm	44	35	n/a	2.2/125	Train (42), traffic (39), birds & insects (35), WCC inaudible
J R57 Coronation Ave	4:40 pm	44	35	n/a	3.2/133	Traffic (43), birds (37), WCC inaudible
K R20 Tonsley Park/ R21 Alco Park	4:20 pm	46	35	n/a	2.6/125	Birds & insects (45), traffic (40), WCC inaudible
L R103	4:23 pm	51	35	n/a	2.6/125	Birds & insects (51), train (30), WCC inaudible

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

Table 3
WCC Noise Monitoring Results – 26 April 2012 (Evening/Night)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	7:55 pm	32	35	+6.7	0.5/155	Traffic (31), insects (25), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	8:14 pm	35	37	+7.0	0.2/166	WCC (33), domestic noise (30), traffic (25)
B2 R9Gedhurst/ R22 Mountain View	8:18 pm	32	36*	+7.0	0.2/166	WCC (31), insects (24)
C R10 Meadholme/ R11 Glenara	7:53 pm	40	35	+6.7	0.5/155	Traffic (39), WCC (30), cattle (30)
D R24 Hazeldene	9:25 pm	39	37	+7.5	0.3/189	Traffic (38), WCC (32), insects (25)
E R12 Railway Cottage	11:33 pm	42	38	+6.0	1.3/101	Traffic (42), WCC (30), insects (25)
F R96 Talavera	9:25 pm	27	37	+7.5	0.3/189	WCC (25), traffic (22)
G R97	1:00 am	28	35	+6.7	0.6/106	Insects (26), WCC (22)
H R96 Kyooma	10:32 pm	32	35	+7.5	0.3/274	WCC (31), insects (25)
I R57 Kurrara St	11:15 pm	47	35	+5.8	0.9/83	Train (46), traffic (40), WCC (<25)
J R57 Coronation Ave	10:56 pm	41	35	+6.1	Calm	Traffic (40), train (35), WCC inaudible
K R20 Tonsley Park/ R21 Alco Park	11:07 pm	42	35	+7.0	Calm	Train (40), insects (36), traffic (32), WCC inaudible
L R103	10:35 pm	41	35	+7.5	0.3/274	Train (41), WCC inaudible

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

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.

During the night time measurement circuit the (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

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 from EPL 12290 Condition L4.1

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 "R0" 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
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

23 May 2012

Ref: 04035/4375

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: MAY 2012 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 17th May, 2012 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 Table 25 of the NMP). The monitoring locations and noise criteria for each are detailed in **Appendix 1**.

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]	R20*	Tonsley Park	Private Agreement
		R21*	Alco Park	
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. 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.

WCC Operations

Mining operations on Thursday 17th May dayshift and nightshift had the 3600 excavator in Strip 13 east at RL390m, a 1900 excavator in Strip 12 west at RL340m, a 1900 excavator in Strip 12 centre at RL350m and a 1900 excavator coaling in Strip 12 east at RL370m. The eastern 3600/1900 truck fleets were running to the eastern RL390m dump while the other two 1900 trucks fleets were running to RL445m dump on dayshift and in pit to RL300m dump on night shift. The crushing plant operated to 3:30am and no trains were loaded.

Mining operations were modified on night shift based on continuous noise monitoring results with most activities suspended at various times to minimise noise emissions.

Noise Compliance Assessment

The results shown in **Tables 2** and **3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC did not exceed the relevant criterion at any monitoring locations at any time during the survey.

Table 2
WCC Noise Monitoring Results – 17 May 2012 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	2:25 pm	33	35	n/a	1.5/197	Birds (32), traffic (26), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	1:20 pm	40	37	n/a	1.9/225	Birds (39), traffic (32), WCC (<20)
B2 R9Gedhurst/ R22 Mountain View	1:20 pm	39	37/36*	n/a	1.9/225	Insects (38), traffic (30), WCC inaudible
C R10 Meadholme/ R11 Glenara	2:20 pm	31	35	n/a	1.6/222	WCC (30), birds (25)
D R24 Hazeldene	2:45 pm	38	37	n/a	1.9/184	Birds (37), traffic (30), WCC (27)
E R12 Railway Cottage	5:00 pm	46	38	n/a	0.9/241	Traffic (46), rail works (35), birds (32), WCC inaudible
F R96 Talavera	2:45 pm	31	38	n/a	1.9/184	WCC (29), birds (24), traffic (23)
G R97	4:07 pm	34	35	n/a	1.2/163	Birds (33), WCC (26)
H R96 Kyooma	3:48 pm	43	35	n/a	2.0/169	Birds (43), WCC (28)
I R57 Kurrara St	4:16 pm	46	35	n/a	0.5/157	Traffic (45), birds (39), WCC inaudible
J R57 Coronation Ave	3:56 pm	43	35	n/a	2.0/169	Traffic (41), trains (35), birds (34), WCC inaudible
K R20 Tonsley Park/ R21 Alco Park	5:42 pm	38	35	+9.7	1.8/267	Insects (37), traffic (30), trains (20), WCC inaudible
L R103	5:22 pm	33	35	+9.1	0.9/276	Birds (32), train (25), WCC inaudible

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

Table 3
WCC Noise Monitoring Results – 17 May 2012 (Evening/Night)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	9:22 pm	35	35	+13.2	0.4/238	Dogs (33), traffic (26), WCC (26)
B1 R7 83 Wadwells Lane/R8 Almawillee	7:30 pm	37	37	+13.7	1.4/85	WCC (36)[1], traffic (26), birds (25)
B2 R9Gedhurst/ R22 Mountain View	7:15 pm	35	36*	+13.6	1.3/123	WCC (35)[1]
C R10 Meadholme/ R11 Glenara	8:33 pm	39	35	+15.8	1.0/63	Traffic (37), WCC (32)
D R24 Hazeldene	8:18 pm	43	37	+14.3	0.6/25	Traffic (43), WCC (25)
E R12 Railway Cottage	10:45 pm	33	38	+12.6	0.7/122	Traffic (32), WCC (26)
F R96 Talavera	8:53 pm	30	37	+13.9	0.3/213	Traffic (30), WCC (<20)
G R97	10:05 pm	24	35	+13.5	0.5/159	Traffic (22), WCC (20)
H R96 Kyooma	10:23 pm	25	35	+12.7	0.2/27	WCC (25)
I R57 Kurrara St	10:43 pm	39	35	+12.6	0.7/122	Traffic (39), WCC (<20)
J R57 Coronation Ave	10:25 pm	29	35	+12.7	0.6/148	Traffic (29), WCC inaudible
K R20 Tonsley Park/ R21 Alco Park	10:06 pm	33	35	+13.1	0.2/257	WCC (32), traffic (27)
L R103	9:47 pm	39	35	+14.4	0.6/187	Traffic (37), WCC (33), dog (30)

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

1 See text below

At approximately 8 pm changes to mining operations resulted in lower noise levels. The results shown in Table 2 for locations B1 and B2 represent the worst case 15 minutes out of the one hour measurement periods. After 8 pm the received noise from mining at these two locations was less than 30 dB(A) Leq.

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.

During the night time measurement circuit the (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

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 from EPL 12290 Condition L4.1

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 "R0" 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
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

15 June 2012

Ref: 04035/4403

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: JUNE 2012 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 12th June, 2012 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 Table 25 of the NMP). The monitoring locations and noise criteria for each are detailed in **Appendix 1**.

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]	R20*	Tonsley Park	Private Agreement
		R21*	Alco Park	
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. 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.

WCC Operations

WCC operations on Tuesday 12th June 2012 dayshift and nightshift had the 3600 excavator in Strip 13 centre at RL400m, a 1900 excavator in Strip 11 west at RL340m, a 1900 excavator in Strip 11 centre at RL320m and a 1900 excavator in Strip 11 east at RL330m. The 3600 truck fleet was running to the RL445m dump day and RL430m dump night while the other three 1900 trucks fleets were running in pit to RL280m dump on both day and night shift. The crushing plant operated to 3:30am and one train commenced loading at 8:20pm and finish about 10pm.

Noise Compliance Assessment

The results shown in **Tables 2** and **3** indicate that, under the operational and atmospheric conditions at the time, elevated noise levels were recorded at the Kyooma monitoring location during the evening/night time survey period. At the time of this measurement meteorological conditions were non compliant as per Condition L4.3 of EPL 12290. WCC has a private agreement in place with the landowner at Kyooma in relation to noise.

The noise did not exceed the criterion at any other location or time.

Table 2 WCC Noise Monitoring Results – 12 June 2012 (Day)						
Location	**Time**	**dB(A), Leq**	**Criterion dB(A) Leq**	**Inversion ^{O}C/100m**	**Wind speed/ dir**	**Identified Noise Sources**
A R5 Rosehill	1.37 pm	43	35	n/a	7.8/123	Birds (40), traffic (38), wind (35), **WCC inaudible**
B1 R7 83 Wadwells Lane/R8 Almawillee	12.45 pm	42	37	n/a	7.9/116	Traffic (39), birds (37), wind (32), **WCC inaudible**
B2 R9Gedhurst/ R22 Mountain View	12.30 pm	47	37/36*	n/a	8.0/114	Birds (45), wind (40), traffic (36), **WCC inaudible**
C R10 Meadholme/ R11 Glenara	2.00 pm	41	35	n/a	7.4/120	Wind (38), traffic (35), birds (35), **WCC inaudible**
D R24 Hazeldene	1.59 pm	40	37	n/a	7.2/117	Traffic (38), birds (35), **WCC inaudible**
E R12 Railway Cottage	4.30 pm	46	38	n/a	5.0/108	Traffic (46), birds (30), **WCC inaudible**
F R96 Talavera	3.21 pm	36	38	n/a	6.4/107	Birds (34), traffic (32), **WCC barely audible**
G R97	2.32 pm	42	35	n/a	6.9/113	Windmill (40), birds (36), **WCC (<25)**
H R96 Kyooma	2.54 pm	44	35	n/a	6.8/114	Birds (42), wind (40), **WCC barely audible**
I R57 Kurrara St	4.16 pm	45	35	n/a	5.3/108	Traffic (42), trains (40), birds (39), **WCC inaudible**
J R57 Coronation Ave	3.56 pm	42	35	n/a	6.9/113	Birds (39), traffic (38), trains (32), **WCC inaudible**
K R20 Tonsley Park/ R21 Alco Park	3.34 pm	50	35	+9.7	5.8/101	Birds (49), traffic (43), **WCC inaudible**
L R103	3.10 pm	46	35	+9.1	7.4/104	Train (43), birds (42), farm animals (35), **WCC inaudible**

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

Table 3 WCC Noise Monitoring Results – 12 June 2012 (Evening/Night)							
Location	**Time**	**dB(A), L1 (1min)**	**dB(A), Leq**	**Criterion dB(A) Leq**	**Inversion ^{O}C/100m**	**Wind speed/ dir**	**Identified Noise Sources**
A R5 Rosehill	9.37 pm	n/a	38	35	+8.0	1.9/69	Traffic (38), **WCC inaudible**
B1 R7 83 Wadwells Lane/R8 Almawillee	7.25 pm	n/a	35	37	+5.3	3.2/105	Traffic (33), cattle (30), **WCC inaudible**
B2 R9Gedhurst/ R22 Mountain View	9.57 pm	35	36	36*	+9.2	1.0/91	Traffic (33), cattle (32), **WCC (28)**
C R10 Meadholme/ R11 Glenara	8.28 pm	n/a	37	35	+8.0	1.8/80	Traffic (36), dog (30), **WCC inaudible**
D R24 Hazeldene	11.00 pm	32	39	37	+8.1	1.3/115	Traffic (39), **WCC (25)**
E R12 Railway Cottage	11.00 pm	37	40	38	+8.1	1.3/115	Traffic (39), **WCC (30)**
F R96 Talavera	9.54 pm	28	33	37	+9.2	1.0/91	Traffic (30), insects (28), dog (26), **WCC (25)**
G R97	9.03 pm	39	31	35	+8.8	2.5/79	**WCC (31)**
H R96 Kyooma	9.25 pm	44	39	35	+8.9	2.1/71	**WCC (38)**, birds (30)
I R57 Kurrara St	8.28 pm	41	37	35	+8.4	2.1/83	**WCC (34)**, traffic (33), train (30)
J R57 Coronation Ave	8.04 pm	33	43	35	+7.2	2.5/79	Train (42), traffic (35), **WCC (<30)**
K R20 Tonsley Park/ R21 Alco Park	7.43 pm	40	38	35	+5.8	2.9/98	**WCC (35)**, traffic (35)
L R103	7.25 pm	n/a	47	35	+4.1	3.8/116	Train (47), insects (35), **WCC inaudible**

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

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 observations and measurements made during the 60 minute long operational noise measurement are noted. Where maximum noise levels from mining activity are recorded in the range > 40 dB(A) L1 (1 min) then, where practical, further measurements are made at the sleep disturbance monitoring location. Note that, as the internal layout of each residence is not known, the measurements are made at the worst case façade in relation to the mine noise. This is not necessarily at the façade of a bedroom window.

During the night time measurement circuit the (1 min) noise from WCC did not exceed 45 dB(A) at any monitoring location.

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 from EPL 12290 Condition L4.1

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
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

27 July 2012

Ref: 04035/4442

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: JULY 2012 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 17th and Wednesday 18th July, 2012 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 **Appendix 1**.

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]	R20*	Tonsley Park	Private Agreement
		R21*	Alco Park	
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. 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.

WCC Operations

Noise monitoring commenced during the day of July 17 and was completed in the morning (i.e. day time monitoring after 7.00am) on July 18.

WCC operations on 17 and 18 July 2012 had the 3600 excavator in Strip 13 centre at RL410m, a 1900 excavator in Strip 11 west at RL350m, a 1900 excavator in Strip 12 centre at RL320m and a 1900 excavator in Strip 12 east at RL370m. The 3600 truck fleet was running to the RL445m dump during the day and RL410m west dump at night, one 1900 truck were running to the ROM Pad while the other two 1900 trucks fleets were running to the RL410m east dump on both day and night shift. Scrapers were operating at RL410m on the eastern side of the pit. On 17 July, the crushing plant operated to 3:30am on and one train commenced loading at 8:20pm and finish about 10pm. On 18 July the crushing plant was operating.

Noise Compliance Assessment

The results shown in **Tables 2** and **3** indicate that, under the operational and atmospheric conditions at the time, the measured noise from WCC operations did not exceed the relevant noise criterion at any location or time.

Table 2
WCC Noise Monitoring Results – 17 (pm) and 18 (am) July 2012 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	1.00 pm	37	35	n/a	0.7/259	Birds & insects (35), traffic (32), **WCC inaudible**
B1 R7 83 Wadwells Lane/R8 Almawillee	1.23 pm	38	37	n/a	2.3/246	Birds & insects (37), traffic (29), **WCC (24)**
B2 R9Gedhurst/ R22 Mountain View	2.33 pm	48	37/36*	n/a	2.2/238	Birds (48), traffic (35), **WCC (<20)**
C R10 Meadholme/ R11 Glenara	2.49 pm	41	39	n/a	1.9/225	Birds & insects (39), traffic (36), **WCC barely audible**
D R24 Hazeldene	7.02 am	47	37	n/a	2.0/280	Traffic (46), birds (38), **WCC (34)**
E R12 Railway Cottage	7.05 am	46	38	n/a	2.0/280	Birds (44), traffic (41), **WCC (30)**
F R96 Talavera	4.09 pm	36	38	n/a	1.0/243	Birds & insects (34), traffic (32), **WCC inaudible**
G R97	4.57 pm	38	35	n/a	0.1/325	Birds (38), **WCC (<25)**
H R96 Kyooma	4.34 pm	38	36	n/a	0.3/275	Birds (37), plane (30), **WCC barely audible**
I R57 Kurrara St	4.30 pm	44	35	n/a	0.3/275	Trains (42), birds (40), traffic (32), **WCC inaudible**
J R57 Coronation Ave	5.32 pm	39	35	n/a	0.2/238	Traffic (36), trains (34), birds (30), **WCC inaudible**
K R20 Tonsley Park/ R21 Alco Park	4.08 pm	39	39	+9.7	1.6/261	Birds (37), traffic (33), **WCC inaudible**
L R103	3.45 pm	44	35	+9.1	2.9/239	Birds (43), construction work (32), train (30), **WCC inaudible**

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

Table 3
WCC Noise Monitoring Results – 12 June 2012 (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	8.36 pm	40	40	35	+4.8	2.5/282	**WCC (35)**, birds (34), dogs (33), traffic (32)
B1 R7 83 Wadwells Lane/R8 Almawillee	11.13 pm	41	37	37	+3.8	1.8/230	**WCC (34)**, insects (32), house pump (30)
B2 R9Gedhurst/ R22 Mountain View	9.07 pm	39	36	37/36*	+4.5	1.5/240	Traffic (33), **WCC (32)**, frogs (28)
C R10 Meadholme/ R11 Glenara	10.55 pm	27	39	39	+5.7	1.8/264	Traffic (38), insects (30), **WCC (25)**
D R24 Hazeldene	10.11 pm	36	43	37	+4.3	2.3/279	Traffic (43), **WCC (30)**
E R12 Railway Cottage	11.15 pm	36	38	38	+3.8	1.8/230	Traffic (37), **WCC (31)**
F R96 Talavera	7.40 pm	<30	33	37	+4.8	0.7/182	Birds (30), traffic (29), **WCC (<25)**
G R97	9.03 pm	26	29	35	+4.1	0.8/310	Traffic (26), **WCC (24)**, insects (22)
H R96 Kyooma	8.44 pm	n/a	29	36	+4.3	0.3/87	Insects (28), traffic (20), **WCC inaudible**
I R57 Kurrara St	9.44 pm	43	40	35	+5.0	1.9/282	Trains in town (38), **WCC (34 – train on loop 34, WCC ops 25)**, traffic (32)
J R57 Coronation Ave	9.29 pm	30	38	35	+4.1	2.6/281	Train (36), traffic (33), **WCC (<30)**
K R20 Tonsley Park/ R21 Alco Park	8.04 pm	43	45	37	+3.9	0.5/70	Train (44), **WCC (37)**, traffic (32)
L R103	7.25 pm	n/a	47	35	+4.8	0.7/44	Train (47), insects (35), **WCC inaudible**

1. L1 (1 min) from mine noise only

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

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 observations and measurements made during the 60 minute long operational noise measurement are noted. Where maximum noise levels from mining activity are recorded in the range > 40 dB(A) L1 (1 min) then, where practical, further measurements are made at the sleep disturbance monitoring location. Note that, as the internal layout of each residence is not known, the measurements are made at the worst case façade in relation to the mine noise. This is not necessarily at the façade of a bedroom window.

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 are shown in **Appendix III**.

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		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.			
Haul truck CAT 785 (unattenutaed)	608	120	122	17/7/12

*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.

15 August 2012

Ref: 04035/4490

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: AUGUST 2012 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 13th August, 2012 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 **Appendix 1**.

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]	R20*	Tonsley Park	Private Agreement
		R21*	Alco Park	
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. 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.

WCC Operations

WCC operations on 13th August 2012 had the 3600 excavator in Strip 13 centre at RL390m, a 1900 excavator in Strip 11 centre at RL300m, a 1900 excavator in Strip 12 west at RL330m and a 1900 excavator in Strip 12 east at RL370m. The 3600 and a 1900 truck fleet was running to the RL445m dump during the day and RL430m centre dump at night, one 1900 truck were running to the ROM Pad while the other 1900 trucks fleet were running to the RL360m centre dump on both day and night shift. Scrapers were operating at RL410m on the eastern side of the pit. On 13th August, the crushing plant operated to 3:30am with no trains loaded.

Noise Compliance Assessment

The results shown in **Tables 2** and **3** indicate that, under the operational and atmospheric conditions at the time, there were elevated noise levels measured at the Kyooma monitoring location during the evening/night time monitoring period. There is a private agreement in place with the owner of Kyooma in relation to noise impacts.

Table 2
WCC Noise Monitoring Results – 13 August 2012 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	2.34 pm	32	35	n/a	2.0/153	Birds (31), traffic (25), **WCC inaudible**
B1 R7 83 Wadwells Lane/R8 Almawillee	5.07 pm	38	37	n/a	1.0/209	Birds (36), traffic (32), **WCC inaudible**
B2 R9Gedhurst/ R22 Mountain View	2.54 pm	37	37/36*	n/a	2.0/157	Birds (36), traffic (30), **WCC inaudible**
C R10 Meadholme/ R11 Glenara	4.50 pm	39	39	n/a	1.7/178	Birds (38), traffic (32), **WCC inaudible**
D R24 Hazeldene	3.57 pm	35	37	n/a	1.4/163	Birds (34), traffic (29), **WCC inaudible**
E R12 Railway Cottage	5.00 pm	48	38	n/a	1.0/209	Traffic (48), birds (38), **WCC inaudible**
F R96 Talavera	3.45 pm	41	38	n/a	1.3/159	Birds (41), **WCC (<25)**
G R97	3.03 pm	38	35	n/a	2.3/150	Birds (38), **WCC (26)**
H R96 Kyooma	3.25 pm	37	36	n/a	2.0/163	Birds (37), **WCC (28)**
I R57 Kurrara St	1.38 pm	49	35	n/a	1.6/140	Birds (47), trains (41), traffic (40), **WCC inaudible**
J R57 Coronation Ave	2.41 pm	54	35	n/a	1.8/157	Traffic (53), birds (45), roadwork (40), **WCC inaudible**
K R20 Tonsley Park/ R21 Alco Park	2.07 pm	36	39	n/a	1.8/137	Birds (33), traffic (33), **WCC barely audible**
L R103	1.44 pm	48	35	n/a	1.0/138	Birds (47), trains (41), **WCC inaudible**

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

Table 3
WCC Noise Monitoring Results – 13 August 2012 (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	8.15 pm	34	40	35	+11.4	0.4/94	Traffic (34), dogs (33), **WCC (29)**,
B1 R7 83 Wadwells Lane/R8 Almawillee	11.08 pm	38	35	37	+11.2	Calm	**WCC (33)**, traffic (30), insects (27)
B2 R9Gedhurst/ R22 Mountain View	8.35 pm	42	36	37/36*	+9.1	1.0/129	Traffic (34), **WCC (34)**, frogs & insects (33)
C R10 Meadholme/ R11 Glenara	10.50 pm	37	34	39	+10.7	Calm	**WCC (33)** traffic (28)
D R24 Hazeldene	9.38 pm	39	43	37	+11.6	0.4/124	Traffic (43), **WCC (32)**, insects (23)
E R12 Railway Cottage	10.43 pm	42	43	38	+10.9	Calm	Traffic (42), **WCC (34)**
F R96 Talavera	7.30 pm	39	38	37	+11.9	2.0/290	Traffic (36), **WCC (33)**, insects (25)
G R97	9.02 pm	43	35	35	+8.7	0.8/125	**WCC (34)**
H R96 Kyooma	8.34 pm	43	36	36	+9.1	1.0/129	**WCC (36)**
I R57 Kurrara St	9.45 pm	n/a	46	35	+11.6	0.6/105	Trains (43), traffic (43), **WCC inaudible**
J R57 Coronation Ave	9.26 pm	n/a	41	35	+10.8	0.3/143	Traffic (40), trains (35), **WCC barely audible**
K R20 Tonsley Park/ R21 Alco Park	7.50 pm	n/a	45	37	+11.4	0.3/41	Trains (41), traffic (35), **WCC (<25)**
L R103	7.31 pm	n/a	45	35	+11.9	2.0/290	Trains (45), traffic (36), **WCC inaudible**

1. L1 (1 min) from mine noise only

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

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 observations and measurements made during the 60 minute long operational noise measurement are noted. Where maximum noise levels from mining activity are recorded in the range > 40 dB(A) L1 (1 min) then, where practical, further measurements are made at the sleep disturbance monitoring location. Note that, as the internal layout of each residence is not known, the measurements are made at the worst case façade in relation to the mine noise. This is not necessarily at the façade of a bedroom window.

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**. For logistical reasons no plant noise measurements were made at the time of the August 2012 monitoring 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:

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		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.			
Haul truck CAT 785 (unattenutaed)	608	120	122	17/7/12
Haul truck CAT 785 (unattenutaed)	614		120	17/7/12

*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 September 2012

Ref: 04035/4511

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: SEPTEMBER 2012 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 11th September, 2012 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 **Appendix 1**.

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]	R20*	Tonsley Park	Private Agreement
		R21*	Alco Park	
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. 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.

WCC Operations

WCC operations on 11th September 2012 had the 3600 excavator in Strip 13 east at RL380m, a 1900 excavator in Strip 11 west at RL320m, a 1900 excavator in Strip 12 east at RL350m and a 1900 excavator in Strip 12 centre at RL350m. The 3600 and two 1900 truck fleets were running to the RL430m east dump during both day and night, and the other 1900 truck fleet was running to the RL290m in pit dump both day and night shift. Scrapers were operating at RL410m on the eastern side of the pit at night only. The crushing plant operated to 3:30am with one train loaded starting 5:13pm and finishing at 7:30pm.

Noise Compliance Assessment

The results shown 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.

Table 2 WCC Noise Monitoring Results – 11 September 2012 (Day)						
Location	**Time**	**dB(A), Leq**	**Criterion dB(A) Leq**	**Inversion °C/100m**	**Wind speed/ dir**	**Identified Noise Sources**
A R5 Rosehill	12.50 pm	44	35	n/a	4.3/274	Birds (41), farm noise (40), traffic (35), **WCC inaudible**
B1 R7 83 Wadwells Lane/R8 Almawillee	1.10 pm	48	37	n/a	3.1/247	Birds (48), traffic (35), **WCC (<25)**
B2 R9Gedhurst/ R22 Mountain View	2.12 pm	43	37/36*	n/a	3.6/248	Birds (42), traffic & planes (34), **WCC (30)**
C R10 Meadholme/ R11 Glenara	3.14 pm	34	39	n/a	3.0/238	Birds & insects (31), traffic (30), **WCC (27)**
D R24 Hazeldene	3.32 pm	41	37	n/a	2.5/254	Birds & insects (40), traffic (32), **WCC (30)**
E R12 Railway Cottage	4.34 pm	46	38	n/a	1.8/254	Traffic (46), birds & insects (33), **WCC (<25)**
F R96 Talavera	4.54 pm	34	38	n/a	1.8/288	Birds (33), traffic (28), **WCC (22)**
G R97	4.34 pm	41	35	n/a	2.1/211	Birds (40), traffic (34), **WCC (28)**
H R98 Kyooma	5.44 pm	40	36	n/a	2.0/313	Birds & insects (39), plane (33), **WCC (25)**
I R57 Kurrara St	3.11 pm	40	35	n/a	2.6/259	Traffic (38), birds & insects (36), **WCC barely audible**
J R57 Coronation Ave	4.15 pm	45	35	n/a	2.8/219	Dogs (42), birds (42), trains (35), **WCC inaudible**
K R20 Tonsley Park/ R21 Alco Park	2.53 pm	32	39	n/a	3.2/243	Birds (32), **WCC inaudible**
L R103	2.35 pm	33	35	n/a	3.4/239	Birds & insects (33), **WCC inaudible**

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

Table 3 WCC Noise Monitoring Results – 11 September 2012 (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	8.10 pm	<30	53	35	+10.9	1.0/276	Dogs (53), traffic (37), **WCC (24)**,
B1 R7 83 Wadwells Lane/R8 Almawillee	9.50 pm	41	37	37	+9.6	1.0/262	**WCC (34)**, irrigator (32), insects (28)
B2 R9Gedhurst/ R22 Mountain View	8.30 pm	41	38	37/36*	+9.4	1.4/275	Water pump (35), **WCC (33)**, frogs & insects (28)
C R10 Meadholme/ R11 Glenara	9.21 pm	42	38	39	+8.1	0.4/248	**WCC (37)** traffic (31)
D R24 Hazeldene	9.35 pm	38	38	37	+9.3	1.3/271	Traffic (37), **WCC (32)**
E R12 Railway Cottage	10.40 pm	35	38	38	+9.8	2.3/280	Traffic (37), **WCC (32)**
F R96 Talavera	11.00 pm	n/a	27	37	+10.0	2.0/262	Frogs & insects (27), **WCC inaudible**
G R97	8.43 pm	/a	29	35	+10.3	1.5/264	Insects (27), plane (22), **WCC inaudible**
H R98 Kyooma	9.01 pm	<25	28	36	+10.2	1.7/289	Insects (28), **WCC (22)**
I R57 Kurrara St	7.20 pm	n/a	46	35	+10.8	0.8/276	Trains (43), traffic (43), **WCC inaudible**
J R57 Coronation Ave	9.26 pm	n/a	39	35	+10.9	1.0/266	Trains (35), dogs (35), traffic (32), **WCC inaudible**
K R20 Tonsley Park/ R21 Alco Park	7.38 pm	n/a	39	37	+11.0	0.8/250	Trains (38), traffic (30), **WCC inaudible**
L R103	7.20 pm	n/a	41	35	+11.0	0.6/288	Traffic (41), **WCC inaudible**

1. L1 (1 min) from mine noise only

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

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 observations and measurements made during the 60 minute long operational noise measurement are noted. Where maximum noise levels from mining activity are recorded in the range > 42 dB(A) L1 (1 min) then, where practical, further measurements are made at the sleep disturbance monitoring location. Note that, as the internal layout of each residence is not known, the measurements are made at the worst case façade in relation to the mine noise. This is not necessarily at the façade of a bedroom window.

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**.

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		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.			
Haul truck CAT 785 (unattenuated)	608	120	122	17/7/12
Haul truck CAT 785 (unattenuated)	614		120	17/7/12
Haul truck CAT 785 (unattenuated)	609	120		11/9/12
Haul truck CAT 785 (unattenuated)	610	121		11/9/12
Haul truck CAT 785 (unattenuated)	611	120		11/9/12
Haul truck CAT 785 (unattenuated)	600	119		11/9/12
Haul truck CAT 785 (attenuated)	608	117	120	11/9/12
Water Cart	WA897	113		11/9/12
Scraper	SC882	113		11/9/12
Excavator (PC 3600)	EX551	115		11/9/12
Dozer	829	114		11/9/12

*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.

5 November 2012

Ref: 04035/4576

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: OCTOBER 2012 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 30th October, 2012 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 **Appendix 1**.

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]	R20*	Tonsley Park	Private Agreement
		R21*	Alco Park	
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. 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.

WCC Operations

WCC operations on 30th October 2012 had the 3600 excavator in Strip 12 west at RL340m, a 1900 excavator in Strip 11 west at RL300m, a 1900 excavator in Strip 12 centre at RL340m and a 1900 excavator in Strip 14 centre at RL385m. The 3600 and two 1900 truck fleets were running to the RL430m east dump during both day and night, and the other 1900 truck fleet was running to the RL360m in pit dump both day and night shift. Scraper operations were limited to day shift only stripping soil ahead of the western dump extension. The crushing plant operated to 3:30am with one train loaded starting 8:33pm and finishing at 10:32pm.

Noise Compliance Assessment

The results shown 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.

Table 2
WCC Noise Monitoring Results – 30 October 2012 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	2.07 pm	45	35	n/a	3.7/267	Birds (44), traffic (38), **WCC inaudible**
B1 R7 83 Wadwells Lane/R8 Almawillee	12.55 pm	49	37	n/a	4.4/277	Birds & insects (49), rooster (40), **WCC barely audible**
B2 R9Gedhurst/ R22 Mountain View	1.00 pm	55	37/36*	n/a	4.4/277	Birds (55), **WCC (25)**
C R10 Meadholme/ R11 Glenara	2.00 pm	38	39	n/a	3.5/251	Birds & insects (38), **WCC (25)**
D R24 Hazeldene	2.30 pm	37	37	n/a	1.6/324	Traffic (36), birds & insects (30), **WCC (25)**
E R12 Railway Cottage	4.35 pm	43	38	n/a	2.4/244	Traffic (43), **WCC barely audible**
F R96 Talavera	2.26 pm	35	38	n/a	1.9/291	Birds & insects (32), **WCC (32)**
G R97	3.48 pm	34	35	n/a	1.9/279	Birds & insects (34), **WCC (<20)**
H R98 Kyooma	3.30 pm	37	36	n/a	2.4/280	Birds & insects (36), **WCC (29)**
I R57 Kurrara St	4.30 pm	47	35	n/a	2.4/224	Birds & insects (45), train (41), traffic (30), **WCC inaudible**
J R57 Coronation Ave	4.10 pm	48	35	n/a	2.6/244	Birds & insects (46), traffic (42), **WCC inaudible**
K R20 Tonsley Park/ R21 Alco Park	4.06 pm	32	39	n/a	2.6/244	Birds (31), traffic (25), **WCC inaudible**
L R103	3.41 pm	44	35	n/a	1.9/279	Birds & insects (42), domestic noise (38), cattle (35), **WCC inaudible**

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

Table 3
WCC Noise Monitoring Results – 30 October 2012 (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	8.24 pm	<30	33	35	+0.5	2.4/286	Bird & insects (32), traffic (25), **WCC (22)**
B1 R7 83 Wadwells Lane/R8 Almawillee	10.36 pm	43	43	37	+3.8	1.3/256	Insects (40), irrigator (38), **WCC (37)**
B2 R9Gedhurst/ R22 Mountain View	7.20 pm	n/a	38	37/36*	lapse	3.3/84	Insects (39), irrigator (30), **WCC inaudible**
C R10 Meadholme/ R11 Glenara	8.44 pm	34	34	39	+1.2	0.6/301	Insects (32), traffic (28), **WCC (20)**
D R24 Hazeldene	9.05 pm	25	39	37	+2.8	1.0/309	Traffic (38), birds & insects (33), **WCC (<20)**
E R12 Railway Cottage	11.00 pm	42	38	38	+4.7	0.8/251	Traffic (37), **WCC (30)**, insects (28)
F R96 Talavera	7.15 pm	n/a	36	37	lapse	2.0/50	Birds & insects (36), traffic (25), **WCC inaudible**
G R97	8.41 pm	44	44	35	+1.2	0.6/301	Birds & insects (44), **WCC (34)**
H R98 Kyooma	8.21 pm	43	38	36	+0.5	2.4/286	**WCC (36)**, insects (34)
I R57 Kurrara St	9.23 pm	n/a	43	35	+2.2	1.4/262	Frogs & insects (42), trains (35), **WCC inaudible**
J R57 Coronation Ave	9.03 pm	n/a	36	35	+1.4	1.0/320	Trains (33), traffic (31), insects (28), **WCC inaudible**
K R20 Tonsley Park/ R21 Alco Park	10.33 pm	n/a	39	37	+3.2	2.2/277	Insects (38), traffic (32), **WCC inaudible**
L R103	10.14 pm	n/a	48	35	+3.1	1.9/287	Insects (48), train (35), **WCC inaudible**

1. L1 (1 min) from mine noise only

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

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**.

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		dB(A) Leq	dB(A) Lmax	Date Measured
Type	No.			
Haul truck CAT 785C (unattenuated)	608	120	122	17/7/12
Haul truck CAT 785C (unattenuated)	614		120	17/7/12
Haul truck CAT 785C (unattenuated)	609	120		11/9/12
Haul truck CAT 785C (unattenuated)	610	121		11/9/12
Haul truck CAT 785C (unattenuated)	611	120		11/9/12
Haul truck CAT 785C (unattenuated)	600	119		11/9/12
Haul truck CAT 785C (attenuated)	608	117	120	11/9/12
Water Cart	WA897	113		11/9/12
Scraper	SC882	113		11/9/12
Excavator (PC 3600)	EX551	115		11/9/12
Dozer	829	114		11/9/12
Crushing Plant	n/a	118		11/9/12
Haul truck CAT 785C Start up horn pre attenuation	608		129	17/7/12
Haul truck Cat 785C Start up horn post attenuation	608		124	11/9/12

*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 December 2012

Ref: 04035/4611

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: NOVEMBER 2012 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 29th November, 2012 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 **Appendix 1**.

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]	R20*	Tonsley Park	Private Agreement
		R21*	Alco Park	
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. 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.

WCC Operations

WCC operations on 29th November 2012 had the 3600 and PC4000 excavators in Strip 15 east at RL390m and two 1900 excavators in Strip 12 east at RL320m. The 3600 and PC4000 truck fleets were running to the RL430m east dump during both day and night shifts, and the two 1900 truck fleets were running to the RL360m in pit dump both day and night shift. Scraper operations were limited to day shift only stripping soil for the new Mine Infrastructure Area. The crushing plant operated to 3:30am with no trains loaded during the monitoring period.

Noise Compliance Assessment

The results shown 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.

Table 2
WCC Noise Monitoring Results – 29 November 2012 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	2.25 pm	36	35	n/a	3.0/169	Birds & insects (36), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	12.50 pm	40	37	n/a	2.0/229	Birds & insects (39), traffic (32), WCC barely audible
B2 R9Gedhurst/ R22 Mountain View	1.20 pm	49	37/36*	n/a	2.5/181	Birds & insects (49), WCC (25)
C R10 Meadholme/ R11 Glenara	2.46 pm	38	39	n/a	0.8/125	Birds & insects (37), WCC (30)
D R24 Hazeldene	3.07 pm	40	37	n/a	2.9/176	Traffic (39), birds & insects (30), WCC (30)
E R12 Railway Cottage	4.52 pm	44	38	n/a	1.9/109	Traffic (43), birds & insects (38), WCC inaudible
F R96 Talavera	2.39 pm	41	38	n/a	2.8/153	Birds & insects (39), traffic (37), WCC (<25)
G R97	4.03 pm	35	35	n/a	2.6/180	Birds & insects (33), traffic (26), plane (25) WCC (22)
H R98 Kyooma	3.44 pm	36	36	n/a	1.2/245	Birds & insects (36), WCC (25)
I R57 Kurrara St	4.40 pm	48	35	n/a	1.9/109	Traffic (46), birds & insects (44), WCC inaudible
J R57 Coronation Ave	5.43 pm	58	35	n/a	1.3/88	Traffic (58), train (40), WCC inaudible
K R20 Tonsley Park/ R21 Alco Park	4.33 pm	38	39	n/a	2.5/169	Birds & insects (34), traffic (34), train (30), WCC (26)
L R103	4.15 pm	37	35	n/a	3.1/180	Train (34), birds & insects (33), WCC (26)

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

Table 3
WCC Noise Monitoring Results – 29 November 2012 (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	8.16 pm	n/a	45	35	+5.1	1.5/264	Bird & insects (43), dogs (41), traffic (22), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	10.50 pm	45	47	37	+0.5	2.5/15	Birds & insects (46), WCC (37), traffic (34)
B2 R9Gedhurst/ R22 Mountain View	7.10 pm	n/a	52	37/36*	+3.3	0.7/50	Birds (52), traffic (35), WCC inaudible
C R10 Meadholme/ R11 Glenara	10.26 pm	41	36	39	+0.6	4.6/351	Insects (34), WCC (32)
D R24 Hazeldene	8.38 pm	40	51	37	+5.0	1.2/294	Birds & insects (51), traffic (35), WCC (28)
E R12 Railway Cottage	10.27 pm	39	40	38	+0.6	5.2/350	Insects (38), traffic (34), WCC (30)
F R96 Talavera	7.10 pm	n/a	37	37	+3.3	0.7/50	Insects (37), WCC inaudible
G R97	8.37 pm	30	45	35	+4.5	0.8/287	Insects (45), WCC (22)
H R98 Kyooma	8.18 pm	<25	39	36	+5.1	1.5/264	Birds & insects (39), WCC (<20)
I R57 Kurrara St	9.19 pm	n/a	50	35	+6.4	1.8/338	Frogs & insects (50), traffic (32), trains (31), WCC inaudible
J R57 Coronation Ave	9.00 pm	n/a	40	35	+4.9	1.9/300	Trains (37), insects (36), traffic (32), WCC inaudible
K R20 Tonsley Park/ R21 Alco Park	10.03 pm	n/a	49	37	+4.6	3.6/358	Insects (49), traffic (35), train (33), WCC inaudible
L R103	9.44 pm	n/a	53	35	+7.6	0.8/342	Insects (52), train (45), WCC inaudible

1. L1 (1 min) from mine noise only

* Gedhurst noise criteria is 37dB(A) Leq while Mountain View noise criteria is 36 dB(A) Leq

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**.

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

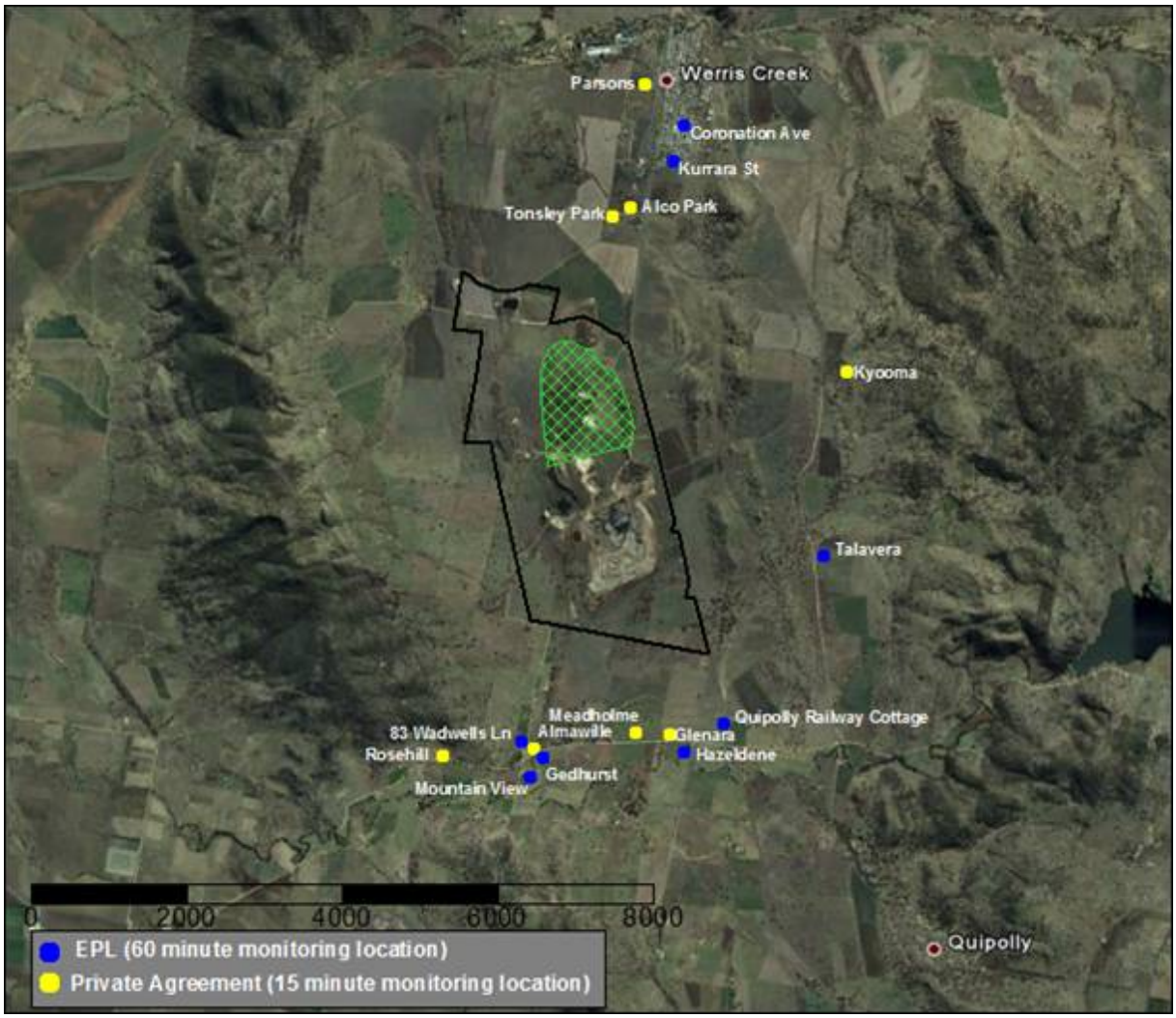
Author:

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 (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

*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.

2 January 2013

Ref: 04035/4631

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: DECEMBER 2012 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 17th December, 2012 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 **Appendix 1**.

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]	R20*	Tonsley Park	Private Agreement
		R21*	Alco Park	
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. 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.

WCC Operations

WCC operations on 17th December 2012 had the 3600 and PC4000 excavators in Strip 13 at RL370m and one 1900 excavator in Strip 11 centre at RL300m and the other 1900 in Strip 12 centre at RL340m. The 3600 and PC4000 truck fleets were running to the RL445m dump during both day and night shifts, and the two 1900 truck fleets were either coaling up to the ROM Pad at RL380m or the western dump at RL390m both day and night shift. Scraper operations were moving overburden from Strip 14 to the LOM Visual Bund at RL410m. The crushing plant operated to 3:30am with one train loaded commencing at 11:25pm and finished at 1:44am.

Noise Compliance Assessment

The results shown 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.

Table 2
WCC Noise Monitoring Results – 17 December 2012 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	4:35 pm	36	35	n/a	6.4 / 143	Birds & insects (36), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	3:29 pm	41	37	n/a	4.2 / 150	Birds & wind (40), tractor (33), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	2:23 pm	42	37/36*	n/a	2 / 155	Birds & wind (42), WCC inaudible
C R10 Meadholme/ R11 Glenara	5:02 pm	38	39	n/a	8.1 / 133	Birds & insects (37), WCC (30)
D R24 Hazeldene	1:18 pm	38	37	n/a	3 / 154	Traffic (37), birds & insects (31), WCC inaudible
E R12 Railway Cottage	4:05 pm	44	38	n/a	3 / 167	Traffic (43), birds & insects (38), WCC inaudible
F R96 Talavera	12:02 pm	42	38	n/a	4.7 / 148	Wind (39), insects (35), traffic (33), WCC (<20)
G R97	1:26 pm	37	35	n/a	3 / 154	Wind (36), traffic (31), WCC (<25)
H R98 Kyooma	1:08 pm	42	36	n/a	3.8 / 170	Wind (39), birds (36), WCC (32)
I R57 Kurrara St	2:12 pm	55	35	n/a	4.2 / 137	Traffic (52), birds (52), WCC inaudible
J R57 Coronation Ave	1:50 pm	47	35	n/a	2.7 / 144	Traffic (46), wind (40), WCC inaudible
K R20 Tonsley Park/ R21 Alco Park	3:18 pm	43	39	n/a	4.5 / 153	Traffic (40), wind (40), WCC inaudible
L R103	3:37 pm	45	35	n/a	3.7 / 139	Dogs (43), train (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 – 17/18 December 2012 (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	8:37 pm	n/a	37	35	-0.5	6.6 / 130	Pump (35), dogs (31), traffic (25), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	8:59 pm	n/a	38	37	0.1	5 / 108	Birds & insects (38), traffic (26), WCC (<25)
B2 R9Gedhurst/ R22 Mountain View	11:16 pm	n/a	32	37/36*	0.5	3.7 / 128	Insects (32), WCC inaudible
C R10 Meadholme/ R11 Glenara	10:08 pm	n/a	33	39	1.2	4.6 / 120	Insects (32), traffic (28), WCC inaudible
D R24 Hazeldene	12:21 am	31	51	37	1.0	3.7 / 129	Insects (30), traffic (23), WCC inaudible
E R12 Railway Cottage	10:56 pm	<30	40	38	0.9	3.7 / 124	Train (57), traffic (36), WCC (<25)
F R96 Talavera	7:38 pm	<35	41	37	-0.1	4.3 / 134	Traffic (40), train (33), WCC (<30)
G R97	9:10 pm	<30	40	35	0.5	3.8 / 109	Insects (39), wind (32), WCC (<25)
H R98 Kyooma	8:50 pm	<35	37	36	-0.5	5 / 108	Birds & insects (36), wind (31), WCC (<30)
I R57 Kurrara St	9:44 pm	<30	50	35	0.9	3.9 / 128	Frogs (45), traffic (44), trains (44), WCC (<25)
J R57 Coronation Ave	9:24 pm	<35	40	35	0.3	4.5 / 112	Wind (37), trains (33), insects (30), WCC (<30)
K R20 Tonsley Park/ R21 Alco Park	8:11 pm	<30	46	37	-0.5	4.9 / 136	Insects (45), wind (38), traffic (30), WCC (25)
L R103	7:48 pm	n/a	42	35	-0.2	4.3 / 134	Train (40), 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.

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**.

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

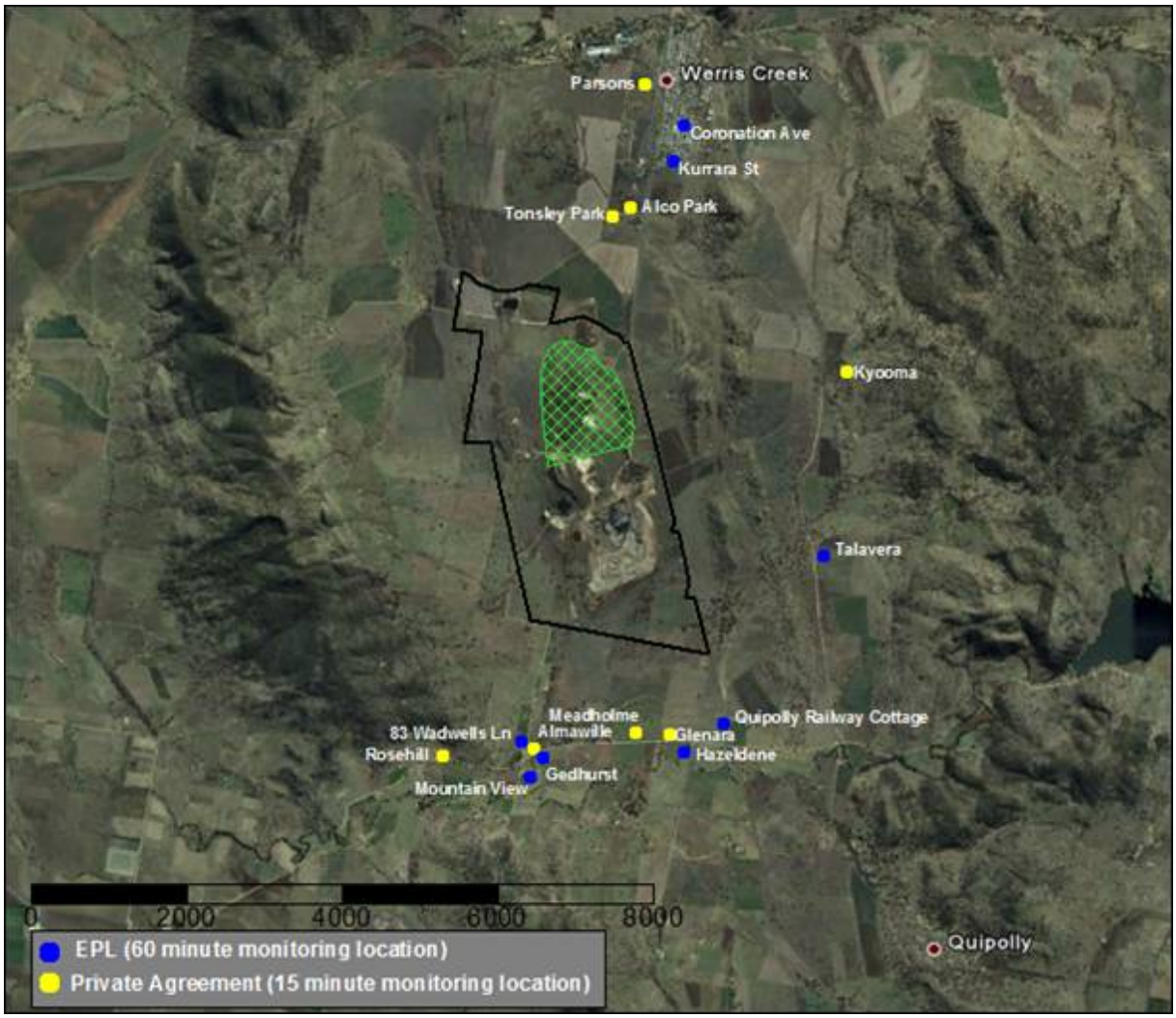
Author:

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 (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

*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.

18 January 2013

Ref: 04035/4643

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: JANUARY 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 16th January, 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 **Appendix 1**.

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]	R20*	Tonsley Park	Mine Owned
		R21*	Alco Park	
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. 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. The lower temperature probe at the weather station was not operational on the 16th January so temperature inversion strength was interpreted from the 10m probe at the weather station and a temperature probe at Quipolly, a vertical separation of 96.3m.

WCC Operations

WCC operations on 16th January 2013 had the 3600 and a 1900 excavator in Strip 12 east at RL320m and PC4000 and a 1900 excavator in Strip 13 west at RL390m. All overburden truck fleets were running to the RL430m western dump on day shift and to the RL390m western dump on night shift. Coal truck fleets ran from in pit to the ROM Pad at RL380m. Scraper operations were moving overburden from Strip 15 to the LOM Visual Bund at RL410m on the eastern side of the mine on day shift only. The crushing plant operated to 3:30am with one train loaded commencing at 3:29am and finished at 5:44am.

Noise Compliance Assessment

The results shown 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.

Table 2
WCC Noise Monitoring Results – 16 January 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	2:43 pm	55	35	n/a	1.9/254	Birds & insects (55), traffic (32), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	1:40 pm	48	37	n/a	1.9/272	Birds & insects (47), traffic (41), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	1:39 pm	42	37/36*	n/a	1.9/272	Birds & insects (42), traffic (30), WCC inaudible
C R10 Meadholme/ R11 Glenara	3:07 pm	45	39	n/a	1.5/299	Birds & insects (45), WCC (<25)
D R24 Hazeldene	3:25 pm	36	37	n/a	0.7/123	Birds & insects (34), traffic (30), WCC (25)
E R12 Railway Cottage	5:00 pm	39	38	n/a	2.4/47	Traffic (38), birds & insects (32), WCC inaudible
F R96 Talavera	2:45 pm	40	38	n/a	1.3/294	Birds & insects (40), WCC (20)
G R97	4:10 pm	34	35	n/a	1.9/127	Birds & insects (34), WCC (17)
H R98 Kyooma	3:50 pm	32	36	n/a	1.0/150	Birds & insects (32), WCC (19)
I R57 Kurrara St	4:48 pm	46	35	n/a	2.1/120	Traffic (42), train (41), birds & insects (40), WCC inaudible
J R57 Coronation Ave	4:30 pm	46	35	n/a	0.3/74	Traffic (43), birds & insects (43), WCC inaudible
L R103	4:35 pm	36	35	n/a	0.3/74	Train (36), 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 – 16 January 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	9:10 pm	37	47	35	+2.8	2.6/85	Birds & insects (47), traffic (32), WCC (28)
B1 R7 83 Wadwells Lane/R8 Almawillee	10:55 pm	43	42	37	+4.2	2.7/87	Insects (41), WCC (35)
B2 R9Gedhurst/ R22 Mountain View	8:07 pm	44	44	37/36*	+2.6	3.2/69	Birds & insects (43), WCC (37)
C R10 Meadholme/ R11 Glenara	9:30 pm	43	39	39	+3.3	2.3/85	Insects (37), WCC (34)
D R24 Hazeldene	9:48 am	40	51	37	+3.6	2.6/90	Insects (51), traffic (38), WCC (32)
E R12 Railway Cottage	10:50 pm	35	46	38	+4.2	2.7/87	Traffic (45), insects (35), WCC (28)
F R96 Talavera	7:40 pm	35	33	37	+0.6	3.4/63	Birds & insects (31), WCC (30)
G R97	9:02 pm	37	39	35	+3.2	2.7/84	Insects (38), WCC (32)
H R98 Kyooma	8:44 pm	39	36	36	+3.3	2.6/85	Insects (34), WCC (32)
I R57 Kurrara St	9:43 pm	n/a	46	35	+3.6	2.6/90	Frogs (42), insects (40), traffic (39), trains (39), WCC inaudible
J R57 Coronation Ave	9:22 pm	n/a	44	35	+3.3	2.6/85	Traffic (42), trains (40), insects (33), WCC inaudible
L R103	7:43 pm	n/a	40	35	+0.9	3.7/59	Train (40), birds (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 shown in Table 3 indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC exceeded the criterion of 36 dB(A) Leq at the Mountain View (Gedhurst) monitoring location during the evening/night monitoring period.

WCC environmental licence conditions indicate that compliance with noise emission criteria is not applicable under atmospheric conditions where winds speeds are higher than 3m/s and/or there is a temperature inversion of greater than +3° C/100m. Data from the mine operated weather station indicated that the elevated noise level was measured whilst the wind was at 3.2m/s and, therefore, under non-compliant atmospheric conditions.

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**.

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

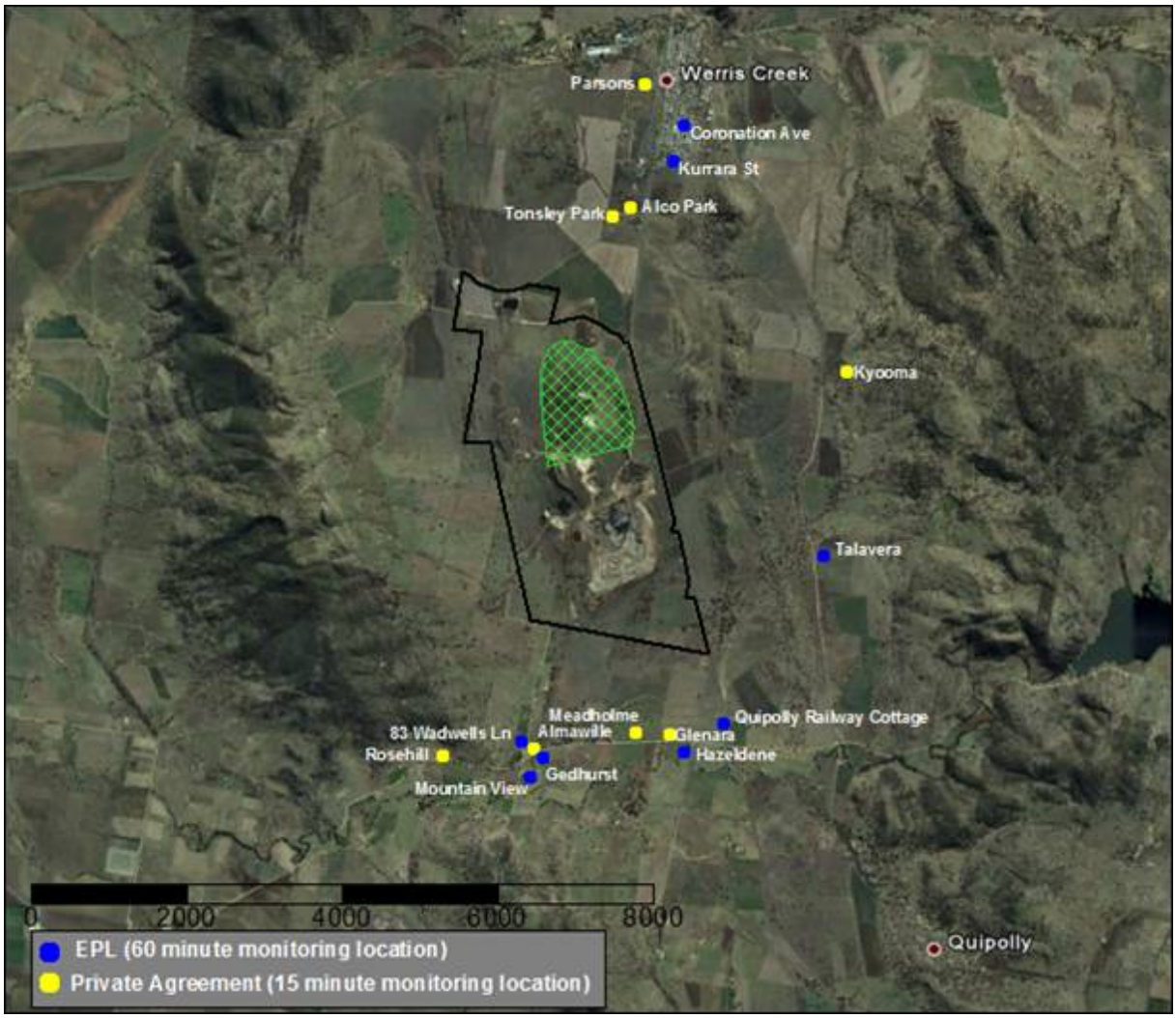
Author:

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 (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

*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.

13 February 2013

Ref: 04035/4670

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: FEBRUARY 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 6th February, 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 **Appendix 1**.

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]	R20*	Tonsley Park	Mine Owned
		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. 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 6th February 2013 had the 3600 and a 1900 excavator in Strip 12 east at RL310m; the PC4000 excavator in Strip 11 centre at RL290m and a 1900 excavator in Strip 14 centre at RL370m. Three overburden truck fleets were running to the RL410m western dump on day and night shift; while one overburden fleet was hauling gravel to the new Mine Infrastructure Area pad. Scraper operations were moving overburden from Strip 15 to the LOM Visual Bund at RL410m on the eastern side of the mine on day and night shift. The crushing plant operated to 3:30am with one train loaded commencing at 10:00am and finished at 12:13pm.

Noise Compliance Assessment

The results shown 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.

Table 2
WCC Noise Monitoring Results – 6 February 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion ^{O}C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	2:35 pm	38	35	n/a	2.1/209	Traffic (36), birds & insects (33), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	1:34 pm	48	37	n/a	3.1/197	Birds & insects (47), traffic (41), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	1:30 pm	43	37/36*	n/a	3.1/197	Birds & insects (41), traffic (35), WCC inaudible
C R10 Meadholme/ R11 Glenara	2:55 pm	45	39	n/a	2.0/161	Birds & insects (45), traffic (22), WCC inaudible
D R24 Hazeldene	3:14 pm	37	37	n/a	3.8/200	Traffic (36), birds & insects (30), WCC inaudible
E R12 Railway Cottage	5:00 pm	44	38	n/a	5.5/197	Traffic (44), birds & insects (35), WCC inaudible
F R96 Talavera	2:40 pm	36	38	n/a	2.8/193	Birds & insects (34), traffic (32), WCC inaudible
G R97	4:10 pm	39	35	n/a	4.7/196	Birds & insects (37), wind (32), WCC inaudible
H R98 Kyooma	3:45 pm	37	36	n/a	3.9/201	Birds & insects (36), wind in trees (31), WCC barely audible
I R57 Kurrara St	4:52 pm	43	35	n/a	5.5/197	Train (40), traffic (39), birds & insects (32), WCC inaudible
J R57 Coronation Ave	4:34 pm	45	35	n/a	4.8/197	Construction noise (41), traffic (40), birds & insects (38), WCC inaudible
K R21 Alco Park	4:37 pm	46		n/a	4.9/197	Birds & insects (43), traffic (42), trains (34), WCC inaudible
L R103	4:20 pm	36	35	n/a	4.7/196	Traffic (35), birds (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 February 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	8:30 pm	n/a	40	35	+1.7	4.1/167	Frogs & insects (39), traffic (32), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	10:47 pm	42	43	37	+6.2	1.0/100	Insects (42), WCC (34), traffic (30)
B2 R9Gedhurst/ R22 Mountain View	7:25 pm	n/a	43	37/36*	+1.1	4.3/185	Birds & insects (42), traffic (34), WCC inaudible
C R10 Meadholme/ R11 Glenara	8:50 pm	n/a	37	39	+1.8	3.2/159	Frogs & insects (34), traffic (34), WCC inaudible
D R24 Hazeldene	9:09 am	n/a	43	37	+2.6	2.7/151	Frogs & insects (42), traffic (34), WCC inaudible
E R12 Railway Cottage	11:00 pm	n/a	44	38	+6.5	1.4/77	Traffic (44), insects (35), WCC barely audible
F R96 Talavera	7:30 pm	n/a	43	37	+1.1	4.3/185	Birds & insects (43), traffic (30), WCC inaudible
G R97	8:52 pm	<25	38	35	+1.8	3.2/159	Frogs & insects (38), WCC (20)
H R98 Kyooma	8:33 pm	28	34	36	+1.7	4.1/167	Frogs & insects (34), WCC (23)
I R57 Kurrara St	9:35 pm	n/a	39	35	+3.6	1.9/134	Frogs & insects (39), traffic (30), trains (22), WCC inaudible
J R57 Coronation Ave	9:13 pm	n/a	36	35	+3.1	3.0/152	Traffic (34), insects (32), WCC inaudible
K R21 Alco Park	10:38 pm	n/a	44		+5.8	0.4/153	Insects (42), trains (38), traffic (37), WCC inaudible
L R103	10:18 pm	n/a	51	35	+4.9	0.6/148	Train (50), insects (44), 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 shown in Table 3 indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC did not exceed the relevant noise criterion oat any location or time 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

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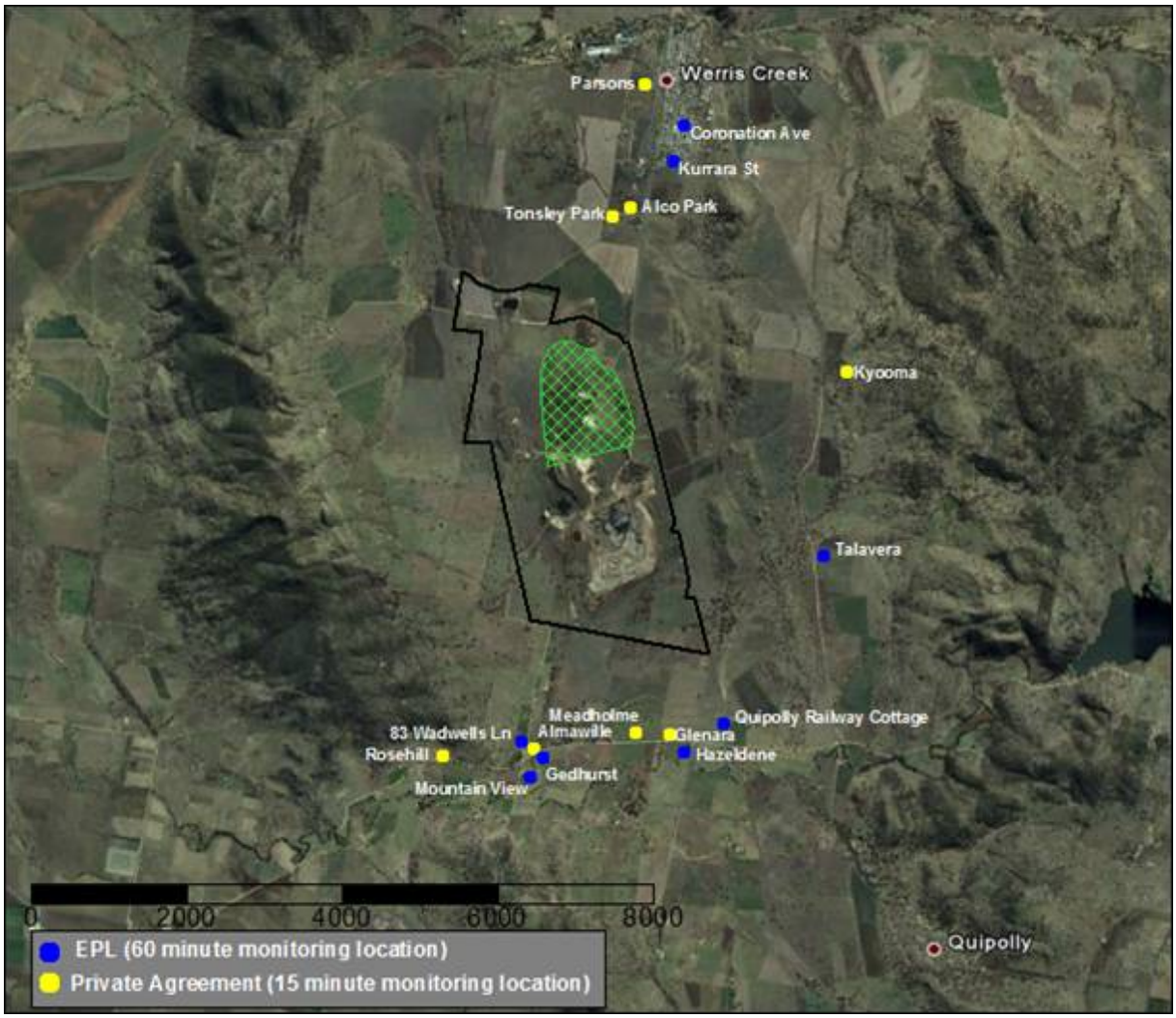
Appendix I



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.

4 April 2013

Ref: 04035/4721

Werris Creek Coal
1435 Werris Creek – Quirindi Road
Werris Creek NSW 2341

RE: MARCH 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 27th March, 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 27th March 2013 had the 3600 excavator in Strip 19 on top of the hill in the pre-strip at RL420m; the PC4000 excavator in Strip 12 west at RL300m; a 1900 excavator in Strip 13 west at RL340m and a 1900 excavator in Strip 11 centre at RL280m. Two overburden truck fleets were running to the RL390m western dump on day and night shift; while one overburden fleet was hauling gravel from the 3600 to the new Mine Infrastructure Area pad. One truck fleet was coaling from the bottom of the pit to the ROM pad. Scraper operations were spreading topsoil on the eastern rehab on day shift only. 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 – 27 March 2013 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
A R5 Rosehill	1:15 pm	36	35	n/a	1.8/253	Birds & insects (36), traffic (25), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	1:22 pm	39	37	n/a	1.6/244	Birds & insects (39), WCC inaudible
B2 R9Gedhurst/ R22 Mountain View	1:35 pm	37	37/36*	n/a	1.4/220	Birds & insects (36), traffic (30), WCC (22)
C R10 Meadholme/ R11 Glenara	2:27 pm	38	39	n/a	1.9/202	Birds & insects (36), plane (32), WCC inaudible
D R24 Hazeldene	2:50 pm	43	37	n/a	1.7/183	Birds (39), traffic (38), train (36), WCC inaudible
E R12 Railway Cottage	4:48 pm	38	38	n/a	1.5/269	Birds & insects (36), traffic (32), WCC inaudible
F R96 Talavera	3:42 pm	37	38	n/a	1.6/238	Birds & insects (37), WCC (15)
G R97	3:05 pm	32	35	n/a	2.0/169	Birds & insects (32), WCC (20)
H R98 Kyooma	3:23 pm	39	36	n/a	1.6/189	Birds & insects (39), WCC (20)
I R57 Kurrara St	4:43 pm	51	35	n/a	1.5/269	Traffic (49), trains (45), WCC inaudible
J R57 Coronation Ave	2:45 pm	48	35	n/a	1.5/184	Traffic (48), birds & insects (39), WCC inaudible
K R21 Alco Park	3:55 pm	50	35	n/a	1.7/179	Cars (50), traffic (37), trains (36), WCC inaudible
L R103	4:19 pm	39	35	n/a	1.6/297	Trains, (36), traffic (35), 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 – 27 March 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	7:50 pm	n/a	42	35	+7.4	0.3/119	Birds & insects (42), dog (31), WCC inaudible
B1 R7 83 Wadwells Lane/R8 Almawillee	10:00 pm	<30	43	37	+7.0	0.6/226	Insects (43), WCC (25)
B2 R9Gedhurst/ R22 Mountain View	8:10 pm	32	39	37/36*	+7.7	1.0/43	Birds & insects (39), traffic (28), WCC (25)
C R10 Meadholme/ R11 Glenara	11:03 pm	<35	41	39	+7.5	1.0/32	Insects (38), traffic (35), WCC (32)
D R24 Hazeldene	11:21 pm	<30	41	37	+6.7	1.9/6	Traffic (40), insects (34), WCC (25)
E R12 Railway Cottage	11:26 pm	<25	37	38	+6.7	2.0/345	Insects (37), WCC (20), traffic (18)
F R96 Talavera	10:20 pm	38	46	37	+6.9	0.6/190	Insects (46), WCC (30)
G R97	9:40 pm	<25	43	35	+7.8	1.7/335	Insects (43), WCC (17)
H R98 Kyooma	10:00 pm	<25	34	36	+7.2	0.3/351	Insects (30), WCC (15)
I R57 Kurrara St	8:01 pm	n/a	52	35	+7.0	0.8/97	Trains (51), insects (40), traffic (38), WCC inaudible
J R57 Coronation Ave	9:20 pm	38	42	35	+8.5	1.2/317	Train (40), traffic (35), insects (32), WCC (32)
K R21 Alco Park	9:05 pm	36	47		+7.5	1.2/317	Insects (46), trains (36), traffic (37), WCC (32)
L R103	9:23 pm	n/a	48	35	+6.7	1.6/325	Train (45), insects (44), 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.

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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.

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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.

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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.

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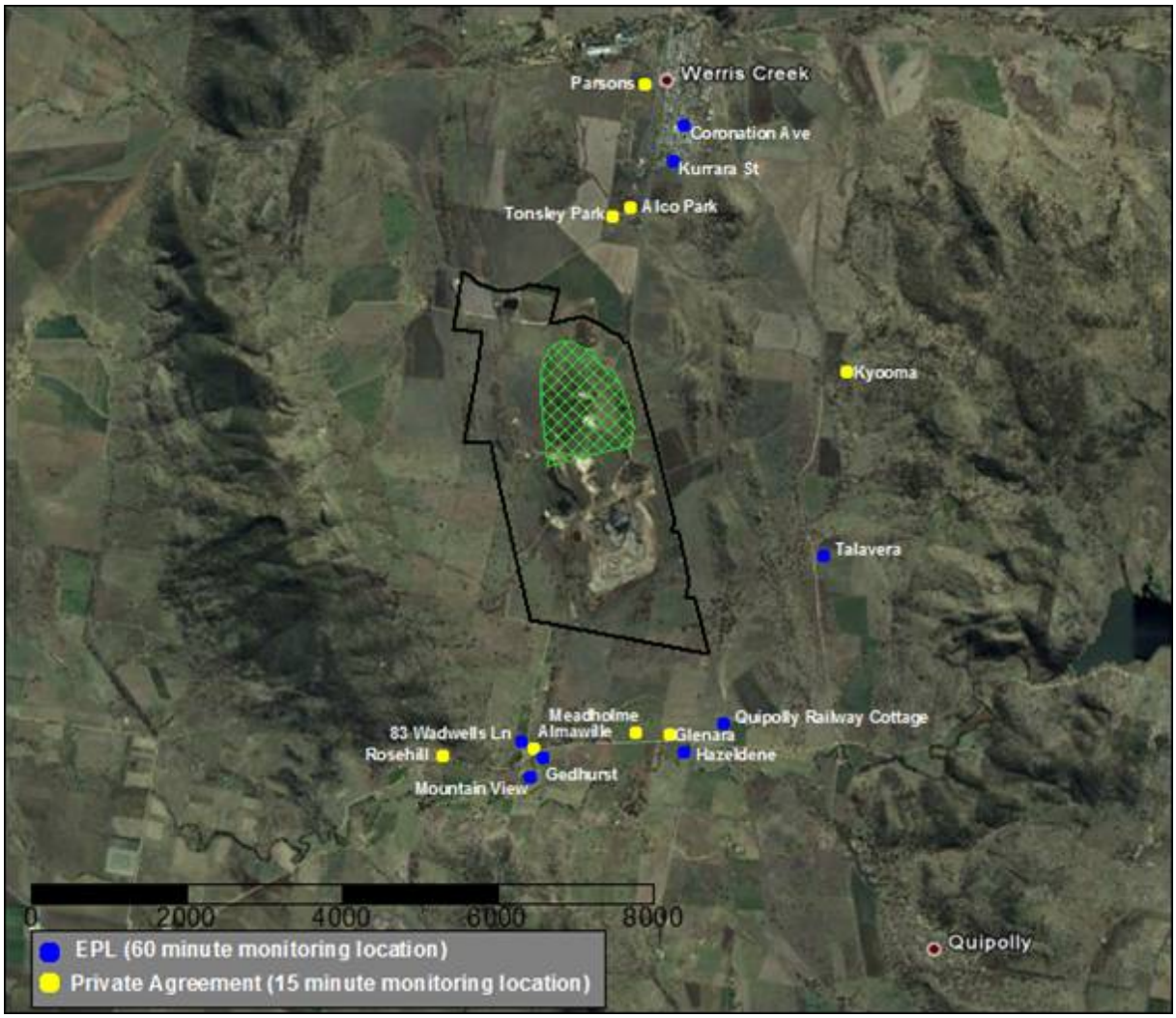
Appendix I



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.

Meteorological Daily Statistics Summary

Unit Id	:	Mountain View (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2012/05/09
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature 2m Avg	2m Min	2m Max	10m Avg	10m Min	10m Max	60m Avg	60m Min	60m Max	Humidity Avg	Humidity Min	Humidity Max	Prevailing Wind Speed Avg	Speed Min	Speed Max	Gust	Dir	Rain	Bar	Solar Rad Avg	Solar Rad Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2012/04/02 00:00:09	20.1	12.3	28.3	20.0	12.7	27.1	-99.0	-99.0	-99.0	51.5	24.3	74.1	2.3	0.0	6.6	9.9	122	0.0	1018.6	202.8	739.0
2012/04/03 00:00:04	21.6	15.9	27.9	21.3	15.9	26.5	-99.0	-99.0	-99.0	53.3	40.4	67.2	1.5	0.0	6.3	10.3	125	0.0	1017.3	207.4	848.1
2012/04/04 00:00:04	21.9	13.8	28.7	21.8	14.3	27.9	-99.0	-99.0	-99.0	49.8	27.3	76.0	0.9	0.0	5.5	7.6	140	0.0	1016.9	203.2	764.3
2012/04/05 00:00:04	23.4	17.1	30.8	23.3	17.6	29.7	-99.0	-99.0	-99.0	48.8	34.2	59.5	1.0	0.0	5.8	7.6	123	0.0	1016.9	194.2	784.7
2012/04/06 00:00:04	22.5	18.2	28.8	22.2	18.0	28.2	-99.0	-99.0	-99.0	55.7	35.7	71.2	1.3	0.0	6.0	8.3	122	0.0	1019.6	197.0	711.6
2012/04/07 00:00:04	21.1	14.6	27.8	20.9	15.0	27.1	-99.0	-99.0	-99.0	52.1	30.1	78.6	0.4	0.0	3.9	5.8	155	0.0	1020.0	202.1	727.5
2012/04/08 00:00:04	21.9	17.0	27.9	21.5	17.1	26.9	-99.0	-99.0	-99.0	54.5	44.5	75.4	1.1	0.0	4.0	5.0	263	0.0	1018.7	154.1	780.3
2012/04/09 00:00:04	22.0	16.2	29.4	21.6	16.5	28.7	-99.0	-99.0	-99.0	64.1	34.1	84.0	1.7	0.3	10.8	17.2	272	3.2	1018.3	181.2	862.0
2012/04/10 00:00:04	17.7	13.0	23.2	17.2	13.4	22.0	-99.0	-99.0	-99.0	57.1	31.9	84.7	1.9	0.4	6.7	8.4	213	0.0	1018.8	180.8	691.4
2012/04/11 00:00:04	12.9	8.8	17.4	12.5	8.7	16.5	-99.0	-99.0	-99.0	52.6	32.5	69.0	5.1	1.2	9.4	13.8	122	0.0	1025.4	203.3	746.1
2012/04/12 00:00:04	13.2	8.8	18.7	12.8	9.0	17.4	-99.0	-99.0	-99.0	62.0	49.3	75.0	5.4	0.7	11.4	14.4	104	0.0	1030.2	179.6	648.3
2012/04/13 00:00:04	15.4	8.8	22.0	15.1	9.1	20.9	-99.0	-99.0	-99.0	64.0	43.1	85.1	3.7	0.0	7.9	10.8	100	0.0	1032.0	178.2	917.1
2012/04/14 00:00:04	17.6	10.7	24.7	17.3	10.7	24.1	-99.0	-99.0	-99.0	58.1	37.2	77.2	1.2	0.2	4.6	6.1	120	0.0	1030.8	204.1	753.4
2012/04/15 00:00:09	19.8	13.4	25.5	19.5	13.9	24.3	-99.0	-99.0	-99.0	57.4	41.0	76.6	1.5	0.0	6.6	8.4	113	0.0	1027.5	162.9	896.2
2012/04/16 00:00:04	20.1	17.3	24.9	19.8	17.4	23.6	-99.0	-99.0	-99.0	64.6	51.3	74.6	1.2	0.0	6.3	8.1	102	0.0	1024.6	111.8	941.5
2012/04/17 00:00:04	18.3	16.0	24.2	18.0	15.9	22.7	-99.0	-99.0	-99.0	75.3	55.5	85.7	3.1	0.9	9.8	12.3	106	1.0	1022.8	90.5	859.9
2012/04/18 00:00:04	16.5	14.6	19.5	16.2	14.4	18.5	-99.0	-99.0	-99.0	79.2	68.8	86.8	3.9	0.7	7.8	10.6	107	0.0	1021.3	76.0	480.2
2012/04/19 00:00:04	18.5	14.0	25.2	18.1	14.0	24.3	-99.0	-99.0	-99.0	71.4	46.6	87.7	1.7	0.2	7.2	9.0	100	0.2	1018.6	112.0	688.0
2012/04/20 00:00:04	20.7	16.5	26.3	20.3	16.5	25.2	-99.0	-99.0	-99.0	63.2	44.8	82.7	0.6	0.1	4.8	6.5	191	0.0	1017.8	151.8	760.1
2012/04/21 00:00:04	20.4	14.4	26.9	20.2	14.4	26.3	-99.0	-99.0	-99.0	62.0	37.6	86.1	0.4	0.0	4.6	6.1	207	0.0	1017.4	149.2	843.1
2012/04/22 00:00:05	21.7	15.2	-99.0	21.6	15.5	-99.0	-99.0	-99.0	-99.0	55.9	34.7	76.6	0.6	0.0	5.2	293.5	141	0.0	1015.5	157.6	687.0
2012/04/23 00:00:04	21.3	16.5	26.0	21.1	16.4	25.1	-99.0	-99.0	-99.0	55.4	38.0	74.0	0.9	0.1	4.6	6.1	269	0.0	1015.2	117.5	665.7
2012/04/24 00:00:04	17.8	16.0	20.9	17.4	15.3	21.2	-99.0	-99.0	-99.0	77.1	51.6	87.4	1.5	0.0	5.9	9.2	300	10.4	1016.3	27.0	123.5
2012/04/25 00:00:04	17.1	11.5	21.6	16.6	11.6	20.9	-99.0	-99.0	-99.0	68.2	41.1	87.6	3.5	0.4	11.0	14.0	246	0.0	1015.6	110.1	730.4

Continued on next page

Record Time	Temperature												Prevailing Wind							
	2m			10m			60m			Humidity			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)	
2012/04/26 00:00:04	11.1	7.0	15.2	10.4	6.5	14.2	-99.0	-99.0	-99.0	60.9	48.2	74.0	3.9	0.1	7.5	10.3	256	0.0	1017.7	160.2	751.6
2012/04/27 00:00:04	12.9	6.4	19.3	12.5	6.4	18.7	-99.0	-99.0	-99.0	62.8	48.5	75.0	0.4	0.0	4.8	6.6	251	0.0	1020.7	165.0	639.0
2012/04/28 00:00:04	15.4	9.3	20.9	15.3	9.4	20.7	-99.0	-99.0	-99.0	64.7	49.7	78.8	0.6	0.0	4.6	6.9	307	0.0	1022.3	114.7	564.4
2012/04/29 00:00:04	15.5	13.0	18.5	15.3	13.0	18.0	-99.0	-99.0	-99.0	73.9	66.4	83.5	0.6	0.0	2.8	3.6	148	0.0	1022.1	63.6	554.3
2012/04/30 00:00:04	15.2	9.4	22.0	15.0	9.9	21.2	-99.0	-99.0	-99.0	68.8	37.9	88.1	4.1	0.0	10.1	12.1	104	0.0	1021.3	166.5	766.6

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2012/06/30
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature 2m Avg	2m Min	2m Max	10m Avg	10m Min	10m Max	60m Avg	60m Min	60m Max	Humidity Avg	Humidity Min	Humidity Max	Prevailing Wind Speed Avg	Speed Min	Speed Max	Gust	Dir	Rain	Bar	Solar Rad Avg	Solar Rad Max
					(°C)						(%)			(m/s)		(m/s)	(°)	(mm)	(hPa)	(W/m^2)	
2012/05/01 00:00:04	15.2	10.2	21.8	15.0	10.1	21.1	-99.0	-99.0	-99.0	62.9	41.2	82.8	2.2	0.2	6.2	7.6	89	0.0	1025.6	145.7	736.4
2012/05/02 00:00:04	17.1	10.7	23.6	16.9	11.3	23.0	-99.0	-99.0	-99.0	56.2	40.2	71.8	0.2	0.0	3.2	4.6	83	0.0	1026.0	146.6	736.2
2012/05/03 00:00:04	17.6	16.1	20.9	17.2	15.6	20.8	-99.0	-99.0	-99.0	63.4	41.5	72.8	1.3	0.2	3.9	7.1	229	0.0	1021.5	0.0	0.0
2012/05/04 00:00:04	15.9	11.6	21.0	15.6	11.9	20.5	-99.0	-99.0	-99.0	75.9	56.2	88.0	0.4	0.0	3.9	4.9	164	5.0	1020.5	84.5	687.1
2012/05/05 00:00:04	17.2	10.9	21.7	16.9	11.6	20.5	-99.0	-99.0	-99.0	54.1	31.8	74.2	1.9	0.0	5.1	7.1	172	0.0	1018.2	177.4	689.5
2012/05/06 00:00:04	13.0	7.5	19.0	12.9	7.7	17.7	-99.0	-99.0	-99.0	62.7	41.5	83.9	1.4	0.0	6.9	8.5	134	0.0	1017.2	152.4	692.8
2012/05/07 00:00:04	12.5	5.9	19.0	12.0	5.4	17.8	-99.0	-99.0	-99.0	56.1	31.0	79.4	2.0	0.2	5.2	8.5	272	0.0	1019.2	160.3	618.4
2012/05/08 00:00:04	13.5	6.8	20.8	13.2	6.4	19.7	-99.0	-99.0	-99.0	52.8	35.2	74.0	0.6	0.0	3.5	5.6	253	0.0	1019.3	147.9	669.7
2012/05/09 00:00:04	14.9	7.0	22.2	14.8	7.2	22.3	-99.0	-99.0	-99.0	52.0	34.1	75.0	0.5	0.0	3.8	6.1	206	0.0	1020.2	148.4	599.4
2012/05/10 00:00:04	16.3	9.3	24.4	16.3	9.3	23.5	-99.0	-99.0	-99.0	49.0	30.8	67.6	0.4	0.0	3.3	5.4	188	0.0	1023.5	150.4	613.8
2012/05/11 00:00:04	18.1	10.2	25.6	18.1	10.7	24.7	-99.0	-99.0	-99.0	45.3	27.0	67.3	0.6	0.0	3.8	6.0	217	0.0	1024.0	149.6	609.8
2012/05/12 00:00:04	18.5	10.4	24.7	18.4	11.1	23.9	-99.0	-99.0	-99.0	45.1	31.2	65.8	2.0	0.0	5.2	7.4	275	0.0	1021.5	151.1	595.4
2012/05/13 00:00:04	16.3	9.8	22.6	16.1	10.6	21.4	-99.0	-99.0	-99.0	48.5	36.9	63.4	2.8	0.0	7.8	10.4	239	0.0	1018.7	144.3	680.8
2012/05/14 00:00:04	10.7	4.3	16.1	10.2	4.7	14.8	-99.0	-99.0	-99.0	54.7	40.0	72.1	2.8	0.0	7.5	11.1	236	0.0	1019.7	149.6	590.5
2012/05/15 00:00:04	10.2	4.8	16.2	10.1	5.7	15.1	-99.0	-99.0	-99.0	54.9	34.5	74.6	1.8	0.1	4.8	7.2	118	0.0	1023.0	143.3	583.1
2012/05/16 00:00:04	11.0	4.8	18.0	10.9	5.3	17.0	-99.0	-99.0	-99.0	49.6	28.5	65.6	1.2	0.0	5.0	6.0	122	0.0	1024.9	139.4	572.3
2012/05/17 00:00:04	12.7	5.8	20.7	12.7	6.7	19.4	-99.0	-99.0	-99.0	53.1	30.5	70.6	0.8	0.0	3.4	4.5	123	0.0	1024.8	134.8	557.5
2012/05/18 00:00:04	14.1	8.5	21.4	14.0	8.6	20.0	-99.0	-99.0	-99.0	54.0	31.8	78.4	0.3	0.0	5.2	6.6	208	0.0	1024.9	135.2	550.0
2012/05/19 00:00:04	13.9	8.3	21.2	13.9	8.6	20.3	-99.0	-99.0	-99.0	49.9	29.3	74.8	0.8	0.0	4.0	5.6	252	0.0	1025.4	135.3	544.5
2012/05/20 00:00:04	13.3	6.6	21.1	13.2	7.0	20.4	-99.0	-99.0	-99.0	42.6	25.2	58.7	1.0	0.0	6.2	8.0	259	0.0	1025.1	136.2	593.3
2012/05/21 00:00:04	13.1	6.4	21.0	13.1	6.9	19.8	-99.0	-99.0	-99.0	45.1	24.7	61.9	1.2	0.0	6.3	7.6	130	0.0	1025.2	132.7	564.6
2012/05/22 00:00:04	14.6	9.3	20.1	14.4	9.6	19.1	-99.0	-99.0	-99.0	55.3	39.7	69.7	1.1	0.0	6.3	9.0	263	0.0	1025.2	119.9	588.0
2012/05/23 00:00:04	13.2	7.3	19.0	13.1	7.5	18.2	-99.0	-99.0	-99.0	54.1	29.8	79.6	1.5	0.0	6.8	8.9	271	0.0	1026.4	128.3	524.3
2012/05/24 00:00:04	13.4	6.0	20.3	13.4	6.4	19.2	-99.0	-99.0	-99.0	44.4	29.0	61.3	1.7	0.0	5.7	7.6	273	0.0	1026.3	128.7	515.5

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)	
2012/05/25 00:00:04	15.2	11.0	20.7	15.0	11.2	20.0	-99.0	-99.0	-99.0	66.6	42.4	87.6	1.8	0.0	7.2	9.3	290	11.0	1021.6	63.3	545.6
2012/05/26 00:00:04	11.8	7.6	15.7	11.3	7.4	15.5	-99.0	-99.0	-99.0	77.0	61.2	87.5	6.2	2.8	11.0	15.1	269	16.8	1018.4	43.0	413.0
2012/05/27 00:00:04	9.0	5.4	12.0	8.6	4.9	11.4	-99.0	-99.0	-99.0	71.2	59.2	81.9	3.6	0.9	7.7	9.3	285	0.0	1021.1	75.8	524.8
2012/05/28 00:00:04	10.0	5.3	15.5	9.8	5.4	14.6	-99.0	-99.0	-99.0	69.0	52.6	82.9	1.0	0.0	4.7	6.1	137	0.0	1022.2	102.7	537.3
2012/05/29 00:00:04	11.7	6.7	17.3	11.7	6.9	16.5	-99.0	-99.0	-99.0	67.2	49.6	80.3	3.6	0.7	7.9	10.9	104	0.0	1026.5	110.7	486.7
2012/05/30 00:00:04	12.3	6.7	19.1	12.1	6.9	18.0	-99.0	-99.0	-99.0	71.4	48.4	84.5	3.0	0.0	6.6	9.5	92	0.0	1031.1	103.2	464.9
2012/05/31 00:00:04	13.0	7.4	19.7	12.9	7.8	18.9	-99.0	-99.0	-99.0	65.6	42.7	83.2	2.2	1.0	5.9	8.9	89	0.0	1033.5	109.8	442.8

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2012/07/01
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)	
2012/06/01 00:00:04	13.6	7.6	20.5	13.5	7.9	19.7	-99.0	-99.0	-99.0	62.0	38.8	78.1	1.9	0.1	4.9	6.0	101	0.0	1031.9	110.1	450.7
2012/06/02 00:00:04	14.1	10.3	19.2	13.9	10.0	18.4	-99.0	-99.0	-99.0	69.4	54.4	78.8	1.3	0.1	3.3	3.9	121	0.0	1027.3	63.7	544.9
2012/06/03 00:00:04	13.1	12.0	14.7	12.7	11.5	14.6	-99.0	-99.0	-99.0	83.8	68.5	89.4	1.3	0.0	3.6	4.2	132	8.2	1020.8	24.3	139.6
2012/06/04 00:00:04	13.5	11.8	15.9	13.0	11.4	15.3	-99.0	-99.0	-99.0	88.9	82.3	90.4	0.7	0.0	4.4	5.7	147	18.6	1013.3	40.5	529.4
2012/06/06 00:00:04	8.7	7.4	10.1	8.1	6.6	9.3	-99.0	-99.0	-99.0	78.6	72.9	85.7	4.3	0.8	8.6	11.7	197	2.2	1009.0	54.4	456.3
2012/06/07 00:00:04	10.5	7.6	13.1	10.0	6.9	12.1	-99.0	-99.0	-99.0	75.2	64.6	88.3	5.3	0.0	11.0	15.1	113	0.4	1016.9	57.2	458.5
2012/06/08 00:00:04	9.8	6.7	14.7	9.6	6.7	13.9	-99.0	-99.0	-99.0	77.7	60.3	88.6	3.2	0.3	6.5	8.5	118	0.0	1023.2	87.9	459.3
2012/06/09 00:00:04	10.3	4.9	17.0	10.3	4.6	16.9	-99.0	-99.0	-99.0	66.4	34.2	86.4	1.1	0.0	4.5	5.8	111	0.0	1025.5	95.0	465.8
2012/06/10 00:00:04	10.6	5.0	17.1	10.5	5.2	16.5	-99.0	-99.0	-99.0	59.5	33.6	77.5	1.1	0.0	4.0	6.1	121	0.0	1026.1	102.4	475.3
2012/06/11 00:00:04	10.1	4.8	17.2	10.0	4.9	16.3	-99.0	-99.0	-99.0	66.4	36.7	83.9	2.3	0.0	6.6	8.1	118	0.0	1024.3	109.0	440.2
2012/06/12 00:00:04	10.1	5.6	13.7	9.8	5.8	12.9	-99.0	-99.0	-99.0	80.5	70.6	87.2	4.1	0.0	7.7	9.5	113	0.0	1020.7	54.4	375.2
2012/06/13 00:00:04	11.7	7.9	16.5	11.5	7.8	15.7	-99.0	-99.0	-99.0	75.2	61.4	84.3	3.9	0.6	9.1	11.9	109	0.0	1018.9	91.0	578.4
2012/06/14 00:00:04	12.3	8.9	17.8	12.1	9.1	17.0	-99.0	-99.0	-99.0	74.7	52.5	86.0	3.0	0.7	7.0	10.3	99	0.0	1019.9	105.7	467.5
2012/06/15 00:00:04	12.2	5.8	18.9	12.3	6.0	18.3	-99.0	-99.0	-99.0	67.9	43.4	88.0	0.4	0.0	3.2	4.8	183	0.0	1019.5	108.4	451.9
2012/06/16 00:00:04	14.0	8.6	19.5	14.0	9.5	18.6	-99.0	-99.0	-99.0	60.0	44.3	73.8	3.1	0.1	8.5	11.1	285	0.0	1019.7	103.4	459.8
2012/06/17 00:00:04	14.5	11.7	16.8	14.2	11.1	16.4	-99.0	-99.0	-99.0	65.7	56.0	85.4	3.4	1.8	9.0	11.1	271	6.0	1020.0	31.7	320.6
2012/06/18 00:00:04	11.3	7.8	15.1	10.7	7.4	14.4	-99.0	-99.0	-99.0	71.3	50.1	85.7	4.1	1.0	8.9	11.5	222	0.0	1024.3	105.8	583.3
2012/06/19 00:00:04	11.0	7.0	15.6	10.6	7.6	14.5	-99.0	-99.0	-99.0	66.6	49.9	83.7	1.1	0.0	5.6	6.9	263	0.0	1024.9	93.9	580.7
2012/06/20 00:00:04	9.7	2.7	15.5	9.4	3.3	14.7	-99.0	-99.0	-99.0	70.1	54.1	85.5	0.6	0.0	3.9	6.5	270	0.0	1024.8	113.5	473.5
2012/06/21 00:00:04	9.6	4.2	15.8	9.4	4.0	14.7	-99.0	-99.0	-99.0	69.6	51.0	85.7	1.5	0.0	4.6	5.3	281	0.0	1024.0	112.6	473.6
2012/06/22 00:00:04	11.8	6.0	17.3	11.6	6.1	16.6	-99.0	-99.0	-99.0	59.3	42.1	78.8	4.4	0.1	9.3	12.7	294	0.0	1019.4	114.7	476.7
2012/06/23 00:00:04	12.3	7.4	14.9	11.9	6.9	14.6	-99.0	-99.0	-99.0	64.1	46.4	79.7	5.7	2.5	11.7	17.3	283	0.0	1015.4	23.6	172.5
2012/06/24 00:00:09	7.8	2.8	13.1	7.3	2.9	12.7	-99.0	-99.0	-99.0	70.8	51.1	84.5	1.3	0.0	4.8	6.9	284	0.0	1025.9	111.0	610.3
2012/06/25 00:00:04	6.8	1.1	13.7	6.6	0.9	12.7	-99.0	-99.0	-99.0	68.6	45.2	85.9	0.3	0.0	3.1	4.8	209	0.0	1031.5	108.8	462.6

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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)	
2012/06/26 00:00:04	8.8	2.3	15.9	8.7	2.5	14.8	-99.0	-99.0	-99.0	61.2	35.3	82.1	0.7	0.0	3.2	4.9	262	0.0	1030.5	108.6	456.1
2012/06/27 00:00:04	10.2	4.2	17.9	10.3	4.8	16.9	-99.0	-99.0	-99.0	68.1	46.6	84.4	2.3	0.2	6.9	8.7	104	0.0	1029.2	87.0	494.1
2012/06/29 00:00:04	14.0	9.7	18.0	13.8	9.7	18.1	-99.0	-99.0	-99.0	62.9	51.0	77.4	2.9	0.0	6.2	7.4	74	0.0	1020.4	87.3	563.7
2012/06/30 00:00:04	12.2	7.8	18.0	12.0	7.7	16.8	-99.0	-99.0	-99.0	75.0	58.9	84.9	0.1	0.0	4.5	6.6	191	0.0	1016.7	78.1	512.2

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2012/08/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature 2m Avg	2m Min	2m Max	10m Avg	10m Min	10m Max	60m Avg	60m Min	60m Max	Humidity Avg	Humidity Min	Humidity Max	Prevailing Wind Speed Avg	Speed Min	Speed Max	Gust	Dir	Rain	Bar	Solar Rad Avg	Solar Rad Max
					(°C)						(%)			(m/s)		(m/s)	(°)	(mm)	(hPa)	(W/m²)	
2012/07/01 00:00:04	12.8	8.9	17.3	12.6	8.8	16.4	-99.0	-99.0	-99.0	65.5	43.7	86.9	2.7	0.2	6.3	8.7	277	0.0	1016.6	88.2	519.2
2012/07/02 00:00:04	10.4	7.3	13.7	10.0	6.9	12.7	-99.0	-99.0	-99.0	55.1	39.8	69.2	4.1	1.3	8.3	11.7	255	0.0	1019.4	64.3	443.8
2012/07/03 00:00:04	8.4	5.9	12.6	7.8	5.1	11.5	-99.0	-99.0	-99.0	64.2	52.3	72.7	3.7	0.0	7.5	10.9	241	0.0	1022.1	89.2	533.9
2012/07/04 00:00:04	7.9	2.0	13.7	7.5	2.1	12.5	-99.0	-99.0	-99.0	65.6	44.6	84.0	0.8	0.0	3.9	6.3	239	0.0	1022.9	110.0	461.2
2012/07/05 00:00:04	7.0	0.5	13.4	7.0	0.5	12.4	-99.0	-99.0	-99.0	69.5	51.0	86.0	2.1	0.0	7.3	9.3	113	0.0	1026.9	110.3	539.2
2012/07/06 00:00:04	9.1	4.5	13.9	8.9	5.4	12.9	-99.0	-99.0	-99.0	69.8	50.9	82.4	4.4	1.2	8.8	12.0	102	0.0	1031.0	108.9	502.7
2012/07/10 00:00:04	16.2	-20.0	19.0	15.8	-20.0	18.1	-99.0	-99.0	-99.0	46.1	28.9	63.2	2.8	0.0	6.6	9.7	358	0.0	1027.1	153.4	479.8
2012/07/11 00:00:04	15.0	12.3	18.2	14.6	12.1	17.8	-99.0	-99.0	-99.0	59.7	47.9	72.1	4.7	0.7	10.3	13.0	335	0.4	1024.5	69.2	628.4
2012/07/12 00:00:04	14.1	12.3	17.2	13.8	11.8	16.4	-99.0	-99.0	-99.0	81.6	69.2	88.1	3.3	0.0	9.8	13.6	298	26.0	1022.7	61.1	482.4
2012/07/13 00:00:04	14.2	11.7	15.7	13.9	11.8	15.2	-99.0	-99.0	-99.0	86.8	81.4	89.2	1.6	0.0	4.3	6.0	302	29.0	1019.2	22.2	178.3
2012/07/14 00:00:04	15.3	13.8	17.0	15.0	13.4	16.7	-99.0	-99.0	-99.0	85.9	78.7	88.9	5.5	1.0	11.1	14.5	303	25.6	1015.8	17.0	285.3
2012/07/16 00:00:04	9.2	4.6	12.0	8.6	4.6	11.3	-99.0	-99.0	-99.0	69.4	56.9	81.1	3.9	0.3	8.5	10.3	249	0.0	1025.3	145.4	492.4
2012/07/17 00:00:04	8.8	1.7	15.5	8.8	1.8	15.1	-99.0	-99.0	-99.0	69.8	52.6	85.8	0.5	0.0	3.7	5.8	154	0.0	1029.0	111.8	465.5
2012/07/18 00:00:13	12.1	7.1	17.8	12.0	7.4	17.2	-99.0	-99.0	-99.0	59.3	44.7	73.6	1.5	0.0	4.1	5.4	278	0.0	1027.3	115.1	465.9
2012/07/19 00:00:04	11.5	8.0	15.1	11.1	7.9	14.0	-99.0	-99.0	-99.0	78.5	67.1	87.6	0.4	0.0	4.0	7.1	240	0.0	1021.8	55.7	615.8
2012/07/20 00:00:04	9.6	6.0	14.5	9.4	6.3	13.1	-99.0	-99.0	-99.0	65.3	34.7	88.7	2.6	0.3	7.6	9.0	129	0.0	1021.8	113.7	524.6
2012/07/21 00:00:04	9.0	3.9	14.3	8.8	4.1	13.5	-99.0	-99.0	-99.0	64.7	38.4	82.4	3.5	0.5	7.9	9.8	118	0.0	1026.2	117.3	469.8
2012/07/22 00:00:04	11.1	7.4	14.2	10.7	7.6	13.2	-99.0	-99.0	-99.0	69.5	61.5	78.9	5.3	0.3	10.3	13.0	111	0.0	1028.7	75.4	457.7
2012/07/23 00:00:04	10.8	7.1	14.5	10.2	6.9	13.5	-99.0	-99.0	-99.0	71.7	62.8	77.5	5.5	1.6	10.0	11.6	112	0.0	1028.6	111.1	564.7
2012/07/24 00:00:04	11.0	7.8	16.0	10.5	7.7	15.0	-99.0	-99.0	-99.0	70.6	50.1	81.1	3.1	0.0	7.9	9.9	105	0.0	1027.8	110.2	557.9
2012/07/25 00:00:04	11.0	4.2	18.6	10.9	5.3	17.7	-99.0	-99.0	-99.0	69.8	46.3	87.2	1.9	0.0	5.6	7.5	101	0.0	1027.2	124.2	498.1
2012/07/26 00:00:04	12.3	7.8	17.5	12.3	7.7	16.5	-99.0	-99.0	-99.0	60.2	46.8	70.6	1.4	0.0	5.5	8.1	281	1.4	1023.9	120.2	527.7
2012/07/27 00:00:04	11.1	8.1	15.8	10.8	7.6	15.0	-99.0	-99.0	-99.0	71.1	57.1	85.7	1.9	0.0	10.2	13.8	274	9.4	1017.9	69.6	559.7
2012/07/28 00:00:04	9.3	5.3	12.7	8.8	4.9	12.1	-99.0	-99.0	-99.0	74.0	53.4	89.3	2.7	0.0	7.8	10.3	242	0.2	1016.4	104.7	631.9

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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)	
2012/07/29 00:00:04	9.1	6.5	13.3	8.6	5.8	12.5	-99.0	-99.0	-99.0	71.1	55.0	84.5	2.3	0.2	6.4	7.9	224	0.0	1020.8	105.2	637.2
2012/07/30 00:00:04	9.0	3.2	14.7	8.7	3.3	14.1	-99.0	-99.0	-99.0	67.7	51.5	84.4	0.9	0.0	4.1	6.0	199	0.0	1024.8	130.1	538.9
2012/07/31 00:00:04	8.3	3.0	13.9	8.1	3.3	12.7	-99.0	-99.0	-99.0	62.3	35.5	82.8	2.0	0.0	7.4	10.3	124	0.0	1025.1	137.0	558.7

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2012/09/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature 2m Avg	2m Min	2m Max	10m Avg	10m Min	10m Max	60m Avg	60m Min	60m Max	Humidity Avg	Humidity Min	Humidity Max	Prevailing Wind Speed Avg	Speed Min	Speed Max	Gust	Dir	Rain	Bar	Solar Rad Avg	Solar Rad Max
					(°C)						(%)			(m/s)		(m/s)	(°)	(mm)	(hPa)	(W/m²)	
2012/08/01 00:00:04	8.1	3.7	13.6	8.0	4.1	13.0	-99.0	-99.0	-99.0	63.3	50.1	78.9	1.7	0.0	6.5	9.0	106	0.0	1026.0	139.4	610.2
2012/08/02 00:00:04	7.5	2.5	13.6	7.4	2.7	13.1	-99.0	-99.0	-99.0	67.9	46.6	83.0	0.6	0.0	4.4	6.9	132	0.0	1023.8	118.0	633.7
2012/08/03 00:00:04	8.2	1.6	14.6	8.1	1.3	14.2	-99.0	-99.0	-99.0	62.1	39.7	82.7	0.8	0.2	3.5	5.6	270	0.0	1023.2	142.6	556.8
2012/08/04 00:00:04	9.9	4.0	16.0	9.7	4.0	15.3	-99.0	-99.0	-99.0	54.9	37.8	73.1	2.6	0.0	7.8	10.4	265	0.0	1021.1	135.8	559.7
2012/08/05 00:00:04	10.7	4.4	17.8	10.6	4.8	16.7	-99.0	-99.0	-99.0	52.1	32.3	71.6	2.3	0.0	6.8	10.0	250	0.0	1021.4	146.4	568.6
2012/08/06 00:00:04	11.5	5.2	17.6	11.3	5.7	16.9	-99.0	-99.0	-99.0	49.2	33.2	65.9	3.0	0.0	6.8	9.8	273	0.0	1020.0	146.8	568.9
2012/08/07 00:00:04	11.4	5.5	16.3	11.0	5.8	15.4	-99.0	-99.0	-99.0	50.6	34.3	67.1	3.8	0.0	9.3	12.1	249	0.0	1021.6	152.8	592.7
2012/08/08 00:00:04	8.7	2.0	14.9	8.5	2.1	14.0	-99.0	-99.0	-99.0	58.4	39.3	78.6	1.5	0.0	4.7	7.3	277	0.0	1026.4	155.7	594.2
2012/08/09 00:00:04	10.1	2.7	16.1	9.8	2.9	15.4	-99.0	-99.0	-99.0	52.7	32.1	74.9	2.1	0.0	6.2	7.9	290	0.0	1024.4	155.0	600.2
2012/08/10 00:00:04	10.4	6.1	14.6	10.1	6.0	13.7	-99.0	-99.0	-99.0	52.5	43.8	65.1	3.0	0.0	9.3	13.7	214	1.6	1019.2	72.7	761.3
2012/08/11 00:00:04	8.6	3.7	14.0	7.9	3.3	12.3	-99.0	-99.0	-99.0	56.1	41.0	70.7	4.8	0.0	9.0	12.1	164	0.0	1020.3	129.1	534.7
2012/08/12 00:00:04	9.9	4.1	14.3	9.5	3.7	13.7	-99.0	-99.0	-99.0	59.5	48.8	72.3	5.7	1.2	10.3	12.7	132	0.0	1022.9	81.2	629.9
2012/08/13 00:00:04	11.5	9.3	15.1	10.9	9.1	14.1	-99.0	-99.0	-99.0	61.6	45.6	72.6	6.4	1.7	11.5	15.7	106	0.0	1025.3	142.8	716.9
2012/08/14 00:00:04	11.5	6.3	17.1	11.2	6.3	16.3	-99.0	-99.0	-99.0	60.9	40.8	79.2	1.1	0.0	5.3	6.6	122	0.0	1026.7	151.7	645.8
2012/08/15 00:00:04	11.3	4.6	17.2	11.1	4.7	16.6	-99.0	-99.0	-99.0	58.3	40.8	78.5	2.7	0.0	6.5	9.7	288	0.0	1024.2	147.2	788.1
2012/08/16 00:00:04	13.9	6.3	20.0	13.6	6.8	19.4	-99.0	-99.0	-99.0	45.6	29.8	65.8	4.1	0.0	10.0	14.0	282	0.0	1020.5	151.4	807.5
2012/08/17 00:00:04	13.6	7.0	18.1	13.2	7.2	17.4	-99.0	-99.0	-99.0	44.4	33.4	56.8	3.1	0.2	8.0	10.5	275	0.0	1016.7	167.2	632.2
2012/08/18 00:00:04	12.3	6.6	18.2	12.0	7.2	17.4	-99.0	-99.0	-99.0	48.2	28.1	64.9	6.5	0.1	16.4	22.1	264	0.0	1012.9	142.2	645.1
2012/08/19 00:00:04	9.4	5.4	13.3	8.7	4.8	12.2	-99.0	-99.0	-99.0	57.8	47.8	68.0	5.1	2.6	8.8	13.0	256	0.0	1017.7	105.8	660.6
2012/08/20 00:00:04	10.6	6.3	15.3	10.0	6.2	14.3	-99.0	-99.0	-99.0	60.0	40.7	79.7	2.1	0.0	6.2	8.7	266	0.0	1023.8	157.4	662.3
2012/08/21 00:00:04	10.4	3.9	16.4	10.2	3.8	15.4	-99.0	-99.0	-99.0	54.3	35.1	75.6	1.4	0.0	5.2	7.9	269	0.0	1023.6	155.5	747.5
2012/08/22 00:00:04	13.8	6.6	20.3	13.5	6.8	19.1	-99.0	-99.0	-99.0	53.0	41.2	64.3	3.0	0.0	7.2	9.8	301	0.0	1021.2	136.9	596.9
2012/08/23 00:00:04	17.0	11.0	21.9	16.7	10.5	21.4	-99.0	-99.0	-99.0	63.2	48.0	85.1	5.3	0.4	13.9	16.6	308	1.4	1017.7	140.1	688.9
2012/08/24 00:00:04	19.2	15.1	24.0	19.0	14.7	23.6	-99.0	-99.0	-99.0	62.1	40.5	81.1	7.6	1.0	13.5	19.9	311	7.4	1014.9	98.5	584.3

Continued on next page

Record Time	Temperature												Prevailing Wind								
	2m			10m			60m			Humidity			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)	
2012/08/25 00:00:04	13.7	10.0	16.9	13.3	9.8	16.7	-99.0	-99.0	-99.0	54.0	36.5	78.8	4.8	1.7	10.8	14.9	263	0.0	1019.9	190.8	702.6
2012/08/26 00:00:04	12.2	7.0	17.3	11.9	7.1	16.6	-99.0	-99.0	-99.0	53.6	43.1	68.1	2.3	0.0	8.5	11.3	257	0.0	1021.7	164.9	753.1
2012/08/27 00:00:04	10.4	4.5	15.4	10.2	4.9	14.8	-99.0	-99.0	-99.0	58.4	42.1	79.0	0.7	0.0	4.6	6.1	178	0.0	1022.0	177.3	720.5
2012/08/28 00:00:04	11.7	4.8	18.9	11.6	4.8	18.1	-99.0	-99.0	-99.0	52.7	32.4	72.4	0.8	0.1	4.7	7.9	108	0.0	1024.4	194.4	717.1
2012/08/29 00:00:04	13.2	8.2	18.7	13.0	8.2	17.8	-99.0	-99.0	-99.0	57.5	40.3	73.9	1.5	0.0	6.2	7.7	274	0.0	1024.6	182.4	750.7
2012/08/30 00:00:04	15.9	8.5	21.9	15.7	8.8	21.2	-99.0	-99.0	-99.0	53.9	40.0	67.1	4.9	0.0	9.9	13.1	300	0.0	1018.8	187.9	769.4
2012/08/31 00:00:04	16.4	8.2	20.6	16.0	8.5	19.4	-99.0	-99.0	-99.0	48.9	34.2	62.5	4.4	1.3	10.5	13.3	245	0.0	1015.8	175.2	870.6

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2012/10/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature 2m Avg	2m Min	2m Max	10m Avg	10m Min	10m Max	60m Avg	60m Min	60m Max	Humidity Avg	Humidity Min	Humidity Max	Prevailing Wind Speed Avg	Speed Min	Speed Max	Gust	Dir	Rain	Bar	Solar Rad Avg	Solar Rad Max
					(°C)						(%)			(m/s)		(m/s)	(°)	(mm)	(hPa)	(W/m²)	
2012/09/01 00:00:04	10.3	5.5	16.0	9.8	5.6	14.8	-99.0	-99.0	-99.0	47.9	31.7	63.5	2.5	0.0	8.5	11.7	207	0.0	1020.7	194.6	715.3
2012/09/02 00:00:04	9.3	3.8	15.2	8.8	3.7	14.1	-99.0	-99.0	-99.0	50.9	25.4	77.9	1.8	0.0	6.9	9.5	139	0.0	1023.7	194.5	708.2
2012/09/03 00:00:04	11.6	5.2	17.9	11.2	5.0	16.8	-99.0	-99.0	-99.0	50.3	35.7	69.0	0.6	0.0	4.6	6.5	172	0.0	1025.2	189.6	696.4
2012/09/04 00:00:04	12.8	5.7	20.3	12.7	5.8	19.8	-99.0	-99.0	-99.0	44.9	24.4	66.6	0.5	0.0	3.3	6.1	261	0.0	1024.2	197.9	712.3
2012/09/05 00:00:04	15.1	7.3	21.9	15.0	8.4	21.4	-99.0	-99.0	-99.0	38.8	24.9	54.6	1.6	0.0	5.2	6.9	278	0.0	1024.4	200.6	715.9
2012/09/06 00:00:04	17.4	10.9	22.8	17.1	11.1	22.0	-99.0	-99.0	-99.0	38.4	32.0	46.4	6.2	1.2	11.4	15.3	298	0.0	1018.8	194.9	701.4
2012/09/07 00:00:04	19.5	16.0	23.1	19.2	16.3	22.6	-99.0	-99.0	-99.0	44.7	37.0	52.7	7.4	2.1	12.7	16.5	287	0.0	1014.6	183.4	752.3
2012/09/08 00:00:04	16.0	10.8	20.8	15.6	10.4	20.0	-99.0	-99.0	-99.0	39.8	29.4	51.6	5.7	2.7	12.9	17.2	247	0.0	1014.7	172.0	771.7
2012/09/09 00:00:04	12.2	7.9	17.9	11.6	7.2	16.6	-99.0	-99.0	-99.0	49.9	38.2	61.4	4.4	0.7	9.9	13.0	243	0.0	1021.3	213.3	747.9
2012/09/10 00:00:04	13.5	6.9	20.3	13.1	6.5	20.0	-99.0	-99.0	-99.0	51.5	36.4	70.1	0.1	0.0	4.3	5.7	223	0.0	1024.1	220.0	776.1
2012/09/11 00:00:04	16.6	10.7	21.8	16.2	10.8	21.0	-99.0	-99.0	-99.0	48.1	33.0	63.0	1.8	0.0	5.7	7.7	280	0.0	1026.0	218.9	771.8
2012/09/12 00:00:04	17.9	11.6	23.5	17.8	12.2	22.7	-99.0	-99.0	-99.0	50.0	34.9	66.7	1.6	0.0	5.6	7.6	271	0.0	1024.8	210.3	956.1
2012/09/13 00:00:14	18.9	12.0	24.6	18.6	12.3	23.7	-99.0	-99.0	-99.0	47.9	33.1	68.3	3.8	0.0	10.5	13.8	283	0.0	1022.1	218.2	824.5
2012/09/14 00:00:04	16.4	7.0	24.1	16.0	6.8	23.1	-99.0	-99.0	-99.0	51.1	38.6	66.3	4.3	0.7	15.5	20.3	260	0.4	1014.4	147.0	806.2
2012/09/15 00:00:04	11.3	4.1	18.1	10.9	4.8	17.3	-99.0	-99.0	-99.0	49.0	30.7	73.8	1.3	0.0	4.6	9.2	149	0.0	1021.1	197.3	748.3
2012/09/16 00:00:04	13.1	4.8	21.2	12.9	4.6	20.4	-99.0	-99.0	-99.0	51.6	34.0	69.8	1.4	0.0	7.1	8.4	124	0.0	1024.2	204.1	707.8
2012/09/17 00:00:04	15.1	8.4	20.9	14.6	8.2	20.1	-99.0	-99.0	-99.0	54.4	38.2	73.9	2.0	0.0	7.4	10.3	271	0.0	1021.9	190.7	738.5
2012/09/18 00:00:04	15.7	11.8	21.7	15.2	11.8	20.6	-99.0	-99.0	-99.0	56.3	41.0	65.7	1.6	0.1	11.6	17.0	260	0.0	1020.1	146.8	747.5
2012/09/19 00:00:04	14.2	9.4	21.1	13.7	9.1	20.3	-99.0	-99.0	-99.0	68.3	44.7	84.1	1.2	0.0	12.5	16.2	267	6.6	1019.7	138.3	894.3
2012/09/20 00:00:04	14.9	8.1	21.0	14.7	8.7	20.4	-99.0	-99.0	-99.0	64.5	39.0	86.0	1.5	0.0	6.7	9.3	242	0.0	1018.6	231.3	894.8
2012/09/21 00:00:04	18.2	9.0	25.8	18.1	9.8	25.4	-99.0	-99.0	-99.0	47.4	29.5	74.5	0.6	0.0	3.9	6.0	245	0.0	1018.6	240.1	838.5
2012/09/22 00:00:04	19.0	13.7	25.3	18.8	13.8	24.7	-99.0	-99.0	-99.0	54.2	35.8	74.6	2.9	0.3	10.7	15.3	232	0.8	1017.1	149.4	803.1
2012/09/23 00:00:04	17.3	10.7	23.7	17.0	11.4	23.3	-99.0	-99.0	-99.0	44.8	29.2	64.3	0.8	0.0	5.1	7.1	167	0.0	1016.9	223.2	765.4
2012/09/24 00:00:04	18.6	9.1	26.1	18.3	9.3	25.4	-99.0	-99.0	-99.0	40.1	25.8	62.5	2.4	0.0	5.9	7.7	287	0.0	1013.8	220.9	753.0

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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)	
2012/09/25 00:00:04	17.4	10.7	23.5	17.0	11.1	22.4	-99.0	-99.0	-99.0	40.1	24.6	54.7	2.1	0.2	8.9	11.4	178	0.0	1014.9	222.7	780.8
2012/09/26 00:00:04	15.6	7.5	24.4	15.4	8.0	23.5	-99.0	-99.0	-99.0	48.5	26.3	70.9	2.4	0.3	6.2	7.7	121	0.0	1020.0	231.3	784.9
2012/09/27 00:00:04	17.9	11.5	24.1	17.6	11.2	23.8	-99.0	-99.0	-99.0	50.7	28.8	73.1	1.0	0.0	6.5	8.9	274	0.0	1021.5	225.4	894.0
2012/09/28 00:00:04	19.7	13.7	25.2	19.4	13.4	24.6	-99.0	-99.0	-99.0	54.1	38.3	72.1	2.2	0.0	5.3	7.2	286	0.0	1020.6	207.5	795.3
2012/09/29 00:00:04	22.7	16.7	28.2	22.2	16.5	27.2	-99.0	-99.0	-99.0	46.7	36.4	59.1	5.4	0.5	10.7	14.3	298	0.0	1015.1	206.4	752.7
2012/09/30 00:00:04	16.9	9.9	23.2	16.4	10.0	22.9	-99.0	-99.0	-99.0	67.4	44.4	88.1	5.7	0.8	13.9	16.9	251	14.8	1014.4	127.5	789.9

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2012/11/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature												Prevailing Wind								
	2m			10m			60m			Humidity				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)	
2012/10/01 00:00:04	12.6	7.0	19.1	12.1	7.2	18.1	-99.0	-99.0	-99.0	42.8	28.1	61.4	1.9	0.8	6.6	9.2	147	0.0	1023.1	270.4	900.6
2012/10/02 00:00:04	14.1	6.0	21.4	13.9	6.2	20.5	-99.0	-99.0	-99.0	49.4	30.5	71.7	1.6	0.0	5.6	7.1	126	0.0	1027.2	265.7	878.9
2012/10/03 00:00:04	15.4	8.6	22.5	15.0	8.7	21.3	-99.0	-99.0	-99.0	54.1	32.7	76.1	3.1	0.7	6.8	9.5	107	0.0	1031.0	272.5	894.1
2012/10/04 00:00:09	17.2	8.6	24.9	17.0	8.4	24.3	-99.0	-99.0	-99.0	47.9	28.9	74.4	1.4	0.0	5.0	7.1	270	0.0	1028.2	276.6	910.3
2012/10/05 00:00:04	20.3	11.7	27.3	19.9	11.4	26.7	-99.0	-99.0	-99.0	41.6	27.2	60.9	3.0	0.0	7.0	10.1	270	0.0	1023.5	279.8	925.5
2012/10/06 00:00:04	23.1	13.2	30.8	23.1	13.6	29.8	-99.0	-99.0	-99.0	35.9	21.9	56.5	2.6	0.1	9.1	12.5	258	0.0	1020.5	258.7	916.4
2012/10/07 00:00:04	25.6	17.6	31.0	25.5	17.9	30.3	-99.0	-99.0	-99.0	30.4	21.1	47.2	5.6	0.5	11.5	17.3	277	0.0	1015.6	254.6	999.7
2012/10/31 00:00:04	18.8	15.3	22.9	18.2	15.1	22.2	-99.0	-99.0	-99.0	57.5	42.7	69.8	1.5	0.0	6.8	8.7	275	2.0	1020.5	177.8	991.6

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2012/12/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature 2m Avg	2m Min	2m Max	10m Avg	10m Min	10m Max	60m Avg	60m Min	60m Max	Humidity Avg	Humidity Min	Humidity Max	Prevailing Wind Speed Avg	Speed Min	Speed Max	Gust	Dir	Rain	Bar	Solar Rad Avg	Solar Rad Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2012/11/01 00:00:04	22.2	12.3	30.6	21.9	12.8	29.2	-99.0	-99.0	-99.0	47.4	25.3	78.6	0.9	0.0	6.0	9.3	205	0.0	1018.3	305.4	1036.3
2012/11/02 00:00:04	24.9	17.3	32.1	24.6	17.7	31.3	-99.0	-99.0	-99.0	37.5	23.4	55.6	3.4	0.0	11.3	15.7	256	0.0	1012.0	256.2	1082.8
2012/11/03 00:00:04	19.3	12.6	26.9	18.6	12.5	25.5	-99.0	-99.0	-99.0	40.1	24.4	59.9	4.4	0.8	11.6	14.1	118	0.0	1013.8	303.9	935.8
2012/11/04 00:00:04	18.1	10.4	25.5	17.5	10.2	24.7	-99.0	-99.0	-99.0	51.3	35.2	71.3	2.7	0.4	7.7	9.3	104	0.0	1018.7	193.3	943.7
2012/11/05 00:00:04	21.9	15.3	28.9	21.5	15.3	28.1	-99.0	-99.0	-99.0	48.6	31.0	66.2	0.3	0.0	5.6	7.9	304	0.0	1019.6	208.9	1003.0
2012/11/06 00:00:04	24.8	17.9	31.0	24.3	17.5	30.5	-99.0	-99.0	-99.0	46.1	30.9	65.3	1.3	0.0	7.3	9.8	289	0.0	1019.8	272.9	1006.9
2012/11/07 00:00:04	27.4	21.9	32.9	26.8	21.7	32.0	-99.0	-99.0	-99.0	39.9	24.9	55.0	2.5	0.5	7.2	10.8	279	0.0	1017.8	284.1	894.8
2012/11/08 00:00:05	26.0	20.6	31.3	25.5	20.1	30.3	-99.0	-99.0	-99.0	43.0	28.1	61.6	3.3	0.6	14.3	18.8	287	0.0	1014.8	188.1	1026.9
2012/11/09 00:00:04	22.3	18.5	29.4	21.7	18.1	28.6	-99.0	-99.0	-99.0	63.6	37.2	88.4	1.8	0.0	12.7	15.9	280	7.4	1015.0	154.1	937.5
2012/11/10 00:00:04	21.0	17.9	26.5	20.5	17.4	25.7	-99.0	-99.0	-99.0	72.7	46.3	89.6	0.4	0.0	8.1	12.2	224	0.0	1017.3	178.3	1145.9
2012/11/11 00:00:04	18.2	12.3	22.9	17.7	12.4	21.6	-99.0	-99.0	-99.0	65.2	52.3	81.9	5.0	1.7	9.5	11.9	104	0.0	1021.2	184.5	688.3
2012/11/12 00:00:04	17.5	10.7	24.5	17.0	10.8	23.6	-99.0	-99.0	-99.0	50.3	31.2	74.3	3.5	1.2	8.0	11.0	66	0.0	1025.9	333.3	1038.4
2012/11/13 00:00:04	20.7	12.2	28.1	20.2	12.3	27.4	-99.0	-99.0	-99.0	41.2	25.6	63.1	0.2	0.0	5.6	9.1	245	0.0	1024.6	330.8	1000.5
2012/11/14 00:00:04	23.7	15.7	31.9	23.3	16.0	31.1	-99.0	-99.0	-99.0	39.7	23.9	71.5	2.6	0.0	13.1	18.5	261	0.0	1020.7	326.4	981.2
2012/11/15 00:00:04	22.6	14.0	32.1	22.2	13.7	31.4	-99.0	-99.0	-99.0	56.5	25.6	84.8	1.6	0.0	11.7	16.5	179	0.0	1017.3	264.1	1152.7
2012/11/16 00:00:04	24.4	14.5	33.1	24.0	14.5	31.9	-99.0	-99.0	-99.0	45.0	18.3	85.7	2.3	0.0	8.3	13.8	184	0.0	1014.6	289.6	963.6
2012/11/17 00:00:04	21.4	15.9	27.7	21.1	15.6	26.6	-99.0	-99.0	-99.0	47.5	23.1	78.1	2.8	0.1	12.5	16.9	116	0.0	1013.0	109.0	876.9
2012/11/18 00:00:04	20.1	12.8	28.6	19.4	13.0	26.4	-99.0	-99.0	-99.0	61.2	38.1	85.6	3.7	0.2	10.7	13.8	107	0.0	1013.3	297.9	1104.8
2012/11/19 00:00:04	21.2	14.5	29.5	20.7	14.1	28.5	-99.0	-99.0	-99.0	51.5	24.3	84.7	2.4	0.2	7.7	11.4	182	1.0	1012.3	265.9	1085.9
2012/11/20 00:00:04	19.3	12.0	26.1	18.6	11.9	24.4	-99.0	-99.0	-99.0	40.8	24.5	68.6	4.8	0.4	13.1	16.0	123	0.0	1015.1	327.7	980.9
2012/11/21 00:00:04	18.0	11.6	25.0	17.3	11.9	23.5	-99.0	-99.0	-99.0	56.4	41.1	71.2	5.7	1.5	9.4	13.5	98	0.0	1020.6	250.7	1104.5
2012/11/22 00:00:04	21.8	12.0	30.3	21.4	11.9	29.4	-99.0	-99.0	-99.0	43.3	25.0	68.5	1.0	0.3	6.2	9.0	244	0.0	1017.4	317.2	1139.6
2012/11/23 00:00:04	24.0	16.3	32.2	23.4	15.9	30.5	-99.0	-99.0	-99.0	43.3	30.6	71.4	2.9	0.0	11.1	13.3	127	0.0	1014.3	329.3	1101.5
2012/11/24 00:00:04	21.9	13.5	31.2	21.2	13.3	29.3	-99.0	-99.0	-99.0	57.5	36.9	79.9	3.7	0.3	8.9	11.6	106	0.0	1017.1	318.5	1152.7

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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)	
2012/11/25 00:00:04	23.4	16.2	32.7	23.0	16.2	32.1	-99.0	-99.0	-99.0	56.4	29.4	73.3	0.4	0.0	12.6	16.8	318	6.4	1017.2	248.7	1118.5
2012/11/26 00:00:04	25.7	18.3	33.5	25.4	18.8	33.2	-99.0	-99.0	-99.0	53.5	28.1	76.3	1.1	0.0	8.7	13.0	302	1.0	1017.6	301.1	1176.2
2012/11/27 00:00:04	25.7	18.8	34.9	25.3	18.3	34.7	-99.0	-99.0	-99.0	58.3	27.5	86.2	0.6	0.0	17.1	23.5	332	27.8	1017.8	257.3	968.6
2012/11/28 00:00:04	23.8	18.8	28.2	23.4	18.5	27.4	-99.0	-99.0	-99.0	65.6	50.6	83.1	1.2	0.0	7.1	9.9	252	0.0	1018.2	190.4	886.1
2012/11/29 00:00:04	25.8	18.9	32.0	25.5	18.7	31.2	-99.0	-99.0	-99.0	58.3	35.3	82.9	2.3	0.3	7.7	10.3	118	0.2	1016.7	275.2	991.2
2012/11/30 00:00:04	27.1	18.5	34.7	26.8	18.4	34.3	-99.0	-99.0	-99.0	56.4	33.0	86.5	0.2	0.0	6.5	9.8	237	0.0	1016.4	302.2	1027.8

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/01/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature 2m Avg	2m Min	2m Max	10m Avg	10m Min	10m Max	60m Avg	60m Min	60m Max	Humidity Avg	Humidity Min	Humidity Max	Prevailing Wind Speed Avg	Speed Min	Speed Max	Gust	Dir	Rain	Bar	Solar Rad Avg	Solar Rad Max
					($°C$)						(%)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2012/12/01 00:00:04	31.2	23.9	37.8	30.9	23.9	37.9	-99.0	-99.0	-99.0	43.5	27.8	64.9	2.1	0.0	7.5	9.6	277	0.0	1016.2	300.2	953.0
2012/12/02 00:00:04	33.0	27.3	38.1	32.7	27.2	37.6	-99.0	-99.0	-99.0	36.3	25.5	51.3	4.5	0.7	9.7	12.7	285	0.0	1015.3	277.9	1003.3
2012/12/03 00:00:04	30.8	22.9	36.7	30.5	22.3	35.7	-99.0	-99.0	-99.0	42.9	29.2	69.5	1.1	0.2	6.7	9.5	152	0.0	1013.6	188.0	967.7
2012/12/04 00:00:04	22.6	20.4	26.7	22.3	20.0	26.1	-99.0	-99.0	-99.0	76.4	63.8	85.8	1.2	0.0	9.6	12.5	320	16.2	1011.6	127.1	1031.8
2012/12/05 00:00:04	22.1	17.2	27.6	21.7	16.6	26.8	-99.0	-99.0	-99.0	51.0	22.5	88.8	3.5	0.0	8.8	12.8	207	0.0	1008.9	338.9	1004.6
2012/12/06 00:00:04	19.5	14.0	25.7	18.9	14.3	24.0	-99.0	-99.0	-99.0	33.6	23.2	46.3	5.0	1.3	9.8	15.2	188	0.0	1013.5	356.7	1075.1
2012/12/07 00:00:04	20.9	12.6	27.9	20.6	12.8	28.0	-99.0	-99.0	-99.0	35.7	24.5	57.5	1.1	0.1	6.2	8.9	139	0.0	1018.7	334.3	974.0
2012/12/08 00:00:04	22.4	14.4	29.6	22.0	14.3	28.7	-99.0	-99.0	-99.0	50.3	29.9	70.7	1.0	0.2	6.6	8.1	106	0.0	1021.3	230.5	1054.3
2012/12/09 00:00:04	26.0	20.0	31.6	25.4	20.1	30.6	-99.0	-99.0	-99.0	46.4	27.9	67.0	3.3	0.0	8.3	12.1	305	0.0	1018.6	248.7	1007.9
2012/12/10 00:00:04	24.7	17.1	32.6	24.1	16.7	31.6	-99.0	-99.0	-99.0	56.2	32.4	85.4	2.5	0.1	14.1	20.2	322	12.6	1017.3	237.1	1074.8
2012/12/11 00:00:04	19.6	15.1	25.3	18.9	15.0	23.9	-99.0	-99.0	-99.0	68.8	53.7	83.1	7.5	3.3	11.6	14.4	97	0.0	1022.5	357.8	1201.9
2012/12/12 00:00:04	19.8	13.4	26.5	19.0	13.1	25.0	-99.0	-99.0	-99.0	67.6	48.2	86.7	6.2	2.5	11.6	14.6	103	0.0	1024.9	319.1	1341.2
2012/12/13 00:00:04	21.9	15.8	28.3	21.2	15.8	26.9	-99.0	-99.0	-99.0	50.6	29.7	72.9	3.8	0.9	9.1	11.1	73	0.0	1024.8	333.2	998.4
2012/12/14 00:00:04	22.8	13.7	30.9	22.4	13.4	29.9	-99.0	-99.0	-99.0	44.8	22.6	74.6	2.0	0.0	8.1	11.9	115	0.0	1021.6	342.8	995.6
2012/12/15 00:00:04	26.2	17.1	33.8	25.8	17.5	33.7	-99.0	-99.0	-99.0	40.6	20.6	66.6	0.8	0.1	8.6	12.1	357	0.0	1015.9	334.9	984.5
2012/12/16 00:00:04	26.6	21.7	33.6	26.1	22.0	32.2	-99.0	-99.0	-99.0	39.6	24.6	55.7	1.5	0.4	10.8	13.5	251	0.0	1011.6	244.0	1336.9
2012/12/17 00:00:04	28.4	18.8	35.3	28.0	19.7	34.3	-99.0	-99.0	-99.0	38.5	24.6	64.2	2.2	0.2	8.7	13.6	242	0.0	1008.2	302.6	1131.4
2012/12/18 00:00:04	26.9	18.4	34.3	26.4	18.4	32.8	-99.0	-99.0	-99.0	44.4	29.6	66.3	3.9	1.4	8.7	11.1	128	0.0	1009.1	354.8	1049.4
2012/12/19 00:00:04	25.6	15.0	34.9	25.1	15.2	34.3	-99.0	-99.0	-99.0	47.8	19.5	80.3	1.5	0.2	7.0	9.4	154	0.0	1010.8	367.3	1063.2
2012/12/20 00:00:04	30.1	22.4	36.8	29.5	22.5	35.7	-99.0	-99.0	-99.0	42.4	22.1	65.6	2.1	0.3	8.3	11.7	316	0.0	1010.5	317.7	1091.1
2012/12/21 00:00:34	-18.0	-20.0	29.8	-18.0	-20.0	29.6	-99.0	-99.0	-99.0	-99.0	-99.0	57.0	5.0	0.5	12.1	16.1	290	1.0	-99.0	-99.0	0.0
2012/12/22 00:00:36	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-99.0	-99.0	-99.0	-99.0	-99.0	-99.0	1.8	0.3	7.1	9.6	145	0.8	-99.0	-99.0	0.0
2012/12/23 00:00:38	-19.5	-20.0	0.6	-19.5	-20.0	0.4	-99.0	-99.0	-99.0	-99.0	-99.0	-99.0	3.4	0.4	16.4	19.0	53	63.0	-99.0	-99.0	0.0
2012/12/24 00:00:04	4.9	-20.0	33.5	4.7	-20.0	33.0	-99.0	-99.0	-99.0	15.2	-99.0	59.3	0.8	0.0	9.1	12.0	223	0.0	504.8	174.0	1013.7

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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)	
2012/12/25 00:00:04	27.8	22.1	34.3	27.2	21.8	33.4	-99.0	-99.0	-99.0	52.9	34.7	69.9	2.1	0.0	7.2	9.5	178	3.8	1015.5	310.8	1202.4
2012/12/26 00:00:04	22.6	17.5	31.7	22.2	17.1	31.0	-99.0	-99.0	-99.0	73.8	43.2	87.7	2.3	0.0	15.9	20.4	55	44.0	1013.8	198.8	1230.7
2012/12/27 00:00:04	19.0	16.1	23.8	18.3	15.7	22.6	-99.0	-99.0	-99.0	71.5	58.5	86.0	6.6	3.9	11.4	13.8	67	0.0	1015.5	308.8	1342.3
2012/12/28 00:00:04	21.6	13.1	29.8	21.2	13.2	29.5	-99.0	-99.0	-99.0	55.7	32.8	80.1	1.4	0.0	5.6	7.9	90	0.0	1016.0	363.7	1229.0
2012/12/29 00:00:04	23.4	19.0	28.7	23.0	19.0	27.2	-99.0	-99.0	-99.0	64.0	50.9	79.7	2.6	0.0	7.4	9.3	262	1.2	1014.5	206.3	1221.8
2012/12/30 00:00:04	23.9	16.3	31.0	23.3	16.0	29.7	-99.0	-99.0	-99.0	55.4	24.3	84.9	2.6	0.0	6.3	8.4	83	0.0	1016.2	396.2	1148.5
2012/12/31 00:00:04	24.4	16.0	31.6	23.9	15.6	31.3	-99.0	-99.0	-99.0	52.8	32.9	79.8	2.3	0.1	7.2	9.2	71	0.0	1017.7	381.1	1122.2

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/02/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature 2m Avg	2m Min	2m Max	10m Avg	10m Min	10m Max	60m Avg	60m Min	60m Max	Humidity Avg	Humidity Min	Humidity Max	Prevailing Wind Dir Avg	Speed Min	Speed Max	Gust	Dir	Rain	Bar	Solar Rad Avg	Solar Rad Max
					(°C)						(%)			(m/s)		(m/s)	(°)	(mm)	(hPa)	(W/m²)	
2013/01/01 00:00:04	26.8	20.1	33.5	26.2	19.7	33.3	-99.0	-99.0	-99.0	47.6	31.3	65.5	0.8	0.0	4.6	7.3	298	0.0	1017.8	378.3	1095.8
2013/01/02 00:00:04	29.2	22.4	35.1	28.5	22.3	34.1	-99.0	-99.0	-99.0	40.0	28.0	55.6	3.2	0.4	6.4	13.1	234	0.0	1015.1	380.0	1105.8
2013/01/03 00:00:04	29.2	20.4	36.6	28.6	19.9	35.4	-99.0	-99.0	-99.0	37.9	20.5	68.7	0.3	0.3	8.6	11.3	120	0.0	1012.7	386.4	1144.7
2013/01/04 00:00:04	25.3	18.0	33.4	24.6	17.6	32.1	-99.0	-99.0	-99.0	56.6	35.4	76.7	3.5	0.5	8.3	10.1	70	0.0	1015.6	382.9	1255.1
2013/01/05 00:00:04	27.1	18.1	35.0	26.6	17.9	34.2	-99.0	-99.0	-99.0	47.1	30.6	71.8	0.7	0.2	5.1	7.6	31	0.0	1015.4	384.0	1112.8
2013/01/06 00:00:04	29.8	23.9	37.0	29.3	23.6	36.0	-99.0	-99.0	-99.0	38.4	19.7	53.3	0.2	0.0	7.9	10.0	36	0.0	1016.3	382.8	1111.1
2013/01/07 00:00:04	29.2	21.0	37.0	28.8	21.0	35.8	-99.0	-99.0	-99.0	41.4	20.9	64.0	2.5	0.0	7.8	10.9	41	0.0	1018.7	389.3	1129.3
2013/01/08 00:00:04	27.1	17.5	35.6	26.6	17.5	35.1	-99.0	-99.0	-99.0	48.4	26.3	81.8	1.4	0.4	5.0	7.1	101	0.0	1020.0	383.7	1121.0
2013/01/09 00:00:04	29.5	22.3	35.3	28.7	22.6	34.3	-99.0	-99.0	-99.0	35.8	22.0	51.9	3.6	0.0	10.6	12.9	117	0.0	1011.1	388.1	1127.4
2013/01/10 00:00:04	30.2	19.5	37.7	29.4	19.1	36.1	-99.0	-99.0	-99.0	34.6	15.2	67.3	3.6	3.2	13.6	17.8	55	0.0	1001.0	354.6	1237.5
2013/01/11 00:00:04	26.3	17.9	36.7	25.6	17.8	35.4	-99.0	-99.0	-99.0	50.4	19.3	75.2	1.5	0.1	9.5	12.2	263	0.0	1006.9	389.9	1149.6
2013/01/12 00:00:04	30.2	19.5	39.2	29.5	19.3	37.9	-99.0	-99.0	-99.0	45.9	20.8	72.9	3.1	0.0	9.3	19.7	61	0.0	1010.3	369.4	1092.1
2013/01/13 00:00:04	33.1	27.5	41.0	32.6	28.1	40.2	-99.0	-99.0	-99.0	39.4	23.2	64.2	3.2	0.3	14.5	21.2	96	0.0	1011.4	305.2	1177.0
2013/01/14 00:00:04	29.7	21.4	41.3	29.2	20.2	39.5	-99.0	-99.0	-99.0	50.4	25.1	84.2	2.6	0.0	18.3	44.3	66	17.6	1009.3	277.0	1087.6
2013/01/15 00:00:04	22.1	17.2	27.4	21.4	16.9	26.0	-99.0	-99.0	-99.0	66.9	49.0	84.5	6.4	0.4	11.3	14.8	256	0.0	1013.8	345.1	1014.1
2013/01/16 00:00:04	22.9	15.2	30.8	22.4	15.1	29.9	-99.0	-99.0	-99.0	53.5	37.5	70.7	2.3	0.4	7.1	9.0	247	0.0	1017.3	284.7	1197.5
2013/01/17 00:00:04	27.0	20.1	33.8	26.4	19.9	33.0	-99.0	-99.0	-99.0	51.3	35.4	70.5	1.2	0.0	8.0	10.1	85	0.0	1015.3	291.9	1082.7
2013/01/18 00:00:04	30.7	23.5	36.2	30.4	23.7	35.5	-99.0	-99.0	-99.0	42.1	29.8	61.9	1.7	0.0	6.5	9.0	19	0.0	1011.5	249.8	1143.2
2013/01/19 00:00:04	32.9	26.6	39.2	32.7	26.7	38.5	-99.0	-99.0	-99.0	37.4	27.0	53.2	3.6	0.2	10.9	13.9	350	0.0	1008.3	316.6	1006.6
2013/01/20 00:00:04	25.5	21.6	32.0	25.1	21.4	32.4	-99.0	-99.0	-99.0	64.6	40.4	79.1	3.0	0.4	10.6	13.3	182	0.4	1011.6	101.7	793.7
2013/01/21 00:00:04	21.4	18.9	26.7	20.9	18.3	25.9	-99.0	-99.0	-99.0	76.3	60.7	88.0	3.5	1.4	7.0	8.1	184	4.8	1015.7	130.8	957.3
2013/01/22 00:00:04	25.1	17.9	32.7	24.6	18.0	31.5	-99.0	-99.0	-99.0	61.2	35.3	84.7	2.4	0.2	8.3	11.2	178	0.0	1014.2	312.3	1185.0
2013/01/23 00:00:04	23.9	20.0	30.5	23.5	20.0	29.2	-99.0	-99.0	-99.0	62.4	46.2	80.8	0.6	0.0	12.0	15.7	135	1.6	1013.5	193.6	1172.2
2013/01/24 00:00:04	25.8	19.2	33.3	25.2	19.3	31.9	-99.0	-99.0	-99.0	55.2	37.0	75.1	2.8	0.3	10.1	17.2	170	0.0	1014.0	334.9	1039.1

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)	
2013/01/25 00:00:04	24.8	18.8	31.5	24.2	18.5	30.1	-99.0	-99.0	-99.0	58.5	39.4	81.3	4.4	1.2	10.6	13.2	138	0.0	1015.4	312.7	1242.0
2013/01/26 00:00:14	26.0	18.8	35.5	25.6	18.3	35.1	-99.0	-99.0	-99.0	57.8	30.1	80.7	1.0	0.1	8.1	10.8	147	25.0	1012.2	329.3	1081.7
2013/01/27 00:00:04	27.2	23.1	33.0	26.8	23.4	32.0	-99.0	-99.0	-99.0	55.4	40.3	69.3	3.5	0.3	10.0	12.8	69	0.0	1011.2	278.4	1286.0
2013/01/28 00:00:04	21.7	20.4	24.9	21.3	19.9	24.9	-99.0	-99.0	-99.0	84.9	62.9	89.7	2.6	0.1	7.9	10.1	181	22.8	1010.2	88.8	442.1
2013/01/29 00:00:04	20.4	19.6	22.6	20.0	19.2	22.8	-99.0	-99.0	-99.0	86.7	71.8	90.7	4.4	1.6	7.3	9.8	185	92.4	1005.6	16.2	98.8
2013/01/30 00:00:04	24.3	19.6	30.6	23.9	19.1	30.1	-99.0	-99.0	-99.0	73.3	45.1	91.5	2.0	0.2	5.7	7.9	305	8.4	1006.6	260.9	1199.7
2013/01/31 00:00:04	25.5	18.5	31.8	25.3	18.4	31.9	-99.0	-99.0	-99.0	58.4	26.9	85.5	1.7	0.0	6.5	8.2	204	24.8	1013.6	355.7	1081.3

Meteorological Daily Statistics Summary

Unit Id	:	Quipolly (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/03/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature 2m Avg	2m Min	2m Max	10m Avg	10m Min	10m Max	60m Avg	60m Min	60m Max	Humidity Avg	Humidity Min	Humidity Max	Prevailing Wind Speed Avg	Speed Min	Speed Max	Gust	Dir	Rain	Bar	Solar Rad Avg	Solar Rad Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/02/01 00:00:04	27.1	20.5	32.6	26.8	21.2	31.9	-99.0	-99.0	-99.0	54.7	30.4	77.8	1.4	0.0	5.9	8.7	342	0.0	1013.0	346.0	1047.1
2013/02/02 00:00:04	23.3	17.4	30.4	23.0	16.9	29.1	-99.0	-99.0	-99.0	68.3	48.0	87.6	2.8	0.0	18.1	26.0	22	24.4	1008.0	148.4	1147.0
2013/02/03 00:00:04	16.7	14.3	19.7	16.1	14.2	18.5	-99.0	-99.0	-99.0	76.1	63.4	87.6	5.1	0.0	11.9	14.6	177	6.0	1011.2	247.5	1186.2
2013/02/04 00:00:04	17.2	12.1	21.8	16.7	12.3	21.3	-99.0	-99.0	-99.0	62.4	47.6	76.9	4.4	0.1	9.7	13.7	171	0.0	1016.8	307.1	1228.4
2013/02/05 00:00:04	20.2	13.9	26.4	19.8	14.0	25.1	-99.0	-99.0	-99.0	60.7	41.1	80.4	4.5	0.0	10.5	13.0	165	0.0	1021.6	355.7	1150.0
2013/02/06 00:00:04	21.2	14.7	27.6	20.7	14.9	26.5	-99.0	-99.0	-99.0	59.0	39.5	78.1	3.1	0.9	7.5	9.5	177	0.0	1022.9	351.3	1251.5
2013/02/07 00:00:04	21.8	15.1	28.3	21.4	14.6	27.1	-99.0	-99.0	-99.0	56.4	35.0	78.4	2.1	0.1	6.8	9.0	187	0.0	1020.4	358.1	1099.0
2013/02/08 00:00:04	23.5	17.1	30.3	23.1	17.3	29.5	-99.0	-99.0	-99.0	50.7	29.7	68.4	0.7	0.0	5.6	6.8	172	0.0	1018.7	354.5	1077.6
2013/02/09 00:00:04	25.1	19.0	31.3	24.7	19.0	30.6	-99.0	-99.0	-99.0	51.1	36.0	68.8	0.4	0.0	4.4	6.8	4	0.0	1019.5	346.8	1067.0
2013/02/10 00:00:04	26.1	20.0	31.4	25.7	19.7	31.1	-99.0	-99.0	-99.0	48.4	33.6	66.8	1.0	0.0	4.3	6.3	351	0.0	1018.5	338.5	1084.8
2013/02/11 00:00:04	26.3	20.8	32.5	25.8	20.5	32.2	-99.0	-99.0	-99.0	53.8	40.1	74.3	0.5	0.0	12.6	16.5	190	0.0	1017.1	326.6	1098.0
2013/02/12 00:00:04	22.8	18.0	28.6	22.3	17.6	27.5	-99.0	-99.0	-99.0	68.3	49.2	85.5	2.9	0.0	12.3	14.5	172	9.0	1018.5	299.1	1169.2
2013/02/13 00:00:04	22.1	17.4	27.9	21.6	17.3	26.8	-99.0	-99.0	-99.0	70.1	47.2	86.2	4.2	1.6	9.6	12.2	183	0.0	1019.5	313.7	1230.2
2013/02/14 00:00:04	21.1	15.3	27.2	20.7	15.4	26.2	-99.0	-99.0	-99.0	61.0	41.2	82.3	3.3	1.5	6.9	8.7	158	0.0	1021.9	311.2	1338.9
2013/02/15 00:00:04	21.7	14.5	28.2	21.2	14.4	27.1	-99.0	-99.0	-99.0	56.3	38.2	73.8	2.5	0.5	6.3	8.5	182	0.0	1021.1	317.9	1171.4
2013/02/16 00:00:08	22.3	17.6	28.6	21.9	17.8	27.3	-99.0	-99.0	-99.0	61.1	43.0	73.5	2.4	0.0	9.0	12.1	154	0.2	1020.3	253.6	1197.8
2013/02/17 00:00:04	21.8	15.8	28.1	21.4	15.7	27.2	-99.0	-99.0	-99.0	61.9	37.3	80.8	3.5	1.4	10.1	12.8	158	0.0	1020.8	298.9	1266.3
2013/02/18 00:00:04	21.2	14.4	27.8	20.8	14.6	26.7	-99.0	-99.0	-99.0	57.9	31.6	79.7	2.8	0.0	8.0	10.3	163	0.0	1020.4	325.6	1091.6
2013/02/19 00:00:04	21.5	15.4	28.9	21.1	15.6	28.0	-99.0	-99.0	-99.0	60.5	39.2	79.2	2.2	0.0	9.0	10.8	152	3.6	1018.3	262.1	1245.2
2013/02/20 00:00:04	23.1	16.9	29.3	22.9	16.8	28.4	-99.0	-99.0	-99.0	56.9	38.6	74.9	2.9	0.0	8.8	11.6	178	0.0	1015.5	326.8	1013.7
2013/02/21 00:00:04	22.0	16.5	27.9	21.6	16.2	27.2	-99.0	-99.0	-99.0	63.5	41.8	81.8	4.8	0.4	11.0	14.3	166	0.0	1015.9	277.3	1132.9
2013/02/22 00:00:04	21.9	17.2	27.8	21.5	17.3	26.6	-99.0	-99.0	-99.0	61.3	39.9	80.0	6.0	2.9	10.6	13.2	156	0.0	1016.8	279.3	1110.6
2013/02/23 00:00:04	20.4	16.2	25.1	20.0	16.7	24.2	-99.0	-99.0	-99.0	67.1	47.4	84.9	7.5	3.8	13.0	17.0	170	2.4	1015.0	188.6	867.1
2013/02/24 00:00:04	20.1	17.9	21.7	19.7	17.8	21.1	-99.0	-99.0	-99.0	84.0	77.3	88.8	5.6	0.0	11.5	14.9	179	21.6	1009.2	81.7	420.0

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)	
2013/02/25 00:00:04	24.3	19.2	30.8	24.1	19.0	30.2	-99.0	-99.0	-99.0	68.2	45.0	85.4	1.7	0.0	9.4	11.2	37	0.6	1014.4	259.6	1067.2
2013/02/26 00:00:04	23.5	19.9	30.4	23.4	19.6	30.0	-99.0	-99.0	-99.0	71.2	50.8	86.5	0.9	0.0	15.6	19.7	79	41.2	1018.0	170.2	1079.2
2013/02/27 00:00:04	24.2	20.3	29.0	24.1	20.2	28.6	-99.0	-99.0	-99.0	66.3	51.5	83.6	2.1	0.1	7.9	10.6	98	0.0	1017.9	192.9	801.3
2013/02/28 00:00:04	24.7	19.9	30.1	24.4	19.9	29.6	-99.0	-99.0	-99.0	56.2	35.7	72.5	2.0	0.0	5.6	7.3	42	0.0	1016.2	290.3	966.2

Meteorological Daily Statistics Summary

Unit Id	:	Werris Ck Mine (Sentinex95)
Module Id	:	M2 (10M Weather Station)
Requested Report Date	:	2013/04/01
Requested Report Hour	:	00
Chart Available	:	no

Main Data Summary

Record Time	Temperature 2m Avg	2m Min	2m Max	10m Avg	10m Min	10m Max	60m Avg	60m Min	60m Max	Humidity Avg	Humidity Min	Humidity Max	Prevailing Wind Speed Avg	Speed Min	Speed Max	Gust	Dir	Rain	Bar	Solar Rad Avg	Solar Rad Max
					($°C$)						($\%$)			(m/s)		(m/s)	($°$)	(mm)	(hPa)	(W/m^2)	
2013/02/28 00:00:00	18.7	16.5	22.4	18.3	16.3	22.2	-99.0	-99.0	-99.0	84.0	74.7	89.7	5.7	0.0	12.9	16.5	170	75.2	1011.9	52.2	378.8
2013/03/01 00:00:00	17.6	16.2	19.1	17.3	16.0	18.6	-99.0	-99.0	-99.0	76.4	70.4	81.6	8.8	3.8	13.4	16.5	171	0.6	1016.8	95.8	478.1
2013/03/02 00:00:00	19.7	17.3	23.2	19.4	17.3	22.2	-99.0	-99.0	-99.0	76.0	68.4	83.2	6.4	3.5	11.3	14.0	169	0.2	1018.3	160.5	1108.3
2013/03/03 00:00:00	20.8	17.6	25.6	20.5	17.7	24.6	-99.0	-99.0	-99.0	69.8	53.9	82.7	5.6	3.7	9.9	11.9	161	0.0	1019.4	236.6	1146.6
2013/03/04 00:00:00	21.0	15.7	27.3	20.8	15.9	26.5	-99.0	-99.0	-99.0	63.2	43.7	81.3	3.8	2.0	8.4	10.9	137	0.0	1020.1	251.1	1017.3
2013/03/05 00:00:00	21.3	14.3	27.9	21.1	14.9	27.4	-99.0	-99.0	-99.0	60.8	40.3	79.4	1.6	0.3	4.6	7.1	135	0.0	1020.2	239.6	1112.0
2013/03/06 00:00:00	22.7	16.5	27.9	22.4	16.5	28.0	-99.0	-99.0	-99.0	53.6	39.8	70.9	0.8	0.0	5.0	7.9	132	0.0	1020.1	287.6	918.2
2013/03/07 00:00:00	22.6	17.9	28.3	22.3	17.8	27.6	-99.0	-99.0	-99.0	57.4	41.0	68.2	1.2	0.0	5.4	7.1	145	0.0	1021.3	250.1	1054.6
2013/03/10 00:00:00	24.5	20.2	28.0	24.1	20.0	27.1	-99.0	-99.0	-99.0	52.6	44.5	62.5	2.5	0.3	7.3	9.0	124	0.0	1019.8	261.2	1159.0
2013/03/11 00:00:00	21.8	16.7	27.6	21.5	16.9	26.5	-99.0	-99.0	-99.0	56.9	38.7	73.4	2.1	0.2	6.8	9.1	129	0.0	1019.9	237.6	1033.7
2013/03/12 00:00:00	21.8	15.9	27.8	21.6	16.1	27.4	-99.0	-99.0	-99.0	55.9	35.5	74.5	0.9	0.0	4.0	6.5	193	0.0	1015.3	263.9	957.1
2013/03/13 00:00:00	22.0	15.1	28.8	21.8	15.1	27.6	-99.0	-99.0	-99.0	60.5	41.4	80.0	2.3	0.0	7.5	10.7	176	0.0	1013.0	244.8	878.5
2013/03/14 00:00:00	22.4	17.2	28.4	22.1	16.5	27.4	-99.0	-99.0	-99.0	66.6	48.2	81.9	3.0	0.1	6.7	8.7	169	0.0	1016.6	245.1	883.7
2013/03/15 00:00:00	23.6	15.8	31.4	23.2	15.7	30.4	-99.0	-99.0	-99.0	62.2	38.2	86.9	1.6	0.0	8.2	10.5	333	0.0	1014.8	230.4	829.2
2013/03/16 00:00:00	21.1	14.9	25.2	20.7	14.9	25.0	-99.0	-99.0	-99.0	44.2	30.5	63.0	3.6	0.1	8.6	10.7	185	0.0	1015.0	249.1	840.8
2013/03/17 00:00:00	17.8	11.7	26.1	17.5	12.0	25.3	-99.0	-99.0	-99.0	59.2	34.6	73.4	2.4	0.2	7.3	9.3	170	0.0	1020.5	228.7	1050.2
2013/03/18 00:00:00	19.4	13.5	26.5	19.0	13.4	25.3	-99.0	-99.0	-99.0	60.0	39.0	77.1	2.7	0.6	7.1	9.0	161	0.0	1023.2	206.9	1062.5
2013/03/19 00:00:00	20.5	15.3	26.8	20.1	15.0	25.6	-99.0	-99.0	-99.0	55.4	38.3	71.4	1.4	0.0	9.3	13.8	98	0.0	1024.2	200.2	877.9
2013/03/20 00:00:00	22.3	16.5	28.0	21.8	16.6	26.9	-99.0	-99.0	-99.0	50.9	36.2	63.9	2.8	0.0	7.3	9.1	7	0.0	1020.7	211.6	816.1
2013/03/21 00:00:00	22.9	20.0	26.6	22.4	19.5	25.9	-99.0	-99.0	-99.0	65.9	56.0	82.2	4.2	1.0	8.9	11.9	3	0.0	1020.4	107.0	661.0
2013/03/22 00:00:00	22.5	17.9	27.2	22.1	17.6	26.7	-99.0	-99.0	-99.0	73.0	60.3	84.5	1.6	0.3	6.3	9.2	341	1.6	1019.6	155.4	738.6
2013/03/23 00:00:00	24.4	18.7	30.8	24.1	19.2	29.8	-99.0	-99.0	-99.0	59.2	29.1	86.1	1.7	0.0	7.2	10.3	303	0.0	1017.6	217.7	780.5
2013/03/24 00:00:00	23.8	16.3	30.8	23.8	16.9	30.0	-99.0	-99.0	-99.0	50.7	31.5	70.0	1.2	0.0	5.7	7.4	185	0.0	1018.8	220.8	752.4
2013/03/25 00:00:00	24.6	18.7	29.2	24.3	19.8	28.2	-99.0	-99.0	-99.0	56.3	45.2	71.9	0.2	0.0	3.7	5.0	355	0.0	1019.8	168.0	884.8

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)	
2013/03/26 00:00:00	24.9	20.3	30.4	24.6	20.4	29.6	-99.0	-99.0	-99.0	56.3	40.2	72.2	0.7	0.0	3.8	5.2	357	0.0	1020.4	176.7	888.1
2013/03/27 00:00:00	25.4	18.7	28.9	25.1	18.1	28.1	-99.0	-99.0	-99.0	53.3	42.4	81.9	2.3	2.1	7.6	11.5	287	0.0	1018.0	27.5	280.0
2013/03/28 00:00:00	19.9	14.8	25.9	19.4	14.8	24.5	-99.0	-99.0	-99.0	65.9	34.6	87.7	2.0	0.0	5.6	8.2	204	3.8	1018.2	208.0	787.6
2013/03/29 00:00:00	19.8	12.4	27.3	19.5	12.3	26.4	-99.0	-99.0	-99.0	60.6	32.8	85.3	0.8	0.2	6.1	8.5	293	0.0	1016.6	200.1	754.3
2013/03/30 00:00:00	19.5	15.3	22.8	19.2	15.2	21.7	-99.0	-99.0	-99.0	49.0	40.1	60.7	1.0	0.0	4.7	6.3	326	0.0	1015.3	88.3	732.5

WHITEHAVEN COAL

2012-2013 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
1	223	3/04/2012 11:00pm	Noise - Mine	L Quipolly	Phone to EO mobile	Complainant stated that mine was very loud tonight	The calm conditions and strong inversion at the time of complaint was likely to result in noise enhancement at the complainants residence, however the noise levels measured without the influence of cattle did not exceed the noise criteria.	EO relocated the noise trailer the follow night to avoid impacts from cattle. A written response provided to the complainant.
2	224	4/04/2012 5:45pm	Dust - Mine	AD Quipolly	In person with EO	Complainant indicated that mine had been very dusty lately and was concerned over microscopic impacting on their health.	Seasonal change and onset of longer and stronger inversions had been concentrating dust emissions. Dust deposition gauge results for the last 12 months at complainant's property have been well below dust criteria.	A written response and NSW Health Coal Mine Dust factsheet provided to the complainant.
3	225	18/04/2012 12:29pm	Light - Mine	A Werris Creek	Phone to EM phone	Lights from WCC were shining at complainants residence and neighbours for the last 2 nights from 11:30pm.	Lighting camera confirms glow of mine lights visible but not intrusive. In pit inspection confirms lighting plants orientated away from Werris Creek.	Lighting plant re-orientated further to the south by OCE. Written response sent to complainant.
4	226	27/04/2012 10:41pm	Noise - Mine	L Quipolly	Phone to EO mobile	Complainant stated that noise from mine was loud tonight and preventing her from going to sleep had been noisy that week.	Continuous noise monitor levels show that the average noise levels were below the noise criteria. NCO and OCE appropriately managed operations to prevent further impacts even though noise enhancing conditions were present.	A written response provided to the complainant.
5	227	30/04/2012 3:03pm	Blast - OP/ Vibration	A/EPA Werris Creek	Email from EPA to EO	Complainant alleged that a large blast from WCC shook their house on Friday 27th April 2012.	Blast #19 (BlackSeam4) fired at 13:14 on 27th April 2012 was an overburden blast in the weathered material on the ridge in front of the pit down to the Black Seam or RL385m. Blast results were in compliance.	A written response provided to the complainant and EPA.
6	228	1/05/2012 11:00pm	Noise - Mine	L Quipolly	Phone to WCC Production Office	Complainant stated that mine was very loud tonight 11pm 1/5 and have had to move out of main bedroom.	The wind direction and inversion could cause noise enhancement, however mining noise levels were at or below the relevant criteria of 37dBA.	A written response provided to the complainant. WCC to cover the cost of complainant hiring own independent noise monitoring consultant.
7	229	10/05/2012 10:03pm	Noise - Mine	L Quipolly	Phone to EO mobile	Mine too noisy and its not road noise 10pm 10/5.	OCE/NCO modifying operations at time of complaint to reduce noise levels. Temperature inversion present. Extraneous noises causing measured noise level >37dB(A) not related to mining operations.	A written response provided to the complainant. WCC to cover the cost of complainant hiring own independent noise monitoring consultant.
8	230	12/05/2012 1:29am	Noise - Mine	L Quipolly	Phone to EO mobile	Mine noise is ridiculous 1am 12/5.	OCE/NCO modifying operations at time of complaint to reduce noise levels. A review of audio heard mining noise drowned out by road & train. Temperature inversion (>12oC/100m) present, noise levels measured under these conditions are not assessable against criteria.	A written response provided to the complainant. WCC to cover the cost of complainant hiring own independent noise monitoring consultant.

WHITEHAVEN COAL

2012-2013 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
9	231	14/05/2012 2:15pm	Light - Mine	A Werris Creek	Phone to EM phone	Lights from WCC were shining at complainant's residence at 1:30am Friday 11/5.	Lighting camera confirms mobile machinery lights visible but not intrusive at time of complaint. Lighting Plants not relocated.	A written response provided to the complainant.
10	232	21/05/2012 10:45pm	Noise - Mine	L Quipolly	Phone to EO mobile	Mine noise tonight is too noisy 10:45pm 21/5.	OCE/NCO modifying operations at time of complaint to reduce noise levels. No temperature inversion present. Noise levels below relevant criteria of 37dB(A).	A written response provided to the complainant.
11	233	23/05/2012 9:18am	Noise – Rail Load Out	A Werris Creek	Phone to Community Complaints Line	Noise complaint from coal loader at 1am 23/5.	Rail Load Out Facility operated to 3:30am with two dozers pushing up coal stockpile. 22/5/12 had >+12oC/100m inversion and noise levels not applicable against criteria.	A written response provided to the complainant.
12	234	23/05/2012 11:33am	Blast – Damage	AE Werris Creek	Phone to Community Complaints Line	Complainant alleged mine blasting caused cracking in home.	Complainant did not identify a particular blast event.	EO visited the complainant's residence. Structural engineer undertook Property Investigation in accordance with PA10_0059.
13	235	24/05/2012 11:14am	Noise – Mine	L Quipolly	Email to EO	Noise from mine was terrible and forced complainant to change rooms at 2am 24/5. Mine related traffic using Paynes Road.	OCE/NCO modified operations at time of complaint to reduce noise levels. A review of audio heard mining noise drowned out by road & train. Temperature inversion (>3oC/100m) and wind speeds (>2m/s) present, noise levels measured under these conditions are not assessable against criteria.	A written response provided to the complainant. WCC to cover the cost of complainant hiring own independent noise monitoring consultant.
14	236	30/05/2012 10:33am	Blast – Damage	AF Werris Creek	Phone to Community Complaints Line	Complainant alleged mine blasting caused cracking in home.	Complainant did not identify a particular blast event.	EO visited the complainant's residence. Structural engineer undertook Property Investigation in accordance with PA10_0059.
15	237	30/05/2012 2:44pm	Noise – Rail Load Out	A Werris Creek	Phone to EM phone	Complainant alleged that the coal loader on Wednesday 23/5 to Friday 25/5 nights were excessively noisy.	Rail Load Out Facility operated to 3:30am with two dozers pushing up coal stockpile. 23/5/12 had >+12oC/100m inversion and 24&25/5/12 wind >3m/s and noise levels not applicable against criteria.	A written response provided to the complainant.
16	238	13/06/2012 10:54am	Light - Rail Load Out	A Werris Creek	Phone to EM phone	RLO lights on 8/6/12 10:30pm to late shining at house and 2 sets of RLO lights shining at house until 2am on 12/6/12.	Inspection of Rail Load Out Facility lights on 12/6/12 prior to complaint show that they are set up to north west. Possible that the lights seen are from dozers on coal stockpile.	A written response provided to the complainant.

WHITEHAVEN COAL

2012-2013 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
17	239	20/06/2012 10:16pm	Noise - Mine	L Quipolly	Phone to EO mobile	Mine noise 20/6/12 getting too loud.	OCE/NCO did not modify operations at time of complaint as Quipolly noise monitor identified extraneous noises causing noise levels >37dB(A) not related to mining operations. Temperature inversion present >+12oC/100m so not assessable against criteria.	A written response provided to the complainant. WCC to cover the cost of complainant hiring own independent noise monitoring consultant.
18	240	22/06/2012 1:50am	Noise – Mine	Z Quipolly	Phone to WCC Production Office	Mine noise is keeping the complainant awake since 1am 22/6/12.	OCE drove to Paynes Road to inspect noise emissions. OCE/NCO modified operations at midnight. Quipolly noise monitor identified extraneous noises causing noise levels >35dB(A) not related to mining operations. Wind >3m/s so not assessable against criteria.	A written response provided to the complainant.
19	241	25/06/2012 1:42pm	Noise - Rail Load Out	A Werris Creek	Email to EM	Noise complaint for Coal Loader at 2am 23/6/12.	Werris Creek noise monitor identified extraneous noises causing noise levels >35dB(A) not related to mining operations. Wind and temperature inversion present so not assessable against criteria.	A written response provided to the complainant.
20	242	25/06/2012 1:42pm	Light - Rail Load Out	A Werris Creek	Email to EM	Light complaint for Coal Loader at 2am 23/6/12.	Inspection of lighting plants at Rail Load Out Facility confirm set up appropriately and orientated to the north west. Possible that the lights seen are from dozers on coal stockpile.	A written response provided to the complainant.
21	243	4/07/2012 9:01am	Noise – Mine	C Werris Creek	Phone to EO phone	Noise from mine very loud at 10pm 3/7/12 and can still be heard 9am 4/7/12.	Werris Creek noise monitor identified extraneous noises causing noise levels >35dB(A) not related to mining operations. Southerly wind enhanced noise propagation towards Werris Creek.	A written response provided to the complainant.
22	244	13/07/2012 1:04pm	Noise - Rail Load Out	A Werris Creek	Phone to EM phone	Noise complaint for Coal Loader on nightshift 11/7/12.	Werris Creek noise monitor identified extraneous noises causing noise levels equal to 35dB(A) not related to mining operations and not an exceedance.	A written response provided to the complainant.
23	245	13/07/2012 1:04pm	Light - Rail Load Out	A Werris Creek	Phone to EM phone	Light complaint for Coal Loader on nightshift 11/7/12.	Inspection of lighting plants at Rail Load Out Facility confirm set up appropriately and orientated to the west. Possible that the lights seen are from dozers on coal stockpile.	A written response provided to the complainant.
24	246	17/07/2012 10:53am	Noise - Mine	L Quipolly	Email to EO	Mine noisy on nightshift 16/7/12. Observed allegedly unsafe equipment operation and Leading Hand that answer phone was rude.	OCE/NCO did not modify operations at time of complaint as audio from Quipolly noise monitor not working but noise levels did not exceed 37dB(A) and not an exceedance. Temperature inversion present >+12oC/100m so not assessable against criteria.	A written response provided to the complainant. WCC to cover the cost of complainant hiring own independent noise monitoring consultant. New Operations Manager to meet with complainant.

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25	247	17/07/2012 11:16am	Noise - Rail Load Out	A Werris Creek	Email to EM	Noise complaint for Coal Loader on nightshift 12&13/7/12.	Werris Creek noise monitor identified extraneous noises causing noise levels equal to 35dB(A) not related to mining operations and not an exceedance. Wind >3m/s so not assessable against criteria.	A written response provided to the complainant.
26	248	17/07/2012 11:16am	Light - Rail Load Out	A Werris Creek	Email to EM	Light complaint for Coal Loader on nightshift 12&13/7/12.	Inspection of lighting plants at Rail Load Out Facility confirm set up appropriately and orientated to the west. Possible that the lights seen are from dozers on coal stockpile.	A written response provided to the complainant.
27	249	17/07/2012 3:25pm	Blast - OP/ Vibration	U Werris Creek	Phone to EO phone	Blast at 3pm 17/7/12 impacted house similar to last years' blast when last made complaint.	Blast performed as expected and all community monitoring location in compliance. South westerly wind (but not towards Werris Creek) could have enhanced blast effects.	A written response provided to the complainant.
28	250	18/07/2012 12:30pm	Dust – Mine	Y Werris Creek	In person with EO	Grey/black dust deposited on ute and roof only appeared over last couple of years and believes not from rail.	No specific event. Complainant's residence adjacent to North West Rail Line.	Dust gauge installed on complainants property and will visually analyse dust source. A written response provided to the complainant.
29	251	27/07/2012 3:10pm	Noise - Rail Load Out	A/EPA Werris Creek	Email from EPA to EO	Noise complaint for Coal Loader from 11pm 22/7/12 to 3:45am 23/7/12.	Werris Creek noise monitor identified extraneous noises causing noise levels >35dB(A) not related to mining operations. Wind >3m/s so not assessable against criteria.	A written response provided to the complainant.
30	252	7/08/2012 7:40am	Surface Water	AG Quipolly	Phone to Community Liaison Officer	Complaint related to alleged new spillway on dam on "Plain View" property south of mine changing flow path and water was dirty in colour.	Dam on "Plain View" is off the mine site. Spillway was present on dam prior to Whitehaven purchasing the property and was not modified during discharge incident. Water runoff due to 75mm rain the previous week and unrelated to WCC.	Additional earthworks undertaken to repair temporary banks constructed during discharge event, fill in spillway and repair boundary fence. Verbal response provided by Regional Operations Manager and Coal Processing Manager to the complainant.
31	253	7/08/2012 8:30am	Dust – Mine	Q Quipolly	Phone to EO mobile	Complainant stated that the mine looked dusty this morning (7/8/12) as it was hazy and concerned about their drinking water.	Complainant called back indicating that it was hazy in all directions and not necessarily the mine. Temperature inversion present potentially trapping and concentrating dust emissions.	Installed dust gauge on property and sampled drinking water for potable water analysis. A written response provided to the complainant.
32	254	15/08/2012 11:15am	Dust – Mine	M Quipolly	Phone to EO mobile	Complainant was cleaning outdoor table and wiped up black dust and assumed that it was coal dust.	Analysis of wind rose found that wind was from the North West for 25% of last fortnight was not unusual. Excessively high dust level recorded in dust gauge for July unrelated to mining. EPA PM10 in Tamworth showing regional dust event for last 5 days.	Check August dust results at property and organise for visual analysis of dust source. A written response provided to the complainant.

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33	255	22/08/2012 11:45am	Dust – Mine	A/EPA Werris Creek	Email from EPA to EO	Complainant alleges dust blowing off mine site on 16, 17 & 18/8/12.	Five offsite visual inspections undertaken on 16&17/8/12 did not identify excessive dust. Scrapers did not operate on Saturday. Over 5ML water used for dust suppression to minimise dust. RLO suspended activities on 17/8/12 due to excessive wind.	Email response sent to EPA and complainant.
34	256	27/08/2012 10:55pm	Noise - Mine	L Quipolly	Phone to WCC Production Office Message Bank	Complainant alleges that the mine was very noisy at 11pm 27/8/12.	OCE/NCO did not modify operations at time of complaint due to dominant train noise and mining noise levels below 37dB(A) criteria.	A written response provided to the complainant.
35	257	3/09/2012 10:59pm	Noise - Mine	L Quipolly	Phone to WCC Production Office Message Bank	Complainant alleges that the mine was very noisy at 11pm 3/9/12.	11 hours of production lost due to operations being suspended. WCC mining noise would have been equal to or below the "Hazeldene" noise criteria of 37dB(A) indicating that the OCE was appropriately managing mining operations to minimise noise levels. Noise levels measured under extreme temperature inversions (>+12oC/100m) are not assessable against noise criteria.	A written response provided to the complainant.
36	258	5/09/2012 11:59am	Dust – Mine	AD Quipolly	Phone to EO	The complainant indicated that the laundry is covered in a layer of black dust after being recently cleaned. The complainant is concerned about the black dust from WCC coal mine getting into her drinking water and wants WCC to put a filter on her drinking water supply.	Winds at time of complaint were from north west and had been for the last three days which is not towards the complainants residence. No change in dust levels measured at complainants residence. While it was windy, the Tamworth EPA PM10 indicated that there was a regional dust event present at the time.	In recognition of complainant's concerns, WCC will investigate installing a filter on drinking water supply. A written response provided to the complainant.
37	259	6/09/2012 11:24am	Dust – Mine	EPA/ Anonymous	Phone to EO	Complainant alleges dust blowing off mine site at 11am 6/9/12.	Four offsite visual inspections undertaken on 6/9/12 did not identify excessive dust. Five water carts in operation. Trucks from 3600 were dumping on RL430m level east side which was the most sheltered dump available in the high westerly winds. Tamworth EPA PM10 indicated that there was a regional dust event present at the time.	Operations Manager relocated 3600 lower in pit so not as exposed to westerly winds. Verbal response provided to EPA.
38	260	28/09/2012 12:30pm	Blast – Dust	Q Quipolly	Phone to EO	Complaint stated large dust cloud generated by blast towards Quipolly.	Dry weather and high winds at time of blast would have contributed the larger than normal dust cloud generated by the blast.	Orica to review blast performance. WCC to review controls for blasting in high winds.

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39	261	25/10/2012 2:24pm	Blast - OP/ Vibration	A/EPA Werris Creek	Email from EPA to EO	Complainant alleges that WCC blasted between 12:30 & 12:45pm on 18/10/12.	WCC did not blast on 18/10/12.	Email response sent to EPA and complainant.
40	262	25/10/2012 2:24pm	Dust – Mine	EPA/AA Werris Creek	Email from EPA to EO	Complainant alleged heavy dust from mine on 23&24/10/12 covering his house and car.	Dust gauge on property did not indicate that October was a dusty month. The highest result from real time dust monitoring for 23&24/10/12 was 23µg/m3 which is below criteria. Offsite visual inspections support that there was no excessive dust generation from the mine on those days.	Email response sent to EPA and letter to complainant.
41	263	31/10/2012 1:35pm	Blast - OP/ Vibration	A/EPA Werris Creek	Email from EPA to EO	Complainant alleges that blast on 31/10/12 shook house and created "brownish/rusty" colour dust cloud.	Except for Werris Creek monitor, blast results were in compliance. The Werris Creek monitor missed the blast and no result is available. The blast scored a "0" for fume and the colour was due to the rock type.	Orica to investigate Werris Creek monitor failure. Email response sent to EPA and complainant.
42	264	22/11/2012 12:32pm	Blast - Odour	AH Werris Creek	Phone to EO	Complainant alleges that the WCC blast smelt sulfurous and could see a dust cloud from the mine towards Werris Creek.	The pre-blast weather check confirmed winds not towards Werris Creek. The blast results were in compliance. Upon investigation there was no obvious reason to confirm the cause of the odour or whether it was sourced from the blast.	A written response provided to the complainant. The next blast to the former magazine area will have the DO NOT BLAST arc around Werris Creek will be increased.
43	265	28/11/2012 1:09pm	Clearing	DoP	Email from DoP	The complaint from WIRES was in relation to impacts of clearing on protected fauna during nesting season.	WCC undertook clearing on 20th November in accordance with Biodiversity and Offset Management Plan. Approximately 20 habitat trees were assessed with no fauna identified. After clearing, no threatened fauna were identified however a number of nestlings were found and were taken to WIRES to be cared for.	Ecologists to issue a Clearing Report. A written report provided to DoP.
44	266	09/01/2013 10:08am	Dust – Mine	Q Quipolly	Phone to EO	A lot of dust from the mine blowing towards Quipolly.	The complaint coincided with a sudden increase in wind speed from 7m/s to over 13m/s at 10am with wind speed dropping back to average at 10:30am. All five water carts were operating applying 2.4ML of water on the 9/1 for dust suppression.	EO met with complainant on day of complaint. A written response provided to the complainant.
45	267	14/01/2013 11:41am	Dust – Mine	AI Werris Creek	Phone to WCC Production Office	Last fortnight dust has been bad, especially 9/1 & 10/1 with coal dust on house floor.	Prevailing weather conditions have been hot and dry including two non-mining events affecting air quality. However, Werris Creek dust levels (whether from WCC or other/ambient dust sources) have not exceeded the accepted criteria for air quality impacts and that on average the Werris Creek PM10 levels are lower than that measured in Tamworth indicating that Werris Creek is not being adversely impacted by WCC mining operations.	A written response provided to the complainant. ALS to analyse dust sample and test drinking water quality.

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46	268	24/01/2013 8:01am	Dust – Mine	I Werris Creek	Phone to EO	Black dust has coated roof and swimming pool over the last fortnight. Blast dust looks like coal dust.	Prevailing weather conditions have been hot and dry including two non-mining events affecting air quality. However, Werris Creek dust levels (whether from WCC or other/ambient dust sources) have not exceeded the accepted criteria for air quality impacts and that on average the Werris Creek PM10 levels are lower than that measured in Tamworth indicating that Werris Creek is not being adversely impacted by WCC mining operations.	A written response provided to the complainant. ALS test drinking water quality.
47	269	29/01/2013 2:15pm	Dust – Mine	AJ Werris Creek	Phone to WCC Production Office	Black dust on pegs has stained clothes on clothes line.	Prevailing weather conditions have been hot and dry including two non-mining events affecting air quality. However, Werris Creek dust levels (whether from WCC or other/ambient dust sources) have not exceeded the accepted criteria for air quality impacts and that on average the Werris Creek PM10 levels are lower than that measured in Tamworth indicating that Werris Creek is not being adversely impacted by WCC mining operations.	A written response provided to the complainant. ALS test drinking water quality.
48	270	31/01/2013 11:35am	Groundwater – Contamination	AK Quipolly	Passed on by CCC member	Alleged that the bore water supply is contaminated. Groundwater level has declined and don't accept that it is to do with dry conditions.	Across 2012, Quipolly Alluvium aquifer upstream of "Naranji" has fallen on average by 0.6m across the 15 bores monitored, equating to between 5 and 15% decrease. Water quality monitoring of Quipolly Creek and Quipolly Alluvium has not identified any changes in water chemistry or contamination of the creek or aquifer. Rainfall had only reached 64% of the Quirindi Long Term Average (259mm out of 403mm for April to November) demonstrating how dry it was prior to December.	ALS to test bore water quality and commence monitoring bimonthly water levels. A written response provided to the complainant.
49 to 54	271 to 276	08/02/2013 1:17pm	Blast - OP/ Vibration	Various	Phone to EO	The complainants allege that the blast on 08/02/13 shook their homes and rattled objects inside.	Blast performed as expected and all community monitoring location in compliance. Investigation did not identify a reason for the blast causing the complaints but did identify actions to improve processes and procedures around blast design.	A written response provided to the complainants. Property investigation by structural engineer organised for one complaint of alleged property damage.
55	277	21/02/2013 11:09am	Noise - Mine	C Werris Creek	Phone to EO	Complainant stated that the mine noise was high (loud) at 11pm on 20/02/13.	Noise levels and audio from Werris Creek noise monitor demonstrate that rail noise is major component of elevated noise levels. WCC mine noise very infrequently audible and in compliance.	A written response provided to the complainant.

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56	278	27/02/2013 11:50pm	Noise - Mine	L Quipolly	Phone to Old OCE Office Phone	Complainant stated that the mine noise was “ridiculous” at midnight on 27/02/13 and questioned why the mine noise was louder than it had been for some time.	Noise levels and audio from Quipolly noise monitor demonstrate that there were no elevated noise levels and mining noise was in compliance with the criteria. OCE not required to change mining operations.	A written response provided to the complainant.