WERRIS CREEK COAL

ANNUAL ENVIRONMENTAL MANAGEMENT REPORT AND ANNUAL REVIEW

2011-2012

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 2011 31 March 2012
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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(APPENDED TO THIS REPORT)

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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 2011 to 31st March 2012 including performance and forecasts relating to:

- The current Mining Operations Plan (MOP) for the period 01 September 2011 to 31 August 2018;
- PA10_0059 issued by the Acting Deputy Director-General of the Department of Planning on 25th October 2011;
- 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 Michael Howat
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:

Planner Att: **Mr Paul Freeman**
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

The WCC AEMR for 2011/2012 is also available on the Whitehaven Coal website at:
http://www.whitehavencoal.com.au/operations/werris_creek_mine_environmental_management.cfm

iv ANNUAL REVIEW REQUIREMENTS

The requirements for the Director-General to assess this Annual Environmental Monitoring Report (AEMR) and Annual Return, as stipulated in PA10_0059, are summarised in the following table and identifies where these requirements are addressed within this document.

Schedule (Condition)	Requirement	Response Detailed in Section
2 (6)	The Proponent shall not extract more than 2.5 million tonnes of ROM coal from the site in a calendar year.	Section 2.4 (Mining)
2 (7)	The Proponent shall not stockpile more than 250,000 tonnes of product coal on the site	Section 2.4 (Mining)
2 (8)	a) more than 50,000 tonnes of product coal from the site by public road in any calendar year; and	Section 2.11 (Product Transport)
2 (15)	The Proponent shall establish and operate a Community Enhancement Fund for the project to the satisfaction of the Director-General.	Section 5.2.3 (Community Fund)
3 (4)	b) The proponent shall use its best endeavours to achieve the long-term noise goals in Table 4 of PA10_0059, where this is reasonable and feasible, and report on the progress towards achieving these goals in the annual review.	Section 3.8 (Operational Noise)
3 (23)	b) In addition to the standard requirements for management plans (see condition 2 of schedule 5), this plan must include a site water balance in each annual review.	Section 2.8 (Water Management)
3 (36)	b) make these records (monitoring of coal transport) available on its website at the end of each calendar year	Section 2.11 (Product Transport)
3 (39)	c) The Proponent shall monitor and report on effectiveness of the waste minimisation and management measures in the annual review.	Section 2.6 (Waste Management)
5 (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.	Section 2 (Operations During the Reporting Period) and Section 5 (Rehabilitation)
	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: o relevant statutory requirements, limits or performance measures/criteria; o monitoring results of previous years; and o relevant predictions in the EA.	Section 3 (Various sub-sections) and Section 4 (Community)
	c) identify any non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance.	Section 3 (Various sub-sections)
	d) identify any trends in the monitoring data over the life of the project.	Section 3 (Various sub-sections)
	e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies.	Section 3 (Various sub-sections)
	f) describe what measures will be implemented over the next year to improve the environmental performance of the project.	Section 3 (Various sub-sections) and Section 6
5 (4)	Within 3 months of: the submission of an annual review under condition 3 above	Section 3 (Various sub-sections)
5 (10)	a) make copies of the following publicly available on its website: the last five annual reviews.	Section iii

1. INTRODUCTION

This Annual Environmental Management Report (AEMR) is the seventh 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 2012.

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.

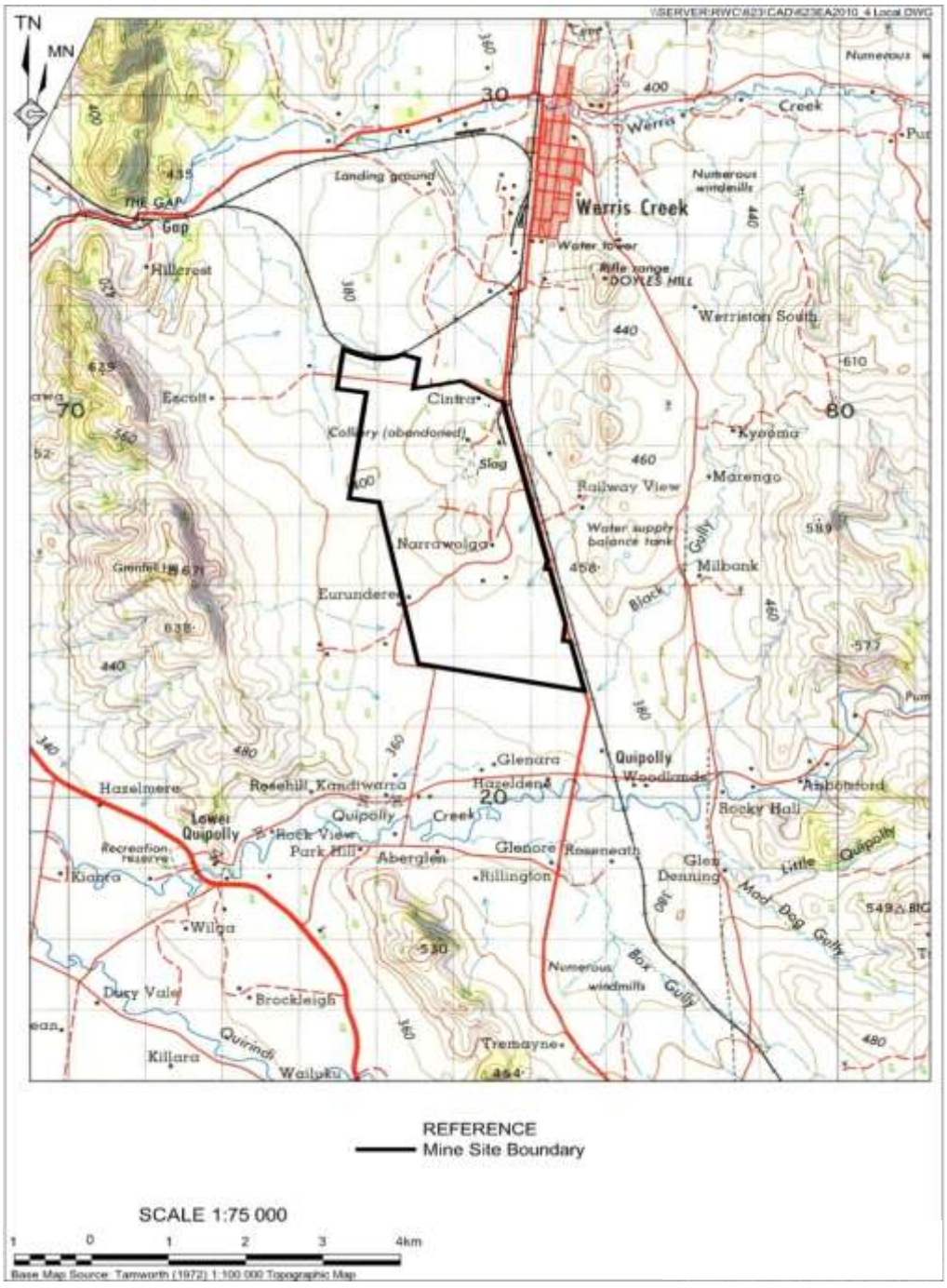


Figure 1.1 WCC Mine Site and Locality

1.1 CONSENT, LEASES AND LICENCES

All applicable consents, leases and licences held by WCC for the 2011-2012 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

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Department of Infrastructure, Planning and Natural Resources	Development Consent DA 172-7-2004	18 February 2005	18 February 2020	MOD 5 approved 6th October 2009 for northerly extension of open cut, increase void water storage and modify BOS. To be surrendered and superseded by PA10_0059
Department of Planning and Infrastructure (DP&I)	Project Approval (PA10_0059)	25 October 2011	31 December 2032	Life of Mine Project allows northerly continuation for entire coal deposit mining up to 2.5Mtpa and 24 hours 7 days per week.
Division of Resources and Energy (DRE)	EL 5993	18 September 2002	17 September 2013	To be relinquished and consolidated into ML1672
	ML 1563	23 March 2005	23 March 2026	Mining Lease granted for 21 years.
	ML 1671	9 March 2012	9 March 2032	Mining Lease granted for 21 years.
	ML 1672	9 March 2012	9 March 2032	Mining Lease granted for 21 years.
	Mining Operations Plan	1 September 2011	31 August 2018	MOP approved on 29 November 2011
Department of Primary Industries[1]	EL 7422	26 November 2009	25 November 2011	To be relinquished and consolidated into ML1672
Environment Protection Authority	Environment Protection Licence No. 12290	18 April 2005		Last variation 4th April 2012. Review Date14 April 2013
	Radiation Licence RL41800		8 February 2013	

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Department of Infrastructure, Planning and Natural Resources[2]	Water Licence 90BL252588 90BL253367 90BL253363 90BL253360 90BL252589 90BL252590 90BL253361 90BL253503 90BL252587 90BL251769 90BL254903 90BL254902 90BL254901 90BL254899 90BL254900	 15/10/08 18/05/06 18/05/06 18/05/06 18/05/06 18/05/06 18/05/06	 14/10/13 Perpetuity Expired Expired Perpetuity Perpetuity Expired	Industrial and Mining Bore allocation of 50 ML per year.
Workcover	Dangerous Goods Notification 35/037966		4 June 2012	2 x 60000L Above Ground Diesel Tanks held by Werris Creek Coal Pty Limited
	35/037161		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		28/11/2013	Orica Australia Pty Limited authorised to possess and store explosives
Liverpool Plains Shire Council	On-Site Sewerage Management Systems 04/06 05/06	 1 March 2006 1 March 2006		
Commonwealth Department of Sustainability, Environment, Water, Population and Communities	Environment Protection and Biodiversity Conservation Act Approval 2010/5571	21 December 2011	31 December 2032	Authorities impacts on EPBC listed threatened species and communities and listed migratory species

[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 2011-2012

Date Issued	Title	Details
25 October 2011	Project Approval (PA10_0059)	New Project Approval relating to Life of Mine Environmental Assessment (LOM EA)
29 November 2011	Mining Operations Plan (MOP)	New MOP associated with LOM Project and consistent with EA
4th April 2012	EPL12290	Update EPL in ling with LOM Project and consistent with EA
21st December 2011	Environment Protection and Biodiversity Conservation Act Approval 2010/5571	Authorities impacts on EPBC listed threatened species and communities and listed migratory species
9 March 2012	ML 1671	Mining Purposes lease for 96ha over LOM Project where no previous leases were
9 March 2012	ML 1672	160ha of EL5993 and EL7422 converted to ML

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 Tony Haggarty	WHC Managing Director	02 8507 9700	16/10/2008 Present
Mr Peter Wilkinson	WHC General Manager – Open Cut	02 6742 4337	12/03/2012 - Present
Mr Brian Cullen	WHC General Manager – Technical Services	02 6742 4337	11/1/2008 – Present
Mr Nigel Wood	WHC Operations Manager and Acting WCC Project Manager	02 6763 6002	5/03/2012 - Present
Mr Danny Young	WHC Environmental Group Manager	02 6742 4337	11/1/2008 – Present
Mr Andrew Wright	WCC Environmental Officer	02 6768 7071	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;
- Advitech Environmental Pty Ltd;
- R.W. Corkery & Associates Pty Ltd;
- Horizon Surveying Pty Ltd;
- Department of Lands - Soil Services; and
- Spectrum Acoustics.

1.3 ANNUAL AEMR REVIEW & INSPECTION

The WCC AEMR for 2010-2011 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 2011, DRE noted that there was a shortfall in the rehabilitation completed for the year which was due to the timing of the arrival of earthmoving equipment just outside the reporting period and therefore while the rehabilitation targets were not achieved, they were 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 2011-2012 period.

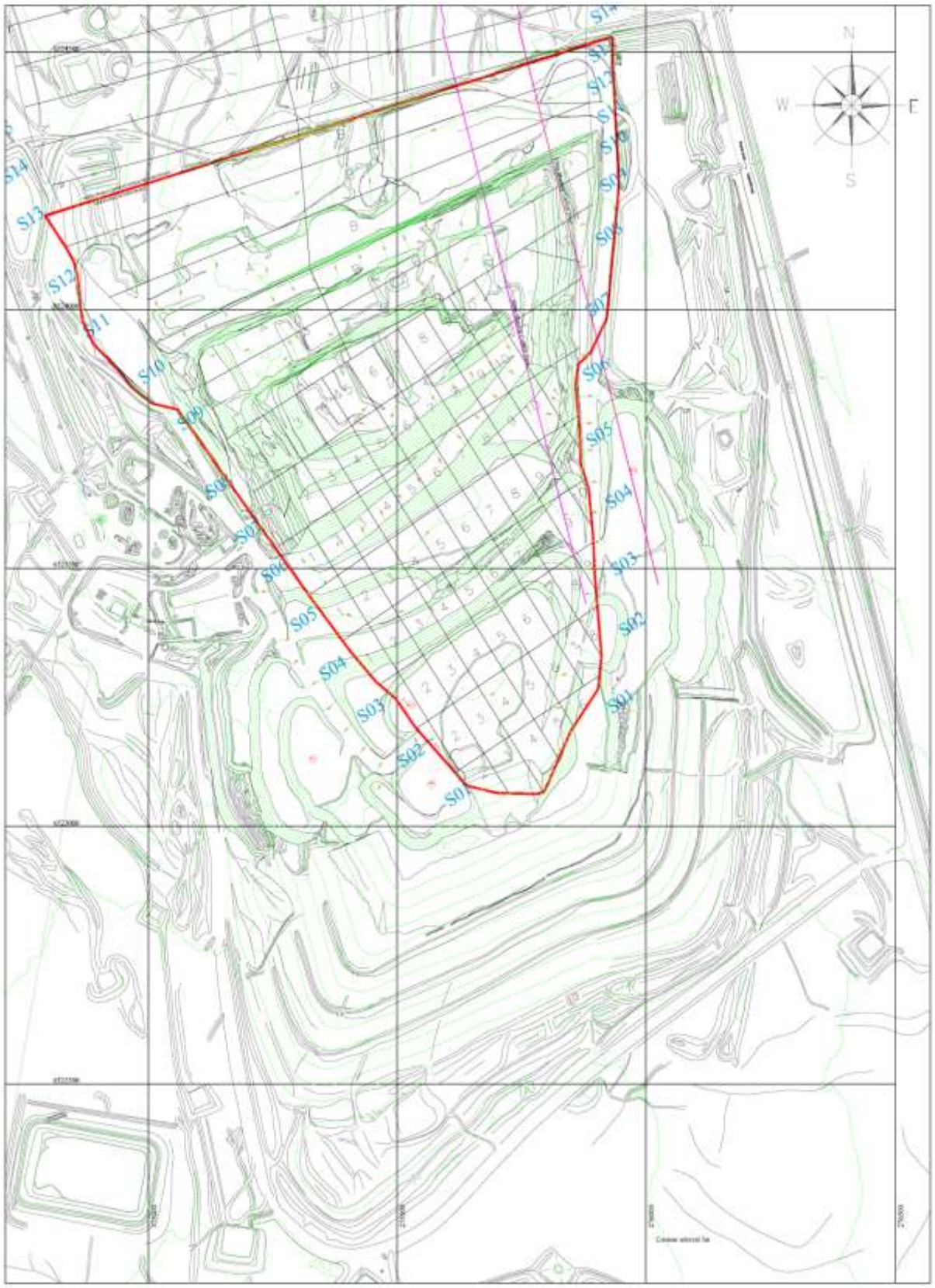


Figure 2.1 Werris Creek Coal Mining Operations as of April 2011

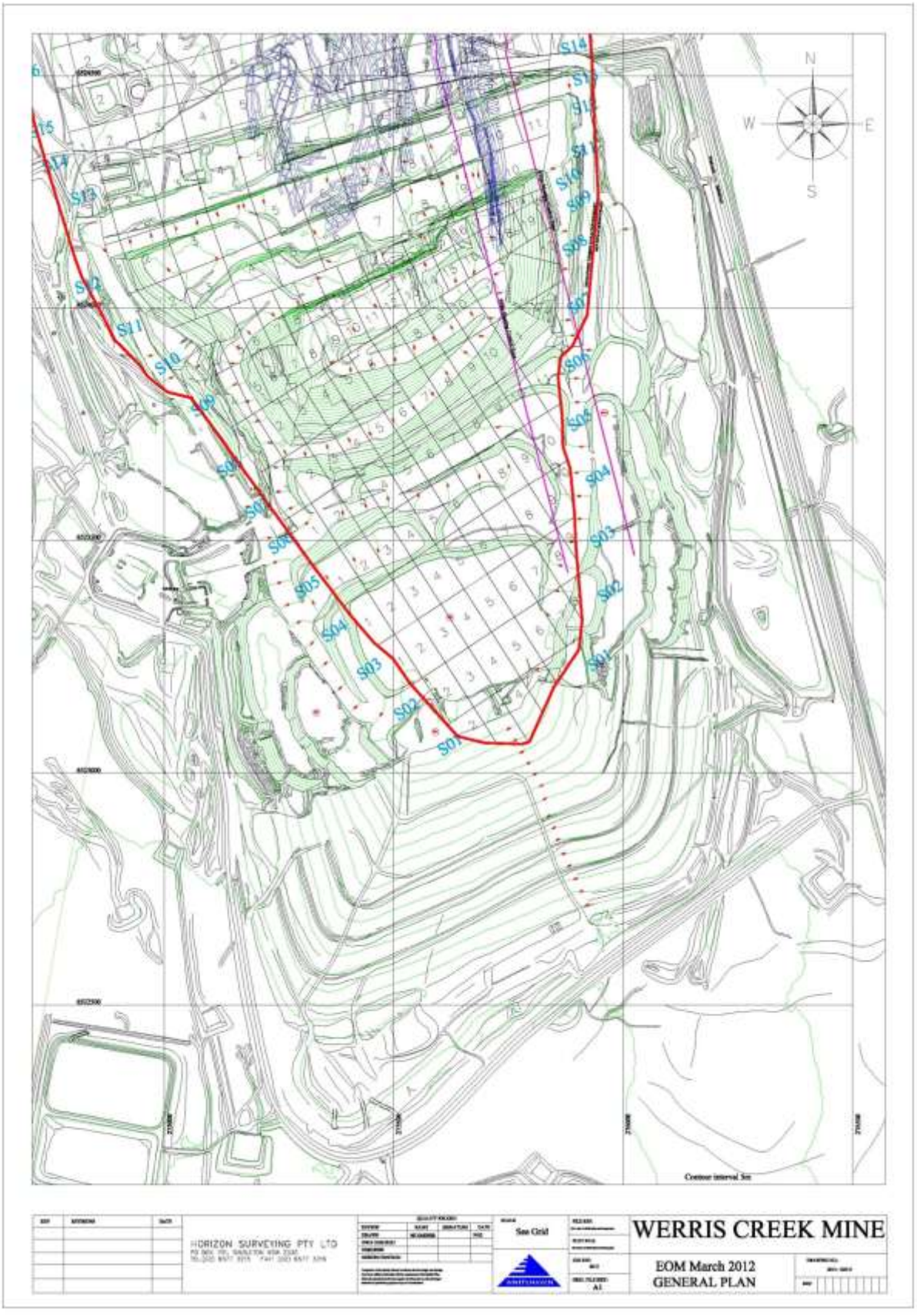


Figure 2.2 Werris Creek Coal Mining Operations as at March 2012 (includes New Extraction Boundary)

2.1 EXPLORATION

2.1.1 Drilling Program

The WCC drilling program included 53 open drill holes and three (3) cored drill holes, plus redrills which were undertaken within the reporting period and focussed primarily in front of the highwall. Total meterage of the combined holes were 5,594m with all boreholes geologically and geophysically logged. Coal quality data has not yet been ascertained at the time this document was submitted.

2.1.2 Resource and Reserve Estimation

The total thickness of the coal-bearing sequence is 190m within the synclinal basin at WCC. The Werris Creek deposit is an outlier of the Greta Coal Measures comprising of eight coal seams (Seams BL and A to G), although the uppermost coal seams within the sequence (BL Seam, A Seam and B Seam) contain only limited quantities of coal separated by thick interburden layers (typically 30m to 40m).

Significantly greater quantities of coal are present within the C Seam to G Seam. With the exception of the interburden layer between the F Seam and G Seam, which ranges in thickness from 20m to 40m, these seams are generally separated by reduced thicknesses of interburden (typically 2m to 6m). The deposit has synclinally folded coal seams forming a basin shape; both in an east-west and north-south cross section, the seams dip towards the centre of the deposit and then rise again at the other sub crop line.

The most recent resource statement (Coxhead, 2011) identified the coal resource as 'Measured' or 'Indicated'. Coxhead (2011) reports the coal resource as 34.5 million tonnes (**Table 2.1**).

Table 2.1 Werris Creek Coal Resource Summary

Category	ML 1563	ML 1672 (formerly EL 5967)	ML 1672 (formerly EL 7422)
Measured	18.8Mt	7.34Mt	0.51Mt
Indicated	4.5Mt	1.17Mt	-
Inferred	1.1Mt	1.07Mt	0.04Mt
TOTAL	**24.40Mt**	**9.58Mt**	**0.55Mt**

The most recent reserve statement (Minarco-MineConsult, 2011) identified a proved and probable reserve of 21.4 million tonnes within ML 1563 (**Table 2.2**). This reserve excludes the coal removed by the former Werris Creek Colliery. Reserve statements for ML1671 and ML1672 have yet to be prepared as these leases were granted towards the end of the reporting period (9 March 2012).

Table 2.2 Werris Creek Coal Reserve Summary

Category	ML 1563
Proved Reserves	17.3Mt
Probable Reserves	4.1Mt
Proved + Probable	**21.4Mt**

2.2 LAND PREPARATION

Land preparation activities undertaken by WCC during the reporting period were conducted in accordance with the MOP and are summarised as follows:

- Surface disturbance throughout the 2011-2012 reporting period increased due to required clearing activities associated with PA10_0059. This increase in vegetation removal in the advance of the active pit was 52.6ha. It should be noted that this initial clearing is a 'one-off' event with future clearings (as indicated in the MOP) typically ranging around 10ha – 25ha each reporting period. All clearing works were undertaken following a pre-start clearing check in accordance with Section 3.1 of the MOP.
- Stripping of topsoil and subsoil was undertaken only for areas with viable soil. At the end of the reporting period, the total volume of soil stockpiled decreased from 1,104,980m^3 to 1,064,790m^3. The reduction in soil stockpile volumes was because 59,120m^3 of topsoil and subsoil was used for rehabilitation and only 17,110m^3 was stripped and stockpiled during the period. Older soil stockpiles were re-surveyed during the period and quantities updated based on new survey volumes. **Figure 2.3** displays the locations of the soil stockpile areas as of March 2012.

2.3 CONSTRUCTION

During the reporting period, construction activity undertaken included the southern 200ML Dam (referred to as Void Water Dam (VWD) 4 in the MOP) and Orica Precursor (Ammonium Nitrate Re-load) Facility. The 200ML Dam South construction was the second stage of a 400ML surface water storage system with VWD3 constructed in the previous reporting period continued to be used to collect the void water from the former underground colliery workings. VWD4 was constructed as a "turkey nest" using four scrappers, two rollers and a water cart and was completed in May 2011. The dam footprint was 300m by 150m and was constructed to a permeability standard of $1x10^{-9}$m/s.

The Orica Precursor Facility was constructed on the western side of the Coal Haul Road to provide onsite facilities to improve WCC explosive loading capabilities. The facility includes two above ground bins (tanks) of 35000kg and 80000kg storing explosive precursor materials that can allow direct loading of explosive trucks. Other demountable buildings for administration and amenity facilities were also added to the site.

Planned construction activities for the next reporting period are likely to include the following.

- A new entrance off Escott Road providing access to the Coal Preparation Plant and Site Infrastructure. This would include upgrading the Escott Road and Werris Creek Road intersection; and
- Repairs and upgrade to the VWD3 breach (details provided later in report) and other Void Water Management System improvements (see Section 3.2).

2.4 MINING

Throughout the reporting period, the mine continued to develop as a series of approximately 100 metre wide east-west orientated strips, advancing in a northerly direction. This has allowed for progressive intersection of each coal seam and has enabled a relatively consistent stripping ratio to be achieved.

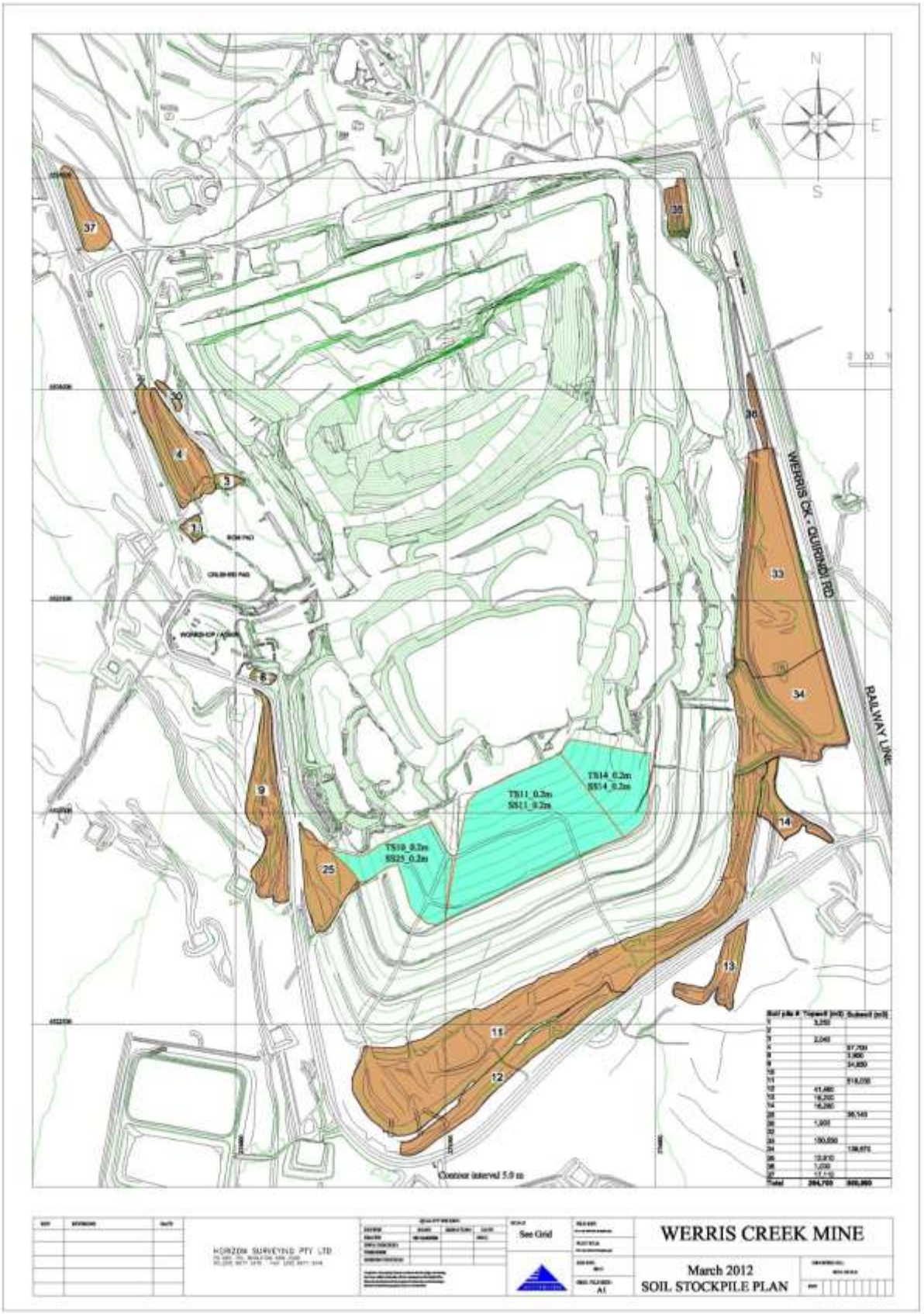


Figure 2.3 WCC Soil Register and Stockpiles

During the 2011-2012 reporting period, a total of 11,877,304 bcm of overburden was removed to produce 1,564,194t of ROM coal at an average over burden to coal stripping ratio of 7.6:1 (**Table 2.3**). Coal production increased by 240,989t and additional overburden removed was 1,535,566bcm over 2010-2011 production numbers. It is WCC target to increase production to 2Mtpa.

Table 2.3 Cumulative Production and Waste Summary

	Start of Reporting Period 1 April 2011	At end of Reporting Period 31 March 2012	End of next Reporting Period 31 March 2013
Soil Stripped (m^3)	1,172,990	1,189,990	1,369,990
Soil Used/Spread(m^3)	249,689	308,689	334,089
Waste Rock (bcm)	43,222,307	55,099,611	70,699,611
ROM coal (t)	6,647,843	8,212,037	10,212,037
Product coal (t)	6,647,843	8,212,037	10,212,037

2.5 PROCESSING

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.

Plan 4 (see Appended plans) details the current and proposed location of the coal processing area beyond the western perimeter of the open cut mine and includes additional areas on the southern ROM pad boundary for operational and coal blending requirements as well as the proposed rail loop.

Figure 2.4 presents a schematic of coal movements, outputs and yields for the reporting period and shows that a total of 1,573,846t coal was processed through the crusher. Domestic coal produced includes 42,892t trucked by road and 118,644t railed offsite. Total coal railed offsite (domestic and export) was 1,522,039t.

2.6 WASTE MANAGEMENT

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

- Production wastes - overburden and inter-burden 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.

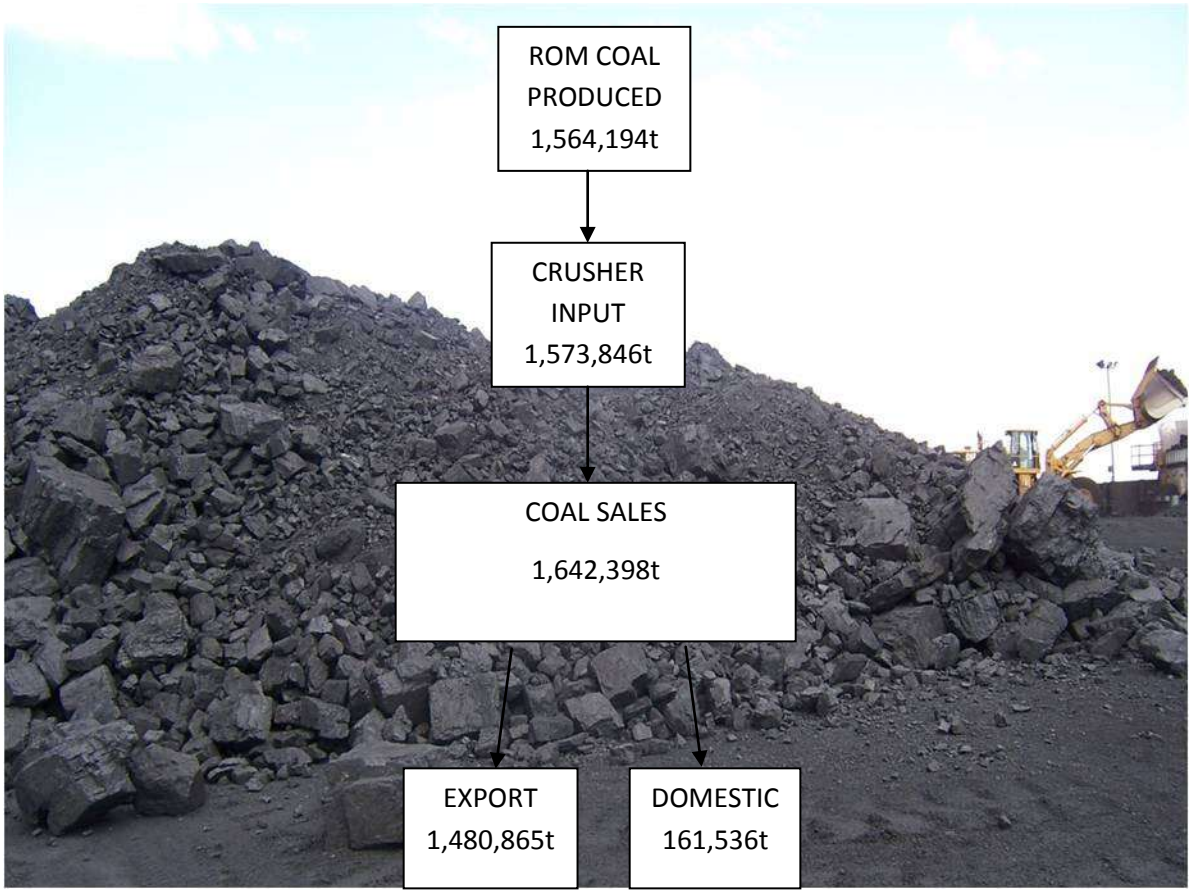


Figure 2.4 Coal Movements and Production Summary for 2011-2012 Period

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.

Waste management practices adopted and waste quantities generated (**Table 2.4**) 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 and disposed at Tamworth Waste Facility.
- 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 and disposed of at Transpacific's depot in Tamworth.
- 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.

Table 2.4 Quantities of Waste Generated by Waste Stream for WCC 2011-2012

2011-2012	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	TOTAL
General Waste (m3)	56*	56*	66	54	69	54	54	66	54	18	69	54	670
Scrap Metal (kg)	15900	1320	0	660	0	13550	660	0	0	0	16420	660	49170
Waste Oil (L)	7000	11000	4000	14000	9000	16000	11000	11800	9000	4000	17000	9000	122800

* Data not available therefore estimated as the monthly average prorated for that month

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 AEMR period 26,695t of coal was stored at the Rail Load-out Facility and 20,900t of coal was stored at the ROM and crushed coal processing 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 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 three septic systems onsite.

Figure 2.5 outlines the overall void water management system at WCC. 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. Clean water and dirty water is separated and diverted using a series of contour, diversion drains and dams and erosion and sediment control.

2.8.1 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 21 discharge events during this AEMR period as a result of wet weather and controlled discharges which reflects the above average rainfall experienced in the 12 months to 31st March 2012. 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 24.7ML of water was discharged during controlled discharge events.

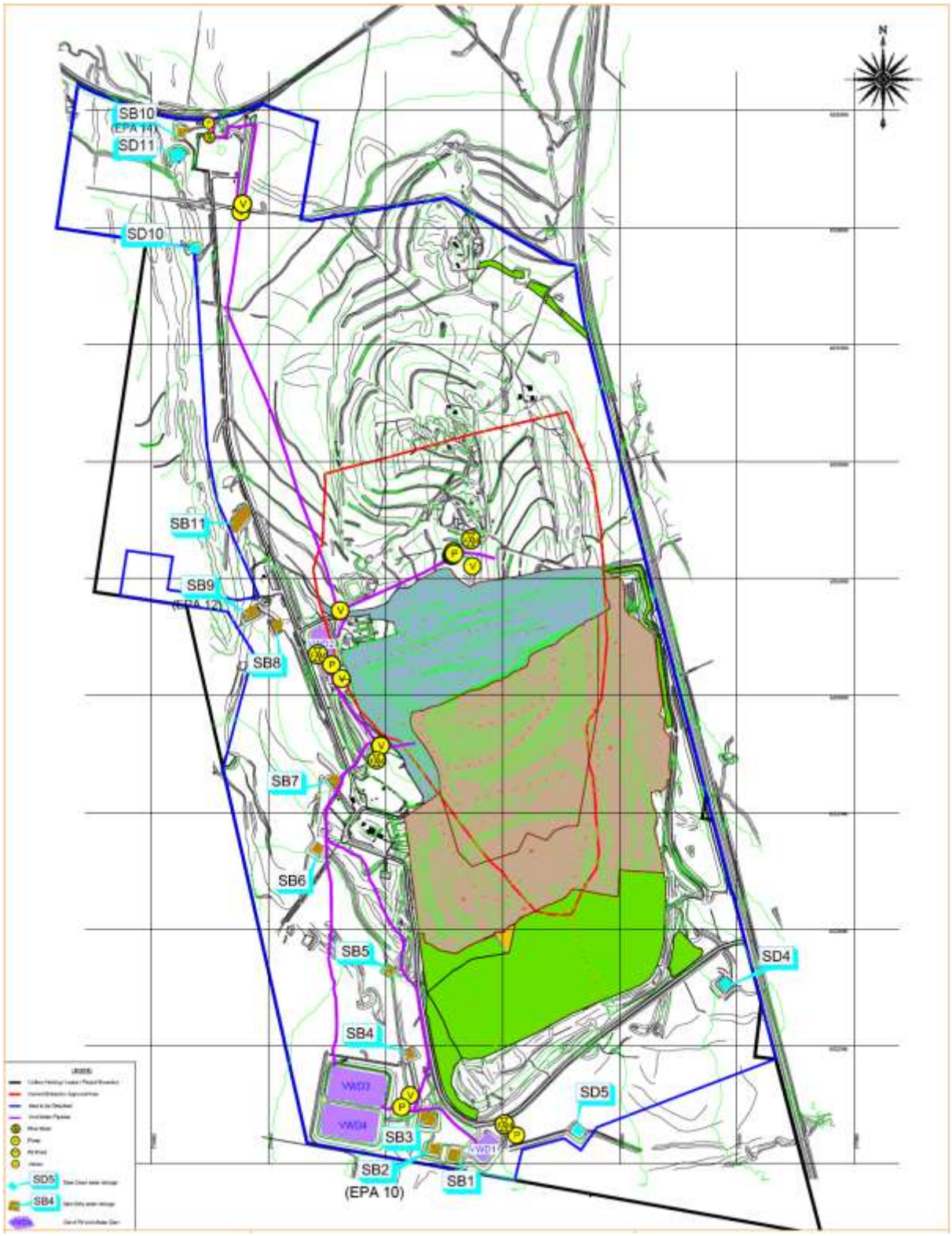


Figure 2.5 Void Water Management System Plan

Table 2.5 WCC Discharge Event Summary

Date	Dam	pH	EC (µS/cm)	TSS (mg/L)	O&G (mg/L)	Type	5 Day Rain (mm)	Compliance
12/04/11	SB2	7.9	444	34	<5	Controlled	N/A	Compliant
12/04/11	SB9	8.13	148	15	<5	Controlled	N/A	Compliant
01/06/11	SB2	8.09	493	20	<5	Controlled	N/A	Compliant
07/06/11	SB9	7.72	666	8	<5	Controlled	N/A	Compliant
16/06/11	SB2	8.17	510	28	<5	Controlled	N/A	Compliant
16/06/11	SB9	8.05	712	<5	<5	Controlled	N/A	Compliant
27/09/11	SB9	8.16	683	6	<5	Controlled	N/A	Compliant
16/10/11	SB9	7.72	658	6	<5	Wet Weather	49.8	Compliant
18/10/11	SB9	7.77	641	16	<5	Controlled	N/A	Compliant
25/10/11	SB10	7.43	352	<5	<5	Controlled	N/A	Compliant
25/11/11	SB2	7.80	407	34	<5	Wet Weather	80.0	Compliant
25/11/11	SB9	7.42	493	40	<5	Wet Weather	80.0	Compliant
26/11/11	SB10	7.60	342	**106**	<5	Wet Weather	116.2	Compliant
13/12/11	SB2	7.92	464	<5	<5	Wet Weather	42.2	Compliant
13/12/11	SB9	7.68	224	18	<5	Wet Weather	42.2	Compliant
20/12/11	SB2	7.98	468	12	<5	Controlled	N/A	Compliant
20/12/11	SB9	7.67	214	14	<5	Controlled	N/A	Compliant
02/02/12	SB9	7.92	404	32	<5	Wet Weather	60.2	Compliant
02/02/12	SB10	7.59	282	**300**	<5	Wet Weather	60.2	Compliant
16/02/12	SB2	7.92	436	16	<5	Controlled	N/A	Compliant
16/02/12	SB9	7.18	325	41	<5	Controlled	N/A	Compliant
Criteria		**8.5**	**N/A**	**50**	**10**		**39.2**	

A breach in a void water dam (Void Water Dam 3 – 200ML Dam North) was observed at approximately 9:30am on Sunday 11th March 2012. The breach of the void water dam wall had occurred at the spillway of the dam, located on the northern embankment as result of pumping water from the open cut pit into the dam and overflowing through the spillway resulting in the release of approximately 30ML of void water. WCC is not approved to discharge void water offsite and the incident is being investigated by the EPA. Laboratory analysis found that the water samples both of the discharge water and normal creek water generally complied with both Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) Livestock Watering, Agricultural Irrigation and Drinking Water Guidelines with a few minor exceptions due to in stream water quality and not the void water discharge. WCC is undertaking a number of actions to rectify the dam breach as well as upgrading overflow controls on all void water dams.

2.8.2 Predicted Water Balance

The surface water assessment (GSS Environmental 2010) that accompanied the LOM EA, 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 **Tables 2.6** and **2.7**.

Table 2.6 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**
* Provides all required water for Dust Suppression and Crushing/Screening Operations				

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.

Table 2.7 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 majority of the Dust Suppression and Crushing/Screening Operations requirements are sourced from the Void water system.				

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).

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 (41.2ML) that could be utilised for water supply are within the Maximum Harvestable Right Dam Capacity (MDHRC). Therefore, no licences are required for these existing dams with no additional clean water dams proposed.

2.8.3 Stored Water

Following the construction of VWD4 during the reporting period, WCC now has a combined void water storage capacity of 365ML (VWD1 – 20ML, VWD2 – 35ML, VWD3 – 157ML and VWD4 – 153ML). There is an estimated 59ML of water still stored in the former underground workings, most of which cannot currently be reached by the bore pump. Following the void water discharge event in March 2012, WCC reviewed the capacities of the 200ML Dams North and South (VWD3 and VWD4) and found that the construction of the dams did not meet the dam design and subsequently the dam's capacities were downgraded to 157ML and 153ML respectively. **Table 2.8** presents an estimate of the volume of stored water at the beginning and end of the 2011-2012 reporting period. Details for individual storages are presented in **Table 2.9**.

Table 2.8 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)	13.95	10.5	13.95
Dirty Water (in Sediment Basins)	52.4	42.0	75.05
Void Water (in Void Water Dams)	155.0	262.0	365.0
Former Underground Workings	190.0	59.0	-

Table 2.9 Detail on Individual Dams Water Storage

Label	Function	Capacity (ML)	Source of Capacity	Storage @ March 2012 (ML)
Clean Water Storage Dams				
SD4	Clean water capture and use Diversion of Clean water around mine	5.05	Surveyed	4.0
SD5	Clean water capture and use Diversion of Clean water around mine	4.0	Surveyed	3.5
SD10	Clean water capture and use	1.9	Surveyed	1.5
SD11	Clean water capture and use	3.0	Estimated	2.5
Total Capacity of All Clean Water Dams		**13.95**		**10.5**
Dirty Water Ancillary Dams				
Farm 2	Ancillary to Dirty Water System	0.4	Estimated	0.3
Farm 3	Ancillary to Dirty Water System	0.4	Estimated	0.3
Farm 4	Ancillary to Dirty Water System	4.2	Estimated	4.0
Farm 5	Ancillary to Dirty Water System	0.45	Estimated	0.4
Farm 6	Ancillary to Dirty Water System	10.7	Surveyed	10.0
Sub-Total (Ancillary Dams)		**16.15**		**15.0**
Dirty Water Sediment Basins				
SB10	Northern Area – Dirty water capture, treatment and use EPL discharge point (NO. 14)	2.85	Surveyed	1.0
SB8	Middle Area – Dirty water capture, treatment and use	3.0	Estimated	2.5
SB9	Middle Area – Dirty water capture, treatment and use EPL discharge point (NO. 12)	4.0	Partially Surveyed	1.0
SB1	Southern Area – Dirty water capture, treatment and use	7.0	Estimated	6.0
SB2	Southern area – Dirty water capture, treatment and use EPL discharge point (NO. 10)	8.5	Surveyed	2.0
SB3	Southern Area – Dirty water capture, treatment and use	6.5	Estimated	5.5
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
SB6	Southern Area – Dirty water capture, treatment and use	4.5	Estimated	4.0

Label	Function	Capacity (ML)	Source of Capacity	Storage @ March 2012 (ML)
SB7	Southern Area – Dirty water capture, treatment and use	2.5	Estimated	2.0
Total Capacity of All Dirty Water Dams		**58.9**		**27.0**
Void Water Dams				
VWD1	Southern Area – Void water storage	20.0	Surveyed	15.0
VWD2	Middle Area – Void water storage.	35.0	Surveyed	19.0
VWD3	200ML Dam North – Underground Water Storage.	157.0	Surveyed	75.0
VWD4	200ML Dam South – Underground Water Storage.	153.0	Surveyed	166.0
Total Capacity of Void Water Dams		**365.0**		**275.0**

2.8.4 Water Usage and Consumption

Incorporating the above information for discharges, water balances and water stored onsite; WCC maintains records water meters on key pipelines and undertaken recording of volumes onsite monthly to determine the site water usage. **Table 2.10** summarises total water usage and consumption for 2011-2012 reporting period. Between October and December 2012, WCC implemented a water curtain over a blasted section of the former underground colliery to seal and prevent the mixing of the outside atmosphere with the underground atmosphere to mitigate ignition of an underground fire. The water curtain involved pumping water back from the 200ML Dams and irrigating over the surface of the blasted area at 2ML/day for 58 days, recycling approximately 87ML directly into the underground workings and 26ML runoff into the pit.

Table 2.10 WCC Water Usage 2011-2012

WATER INPUTS				**+454.5ML**
Void Water	**Total Bore Extraction**		**122.3ML**	
		Recycled Water Curtain	72.3ML	
		Groundwater (90BL252588)	50.0ML	
	Total Pit Dewatering		**332.2ML**	
		Rainfall Interception	260.2ML	
		Incidental Groundwater (BL TBA)	26.0ML	
		Spoil Recharge	1.0ML	
		Recycled Water Curtain	45.0ML	
WATER OUTPUTS				**-241.8ML**
	Total Dust Suppression		**202.4ML**	
		Haul Roads	189.0ML	
		Crushing Plant	5.4ML	
		Rail Load Out	8.0ML	
	Other		**39.4ML**	
		Workshop	39.4ML	
NET WATER				**+212.7ML**

Note: Evaporation losses have been assumed as final storage levels of dams onsite have been used in estimating water inputs; BL TBC – WCC has an application with NOW for approval of a Bore Licence for intercepted groundwater in pit.

WCC obtained a temporary transfer of 50ML to increase the licensed extraction volume to 100ML in the water year July 2011 to June 2012 for 90BL252588. The reason that the volume extracted is greater than 100ML is due to the water recycled from the water curtain and the difference in time periods between the AEMR and Water Licensing reporting periods. The total volume of "true" groundwater extracted via the bore pump was 50.0ML.

The Groundwater Impact Assessment as part of the LOM EA (RCA, 2010) predicted that in Year 3 of the LOM Project that WCC would intercept 13ML of groundwater. An update of the groundwater model (ENVIRON, 2012 – **Appendix 4b**) for WCC estimated that 26.0ML of groundwater was intercepted in pit during the period. The reason why the groundwater intercepted in pit was above that predicted in the EA is because the former underground colliery workings have not yet been completely dewatered. The Groundwater Impact Assessment assumed that the workings had been dewatered, and therefore additional water ingress from the former underground mine for 2011-2012 resulted in the higher groundwater volume intercepted but within the quantity of groundwater that WCC has an application with NOW to be licensed. The surplus water from **Table 2.10** was held in surface storage of the 200ML Dams and in pit (~100ML) at the end of the reporting 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. The magazines are separated into two areas, 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 two 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 acquired the additional three neighbouring properties of "Werris Creek Railway Cottage", "Greenslopes" and "Banool" during the reporting period. These acquisitions occurred thorough private negotiation to alleviate any current or future environmental impacts on these residents; allowing mining to continue in the most productive and efficient method possible and avoiding the need to restrict operations impacting on production. **Table 2.11** details the properties purchased by the company and the subsequent dates of purchase.

Table 2.11 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	"W C 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	"W C Railway Cottage"	3rd November 2011
R14	"Greenslopes"	20th December 2011
R100	"Banool"	20th December 2011
R65	"Banool" (Subdivision)	20th December 2011

* 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.

2.11 PRODUCT TRANSPORT

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. During the reporting period, 1,573,846t of coal was transported to the rail load-out storage area via the internal coal haul road using road-registered semi-trailers. A total of 1,480,862t of export coal was loaded onto 287 trains during the reporting period.

During the reporting period 42,891.68t of coal was transported by road to domestic markets by 1,416 trucks. The domestic coal is loaded from the stockpiles at the coal processing area and despatched to the public road network via the mine access road and was primarily sold into local markets.

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 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 and also includes a revised air quality criteria for Particulate Matter less than 2.5 microns however no monitoring was conducted during the period. 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 below.

Table 3.1 Air Quality Impact Assessment Criteria

Pollutant	Averaging Period	AQGHGMP Criteria	Background Level
Total Suspended Particulate (TSP) Matter	Annual	90µg/m^3	30.2µg/m^3
Particulate Matter < 10 microns (µm) (PM_{10})	Annual	30µg/m^3	15.1µg/m^3
Particulate Matter < 10 microns (µm) (PM_{10})	24 hour	50µg/m^3	Variable Daily
Deposited Dust	Annual	4g/m^2/month	0.6g/m^2/month
Deposited Dust	Annual	2g/m^2/month (maximum incremental (Project only) increase)	0.6g/m^2/month

The Air Quality Monitoring Program undertaken by WCC for 2011-2012 included deposited dust, total suspended particulates (TSP) and PM10 particulates. A summary of the air quality monitoring network is provided in **Table 3.2** and the locations are shown on **Figure 3.1**.

Table 3.2 Air Quality Monitoring Program

Pollutant	Frequency	Locations
TSP	6 Days	"Railway View"
PM_{10}	6 Days	"Eurunderee", "Railway View", "Cintra", "Tonsley Park"
Deposited Dust	Monthly	"Plain View", "Railway View", "Cintra", "Tonsley Park", "Marengo", "Mountain View", "Glenara"

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 one 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 2010-2011 reporting period, where 140.3ML (11.7ML per month) of water was used for dust suppression activities, water usage in the 2011-2012 reporting period increased 26% to a total of 189.7ML (15.5ML per month). This rise in water usage for dust suppression is attributable to increased area of disturbance of mining operations associated with the new Project Approval.

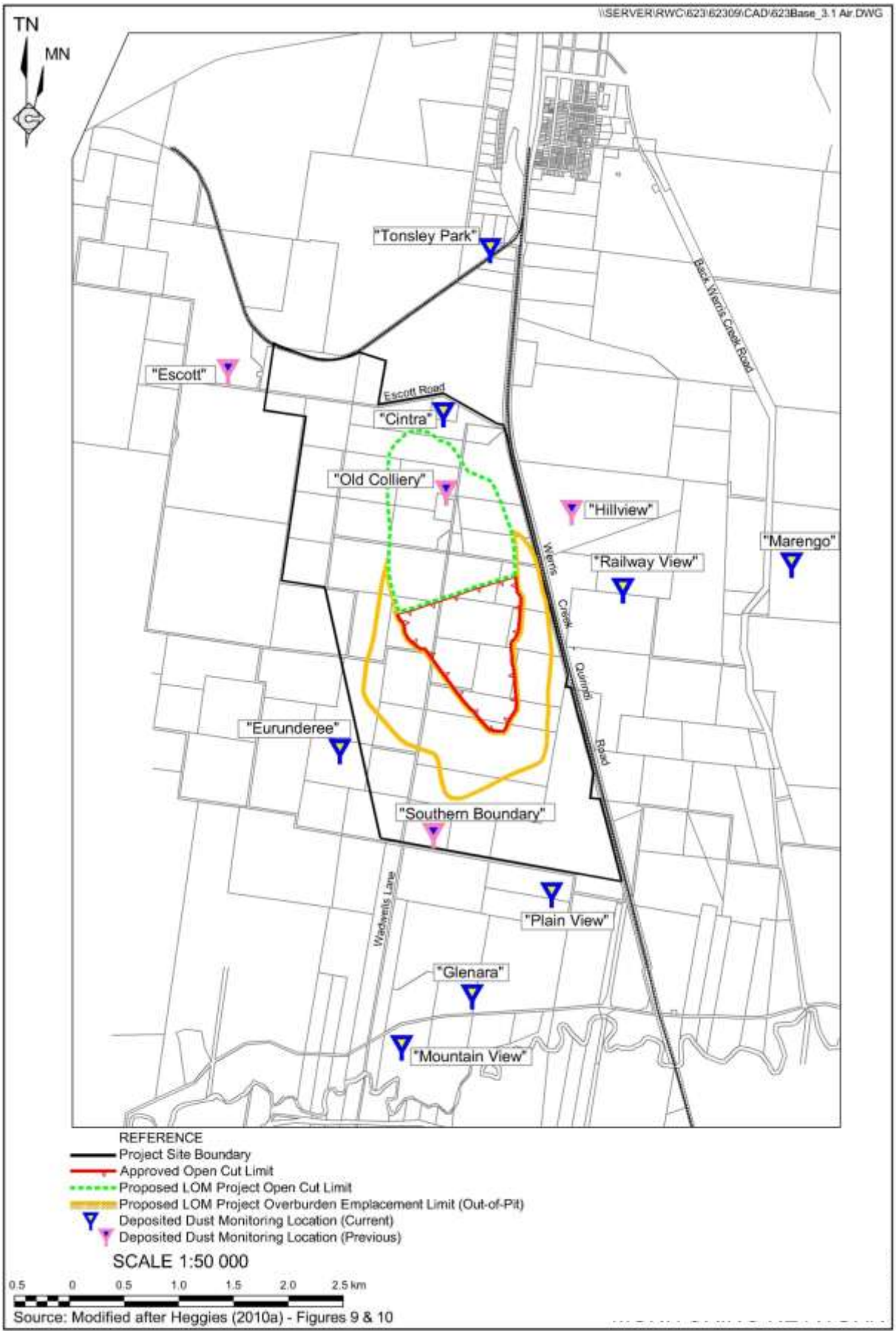


Figure 3.1 Air Quality Monitoring Network for 2011-2012

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).

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 sources not from WCC activities and therefore these are excluded from annual averages. 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.

Dust deposition monitoring results within the reporting period indicate that at the privately owned neighbouring properties, elevated results were due to dust generation from surrounding, non-WCC related land uses and/or contamination due to excessive organic matter from non-mining sources. **Table 3.3** provides the deposited dust locations and levels for the reporting period.

Elevated and contaminated monthly results were recorded across the monitoring network (excluding “Plain View”) over the reporting period. As discussed previously, these results were tainted by non-WCC activities and organic matter contamination. WC10 (“Mountain View”) recorded a number of months with excessive organic matter contamination, the highest recorded in May 2011 with total matter 5.9 g/m^2/month with only 2.0 g/m^2/month ash content indicating that >50% of the sample was organic matter and therefore not mining related. WC11 (“Glenara”) recorded excessive levels in August and September 2011 with total matter 20 g/m^2/month and 19.8 g/m^2/month respectively that was not due to organic matter contamination. WCC investigated each excessive result and identified that the landowner at “Glenara” had recently tilled the paddock adjacent to the dust deposition gauge and house which was the source of excessive dust. WCC also had the September

sample analysed under the microscope which revealed that the material was soil and not overburden or coal. Dust levels returned to normal in October after the paddock's crop germinated. WC11 was also relocated to fence line away from the paddock. WC11 also recorded an organic matter contaminated sample in March 2012 with total matter 5 g/m^2/month and ash content 2 g/m^2/month (>50% organic matter) and was excluded from the average. WC10 and WC11 are representative of the Quipolly district to the south of WCC, these elevated and contaminated samples are representative of the agricultural environment and when excluded from the annual average, the dust levels are consistent with the other mining ambient results monitored by WCC.

The actual annual average dust deposition results are below the dust levels predicted in the LOM EA to be generated by WCC and are in line with the assumed background dust levels prior to mining. Detailed dust deposition results are provided in **Appendix 3(a)**.

Table 3.3 Dust Deposition Monitoring Results April 2011 to March 2012 (g/m^2/month)

	WC2		WC5		WC7		WC8		WC9		WC10		WC11		AQGHG MP Criteria
	*Cintra^*		*Railway View^*		Tonsley Park		*Plain View^*		*Marengo^*		Mountain View		Glenara		
	Total Matter	*Ash Content*	*Total Matter*	*Ash Content*	*Total Matter*	*Ash Content*	*Total Matter*	*Ash Content*	*Total Matter*	*Ash Content*	*Total Matter*	*Ash Content*	*Total Matter*	*Ash Content*	*Total Matter*
April 2011	1.5	1.0	1.1	0.7	0.6	0.5	1.1	0.9	0.5	0.4	2.3[@]	1.6	0.6	0.6	
May 2011	0.6*	0.2	0.6	0.3	0.1	0.1	0.2	0.2	0.1	0.1	5.9*	2.0	0.2	0.2	
June 2011	3.0	1.8	2.4	1.5	0.9	0.5	1.3	0.8	0.8	0.5	0.8	0.4	1.4	0.8	
July 2011	0.5	0.3	0.5	0.4	0.3	0.2	0.8	0.5	0.2	0.2	0.9	0.5	0.6	0.5	
August 2011	0.8	0.6	0.9	0.7	0.4	0.3	1.1	0.8	0.5	0.4	0.5	0.4	**20[@]**	**17.6**	
September 2011	1.5	1.0	1.4	0.9	1.2	0.8	1.4	1.0	0.5	0.5	0.5	0.3	**19.8[@]**	**17.1**	
October 2011	1.1	0.8	1.2	0.8	0.9	0.5	0.5	0.5	0.8	0.5	0.8	0.5	1.0	0.8	
November 2011	3.3	2.0	1.2*	0.5	0.8*	0.3	1.2	0.6	1.7	1.3	0.8	0.4	2.2	1.7	
December 2011	1.1	0.6	0.6	0.5	0.7	0.4	1.0	0.5	0.3	0.2	2.2*	0.7	3.5	2.3	
January 2012	1.1	0.9	0.5	0.5	0.5	0.4	0.4	0.4	0.9	0.6	1.1	0.9	1.5	0.8	
February 2012	0.7	0.5	0.5	0.3	0.5	0.2	0.5	0.2	0.8*	0.2	0.4	0.3	0.2	0.1	
March 2012	1.2	0.7	0.6	0.4	0.7	0.4	1.2	0.9	0.5	0.2	0.8	0.4	**5***	**2**	
MEAN[+]	1.3		0.9		0.6		0.9		0.6		0.7		1.2		**4.0**
MINIMUM	0.5		0.5		0.1		0.2		0.1		0.4		0.2		**-**
MAXIMUM	3.3		2.4		1.2		1.4		1.7		1.1		3.5		**-**
PREDICTED	*N/A^*		*N/A^*		1.1		*1.0^*		*N/A^*		0.7		0.8		**4.0**

Bold Individual month result above annual average criteria;
^ Properties in *Italics* 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)
+ Does not include any contaminated results
N/A – Predicted levels not available as LOM EA did not model as property owned by WCC

WCC has undertaken dust deposition monitoring since 2005 and the annual averages since that time are presented in **Table 3.4**. 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. All actual monitoring results are below the dust deposition levels predicted in LOM EA for WCC and at the majority of the sites, the levels have been similar to the background dust deposition levels prior to mining commencing.

Table 3.4 Dust Deposition Monitoring Results from 2005 to 2012 (g/m^2/month)

ID	Property	Back-ground	Predicted	2005/ 2006	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	AQGHG MP Criteria
WC1	***Escott^***	*0.7*	*N/A*	*0.6*	*0.8*	*0.7*	*0.5*	*0.7*	-	-	4.0
WC2	***Cintra^***	*1.3*	*N/A*	*1.2*	*1.4*	*1.1*	*1.3*	*1.6*	*1.4*	*1.4*	4.0
WC3	***Old Colliery^***	*2.7*	*N/A*	*1.5*	*2.3*	*2.9*	*3.7*	*2.5*	-	-	*4.0*
WC4	***Hill View^***	*1.0*	*N/A*	*0.8*	*0.9*	*0.7*	*0.7*	*1.2*	-	-	*4.0*
WC5	***Railway View^***	*1.1*	*0.6*	*2.0*	*1.2*	*0.6*	*0.7*	*1.1*	*1.3*	*0.9*	4.0
WC6	***Southern Boundary^***	*7.4*	*N/A*	*5.4*	*9.4*	*5.1*	*4.8*	*2.3*	-	-	*4.0*
WC7	**Tonsley Park**	*1.9*	*0.7*	*1.3*	*2.3*	*1.6*	*0.9*	*1.3*	*0.8*	*0.6*	4.0
WC8	***Plain View^***	*2.0*	*0.8*	-	-	-	-	*1.9*	*0.9*	*0.9*	4.0
WC9	***Marengo***	*1.0*	*0.7*	-	-	-	-	*1.5*	*0.7*	*0.6*	4.0
WC10	**Mountain View**	*1.6*	*0.7*	-	-	-	-	-	*0.9*	*0.7*	4.0
WC11	**Glenara**	*0.6*	*0..8*	-	-	-	-	-	*1.3*	*1.2*	4.0

Note – none of the annual averages in Table 3.4 contain any contaminated results
Bold Individual month result above annual average criteria;
^ Properties in *Italics* owned by Werris Creek Coal;
N/A – Predicted levels not available as LOM EA did not model as property owned by WCC

3.1.4 Quirindi Train Dust Deposition Monitoring

In the reporting period, an additional monitoring program was undertaken by WCC to monitor dust emissions from trains 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 rail line at nominal distances of 13m, 20m and 30m to determine the rate of dust fall out with distance from the rail line and the eastern and western gauges compare the influence of road vs rail transport dust deposition rates. 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) monitoring network with the summarised results shown in **Table 3.5**. Full results from the Quirindi train deposited dust monitoring are provided in **Appendix 3(c).**

The limited monitoring results indicate that all deposited dust levels are well below normal amenity guideline levels with the average dust deposition levels of 1.1 g/m^2/month across all gauges for the period. The results across the three western gauges were as expected with the higher deposited dust level experienced at the gauge closest to the rail line with less deposited dust at each subsequent gauge travelling away from the railway line. However, the eastern deposited dust gauges indicate the opposite where the closest gauge to the rail line shows levels lower than the gauges further away from the railway line. With the limited sample size to date, the reason for the variation in the eastern side dust deposition results are undetermined but will continue to be monitored over the next 12 months and the increased data will clarify any trends. 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 percentage contribution of dust from coal (i.e. coal trains) does not demonstrate a clear trend in the data at this time.

Table 3.5 Quirindi Train Dust Deposition Monitoring Results

	DDW30	DDW20	DDW13	DDE13	DDE20	DDE30	Guideline
Annual Average	1.0	1.0	1.4	0.7	1.2	1.1	**4.0**
Minimum Result	0.5	0.5	0.4	0.5	0.3	0.4	
Maximum Result	1.5	1.6	3.4	1.1	3.8	2.6	**4.0**
Coal %	22%	25%	47%	17%	15%	26%	-

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

3.1.5 TSP and PM_{10} Monitoring

Detailed air quality monitoring results for TSP and PM_{10} over the last 12 months has been included in **Appendix 3(b)** with **Table 3.6** summarizing the monthly averages.

Table 3.6 TSP and PM_{10} Monthly Average Monitoring Results April 2011 to March 2012 (µg/m^3)

	PM_{10}						TSP	
	WCHV1	**WCHV2**	***WCHV3***	***WCHV4***	**AQGHGMP Daily Criteria**	**AQGHGMP Annual Criteria**	***WCTSP***	**AQGHGMP Annual Criteria**
Period	***Cintra***	**Tonsley Park**	***Railway View***	***Eurunderee***			***Railway View***	
April 2011	24.5	14.7	27.8	12.2			64.3	
May 2011	23.9	19.6	24.7	15.9			56.1	
June 2011	**38.7**	**35.2**	**39.5**	8.1			**132.5**	
July 2011	10.3	7.8	16.3	11.5			44.8	
August 2011	13.7	9.2	13.1	10.0			37.8	
September 2011	20.3	17.6	24.2	17.2			50.8	
October 2011	17.5	13.5	16.8	10.0			36.3	
November 2011	17.0	16.6	15.8	20.4			35.8	
December 2011	10.3	8.1	8.8	8.6	**50**	**30**	20.7	**90**
January 2012	9.3	11.3	15.3	12.3			38.4	
February 2012	6.7	6.2	4.6	5.4			11.6	
March 2012	9.5	9.1	10.9	10.6			24.9	
MEAN	16.8	14.0	18.1	11.7			45.9	
MINIMUM	1.2		2.2	2.7			7.5	
MAXIMUM	62.2	55.9	80.4	36.2			256.0	
PREDICTED DAILY	-	44.9	-	-			-	
PREDICTED ANNUAL	-	21.2	-	-			-	

Bold = elevated result
Italics Properties owned by Werris Creek Coal

Two PM_{10} daily exceedances of 52 µg/m^3 and 58 µg/m^3 occurred at "Tonsley Park" on 1st June and 7th June 2011 respectively. For the 1st June, while the prevailing wind was a strong south easterly indicating that WCC could be the dust source, however the other PM_{10} monitoring locations closer to WCC were not conclusive. South easterly winds would be an example of mine dust source to receiver for "Eurunderee" and "Cintra" monitoring locations, however differing PM_{10} levels of 7.7 µg/m^3 and 58 µg/m^3 respectively were recorded. Similarly, "Railway View" which would be downwind of the mine on the 1st June 2011 but still recorded elevated PM_{10} levels of 50 µg/m^3 indicating that WCC was not the dust source at least at "Railway View". For the 7th June 2011, WCC was not the source of dust given that the prevailing winds were moderate west north westerlies. WCC owns "Eurunderee", "Cintra" and "Railway View" and therefore AQGHGMP criteria do not apply to these properties.

WCC has undertaken PM_{10} and TSP dust monitoring since 2005 and the annual averages since that time are presented in **Table 3.7**.

Table 3.7 TSP and PM10 Dust Monitoring Annual Averages since 2005 (µg/m^3)

ID	Property	Back-ground	Predicted	2005/ 2006	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	AQGHG MP Criteria
WCHV1	***Cintra***	*30.2*	-	-	-	-	-	*19.2*	*13.7*	16.9	**30**
WCHV2	**Tonsley Park**	30.2	44.0	12.1	11.4	12.1	12.1	16.4	11.2	14.0	**30**
WCHV3	***Railway View***	*30.2*	-	*11.0*	*11.5*	*12.1*	*11.8*	*15.0*	*12.2*	17.9	**30**
WCHV4	***Eurunderee***	*30.2*	-	*13.5*	*15.4*	*16.8*	*16.9*	*17.7*	*12.2*	11.7	**30**
WC TSP	***Railway View***	*N/A*	-	*21.6*	*24.8*	*25.0*	*25.9*	*35.7*	*29.7*	44.1	**90**
	Old Colliery	-	-	*10.5*	*13.5*	*16.0*	*13.6*	-	-	**-**	**30**

Italics Properties owned by Werris Creek Coal;

The annual average monitoring results for all properties (with the exception of Eurunderee) show an increasing trend of PM_{10} and TSP dust levels since 2005, that reflects the increased production levels and size of WCC operations plus the reduced distance to neighbouring properties over that time. The actual annual average dust levels have been at or below the Environmental Assessment predicted levels, slightly above the pre-mining background levels and have remained below the AQGHGMP criteria.

3.1.6 Summary of Air Quality Compliance

Based on the dust deposition and HVAS results discussed above, it is indicative that WCC does appropriately manage and minimise potential off-site dust impacts from its activities and that actual dust, TSP and PM_{10} monitoring over the last seven years shows that WCC has generally complied with the draft AQGHGMP criteria. The daily PM_{10} exceedances at "Tonsley Park" in June 2011 appear to be isolated and unrelated to WCC with subsequent monthly monitoring revealing no further elevated levels.

3.1.7 Greenhouse Gas (GHG)

Diesel combustion during the reporting period increased 11% to 13,549,287L of fuel used at WCC. 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 3.8**.

Table 3.8 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

Electricity usage decreased 13.6% for 2011-2012 from 1,506,725 kWh in the previous reporting period to 1,302,197 kWh. 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 3.9**.

Table 3.9 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

During the Reporting Period, a total of 10,140 tonnes of explosives were used at WCC. Assuming a conversion factor of 0.1778 kg CO_2 – equivalents / kWh, the estimated GHG emissions from explosion combustion in blasting since 2005 is presented **Table 3.10**.

Table 3.10 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

The total GHG emissions for WCC increased 10.3% for 2011-2012, mainly due to the increased rates of production at WCC and follows the trend since 2005 of production related increases in GHG emissions. **Table 3.11** presents the total CO_2 equivalent GHG emissions and emissions per unit of production levels since 2005.

Table 3.11 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

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 a extraction rate of 2.5Mtpa of coal. The 2011-2012 GHG emissions are relatively in line with this estimation albeit at lower production levels. The slight decrease in CO_2 emissions per BCM of production for 2011-2012 shown in **Table 3.10**, could be indicative of WCC becoming more streamlined with its emission producing activities.

Whitehaven Coal submitted its first annual report under the Commonwealth Energy Efficiency Opportunities (EEO) legislation which included site specific details for WCC. The EEO process and draft AQGHGMP will replace the previous ESAP process that was in place for WCC. As part of the EEO process, monthly meetings are held, comprising WCC personnel to discuss various energy efficiency projects identified in the annual report, and progress of implementation for those measures deemed suitable for energy savings.

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 of 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. Following the breach in VWD3 during the reporting period, WCC has undertaken a review of the void water management system and improved overflow protection on the void water dams by reviewing freeboard levels, installation of dam full level marker signage and automated high water level alarms that SMS the OCE when the float switch is triggered indicating the high water level has been reached. Water collected within the dirty water system which cannot be easily treated to achieve the EPL nominated criteria for pH or total 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 SB6 which is a part of the dirty water system. Additional controls such as an under/over weirs has been installed at SB10 adjacent to rail load-out facility to improve containment in case of hydrocarbon spills through the course of operations.

The WCC surface water monitoring program is summarised in **Table 3.12** and **Figure 3.2**.

Table 3.12 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 3.13** presents the annual average results recorded at each location.

Table 3.13 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	4	8.11	1016.50	8.25	<5
VWD2	27	4	8.05	991.25	12.00	<5
VWD3	-	4	8.21	1001.00	27.00	<5
VWD4	-	2	8.36	905.00	18.00	<5
SB2	10	4	8.17	495.67	20.64	<5
SB6	15	3	8.09	559.00	64.00	<5
SB9	12	4	7.97	486.31	22.53	<5
SB10	14	4	7.94	344.89	79.50	<5
SD4	-	3	8.08	266.00	25.00	<5
SD5	-	2	8.08	329.50	62.50	<5
QCU	-	4	7.61	434.76	18.33	<5
QCD	-	4	8.00	809.06	18.59	<5
WCU	-	4	7.83	1070.13	68.14	<5
WCD	-	4	8.14	1325.00	26.75	<5
BGD	-	1	7.95	304.00	35.00	<5

The first quarterly results within the monitoring period was undertaken in May 2011 and reflected the dry conditions monitored in the previous reporting period with both the on-site and off-site water quality showing results typical of a dry period. All subsequent quarterly monitoring events were within the long term averages and management plan trigger values. VWD4 (200ML Dam South) was constructed and commissioned within the reporting period and was sampled twice in accordance with the quarterly monitoring requirements.

The quarterly water quality for the void water dams did not identify any significant change and was consistent with the previous reporting period, in that the void water quality reflected the above average wet weather conditions. The average electrical conductivity from the quarterly water quality results for the Quipolly and Werris Creek sites increased from the previous period but were well within the historical range of results monitored by WCC and within the range of results from discharge monitoring. The increased electrical conductivity is anomalous and just reflects the in situ water quality at the time that the quarterly samples were taken and therefore not related to WCC mining impacts.

Licensed discharge points SB2, SB9 and SB10 discharge water quality monitoring results and comparison with criteria is discussed in **Section 2.8.1**. Within the reporting period, 21 discharges resulted in 16 sampling events being undertaken with the results from Quipolly and Werris Creeks' shown in **Table 3.14.** 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, pH and total suspended solids (TSS) 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 agricultural land use. For example, a TSS concentration of 1830mg/L was sampled for the downstream Werris Creek site and is attributed to environmental factors outside the control of the mine given the recorded concentration was well in excess of SB10's water quality for the same discharge event but is consistent with the elevated TSS recorded for the upstream site of 799mg/L for the same discharge event. The total dirty water discharged from controlled discharges during the reporting period was 24ML 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 3.14 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	12	Minimum	7.37	405	<5	<5
			Average	7.56	454	17	<5
			Maximum	8.02	509	40	<5
Quipolly Downstream	26	12	Minimum	7.94	750	8	<5
			Average	8.00	841	17	<5
			Maximum	8.35	915	26	<5
Werris Upstream	23	4	Minimum	7.64	93	18	<5
			Average	7.79	733	94	<5
			Maximum	7.94	1360	261	<5
Werris Downstream	24	4	Minimum	7.82	162	9	<5
			Average	8.03	664	799	<5
			Maximum	8.32	1150	1830	<5

3.2.3 Unplanned Void Water Discharge Event

On 11 March 2012, an unlicensed discharge event occurred from a breach in the spillway of the VWD3 (200ML Dam North) resulting in an offsite discharge of void water reaching Quipolly Creek. The breached spillway was discovered at approximately 9:30am with measures undertaken to stem the flow including pumping the water out of the dam to lower the water level, before using an excavator to temporarily repair the breached spillway. The discharge event ceased at 6pm the same day. The volume of the discharge was estimated at 30ML based on calculations taking account of the stored water level before and after the breach.

An initial report was sent to both the Environmental Protection Agency (EPA) and DP&I on the 19th March 2012.

Water within VWD3 was pumped from the open cut pit and the void water is a combination of rainfall and groundwater. Water samples taken during, and for 5 days after the discharge, indicated that the discharged void water and creek water quality samples were generally within the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) and Livestock Watering and Agricultural Irrigation and the Australian Drinking Water Guidelines 6 (2004) for all but a few analytes related to water aesthetics and irrigation limits for sensitive crops that are not grown in the Quipolly District.

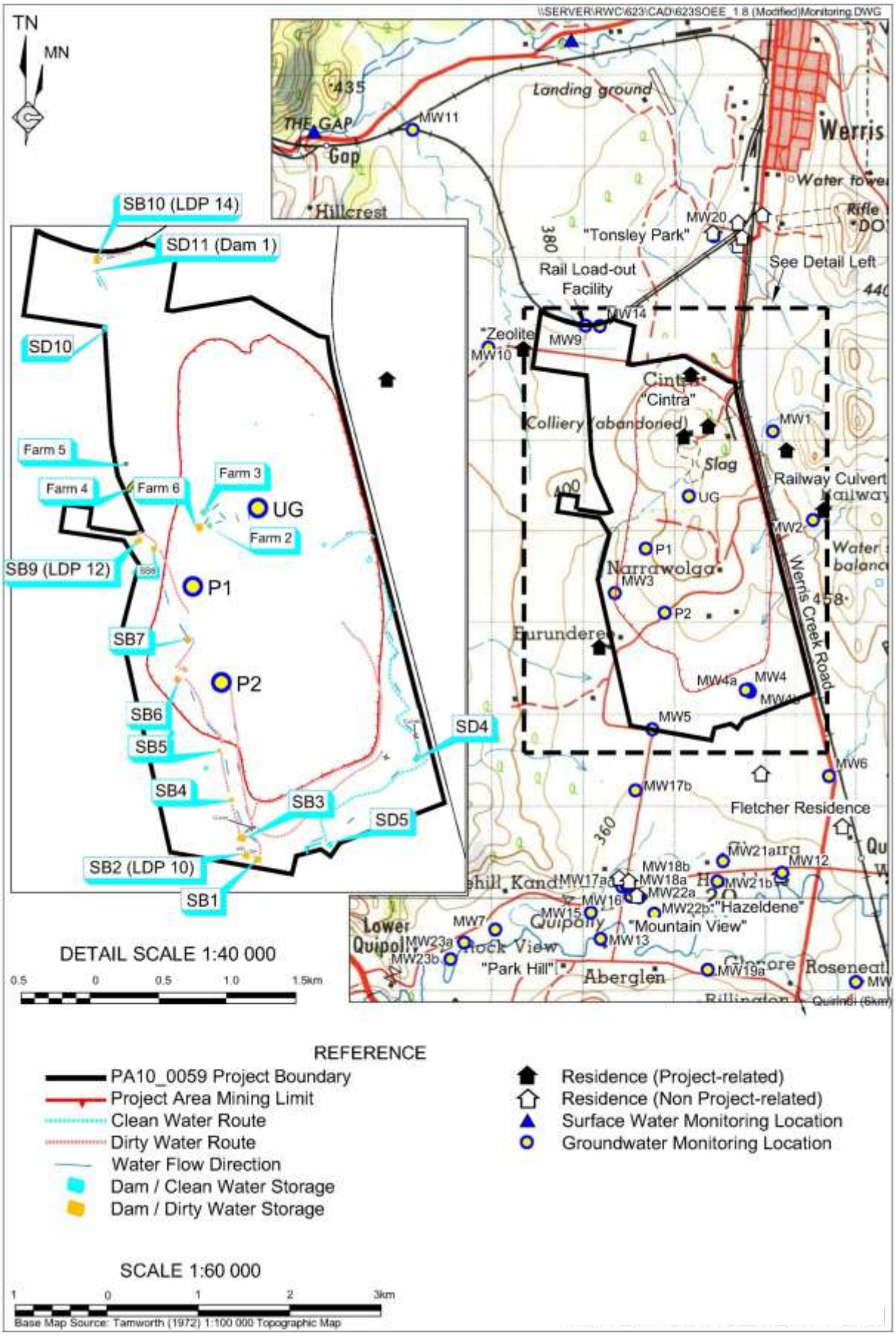


Figure 3.3 WCC Water Monitoring Network

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 stream.

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).

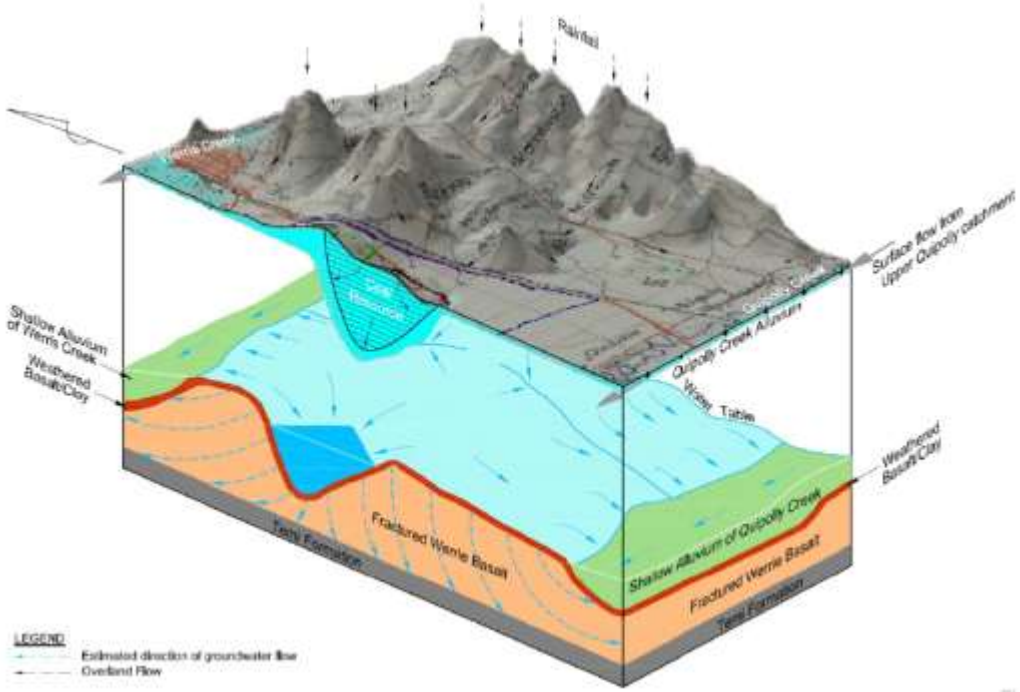


Figure 3.4 Conceptual Hydrogeological Model at WCC (taken from RCA, 2010)

Table 3.15 identifies the three key aquifers along with the bores and piezometers monitored within each. The groundwater monitoring program currently implemented by WCC is summarised in **Table 3.16**. **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).

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

Table 3.15 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

Table 3.16 Groundwater Monitoring Program

Parameters	Frequency	Bore/Piezometers
Standing Water Level	Quarterly	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
Standing Water Level	Periodic	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	Quarterly	MW1, MW 2, MW 3, MW4B, MW 5, MW6, MW7, MW8, MW9, MW10, MW11, MW12, MW13, MW14, MW15, MW16, MW17A, MW17B, P1, P2
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, MW8, MW9, MW10, MW11, MW12, MW13, MW14, MW15, MW16, MW17A, MW17B, P1, P2

WCC received approval from NOW and DP&I in 2005 for the Groundwater Contingency Plan which outlines the following trigger levels in **Table 3.17** which are regularly compared with actual monitoring results during the reporting period.

Table 3.17 Groundwater Trigger Levels

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

3.3.2 Performance

Performance with respect to groundwater management, the prevention of pollution and the assessment of impacts on groundwater availability to other surrounding users is assessed through groundwater level and chemistry monitoring. Monitoring focuses on the Werrie Basalt and Quipolly Creek Alluvium aquifers given that these two aquifers have the greatest potential for impact on the environment and neighbouring bore water users. **Table 3.18** 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 2011-2012 period. All groundwater sampling and analyses were undertaken by a NATA accredited laboratory.

Table 3.18 Selected Werrie Basalt and Quipolly Creek Alluvium Analysis 2011-2012

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	7.84	7.2	453	
	18/05/2011	6.75	7.2	413	-
	13/09/2011	7.96	7.23	384	-
	13/12/2011	7.95	7.03	392	-
	27/03/2012	7.84	7.17	448	<50
	Average	**7.46**	**7.16**	**409**	**<50**
MW7	Long Term Average	4.41	7.1	521	
	7/09/2011	4.29	-	-	-
	14/12/2011	4.28	6.73	560	-
	26/03/2012	5.22[@]	7.06	588	<50
	Average	**4.32**	**6.90**	**574**	**<50**
Werris Basalt Aquifer					
MW5	Long Term Average	8.18	7.1	2103	
	17/05/2011	7.28	7.05	2230	-
	13/09/2011	6.71	7.22	1405	-
	30/09/2011	7.66	-	-	-
	14/12/2011	7.81	7.21	1410	-
	27/03/2012	7.89	7.64	1640	<50
	Average	**7.47**	**7.28**	**1671**	**<50**
MW14	Long Term Average	15.79	7.1	1134	
	17/05/2011	15.57	7.1	1080	-
	13/09/2011	16.1	6.92	1040	-
	14/12/2011	15.49	6.90	1025	-
	27/03/2012	15.40	7.28	1220	<50
	Average	**15.64**	**7.05**	**1091**	**<50**

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

The quarterly monitoring results indicated that no groundwater standing water levels fell greater than 15% within the Quipolly Creek Alluvium and Werrie Basalt aquifer bores and piezometers. With the exception of MW12, all other monitored bores displayed fluctuations typically between 1% and

5%. MW12 is the upstream Quipolly Alluvium monitoring point and history has shown that this bore is capable of rapid water level variation because of the high permeability of sand/gravel material as well as it being in an area where the aquifer thins out and is therefore more susceptible to dry periods and rainfall recharge. Monitoring on 13/09/2011, MW12 recorded a 15% reduction in standing water level which is just on the cusp of the Groundwater Response Plan. The following quarterly monitoring results identified negligible change since this event in the standing water level. This isolated decrease is more likely related to the aquifer in this location returning to equilibrium following the last two years of high rainfall and record high water levels recorded for MW12. This conclusion is further supported by the fact that water levels since have been close to the longer term average standing water level for MW12 and is unlikely to be associated with WCC's operations.

There were no sustained changes in pH or EC greater than 15% when compared to the long term average. 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.

During the previous reporting period, above average rainfall recharged the local aquifers to record high standing water levels. During the current reporting period, the majority of monitoring bores had slight reductions in standing water levels (resulting in an increased mbgl). This is attributed to the aquifers returning to equilibrium following the high rainfall and is now expected that standing water levels will continue to decrease until reaching long term average levels. The high rainfall in February 2012 and resulting recharge was observed in most bores within the monitoring program including MW12 and MW14 but is expected to only be a short term pulse in response to the short aquifer recharge event.

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 have updated the groundwater model for WCC (**Appendix 4b**) and found that 26ML of groundwater was intercepted in pit with <1ML from the spoil/overburden emplacement area. This was higher than the 13ML predicted for the Year 3 groundwater incepted in the LOM EA due to the groundwater model used in the Groundwater Impact Assessment assuming that the former underground colliery workings were dewatered. Because the workings are not yet completely dewatered, it is reasonable that additional groundwater would be intercepted in pit at WCC. The overall quantity intercepted is within the range of predicted groundwater make from the LOM EA. There are no additional impacts occurring, as WCC is licensed to dewater the former underground colliery workings, which for safety from in rush hazard must occur prior to mining. WCC has been dewatering the workings from a combination of bore pump extraction and seepage into the pit.

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

DP&I approved the WCC Biodiversity Offset Strategy and Management Plan (BOMP – compiled by Eco Logical Australia (ELA) 2010) on 14th December 2010 to meet conditions within the previous Development Approval. However, DP&I prevented WCC from securing the biodiversity offset through land title caveats due to waiting for approval of the LOM EA. A draft Biodiversity Management Plan is currently being prepared for the LOM Project in accordance with PA10_0059 Schedule 3 Condition 28. **Figure 3.5** displays the previous Biodiversity Offset Area (BOA) as specified in the BOMP with **Figure 3.6** displaying the proposed LOM BOA under PA10_0059. The existing BOA covers an area of 362.23 ha with the proposed LOM BOA covering an area of 1,049.41 ha for a proposed combined total offset of 1,411.64ha (see **Figure 3.5**).

The current BOMP has been written to provide a management framework that will lead to an improvement in the condition of native vegetation on the site through specific woodland restoration techniques. These actions will aid to minimise the effect of key threatening processes that may impact upon Endangered Ecological Communities (EEC)/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.

The two EECs that have been identified and targeted for restoration (within the BOA and rehabilitation areas) at WCC comprise of:

- Brigalow Community; and
- White Box, Yellow Box, Blakely's Red Gum Woodland.

Figure 3.5 WCC Biodiversity Offset Area

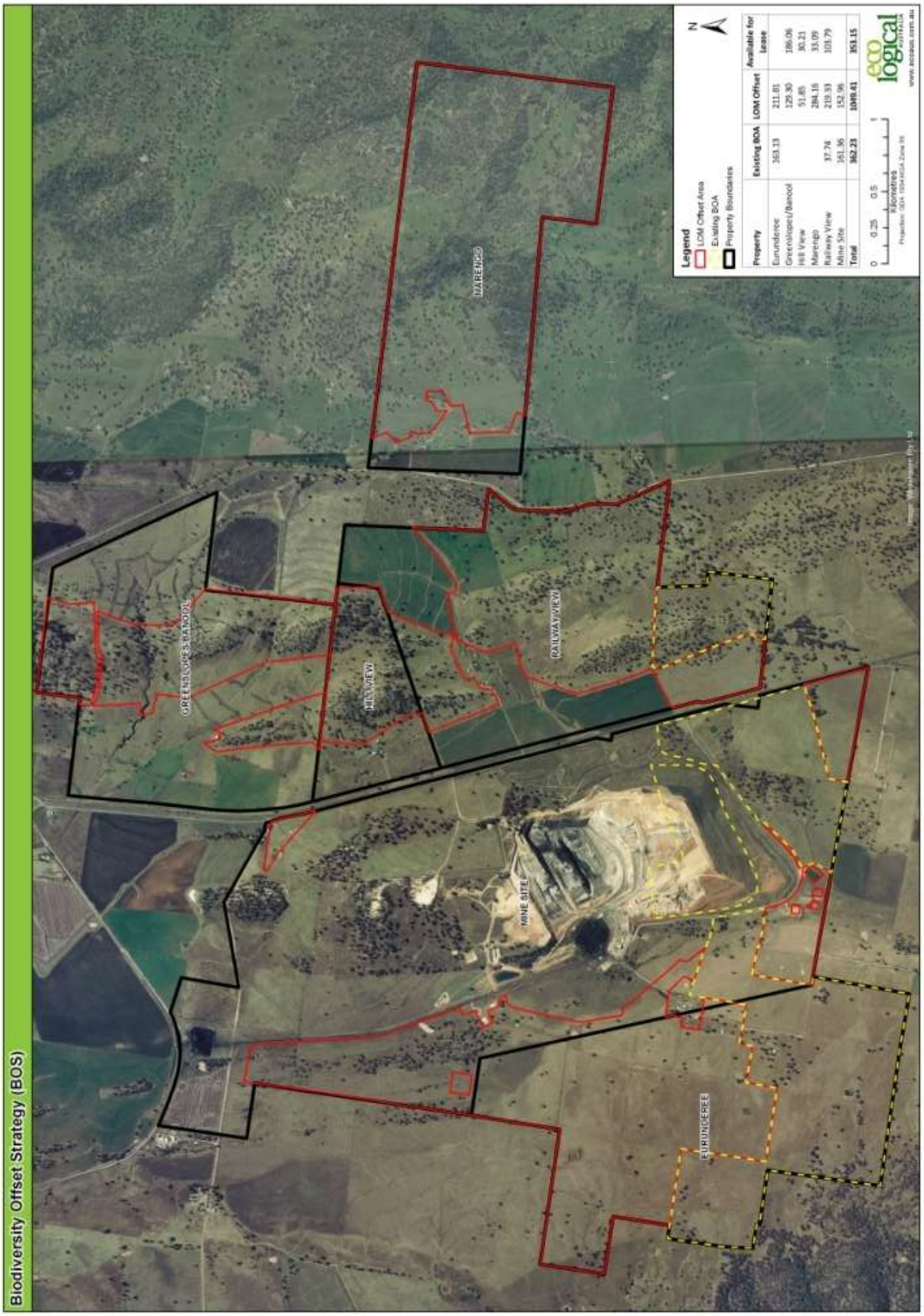


Figure 3.6 Proposed WCC Biodiversity Offset Area

It should be noted that database searches were undertaken by ELA in 2010 and identified that four threatened ecological communities (EECs) have been previously recorded in within 10km of WCC with the conclusion that the previously mentioned EECs are the only ones applicable to WCC as the other remaining EECs are not likely to occur onsite.

3.5.2 Implementation and Performance

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

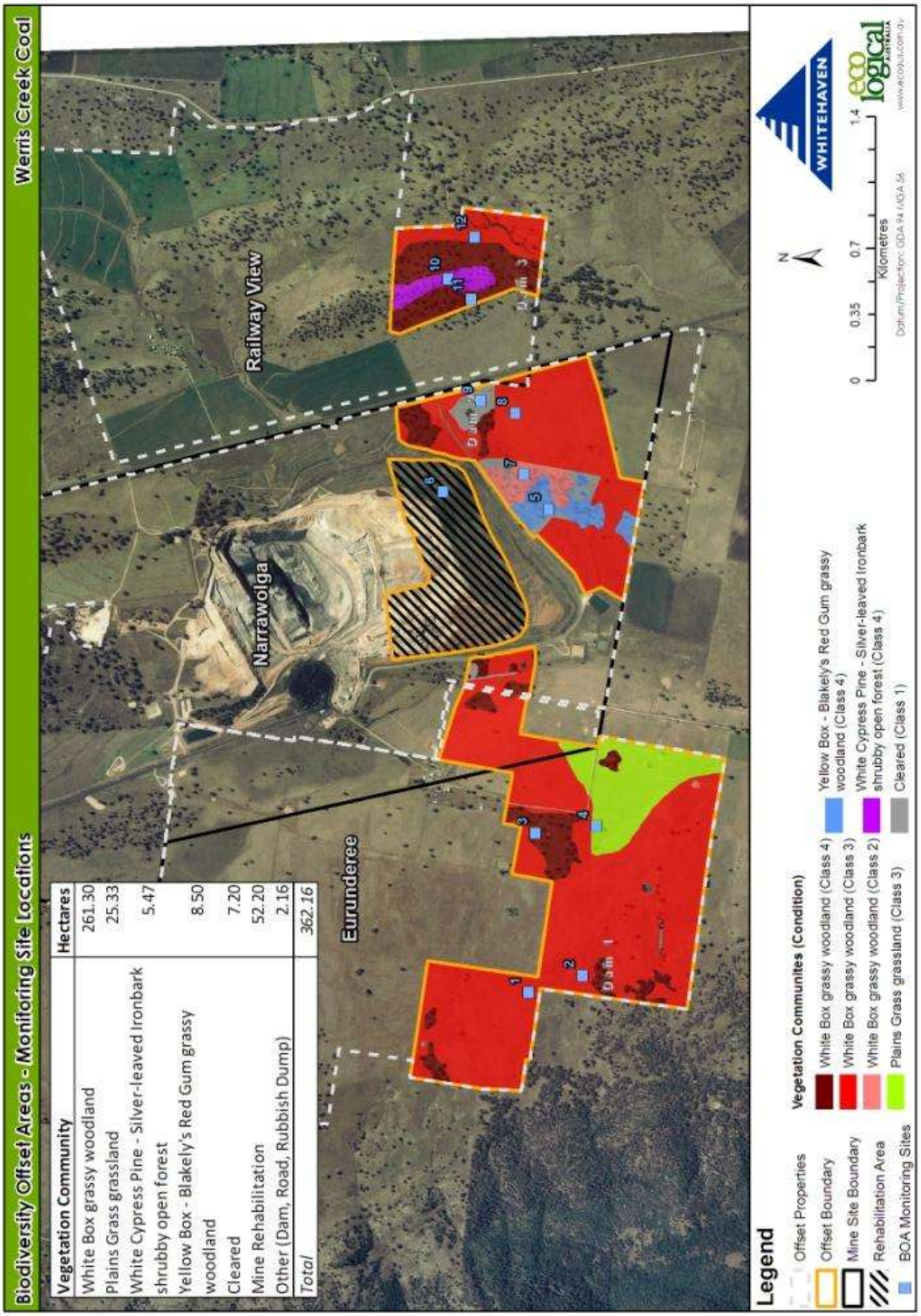
- The continual eradication of weed species, particularly weed spraying over Eurunderee BOA and rehabilitation areas targeting Patersons Curse thistles (Saffron and St Barnabys) from August to October 2011. An area on Narrawolga/Mine Site (surrounding and adjacent to Site 9 – **Figure 3.10**) with less than 50% native ground cover was slashed twice to control weed growth;
- A total of 322 tubestock of overstorey species was planted and included White Box, Yellow Box, Blakely's Red Gum and Rough Barked Apple in areas adjacent to Site 1, Site 4, Site 8, Site 9, Site 10 and Site 12 since August 2011 (**Figure 3.7**). A total of 1579 overstorey tubestock have been planted in rehabilitation areas since October 2010;
- Destocking of the BOA and the retention of the remnant native vegetation has aided the regrowth and increased survival of seedlings with good growth rates occurring in areas adjacent to existing mature trees (**Figure 3.10**); and
- Continued removal of old fences and other miscellaneous farm rubbish.

3.5.3 BOMP Annual Review

The 2011 BOMP Annual Review identified that further work was required for bushfire management, habitat augmentation, inclusion of miscellaneous infrastructure and rubbish within the BOMP and amendments to the monitoring program. During the reporting period, WCC did amend the flora monitoring program, a budget was allocated to develop a Bushfire Management Plan and old fence posts removed have been stockpiled to be used for habitat augmentation. The new BOMP required by PA10_0059 will incorporate the clean up of miscellaneous infrastructure within the BOA.

The 2012 BOMP Annual Review completed in March 2012 found that:

- destocking and strategic plantings for increasing overstorey coverage have been effective to date;
- extensive weed control program across the whole BOA had reduced the size of St John's Wort and St Barnaby's Thistle infestations;
- monitoring is continuing for deeply incised section of Black Gully finding that it has partially stabilised;
- no pest monitoring or control programs have been implemented;
- annual soil analysis found that BOA soils were weakly acidic while rehabilitation and soil stockpiles soils were alkaline;



Vegetation Community	Hectares
White Box grassy woodland	261.30
Plains Grass grassland	25.33
White Cypress Pine - Silver-leaved Ironbark shrubby open forest	5.47
Yellow Box - Blakely's Red Gum grassy woodland	8.50
Cleared	7.20
Mine Rehabilitation	52.20
Other (Dam, Road, Rubbish Dump)	2.16
Total	*362.16*

Figure 3.7 Biodiversity Offset Area Annual Monitoring Program Sites

- flora monitoring found that at least two sites were meeting BOA completion criteria increasing from zero the previous year; and
- the biodiversity offset management audit found that the BOA was well managed but recommended pest control monitoring be implemented.

For the 2012-2013 period, the new Biodiversity and Offset Management Plan will be submitted to DP&I and DSEWPaC for their approval. The new BOMP will update the existing biodiversity management strategies and measures now with adequate resourcing to implement habitat augmentation, pest monitoring and control and bushfire management.

3.5.4 Vegetation Monitoring

An independent ecological consultancy (ELA) was engaged to undertake the BOA annual flora and fauna monitoring program from 17th to 21st October 2011 in accordance with the flora and fauna monitoring program in the BOMP. Vegetation monitoring was undertaken at the 12 monitoring sites (**Figure 3.7**) 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) **Table 3.19** outlines the number of monitoring plots per vegetation community type/condition class as defined in the BOMP.

Table 3.19 Biodiversity Offset Area Monitoring Plots per Vegetation Type/Condition

Biometric vegetation type	Condition class	Area (ha)	No. of plots (plot numbers)	No. of plots required in BOMP
White Box grassy woodland of the Nandewar and Brigalow belt south bioregions	4	44.1	2 (3, 11)	3-4#
	3	210.49	5 (1, 2, 4, 8, 12)	
	2	6.72	1 (7)	
Yellow Box – Blakely's Red Gum grassy woodland of the Nandewar Bioregion	4	8.5	1 (5)	3-4#
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Gum shrubby open forest of the Nandewar and Brigalow belt south bioregions	4	5.47	1 (10)	3-4
Mine Rehabilitation Area	1	52.2	1 (6)	2
Cleared Land (<50% native ground cover)	1	2.16	1 (9)	1

For the purposes of replication of monitoring plots in each condition class, it is noted that the Class 3 White-Box grassy woodland and Native Vegetation on Cracking Clay soils are effectively the same condition class, thus meeting the 3-4 replicate requirement and the Class 4 Yellow-Box Blakely's Red Gum grassy woodland is effectively the same vegetation type as the White-Box Grassy woodland, again meeting the required replication.

Table 3.20 Monitoring Site 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		2010	2011		
White Box grassy woodland	3	4	8	29	23	5	12.5	6-25	YES
	11	4	19	24	23	26	24.5	6-25	YES
	1	3	2	8	23	0	0	6-25	No
	2	3	10	12	23	0	0	6-25	No
	4	3	21	16	23	0	0	6-25	No
	8	3	2	14	23	0	0	6-25	No
	12	3	5	13	23	0	0	6-25	No
	7	2	10	10	23	0	0	6-25	No
Yellow Box – Blakely's Red Gum grassy woodland	5	4	9	18	23	5	12	6-25	Partial YES
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	10	4	7	12	30	0	0	6-40	No
Cleared land (Mine Rehab Site)	6	1	3	5	23	0	0	6-25	No
Cleared land (formerly cultivated land)	9	1	5	5	23	0	0	6-25	No

3.5.5 Fauna Monitoring

The fauna monitoring program was run concurrently with the vegetation monitoring program during Spring 2011. The objective of the fauna monitoring methodology was 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. It is the intention that future monitoring programs will be expanded to include all species groups once the BOA has been rehabilitated to support other faunal groups.

Fauna monitoring is undertaken at a minimum of one site for every 5ha of each vegetation type/condition zone and up to 3 replicates while rehabilitation sites will be established every 60ha completed. Therefore only 10 monitoring sites (**Figure 3.7**) are required for fauna monitoring with Site 8 (Condition 3 White Box grassy woodland) likely to have limited faunal activity due to limited habitat and Site 10 (Condition 4 White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest) being too small an area for fauna monitoring and excluded from the program. **Table 3.21** summaries the fauna monitoring methods and intensity for the Spring 2011 period.

Table 3.21 WCC Fauna Monitoring Methodology

Method	Detail	Requirement per Site
Elliot traps	Small traps placed in straight lines on the ground, primarily to target small and medium sized mammals. Traps were set for 3 consecutive nights	10 medium Elliot traps (Elliot A); 3 large cage traps.
Hair funnels	At each site for a minimum of 4 nights and set in habitat trees where present. Targeted small and medium sized mammals.	10 hair funnels.
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 for full details on fauna monitoring see **Appendix 5**.

During Spring 2011, no megachiropteran bats were recorded during the monitoring survey, which is consistent with previous monitoring at WCC. Nine microbat species (including 1 threatened species – Eastern Bentwing Bat) were identified through ultra-sonic call detection (i.e. anabat recordings) across the 10 fauna monitoring sites representing approximately 60% (9 of 15) of the total number of species recorded at WCC since 2004. No new bat species were recorded during the period.

Microbats were categorised into 'guilds" based on their preferred foraging niche to infer the status of habitat quality/availability in the BOA (**Figure 3.8**) The 2011 survey found that the majority of bat species were 'above canopy' foragers with Sites 6 and 11 recording 'above canopy' forages only. ELA (2011) notes that the trends of 'above canopy' forages is not surprising given the current lack of an over-storey at most monitoring locations. Except for Site 9, more microbat species were recorded then in the previous monitoring period with this trend expected to continue as the vegetation condition improves and can support increased fauna populations. Site 9 (Class 1 cleared) recorded the highest number of individual calls and can be attributed to the presence of a dam adjacent to Site 9 which would be utilised throughout the evenings. Site 6 (rehabilitation site) again recorded the lowest number of species and calls.

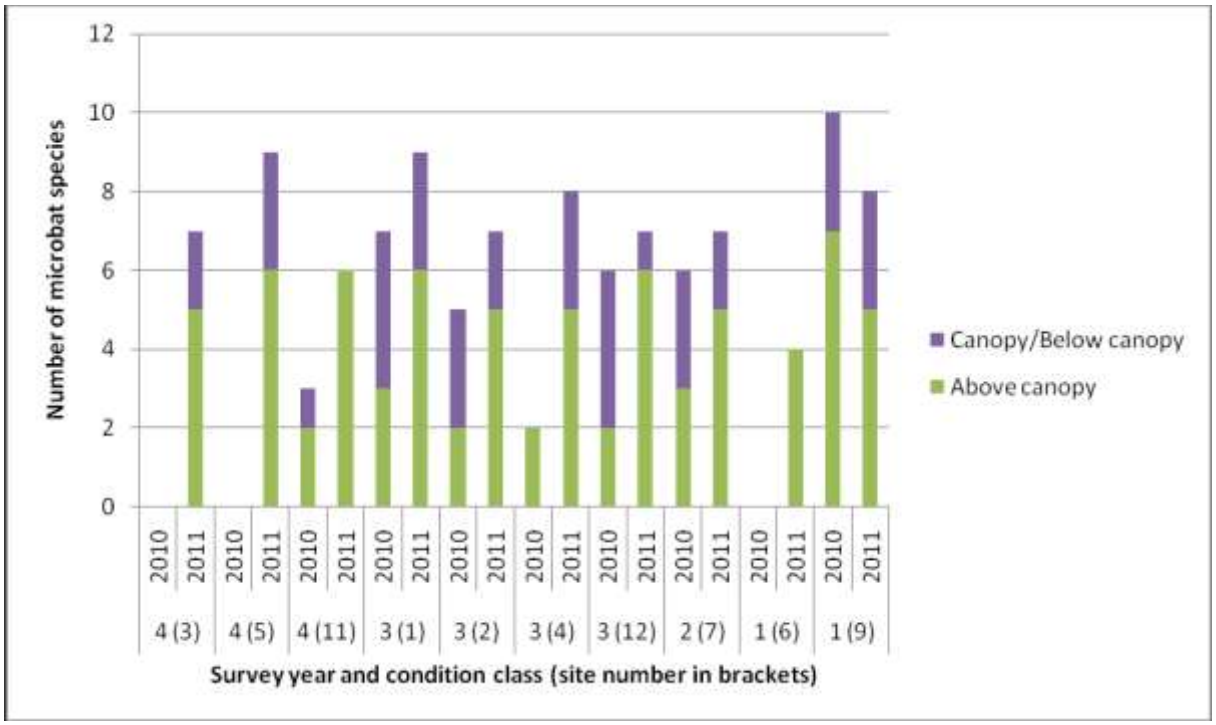


Figure 3.8 Microbat species abundance across BOA, presented in terms of 'guilds'.

A total of 58 birds species (including two threatened species and two exotic species) were recorded during the monitoring period. The survey recorded an additional seven diurnal bird species to those recorded previously. Of these additional species, one threatened species – *Ozyura australis* (Blue-billed Duck) which is listed as vulnerable under the TSC Act, was recorded on a dam at "Railway View" (Dam 3) and is a new species recorded for WCC.

The prevalence of bird guilds measured in terms of number of species is presented in **Figure 3.9**. Similar to the bat guild distributions, Site 9 (Class 1 cleared) and Site 2 recorded the largest number of bird guilds. For 2011, species richness increased for the majority of monitoring sites (except Site 7) but species richness across each guild also increased.. This may reflect the improvement in vegetation condition of the monitoring sites or could be due to the presence of birds within monitoring plots may have been attributable to species flying over the monitoring plots, rather than using the plots.

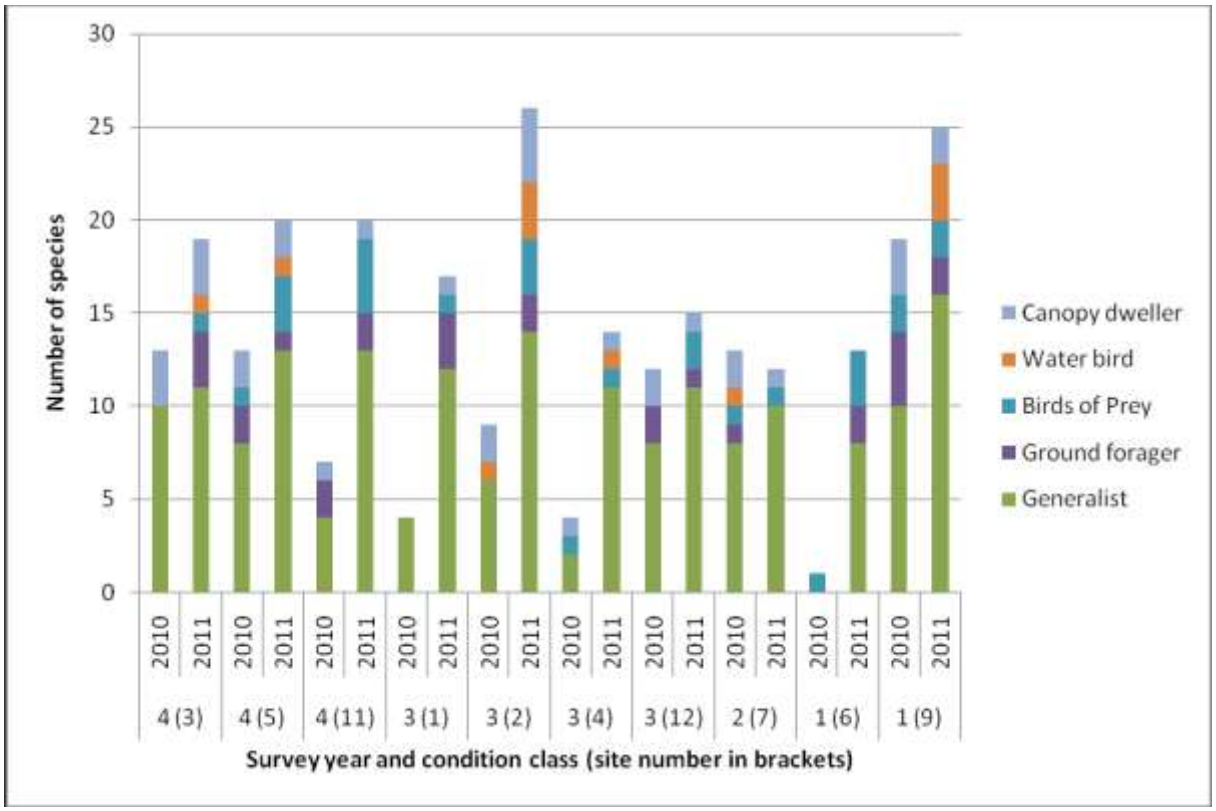


Figure 3.9 Abundance of species from selected bird guilds of the BOA.

3.6 WEEDS

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 3.22** outlines the weeds targeted by WCC, including location and timing for 2011-2012 reporting period.

Table 3.22 WCC Weed Control Program by Location

Weed Name	Scientific Name	Noxious	Date	Location					
				Rehab	Mine Site South	Mine Site North	Eurunderee	Railway View	Marengo
Spiny Burr Grass	*Cenchrus incertus*	W4[2]	Sept 2011	2ha					
St John's Wort	*Hypericum perforatum*	W4	Oct 2011 to Feb 2012				100ha		
Prickly Pear	*Opuntia stricta*	W4	Aug 2011						1ha
Noogoora Burr	*Xanthium pungens*	W4	Jan 2012 to Mar 2012	50ha	10ha				

[2] The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed.

Weed Name	Scientific Name	Noxious	Date	Location					
				Rehab	Mine Site South	Mine Site North	Eurunderee	Railway View	Marengo
Bathurst Burr	*Xanthium spinosum*	W4	Jan 2012 to Mar 2012	50ha	10ha				
Patersons Curse	*Echium plantagineum*	W4	Aug 2011 to Nov 2011				50ha		
Scotch Thistle	*Onopordum acanthium*	W4	Oct 2011	5ha			10ha		
Saffron Thistle	*Cathamus lanatus*	-	Oct 2011				50ha		
African Box Thorn	*Lycium ferocissimum*	W4	Mar 2012						1ha
St Barnabys Thistle	*Centaurea soltitialis*	-	July 2011 to Mar 2012	50ha	50ha		100ha		
Turnip Weed	*Rapistrum rugosum*	-	Oct 2011	20ha	50ha				
Johnson Grass	*Sorghum Halepense*	W4	Feb 2012	1ha					

Quarterly inspections of the rehabilitation and biodiversity offset area as well as knowledge from previous years weed control programs are used to identify weeds locations and when control is required. Only appropriately qualified contractors are used for weed control programs with records kept as required by the relevant legislation. The weed contractor predominantly uses a splatter gun or boom spraying methods to control most weeds, except for Box-Thorn and Prickly Pear which was manually controlled. The weed contractor maintains a current qualification for herbicide use and documents what weeds were targeted, the herbicide used and rate plus prevailing the weather conditions. In addition to herbicide control, a slasher was used to control other environmental weeds between Site 5 and Site 9 in the BOA such as Farmers Friend and Fleabane, which had a prolific season due to the high rainfall (see **Figure 3.10)**.

Figure 3.10 Slashing for Weed Control around Seedling Regenerating near BOA Site 9

3.7 BLASTING

3.7.1 Blast Criteria and Control Procedures

The revised blast criteria for WCC outlined in **Table 3.23** was established in accordance with PA10_0059 (Schedule 3 Conditions 6 to 13) and (Conditions L5 and M7) EPL 12290 and specify the following:

Table 3.23 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 (April 2012).

The management plan that was current for the reporting period was the Blast Monitoring Program approved by DP&I and DECCW (now EPA) in August 2010. With the approval of PA 10_0059, WCC developed a draft Blast Management Plan (BMP) for the LOM Project, which was submitted to DP&I for approval in April 2012. The draft BMP summarises a number of blast management controls implemented by WCC and the blasting contractor for the LOM Project which are summarised in **Table 3.24** in order to mitigate the risks associated with blasting.

Table 3.24 Blast Management Strategies and Controls

Measure	Timing
Property Acquisition and Private Agreement	As required
Pre-Blast Design Risk 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 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 generations. During drilling the drillers log subsurface information such as coal seam, broken ground and underground locations to prevent overpressure or fume impacts	Prior to and During Drilling
Shotfirer Inspections includes surface and subsurface checks such as dipping hole depth, temperature, gamma and video camera logging of holes	Prior to Loading
Loading Explosives and Detonators to ensure that the right depth/quantity of explosives are used. The blast design should have selected the correct explosives product to make ground 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 exploded explosives and the stemming quality ensures that the material locks together to contain the energy in the ground.	Prior to Loading
Initiation Sequence is designed to prevent overpressure and vibration re-enforcement impacts by modifying the time that each individual blast hole is detonated in milliseconds	Prior to Firing
Sleeping Shots are left in the ground for the minimum time practicable and no longer than the maximum time individual explosive products deteriorate	Prior to Firing
Blast Times and Frequency in accordance with the conditions of EPL 12290 and PA 10_0059	At Firing
Blast Notification included on Whitehaven Coal website providing up to date information of the next scheduled blast	Post Firing
Road and Rail Closure process to notify Council, ARTC, emergency services to protect infrastructure and public safety	Prior to Firing
Pre-Blast Weather Check to mitigate overpressure, dust and fume events from impacting on Werris Creek community	Prior to Firing
Pre-Blast Planning at 9am meetings discussing how the forecasted weather conditions could impact on the blast	Day of Firing
Structural Inspections of private property following claims of damage	After Complaint

The locations of blast monitoring were determined in accordance with the Blast Monitoring Program as outlined in **Table 3.25** and locations identified in **Figure 3.11**. The draft BMP makes a slight change to the blast monitoring program by removing "Cintra" and "Greenslopes" as these properties have been acquired by WCC.

Table 3.25 WCC Blast Monitoring Program

Monitoring Location Type	Site ID (see Figure 1)	Purpose	Property/Location Description	Frequency	Direction from WCC	Distance (km)
Permanent	WCB - 3	Community	"Tonsley Park"	Every Blast	North	2.9
Mobile	WCB - 5	Community	"Greenslopes"	Three locations every Blast	North East	2.7
Mobile	WCB - 1	Community	"Glenara"		South	3.8
Mobile	WCB - 4	Contractual	"Cintra"		North	1.6
Mobile	WCB – 6	Community	Laneway off Kurrara Street, Werris Creek		North East	3.7
Mobile	WCB – 7	Community	"Talavera"		South East	2.7
Mobile	WCB – 20	Contractual	ARTC Railway Culvert	Every Blast with 500m of Rail Line	East	0.3

3.7.2 Blast Monitoring Results

During the reporting period, a total of 84 blasts were fired by the blasting contractor, Orica Mining Services. The number of blasts has reduced from the previous reporting period as fewer delays for blasts improves production efficiency. There were no exceedances of the maximum limit of 10mm/s or 120dB(L) for the period at any residence – including company owned residences (**Table 3.26**). It should be noted, that "Greenslopes" was purchased by WCC in December 2011 and is now deemed a company owned residence.

Only two blasts during the reporting period resulted in air overpressure exceeding 115dB(L). On both occasions the exceedances occurred on privately owned "Greenslopes" and on one occasion on company owned "Cintra". A blast on 03/06/11 resulted in air overpressure results of 115.8 dB(L) and 117.4 dB(L) at "Greenslopes" and "Cintra" respectively. On 16/06/11, an air overpressure measurement of 115.7dB(L) was recorded at "Greenslopes". These results are slightly above the predicted average as nominated in the "*Werris Creek Coal Mine Life of Mine Environmental Assessment"* (R.W. Corkery and Co Pty Limited 2011). WCC and the blasting contractor initiated a number of investigations into these two high overpressure events identifying that cratering was common around the margins of the shot due to excess energy escaping through the ground generating the high overpressure impacts. These shots are now designed that every second hole on the face rows is not loaded with a full column of explosives but is now loaded with a toe charge to just break the ground at the base of the blast. To date, WCC has not had a repeated excessive overpressure event.

All remaining monitoring results at privately owned properties were consistent with the levels predicted in the LOM EA (R.W. Corkery and Co Pty Limited, 2010) and the blast criteria for WCC. No blasts were missed at any monitoring location during the period. Detailed blast monitoring results are included in **Appendix 6**.

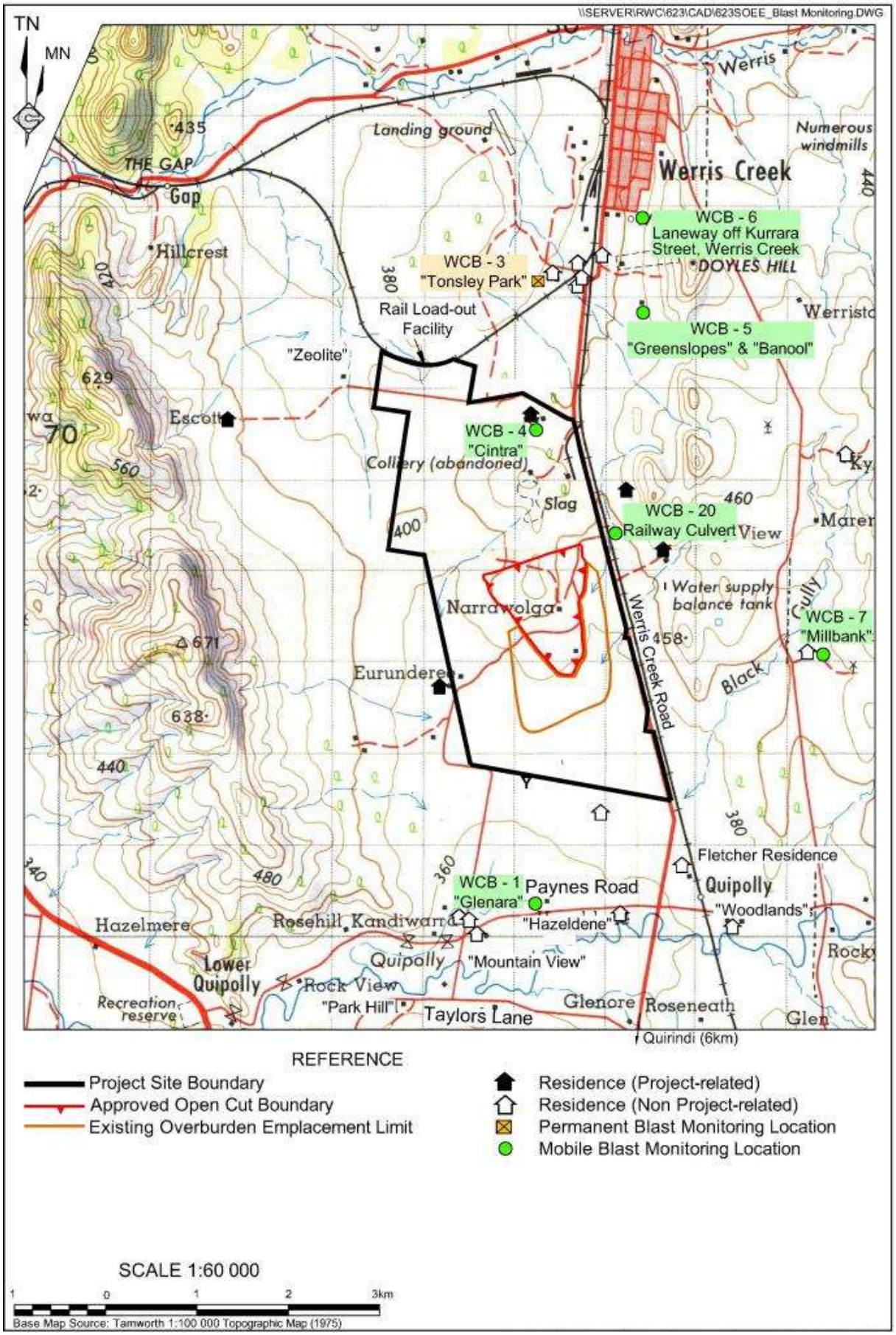


Figure 3.11 WCC Blast Monitoring Program

On 11 November 2011 WCC initiated a blast above the former underground workings resulting excessive fume being generated due to the extensive cracking and cavities within the shot associated with the former underground workings. A community complaint was received for this blast and the EPA commenced an investigation. The blast results for overpressure and vibration were within compliance limits, however the blast was accorded a fume rating of 4 out of 5 (1 being lowest fume and 5 being the highest) by the blasting contractors. The EPA issued WCC a Penalty Infringement Notice for contravention of Condition O1.1 of EPL 12290.

Table 3.26 WCC 2010-2011 Blast Monitoring Results Summary

Month	Blasts		Glenala		Greenslopes*		Tonsley Park		Cintra*		Werris Creek		Talavera	
			mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)
April 2011	9	Ave	<0.37	<109.9	0.31	110.8	0.49	108.2	0.60	109.6	<0.20	<109.9	<0.37	<109.9
		Max	<0.37	<109.9	0.35	111.5	0.83	109.8	1.12	113.2	<0.20	<109.9	<0.37	<109.9
May 2011	6	Ave	NM	NM	0.42	108.2	0.67	99.0	0.67	107.3	<0.20	<109.9	NM	NM
		Max	NM	NM	0.42	108.2	0.95	102.5	0.97	110.1	<0.20	<109.9	NM	NM
June 2011	10	Ave	NM	NM	0.66	109.2	0.79	104.1	0.90	110.9	0.31	105.1	<0.37	<109.9
		Max	NM	NM	1.05	115.8	1.12	113.1	1.92	117.4	0.42	111.7	<0.37	<109.9
July 2011	7	Ave	NM	NM	0.53	99.6	0.58	97.0	1.10	105.5	<0.20	<109.9	<0.37	<109.9
		Max	NM	NM	0.65	110.6	0.72	106.9	1.25	114.0	<0.20	<109.9	<0.37	<109.9
August 2011	8	Ave	NM	NM	0.91	86.7	1.03	98.4	1.73	104.3	0.79	98.0	0.54	94.3
		Max	NM	NM	1.62	101.7	1.98	104.8	3.75	110.0	0.94	103.3	0.55	105.5
September 2011	6	Ave	NM	NM	1.20	99.6	1.02	99.0	1.87	104.4	0.56	98.7	0.47	111.0
		Max	NM	NM	2.19	111.6	1.69	105.2	3.47	108.2	0.89	106.6	0.47	111.0
October 2011	7	Ave	NM	NM	0.75	93.9	0.78	103.1	1.24	108.9	0.30	99.5	0.67	102.2
		Max	NM	NM	1.24	113.3	1.25	106.3	1.65	110.6	0.44	103.3	0.67	102.2
November 2011	7	Ave	NM	NM	0.65	104.1	0.94	100.0	1.79	102.4	0.29	100.7	<0.37	<109.9
		Max	NM	NM	1.44	110.2	1.22	111.5	2.27	107.3	0.44	113.2	<0.37	<109.9
December 2011	8	Ave	NM	NM	0.66	107.9	0.67	102.5	0.90	106.5	0.32	100.7	<0.37	<109.9
		Max	NM	NM	1.12	112.8	1.37	110.3	1.17	114.6	0.37	106.6	<0.37	<109.9
January 2012	6	Ave	NM	NM	0.88	105.5	0.92	102.2	1.13	105.4	0.70	104.1	<0.37	<109.9
		Max	NM	NM	1.14	112.8	1.62	111.0	1.97	111.0	1.45	106.3	<0.37	<109.9
February 2012	4	Ave	NM	NM	0.61	106.7	0.92	105.1	1.36	110.0	0.33	102.5	<0.37	<109.9
		Max	NM	NM	0.75	110.5	1.25	107.9	1.57	113.2	0.34	104.6	<0.37	<109.9
March 2012	6	Ave	NM	NM	0.49	102.3	0.86	100.1	1.00	105.6	0.34	104.1	<0.37	<109.9
		Max	NM	NM	0.77	108.7	1.05	108.0	1.22	110.1	0.42	107.2	<0.37	<109.9
Annual	**84**	**Ave**	**<0.37**	**<109.9**	**0.69**	**102.9**	**0.81**	**101.6**	**1.19**	**106.7**	**0.44**	**101.5**	**0.56**	**102.5**
		Max	**<0.37**	**<109.9**	**2.19**	**115.8**	**1.98**	**113.1**	**3.75**	**117.4**	**1.45**	**113.2**	**0.56**	**111.0**

A summary of blasting complaints received by WCC since operations commenced in 2005 is presented in **Table 3.27**. Blasting related complaints have been the most common community complaint resulting from WCC operations since the mine commenced in 2005. A summary of blasting and all types of complaints received from 2005 to 2012 are provided in **Table 3.27**.

Table 3.27 WCC Complaint Issues from 2005 to 2012

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

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. Of the 68 blasting complaints due to overpressure or vibration (categorised together because complainants unable to differentiate), 46 complaints were generated from four individual blasts (3rd & 16th June and 3rd and 17th August 2011).

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 1600 people than compared to the rural Quipolly area. Since 2010, over a quarter of the blast complaints (25 out of 98) are from a single complainant located on the southern limits of Werris Creek. While one complainant has dominated the complaint data, WCC does recognise that overall blast complaints have increased, the number of complainants has 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 3.28** found that there was a trend for blasting complaints in particular locations in pit but also the likely cause of the complaint. For example, blasts in the upper horizons of the pit (above RL350m and including the A Seam) are resulting in overpressure complaints. Blasts deeper in pit (RL350m and below including the basal G Seam) have resulted in vibration complaints. As discussed above, WCC and the blasting contractor undertook a number of investigations which identified the likely causes of these blasting impacts and have implemented actions to reduce the likelihood of blasting related complaints.

Table 3.28 WCC Blasting Complaints by 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

3.8 OPERATIONAL NOISE

3.8.1 Management

In the draft Noise Management Plan (April, 2012), WCC has developed a revised noise criteria based on additional property acquisitions and negotiated private agreements by Whitehaven Coal since the Project Specific Noise Criteria in PA10_0059 and EPL Noise Criteria were approved. **Table 3.29** outlines the noise criteria for private properties without private agreements while **Table 3.30** displays the noise criteria for private properties with private agreements.

Table 3.29 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 3.30 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

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.

Prior to the approval of PA10_0059 (April to September 2011), adverse weather was previously defined for temperature inversions as a lapse rate >+3°C/100m and wind speeds >3m/s.

Between April and September 2011, the noise monitoring program consisted of three 15 minutes noise measurements corresponding to the day, evening and night time periods at six properties. From October 2011 onwards when PA10_0059 was approved, WCC revised its noise monitoring program to increase the number of monitoring locations to 13, which is representative of 18 private properties in proximity to the operation as outlined in **Figure 3.12**.

The draft Noise Management Plan submitted to DP&I (previously DP&I) in April 2012 as conditioned by PA10_0059 outlines the key operational and proposed 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;

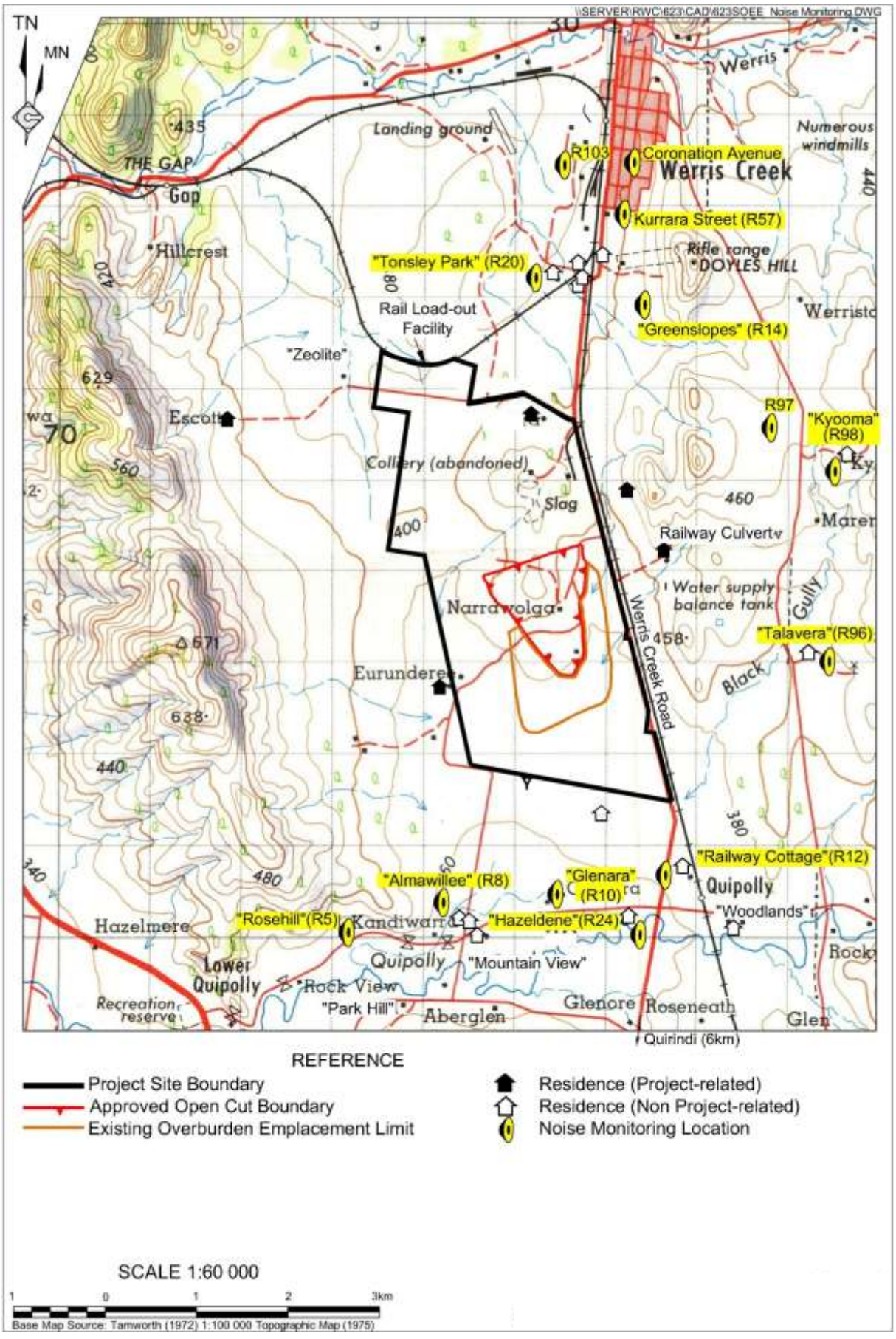


Figure 3.12 WCC Noise Monitoring Locations

- Noise attenuation measures including installing noise attenuation fitments to WCC's fleet of CAT 785 trucks to achieve an 8dB sound power level reduction and for all dozers onsite (open cut and Rail Load Out) using 1st gear reverse only to achieve a 7dB sound power level 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 personnel through SMS and 2 way radio alarms allowing necessary changes to mining operations;
- Monitoring of adverse weather conditions (source to receiver winds or temperature inversions) between the onsite weather station at RL445m and mobile continuous noise monitoring system at RL360m;
- 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.
- The appointment of a '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 to maintain noise levels at or below the long tern noise criteria of 35dB(A).

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

3.8.2 Operational Noise Monitoring

The results of routine operational noise monitoring conducted on a monthly basis by Spectrum Acoustics Pty Limited are outlined in **Table 3.31** 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 as described above, noise levels measured under adverse weather conditions enhancing 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 adverse impacts from mining noise emissions. This is the first annual reporting period that WCC has not recorded any noise non-compliance (**Table 3.32**).

Table 3.31 WCC Noise Monitoring Results for 2011-2012

Receiver	Period	April	May	June	July	August	September	October	November	December	January	February	March
R5 "Rosehill"	Day	NM	NM	NM	NM	NM	NM	IA#	IA#	IA#	30#	<30#	31
	Evening	NM	NM	NM	NM	NM	NM	IA#	33	IA#	BA#	IA#	33
	Night	NM	NM	NM	NM	NM	NM	IA	IA	IA	25#	<30	27#
R8"Almawillee"* R7 83 Wadwells Ln R9 "Gedhurst" R22 "Mountain View"	Day	IA*#	IA*#	<20*	<20*#	*IA	*<25#	IA#	IA#	IA	IA#	<25#	31
	Evening	IA*#	35*#	37*#	32*#	*IA#	*32#	IA#	30	IA#	IA#	IA#	32
	Night	30*	32*#	38*#	33*#	*27#	*32#	29	BA	35	32#	<25	32#
R10 "Glenara"* R11 "Meadholme"*	Day	IA*#	IA*#	37*#	34*#	*<30	*BA#	IA#	IA#	IA#	IA#	IA#	30
	Evening	IA*#	38*#	33*#	30*#	*IA#	*33#	IA#	28	IA#	IA#	IA#	32
	Night	<25*#	32*#	38*#	34*#	*29#	*33#	<20	<25	<25	30#	<25	32#
R24 "Hazeldene"	Day	NM	NM	NM	NM	NM	NM	IA#	IA#	IA#	IA#	IA#	29
	Evening	NM	NM	NM	NM	NM	NM	IA#	IA	IA#	IA	IA#	25
	Night	NM	NM	NM	NM	NM	NM	IA#	IA	IA	25#	<25	31#
R12 "Railway Cottage"	Day	IA#	IA#	BA	32#	30#	IA#	IA#	IA#	IA#	IA#	IA#	<25
	Evening	IA#	IA#	<30#	34#	IA	32#	IA#	IA#	IA#	IA	IA#	31
	Night	IA#	25#	32#	34#	28#	IA#	IA#	25	IA	IA	<30#	31#
R96 "Talavera"	Day	NM	NM	NM	NM	NM	NM	<30	IA#	30#	IA#	<30#	21
	Evening	NM	NM	NM	NM	NM	NM	IA#	33	25#	BA#	<30#	<20
	Night	NM	NM	NM	NM	NM	NM	24#	27	<20	<20#	<30#	BA#
R97	Day	NM	NM	NM	NM	NM	NM	NM	IA#	33#	25#	24#	<20
	Evening	NM	NM	NM	NM	NM	NM	NM	30	30#	20#	<30#	<20
	Night	NM	NM	NM	NM	NM	NM	NM	29	IA#	IA	<30	<20#
R98 "Kyooma"*	Day	IA*#	31*	27*	IA*#	*28#	*<30#	BA	IA#	35#	<20#	25#	<20
	Evening	IA*#	IA*#	36*#	37*#	*40#	*32#	BA#	30	33#	<20#	<30#	<20
	Night	IA*#	IA*#	35*#	35*#	*35#	*41#	23#	36	<20	<20#	<30	BA#
R57 Kurrara St	Day	IA#	IA	IA	IA#	33	IA#	30	IA#	IA#	IA#	IA#	IA
	Evening	32#	IA#	<30#	IA#	34#	32#	IA	25	IA#	IA#	<30#	IA
	Night	34#	IA#	35#	IA#	38#	30#	30#	<25	26	IA#	<30	IA#
Coronation Ave	Day	IA#	IA	IA	IA#	IA#	IA#	IA	IA#	IA#	IA#	<30#	IA
	Evening	32#	IA#	33#	IA#	30#	IA#	IA	IA	IA#	IA#	IA#	IA
	Night	34	IA#	34#	IA#	35#	30#	25#	IA	IA	IA#	IA#	IA#
R14 "Greenslopes"	Day	BA#	<25	IA	IA#	BA#	IA#	34	25	35	NM	NM	NM
	Evening	35#	28#	40#	31#	42#	36#	34	35	33#	NM	NM	NM
	Night	39#	IA#	45#	36#	38#	31#	33#	39	34	NM	NM	NM
R20 "Tonsley Park"* R21 "Alco Park"	Day	IA*#	28*	IA*	IA*#	*IA#	*IA#	IA#	IA#	IA#	IA#	IA#	IA
	Evening	33*#	IA*#	35*#	IA*#	*34#	*31#	30	IA	37#	IA	30#	33
	Night	38*#	IA*#	38*#	IA*#	*32#	*IA#	34#	IA	37	30	30#	IA#
R103	Day	NM	NM	NM	NM	NM	NM	IA#	IA#	IA	IA#	<25#	IA
	Evening	NM	NM	NM	NM	NM	NM	IA	IA	IA#	IA#	IA#	IA
	Night	NM	NM	NM	NM	NM	NM	IA#	IA	IA#	IA	IA#	IA#

- 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; NM – Not monitored, included into program from October 2011 onwards

Table 3.32 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
Number of Non-compliance events	2	46	23	3	1	1	0

A summary of noise complaints received by WCC since operations commenced in 2005 is presented in **Table 3.33**. Noise complaints represent approximately a quarter of all complaints received by WCC since 2006. The number of complaints and the number of complainants have increased significantly since 2010, however noise complaints still represent approximately 25% of all complaints for the 2010-2011 and 2011-2012 reporting periods.

Table 3.33 WCC Noise Complaints since 2005

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

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 and population density compared to the rural Quipolly area.

Since 2010, half the noise complaints (23 out of 46) related to the Rail Load-Out Facility, and significantly all of these complaints are from a single complainant located on the southern limits of Werris Creek. All 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 one Werris Creek complainant has made a total of 24 noise complaints while one Quipolly complainant has made a total of 13 noise complaints since 2010. Combined, the two complainants account for 80% of the noise complaints made and both complainants have increased the number of complains made in 2011-2012 compared to the previous year. While the two complainants have biased the analysis of the noise complaint data, WCC does recognise that overall noise complaints have increased, the number of complainants has increased and that there is a shift towards Werris Creek residents making noise complaints that requires further management by WCC. WCC believes that a combination of implementing the noise attenuation measures on the trucks and dozers 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.

3.9 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;
- 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 visual impacts and 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 and as a consequence the potential for visual impacts from surrounding landholders has been mitigated. 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 24.76ha of rehabilitation bringing the total area of rehabilitation completed at WCC to 54.68ha which means the entire southern face of the rehabilitation/overburden emplacement has now been rehabilitated. Quipolly residents view towards WCC is now of a green hill (**Figure 3.13**).

Figure 3.13 View of WCC Southern Rehabilitation/Overburden Emplacement Area from Quipolly

The ongoing 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 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 3.14**).

Since WCC increased the height of the overburden emplacement in February 2010 from RL410m to RL445m as approved in DA 172-7-2004 MOD5, 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 in 5 to 10 years will screen the construction of a visual amenity bund from Werris Creek as committed to in the Environmental Assessment (R.W. Corkery & Co., 2010). The 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 first 18 months since being planted (**Figure 3.15**).

Figure 3.14 Werris Creek Road Tree Screen and Visual Bund to the south (left) and north (right)

Figure 3.15 WCC LOM Visual Bund Tree Screen planted to the east of "Cintra"

During the reporting period, WCC received 13 complaints relating to lighting impacts which is a slight reduction on the number of visual amenity complaints from the previous period (**Table 3.34**). While it is too early to determine that the reduction in complaints was due to the Lighting Monitoring Camera, a summary video from the camera of the previous night has improved the onsite awareness of lighting impacts and in particular the potential for impacts at Werris Creek (**Figure 3.16**). Of the 28 complaints received since 2010, 26 complaints have come from the one complainant located in Werris Creek. 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 (**Figure 3.16**). Notwithstanding this particular Werris Creek complainants visual amenity issues,

WCC engaged an independent assessment of visual mitigation options in March 2012 that hopefully will identify additional reasonable and feasible visual mitigation controls to not only ameliorate one Werris Creek residents' concerns but also looking more broadly at what can be done to mitigate visual impacts for Werris Creek as a whole.

Table 3.34 Summary of Visual Amenity Complaints since 2010

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

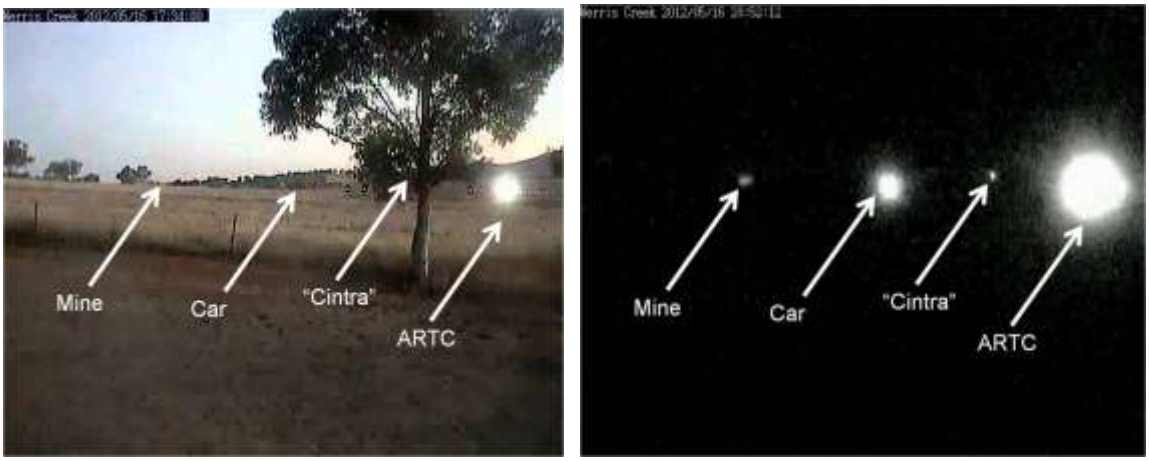


Figure 3.16 Example View from Lighting Monitoring Camera in Werris Creek during day & night

3.10 HERITAGE MANAGEMENT

3.10.1 Predicted Impacts from LOM Project

The LOM Project would not have any direct impact on any sites or objects of Aboriginal heritage significance. Through further consultation and implementation of a revised management plan, it is unlikely that the LOM Project would 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

No routine monitoring of Aboriginal Cultural or Historical Heritage is proposed for the LOM Project. PA10_0059 Condition 33 required an additional Historical Heritage Investigation and archive photo record of remnant mining features of the former underground colliery. WCC engaged a suitably qualified and experienced archaeologist to undertake the historical heritage assessment in April 2010 and is discussed in **Section 3.10.4**.

3.10.3 Management Measures

WCC is currently preparing a draft Heritage Management Plan (HMP) that is to be submitted to DP&I by June 2012 as required by Condition 32 of PA10_0059 to manage cultural heritage issues, impacts and discuss management strategies superseding the previous Archaeology and Cultural Heritage Management Plan approved in 2007. The draft HMP will discuss the 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.

Additional management actions were identified in the Historical Heritage Assessment for the former underground colliery and are discussed in **Section 3.10.4**. During the reporting period, WCC CCC completed and published a booklet on the history of the former underground mine (Werris Creek Colliery) titled "A History of Coal Mining at Werris Creek". The WCC CCC has donated the booklets to Australian Railway Monument and Rail Journeys Museum at Werris Creek so that the not-for-profit organisation can collect the proceeds from the sale of the booklet from their gift shop. Copies of the booklet will be made available to other heritage organisations in the Liverpool Plains Shire Council area.

3.10.4 Monitoring Results

An archaeological 'Investigation and Heritage Record Report' was undertaken within the reporting period by Advitech Environmental in response to Condition 30 of PA10_0059 to undertake primary historical investigations of the former Werris Creek Colliery items, buildings and surrounds (**Appendix 10).** The archaeologists agreed with the conclusion from the Heritage Assessment undertaken as part of the LoM Environmental Assessment (Landskape, 2010) that the dwellings, sheds and surrounds associated with the former Werris Creek Colliery were of a minor cultural significance locally due to the poor state of preservation. The Historical Heritage Assessment generally recommended that most remanent items be demolished and the materials be recycled (where possible) with the exception of:

- Salvage on old mileage marker for Werris Creek within the gardens of the former Deputy Mine Managers residence; and
- Contact local heritage organisations to see if there is any interest in salvaging a former steel coal loading ramp (see **Figure 3.17**).

There was no change in the condition of the "Narrawolga" axe grinding grooves, with the temporary storage site fenced and protected away from potential disturbance. WCC will upgrade the fencing of the site in the next reporting period.

Figure 3.17 Former Coal Loading Ramp Associated with Werris Creek Underground Colliery

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 was one reported instance of spontaneous combustion (sponcom) on site during the reporting period. A small area of carbonaceous waste rock started to smoke in the overburden emplacement on 28th March 2012. Water carts were used to suppress the area of sponcom until the site was dug out and put out on the 29th March 2012. Unfortunately, WCC received a community complaint for dust in relation to the haze created by the sponcom trapped by an inversion at 9am on 29th March 2012.

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 BUSHFIRE MANAGEMENT

The current Bushfire Management Plan was completed and forwarded to DP&I in August 2007. During the development of this document, consultation between the Werris Creek Rural Fire Service and WCC staff was undertaken.

During the next reporting period, WCC intends to update the Bushfire Management Plan to reflect the LOM Project. As part of the planning for the revised Bushfire Management Plan, members of the Werris Creek Fire Brigade were given a site familiarisation in late March 2012 of the Precursor Facility, Explosives Magazine and Bulk Diesel Storage Tanks and exchanged information on best management of the facilities for fire prevention that will be incorporated into the revised management plan.

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 maybe 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 was one reported hydrocarbon spill associated with an exploration drill rig that developed a hair line fracture in the oil pipeline on the compressor spilling approximately 1L of oil on the ground on 5th March 2012. The drill rig and compressor were stopped once identified and the spillage cleaned up and transferred to the wash pad sump for treatment.

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 onsite. The site is fenced and "do not enter" signs are installed with regular security patrols present on weekends.

Trucks carrying product coal to the Rail Load Out Facility are required to travel at low speed through the intersection with Escott Road, after giving way to any approaching traffic travelling along Escott Road. 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

Feral animals are not a significant land management issue on WCC's landholding and are limited to isolated occurrences of foxes, hares, rabbits, and mice.

In view of the low frequency of occurrence, and in the absence of an extensive programme by all surrounding landowners, no broad scale feral animal control programme was considered warranted during the period. In accordance with prior commitments, WCC will continue to monitor feral animal occurrences and implement necessary control programmes if and when necessary.

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 80m is the method approved in EPL 12290 for WCC to measure temperature inversions.

In addition, WCC also maintains "mini" weather stations associated with the Continuous Noise Monitors ("M1" and "M4"). "M2" is the main weather station utilised by WCC on a 10m mast which continuously monitors the meteorological parameters in **Table 3.35**.

Table 3.35 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.*

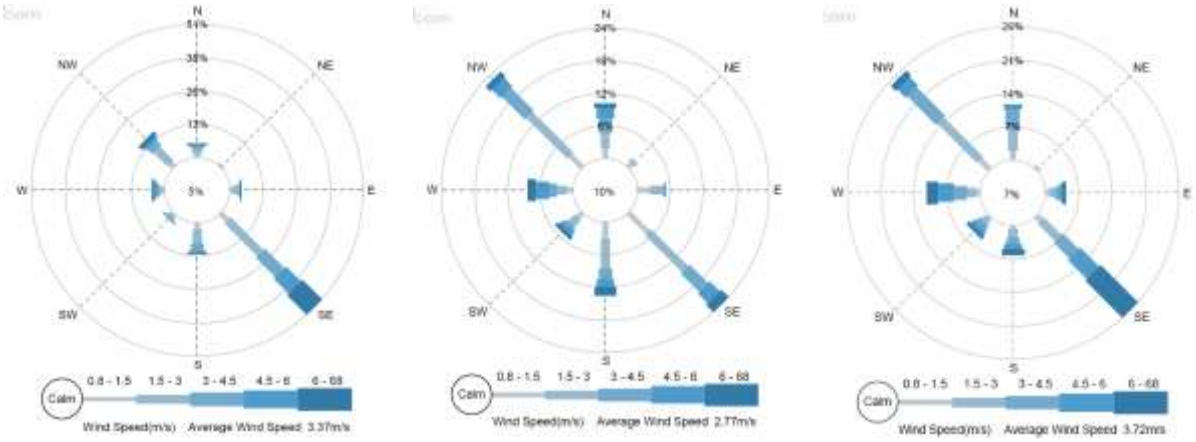
Table 3.36 summarises the rainfall and temperature records measured at WCC and compares the results with the longer term meteorological records for the Quirindi Post Office (1882-2010) approximately 11km away. **Figure 3.18** provides the monthly wind roses measured at WCC.

Over the 12 month period to the end of March 2012, WCC was well above the mean rainfall for Quirindi historically, 794mm versus 684mm respectively but experienced a total of 23mm less rainfall than the previous reporting period (817mm). 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 November that differed with the long-term average of January. The 90th percentile night time lapse rates (worst case temperature inversions) are also presented below.

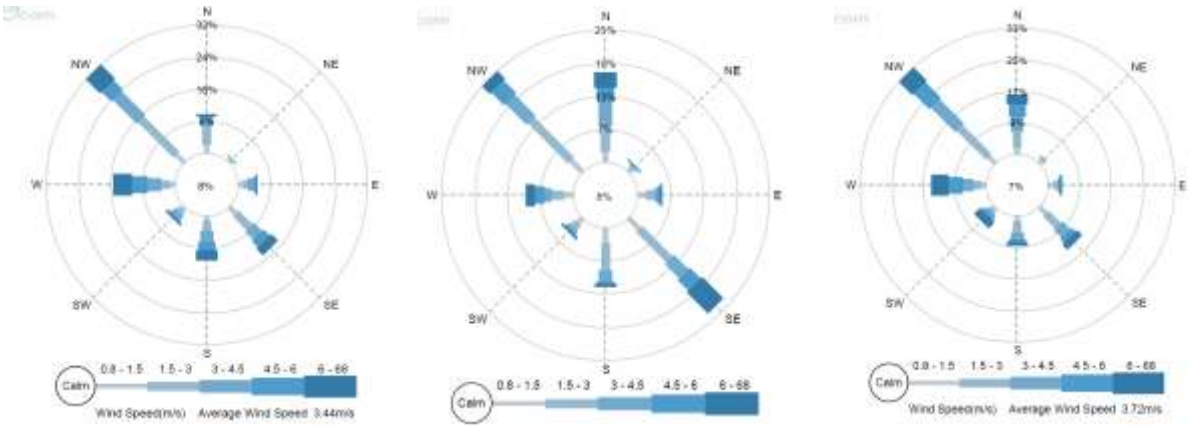
Table 3.36 Rainfall and Temperature Records for 2011-2012 Period

		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
Rainfall* (mm)		39.4	68.6	10.6	4.8	32.4	81.4	79.2	199.4	58.4	55.8	119.0	44.6	793.6
BOM Average (mm)		42.0	44.4	51.3	48.5	45.4	46.6	60.7	64.8	80.9	80.7	65.1	53.0	683.8
Temperature	**WCC Min (°C)**	8.4	2.4	0.0	-0.1	3.8	4.6	6.8	13.7	9.3	11.9	14.4	10.3	-0.1
	WCC Avg (°C)	17.1	12.6	10.6	9.8	12.7	15.3	16.9	22.6	19.0	22.5	22.1	20.5	16.8
	WCC Max (°C)	26.6	22.0	17.9	17.9	23.3	28.0	29.1	35.5	28.8	33.3	31.5	29.5	35.5
	Q BOM Min (°C)	8.9	5.0	2.8	1.6	2.4	5.0	8.7	12.0	14.7	16.4	16.1	13.5	7.9
	Q BOM Max (°C)	24.9	20.4	16.6	15.9	17.9	21.5	25.2	28.5	31.1	32.2	31.3	29.3	27.1
90% Lapse (°C/100m)		+4.7	+5.7	+7.5	+8.6	+8.9	+9.3	+3.0	+1.3	+1.3	+2.5	+4.5	+6.0	-

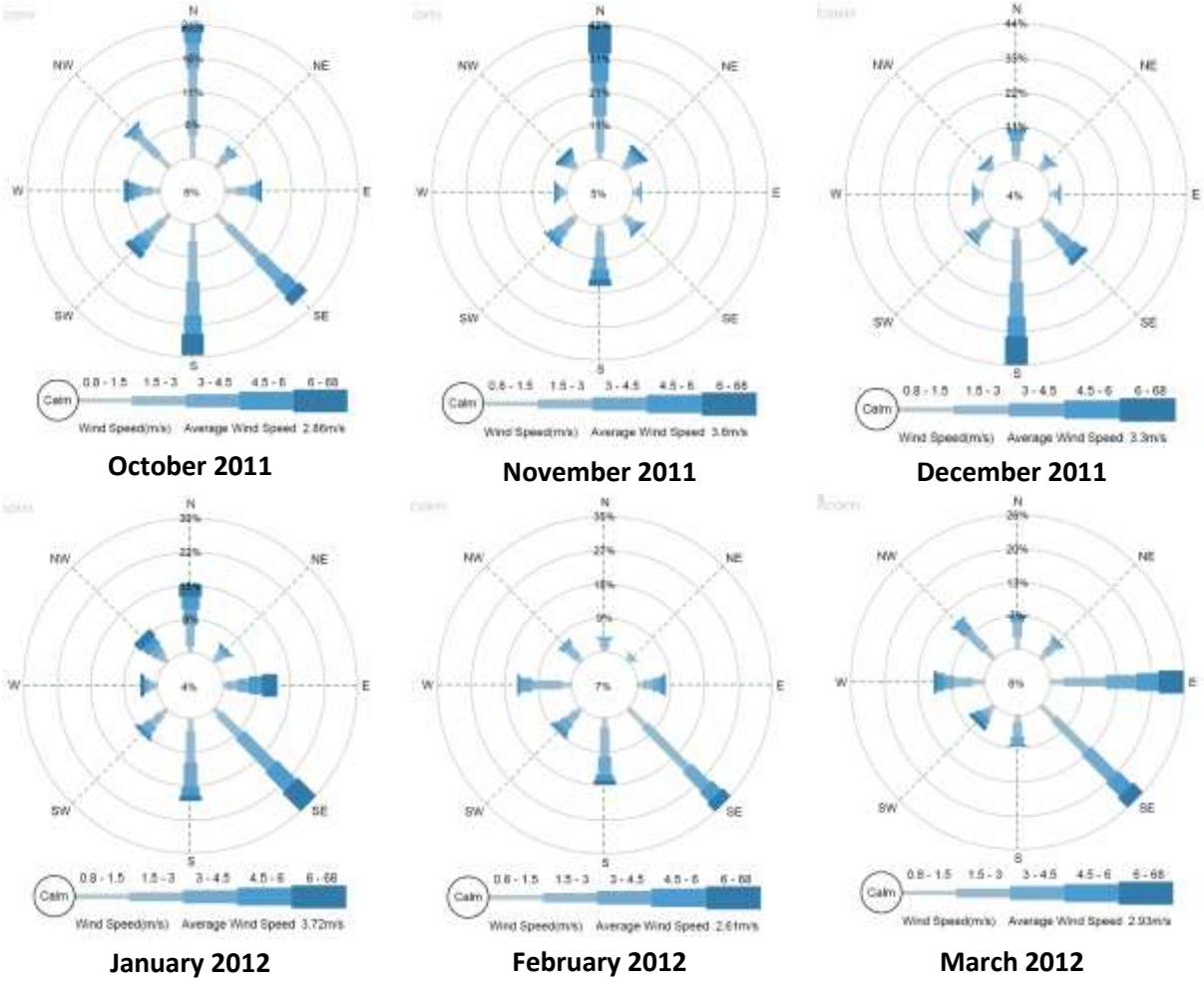
Note: BOM Average is the Quirindi Post Office Bureau of Meteorology long term monthly and annual rainfall average for 1882 to 2011. Q BOM Min and Max are Quirindi Post Office Bureau of Meteorology long term monthly and annual temperature averages for 1907 to 2011. * Rainfall is a compositive of the Sentinex meterology stations of onsite with noise trailer data.



April 2011 **May 2011** **June 2011**



July 2011 **August 2011** **September 2011**



October 2011 **November 2011** **December 2011**

January 2012 **February 2012** **March 2012**

Figure 3.18 WCC Wind roses for April 2011 to March 2012

4. COMPLIANCE

During the 2011-2012 reporting period, WCC was subject to its second (Year 6 - August 2008 to July 2011) Independent Environmental Audit and its first Biodiversity Offset Management Plan Audit. DP&I approved AECOM Pty Ltd as the approved auditors in correspondence dated 6th July 2011. **Table 4.1** summarises the non-compliance findings and recommendations made by the auditors that was submitted to government agencies including DP&I on 29th August 2011 for Biodiversity Offset Management Plan Audit and 13th September 2011 for the Independent Environmental Audit.

It is worth noting that one non-compliant event can for example be found non-compliant numerous times throughout the audit process i.e. a dirty water discharge event with a minor pH exceedance and minor total suspended solids exceedances (same event would now be compliant because the EPL TSS limits were subsequently changed) was found non-compliant twice in DA 172-7-2004 and four times in EPL 12290 and a minor noise exceedances were found non-compliant once in DA 172-7-2004 and once in EPL 12290. These events were minor and on both occasions DP&I and EPA did not take any further action against WCC.

DP&I approved the Biodiversity Offset Management Plan Audit Report and action plan on 21st September 2011. DP&I responded to the Independent Environmental Audit Report and action plan on 8th February 2012 requesting WCC to provide advice on the compliance status of commitments from documents that were not audited. WCC responded on 22nd February 2012 and DP&I verbally indicated that no further action will be taken given that PA10_0059 was to supersede DA 172-7-2004 and DA 172-7-2004 to be relinquished.

Overall, AECOM (2011) found that WCC has a well-documented systems and sound procedures for record keeping relating to environmental activity and that a good standard of environmental management was being applied to the operation. **Appendix 10** provides a detailed overview of status of actions from the Independent Environmental Audit and the Biodiversity Offset Management Plan Audit.

Table 4.1 Summary of Non-Compliance found and Recommendations made from Independent Environmental Audits in 2011

Document	Non Compliances	Recommendations
DA-172-7-2004	7	1
Environmental Impact Statement	0	0
Statement of Environmental Effects	1	2
EPL 12290	6	0
Landscape Management Plan	0	1
Archaeology and Cultural Heritage Plan	1	1
Rail Spur Management Plan	0	0
Noise Management Protocol and Program	0	1
Bushfire Management Plan	1	0
Air Quality Monitoring Program	1	0
Blasting Monitoring Program	0	0
Site Water Management Plan	3	1
Groundwater Contingency Plan	0	0
Waste Management Plan	1	2

Document	Non Compliances	Recommendations
Energy Savings Action Plan	0	0
Mine Closure Plan	0	0
Biodiversity Offset Management Plan	3	-

5. COMMUNITY RELATIONS

5.1 ENVIRONMENTAL 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 2011-2012 period there were 117 complaints received by WCC, which is a significant increase from the previous years (**Figure 5.1**). Unfortunately, the increase in complaints since the mine commenced in 2005 is a result of both the increase in the scale of mining operations and decreasing distance to the nearest major town of Werris Creek with a population of approximately 1500 persons. 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 increasing the awareness of Werris Creek residents to WCC operations.

Figure 5.2 demonstrates the trend of complaints from surrounding land users including Quipolly and Werris Creek residents within the 2011-2012 reporting period. All adjacent property owners have been acquired by WCC and hence, no complaints have been recorded since 2008.

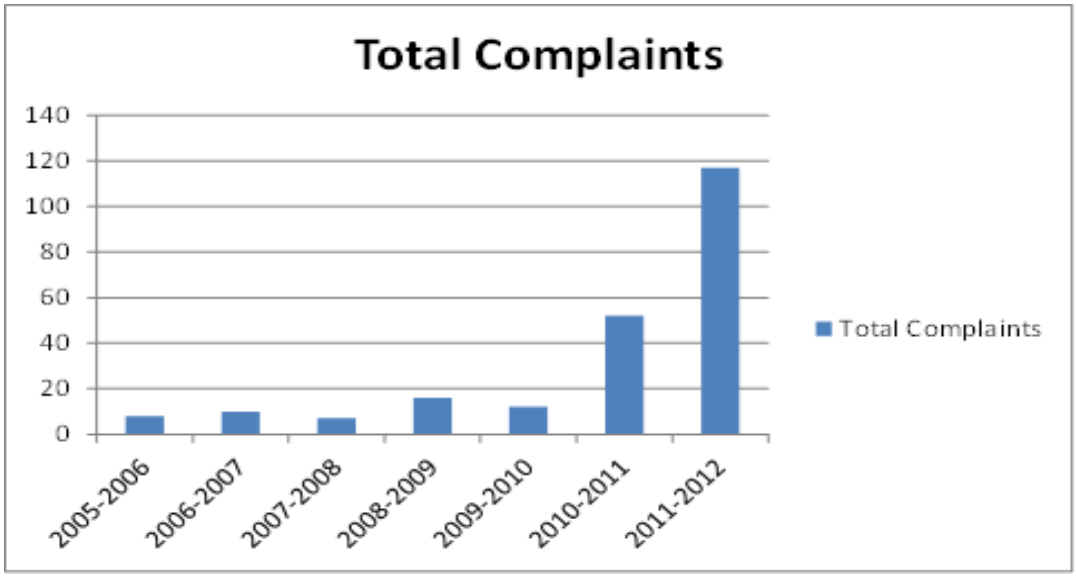


Figure 5.1 Total Number of Complaints Received by WCC from 2005-2006 to 2010-2011

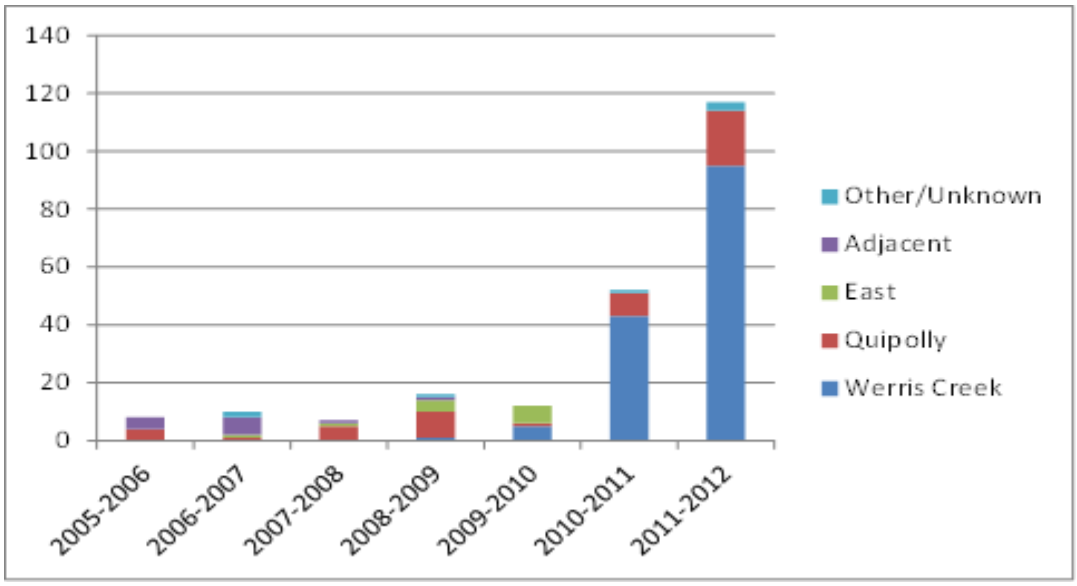


Figure 5.2 Locations of Complaints Received by WCC 2005 to 2011

Table 5.1 WCC Complaint Issues from 2005 to 2011

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

* 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

Figure 5.3 graphically represents the number of complaints by complainants within the reporting period. Of the 117 complaints, 33 originated from one Werris Creek resident and 12 complaints came from one Quipolly resident. The Werris Creek complainant with 33 individual complaints has publically and privately stated that they wish for WCC to purchase their property. Of the 42 individual complainants during 2011-2012, 36 complainants resided in Werris Creek and 28 were first time complainants.

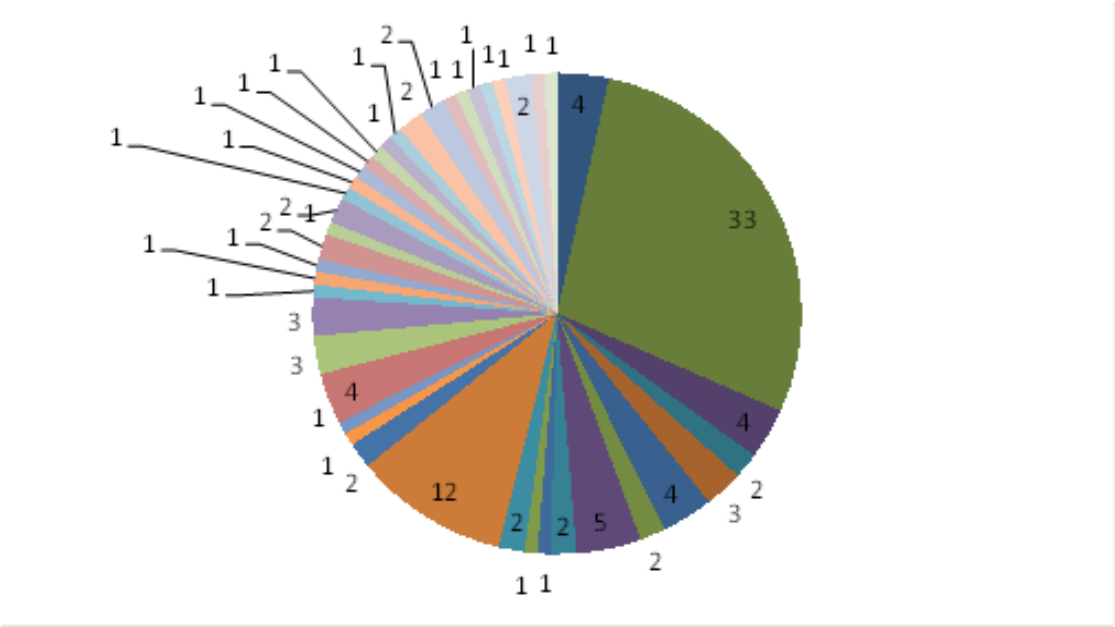


Figure 5.3 Number of Complaints per Complainant 2011-2012

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. Of the 68 blasting complaints due to overpressure or vibration (categorised together because complainants unable to differentiate the difference), 46 complaints were generated from four individual blasts (3rd & 16th June and 3rd and 17th August 2011).

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 of over these impacts included in the relevant sections of this report. For specific complaint details and actions taken refer to the Complaint Database for 2011-2012 in **Appendix 9**.

5.2 COMMUNITY LIAISON

There have been 22 Community Consultative Committee (CCC) meetings held since WCC commenced operations in 2005 with details of the meetings held summarised in **Table 5.2**.

Table 5.2 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 2012 24th November 2012 20th March 2012	10 (4 community representatives) 10 (3 community representatives) 6 (2 community representatives) 9 (4 community representatives)

The frequency of meetings during the 2011-2012 reporting period was held every quarter during the year for a total of four CCC meetings. The meetings were generally well attended with the exception of the November 2011 meeting which had a number of apologies due to unspecified commitments. The meetings continue to have strong representation from the Liverpool Plains Shire Council and local community members in attendance willing to participate.

Following the resignation of the previous Chairman, Gae Swain was appointed by the Department of Planning and Infrastructure as the Independent Chairperson on 1st February 2012. Also two new community representatives were appointed by the DP&I as Community Representatives on 7th March 2012 replacing retired retiring member from the Committee during 2011.

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. Every second meeting a tour of the mine is given prior to the meeting.

During the 2011-2012 reporting period, WCC released a community newsletter updating the community on the status of WCC operations including:

- Information on the approval of LOM Project PA10_0059;
- Planned activities associated with the LOM Project implementation;
- Clearing activities; and
- Blasting and dust impacts.

5.3 EMPLOYMENT STATUS, DEMOGRAPHY, SOCIO-ECONOMIC CONTRIBUTIONS

5.3.1 Employment Status and Demography

Due to the increase in mining activities, employment and contractors onsite increased during the reporting period. WCC currently employees 93 full-time equivalent personnel with a further 2 full-time casual staff employed at the mine (an increase of 6 full-time equivalent positions). Of the full-time employees, 41 live locally in the Liverpool Plains Shire with the majority of the regular contractors based in Werris Creek or Quirindi. This increase of permanent jobs is beneficial to the community as people have moved into the local area to seek employment from a reliable employer with positive flow on effects felt throughout the local community.

5.3.2 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 $23,000 to events and services in the local area including:

- Westpac Rescue Helicopter;
- Spring Ridge Rural Fire Service
- Royal Far West Annual Appeal;
- Werris Creek Lions Club;
- Dorothea Mackellar Poetry Awards;
- Cancer Council;
- Quirindi Show Society; and
- Echo Ministries.

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.

5.3.3 Community Enhancement Fund

WCC submitted a draft Community Enhancement Fund (CEF) required by Schedule 2 Condition 15 of PA 10_0059 for approval by DP&I on the 23rd April 2012. The aim of the CEF is for WCC to support community projects in Liverpool Plains Shire for the benefit of the local community in particular the Werris Creek township. The CEF has been jointly developed with the LPSC since 2010, with LPSC outlining a list of community projects proposed to be funded from the CEF. This joint development process has culminated in a document titled “Werris Creek Coal Community Enhancement Fund March 2012 v1” outlining the community projects to be funded by the CEF as well as the processes to operate the CEF. Both the LPSC and WCC CCC support the proposed CEF on the provision that both parties are able to annually review the projects to be funded.

Upon approval by DP&I, WCC will establish a CEF:

- funded to $300,000 over a 6 calendar year period commencing May 2012;
- LPSC will coordinate the implementation community projects;
- Two- thirds of the CEF will be spent in the Werris Creek township; and
- The schedule of projects funded from the CEF will be reviewed annually by WCC, LPSC and CCC and amended as required due to changing circumstances and priorities and updated in the AEMR.

The project schedule (**Table 5.3**) outlines the anticipated community projects to be funded from the CEF, the estimated date the project will occur and estimated cost. It is proposed that $200,000 will be spent in Werris Creek township.

Table 5.3 Anticipated Community Projects Expenditure

YEAR	PROJECT/PROPOSAL	COST
	Royal Theatre Quirindi – Grand Piano (already spent)	$20,000
2012	Disabled Lift at Australian Railway Museum Werris Creek	$60,000
2012	Skate Park – Werris Creek	$70,000
2013	Nil	$0
2014	Playground Equipment – Bell Park Quirindi	$30,000
2015	Werris Creek Pool – water feature/playground	$70,000
2016	Various playground improvements in Villages	$50,000
2017	Nil	$0
	TOTAL (excluding CPI)	**$300,000**

6. 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 2011-2012.

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 6.1**, 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 6.1 WCC Rehabilitation Objectives

Integrated Landscapes
• To provide an ecological 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 ecological 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 ecological 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 woodlands 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 biodiversity offset area. The breakdown of the final land use post mining and rehabilitation is illustrated on **Plan 5** and **Table 6.2** provides a progressive rehabilitation target up to and after the completion of mining.

Table 6.2 WCC Rehabilitation Program

Period*		Woodland Ecological Community			Agriculture	Annual	Cumulative
		GWBW (ha)	SWBW (ha)	Brigalow(ha)	Class 3 (ha)	Total (ha)	Total (ha)
Pre-MOP		29.9	0.0	0.0	0.0	29.9	29.9
2011		20.6	0.0	0.0	0.0	20.6	50.5
Year 1	2012	22.0	0.0	3.7	0.0	25.7	76.2
Year 2	2013	21.6	0.0	0.0	0.0	21.6	97.8
Year 3	2014	22.4	0.0	0.0	0.0	22.4	120.2
Year 4	2015	23.5	0.0	0.0	0.0	23.5	143.7
Year 5	2016	15.1	0.0	0.0	0.0	15.1	158.8
Year 6	2017	24.0	0.0	0.0	0.0	24.0	182.8
Year 7	2018	14.3	0.0	0.0	0.0	14.3	197.1
TOTAL		193.4	0.0	3.7	0.0	197.1	197.1
REMAINING*		184.0	180.0	0.0	47.9	408.2	408.2

* Remaining rehabilitation to be completed by mine closure (**Plan 6**) following ongoing mining until the resource is exhausted at WCC beyond this MOP period. Areas to be rehabilitated shown in the MOP are higher than outlined in the EA due to the rehabilitation of land shown in **Figure 4.2** as "Cleared & Cultivated Land".

6.1 BUILDINGS

The only buildings added during the reporting period were for the blasting contractors explosive Precursor Facility which are of a demountable/portable style construction as discussed in **Section 2.3**.

6.2 REHABILITATION PERFORMANCE

During the period, rehabilitation of the southern emplacement was completed. In total, 16.51ha of final rehabilitation to GWBW Woodland and 8.25ha of temporary (cover crop sown) rehabilitation was established with a summary of the individual rehabilitation programs outlined in **Table 6.3** and **Figure 6.1**.

Table 6.3 WCC Rehabilitation Program Summary 2011-2012

Domain:	3	**Sub Domain:**	GWW	**Reveg Date:**	September 2011	**Area:**	3.43ha
Name:	South Eastern Rehabilitation Zone C		**Land Use:**	Ecological Community	**Seed/Plant:**	Grassy White Box Woodland species	
Description/Methodology: The area was shaped, topsoil and subsoil applied to 0.2m depth each in 2008. The area harrowed and resown with Oats cover crop in March 2011. Trees (hikos) were planted into holes 0.3m deep with a mechanical auger with a fertiliser pill and water saving crystals added and back filled to create a basin for increased surface water retention. Approximately 160 trees were planted at a 10mx10m aiming to replicate a 100 stem/ha density where planted but a gap row was left in the middle to allow dozers to install stag trees and logs. Zone C GWBW overstorey species ratio was White Box, Yellow Box, White Cypress Pine and Tumbledown Red Gum at 6:1:1:1. **Status/Progress:** Good rainfall for 2011-2012 has achieved a moderate to good survival of plants (>75%) to date. Additional grass and weed control is required.							
Domain:	3	**Sub Domain:**	GWW	**Reveg Date:**	November 2011	**Area:**	13.08ha
Name:	Southern Rehabilitation Zone D,E & F		**Land Use:**	Ecological Community	**Seed/Plant:**	Grassy White Box Woodland species	
Description/Methodology: The area was shaped in March 2011, with topsoil and subsoil applied to 0.2m depth each in June 2011 from soil stockpiles 10, 11, 14 and 25. The area harrowed and sown with Jap Millet cover crop in September 2011. Zone D & E had 240L of native grass seed hand sown. Trees (hikos) were planted into holes 0.15m deep with a pottiputki tree planter with a fertiliser pill and water saving crystals added. Approximately 560 trees were planted at a 10mx10m aiming to replicate a 100 stem/ha density where planted but a gap row was left in the middle to allow dozers to install stag trees and logs. Zone D/E/F GWBW overstorey species ratio was White Box, Yellow Box, White Cypress Pine and Tumbledown Red Gum at 6:1:1:1. **Status/Progress:** Good rainfall for 2011-2012 has achieved a moderate to good survival of plants (>75%) to date. Additional grass and weed control is required.							

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 species at the required woodland densities. Indicatively, the overstorey tubestock/hiko 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 plant watered in with 1L at time of planting (depending on the conditions). The overstorey 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 E).

Figure 6.1 WCC Rehabilitation Schedule and Revegetation Planning

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 6.4** 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 indices are included in **Table 6.9**.

Table 6.4 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*

6.3 REHABILITATION STATUS

At the end of the 2011-2012 period, the area rehabilitated to final GWBW was 46.43ha and 8.25ha of temporary rehabilitation. The additional rehabilitation has completed the southern rehabilitation area up to the upper height of RL445m on the overburden emplacement area improving the visual amenity when viewed from Quipolly. The LOM MOP/RMP committed to achieving 50.5ha by the end of this reporting period (**Table 6.2**) and therefore WCC is now 4.18ha ahead. While WCC was down 14ha of rehabilitation at the end of the last period, with the approval of the LOM Project triggering an update of the previous MOP allowing the overburden emplacement area to expand to the east and the west resulted in the rehabilitation targets being amended for the period. **Table 6.5** summarises the year on year progress of rehabilitation.

Tables 6.6 and **6.7** outline the disturbance status (**Figure 6.2**) and maintenance works undertaken by WCC for 2011-2012.

Table 6.5 WCC Annual Rehabilitation Progress

Period	Woodland Ecological Community			Agriculture	Annual Total (ha)	Temporary Rehab (ha)
	GWBW(ha)	SWBW(ha)	Brigalow(ha)	Class 3 (ha)		
2008-2009	14.31	0	0	0	**14.31**	
2009-2010	-5.12*	0	0	0	**-5.12**	
2010-2011	20.73	0	0	0	**20.73**	
2011-2012	16.51	0	0	0	**24.76**	8.25
				Cumulative Total	**54.68**	

* Approval of DA 172-7-2004 MOD 5 for an extension to the eastern emplacement required 5ha of existing rehabilitation to be re-disturbed.

Table 6.6 Rehabilitation Summary

	Area Affected (hectares)			
	This Report Period (as of 31/3/12)	**Last Report Period (as of 31/3/11)**	**Next Report Period (estimated) (as at 31/03/13)**	
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)	89.3*	91.0	150.0	
B2 Active Mining Area (excluding items B3 - B5 below)	49.4	64.4	55.0	
B3 Waste emplacements, (active/unshaped/in or out-of-pit)	114.4	85.7	120.0	
B4 Tailings emplacements, (active/unshaped/uncapped)	0	0	0	
B5 Shaped waste emplacement (awaits final vegetation)	0.6	7.1	10.0	
ALL DISTURBED AREAS	253.7	248.2	335.0	F1
C: REHABILITATION PROGRESS				
C1 Total Rehabilitated area (except for maintenance)	54.7	38.0	76.2	F2
D: REHABILITATION ON SLOPES				
D1 Less than or equal to 10 degrees	54.7	38.0	76.2	
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	46.43	29.9	68.5	
E3 Plantations and crops	0	0	0	
E4 Other (include non vegetative outcomes)	8.25	8.1	7.7	

* Includes Infrastructure (25.3ha), Sediment Dams and Basins (14ha) and Topsoil / Subsoil stockpile areas (50ha)

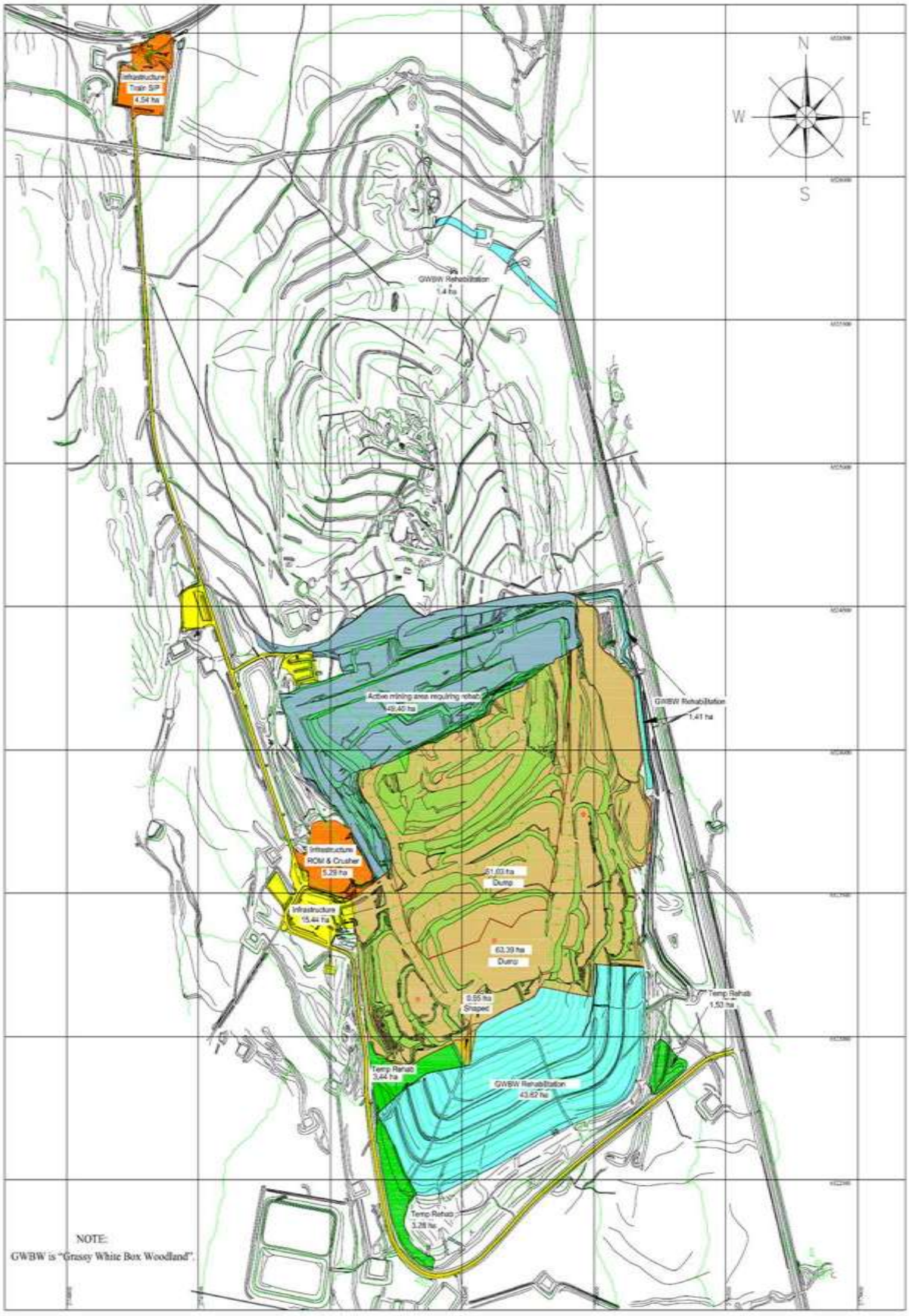


Figure 6.2 WCC Rehabilitation Status as at the end March 2012

Table 6.7 Maintenance Activities on Rehabilitated Land

	Area Treated (ha)		
Nature of Treatment	**Report period**	**Next period**	**Comment/control strategies/ treatment detail**
Additional erosion control works (drains re-contouring, rock protection)	10	As required	Eastern Drainage Diversion, Rehabilitation Contour Banks (**Section 5.3**)
Re-covering (detail - further topsoil, subsoil sealing etc)	8.25	0	Temporary Rehabilitation (**Section 5.3**)
Soil treatment (detail - fertilizer, lime, gypsum etc)	0	As required	
Treatment/Management (detail - grazing, cropping, slashing etc)	25	As required	Scalping soil stockpiles (**Section 3.6** and **5.3**)
Re-seeding/Replanting (detail - species density, season etc)	25	As required	Reseeding soil stockpiles (**Section 5.3**)
Adversely Affected by Weeds (detail - type and treatment)	200	As required	St Johns Wort, Patterson Curse, St Barnabys Thistle (**Section 3.6**)
Feral animal control (detail - additional fencing, trapping, baiting etc)	0	As required	

WCC undertook repair works on the outlet of the eastern diversion drainage that was originally constructed in 2010 importing large rocks (~0.5m) to armour the outlet from large flows. Additional work was also undertaken on the temporary western rehabilitation drop structure which is designed to erode as this drain temporarily runs directly down the slope to handle all six contour banks on the rehabilitation area until the western overburden emplacement area is expanded, shaped and rehabilitated so the contour banks can be extended. Annual soil stockpile maintenance was undertaken with weeds sprayed, ripped and reseeded. As discussed in **Section 3.6**, WCC has an extensive weed control program across both the rehabilitation and biodiversity offset areas.

6.4 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 small area of rehabilitation (~50ha), only one monitoring site, Site 6, has been established to date.

Annual soil analysis monitoring was completed in June 2011 with 13 samples taken from soil stockpiles, rehabilitation and biodiversity offset areas. In October 2011, 9 samples were taken from the Brigalow Woodland area attempting to match with a preferred rehabilitation site. **Table 6.8** summarises soil analysis results and, where applicable, whether the Rehabilitation/BOA met the completion criteria. In general, the limited sampling of soil stockpiles and rehabilitation areas found the soil to be moderately alkaline. WCC in the next reporting period will consider using soil ameliorants such as gypsum and sulphate of ammonia to improve calcium and nutrient levels without over fertilising the soil. WCC will also investigate a soil amendment strategy to reduce soil alkalinity closer to natural/in situ soils that were tested. No land capability assessment was undertaken because no Class III agriculture rehabilitation has been completed to date.

Table 6.8 Annual Soil Analysis Results

Soil Sample ID	pH	Completion Criteria	Completion Criteria Met?
Subsoil Stockpile 11	8.6	-	-
Topsoil Stockpile 12	8.1	-	-
Subsoil Stockpile 33	8.9	-	-
Topsoil Stockpile 34	8.7	-	-
Baseline LOM 6	6.5	-	-
BOA 1	6.6	5.0 - 8.5	YES
BOA 2	6.4	5.0 - 8.5	YES
BOA 3	7.3	5.0 - 8.5	YES
BOA 4	7.2	5.0 - 8.5	YES
BOA 11	6.7	5.0 - 8.5	YES
Rehab South East Zone B/BOA 6	8.9	5.0 - 8.5	No
Rehab West Zone A O/B	8.8	5.0 - 8.5	No
Rehab West Zone A Topsoil	8.7	5.0 - 8.5	No
Rehab SE Zone A (Fmr TSS 14)	8.5	5.0 - 8.5	YES
Rehab SE Zone A (Fmr TSS 14)	8.7	5.0 - 8.5	No
Rehab West Zone A (Fmr TSS 10)	8.7	5.0 - 8.5	No
Rehab West Zone A (Fmr TSS 10)	8.3	5.0 - 8.5	YES
Brigalow Woodland	6.0	5.0 - 8.5	No
Brigalow Woodland	6.0	5.0 - 8.5	No
Rehab West Zone A (Fmr TSS 10)	8.0	5.0 - 8.5	YES
Marengo Fenceline	8.0	-	-
Marengo Shrubland	8.5	-	-

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 6.3a** displays the photopoint (south east) one month after planting in July 2008 and **Figure 6.3b** shows progress after 33 months in March 2011. From **Figure 6.4** the key change to the rehabilitation has been the advancement of the White Box tubestock planted nearly 4 years ago.

Figure 6.3 South East Rehabilitation Area a (left) July 2008 and b (right) March 2011

Figure 6.4 South East Rehabilitation Area at end of March 2012

Figure 6.5a displays the photopoint (south west) during contour and erosion maintenance in March 2010 and **Figure 6.5b** shows the germination of a cover crop sown in March 2011. From **Figure 6.6**, while there is no green cover crop, it is evident that there is now a stable groundcover in particular from native grasses that can be seen below the first contour bank (Zone A). The St Barnabys Thistle has been successfully controlled and hopefully in the next 12 months, the tubestock planting from 2010 will start to become visible.

Figure 6.5 South West Rehabilitation Area a (left) March 2010 and b (right) March 2011

Figure 6.6 South West Rehabilitation Area at end of March 2012

6.5 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 6.1**):

- 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 6.9** summarises the completion criteria for each Woodland Ecological Community. The completion criteria have been partially based on NSW EPA biometric vegetation community benchmark indices. **Table 6.9** refers todata from **Table 3.20** and **Table 6.9** measured through the rehabilitation and biodiversity monitoring programs to quantify progress against the completion criteria and the trend towards being able to "sign off" on the final land uses.

Table 6.9 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 2/12
	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 2.5/12
	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 11/12
	Appropriate native groundcover is present.	Bare ground and litter does not exceed: • Box Gum Woodland: 55% • Other Woodland: 55% • Brigalow Woodland: 65%	Partial 8/12
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
	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 6/9
	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 Woodland Ecological Landuse; WCC still has a long way to achieve the completion criteria.

6.6 REHABILITATION TRIALS AND RESEARCH

No rehabilitation trials were undertaken at the WCC during 2011-2012.

6.7 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 MCP identified the preferred final land use options for each domain summarised in **Table 6.10**.

Table 6.10 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.

7. ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

With the exception of the void water discharge event and blast fume event penalty infringement notice; WCC had made progress during the 2011-2012 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 2011-2012 period:

- Obtained the required approvals for the WCC Life of Mine Project including Project Approval PA10_0059, EPL 12290 variation, ML1671 and ML1672, EPBC Act approval and a new Mining Operations Plan;
- Community consultation included four WCC CCC meetings, development of a Community Enhancement Fund and a Community Newsletter distributed to Quipolly and Werris Creek residents. 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 with Werris Creek township;
- The WCC CCC completed a booklet on the "History of Coal Mining at Werris Creek" that was printed and distributed to local heritage organisations;
- Submitted drafts of the following Management Plans to DP&I in accordance with PA10_0059:
    - Air Quality and Greenhouse Gas Management Plan
    - Noise Management Plan
    - Blast Management Plan
    - Site Water Management Plan
    - Biodiversity Offset Management Plan
    - Heritage Management Plan
    - Rehabilitation Management Plan
    - Community Enhancement Fund
- Install and implement deposited dust monitoring in Quirindi to monitor coal dust fall out associated with the Main Northern Rail Line;
- Completed 25ha of additional rehabilitation and commenced overstorey planting within Biodiversity Offset Area including construction and maintenance of a visual bund and tree screens along Werris Creek Road to reduce visual impact to road users;
- Zero noise exceedances during 2011-2012 which is the first time that WCC has achieved a 12 month period without a noise exceedance;
- Commission blasting investigations to improve blasting practices by reducing the likelihood of receiving overpressure or vibration related community complaints;
- Developed and implemented a lighting monitoring camera established on the southern edge of Werris Creek township to monitor lighting impacts in real time;

- Implemented a dedicated position of a 'Noise Control Operator' who continually monitors the real time noise data working in tandem with the OCE to manage mining noise levels at or below 35dB(A); and
- Whitehaven Coal submitted its first annual report under the Commonwealth Energy Efficiency Opportunities (EEO) legislation which included WCC.

WCC targets for the 2011 / 2012 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 an additional 25ha of GWBW rehabilitation and strategic BOA plantings to improve restoration of endangered ecological communities and threatened species onsite;
- Establish continuous noise monitoring and real time dust monitoring sites within Werris Creek township;
- Expand the air quality and groundwater monitoring programs to the north to monitor potential impacts to the north including Werris Creek township;
- Working with qualified dam engineers, repair 200ML Dam North (VWD 3) and upgrade void water management system controls to prevent recurrence of a void dam breaches and offsite discharge ;
- Upgrade Escott Road as nominated in the approved *"Werris Creek Coal Life of Mine Project Environmental Assessment* (R.W. Corkery & Co. Pty Ltd, 2010);
- 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						
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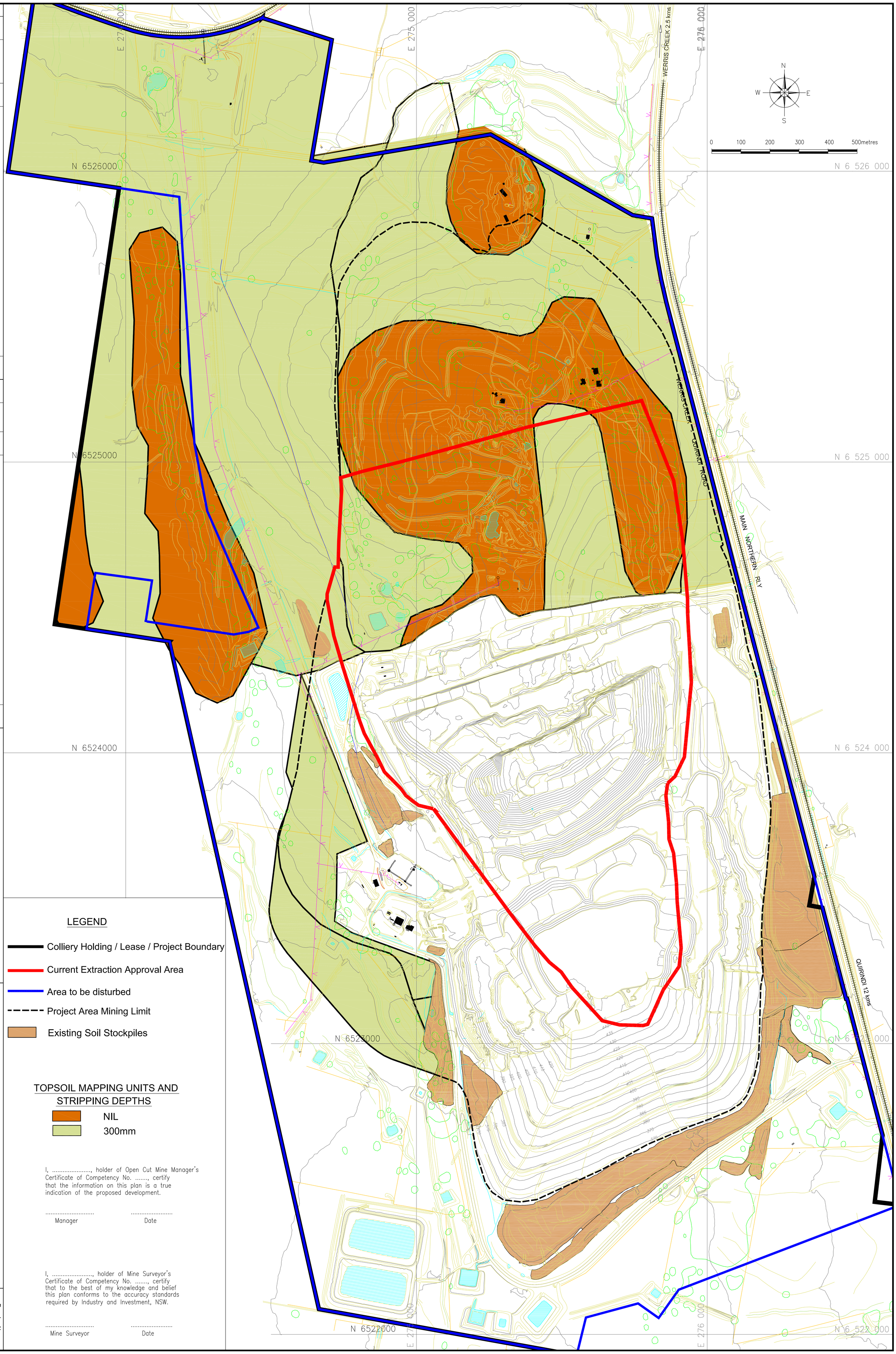

LEGEND

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

TOPSOIL MAPPING UNITS AND STRIPPING DEPTHS

- NIL
- 300mm

I, ..., holder of Open Cut Mine Manager's Certificate of Competency No. ....., certify that the information on this plan is a true indication of the proposed development.

..... Manager

..... Date

I, ..., holder of Mine Surveyor's Certificate of Competency No. ....., certify that to the best of my knowledge and belief this plan conforms to the accuracy standards required by Industry and Investment, NSW.

..... Mine Surveyor

..... Date

Werris Creek Coal Pty Limited

1435 Werris Creek Road. Werris Creek 2341

TEL. +61 2 6768 7039

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

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

Scale:	Drawn	Checked	Approved	Date	Revision No.	Drawing No.	Sheet Size
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REVISIONS

REV.	DATE	BY	DESCRIPTION

CHK.	REV.	DATE	BY	DESCRIPTION

SB10
(EPA 14)

PROPOSED
RAIL LOOP

PROPOSED
PRODUCT COAL STOCKPILE
EXTENSION AREA

PRODUCT
STOCKPILE

PROPOSED ACCESS ROAD

PROPOSED
ADMIN, BATHHOUSE
AND
WORKSHOP

PROPOSED
VWD5

PROPOSED
COAL PROCESSING
AND
ROM STOCKPILES

PROPOSED
MAGAZINES

AN RELOAD

(EPA 12)
SB9

VWD2

MAGAZINES

ROM
COAL PREP
WORKSHOP
AND
ADMIN, BATHHOUSE

VWD3

(EPA 10)
SB2

VWD4

VWD1

WERRIS CREEK 2.5 kms

WERRIS CREEK - GUNNEDAH ROAD

MAIN NORTHERN RLY

QUIRINDI 12 kms

E 275 000

E 276 000

N 6526000

N 6525000

N 6524000

N 6523000

N 6522000

N 6 526 000

N 6 525 000

N 6 524 000

N 6 523 000

N 6 522 000

N
W E
S

0 100 200 300 400 500metres

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

LEGEND

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

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

I, ..., holder of Open Cut Mine Manager's Certificate of Competency No. ....., certify that the information on this plan is a true indication of the proposed development.

....
Manager Date

I, ..., holder of Mine Surveyor's Certificate of Competency No. ....., certify that to the best of my knowledge and belief this plan conforms to the accuracy standards required by Industry and Investment, NSW.

....
Mine Surveyor Date

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

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

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

Date	Scale:	Drawn	Checked	Approved	Sheet Size	Revision No.	Drawing No.
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REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.

SB10 (EPA 14)
SD11
PROPOSED RAIL LOOP
PROPOSED PRODUCT COAL STOCKPILE EXTENSION AREA
PRODUCT STOCKPILE
SB14
SB15
SD10
PROPOSED ACCESS ROAD
SF
PROPOSED ADMIN, BATHHOUSE AND WORKSHOP
PROPOSED VWD5
PROPOSED COAL PROCESSING AND ROM STOCKPILES
SB11
PROPOSED MAGAZINES
SB9 (EPA 12)
AN RELOAD
SB12
SB13
SB8
VWD2
RD
ACOUSTIC BUND
WERRIS CREEK 2.5 kms
MAIN NORTHERN RLY
QUIRINDI 12 kms
clean water piped under dirty water
SB7
SB6
SB5
SB4
SB3
SB2
SB1
SB16
SB17
SD4
SD5
VWD1
VWD3
VWD4
(EPA 10)
2018
2017
2016
2015
2014
2013
2012
E 274 000
E 275 000
E 276 000
N 6526000
N 6525000
N 6524000
N 6523000
N 6522 000
N
S
E
W
0 100 200 300 400 500metres

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 (Prop Dirty)
- Water Management (Clean)
- Water Management (Prop Clean)
- RD Proposed rock lined drain area
- SF Proposed Sedimentation Fence
- Out of Pit Void Water Dam
- SB13 Dam-Proposed water storage
- SD5 Dam-Clean water storage
- SB4 Dam-Dirty water storage

Note: No Rehabilitated slopes >10°

I, ..., holder of Open Cut Mine Manager's Certificate of Competency No. ....., certify that the information on this plan is a true indication of the proposed development.

..... Manager ..... Date

I, ..., holder of Mine Surveyor's Certificate of Competency No. ....., certify that to the best of my knowledge and belief this plan conforms to the accuracy standards required by Industry and Investment, NSW.

..... Mine Surveyor ..... Date

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

WHITEHAVEN

Werris Creek Coal Pty Limited

1435 Werris Creek Road. Werris Creek 2341

TEL. +61 2 6768 7039

WERRIS CREEK MINE- AEMR PLAN

PROPOSED REHABILITATION - PLAN 5

Date	Scale:	Drawn	Checked	Approved	Sheet Size
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Revision No. 1

Drawing No. 000000-5

APPENDICES

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Appendix 1
Project Approval (PA10_0059)

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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

Sydney 25. OCTOBER 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

NSW Government
Department of Planning and Infrastructure

TABLE OF CONTENTS

DEFINITIONS

Annual review	The review required by condition 3 of schedule 5
ARTC	Australian Rail Track Corporation
BCA	Building Code of Australia
Biodiversity offset strategy	The conservation and enhancement strategy described in EA, and shown conceptually in the figure in Appendix 4
CCC	Community Consultative Committee
CEEC	Critically endangered ecological community
Conditions of this approval	Conditions contained in schedules 2 to 5 inclusive
Council	Liverpool Plains Shire Council
Day	The period from 7 am to 6 pm on Monday to Saturday, and 8 am to 6 pm on Sundays and Public Holidays
Department	Department of Planning and Infrastructure
Director-General	Director-General of the Department, or delegate
DNG	Derived native grassland
DRE	Division of Resources and Energy (within the Department of Trade and Investment, Regional Infrastructure and Services)
EA	Environmental assessment titled *Werris Creek Coal Mine Life of Mine Project*, dated December 2010, as modified by the response to submissions, dated March 2011; and the letter from Whitehaven Coal Limited to the Department, dated 25 July 2011
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
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
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; and
   (c) 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 OEH 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 RTA;
   (b) the Main Northern Railway without the approval of ARTC; and
   (c) any land outside the site that is not owned by the Proponent unless:
      - the Proponent has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Proponent has advised the Director-General in writing of the terms of this agreement; or
      - the Proponent has:
         - demonstrated to the satisfaction of the Director-General that the blasting can be carried out closer to the land without compromising the safety of people or livestock on the land, or damaging the buildings and/or structures on the land; and

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

Blast Management Plan

13. The Proponent shall prepare and implement a Blast Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be prepared in consultation with OEH, RTA 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 OEH.*

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[b] in deposited dust level	Maximum total[a] 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 OEH, 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 OEH.

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 OEH 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.

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	218.66
Additional Offset Area	74
TOTAL	**1,241.72**

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*
- *The Additional Offset Area 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 Honey Eater, 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 RTA 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; and
   (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, 73-75, 93, 94, 109, 110, 112, 120, 121, 123, 126-130, 133, 135, Part Lots 65, 83, 131, 132, 217, 255	DP751017
Lots 1-4	DP1022826
Lots 1-4	DP1037145
Lot 2	DP431951
Lot 1	DP186633
Lots 270	DP257307
Lots 1-2	DP1095262
Lot 1	DP344178
Lot 1	DP1114226
Lot 1	DP328762
Lot 1	DP328763
Part Lot 1	DP1085891

APPENDIX 2
PROJECT LAYOUT PLAN

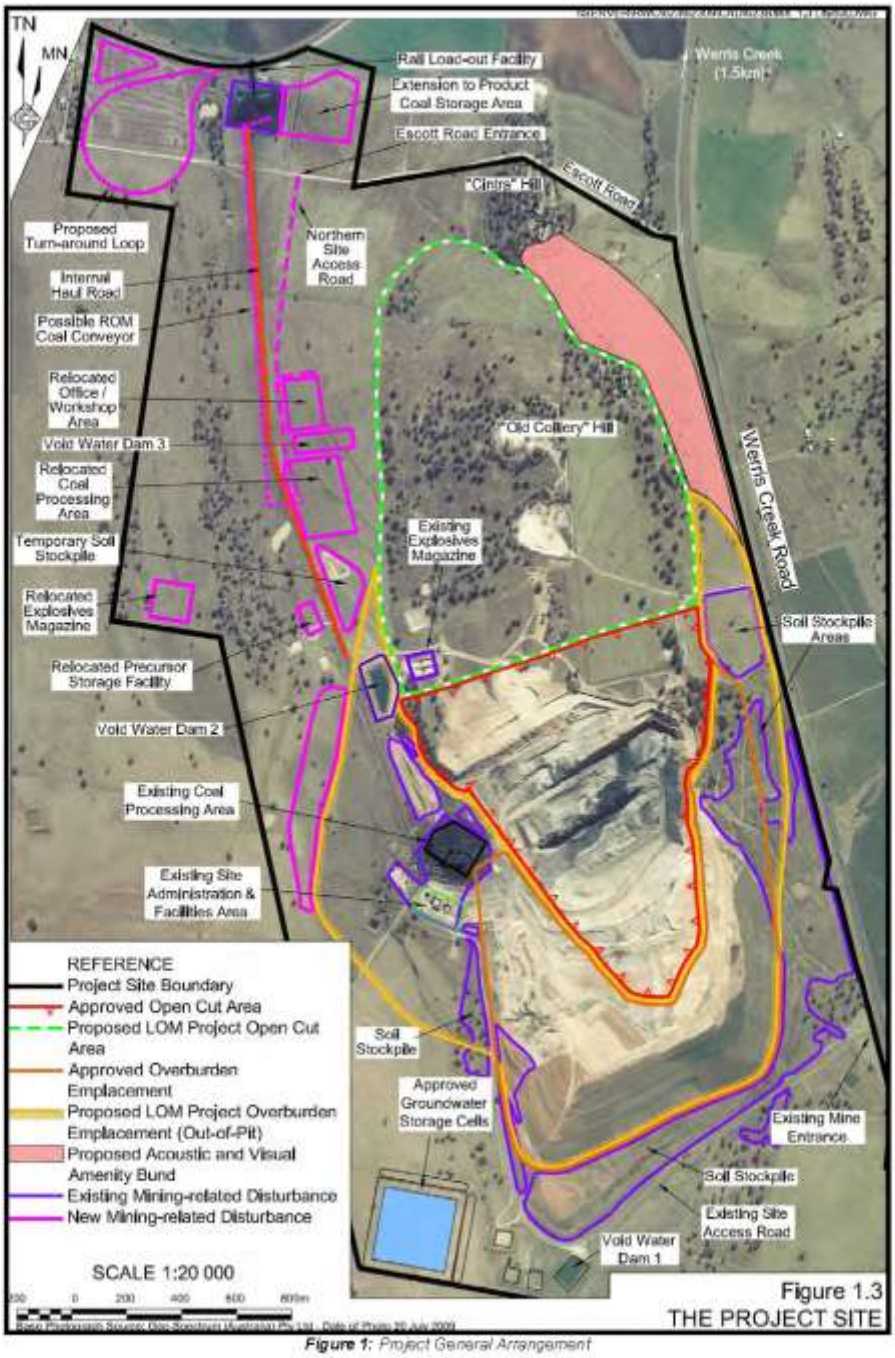

Figure 1: *Project General Arrangement*

APPENDIX 3
NOISE RECEIVER LOCATIONS

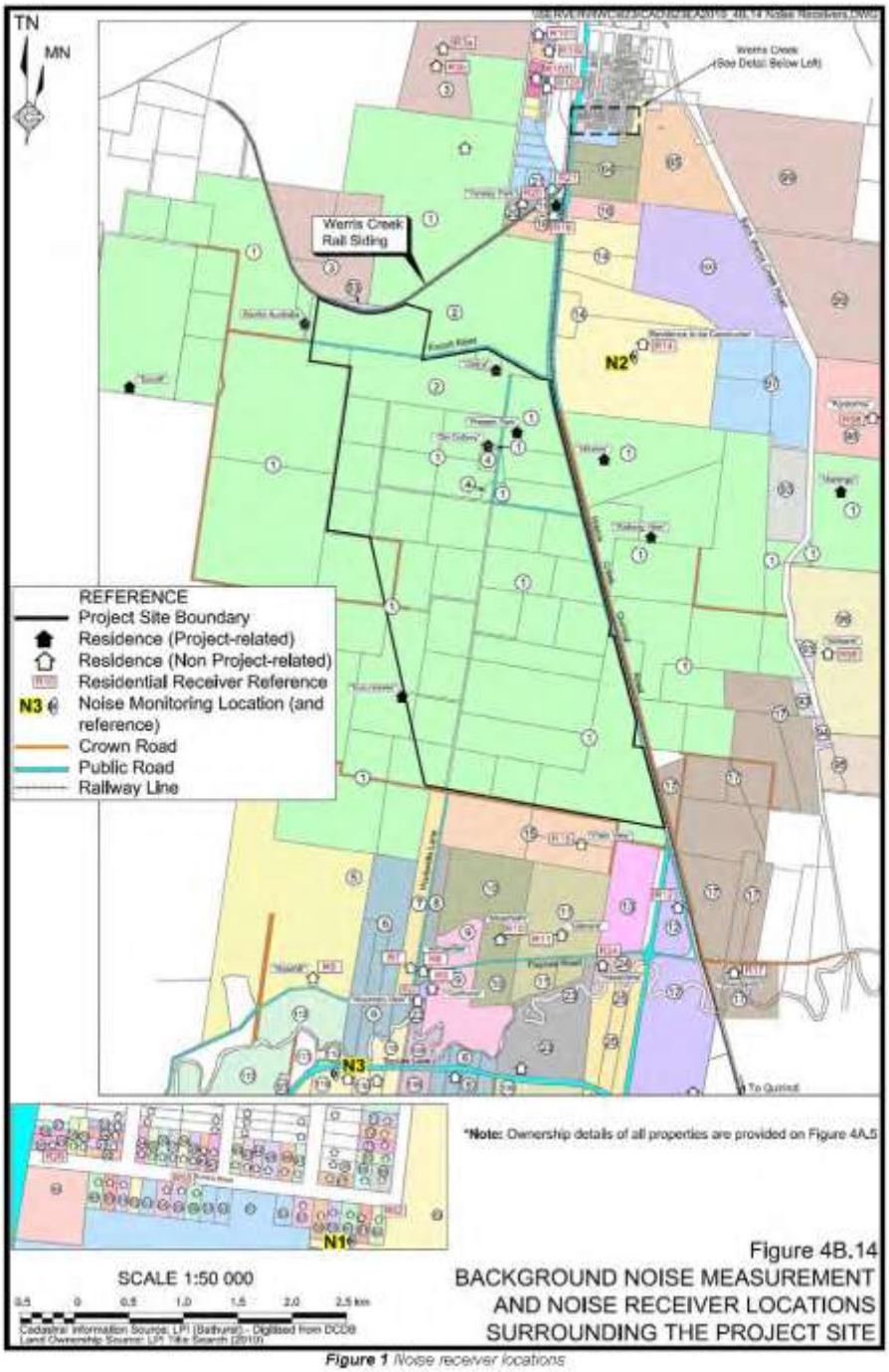

Figure 1 *Noise receiver locations*

APPENDIX 4
BIODIVERSITY OFFSET STRATEGY

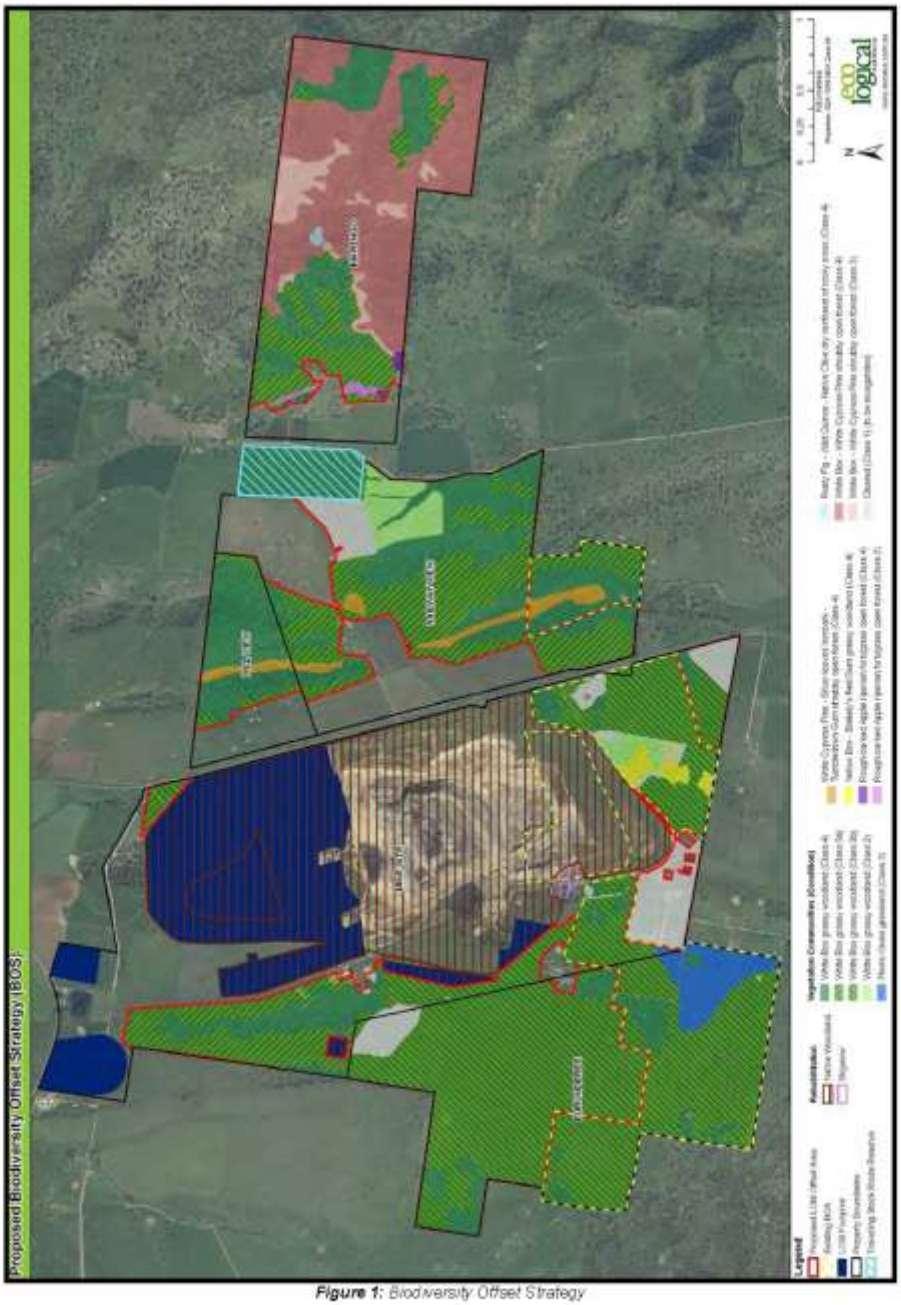

Figure 1: *Biodiversity Offset Strategy*

APPENDIX 5
CONCEPTUAL FINAL LANDFORM PLAN

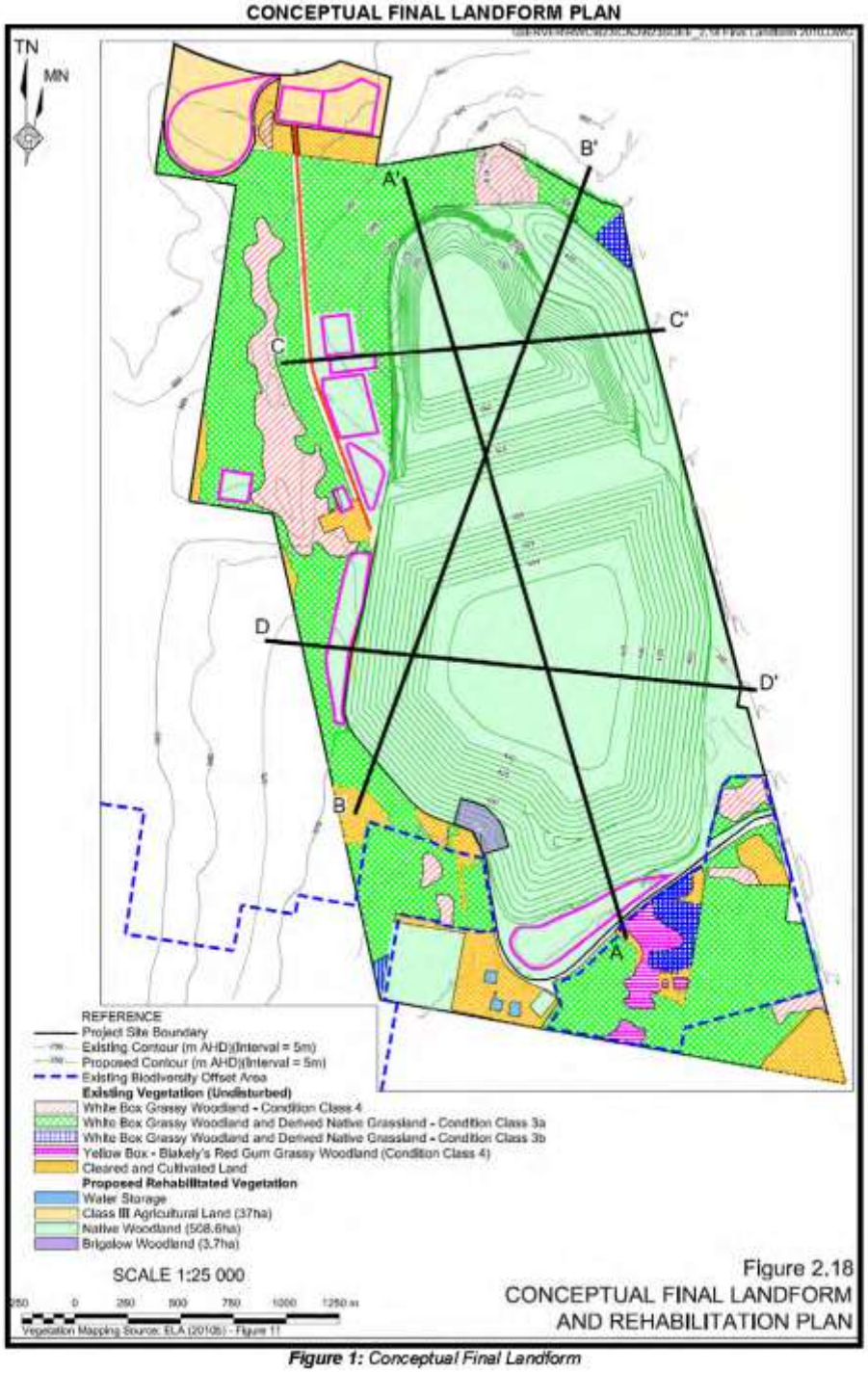

***Figure 1:** Conceptual Final Landform*

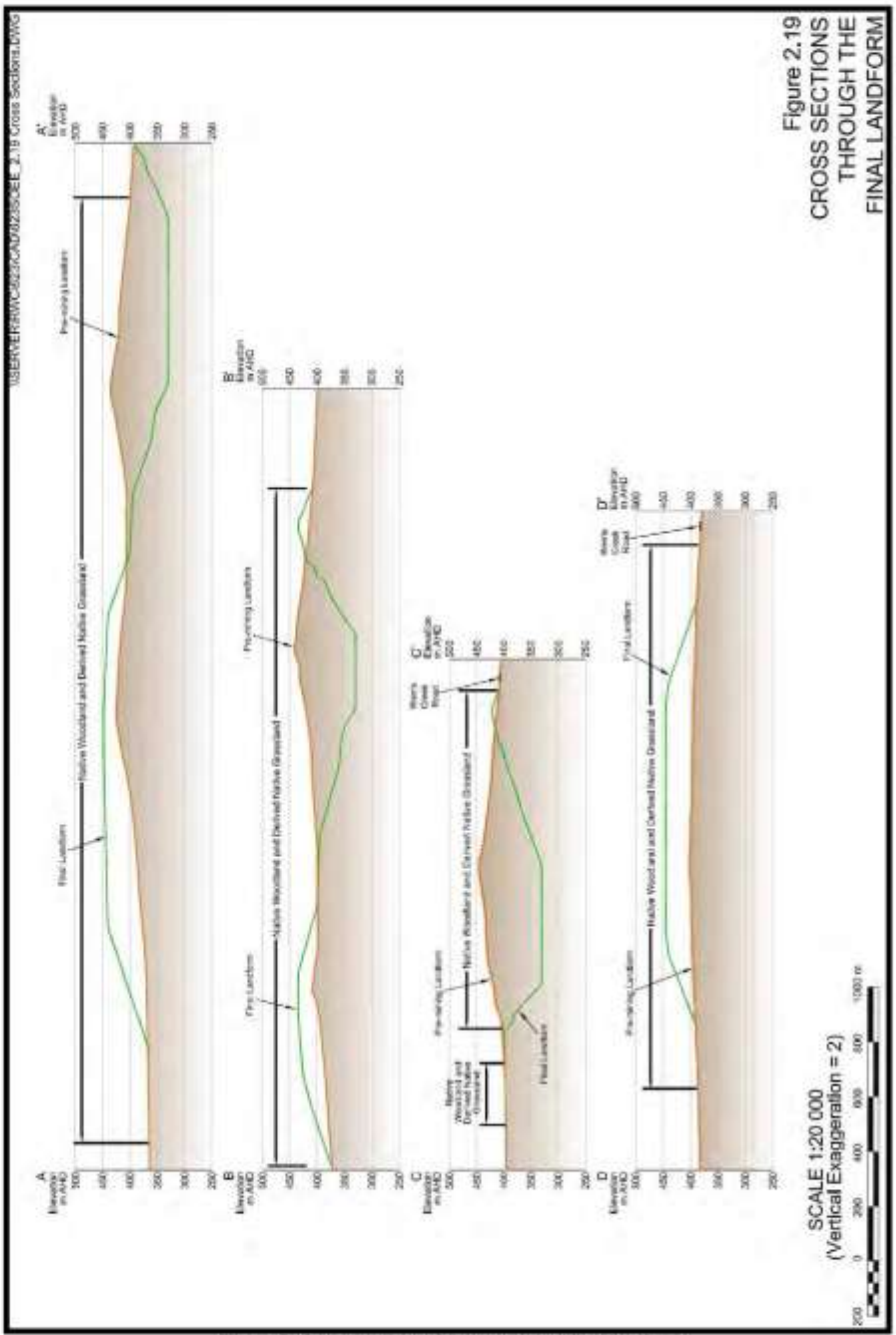

Figure 2: *Cross-sections of the conceptual final landform*

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 18° (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

Appendix 2
Licence and Lease

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Appendix 2(a)

Section 55 Protection of the Environment Operations Act 1997

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 West - 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

Section 55 Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 12290

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.

Environment Protection Licence

Licence - 12290

NSW GOVERNMENT | Office of Environment & Heritage

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.

Environment Protection Licence

Licence - 12290

NSW GOVERNMENT Office of Environment & Heritage

Air

EPA identification 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 Identification 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 12°C/100m and wind speeds greater than 2 metres/second at 10 metres above ground level; or
c) Temperature inversion conditions greater than 12°C/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) are to be determined by direct measurement over a minimum 50m height interval as referred to in Part E2 of Appendix E to the NSW Industrial Noise Policy.

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 Reduction Programs (PRP)**

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

8 Pollution Studies and Reduction Programs

U1 PRP 2: Coal Mine Particulate Matter Control Best Practice

U1.1 The Licensee must conduct a site specific Best Management Practice (BMP) determination to
identify the most practicable means to reduce particle emissions.

U1.2 The Licensee must prepare a report which includes, but is not necessarily limited to, the following:
- identification, quantification and justification of existing measures that are being used to minimise particle emissions;
- identification, quantification and justification of best practice measures that could be used to minimise particle emissions;
- evaluation of the practicability of implementing these best practice measures; and
- a proposed timeframe for implementing all practicable best practice measures.

In preparing the report, the Licensee must utilise the document entitled Coal Mine Particulate Matter Control Best Practice – Site Specific Determination Guideline - November 2011.

U1.3 All cost related information is to be included as Appendix 1 of the Report required by condition U1.2 above.

U1.4 The report required by condition U1.2 must be submitted by the Licensee to the Environment Protection Authority, Manager Armidale Region, at PO Box 494 Armidale NSW 2350 by 29 June

2012.

U1.5 The report required by condition U1.2 above, except for cost related information contained in Appendix 1 of the Report, must be made publicly available by the Licensee on the Licensee's website 6 July 2012.

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

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 described 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 months. 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

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

Appendix 2(b)

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 Lease Application No. 249

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:

Betalpha Pty Limited
(A. C. N. 105 663 518)

.....
K ROSS - DIRECTOR

in the presence of

.....
Witness
HAMILTON - SECRETARY

MINING LEASE CONDITIONS 2004

Notice to Landholders

1. Within a period of three months from the date of grant of this lease or within such further time as the Minister may allow, the lease holder must serve on each landholder of the land a notice in writing indicating that this lease has been granted and whether the lease includes the surface. An adequate plan and description of the lease area must accompany the notice.

   If there are ten or more landholders affected, the lease holder may serve the notice by publication in a newspaper circulating in the region where the lease area is situated. The notice must indicate that this lease has been granted; state whether the lease includes the surface and must contain an adequate plan and description of the lease area.

Mining, Rehabilitation, Environmental Management Process (MREMP)

Mining Operations Plan (MOP)

2. (1) Mining operations, including mining purposes, must be conducted in accordance with a Mining Operations Plan (the Plan) satisfactory to the Director-General. The Plan together with environmental conditions of development consent and other approvals will form the basis for:-

   (a) ongoing mining operations and environmental management; and

   (b) ongoing monitoring of the project.

   (2) The Plan must be prepared in accordance with the Director-General's guidelines current at the time of lodgement.

   (3) A Plan must be lodged with the Director-General:-

   (a) prior to the commencement of mining operations (including mining purposes);

   (b) subsequently as appropriate prior to the expiry of any current Plan; and

   (c) in accordance with any direction issued by the Director-General.

   (4) The Plan must present a schedule of proposed mine development for a period of up to seven (7) years and contain diagrams and documentation which identify:-

   (a) area(s) proposed to be disturbed under the Plan;

   (b) mining and rehabilitation method(s) to be used and their sequence;

   (c) areas to be used for disposal of tailings/waste;

(d) existing and proposed surface infrastructure;

(e) existing flora and fauna on the site;

(f) progressive rehabilitation schedules;

(g) areas of particular environmental, ecological and cultural sensitivity and measures to protect these areas;

(h) water management systems (including erosion and sediment controls);

(i) proposed resource recovery; and

(j) where the mine will cease extraction during the term of the Plan, a closure plan including final rehabilitation objectives/methods and post mining landuse/vegetation.

(5) The Plan when lodged will be reviewed by the Department.

(6) The Director-General may within two (2) months of the lodgement of a Plan, require modification and re-lodgement.

(7) If a requirement in accordance with clause (6) is not issued within two (2) months of the lodgement of a Plan, the lease holder may proceed with implementation of the Plan.

(8) During the life of the Mining Operations Plan, proposed modifications to the Plan must be lodged with the Director-General and will be subject to the review process outlined in clauses (5) - (7) above.

Annual Environmental Management Report (AEMR)

3. (1) Within 12 months of the commencement of mining operations and thereafter annually or, at such other times as may be allowed by the Director-General, the lease holder must lodge an Annual Environmental Management Report (AEMR) with the Director-General.

(2) The AEMR must be prepared in accordance with the Director-General's guidelines current at the time of reporting and contain a review and forecast of performance for the preceding and ensuing twelve months in terms of:

(a) the accepted Mining Operations Plan;

(b) development consent requirements and conditions;

(c) Department of Environment and Conservation and Department of Infrastructure, Planning and Natural Resources licences and approvals;

(d) any other statutory environmental requirements;

(e) details of any variations to environmental approvals applicable to the lease area; and

(f) where relevant, progress towards final rehabilitation objectives.

(3) After considering an AEMR the Director-General may, by notice in writing, direct the lease holder to undertake operations, remedial actions or supplementary studies in the manner and within the period specified in the notice to ensure that operations on the lease area are conducted in accordance with sound mining and environmental practice.

(4) The lease holder shall, as and when directed by the Minister, co-operate with the Director-General to conduct and facilitate review of the AEMR involving other government agencies and the local council.

Subsidence Management

4. (a) The lease holder shall prepare a Subsidence Management Plan prior to commencing any underground mining operations which will potentially lead to subsidence of the land surface.

(b) Underground mining operations which will potentially lead to subsidence include secondary extraction panels such as longwalls or miniwalls, associated first workings (gateroads, installation roads and associated main headings, etc), and pillar extractions, and are otherwise defined by the *Guideline for Applications for Subsidence Management Approvals*.

(c) The lease holder must not commence or undertake underground mining operations that will potentially lead to subsidence other than in accordance with a Subsidence Management Plan approved by the Director-General, an approval under the *Coal Mines Regulation Act 1982*, or the document *New Subsidence Management Plan Approval Process – Transitional Provisions*.

(d) Subsidence Management Plans are to be prepared in accordance with the *Guideline for Applications for Subsidence Management Approvals*.

(e) Subsidence Management Plans as approved shall form part of the Mining Operations Plan required under Condition 2 and will be subject to the Annual Environmental Management Report process as set out under Condition 3. The SMP is also subject to the requirements for subsidence monitoring and reporting set out in the document *New Approval Process for Management of Coal Mining Subsidence - Policy*.

Working Requirement

5. The lease holder must:

(a) ensure that at least **28** competent people are efficiently employed on the lease area on each week day except Saturday or any week day that is a public holiday,

OR

(b) expend on operations carried out in the course of prospecting or mining the lease area, an amount of not less than **$490,000.00** per annum whilst the lease is in force.

The Minister may at any time or times, by instrument in writing served on the lease holder, increase or decrease the expenditure required or the number of people to be employed.

Control of Operations

6. (a) If an Environmental Officer of the Department believes that the lease holder is not complying with any provision of the Act or any condition of this lease relating to the working of the lease, he may direct the lease holder to:-

(i) cease working the lease; or

(ii) cease that part of the operation not complying with the Act or conditions;

until in the opinion of the Environmental Officer the situation is rectified.

(b) The lease holder must comply with any direction given. The Director-General may confirm, vary or revoke any such direction.

(c) A direction referred to in this condition may be served on the Mine Manager.

Reports

7. The lease holder must provide an exploration report, within a period of twenty-eight days after each anniversary of the date this lease has effect or at such other date as the Director-General may stipulate, of each year. The report must be to the satisfaction of the Director-General and contain the following:

(a) Full particulars, including results, interpretation and conclusions, of all exploration conducted during the twelve months period;

(b) Details of expenditure incurred in conducting that exploration;

(c) A summary of all geological findings acquired through mining or development evaluation activities;

(d) Particulars of exploration proposed to be conducted in the next twelve months period;

(e) All plans, maps, sections and other data necessary to satisfactorily interpret the report.

Licence to Use Reports

8. (a) The lease holder grants to the Minister, by way of a non-exclusive licence, the right in copyright to publish, print, adapt and reproduce all exploration reports lodged in any form and for the full duration of copyright.

(b) The non-exclusive licence will operate as a consent for the purposes of section 365 of the Mining Act 1992.

Confidentiality

9. (a) All exploration reports submitted in accordance with the conditions of this lease will be kept confidential while the lease is in force, except in cases where:

(i) the lease holder has agreed that specified reports may be made non-confidential.

(ii) reports deal with exploration conducted exclusively on areas that have ceased to be part of the lease.

(b) Confidentiality will be continued beyond the termination of a lease where an application for a flow-on title was lodged during the currency of the lease. The confidentiality will last until that flow-on title or any subsequent flow-on title, has terminated.

(c) The Director-General may extend the period of confidentiality.

Terms of the non-exclusive licence

10. The terms of the non-exclusive copyright licence granted under condition 8 (a) are:

(a) the Minister may sub-licence others to publish, print, adapt and reproduce but not on-licence reports.

(b) the Minister and any sub-licensee will acknowledge the lease holder's and any identifiable consultant's ownership of copyright in any reproduction of the reports, including storage of reports onto an electronic database.

(c) the lease holder does not warrant ownership of all copyright works in any report and, the lease holder will use best endeavours to identify those parts of the report for which the lease holder owns the copyright.

(d) there is no royalty payable by the Minister for the licence.

(e) if the lease holder has reasonable grounds to believe that the Minister has exercised his rights under the non-exclusive copyright licence in a manner which adversely affects the operations of the lease holder, that licence is revocable on the giving of a period of not less than three months notice.

Blasting

11. (a) Ground Vibration

The lease holder must ensure that the ground vibration peak particle velocity generated by any blasting within the lease area does not exceed 10 mm/second and does not exceed 5 mm/second in more than 5% of the total number of blasts over a period of 12 months at any dwelling or occupied premises as the case may be, unless determined otherwise by the Department of Environment and Conservation.

(b) Blast Overpressure

The lease holder must ensure that the blast overpressure noise level generated by any blasting within the lease area does not exceed 120 dB (linear) and does not exceed 115 dB (linear) in more than 5% of the total number of blasts over a period of 12 months, at any dwelling or occupied premises, as the case may be, unless determined otherwise by the Department of Environment and Conservation.

Safety

12. Operations must be carried out in a manner that ensures the safety of persons or stock in the vicinity of the operations. All drill holes shafts and excavations must be appropriately protected, to the satisfaction of the Director-General, to ensure that access to them by persons and stock is restricted. Abandoned shafts and excavations opened up or used by the lease holder must be filled in or otherwise rendered safe to a standard acceptable to the Director-General.

Rehabilitation

13. (a) Land disturbed must be rehabilitated to a stable and permanent form suitable for a subsequent land use acceptable to the Director-General and in accordance with the Mining Operations Plan so that:-

- there is no adverse environmental effect outside the disturbed area and that the land is properly drained and protected from soil erosion.
- the state of the land is compatible with the surrounding land and land use requirements.
- the landforms, soils, hydrology and flora require no greater maintenance than that in the surrounding land.
- in cases where revegetation is required and native vegetation has been removed or damaged, the original species must be re-established with close reference to the flora survey included in the Mining Operations Plan. If the original vegetation was not native, any re-established vegetation must be appropriate to the area and at an acceptable density.

- the land does not pose a threat to public safety.

(b) Any topsoil that is removed must be stored and maintained in a manner acceptable to the Director-General.

14. The lease holder must comply with any direction given by the Director-General regarding the stabilisation and revegetation of any mine residues, tailings or overburden dumps situated on the lease area.

Exploratory Drilling

15. (1) At least twenty eight days prior to commencement of drilling operations the lease holder must notify the relevant Department of Infrastructure, Planning and Natural Resources regional hydrogeologist of the intention to drill exploratory drill holes together with information on the location of the proposed holes.

(2) If the lease holder drills exploratory drill holes he must satisfy the Director-General that:-

(a) all cored holes are accurately surveyed and permanently marked in accordance with Departmental guidelines so that their location can be easily established;

(b) all holes cored or otherwise are sealed to prevent the collapse of the surrounding surface;

(c) all drill holes are permanently sealed with cement plugs to prevent surface discharge of groundwaters;

(d) if any drill hole meets natural or noxious gases it is plugged or sealed to prevent their escape;

(e) if any drill hole meets an artesian or sub-artesian flow it is effectively sealed to prevent contamination of aquifers.

(f) once any drill hole ceases to be used the hole must be sealed in accordance with Departmental guidelines. Alternatively, the hole must be sealed as instructed by the Director-General.

(g) once any drill hole ceases to be used the land and its immediate vicinity is left in a clean, tidy and stable condition.

Prevention of Soil Erosion and Pollution

16. Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation) or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. For the purpose of this condition, water shall be taken to include any watercourse, waterbody or groundwaters. The lease holder must observe and perform any instructions given by the Director-General in this regard.

Transmission lines, Communication lines and Pipelines

17. Operations must not interfere with or impair the stability or efficiency of any transmission line, communication line, pipeline or any other utility on the lease area without the prior written approval of the Director-General and subject to any conditions he may stipulate.

Fences, Gates

18. (a) Activities on the lease must not interfere with or damage fences without the prior written approval of the owner thereof or the Minister and subject to any conditions the Minister may stipulate.

(b) Gates within the lease area must be closed or left open in accordance with the requirements of the landholder.

Roads and Tracks

19. (a) Operations must not affect any road unless in accordance with an accepted Mining Operations Plan or with the prior written approval of the Director-General and subject to any conditions he may stipulate.

(b) The lease holder must pay to the designated authority in control of the road (generally the local council or the Roads and Traffic Authority) the cost incurred in fixing any damage to roads caused by operations carried out under the lease, less any amount paid or payable from the Mine Subsidence Compensation Fund.

20. Access tracks must be kept to a minimum and be positioned so that they do not cause any unnecessary damage to the land. Temporary access tracks must be ripped, topsoiled and revegetated as soon as possible after they are no longer required for mining operations. The design and construction of access tracks must be in accordance with specifications fixed by the Department of Infrastructure, Planning and Natural Resources.

Trees and Timber

21. (a) The lease holder must not fell trees, strip bark or cut timber on the lease without the consent of the landholder who is entitled to the use of the timber, or if such a landholder refuses consent or attaches unreasonable conditions to the consent, without the approval of a warden.

(b) The lease holder must not cut, destroy, ringbark or remove any timber or other vegetative cover on the lease area except such as directly obstructs or prevents the carrying on of operations. Any clearing not authorised under the Mining Act 1992 must comply with the provisions of the Native Vegetation Conservation Act 1997.

(c) The lease holder must obtain all necessary approvals or licences before using timber from any Crown land within the lease area.

Resource Recovery

23. (a) Notwithstanding any description of mining methods and their sequence or of proposed resource recovery contained within the Mining Operations Plan, if at any time the Director-General is of the opinion that minerals which the lease entitles the lease holder to mine and which are economically recoverable at the time are not being recovered from the lease area, or that any such minerals which are being recovered are not being recovered to the extent which should be economically possible or which for environmental reasons are necessary to be recovered, he may give notice in writing to the lease holder requiring the holder to recover such minerals.

(b) The notice shall specify the minerals to be recovered and the extent to which they are to be recovered, or the objectives in regard to resource recovery, but shall not specify the processes the lease holder shall use to achieve the specified recovery.

(c) The lease holder must, when requested by the Director-General, provide such information as the Director-General may specify about the recovery of the mineral resources of the lease area.

(d) The Director-General shall issue no such notice unless the matter has firstly been thoroughly discussed with and a report to the Director-General has incorporated the views of the lease holder.

(e) The lease holder may object to the requirements of any notice issued under this condition and on receipt of such an objection the Minister shall refer it to a Warden for inquiry and report under Section 334 of the Mining Act, 1992.

(f) After considering the Warden's report the Minister shall decide whether to withdraw, modify or maintain the requirements specified in the original notice and shall give the lease holder written notice of the decision. The lease holder must comply with the requirements of this notice.

Indemnity

24. The lease holder must indemnify and keep indemnified the Crown from and against all actions, suits, claims and demands of whatsoever nature and all costs, charges and expenses which may be brought against the lease holder or which the lease holder may incur in respect of any accident or injury to any person or property which may arise out of the construction, maintenance or working of any workings now existing or to be made by the lease holder within the lease area or in connection with any of the operations notwithstanding that all other conditions of this lease shall in all respects have been observed by the lease holder or that any such accident or injury shall arise from any act or thing which the lease holder may be licensed or compelled to do.

Security

25. (a) A security in the sum of **$50,000.00** must be given and maintained with the Minister by the lease holder for the purpose of ensuring the fulfilment by the lease holder of obligations under this lease. If the lease holder fails to fulfil any one or more of such obligations the said sum may be applied at the discretion of the Minister towards the cost of fulfilling such obligations. For the purpose of this clause the lease holder shall be deemed to have failed to fulfil the obligations of this lease if the lease holder fails to comply with any condition or provision hereof, any provision of the Act or regulations made thereunder or any condition or direction imposed or given pursuant to a condition or provision hereof or of any provision of the Act or regulations made thereunder.

(b) The lease holder must provide the security required by sub-clause (a) in one of the following forms:

(i) cash,

(ii) a security certificate in a form approved by the Minister and issued by an authorised deposit-taking institution.

Barriers

29. (a) Unless with the consent of the Minister first had and obtained and subject to such further conditions as he may impose, the lease holder shall not mine within a barrier of 50 metres in width against the underground workings of the former Werris Creek Colliery as referred to in the Environmental Impact Statement entitled "Werris Creek Coal Pty Limited – ABN 69 107 169 103 - Environmental Impact Statement for the Proposed Werris Creek Coal Mine" dated August 2004.

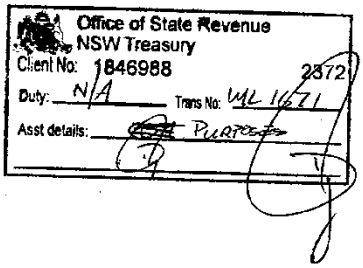
(b) The lease holder must, prior to seeking the Ministers consent under this condition, complete a risk assessment to determine hazards and develop management controls. This risk assessment is to be subject to any amendments as may be required by the Director General.

Special Conditions

30. The lease holder shall ensure that operations on the lease area are conducted in a manner consistent with the Environmental Impact Statement, except were no longer applicable due to subsequent approval, conditioning or exemption.

31. The lease holder shall ensure that 53 hectares of the rehabilitated landform is revegetated with species from the White Box Yellow Box Blakley's Red Gum Endangered Ecological Community, and stock are excluded from the 200 hectares as shown in Figure 4.15 of the Environmental Impact Statement.

Appendix 2(c)



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

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

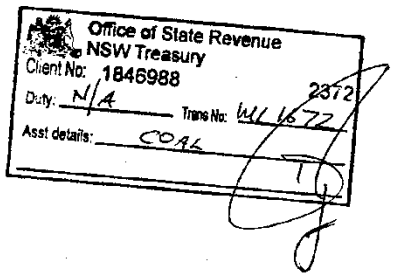
- rehabilitation issues.

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).

Appendix 2(d)



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

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

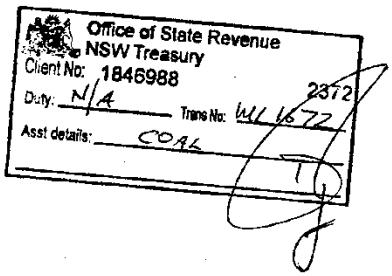
The lease holder must make every reasonable attempt, and be able to demonstrate their attempts, to enter into a cooperation agreement with the holder(s) of any overlapping title(s). The cooperation agreement should address but not be limited to issues such as:

- 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).



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

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Witness

SIGNED AND DELIVERED
BY

.....

in the presence of

.....
Witness

MINING LEASE CONDITIONS 2010

Content

Note: Exploration Reports (Geological and Geophysical)

Definition:

"Director-General" means the Director-General of the Department of Trade and Investment; Regional Infrastructure and Services

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).

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Appendix 3
Air Quality Monitoring Results

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Deposited Dust - Werris Creek Coal Mine 2011-2012

MONTH (g/m2/month)	EPL #7		EPL #4		EPL #1		EPL #8		-		-		-		ANNUAL AVERAGE LIMIT
	WC-2 Cintra		WC-5 Railway View		WC-7 Tonsley Park		WC-8 Plain View		WC-9 Marengo		WC-10 Mountain View		WC-11 Glenara		
	Total Matter	Ash Content	Total Matter	Ash Content	Total Matter	Ash Content	Total Matter	Ash Content	Total Matter	Ash Content	Total Matter	Ash Content	Total Matter	Ash Content	
April 2011	1.5	1.0	1.1	0.7	0.6	0.5	1.1	0.9	0.5	0.4	c2.3	1.6	0.6	0.6	4.0
May 2011	c0.6*	0.2	0.6	0.3	0.1	0.1	0.2	0.2	0.1	0.1	5.9*	2.0	0.2	0.2	4.0
June 2011	3.0	1.8	2.4	1.5	0.9	0.5	1.3	0.8	0.8	0.5	0.8	0.4	1.4	0.8	4.0
July 2011	0.5	0.3	0.5	0.4	0.3	0.2	0.8	0.5	0.2	0.2	0.9	0.5	0.6	0.5	4.0
August 2011	0.8	0.6	0.9	0.7	0.4	0.3	1.1	0.8	0.5	0.4	0.5	0.4	c20	c17.6	4.0
September 2011	1.5	1.0	1.4	0.9	1.2	0.8	1.4	1.0	0.5	0.5	0.5	0.3	c19.8	c17.1	4.0
October 2011	1.1	0.8	1.2	0.8	0.9	0.5	0.5	0.5	0.8	0.5	0.8	0.5	1.0	0.8	4.0
November 2011	3.3	2.0	1.2*	0.5	0.8*	0.3	1.2	0.6	1.7	1.3	0.8	0.4	2.2	1.7	4.0
December 2011	1.1	0.6	0.6	0.5	0.7	0.4	1.0	0.5	0.3	0.2	c2.2	0.7	3.5	2.3	4.0
January 2012	1.1	0.9	0.5	0.5	0.5	0.4	0.4	0.4	0.9	0.6	1.1	0.9	1.5	0.8	4.0
February 2012	0.7	0.5	0.5	0.3	0.5	0.2	0.5	0.2	0.8*	0.2	0.4	0.3	0.2	0.1	4.0
March 2012	1.2	0.7	0.6	0.4	0.7	0.4	1.2	0.9	0.5	0.2	0.8	0.4	c5	c2	4.0
ANNUAL AVERAGE	**1.4**		**0.9**		**0.6**		**0.9**		**0.6**		**0.7**		**1.2**		**4.0**
MINIMUM	**0.5**		**0.5**		**0.1**		**0.2**		**0.1**		**0.4**		**0.2**		**-**
MAXIMUM	**3.3**		**2.4**		**1.2**		**1.4**		**1.7**		**1.1**		**3.5**		**4.0**

Note: All results are in the form of Insoluble Matter (g/m2/month)

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

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

High Volume Air Sampler Results

Site / Date	WCHV1 Cintra	Monthly Monthly Average	Rolling Annual Average	WCHV2 Tonsley Park	Monthly Monthly Average	Rolling Annual Average	WCHV3 Railway View	Monthly Monthly Average	Rolling Annual Average	WCHV4 Eurunderee	Monthly Monthly Average	Rolling Annual Average	WCTSP Railway View	Monthly Monthly Average	Rolling Annual Average	PM10 24hr Limit	PM10 Annual Average	TSP Annual Average
02-Apr-11	11		11.2	15		15.4	11		10.8	13		13.3	19		18.8	50	30	90
08-Apr-11	25		18.2	11		13.1			10.8	9		11.1			18.8	50	30	90
14-Apr-11	24		20.2	20		15.3	39		24.7	15		12.2	97		57.8	50	30	90
20-Apr-11	51		27.8	21		16.6	50		33.1	18		13.6	114		76.5	50	30	90
26-Apr-11	11	24.5	24.5	7	14.7	14.7	12	27.8	27.8	7	12.2	12.2	28	64.3	64.3	50	30	90
02-May-11	38		26.7	26		16.6	35		29.1	16		12.9	85		68.4	50	30	90
08-May-11	13		24.8	16		16.5	12		26.2	12		12.8	20		60.4	50	30	90
14-May-11	7		22.5	5		15.1	14		24.5	7		12.1	50		58.9	50	30	90
20-May-11	34		23.9	34		17.2	50		27.8	28		13.8	100		64.0	50	30	90
26-May-11	27	23.9	24.2	17	19.6	17.1	13	24.7	26.1	16.1	15.9	14.0	25.7	56.1	59.8	50	30	90
01-Jun-11	58		27.2	52		20.3	50		28.4	7.7		13.5	95		63.2	50	30	90
07-Jun-11	62		30.2	56		23.2	80		33.1	9		13.1	256		80.8	50	30	90
13-Jun-11	49		31.6	48		25.1	47		34.3	5.4		12.5			80.8	50	30	90
19-Jun-11	7		29.8	8		23.9	7		32.2	5.5		12.0	155		87.0	50	30	90
25-Jun-11	18	38.7	29.0	13	35.2	23.2	14	39.5	30.9	13.1	8.1	12.1	25	132.5	82.1	50	30	90
01-Jul-11	11		27.9	8		22.2	4		29.1	4		11.6	10.1		77.0	50	30	90
07-Jul-11	10		26.8	4		21.1	35		29.5	5		11.2	105		78.9	50	30	90
13-Jul-11	15		26.2	15		20.8	19		28.8	25		12.0	47.5		76.9	50	30	90
19-Jul-11	8		25.2	4		19.9	14		28.0	4		11.6	44.3		75.0	50	30	90
25-Jul-11	8	10.3	24.3	8	7.8	19.3	10	16.3	27.0	19	11.5	11.9	16.9	44.8	71.8	50	30	90
31-Jul-11	9		23.6	11		18.9	10		26.2	15		12.1	24.5		69.3	50	30	90
06-Aug-11	9		23.0	10		18.5	12		25.5	20		12.5	31.3		67.4	50	30	90
12-Aug-11	21		22.9	12		18.2	17		25.1	7		12.2	38.7		66.0	50	30	90
18-Aug-11	5		22.1	2		17.5	13		24.6	3		11.8	46.8		65.1	50	30	90
24-Aug-11	25	13.7	22.2	11	9.2	17.3	13	13.1	24.1	5	10.0	11.6	47.8	37.8	64.4	50	30	90
30-Aug-11	30		22.5	21		17.4	22		24.0	13		11.6	47		63.7	50	30	90
05-Sep-11	15		22.2	12		17.2	32		24.4	15		11.8	65		63.7	50	30	90
11-Sep-11	5		21.6	5		16.8	6		23.7	5		11.5	14		61.8	50	30	90
17-Sep-11	12		21.2	18		16.8	15		23.4	17		11.7	37		60.9	50	30	90
23-Sep-11	41	20.3	21.9	32	17.6	17.3	46	24.2	24.1	36	17.2	12.5	91	50.8	62.0	50	30	90
29-Sep-11	8		21.5	7		17.0	8		23.6	7		12.3	16		60.4	50	30	90
05-Oct-11	27		21.6	17		17.0	16		23.3	10		12.2	36		59.6	50	30	90
11-Oct-11	22		21.6	11		16.8	32		23.6	7		12.1	67		59.8	50	30	90
17-Oct-11	15		21.4	12		16.7	10		23.2	11		12.0	19		58.5	50	30	90
23-Oct-11	16	17.5	21.3	21	13.5	16.8	18	16.8	23.1	16	10.0	12.1	44	36.3	58.1	50	30	90
29-Oct-11	7		20.9	9		16.6	8		22.6	16		12.3	29		57.2	50	30	90
04-Nov-11	16		20.7	15		16.5	14		22.4	13		12.3	47		56.9	50	30	90
10-Nov-11	24		20.8	20		16.6	22		22.4	24		12.6	41		56.5	50	30	90
16-Nov-11	21		20.8	21		16.7	20		22.3	22		12.8	28		55.7	50	30	90
22-Nov-11	18	17.0	20.7	19	16.6	16.8	16	15.8	22.1	28	20.4	13.2	35	35.8	55.1	50	30	90
28-Nov-11	8		20.4	8		16.5	14		21.9	10		13.1	30		54.5	50	30	90
04-Dec-11	6		20.1	4		16.2	10		21.6	5		12.9	30		53.9	50	30	90
10-Dec-11	15		20.0	10		16.1	4		21.2	13		12.9	8		52.8	50	30	90
16-Dec-11	8		19.7	6		15.9	9		20.9	5		12.7	19		52.0	50	30	90
22-Dec-11	15	10.3	19.6	12	8.1	15.8	7	8.8	20.6	11	8.6	12.7	16	20.7	51.1	50	30	90
28-Dec-11	1		19.2	1		15.5	10		20.4	16		12.8	16		50.3	50	30	90
03-Jan-12			19.2			15.5			20.4	15		12.8	50		50.3	50	30	90
09-Jan-12	16		19.1	15		15.5	25		20.5	13		12.8	71		50.8	50	30	90
15-Jan-12	8		18.9	17		15.5	16		20.4	8		12.7	34		50.4	50	30	90
21-Jan-12	12	9.3	18.7	12	11.3	15.4	11	15.3	20.2	9	12.3	12.6	22	38.4	49.8	50	30	90
27-Jan-12	5		18.5	4		15.2	3		19.8	4		12.5	9		49.0	50	30	90
02-Feb-12	5		18.2	3		15.0	2		19.5	3		12.3	9		48.2	50	30	90
08-Feb-12	7		18.0	8		14.8	5		19.2	5		12.1	11		47.5	50	30	90
14-Feb-12	10		17.8	10		14.7	7		18.9	6		12.0	16		46.9	50	30	90
20-Feb-12	6	6.7	17.6	7	6.2	14.6	6	4.6	18.7	9	5.4	12.0	13	11.6	46.2	50	30	90
26-Feb-12	6		17.4	7		14.4	6	6	18.5	6		11.9	13		45.6	50	30	90
04-Mar-12	4		17.2	4		14.2	5	5	18.2	5		11.8	8		44.9	50	30	90
10-Mar-12	8		17.0	11		14.2	20	20	18.2	10		11.7	46		44.9	50	30	90
16-Mar-12	13		16.9	11		14.1	7	7	18.0	17		11.8	14		44.4	50	30	90
22-Mar-12	17		16.9	8		14.0	13	13	17.9	6		11.7	28		44.1	50	30	90
28-Mar-12		9.5	16.9		8.2	14.0		9.9	17.9		8.8	11.7		21.6	44.1	50	30	90
Min	1.2						2.2			2.7			7.5					
Max	62.2			55.9			80.4			36.2			256.0					
Capture	97%			97%			95%			98%			95%					

Deposited Dust - Quirindi Trains 2011-2012

	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 2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	4.0
May 2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	4.0
June 2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	4.0
July 2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	4.0
August 2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	4.0
September 2011	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	4.0
October 2011	1.0	30%	15%	55%	0.7	45%	10%	45%	0.6	40%	10%	50%	1.1	40%	15%	45%	3.8	10%	35%	25%	0.7	35%	15%	50%	4.0
November 2011	1.4	10%	70%	20%	1.6	25%	60%	15%	2.0	35%	55%	10%	0.9	5%	55%	40%	1.2	5%	50%	45%	2.6	5%	80%	15%	4.0
December 2011	0.8	10%	55%	35%	0.8	5%	70%	25%	0.9	25%	55%	20%	0.7	10%	70%	20%	0.9	5%	80%	15%	1.2	30%	55%	15%	4.0
January 2012	1.5	50%	30%	20%	1.5	20%	70%	10%	3.4	20%	60%	20%	0.5	20%	60%	20%	0.3	30%	50%	20%	0.5	40%	40%	20%	4.0
February 2012	0.5	10%	80%	10%	0.6	40%	50%	10%	0.8	60%	30%	10%	0.5	40%	55%	5%	0.7	10%	80%	5%	1.4	10%	80%	10%	4.0
March 2012	0.7	25%	50%	25%	0.5	25%	50%	25%	0.4	30%	45%	25%	0.7	25%	50%	25%	0.4	15%	25%	60%	0.4	15%	25%	60%	4.0
Average Coal		23%				27%				35%				23%				13%				23%			-
Total Coal		0.22				0.25				0.47				0.17				0.15				0.26			-
ANNUAL AVERAGE	**1.0**				**1.0**				**1.4**				**0.7**				**1.2**				**1.1**				**4.0**
MINIMUM	**0.5**				**0.5**				**0.4**				**0.5**				**0.3**				**0.4**				**-**
MAXIMUM	**1.5**				**1.6**				**3.4**				**1.1**				**3.8**				**2.6**				**4.0**

Note: All results are in the form of Insoluble Matter (g/m2/month); NM - Not Monitored as gauges not set up September 2011

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Appendix 4
Water Quality Monitoring Results

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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
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
Lowest	Discharge	**7.52**	**242.00**	**6.00**		**0.01**			**0.20**	**0.02**	**0.01**	**0.00**
Highest	Discharge	**8.59**	**444.00**	**25.00**		**0.54**			**1.50**	**0.16**	**0.10**	**0.00**
Mean	Discharge	**8.15**	**383.11**	**15.78**		**0.12**			**0.69**	**0.06**	**0.04**	**<5**
Number of samples	Discharge	**9**	**9**	**9**		**7**			**9**	**6**	**5**	**0**
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										
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
Lowest	Discharge	**7.80**	**407.00**	**12.00**		**0.02**			**0.30**	**0.02**	**0.04**	**<5**
Highest	Discharge	**8.17**	**510.00**	**34.00**		**0.35**			**1.10**	**0.21**	**0.17**	**<5**
Mean	Discharge	**7.97**	**460.29**	**24.00**		**0.09**			**0.69**	**0.10**	**0.10**	**<5**
Number of samples	Discharge	**7**	**7**	**7**		**7**			**7**	**7**	**7**	**7**

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
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
Lowest		**7.69**	**434.00**	**8.00**		**9.71**			**11.60**	**0.05**	**0.05**	
Highest		**8.16**	**582.00**	**60.00**		**17.80**			**23.20**	**0.14**	**0.05**	
Mean		**7.91**	**501.75**	**27.00**		**12.31**			**16.13**	**0.09**	**0.05**	
Number of samples		**4**	**4**	**4**		**4**			**4**	**4**	**1**	
12/05/2011	Quarterly	DRY AS PER FIELD SHEET										
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
Mean	**Quarterly**	**8.09**	**559**	**64**		**15.44**			**18.2**	**0.06**	**0.02**	**<5**

SB9			EPL ID 12	7.96875								
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
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
Lowest	Discharge	**7.25**	**95.00**	**13.00**		**0.02**			**1.10**	**0.06**	**0.01**	**5.00**
Highest	Discharge	**8.02**	**290.00**	**160.00**		**0.81**			**2.20**	**0.41**	**0.21**	**5.00**
Mean	Discharge	**7.62**	**169.60**	**55.40**		**0.32**			**1.61**	**0.21**	**0.08**	**5.00**
Number of samples	Discharge	**10**	**10**	**10**		**9**			**10**	**10**	**9**	**1**
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
Lowest	Discharge	**7.18**	**214.00**	**6.00**		**0.30**			**1.00**	**0.04**	**0.02**	**<5**
Highest	Discharge	**8.16**	**712.00**	**41.00**		**7.26**			**9.90**	**0.22**	**0.16**	**<5**
Mean	Discharge	**7.77**	**504.36**	**20.10**		**3.23**			**4.84**	**0.11**	**0.06**	**<5**
Number of samples	Discharge	**11**	**11**	**11**		**11**			**11**	**11**	**11**	**11**

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
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
Lowest	Discharge	**7.22**	**179.00**	**132.00**		**0.76**			**0.80**	**0.17**	**0.11**	**0.00**
Highest	Discharge	**7.92**	**199.00**	**314.00**		**1.07**			**2.70**	**0.42**	**0.29**	**0.00**
Mean	Discharge	**7.57**	**189.00**	**223.00**		**0.92**			**1.75**	**0.30**	**0.20**	**<5**
Number of samples	Discharge	**2**	**2**	**2**		**2**			**2**	**2**	**2**	**0**
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
Lowest	Discharge	**7.43**	**282.00**	**106.00**		**0.63**			**2.60**	**0.02**	**0.02**	**<5**
Average	Discharge	**7.54**	**325.33**	**203.00**		**1.67**			**3.47**	**0.13**	**0.07**	**<5**
Highest	Discharge	**7.60**	**352.00**	**300.00**		**3.61**			**4.80**	**0.21**	**0.16**	**<5**
Number of samples	Discharge	**3**	**3**	**3**		**3**			**3**	**3**	**3**	**3**

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
18/01/2012	Non-routi	8.07	344	18	<0.01	0.03	0.03	0.7	0.7	0.1	<0.01	<5

SD4

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
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
Lowest		**8.33**	**196.00**	**8.00**		**0.02**			**0.60**	**0.23**	**0.02**	
Highest		**9.18**	**343.00**	**214.00**		**0.03**			**1.30**	**0.78**	**0.76**	
Mean		**8.74**	**253.00**	**79.00**		**0.03**			**0.90**	**0.59**	**0.47**	
Number of samples		**3**	**3**	**3**		**3**			**3**	**3**	**3**	
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
23/02/2012	Quarterly	8.06	211	9	0.02	0.09	0.11	1.1	1.2	0.8	0.75	<5
Lowest		**7.82**	**211**	**9**		**0.02**			**1.2**	**0.49**	**0.37**	**<5**
Highest		**8.37**	**306**	**46**		**0.09**			**1.2**	**0.8**	**0.75**	**<5**
Mean		**8.08**	**266**	**25**		**0.06**			**1.2**	**0.64**	**0.57**	**<5**
Number of samples		**3**	**3**	**3**		**2**			**2**	**3**	**3**	**<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
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
Lowest		**8.48**	**212.00**	**36.00**		**0.06**			**1.00**	**0.24**	**0.20**	
Highest		**9.55**	**250.00**	**43.00**		**0.06**			**3.00**	**0.81**	**0.60**	
Mean		**9.02**	**231.00**	**39.50**		**0.06**			**2.00**	**0.53**	**0.40**	
Number of samples		**2**	**2**	**2**		**1**			**2**	**2**	**2**	
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
Lowest		**7.95**	**316**	**56**		**0.02**	**0.02**		**1**	**0.12**	**0.7**	
Highest		**8.21**	**343**	**59**		**0.02**	**0.02**		**2.2**	**0.26**	**0.16**	
Mean		**8.08**	**329.5**	**62.5**		**0.02**	**0.02**		**1.6**	**0.19**	**0.115**	
Number of samples		**2**	**2**	**2**		**1**	**1**		**2**	**2**	**2**	

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
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
Lowest	Quarterly	**7.90**	**808.00**	**16.00**		**0.81**			**0.80**	**0.52**	**0.01**	
Highest	Quarterly	**8.43**	**1220.00**	**148.00**		**3.30**			**4.60**	**0.52**	**0.04**	
Mean	Quarterly	**8.11**	**994.75**	**61.00**		**1.94**			**2.75**	**0.52**	**0.03**	
Number of samples	Quarterly	**4**	**4**	**3**		**4**			**4**	**1**	**2**	
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
Lowest	Quarterly	**7.9**	**912**	**6**		**1.45**			**1.9**	**0.03**		
Highest	Quarterly	**8.32**	**1150**	**11**		**5.62**			**7.8**	**0.03**		
Mean	Quarterly	**8.11**	**1016.5**	**8.25**		**3.695**			**4.9**	**0.03**		
Number of samples	Quarterly	**4**	**4**	**4**		**4**			**4**	**1**		

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
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
Lowest	Quarterly	**7.89**	**646.00**	**8.00**		**0.02**			**3.00**	**0.01**	**0.01**	
Highest	Quarterly	**8.81**	**1200.00**	**280.00**		**14.40**			**19.30**	**0.91**	**0.01**	
Mean	Quarterly	**8.52**	**836.00**	**88.75**		**5.24**			**9.83**	**0.39**	**0.01**	
Number of samples	Quarterly	**4**	**4**	**4**		**4**			**3**	**3**	**1**	
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
Lowest	Quarterly	**7.64**	**871**	**6**		**3.83**			**5.1**			
Highest	Quarterly	**8.34**	**1220**	**22**		**15.9**			**21.8**			
Mean	Quarterly	**8.05**	**991.25**	**12**		**8.82**			**12.15**			
Number of samples	Quarterly	**4**	**4**	**4**		**4**			**4**			

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
Lowest		**7.78**	**159.00**	**37.00**		**0.02**			**1.70**	**0.46**	**0.29**	
Highest		**8.38**	**608.00**	**216.00**		**0.66**			**8.70**	**0.90**	**0.37**	
Mean		**8.21**	**417.75**	**128.50**		**0.19**			**3.93**	**0.61**	**0.34**	
Number of samples		**4**	**4**	**4**		**4**			**4**	**4**	**3**	
12/05/2011	Quarterly	DRY AS PER FIELD SHEET										
18/08/2011	Quarterly	DRY AS PER FIELD SHEET										
23/02/2012	Quarterly	7.95	304	35	<0.01	<0.01	<0.01	1.1	1.1	0.86	0.77	<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
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
Lowest	Discharge	**7.02**	**256.00**	**1.00**		**0.02**			**0.50**	**0.07**	**0.01**	**0.00**
Highest	Discharge	**8.20**	**1790.00**	**63.00**		**0.88**			**2.20**	**0.22**	**0.18**	**0.00**
Mean	Discharge	**7.42**	**632.54**	**23.78**		**0.39**			**1.23**	**0.15**	**0.07**	**<5**
Number of samples	Discharge	**13**	**13**	**9**		**12**			**12**	**13**	**13**	**0**
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
Lowest	Discharge	**7.37**	**405.00**	**8.00**		**0.01**			**0.30**	**0.03**	**0.01**	**<5**
Average	Discharge	**7.56**	**454.08**	**20.09**		**0.38**			**0.86**	**0.14**	**0.04**	**<5**
Highest	Discharge	**8.02**	**509.00**	**40.00**		**0.64**			**1.50**	**0.32**	**0.08**	**<5**
Number of samples	Discharge	**12**	**12**	**12**		**12**			**12**	**10**	**10**	**12**

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
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
Lowest	Discharge	**7.20**	**231.00**	**6.00**		**0.03**			**0.30**	**0.07**	**0.02**	**0.00**
Highest	Discharge	**7.99**	**1010.00**	**105.00**		**0.86**			**1.80**	**0.40**	**0.39**	**0.00**
Mean	Discharge	**7.62**	**692.43**	**21.36**		**0.21**			**0.74**	**0.21**	**0.14**	**<5**
Number of samples	Discharge	**14**	**14**	**14**		**12**			**13**	**14**	**14**	**0**
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
Lowest	Discharge	**7.93**	**750.00**	**8.00**		**0.02**			**0.20**	**0.06**	**0.03**	**<5**
Highest	Discharge	**8.03**	**840.58**	**17.67**		**0.12**			**0.44**	**0.12**	**0.06**	**<5**
Mean	Discharge	**8.35**	**915.00**	**26.00**		**0.28**			**0.80**	**0.20**	**0.10**	**<5**
Number of samples	Discharge	**12**	**12**	**12**		**12**			**12**	**12**	**12**	**12**

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
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
Lowest	Discharge	**7.49**	**299.00**	**65.00**		**0.19**			**1.60**	**0.13**	**0.08**	**0.00**
Highest	Discharge	**7.67**	**1210.00**	**92.00**		**3.80**			**6.00**	**0.59**	**0.56**	**0.00**
Mean	Discharge	**7.58**	**754.50**	**78.50**		**2.00**			**3.80**	**0.36**	**0.32**	**<5**
Number of samples	Discharge	**2**	**2**	**2**		**2**			**2**	**2**	**2**	**0**
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
Lowest	Discharge	**7.64**	**93.00**	**44.00**		**0.25**			**1.10**	**0.14**	**0.08**	**<5**
Average	Discharge	**7.73**	**523.67**	**119.33**		**1.28**			**2.33**	**0.56**	**0.47**	**<5**
Highest	Discharge	**7.79**	**1330.00**	**261.00**		**3.25**			**4.30**	**0.87**	**0.81**	**<5**
Number of samples	Discharge	**3**	**3**	**3**		**3**			**3**	**3**	**3**	**3**

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
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
Lowest	Discharge	**7.69**	**273.00**	**32.00**		**0.90**			**2.60**	**0.29**	**0.20**	**0.00**
Highest	Discharge	**7.71**	**1130.00**	**305.00**		**1.78**			**4.00**	**0.69**	**0.64**	**0.00**
Mean	Discharge	**7.70**	**701.50**	**168.50**		**1.34**			**3.30**	**0.49**	**0.42**	**<5**
Number of samples	Discharge	**2**	**2**	**2**		**2**			**2**	**2**	**2**	**0**
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
Lowest	Discharge	**7.82**	**162.00**	**16.00**		**0.12**			**1.00**	**0.31**	**0.28**	**<5**
Average	Discharge	**7.93**	**512.00**	**1062.00**		**2.67**			**5.33**	**1.12**	**0.46**	**<5**
Highest	Discharge	**8.11**	**1150.00**	**1830.00**		**5.14**			**9.20**	**1.66**	**0.66**	**<5**
Number of samples	Discharge	**3**	**3**	**3**		**3**			**3**	**3**	**3**	**3**

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
Lowest		**8.09**	**830.00**	**11.00**		**0.92**			**1.30**	**0.09**	**0.00**	
Highest		**8.31**	**912.00**	**11.00**		**3.16**			**4.20**	**0.09**	**0.00**	
Mean		**8.20**	**871.00**	**11.00**		**2.04**			**2.75**	**0.09**	**<0.01**	
Number of samples		**2**	**2**	**1**		**2**			**2**	**1**	**0**	
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
Lowest		**7.81**	**851**	**6**		**4.15**			**5.4**	**0.03**	**<0.01**	
Highest		**8.38**	**1190**	**64**		**8.37**			**10.9**	**0.03**	**<0.01**	
Mean		**8.21**	**1001**	**27**		**5.96**			**8.33**	**0.03**	**<0.01**	
Number of samples		**4**	**4**	**4**		**4**			**4**	**1**	**<0.01**	

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
Lowest		**8.27**	**881**	**18**		**1.61**	**1.65**		**2.6**	**0.02**	**<0.01**	**<5**
Highest		**8.45**	**928**	**18**		**7.93**	**7.95**		**11.2**	**0.04**	**<0.01**	**<5**
Mean		**8.36**	**905**	**18**		**4.77**	**4.8**		**6.9**	**0.03**	**<0.01**	**<5**
Number of samples		**2**	**2**	**1**		**2**	**2**		**1**	**2**	**2**	**2**

ENVIRON

28th May 2012 AS130302_1

Werris Creek Coal Pty Limited

Andrew Wright

By email: AWright@whitehavencoal.com.au

Prediction of groundwater contribution to mine inflow for the period April 2011 to March 2012

Environ has undertaken modelling to predict the volume of groundwater in-flow to the Werris Creek Coal Mine void. Void water pumped during the monitoring period was measured to be 332ML of void water and 112ML of dewatering from the underground mine workings. Rainfall for the period was measured to be 806mm.

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

The mine configuration for March 2012 was adopted and simulated by constructing drains 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. To simulate the remaining water within the mine workings drains were set at the height of 295m to drain water to this level. In addition water was introduced to the groundwater system via infiltration. Infiltration was initiated to create a 'water curtain' for the purpose of controlling the risk of fire during mining of the former underground workings. The water curtain was created by blasting the area immediately above and to the south of the former workings to create rock fractures. A surface water pipe was placed above the fracturing and pumped at 2ML/day for a period of 58 days. This water inflow was simulated in the model through the introduction of a recharge boundary in this area.

Modelling was undertaken and groundwater levels within the Werris Basalt were compared to observed levels. Water levels within the monitored borefield have not detected a decline in the water table with the exception of P1. During the monitored period the mine passed within 20m of P1 and a decline has been observed. At this time it is not considered necessary to modify the model to simulate this isolated response however, further evaluation of P1 monitoring over the next 12 months will determined if this decline should be represented in the model.

The comparison of predicted to observed water levels shows a good correlation of <6m. The model predicted drawdown for the Werrie Basalt was <1.0m and isolated to the footprint of the mining area.

Recharge across the model domain (with the exception of the introduced infiltration recharge) was increased to represent the above average rainfall observed over the period. The volume

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of water discharging from the overburden was also estimated by assigning zone boundaries to represent the groundwater zones.

To achieve the measured volume of water pumped from the underground mine workings (122ML) the recharge of the simulated infiltration was manipulated. The final proportion of water infiltrating to the system was determined to represent 75% of the total volume. This is not considered unreasonable given that evapotranspiration over this area would account for less than 2.5% and the infiltration is constructed to maximise flow to the subsurface. The remaining water would result in runoff to the void (estimated to be 26ML).

Modelling has predicted the following.

Volume of groundwater pumped from the underground workings is estimated to be 50ML/year. The remaining 72ML is estimated to occur from infiltration resulting from the water curtain, and therefore not groundwater sources.

Volume of water pumped from the void comprises:

- Infiltration through the overburden and discharging as seepage to the void is estimated to be <1ML per year;
- Groundwater inflow is estimated to be 26ML per year. Groundwater inflow is derived from the Werrie Basalt, coal measures to the north and the underground workings;
- Groundwater inflow to the void occurring as a result of the water curtain event is estimated to be 19ML per year;
- Surface water runoff occurring from the water curtain event comprises 26ML per year;

The remaining component of void water pumped over the period (approx. 260ML) is representative of surface water runoff to the void.

Kind Regards

Fiona Robinson
Manager – Hunter

Piezo ID	MW1				Other Name		Hillview Bore	
Aquifer	Werrie Basalt				Ground RL		418.692	
Coordinates	276322.7		6525107	Elevation	EPL ID 17		Stick Up	0.27m
Sample Date	Depth to Ground - metres	% Difference	pH -field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	44.11		6.5	1240	6.3	7.0	0.1	0.08
Jul-05	49.10		6.8	1190	6.1	5.9	0.1	0.03
Aug-05	Sampling Suspended - Managers Request							
Sep-05	Sampling Suspended - Managers Request							
Oct-05	Sampling Suspended - Managers Request							
Nov-05	Sampling Suspended - Managers Request							
Dec-05	Sampling Suspended - Managers Request							
Jan-06	Sampling Suspended - Managers Request							
Feb-06	Sampling Suspended - Managers Request							
Mar-06	Sampling Suspended - Managers Request							
Apr-06	Sampling Suspended - Managers Request							
Jul-06	Sampling Suspended - Managers Request							
Nov-06	52.00		7.0	1230	6.3	6.7	0.05	0.01
Jan-07	51.05		6.7	1250	6.7	6.9	0.10	0.04
Apr-07	52.40		6.9	730	6.6	7.0	0.09	0.03
Jul-07	Sampling postponed due to unsafe access following wet weather							
Aug-07	51.48		Pump Disconnected					
Oct-07	Pump Failed. Site to be re-sampled in November 2007							
Nov-07	51.00		No sample obtained					
Jan-08	50.91		No sample obtained, no access					
Apr-08	50.92		No sample obtained, no access					
Jul-08	51.07		No sample obtained, no access					
Oct-08	51.35		7.2	1250	7.2	7.9	0.11	0.04
Jan-09	51.16		6.6	1240	6.6	8.2	0.1	0.04
Apr-09	No sample taken - contract change over							
Jun-09	50		6.8	1280	N/T	10.2	0.01	0.04
26/08/2009	51.94		7	1230	Testing for these analytes not undertaken			
Nov-09	51.62		6.86	1254	Testing for these analytes not undertaken			
23/02/2010	52.03		7.65	1289	7.37	7.1	0.03	0.05
20/05/2010	52.34	-1%	7.56	1880	7.06	8.7	0.07	0.05
8/09/2010	52.17	0%	6.71	1235	8.6	9.2	0.13	0.05
11/01/2011	51.32	2%	6.58	952	8.05	10	0.28	0.34
16/03/2011	50.3	2%	6.8	1095	4.68	9.5	0.24	0.24
Lowest	**50.3**		**6.58**	**952**	**4.68**	**8.7**	**0.07**	**0.05**
Highest	**52.34**		**7.56**	**1880**	**8.6**	**10**	**0.28**	**0.34**
Mean	**51.5325**		**6.9125**	**1290.5**	**7.0975**	**9.35**	**0.18**	**0.17**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**
18/05/2011	50.6	-1%	6.95	1130	0.9	2.2	0.25	0.21
12/09/2011	51.56	-2%	6.73	1070	1.82	2.5	0.12	0.11
13/12/2011	52.42	-2%	6.77	1036	2.78	4.6	0.14	0.11
26/03/2012	52.2	0%	7.01	1240	2.98	1.4	0.15	0.09
Lowest	**50.6**		**6.73**	**1036**	**0.9**	**1.4**	**0.12**	**0.09**
Average	**51.695**		**6.865**	**1119**	**2.12**	**2.675**	**0.165**	**0.13**
Highest	**52.42**		**7.01**	**1240**	**2.98**	**4.6**	**0.25**	**0.21**
Number of samples	**4**		**4**	**4**	**4**	**4**	**4**	**4**

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**

Piezo ID	MW3			Other Name		Eurunderee	
Aquifer	Werrie Basalt			Ground RL		367.267	
Coordinates	274594.69	6522940		EPL ID 19		Stick Up	0.4m/0.95 m
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**

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
Jun-05	Site Not Sampled - Managers Request						
Jul-05	Site Not Sampled - Managers Request						
Aug-05	8.94	7.9	820	0	0.66	0.08	0.06
Sep-05	8.40	7.6	910	0	0.74	0.26	0.02
Oct-05	8.52	7.8	1010	0.01	0.71	0.34	0.06
Nov-05	7.90	7.4	1020	0	4.40	3.50	0.24
Dec-05	7.89	7.0	560	1.20	1.30	0.14	0.14
Jan-06	8.19	8.0	1090	0.07	21.00	1.10	0.94
Feb-06	8.33	7.5	1280	0.02	40.00	1.90	1.80
Mar-06	9.27	7.4	1310	0.08	41.00	2.50	2.30
Apr-06	Piezo Blocked, additional bore drilled MW4B						
Jul-06	Borehole blocked for sampling						
Jan-07	8.94	Bore hole blocked for sampling					
Apr-07	Borehole blocked for sampling						
Jul-07	Sampling postponed due to unsafe access following wet weather						
Aug-07	Borehole blocked for sampling						
Nov-07	8.52	Borehole blocked for sampling					
Jan-08	Borehole blocked for sampling						
Apr-08	Borehole blocked for sampling						
Jul-08	Borehole blocked for sampling						
Oct-08	Borehole blocked for sampling						
Jan-09	Borehole blocked for sampling						
Apr-09	No sample taken - contract change over						
Jun-09	8.78	7.2	4110	N/T	546	26.3	20.5
Aug-09	Not sampled due to contamination						
Nov-09	Not sampled due to contamination						
Feb-10	Not sampled due to contamination						
May-10	Not sampled due to contamination						
15/09/2010	9.24	Water Depth Only Monitored					

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**

Piezo ID	MW5				Other Name		Narrawolga/Eurunderee 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**

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					

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**

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**

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					

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**

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**

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**

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**

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**

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**

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					

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					

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**

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

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**

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**

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**

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**

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					

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**

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					

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					

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					

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					

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					

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					

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

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

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

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**

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**

Piezo ID	UG			Other Name			
Aquifer	Coal Measures			Ground RL		413.074m	
Coordinates	275295.4	6524595	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

Appendix 5
Biodiversity Offset Area Annual Monitoring Report Spring 2011

Prepared by: Eco Logical Australia Pty Ltd

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ecological AUSTRALIA

WERRIS CREEK COAL MINE – BIODIVERSITY OFFSET AREA

Annual Monitoring Report (Spring 2011)

Prepared for
Werris Creek Coal Pty. Ltd.

December 2011

DOCUMENT TRACKING

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Abbreviations

ABBREVIATION	DESCRIPTION
BOA	Biodiversity Offset Area
BOAAMR	Biodiversity Offset Area Annual Monitoring Report
BOSMP	Biodiversity Offset Strategy and Management Plan
CWD	Coarse Woody Debris
ELA	Eco Logical Australia Pty Ltd
HBT	Hollow Bearing Tree
LFA	Landscape Function Analysis
TSC Act	NSW *Threatened Species Conservation 1995*
SSA	Soil Surface Assessment
WCC	Werris Creek Coal Pty Ltd

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 Werris Creek Biodiversity Offset Strategy and Management Plan (BOSMP) (ELA 2010) and Schedule 3 Condition 41 of DA-172-7-2004.

This is the second BOA AMR, representing the first analysis from baseline conditions in assessing the progressive trajectory of the BOA towards self sustainability and meeting the completion criteria specified in Section 10 of the BOSMP.

Twelve replicated permanent monitoring sites were monitored across the BOA to assess vegetation dynamics, while ten and five monitoring sites were monitored for fauna and landscape function, respectively. The number of sites monitored followed from recommended changes to the BOSMP in the first BOA AMR (ELA 2011a).

Landscape Function Analysis, Biometric vegetation condition assessment and standard census of the key vertebrate fauna groups (bats, diurnal birds, nocturnal birds and mammals, and reptiles and amphibians) were used in the monitoring survey. The assemblages were compared to the benchmark condition or completion criteria for vegetation communities and previous species lists.

The results showed an improvement in the condition of monitoring plots since the 2010 baseline survey. Since the 2010 survey, two plots reached benchmark condition for species richness for White Box grassy woodlands, while five plots had over 50% of the benchmark species richness for White Box grassy woodlands and Yellow Box – Blakely's Red Gum grassy woodland. In 2010, no plots were over the benchmark species richness for any vegetation community, only two plots had near benchmark native species richness for White Box grassy woodlands, and all other sites were below 50% of the benchmark for native species richness for vegetation communities. Changes in the proportion of annual weeds between 2010 and 2011 and the resultant detectability of native ground cover species is likely to have influenced this result.

Benchmark condition for native overstorey cover was also reached for two sites in 2011 compared to 2010, where only one site reached the overstorey benchmark condition. While no benchmark criteria exist for the groundlayer to determine the trajectory towards vegetation in various conditions, the condition of the groundlayer improved in 2011 compared to 2010, with the proportion of native species relative to exotic species increasing at eight monitoring plots compared to 2010, and the cover of the groundlayer changing from being exotic dominated in 2010 to native dominated at the majority of sites in 2011. High rainfall prior to the 2010 survey encouraging a flush of weeds is likely to have influenced this result. The completion criteria for bare ground and litter (not to exceed 55% for Box Gum Woodland and White Cypress Pine were met at every monitoring plot).

While the total number of microbat species recorded during the 2011 survey decreased compared to the 2010 survey, the 2011 survey recorded microbats at all monitoring plots, while the 2010 survey recorded microbats at 7 out of 10 monitoring plots. The number of microbat calls increased at all sites in 2011 compared to 2010 at 11 out of 12 sites. Higher numbers of diurnal bird species were recorded in the 2011 surveys compared to 2010 at 11 out of 12 sites. The 2011 survey also recorded 19 new species for the Werris Creek Mine site. Two of the species, *Stagonopleura guttata* (Diamond Firetail)

and *Oxyura australis* (Blue-billed Duck), are listed as vulnerable under the NSW *Threatened Species Conservation Act 1995* (TSC Act). No changes to the management of the BOA are required for these species.

Koalas were also recorded on the mine site in October 2011 and assessed as part of pre-clearance surveys (ELA 2011b). Koalas are likely to continue to use the resources in the BOA.

The species inventories for the mine site have been updated accordingly.

The results of the Landscape Function Analysis (LFA) were positive, and Soil Surface Assessment (SSA) returned high indices for site stability, nutrients and infiltration. While some changes were found for both LFA and SSA between 2010 and 2011, given the subjective nature of defining patches in LFA, and the fact that only two years of data have been collected, results from LFA may become clearer over a longer time scale such as following five years.

Consistent with the commitments in the BOSMP, the flora and fauna monitoring program will be repeated in spring 2012 and form part of the expanded Life of Mine Biodiversity Offset Area. Any changes to the monitoring program will be detailed in the LOM Biodiversity Offset Area Management Plan (ELA in prep).

1 Introduction

Eco Logical Australia (ELA) was commissioned by Werris Creek Coal Pty Ltd (WCC) to undertake a second year of biodiversity monitoring at monitoring plots established in 2010 within the WCC Biodiversity Offset Area (BOA). 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.

A description of the BOA (location, climate) and the vegetation communities supported within the BOA, including their condition and area covered, was provided in the baseline monitoring report for the BOA (ELA 2011a).

ELA's scope of works was to:

- Record data using Landscape Function Analysis, 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 monitoring plots;
- Compare data to the benchmark condition or completion criteria for vegetation communities specified in Section 10 of the Werris Creek Biodiversity Offset Strategy and Management Plan (BOSMP) (ELA 2010) and to mine site pre-clearing species lists, to assess the progressive trajectory of the BOA towards self sustainability; and
- Report the findings from the 2010 and current survey.

1.1 MANAGEMENT ACTIVITES IN THE BOA BETWEEN OCTOBER 2010 AND 2011

The Werris Creek Annual Environmental Monitoring Report (WCC 2011) reported the following management activites in the BOA between October 2010 and April 2011.

- Weed sprayers were contracted to control Patersons Curse and St Johns Wort in the BOA from November to February 2010. This work involved 200 hours of spraying predominately within the BOA portion of the Eurunderee property;
- Rubbish was removed from the former dump site at Eurunderee in February 29011 and a cover crop was sown; and
- BOA boundary fencing was installed (approximaltey 10km) and old/internal fences were removed in April 2011.

Additional management actions taken between April 2011 and October 2011 (monitoring) included:

- Weed spraying over Eurunderee BOA and rehabilitation areas targeting Patersons Curse thistles (Saffron and St Barnabys) from August to October 2011. The area surrounding and adjacent to Site 9 with less than 50% native ground cover was slashed twice to control weed growth; and

- Planting of overstorey species. A total of 322 tubestock have been planted including White Box, Yellow Box, Blakely's Red Gum and Rough Barked Apple in areas adjacent to Site 1, Site 4, Site 8, Site 9, Site 10 and Site 12 since August 2011. A total of 1579 overstorey tubestock have been planted in rehabilitation areas since October 2010.

2 Methodology

The methods were identical to the 2010 baseline survey, except that, in line with the recommendations made in ELA (2011) for future work, monitoring using Landscape Function Analysis (LFA) was reduced within the BOA. Data was collected at five sites only, at analogue sites (Class 4 vegetation sites: Sites 3, 5, 10, 11) and at the rehabilitation site (Site 6), rather than across all sites during the current monitoring survey. This is because the results of the LFA in the baseline survey had a fairly homogenous Landscape Organisation Index across all sites, with the Soil Surface Assessment also returning similar values for analogue sites compared to Class 3, 2 and 1 sites. Further, consistent with the BOSMP, survey of ground mammals was not undertaken in the current spring 2011 survey. Surveys of woodland birds and microbats, which represent all of the threatened species previously recorded onsite, and other mobile species such as reptiles provide more information on the progress of woodland restoration than other fauna groups, particularly in the first 10 years of restoration activity.

Field investigations for the current survey were conducted between the 17th and 21st October 2011 by two ELA ecologists, Antony Von Chrismar and Enhua Lee.

2.1 WEATHER CONDITIONS

Weather conditions during the monitoring period were considered adequate for the biodiversity surveys. Although no rain fell during the survey, free water from previous rainfall events, including events in the two days prior to the survey, was present within the BOA, stimulating frog activity. Temperatures leading up to and during the survey were mild. **Table 1** shows the weather conditions two days leading up to the survey and during the survey (records from the nearest weather station, Quirindi, NSW; BoM 2011).

Table 1: Weather conditions during the spring monitoring period

Date	Min Temp (°C)	Max Temp (°C)	Rainfall (mm)	Wind (km/h)	9am Temp (°C)	3pm Temp (°C)
15/10/11	15.0	24.4	8.6	Calm	16.2	n/a
16/10/11	10.2	26.0	0.2	Calm	15.0	n/a
17/10/11	8.8	24.4	0	Calm	17.2	n/a
18/10/11	4.4	23.6	0	Calm	14.8	n/a
19/10/11	5.2	26.8	0	Calm	16.4	n/a
20/10/11	7.4	27.6	0	Calm	17.8	n/a
21/10/11	8.0	29.4	0	Calm	19.8	n/a

Source: http://www.bom.gov.au/climate/dwo/201110/html/IDCJDW2118.201110.shtml

3 Results and Discussion

3.1 FLORA

3.1.1 Vegetation Monitoring

The floristic data collected during the monitoring are summarised below, with the full floristic plot data provided in **Appendix B**.

Flora species richness

Current survey

There was a large amount of variation between monitoring plots in terms of native species richness, with the number of native species in each monitoring plot ranging between 5 and 29. Of the plots, two plots representative of Condition Class 4 (Sites 3 and 11) had native species richness above the benchmark species richness or completion criteria for White Box grassy woodlands (**Table 2**). Five plots representative of Condition Classes 3 (Sites 2, 4, 8, 12) and 4 (Site 5) had over 50% of the benchmark species richness or completion criteria for White Box grassy woodlands and Yellow Box – Blakely's Red Gum grassy woodland (**Table 2**). The remaining plots, representative of all Condition Classes, had native species richness below 50% of the benchmark. Generally, Condition Classes 3 and 4 vegetation showed higher native species richness in comparison to Condition Classes 1 and 2, although one Condition Class 3 site (Site 1) had a comparatively lower native species richness than other sites representative of Condition Class 3 vegetation, with only 8 native species recorded within the 400m^2 monitoring plot (**Table 2** and **Figure 1**). Only two sites maintained a native species richness greater than 50% of all species recorded (Sites 3 and 11) (**Figure 2**).

Regarding exotic vegetation at monitoring plots, the majority was comprised of annual rather than perennial species. Annual species generally comprised greater than 60% of all exotic species recorded. The exception was for Site 3, where annual species comprised 57% of all exotic species recorded.

2010 versus 2011 survey

The 2011 survey recorded 64 new flora species (26 native, 36 exotic, and 2 unknown species) that were not recorded during the 2010 survey (**Table 3).** However, up to 51 flora species (25 native and 26 exotic species) recorded in the 2010 survey were not recorded in the 2011 survey (**Table 4**). Note that some species identified to the genus level in one survey year may have been identified to species level in another survey year, and thus could seemingly appear as new species in the data. Further, observer variation may have been a factor in the different results between years.

In terms of the numbers of species recorded in 2011 versus 2010, higher numbers of native species were recorded in 2011 compared to 2010, other than for three sites: one site (Site 4) recorded a lower number of native species in 2011 compared to 2010, while two sites (Sites 7 and 9) recorded the same number of native species in 2010 and 2011 (**Figure 1**). Patterns for changes in the numbers of exotic species recorded between the monitoring periods were more difficult to decipher than for native species, with seven sites recording higher numbers of exotic species in 2011 compared to 2010, four sites recording lower numbers of exotic species in 2011 compared to 2010, and one site recording the same number of exotic species in 2010 and 2011. However, the numbers of perennial exotic species

increased at all monitoring plots, with the exception of Site 9, where the numbers were the same in 2010 and 2011 (**Figure 1**). Thus, the dominance of annual exotic species to perennial exotic species was less pronounced in monitoring plots in 2011 compared to 2010.

Concerning the proportion of native to exotic species, there was an increase in the proportion of native species to exotic species within plots at eight monitoring plots in 2011 compared to 2010 (Sites 3, 5, 6, 8, 9, , 10, 11 and 12 representing all Class 4 sites, two Class 3 sites, and all Class 1 sites) (**Figure 2**). Conversely, there was a decrease in the proportion of native species to exotic species within plots at four monitoring plots in 2011 compared to 2010 (Sites 1, 2, 4 and 7 representing Class 2 and 3 sites) (**Figure 2**).

Given the increase in native species in 2011 compared to 2010 at the majority of monitoring plots, a higher number of monitoring plots either met or had over 50% of the benchmark species richness or completion criteria for Biometric Vegetation Types within the BOA in 2011 compared to 2010. In 2010, only two sites (Sites 4 and 11) had near benchmark native species richness, with all other sites below 50% of the benchmark (ELA 2011). This increased to two sites being over the benchmark for native species richness, five sites having over 50% of the benchmark native species richness, and only five sites having below 50% of the benchmark native species richness in 2011 (see 'Current survey'; this section and **Table 2**). Changes in the proportion of annual weeds between 2010 and 2011 and the resultant detectability of native ground cover species is likely to have influenced this result.

Table 2: Floristic summary as compared to Biometric Benchmarks and Completion Criteria

Biometric Vegetation Type	Condition Class (Site No.)	No. Natives Species 2010	No. Native Species 2011	No. Exotic Species (annual) 2011	Benchmark / Completion Criteria	Completion Criteria met? (2011)
White Box grassy woodland	4 (3)	8	29	23 (13)	23	Yes
	4 (11)	19	24	16 (12)	23	Yes
	3 (1)	2	8	25 (16)	23	No
	3 (2)	10	12	25 (18)	23	No
	3 (4)	21	16	21 (15)	23	No
	3 (8)	2	14	23 (15)	23	No
	3 (12)	5	13	17 (14)	23	No
	2 (7)	10	10	14 (9)	23	No
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	9	18	19 (14)	23	No
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	7	12	19 (12)	30	No
Cleared land (Mine Rehab Site)	1 (6)	3	5	19 (13)	23	No
Cleared land (formerly cultivated land)	1 (9)	5	5	16 (10)	23	No
Cumulative totals of BOA		**52**	**54**	**70 (42)**		

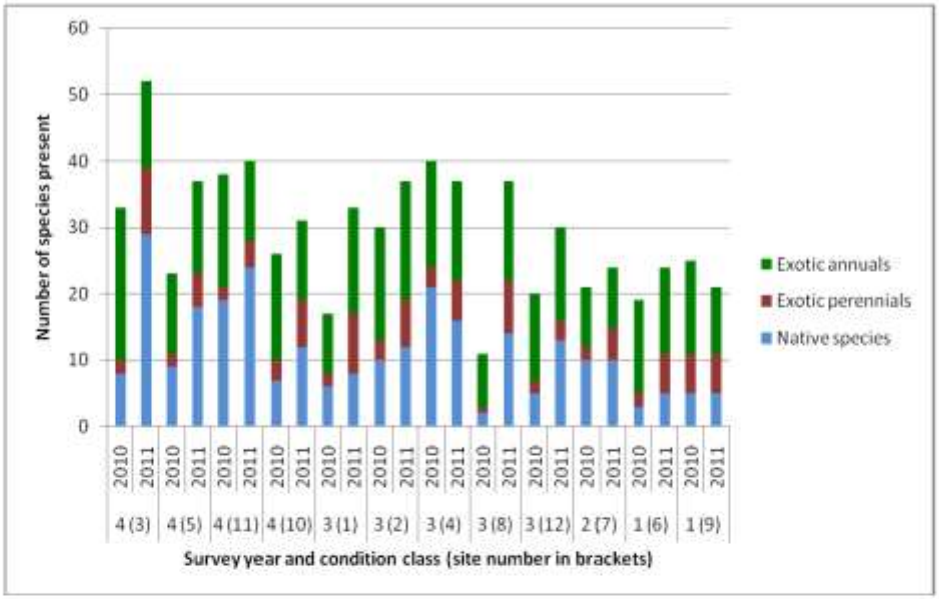


Figure 1: Number of native and exotic species identified at each monitoring site during the 2010 and 2011 monitoring periods

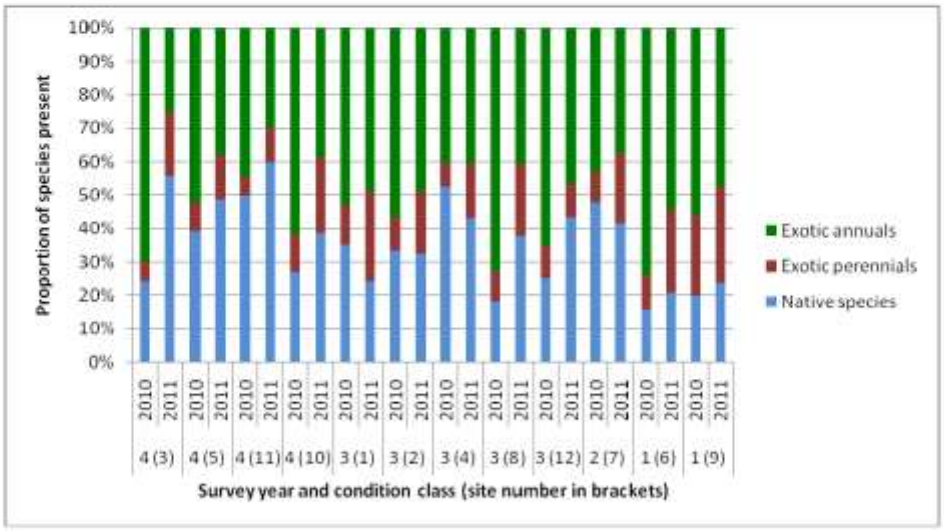


Figure 2: Proportion of native versus exotic species within each monitoring site during the 2010 and 2011 monitoring periods

Table 3: Flora species recorded in the 2011 survey which were not recorded during the 2010 survey

Flora Species	
Agapanthus sp. (Agapantha) *	*Lomandra multiflora* (Many-flowered Mat-rush)
Alternanthera pungens (Khaki Weed) *	*Lupinus* sp. *
Aristida ramosa (Purple Wiregrass)	*Maireana microphylla* (Small-leaf Bluebush)
Austrodanthonia bipartita (Wallaby Grass)	*Medicago minima* (Woolly Burr Medic) *
Biflora testiculata (Bird's Eye, Carrot Weed) *	*Medicago scutellata* (Snail Medic) *
Bromus catharticus (Prairie Grass) *	*Medicago truncatula* (Barrel Medic) *
Calocephalus citreus (Lemon Beauty-heads)	*Modiola caroliniana* (Red-flowered Mallow) *
Centaurium sp.*	*Onopordium acanthium* (Scotch Thistle) *
Chamaesyce drummondii (Caustic Weed)	*Panicum effusum* (Hairy Panic)
Convolvulus erubescens (Blushing Bindweed)	*Papaver* sp. (Poppy) *
Crassula sieberiana (Australian Stonecrop)	*Paronchia brasiliana* *
Cymbonotus lawsonianus (Bear's Ear)	*Polycarpon tetraphyllum* (Four-leaf Allseed) *
Desmodium sp.	*Rapistrum rugosum* (Giant Mustard) *
Desmodium varians (Slender Tick-trefoil)	*Senecio quadridentatus* (Cotton Fireweed)
Dichondra sp. A	*Senecio* sp. *
Einadia hastata (Berry Saltbush)	*Sida cordifolia* *
Einadia nutans (Climbing Saltbush)	*Silene gallica* var *gallica* (French Catchfly) *
Einadia trigonos (Fishweed)	*Solanum nigrum* (Blackberry Nightshade) *
Eragrostis sp. *	*Solanum* sp. *
Eucalyptus spp. (planted)	*Swainsona* sp.
Galium aparine *	*Trifolium resupinatum* (Shaftal Clover) *
Glycine tabacina	*Trifolium subterraneum* (Subterranean Clover) *
Gomphocarpus sp. (Cotton Bush) *	*Trifolium vesiculosum* (Arrow-leaf Clover) *
Goodenia pinnatifida	*Triptilodiscus pygmaeus* (Common Sunray)
Hedypnois cretica (Cretan Weed) *	Unknown Asteraceae
Hedypnois sp. *	Unknown herb
Hyparrhenia rufa *	*Urtica incisor* (Stinging Nettle) *
Juncus filicaulis	*Verbascum thapsus* (Great Mullein) *
Juncus subglaucus	*Verbena bonariensis* (Purpletop) *
Lachnagrostis filiformis	*Vittadinia cuneata* (Fuzzweed)
Lepidium africanum (Common Peppercress) *	*Vulpia muralis* (Wall Fescue) *
Lepidium didymum (Lesser Swinecress) *	*Xanthium occidentale* (Noogoora Burr) *

* Denotes exotic species.

Table 4: Flora species recorded in the 2010 survey which were not recorded during the 2011 survey

Flora Species	
Ajuga australis (Austral Bugle)	*Galium divaricatum* (Slender Bedstraw)
Aristida sp.	*Hypericum gramineum* (Small St. John's Wort)
Arthropodium sp.	*Juncus subsecundus*
Austrostipa bigeniculata	*Lolium rigidum* (Wimmera Ryegrass) *
Austrostipa sp.	*Maireana enchylaenoides* (Wingless Bluebush)
Avena sp. *	*Iridaceae* species (Unknown Lilly) *
Boerhavia dominii	*Medicago* sp. (2) *
Bromus hordeaceus (Soft Brome) *	*Microlaena stipoides* (Weeping Grass)
Bromus diandrus (Great Brome) *	*Oxalis* sp. *
Bulbine bulbosa (Bulbine Lilly)	*Phalaris aquatica* (Phalaris) *
Capsella bursa-pastoris (Shepherd's Purse) *	*Piptatherum miliacea* (Rice Millet) *
Carduus tenuiflorus (Winged Slender Thistle) *	*Ranuculus* sp. (Buttercup)
Centaurea solstitialis (Maltese Cockspur) *	*Rumex* sp. (Dock)
Cheilanthes austrotenuifolia (Rock Fern)	*Salvia verbenaca* (Wild Sage) *
Chondrilla juncea (Skeleton Weed) *	*Sclerolaena birchii* (Galvanised Burr)
Chrysocephalum semipapposum (Clustered Everlasting)	*Sonchus* sp. (Sowthistle) *
Cyclospermum leptophyllum (Slender Celery) *	*Taraxacum officinale* (Dandelion) *
Cyperus gracilis (Slender Flat-sedge)	*Tragopogon dubius* (Goat's Beard) *
Cyperus sp.	*Tribulus terrestris* (Caltrop, Cat-head) *
Daucus glochidiatus (Native Carrot)	*Trifolium angustifolium* (Narrow-leaved Clover) *
Dichopogon fimbriatus (Nodding Chocolate Lilly)	*Urtica urens* (Small Nettle) *
Enneapogon nigricans	*Veronica* sp. (Speedwell) *
Erodium cicutarium (Common Storksbill) *	*Vicia villosa* (Russian Vetch) *
Eucalyptus sp. (revegetation)	*Vulpia* sp. (Silvergrass) *
Eucalyptus melliodora	*Wahlenbergia* sp. (Bluebell)
Fumaria sp. *	

* Denotes exotic species.

Vegetation cover and structure

Current survey

Native overstorey vegetation was recorded within three out of the four monitoring plots present in Condition Class 4 vegetation, at Sites 3, 5 and 11 (**Figure 3**); the fourth monitoring plot in Condition Class 4 vegetation occurred within a gap in the canopy. The projected foliage cover (PFC) of the overstorey fell within benchmark covers for all of these monitoring plots (**Table 5**). No native mid-storey was recorded within any of the monitoring plots (**Figure 3**).

The ground layer was dominated by native species, other than at four sites (Sites 1, 6, 7, 9 representative of mostly Condition Classes 1 and 2, although Site 1 represented a Class 3 Condition Class), which instead had ground layers dominated by exotic species (**Figure 3**). Grasses dominated the native ground layer at all sites, except Site 10, which was dominated by herbs.

2010 versus 2011 survey

The 2011 survey recorded higher PFCs for overstorey vegetation compared to the 2010 survey, such that the PFCs at all sites supporting an overstorey were within benchmark covers or completion criteria for White Box grassy woodland and Yellow Box – Blakely's Red Gum grassy woodland in 2011. The 2010 survey found that only one of the three sites supporting an overstorey were within benchmark covers. It is possible that the 2011 results reflected real changes in the PFC of the canopy, although it is also possible that estimations differed between the observers conducting the surveys in 2010 versus 2011 as canopy cover is estimated by the observer rather than measured.

In terms of the cover of the ground layer, native grass cover was higher in 2011 compared to 2010 at all monitoring plots. In contrast, the cover of native herbs was lower in 2011 compared to 2010 at all sites except Sites 9 and 10, where the native herb cover increased. Similarly, the cover of exotics was lower in 2011 compared to 2010, except at Site 4 which remained the same. As such, understorey cover changed from being exotic dominated in 2010 to native dominated in 2011. Only four plots remained dominated by exotic vegetation cover between 2010 and 2011 (Sites 1, 6, 7, 9 representing Class 1, 2 and 3 vegetation).

Table 5: Native overstorey cover in comparison with Completion Criteria

Biometric Vegetation Type	Condition Class (Site No.)	Native overstorey cover 2010	Native overstorey cover 2011	Benchmark / Completion Criteria	Completion Criteria met? (2011)
White Box grassy woodland	4 (3)	5	12.5	6-25	No except for Sites 3 and 11
	4 (11)	26	24.5		
	3 (1)	0	0		
	3 (2)	0	0		
	3 (4)	0	0		
	3 (8)	0	0		
	3 (12)	0	0		
	2 (7)	0	0		
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	5	12	6-25	Yes
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	0	0	6-40	No
Cleared land (Mine Rehab Site)	1 (6)	0	0	6-25	No
Cleared land (formerly cultivated land)	1 (9)	0	0	6-25	No

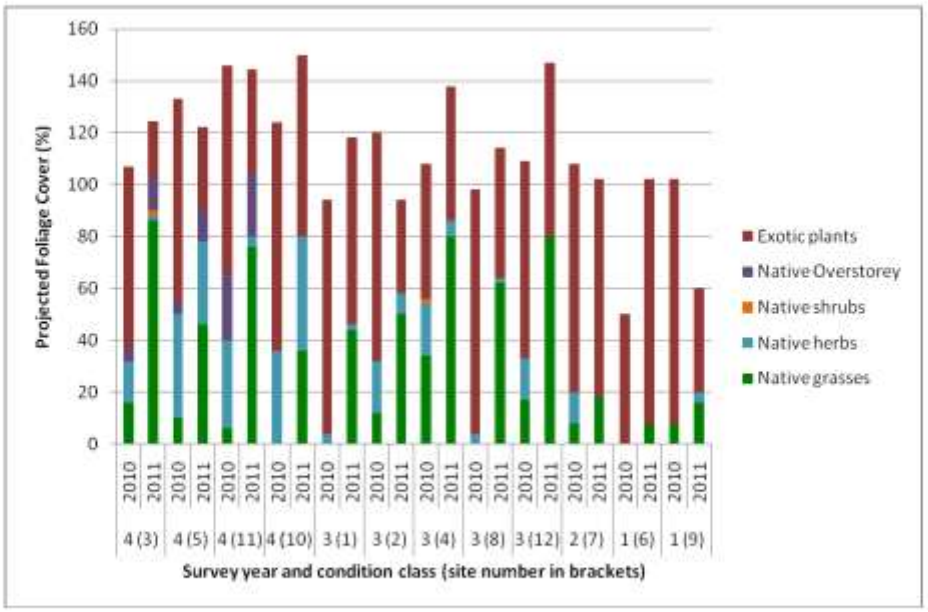


Figure 3: Projected foliage cover of each vegetation stratum at each monitoring site during the 2010 and 2011 monitoring periods. Note that while the cover of exotic plants was comprised mainly of ground layer vegetation, it also included the cover of exotic plants in the midstorey (at Site 9)

Other biometric variables

The following variables provide a representation of the ecological resources and condition of the vegetation across BOA. These variables are not associated with the completion criteria for the BOA, but represent important ecological resources relating to ecosystem functioning. They have been summarised here with comparison to the Biometric Benchmarks for their associated vegetation types to provide a perspective on condition as compared to a standard. A complete inventory of the Biometric field variables recorded are provided in **Appendix B**.

Overstorey regeneration

Regeneration of overstorey species was recorded for eight of the 12 zones in which monitoring plots were located, with no regeneration of overstorey species observed for zones in which Sites 1, 6, 8, and 12 were located. This is in contrast to the 2010 survey which recorded regeneration of overstorey species at four of the 12 monitoring sites (Sites 4, 5, 7 and 11).

For five of the zones where regenerating canopy species were recorded (zones where Sites 3, 4, 5, 7, and 10 were located), 100% regeneration was recorded, while three zones (zones where Sites 2, 9 and 11 were located) recorded 50% regeneration of canopy species.

While the results suggest that higher levels of recruitment were occurring in the BOA in 2011 compared to 2010, the 2010 survey recorded regeneration within the monitoring plots, rather than for the entire zone. Therefore, the 2011 survey results are not directly comparable to the 2010 results.

Coarse woody debris (CWD)

Coarse woody debris (CWD) was recorded at six of the 12 monitoring plots, which increased the number of monitoring plots with CWD by three plots from the 2010 survey (**Figure 4**).

The increase in CWD in 2011 within plots which did not previously support CWD (Sites 2, 3 and 6) is difficult to account for, at least for two of the sites. The increase at Site 3 may have been a result of a fallen branch from the over-storey present at the site. However, Sites 2 and 6 do not support any canopy trees that may have dropped branches. It is possible that CWD at Site 2 was missed during 2010 given only a short length (2 m) of CWD was recorded in 2011.

Coarse woody debris is not considered in the completion criteria for the BOA, though a representation of the CWD against the Biometric Benchmark for each vegetation type showed that three of the 12 sites (Sites 3, 5, and 11 representing Condition Class 4 vegetation) were greater than the benchmark levels for CWD present (**Table 6**). This increased the number of sites which were greater than the benchmark levels for CWD in 2010 by one site (Site 3 was below the benchmark in the 2010 survey).

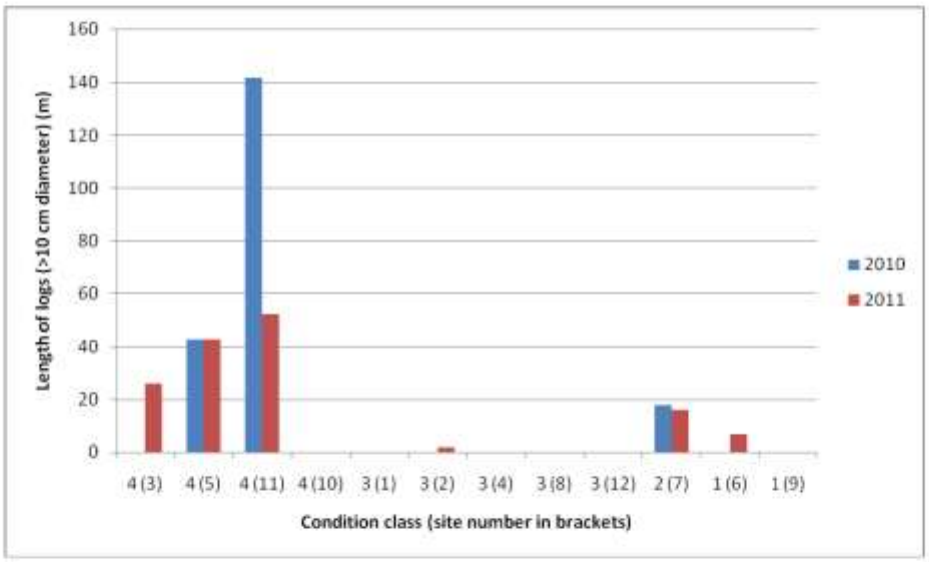


Figure 4: Coarse woody debris recorded within each monitoring plot (0.1ha) during the 2010 and 2011 monitoring periods

Table 6: Coarse woody debris in comparison with Biometric Benchmarks

Biometric Vegetation Type	Condition Class (Site No.)	Coarse Woody Debris (m) 2010	Coarse Woody Debris (m) 2011	Biometric Benchmark (m)	Meets Biometric Benchmark? (2011)
White Box grassy woodland	4 (3)	0	26	20	Yes
	4 (11)	142	52		Yes
	3 (1)	0	0		No
	3 (2)	0	2		No
	3 (4)	0	0		No
	3 (8)	0	0		No
	3 (12)	0	0		No
	2 (7)	18	16		No
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	43	43	20	Yes
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	0	0	30	No
Cleared land (Mine Rehab Site)	1 (6)	0	7	20	No
Cleared land (formerly cultivated land)	1 (9)	0	0	20	No

* Benchmarks for cleared land are considered against the veg type, White Box grassy woodland, as this is the target veg type for restoration.

Hollow-bearing trees

Hollow-bearing trees (HBTs) were recorded within two of the 12 monitoring plots (Sites 5 and 11; one HBT at each site) (**Figure 5**). This result differed from the 2010 survey, which recorded three HBTs at Site 5 and two HBTs at Site 7.

As is the case for the increase in CWD in 2011 compared to 2010, the results for HBTs within monitoring plots in 2011 compared with those in 2010 are difficult to account for. Hollows form slowly in canopy trees, and as such there should not have been such marked differences in the number of hollows within HBTs nor the number of HBTs within monitoring plots. However, hollows are difficult to detect given their height above the ground. The height of the observer can affect whether hollows are observed. It is possible that hollows were missed in either survey year and/or the number of hollows under or overestimated.

Hollow bearing trees (HBTs) are not considered in the completion criteria for the BOA, though a representation of the HBTs against the Biometric Benchmark for each vegetation type showed that two of the 12 sites had benchmark numbers of HBTs present (**Table 7**). The same number of sites were found to have benchmark numbers of HBTs present in the 2010 survey, although the 2010 survey recorded benchmark numbers of HBTs for Sites 5 and 7, rather than for Sites 5 and 11, as was the case for the 2011 survey.

Figure 5: Number of hollow bearing trees (HBTs) within each monitoring plot (0.1ha) during the 2010 and 2011 monitoring periods

Table 7: Hollow-bearing trees in comparison with Biometric Benchmarks

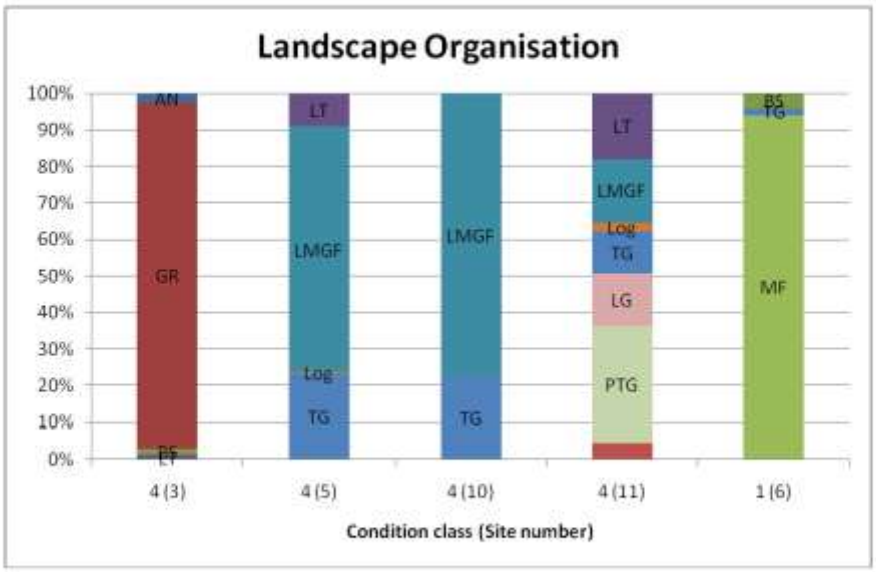
Biometric Vegetation Type	Condition Class (Site No.)	Number of hollow bearing trees (HBTs) 2010	Number of hollow bearing trees (HBTs) 2011	Biometric Benchmark (no.)	Meets Biometric Benchmark (2011)
White Box grassy woodland	4 (3)	0	0	1	No
	4 (11)	0	1		Yes
	3 (1)	0	0		No
	3 (2)	0	0		No
	3 (4)	0	0		No
	3 (8)	0	0		No
	3 (12)	0	0		No
	2 (7)	2	0		No
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	3	1	1	Yes
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	0	0	2	No
Cleared land (Mine Rehab Site)	1 (6)	0	0	1	No
Cleared land (formerly cultivated land)	1 (9)	0	0	1	No

* Benchmarks for cleared land are considered against the veg type, White Box grassy woodland, as this is the target veg type for restoration.

3.1.2 Landscape Function Analysis

Landscape Organisation

In general, the LFA conducted for 2011 indicated a high Landscape Organisation Index i.e. a low number of bare soil patches (inter-patches) between obstruction components (patches) in the soil landscape across all sites sampled. This suggests that each of the sites sampled have relatively stable micro-landscape features, with soil surface features offering resistence to erosion and supporting important soil processes. **Figure 6** provides the results of the Landscape Organisation process for each of the sites sampled.



Legend			
Patch / inter-patch	Code	Patch / inter-patch	Code
Annuals	AN	Tussock Grass	TG
Grasses	GR	Moderate Exotic Forbs	MF
Bare Soil	BS	Low Grasses	LG
Litter	LT	Plains Grass Tussock	PTG
Low/moderate Grass/forbs	LMGF	Bare Soil with Litter	BSLT
Log	Log		

Figure 6: Landscape organisation of patch / inter-patch types across five sites in the BOA in 2011

Table 8 provides a comparison of the Landscape Organisation Index for 2010 and 2011 sampling events for each of the sites sampled. The landscape organisation index is essentially a measure of the proportion of each transect that is occupied by patches (length of patches/length of transect). Results indicated that only relatively minor fluctuations occurred in the index between years.

Table 8: Landscape organisation index for each of the sites in the 2010 and 2011 monitoring events

Site 3		Site 5		Site 10		Site 11		Site 6	
2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
0.98	0.98	1.0	1.0	1.0	1.0	1.0	0.96	1.0	0.96

Soil Surface Assessment (Stability, Infiltration and Nutrient levels)

The assessment returned high Soil Surface Assessment (SSA) indices, indicating that the site had favourable stability, nutrient, and infiltration characteristics. **Figure 7**

Figure 8 and **Figure** 9 provide a summary of the soil stability, nutrient and infiltration levels for each of the sites that were sampled. The indices for the 'analogue' sites (Class 4 vegetation) were in the same order as those for Class 1 vegetation (Site 6).

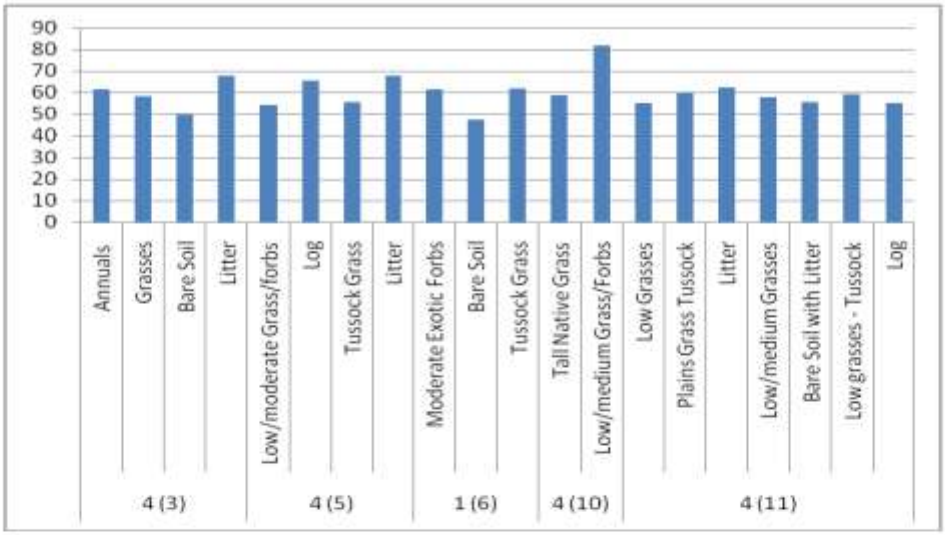


Figure 7: Soil stability across five sites in the BOA in 2011

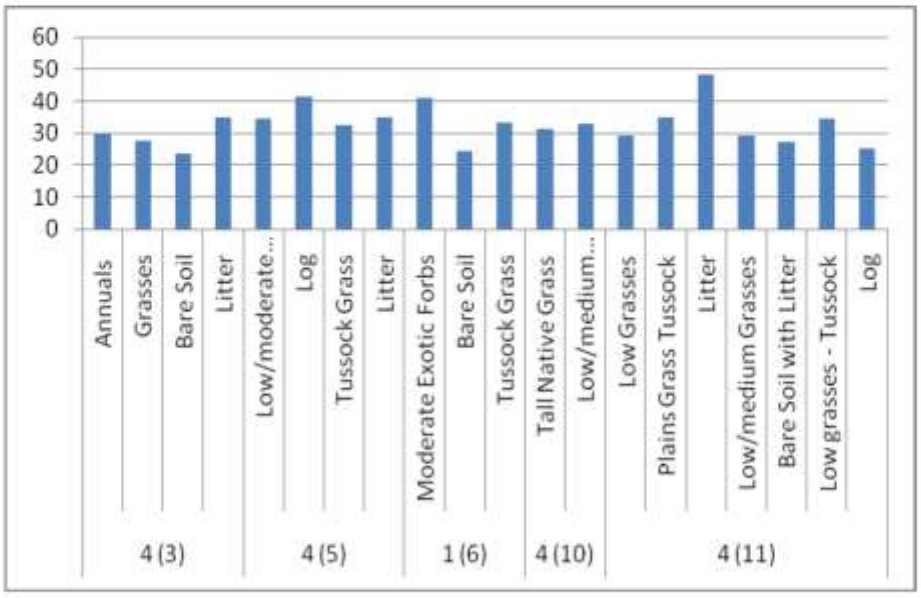


Figure 8: Soil nutrient levels across five sites in the BOA in 2011

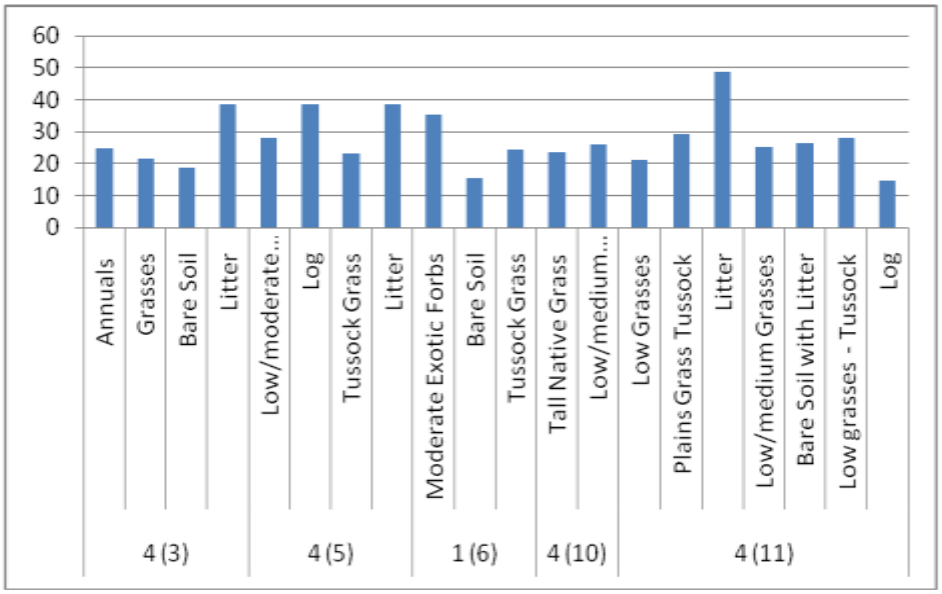


Figure 9: Soil infiltration levels across five sites in the BOA in 2011

In terms of comparing the 2010 and 2011 sampling results, **Table 9** presents the total contribution to soil stability, infiltration and nutrients for each of the sampled sites between sampling years. Apart from Site 3, the total contributions to soil stability, infiltration and nutrients were higher at all sites in 2010 compared to 2011 (**Figure 10**, **Figure** 11, and **Figure** 12). Note that although it appeared that the total contribution to soil stability was lower in 2010 compared to 2011 for Site 10, the standard error in 2011 was high, and thus it is likely that this was not a true reflection of higher soil stability in 2011 compared to 2010.

Result may have been attributed to a number of factors including season and oberserver differences. The conditions prior to the 2010 survey produced a flush of exotic annual vegetation that were not as obvious in the 2011 survey.

Table 9: Total contribution to stability, infiltration and nutrients for each of the sampled sites between 2010 and 2011. Note: The numbers in cells refers to the total contribution to the whole of landscape (±standard error where applicable)

Soil Surface Index	Site 3		Site 5		Site 10		Site 11		Site 6	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
Stability	31.6±0.9	58.2±1.4	70.8	55.9±1.0	68.8	76.6±30.6	68.8	59.0±0.9	65.6	60.8±1
Infiltration	17.3±1.1	27.6±.08	47.5	34.0±2.5	39.1	32.6±0.6	39.1	35.0±0.8	44.9	40.2±0.5
Nutrients	16.2±1.4	21.8±1.2	39.7	28.0±3.0	35.8	25.6±0.9	35.8	30.2±1.3	35.8	34.3±0.8

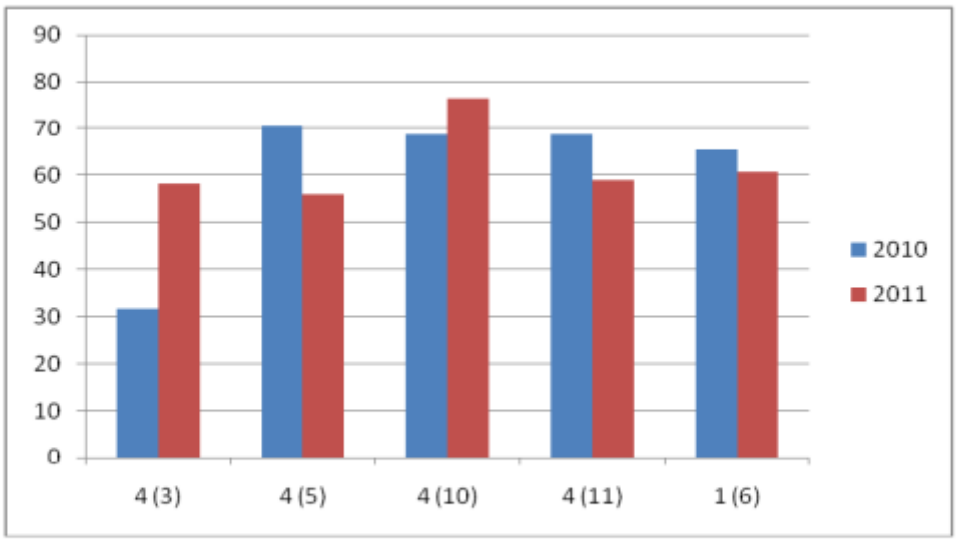


Figure 10: Total contribution to soil stability for each of the sampled sites during the 2010 and 2011 monitoring periods

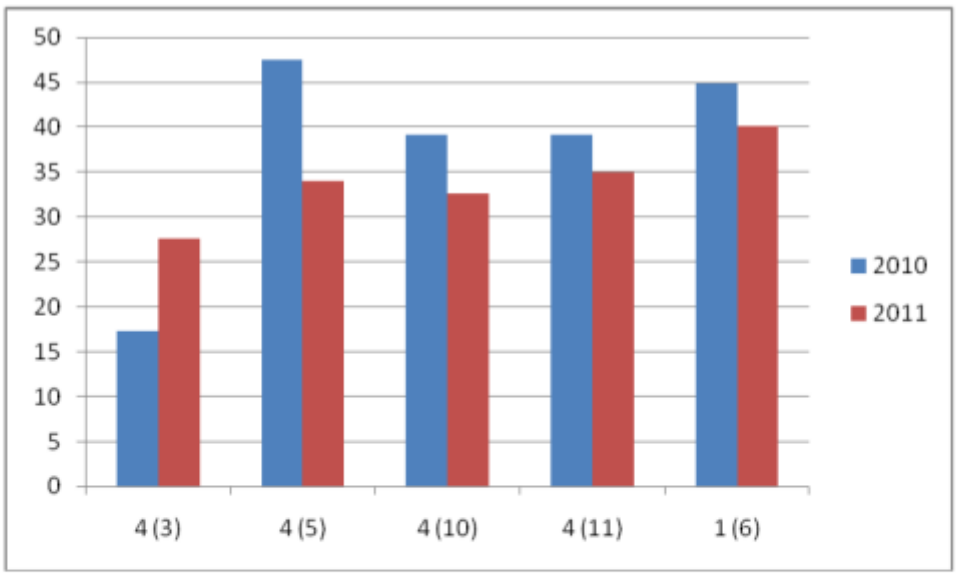


Figure 11: Total contribution to soil infiltration for each of the sampled sites during the 2010 and 2011 monitoring periods

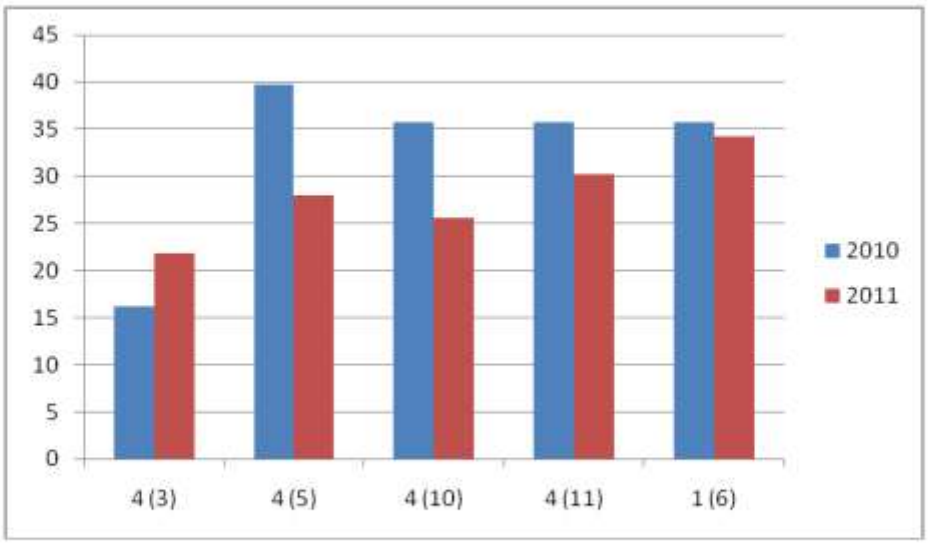


Figure 12: Total contribution to soil nutrients for each of the sampled sites during the 2010 and 2011 monitoring periods

3.2 FAUNA

3.2.1 Bats (Chiroptera)

Megachiropteran bats (fruit bats)

As was the case for the 2010 survey and previous surveys of the Werris Creek Coal mine area, no megachiropteran bats were recorded at the BOA during the current 2011 survey.

Microchiropteran bats (microbats)

Species richness and activity

Nine microbat species, including one threatened species listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act), *Miniopterus orianae oceanensis* (Eastern Bentwing Bat), were identified through ultra-sonic call detection (i.e. Anabat recordings) across the 10 fauna monitoring sites during the current monitoring period (**Table 10**). This represents 60 % (9 of 15) of the total number of species recorded across the Werris Creek mine site since 2004 (see **Table 10**). No new bat species were recorded. A full summary of the Anabat analysis is included in **Appendix D**.

In comparison to the 2010 survey, the total number of microbat species recorded during the 2011 survey decreased, with the 2010 survey recording a total of 11 species (**Appendix C**). The 2011 survey did not record two TSC Act threatened species, *Saccolaimus flaviventris* (Yellow-bellied Sheathtail Bat) or *Falsistrellus tasmaniensis* (Eastern False Pipistrelle), recorded in the 2010 survey. However, the 2011 survey recorded microbats at all monitoring plots, while the 2010 survey recorded microbats at 7 out of 10 monitoring plots (**Figure 13**). Other than at Site 9, the number of species recorded for each plot was also higher in 2011 compared to 2010. Further, rather than the highest number of species recorded at Site 9, as was the case in 2010, the highest number of species were recorded at Sites 1 and 5, followed closely by Sites 4 and 9.

Table 10: Bat species of the Werris Creek Coal Mine site and species recorded within the BOA

FAMILY	SPECIES	COMMON NAME	PRESENT IN BOA	
			2010	2011
Emballonuridae	***Saccolaimus flaviventris***	**Yellow-bellied Sheathtail Bat**	Yes	No
Molossidae	*Tadarida australis*	White-striped Freetail Bat	Yes	Yes
	Mormopterus species 3	Undescribed Little Mastiff Bat @ 25KHz	Yes	Yes
	Mormopterus species 4	Undescribed Little Mastiff Bat @ 30KHz	Yes	Yes
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	Yes	Yes
	Chalinolobus morio	Chocolate Wattled Bat	Yes	Yes
	Falsistrellus tasmaniensis	**Eastern False Pipistrelle**	Yes	No
	Miniopterus orianae oceanensis	**Eastern Bent-wing Bat**	Yes	Yes
	Nyctophilus geoffroyi	Lesser Long-eared Bat	No	No
	Nyctophilus sp.		Yes	Yes
	Scoteanax rueppellii	**Greater Broad-nosed Bat**	No	No
	Scotorepens balstoni	Inland Broad-nosed Bat	Yes	Yes
	Scotorepens greyii	Little Broad-nosed Bat	No	No
	Vespadelus darlingtoni	Large Forest Bat	No	No
	Vespadelus vulturnus	Little Forest Bat	Yes	Yes

* Species highlighted in **bold type** are listed as vulnerable under the TSC Act

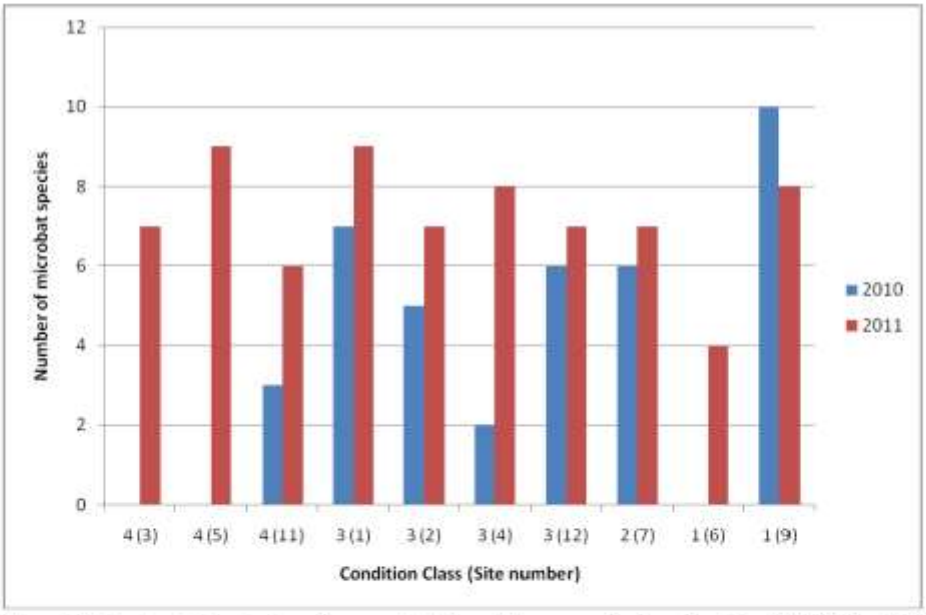


Figure 13: Number of microbat species recorded at each fauna monitoring site during the 2010 and 2011 monitoring periods

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 9 in the current survey, with the majority of calls recorded

for *Vespadelus vulturnus* (Little Forest Bat) followed by Eastern Bentwing Bat (**Figure 14**). This was also the case for the 2010 survey (although calls were mostly comprised of calls of *Tadarida australis* (White-striped Freetail Bat) and *Mormopterus* sp. 3), and was most likely due to the presence of a dam adjacent to Site 9, where microbats would come to water throughout the evening. The lowest number of calls was recorded at Site 6 in the current survey, with only two calls each recorded for Eastern Bentwing Bat, Little Forest Bat, *Chalinolobus gouldii* (Gould's Wattled Bat), and *Chalinolobus morio* (Chocolate Wattled Bat). This was also the case for the 2010 survey, which, along with Sites 3 and 5, did not record any bat activity at this site.

The number of microbat calls increased at all sites in 2011 compared to 2010, other than for Site 12, where the number of calls decreased (mostly for Gould's Wattled Bat and White-striped Freetail Bat).

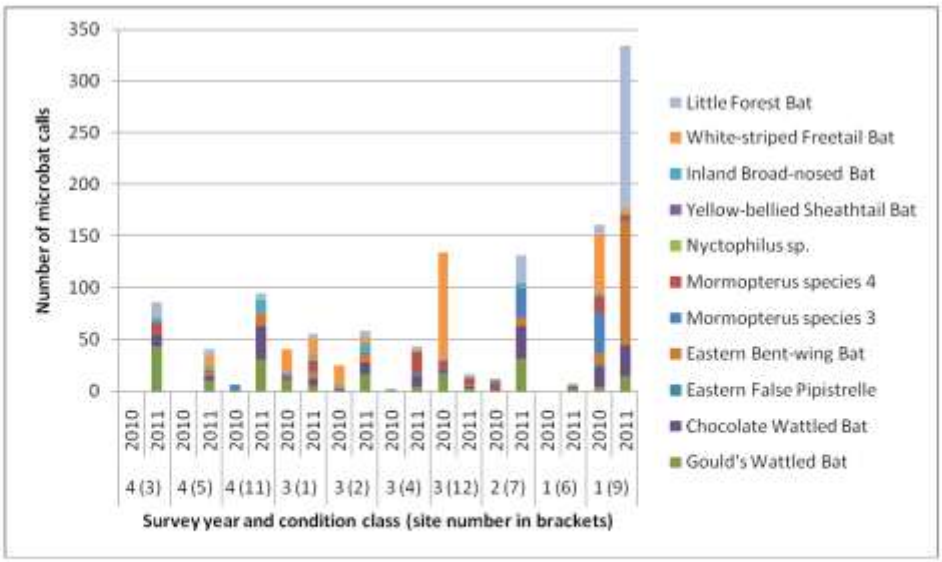


Figure 14: Microbat calls recorded across the BOA during the 2010 and 2011 monitoring periods

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 2011 survey found that the majority of bat species were 'above canopy' foragers, with Sites 6 and 11 recording 'above canopy' foragers only (**Figure 15**). This is in contrast to the 2010 survey, where 'above canopy' foragers dominated at Sites 4, 9 and 11 only (**Figure 15**). That the majority of microbats

were 'above canopy' foragers is not surprising given the current lack of an over-storey at most monitoring plots.

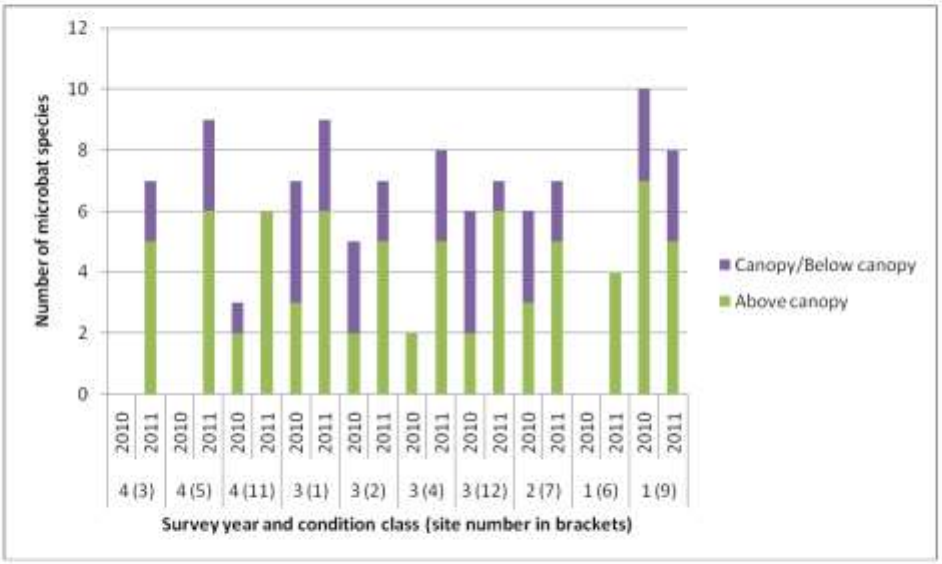


Figure 15: Species richness across the BOA, presented in terms of 'guilds' during the 2010 and 2011 monitoring periods

3.2.2 Diurnal Birds

Species richness

Current survey

An inventory of bird species recorded within each monitoring site and for the BOA is presented in **Appendix E**. A total of 58 bird species (56 native species including 2 threatened species, and 2 exotic species) were recorded during the current monitoring survey for the BOA. Of these, 48 were diurnal species which were recorded within the monitoring plots during formal bird censuses, while the remainder were either diurnal species recorded outside of formal census times for the entire BOA or nocturnal bird species (see **Appendix E**).

Results from the formal bird censuses showed that Condition Class 1 sites (Sites 6 and 9) recorded both the highest and the lowest totals of diurnal bird species of all of the monitoring plots (12 and 25 species recorded at Sites 6 and 9, respectively), although the highest diurnal bird species richness recorded at Site 9 was shared by a Condition Class 3 site, Site 2, while the lowest diurnal bird species richness recorded at Site 6 was shared by a Condition Class 2 site, Site 7. The high diurnal bird species richness recorded for Sites 2 and 9 reflected their positions adjacent to dams, where species of all guilds would attend to utilise these watering points. The low diurnal bird species richness recorded for Sites 6 and 7 possibly reflected the poorer condition of these monitoring plots, which had ground layers dominated by exotic species (see Section 3.1.1).

Condition Class 4 sites had relatively high diurnal bird species richness, with Sites 3 and 11 recording 18 bird species each, and Site 5 recording 17 bird species. Condition Class 3 sites recorded variable numbers of diurnal bird species; Sites 4 and 12 had moderate bird species richness (14 and 15 species, respectively), while Sites 1 and 2 had high bird species richness (17 and 25 species, respectively).

2010 versus 2011 survey

The 2011 survey recorded 24 native bird species that were not recorded during the 2010 survey during formal bird census (**Table 11**). Of the additional species recorded, 12 species are new species for the Werris Creek mine site; the remaining 12 species have previously been recorded for the Werris Creek mine site (**Table 11, Appendix C**). The additional species recorded included one threatened species listed under the TSC Act, *Stagonopleura guttata* (Diamond Firetail). Although the 2011 survey recorded additional species to those recorded in the 2010 survey, 11 native bird species, including the threatened species *Hieraaetus morphnoides* (Little Eagle), recorded in the 2010 survey, were not recorded in the 2011 bird censuses (**Table 12**).

The presence of these additional threatened bird species in the BOA does not require any changes to the management of the BOA.

In terms of the number of species recorded in 2011 versus 2010, higher numbers of bird species were recorded in the 2011 surveys compared to 2010, other than for one site, Site 7, where 12 species were recorded in 2011 and 13 species were recorded in 2010 (**Figure 16**). The patterns for sites with the highest and lowest number of species were similar for 2011 and 2010, with both survey years recording the highest number of species at Site 9, and the lowest number of species at Site 6 (although in 2011, there were other sites sharing the highest and lowest numbers of birds recorded; see 'Current Survey', this section). However, due to the increase in the number of bird species at the majority of monitoring plots in 2011, other patterns for species richness recorded in 2010 between sites were different in 2011.

Table 11: Diurnal bird species recorded in the 2011 survey which were not recorded during the 2010 survey during formal bird censuses

Bird Species	
Acanthiza chrysorrhoa (Yellow-rumped Thornbill)	*Elseyornis melanops* (Black-fronted Dotterel) ^
Accipiter fasciatus (Brown Goshawk) ^	*Gerygone olivacea* (White-throated Gerygone) ^
Anthus australis (Richard's Pipit)	*Hirundo neoxena* (Welcome Swallow)
Aquila audax (Wedge-tailed Eagle) ^	*Lalage tricolor* (White-winged Triller) ^
Artamus cyanopterus (Dusky Woodswallow)	*Malurus cyaneus* (Superb Fairywren)
Cacatua tenuirostris (Long-billed Corella) ^	*Microeca fascinans* (Jacky Winter)
Chenonetta jubata (Australian Wood Duck)	*Philemon corniculatus* (Noisy Friarbird)
Cincloramphus mathewsi (Rufous Songlark) ^	*Plectorhyncha lanceolata* (Striped Honeyeater) ^
Cisticola exilis (Golden-headed Cisticola) ^	*Rhipidura albiscapa* (Grey Fantail) ^
Corvus coronoides (Australian Raven)	*Stagonopleura guttata* (Diamond Firetail) ^
Coturnix ypsilophora (Brown Quail)	*Threskiornis molucca* (Australian White Ibis)
Elanus axillaris (Black-shouldered Kite)	*Todiramphus sanctus* (Sacred Kingfisher) ^

Species highlighted in **bold type** are listed as vulnerable under the TSC Act
^ New species for the Werris Creek Mine Site

Table 12: Diurnal bird species recorded in the 2010 survey which were not recorded during the 2011 survey during formal bird censuses

Bird Species	
Acanthagenys rufogularis (Spiny-cheeked Honeyeater)	*Hirundo ariel* (Fairy Martin)
Colluricincla harmonica (Grey Shrike-thrush)	*Lichenostomus penicillatus* (White-plumed Honeyeater)
Corvus mellori (Little Raven)	*Nymphicus hollandicus* (Cockatiel)
Egretta novaehollandiae (White-faced Heron)	*Pachycephala rufiventris* (Rufous Whistler)
Falco berigora (Brown Falcon)	*Pardalotus punctatus* (Spotted Pardalote)
Hieraaetus morphnoides (Little Eagle)	

Species highlighted in **bold type** are listed as vulnerable under the TSC Act

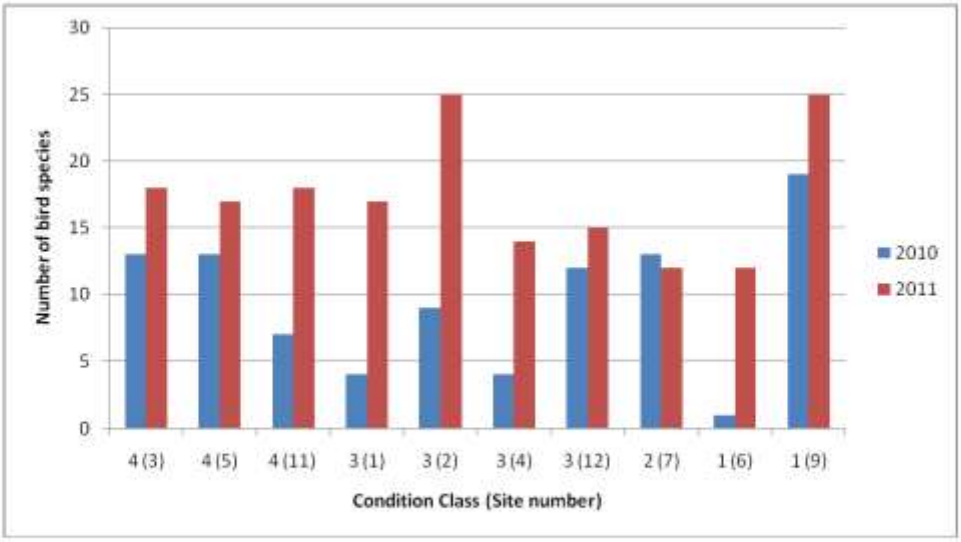


Figure 16: Number of bird species recorded at each fauna monitoring site during the 2010 and 2011 monitoring periods

Besides the bird species recorded during formal bird censuses, the 2011 survey recorded seven additional diurnal bird species to those recorded in the 2010 survey (recorded opportunistically). The additional species are shown in **Table 13**. One of the species recorded was the threatened species, *Oxyura australis* (Blue-billed Duck), listed under the TSC Act. This species was recorded on Dam 3 and is a new species recorded for the Werris Creek mine site (**Table 13, Appendix C**). Three other species are also new species for the Werris Creek mine site; the remaining species have previously been recorded for the Werris Creek mine site (**Table 13, Appendix C**).

Table 13: Diurnal bird species recorded in the 2011 survey which were not recorded during the 2010 survey (outside of formal bird censuses)

Bird Species	
Anas gracilis (Grey Teal)	*Phalacrocorax melanoleucos* (Little Pied Cormorant) ^
Aythya australis (Hardhead) ^	*Phalacrocorax varius* (Pied Cormorant) ^
Falco subniger (Black Falcon) ^	*Vanellus miles* (Masked Lapwing)
***Oxyura australis* (Blue-billed Duck) ^**	

Species highlighted in **bold type** are listed as vulnerable under the TSC Act
^ New species for the Werris Creek Mine Site

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

The prevalence of these guilds measured in terms of number of species is presented in **Figure 17**. Note that **Figure 17** presents data for all species recorded at monitoring plots during the 2011 survey, rather than during formal bird censuses only.

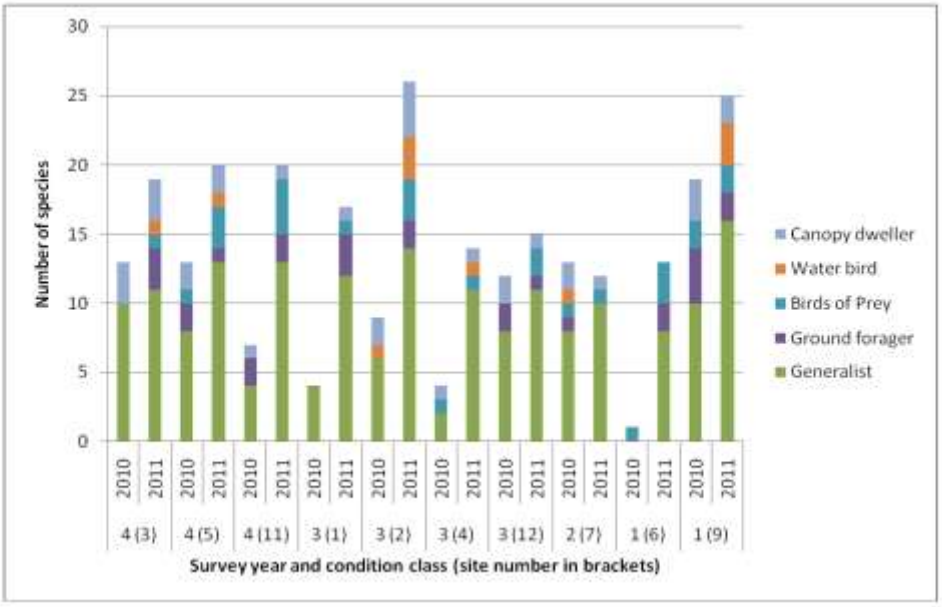


Figure 17: Abundance of species from selected bird guilds of the BOA during the 2010 and 2011 monitoring periods (data in 2011 shows bird species recorded for sites outside of formal bird censuses)

All guilds were represented within the BOA in both survey periods. However, the 2011 survey recorded a larger range of birds representative of different guilds at all monitoring sites compared to the 2010 survey, except for Site 7. For this site, species from five guilds were recorded in 2010, while species from only three guilds were recorded in 2011.

The overall increase in species representative of different guilds in 2011 compared to 2010 may reflect the improvement in condition of the sites in 2011 (see Section 3.1.1 for the improvements in condition at the monitoring plots). However, in some cases, the presence of birds within monitoring plots in 2011 may have reflected species flying over monitoring plots rather than using the plots. Such species would include waterbirds and canopy dwellers.

3.2.3 Nocturnal birds and mammals

Spotlighting and nocturnal call playback

Spotlighting and call playback survey recorded *Tyto alba* (Barn Owl) at all sites surveyed (Condition Class 4 sites: Sites 3, 5 and 10/11. Sites 10 and 11 were treated as one site), with *Ninox novaeseelandiae* (Southern Boobook) recorded at Sites 10/11 through call playback.

Mammals recorded through spotlighting surveys were White-striped Freetail Bat and *Vulpes vulpes* (European Red Fox). White-striped Freetail Bat was recorded at all sites surveyed, while European Red Fox was recorded at Sites 3 and 5.

Call playback undertaken for the nocturnal birds, Barking Owl, Sooty Owl, Masked Owl, Powerful Owl, Tawny Frogmouth and Owlet Night Jar, along with the Koala, did not elicit any responses for these species. Barn Owls responded to the calls of Masked Owl.

Refer to **Appendix C** for a full fauna inventory.

Opportunistic sightings

Opportunistic records of mammals were made during the survey period. Mammals observed in the BOA were *Lepus capensis* (Brown Hare), *Macropus giganteus* (Eastern Grey Kangaroo, and *Rattus* sp.

3.2.4 Herpetofauna

Eight reptile and five amphibian species were recorded during the spring 2011 monitoring period (**Table 14**). While the numbers of reptile and amphibian numbers recorded in 2010 were similar, the 2011 survey recorded seven species, *Litoria caerulea* (Green Tree Frog), *Limnodynastes tasmaniensis* (Spotted Marsh Frog), *Pogona barbata* (Eastern Bearded Dragon), *Anomalopus leuckartii* (Two-clawed Worm Skink), *Cryptoblepharus virgatus* (Wall Lizard), *Lampropholis delicata* (Garden Sunskink), and *Morethia boulengeri* (Boulenger's Morethia), which were not recorded during the 2010 survey (**Table 14**). The Wall Lizard and Garden Sunskink are new species for the Werris Creek Mine site (although it is suspected that previous surveys recorded Wall Lizard as other *Cryptoblepharus* sp.; **Appendix C**). Conversely, the 2010 survey recorded five species, *Neobatrachus sudelli* (Painted Burrowing Frog), *Pseudonaja textilis* (Eastern Brown Snake), *Cryptoblepharus pulcher* (Elegant Snake-eyed Skink), *Lampropholis guichenoti* (Pale-flecked / Grass Garden Sunskink), and *Menetia greyii* (Dwarf Skink), which were not recorded during the 2011 survey (**Table 14**).

In terms of the number of species recorded in 2011 versus 2010, higher numbers of herpetofauna were recorded in the 2011 surveys compared to 2010, other than for one dam, Dam 1, where two species were recorded in 2011 and four species were recorded in 2010 (**Figure 18**). Patterns for species richness recorded between sites were different in 2010 compared to 2011 (**Figure 18**). Details of the numbers of individuals of species recorded for each monitoring site are provided in **Appendix F**.

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

Table 14: Herpetofauna recorded within the BOA during the 2010 and 2011 surveys

Class	Family	Scientific Name	Common Name	2010	2011
Amphibia	Hylidae	*Litoria caerulea*	Green Tree Frog		x
	Hylidae	*Litoria peronii*	Peron's Tree Frog		x
	Myobatrachidae	*Crinia signifera*	Common Eastern Froglet		x
	Myobatrachidae	*Limnodynastes tasmaniensis*	Spotted Marsh Frog		x
	Myobatrachidae	*Neobatrachus sudelli*	Painted Burrowing Frog	x	
	Myobatrachidae	*Uperoleia laevigata*	Smooth Toadlet		?
Reptilia	Agamidae	*Pogona barbata*	Eastern Bearded Dragon		x
	Cheluidae	*Chelodina longicolli*	Eastern Snake-necked Turtle		x
	Elapidae	*Pseudonaja textilis*	Eastern Brown Snake	x	
	Scincidae	*Anomalopus leuckartii*	Two-clawed Worm-skink		x
	Scincidae	*Cryptoblepharus pulcher*	Elegant Snake-eyed Skink	x	
	Scincidae	*Cryptoblepharus virgatus* ^	Wall Lizard		x
	Scincidae	*Egernia striolata*	Tree skink		x
	Scincidae	*Lampropholis delicata* ^	Garden Sunskink		x
	Scincidae	*Lampropholis guichenoti*	Pale-flecked / Grass Garden Sunskink	x	
	Scincidae	*Menetia greyii*	Dwarf Skink	x	
	Scincidae	*Morethia boulengeri*	Boulenger's Morethia		?
	Scincidae	Unknown Reptile eggshells			x

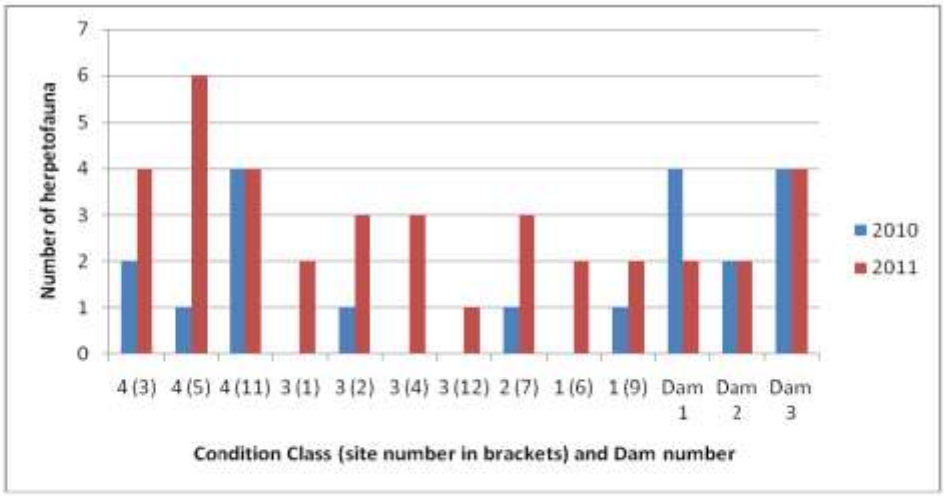


Figure 18: Number of herpetofauna recorded at each fauna monitoring site during the 2010 and 2011 monitoring periods

4 Recommendations and Conclusions

Analysis of 2010 and 2011 data has shown that the condition of monitoring plots has improved since the 2010 baseline survey. Since the 2010 survey, two plots reached benchmark condition for species richness for White Box grassy woodlands, while five plots had over 50% of the benchmark species richness for White Box grassy woodlands and Yellow Box – Blakely's Red Gum grassy woodland. This was an improvement to the 2010 survey, where no plots were over the benchmark species richness for any vegetation community, only two plots had near benchmark native species richness for White Box grassy woodlands, and all other sites were below 50% of the benchmark for native species richness for vegetation communities.

Weed management actions that occured in past 12 months, predominately within the BOA portion of the Eurunderee property, may have, in part, affected this result.

Benchmark condition for native overstorey cover was also reached for two sites in 2011 compared to 2010, where only one site reached the overstorey benchmark condition. While no completion criteria exist for the groundlayer to determine the trajectory towards vegetation in various conditions, the condition of the groundlayer improved in 2011 compared to 2010. In the 2011 survey, the proportion of native species relative to exotic species increased at eight monitoring plots compared to 2010. The cover of the groundlayer changed from being exotic dominated in 2010 to native dominated at the majority of sites in 2011. The completion criteria for bare ground and litter (not to exceed 55% for Box Gum Woodland and White Cypress Pine were met at every monitoring plot).

The results of the Landscape Function Analysis (LFA) were positive, and Soil Surface Assessment (SSA) returned high indices for site stability, nutrients and infiltration. While some changes were found for both LFA and SSA between 2010 and 2011, given the subjective nature of defining patches in LFA, and the fact that only two years of data have been collected, results from LFA may become clearer over a longer time scale such as following five years.

The improvement in the condition of the monitoring plots (in terms of native species richness, canopy cover and native ground cover) may have led to the increased bat species richness and activity at individual monitoring sites, as well as the increased bird species richness, recorded during the 2011 survey compared to the 2010 survey. While the total number of microbat species recorded during the 2011 survey decreased compared to the 2010 survey, the 2011 survey recorded microbats at all monitoring plots, while the 2010 survey recorded microbats at 7 out of 10 monitoring plots. The number of microbat calls increased at all sites in 2011 compared to 2010 at 11 out of 12 sites. Higher numbers of diurnal bird species were recorded in the 2011 surveys compared to 2010 at 11 out of 12 sites. The 2011 survey also recorded 19 new species for the Werris Creek Mine site, two of which (Diamond Firetail and Blue-billed Duck) are threatened.

This monitoring report makes the following recommendations for the BOA:

- Placement of coarse woody debris into areas that currently do not maintain this resource to encourage fauna species diversity (as per the previous report (ELA 2011));
- Introduction of nest boxes into appropriate habitat should be considered to encourage microbats and native avifauna (as per the previous report (ELA 2011)).

- 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;
- Review of monitoring plots located adjacent to dams that are biasing results of foraging guilds for micro bats and avifauna irrespective of the vegetation condtion class; and
- Inclusion of native ground cover benchmarks in completion critera to assess the trajectory towards self sustainability and meeting completion criteria (it is understood that ground cover critera exists which could be included).

The Biodiversity Offset Staregy and Management Plan (ELA 2010) is currently being updated to include the expanded Life of Mine Offset Areas (ELA in prep). Changes to the number, positioning and replication of the number of montoring plots and completion criteria will be addressed in this plan and implemented during the spring 2012 monitoring period.

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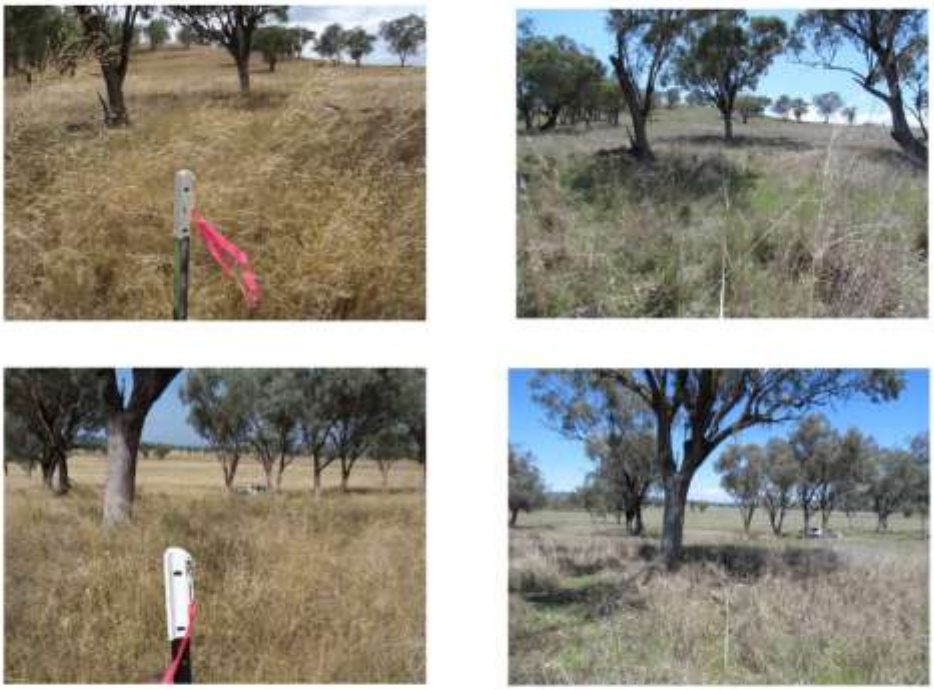
Werris Creek Coal (2011) Werris creek Coal Annual Environmental Managment Report 2010-2011. Report prepared 31 March 2011.

Appendix A: Photo Monitoring Points, Spring 2011

White Box grassy woodland – Class 4 (intact woodland)

Site 3. From top left, clockwise: 2010 looking east, 2011 looking east, 2011 looking west, 2010 looking west



Site 11. From top left, clockwise: 2010 looking west, 2011 looking west, 2011 looking east, 2010 looking east

White Box grassy woodland – Class 3 (derived native grassland)

Site 1. From top left, clockwise: 2010 looking upslope to the north-west, 2011 looking upslope to the north-west, 2011 looking downslope to the south-east, 2010 looking downslope to the south-east

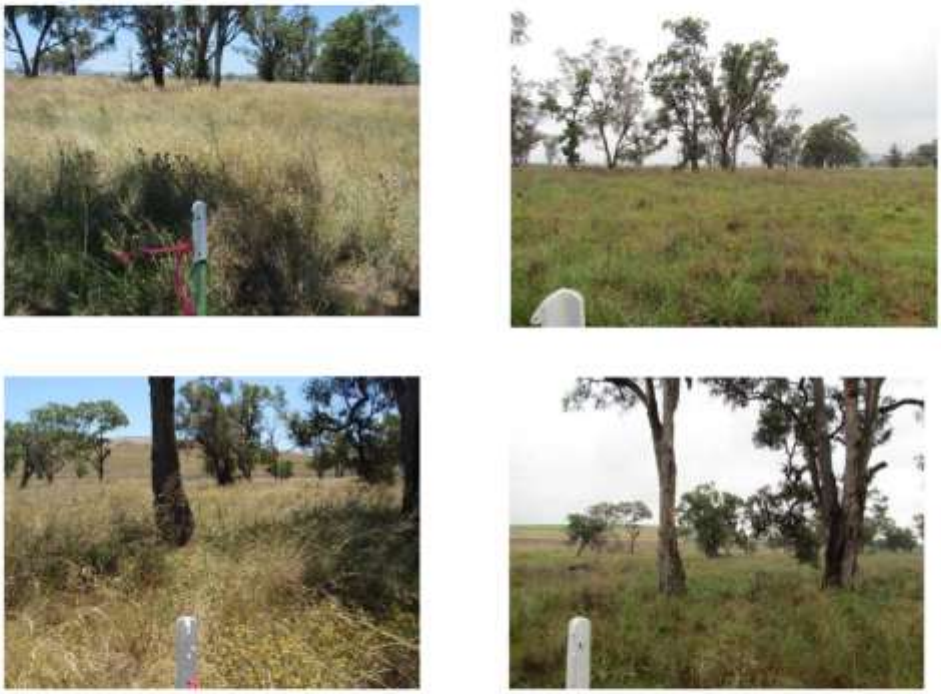
Site 2. From top left, clockwise: 2010 looking downslope to the south-west, 2011 looking downslope to the south-west, 2011 looking north-east, 2010 looking north-east

Site 4. From top left, clockwise: 2010 looking north, 2011 looking north, 2011 looking south, 2010 looking south

Site 8. From top left, clockwise: 2010 looking north-west, 2011 looking north-west, 2011 looking south-east, 2010 looking south-east

Site 12. From top left, clockwise: 2010 looking east, 2011 looking east, 2011 looking west, 2010 looking west

Yellow Box – Blakely's Red Gum grassy woodland (Class 4)



Site 5. From top left, clockwise: 2010 looking south-east, 2011 looking south-east, 2011 looking north-west, 2010 looking north-west

White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum shrubby open forest (Class 4)

Site 10. From top left, clockwise: 2010 looking west, 2011 looking west, 2011 looking east, 2010 looking east

White Box grassy woodland - Class 2 (Scattered Trees/Paddock Trees in Poor Condition)

Site 7: From top left, clockwise: 2010 looking south-east, 2011 looking south-east, 2011 looking north-west, 2010 looking north-west

Cleared Land (Mine Rehab Site) (Class 1)

Site 6: From top left, clockwise: 2010 looking south, 2011 looking south, 2011 looking north, 2010 looking north

Cleared Land (formerly cultivated land) (Class 1)

Site 9. From top left, clockwise: 2010 looking south-east, 2011 looking south-east, 2011 looking north-west, 2010 looking north-west

Appendix B: Biometric Condition Assessment and Flora Inventory, Spring 2011

Summary of Biometric Condition Assessment variables

Class	Native Overstorey	Native Midstorey	Native shrubs	Native grasses	Native herbs	Exotic Plant Cover	Native species	Exotic species	Exotic perennials	Exotic annuals	Hollow Bearing Trees (HBTs)	Overstorey Regeneration	Course woody Debris (CWD)
4 (3)	12.5	0	2	86	2	22	29	23	10	13	0	100	26
4 (5)	12	0	0	48	32	32	18	10	5	14	1	100	43
4 (11)	24.5	0	0	76	4	40	24	18	4	12	1	50	52
4 (10)	0	0	0	16	44	70	12	19	7	12	0	100	0
3 (1)	0	0	0	44	2	72	8	25	9	16	0	0	0
3 (2)	0	0	0	50	8	30	12	25	7	18	0	50	2
3 (4)	0	0	0	80	6	52	16	21	6	15	0	100	0
3 (8)	0	0	0	82	2	50	14	23	8	15	0	0	0
3 (12)	0	0	0	80	0	67	13	27	3	14	0	0	0
2 (7)	0	0	0	18	0	84	10	14	5	9	0	100	16
1 (6)	0	0	0	8	0	94	5	19	6	13	0	0	7
1 (9)	0	0	0	38	4	40	5	38	6	32	0	50	0

Summary of plot data

Family	Scientific Name	Common name	Growth Form	Native / Exotic	Annual/ Perennial	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10)		4 (11)		3 (12)	
Adiantaceae	Cheilanthes sieberi	Narrow Rock Fern	Fern	Native	Perennial			3	3	2	3									2	1								
Amaranthaceae	Alternanthera pungens	Khaki Weed	Herb	Exotic	Ephemeral or Perennial							2	5																
Apiaceae	Ammi majus	Bishops weed	Herb	Exotic	Annual									5	30	5	10					2	10	5	20	5	10	15	100
Apiaceae	[illegible]	Rock Fern / Carrot Weed	Herb	Exotic	Annual	2	2	5	10																				
Apocynaceae	Gomphocarpus sp.	Cotton Bush	Shrub	Exotic	Perennial													3	1										
Asteraceae	Calotis lappulacea	Lesser Burr-daisy, Yellow Daisy-burr	Herb	Native	Perennial					2	10	3	10													5	10		
Asteraceae	Calotis lappulacea	Yellow Burr-daisy, Yellow Daisy-burr	Herb	Native	Perennial							2	10							2	20			2	5				
Asteraceae	Carthamus lanatus	Saffron Thistle	Herb	Exotic	Annual	2	30	3	5	2	10	15	20	2	5	5	20	3	5	2	5			2	2	5	10	2	5
Asteraceae	Chrysocephalum apiculatum	Yellow Buttons, Common Everlasting	Herb	Native	Perennial							3	3																
Asteraceae	Cirsium vulgare	Spear Thistle	Herb	Exotic	Annual	2	3	2	3	2	2	2	5					3	5			3	10					2	5
Asteraceae	Conyza sp.	Fleabane	Herb	Exotic	Annual	2	10	3	3	5	5	3	5	2	10	10	200	3	10			3	30			2	5	2	5
Asteraceae	Cymbonotus lawsonianus	Bears Ear	Herb	Native	Annual			1	2			5	5	2	10											2	5		
Asteraceae	Euchiton sphaericus		Herb	Native	Annual			2	5			5	10							2	5								
Asteraceae	Hedypnois cretica	Cretan Weed	Herb	Exotic	Annual	5	5					3	10											3	5	5	5		
Asteraceae	Hedypnois sp.		Herb	Exotic	Annual									5	20														
Asteraceae	Hypochaeris glabra	Annual	Herb	Exotic	Perennial	2	5																						
Asteraceae	Hypochaeris radicata	Flatweed, Cats-ear	Herb	Exotic	Perennial	5	10	2	10	2	20			5	20	2	20			3	15	5	50	3	5				
Asteraceae	Lactuca serriola	Prickly Lettuce	Herb	Exotic	Biennial			2	5																				
Asteraceae	Onopordum acanthium	Scotch Thistle	Herb	Exotic	Perennial									2	5							2	2	2	2				
Asteraceae	Senecio quadridentatus	Cotton Fireweed	Herb	Native	Perennial			3	5	2	5			5	10			3	10	2	5			5	2	5	5	5	10
Asteraceae	Senecio sp.		Herb	Exotic	Perennial											5	10			2	5								
Asteraceae	Silybum marianum	Variegated Thistle	Herb	Exotic	Biennial	2	3	2	5							5	1											2	1
Asteraceae	Sonchus oleraceus	Common Sowthistle	Herb	Exotic	Annual	2	2			5	5	5	5			5	20			5	5	2	20	2	2	2	2	2	5
Asteraceae	Tragopogon porrifolius	Oyster Plant	Herb	Exotic	Biennial					5	10			5	10	5	10	2	5	5	2	5	5	5	5			5	5
Asteraceae	Vittadinia cuneata	Common Fuzzweed	Herb	Native	Perennial							2	5																
Asteraceae	Unknown Asteraceae		Herb	Unknown	A or P													2	15										
Asteraceae	Vittadinia cuneata	Fuzzweed	Herb	Native	Perennial					1	5	2	5	2	5					15	20					5	10		
Asteraceae	Vittadinia muelleri		Herb	Native	Perennial							2	5							10	5			2	10	2	5		
Asteraceae	Xanthium occidentale	Rough-fruit	Herb	Exotic	Annual			1	1																				
Boraginaceae	Echium plantagineum	Paterson's Curse, Salvation Jane	Herb	Exotic	Annual																			2	5				
Brassicaceae	Hirschfeldia incana	Hoary Brassica	Herb	Exotic	Annual											5	5												

Family	Scientific Name	Common name	Growth Form	Native / Exotic	Annual / Perennial	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10)		4 (11)		2 (12)	
Brassicaceae	Lepidium africanum	Common Peppercress	Herb	Exotic	A or P	2	3	6	10	2	5	2	5							2	10			3	10				
Brassicaceae	Lepidium didymum	Lesser Swinecress	Herb	Exotic	A or P							2	5																
Brassicaceae	Rapistrum rugosum	Giant Mustard / Turnip Weed	Herb	Exotic	A or B									10	3	5	10	3	5	2	5			5	2				
Campanulaceae	Wahlenbergia communis	Tufted Bluebell	Herb	Native	Perennial	2	15	3	10	2	5	2	5	2	1	2	5			3	50					2	10	3	5
Caryophyllaceae	Cerastium glomeratum	Mouse-ear Chickweed	Herb	Exotic	Annual			3	5	2	5			3	10					3	5							3	10
Caryophyllaceae	Paronychia brasiliana		Herb	Exotic	Perennial							2	3																
Caryophyllaceae	Petrorhagia nanteuilii	Proliferous Pink	Herb	Exotic	Annual	2	15	8	20	2	10			2	5					3	50			3	20	2	10	3	10
Caryophyllaceae	Polycarpon tetraphyllum	Four-leaf Allseed	Herb	Exotic	A or P			2	10																				
Caryophyllaceae	Silene gallica var. gallica	French Catchfly	Herb	Exotic	Annual	2	3	2	5																				
Chenopodiaceae	Einadia hastata	Berry Saltbush	Herb	Native	Perennial																			2	5	5	5		
Chenopodiaceae	Einadia nutans	Climbing Saltbush	Herb	Native	Perennial							2	5	1	20									2	5	2	5		
Chenopodiaceae	Einadia trigonos	Fishweed	Herb	Native	Perennial													2	1										
Chenopodiaceae	Maireana microphylla	Small-leaf Bluebush	Shrub	Native	Perennial	5	1																						
Clusiaceae	Hypericum perforatum	St Johns Wort	Shrub	Exotic	Annual	5	50	6	10	2	3	5	20											3	5	3	5		
Convolvulaceae	Convolvulus erubescens	Blushing Bindweed	Herb	Native	Perennial			2	3																	2	5		
Convolvulaceae	Dichondra sp. A		Herb	Native	Perennial			2	10			3	2	1	10											2	20		
Convolvulaceae	Dichondra repens	Kidney Grass, Kidney Weed	Herb	Native	Perennial											2	20												
Crassulaceae	Crassula sieberiana	Australian Stonecrop	Herb	Native	A or P															3	5								
Cyperaceae	Carex inversa		Herb	Native	Perennial	2	2			2	5	5	10	3	20			2	15			3	5						
Euphorbiaceae	Chamaesyce drummondii	Caustic Weed	Herb	Native	Perennial							2	5																
Fabaceae - Faboideae	Desmodium sp.		Herb	Native	Perennial											2	2												
Fabaceae - Faboideae	Desmodium varians	Slender Tick-trefoil	Herb	Native	Perennial																					2	5		
Fabaceae - Faboideae	Glycine tabacina		Herb	Native	Perennial							2	10																
Fabaceae - Faboideae	Lupinus sp.		Herb	Exotic	A or P											3	4												
Fabaceae - Faboideae	Medicago minima	Woolly Burr Medic	Herb	Exotic	Annual	1	1	3	10			2	10	3	20	5	100	3	10					2	10	3	5	3	20
Fabaceae - Faboideae	Medicago polymorpha	Burr Medic	Herb	Exotic	Annual					3	25																		
Fabaceae - Faboideae	Medicago sativa	Lucerne	Herb	Exotic	Perennial															1	5	3	20	2	10				
Fabaceae - Faboideae	Medicago scutellata	Snail Medic	Herb	Exotic	Annual							2	10																
Fabaceae - Faboideae	Medicago sp.	Medic	Herb	Exotic	A or P													3	25							2	5		
Fabaceae - Faboideae	Medicago truncatula	Barrel Medic	Herb	Exotic	Annual	5	25																						

Family	Scientific Name	Common name	Growth Form	Native / Exotic	Annual / Perennial	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10)		4 (11)		2 (12)	
Fabaceae - Faboideae	Swainsona sp.		Herb	Native	Perennial																					3	1		
Fabaceae - Faboideae	Trifolium arvense	Hare's-foot Clover	Herb	Exotic	Annual	2	5			3	50									3	100								
Fabaceae - Faboideae	Trifolium campestre	Hop Clover	Herb	Exotic	Annual	2	5			5	50	2	5							2	50							3	10
Fabaceae - Faboideae	Trifolium repens	White Clover	Herb	Exotic	Perennial															3	5	2	10						
Fabaceae - Faboideae	Trifolium resupinatum	Shaftal Clover	Herb	Exotic	Annual															3	25								
Fabaceae - Faboideae	Trifolium sp.	Clover	Herb	Exotic	Annual			3	10					2	5							3	15						
Fabaceae - Faboideae	Trifolium subterraneum	Subterranean Clover	Herb	Exotic	Annual															3	7								
Fabaceae - Faboideae	Trifolium vesiculosum	Arrowleaf Clover	Herb	Exotic	Annual											5	20												
Fabaceae - Faboideae	Vicia sativa	Common Vetch	Herb	Exotic	Annual									3	50	5	100	3	10										
Gentianaceae	Centaurium sp.		Herb	Exotic	Annual or Biennial							2	10													5	20		
Geraniaceae	Geranium solanderi	Native Geranium	Herb	Native	Perennial	2	3	3	5	2	3	5	10	2	5									2	5	3	5	3	2
Goodeniaceae	Goodenia pinnatifida		Herb	Native	Perennial							2	10	2	10													3	10
Goodeniaceae	Goodenia sp.		Herb	Native	Perennial							5	10																
Juncaceae	Juncus filicaulis		Sedge	Native	Perennial							1	3																
Juncaceae	Juncus sp.		Sedge	Native	Perennial					3	5	2	2	5	2					2	2	3	5					2	5
Juncaceae	Juncus subsecundus		Sedge	Native	Perennial					3	2																		
Lamiaceae	Mentha satureioides	Creeping Mint	Herb	Native	Perennial			5	50					3	50											5	20	5	50
Lamiaceae	Stachys arvensis	Stagger Weed	Herb	Exotic	Annual	2	2	2	5	1	1							3	1							2	2		
Liliaceae	Agapanthus sp.	Agapanthus	Herb	Exotic	Perennial	2	1																						
Lobeliaceae	Pratia concolor	Poison Pratia	Herb	Native	Perennial													10	100										
Lomandraceae	Lomandra multiflora	Many-flowered Mat-rush	Herb	Native	Perennial									3	10														
Malvaceae	Modiola caroliniana	Red-flowered Mallow	Herb	Exotic	Perennial							3	5	1	3														
Malvaceae	Sida [illegible]		Herb	Exotic	Perennial							2	5											2	5	3	5		
Malvaceae	Sida corrugata	Corrugated Sida	Herb	Native	Perennial																			3	2	2	3		
Myrsinaceae	Anagallis arvensis	Blue Pimpernel	Herb	Exotic	A or P	5	25	3	10	2	5									3	15								
Myrtaceae	Eucalyptus [illegible]		Tree	Native	Perennial	5	3																					2	2
Myrtaceae	Eucalyptus albens	White Box	Tree	Native	Perennial							15	1			5	15									1	10		
Myrtaceae	Eucalyptus dealbata	Tumbledown Red Gum	Tree	Native	Perennial																			10	1				
Oxalidaceae	Oxalis perennans		Herb	Native	Perennial	2	15	3	20	3	50	3	10	3	50			3	10	2	10			2	10	5	5	3	20
Papaveraceae	Papaver sp.	Poppy	Herb	Exotic	Annual																							3	10
Plantaginaceae	Plantago coronopus	Bucks Horn Plantain	Herb	Exotic	A or P	2	5																						
Plantaginaceae	Plantago lanceolata	Lambs Tongue	Herb	Exotic	Annual					2	5	3	10	2	5	2	20			5	100	2	10			3	5	3	10
Poaceae	Aira sp.		Grass	Exotic	Annual															1	2								
Poaceae	Aristida ramosa	Purple Wiregrass	Grass	Native	Perennial	25	500	6	10	20	500	3	5	5	50	4	10	5	10	2	10			5	30	5	10	3	5

Family	Scientific Name	Common name	Growth Form	Native / Exotic	Annual / Perennial	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10)		4 (11)		2 (12)	
Poaceae	Austrodanthonia bipartita	Wallaby Grass	Grass	Native	Perennial																					5	10		
Poaceae	Austrodanthonia spp.		Grass	Native	Perennial					3	5	3	10	3	20											5	5		
Poaceae	Austrostipa aristiglumis	Plains Grass	Grass	Native	Perennial									2	8			5	10			3	5			10	30	15	50
Poaceae	Austrostipa scabra	Speargrass	Grass	Native	Perennial							5	10													5	10		
Poaceae	Avena sativa	Oats	Grass	Exotic	Annual			6	20	6	10	5	20	2	20	5	50			2	10	10	50	5	10			5	10
Poaceae	Bothriochloa macra	Redgrass, Redleg Grass	Grass	Native	Perennial							2	5							5	10								
Poaceae	Briza minor	Shivery Grass, Small Shivery Grass, Quaking Grass	Grass	Exotic	Annual			5	30	3	5																		
Poaceae	Bromus catharticus	Prairie Grass	Grass	Exotic	A or P	4	100	10	20	3	50	5	10	5	100	5	100	5	20	3	20	2	10	3	10			5	50
Poaceae	Bromus molliformis	Silky Brome, Soft Brome	Grass	Exotic	Annual	5	100															2	10			3	10		
Poaceae	Chloris truncata	Windmill Grass	Grass	Native	Perennial															1	50								
Poaceae	Chloris ventricosa	Tall Chloris	Grass	Native	Perennial							2	5																
Poaceae	Cynodon dactylon	Couch, Bermudagrass	Grass	Native	Perennial					15	50																		
Poaceae	Eragrostis sp.		Grass	Exotic	Perennial							3	5																
Poaceae	Hordeum leporinum	Barley-grass	Grass	Exotic	Annual																			3	5				
Poaceae	Hyparrhenia hirta		Grass	Exotic	A or P															2	5								
Poaceae	Lachnagrostis filiformis		Grass	Native	A or P																	2	5						
Poaceae	Lolium perenne	Perennial Ryegrass	Grass	Exotic	Perennial	10	500	5	50	4	100	5	50	5	500	5	500	60	1000					3	5	3	5	15	100
Poaceae	Panicum effusum	Hairy Panic	Grass	Native	Perennial					2	3							1	1										
Poaceae	Paspalum dilatatum		Grass	Exotic	Perennial											2	1												
Poaceae	Rostraria cristata	Annual Cats Tail	Grass	Exotic	Annual			3	10			2	5					2	10	5	10								
Poaceae	Sporobolus creber	Western Rat-tail Grass	Grass	Native	Perennial					2	3	2	5							5	10								
Poaceae	Vulpia ciliata	Rat Fescue	Grass	Exotic	Annual															5	20								
Polygonaceae	Rumex brownii	Swamp Dock, Slender Dock	Herb	Native	Perennial	2	3	2	3	3	5	3	5	2	5			3	10			3	20	3	5	3	2	3	5
Rubiaceae	Asperula conferta	Common Woodruff	Herb	Native	Perennial							2	10	5	100													3	10
Rubiaceae	Galium aparine		Herb	Exotic	Annual									1	2							2	5						
Scrophulariaceae	Verbascum thapsus	Great Mullein	Herb	Exotic	Biennial			1	2																				
Solanaceae	Solanum nigrum	Blackberry Nightshade	Herb / Shrub	Exotic	Perennial			2	3																	2	2		
Solanaceae	Solanum sp.		Herb / Shrub	Exotic	Perennial													1	1										
Urticaceae	Urtica incisa	Stinging Nettle	Herb	Native	Perennial													3	5					3	10	5	5	3	7
Verbenaceae	Verbena bonariensis	Purpletop	Herb	Exotic	Perennial	1	1			2	3	2	3									2	2					3	5
	Unknown herb		Herb	Unknown	A or P													1	1										
			Total number of species per plot			33		37		37		52		37		24		24		37		21		31		40		30	

New species recorded in the 2011 survey that were not recorded in the 2010 survey are shown in green text.

Appendix C: Fauna of the Werris Creek Coal Mine and BOA (2004 to 2011)

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
Amphibia	Hylidae	Litoria caerulea	Green Tree Frog	x				x											x
	Hylidae	Litoria peronii	Peron's Tree Frog	x					x					x				x	x
	Hylidae	Litoria rubella	Desert Tree Frog	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
	Myobatrachidae	Neobatrachus sudelli	Painted Burrowing Frog	x														x	
	Myobatrachidae	Uperoleia laevigata	Smooth Toadlet	x										x				x	x ?
Aves	Acanthizidae	Acanthiza chrysorrhoa	Yellow-rumped Thornbill														x		x
	Acanthizidae	Gerygone albogularis	White-throated Gerygone																x
	Accipitridae	Accipiter fasciatus	Brown Goshawk																x
	Accipitridae	Aquila audax	Wedge-tailed Eagle																x
	Accipitridae	Elanus axillaris	Black-shouldered Kite							x		x				x	x		x
	Accipitridae	***Hieraaetus morphnoides***	**Little Eagle**									x				x		x	
	Anatidae	Anas gracilis	Grey Teal													x			x
	Anatidae	Anas superciliosa	Pacific Black Duck			x	x			x						x	x	x	x
	Anatidae	Aythya australis	Hardhead																x
	Anatidae	Chenonetta jubata	Australian Wood Duck		x	x	x			x		x				x	x		x
	Anatidae	***Oxyura australis***	**Blue-billed Duck**																x
	Anatidae	Dendrocygna eytoni	Plumed Whistling-Duck													x			
	Ardeidae	Egretta novaehollandiae	White-faced Heron			x	x			x		x				x	x	x	x
	Artamidae	Artamus cyanopterus	Dusky Woodswallow		x	x	x			x	x	x				x			x
	Artamidae	Cracticus nigrogularis	Pied Butcherbird		x	x	x				x	x				x	x	x	x
	Artamidae	Cracticus torquatus	Grey Butcherbird							x	x					x		x	x
	Artamidae	Gymnorhina tibicen	Australian Magpie		x	x	x			x	x	x				x	x	x	x
	Artamidae	Strepera graculina	Pied Currawong				x									x			
	Cacatuidae	Cacatua galerita	Sulphur crested Cockatoo			x	x			x	x	x				x		x	x
	Cacatuidae	Cacatua tenuirostris	Long-billed Corella																x
	Cacatuidae	Eolophus roseicapillus	Galah		x	x	x			x	x	x				x	x	x	x
	Cacatuidae	Nymphicus hollandicus	Cockatiel								x					x		x	
	Campephagidae	Coracina novaehollandiae	Black-faced Cuckoo-shrike		x	x	x			x						x		x	x
	Campephagidae	Coracina papuensis	White-bellied Cuckoo-shrike													x			
	Campephagidae	Lalage tricolor	White-winged Triller																x
	Charadriidae	Elseyornis melanops	Black-fronted Dotterel																x
	Charadriidae	Vanellus miles	Masked Lapwing			x	x			x									x
	Climacteridae	***Climacteris picumnus***	**Brown Treecreeper**													x			
	Columbidae	Columba livia	Rock Dove *									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
	Columbidae	Geopelia striata	Peaceful Dove			x	x												
	Columbidae	Ocyphaps lophotes	Crested Pigeon								x	x				x		x	x
	Cuculidae	Eudynamys orientalis	Pallid Cuckoo			x	x												
	Corvidae	Corvus bennetti	Little Crow			x	x			x									
	Corvidae	Corvus coronoides	Australian Raven		x	x	x					x				x	x		x
	Corvidae	Corvus mellori	Little Raven															x	
	Cuculidae	Scythrops novaehollandiae	Channel-billed Cuckoo															x	x
	Dicaeidae	Dicaeum hirundinaceum	Mistletoebird													x			
	Dicruridae	Grallina cyanoleuca	Magpie-lark									x				x	x	x	x
	Dicruridae	Rhipidura albiscapa	Grey Fantail																x
	Dicruridae	Rhipidura leucophrys	Willie Wagtail		x	x	x					x				x	x	x	x
	Estrildidae	Stagonopleura guttata	Diamond Firetail																x
	Falconidae	Falco berigora	Brown Falcon									x					x	x	
	Falconidae	Falco cenchroides	Nankeen Kestrel		x	x	x			x		x				x	x	x	x
	Falconidae	Falco peregrinus	Peregrine Falcon			x	x					x							
	Falconidae	Falco subniger	Black Falcon																x
	Halcyonidae	Dacelo novaeguineae	Laughing Kookaburra			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	
	Hirundinidae	Hirundo neoxena	Welcome Swallow													x	x		x
	Hirundinidae	Petrochelidon nigricans	Tree Martin			x	x									x	x	x	x
	Maluridae	Malurus cyaneus	Superb Fairy-wren													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	
	Meliphagidae	Manorina melanocephala	Noisy Miner		x	x	x			x	x	x				x	x	x	x
	Meliphagidae	Philemon corniculatus	Noisy Friarbird		x	x	x									x			x
	Meliphagidae	Plectorhyncha lanceolata	Striped Honeyeater																x
	Motacillidae	Anthus australis	Australian (Richard's) Pipit									x							x
	Pachycephalidae	Colluricincla harmonica	Grey Shrike-thrush															x	
	Pachycephalidae	Pachycephala rufiventris	Rufous Whistler															x	
	Pardalotidae	Pardalotus punctatus	Spotted Pardalote		x	x	x										x	x	
	Pardalotidae	Pardalotus striatus	Striated Pardalote		x	x	x									x		x	x
	Passeridae	Passer domesticus	House Sparrow													x			
	Petroicidae	Melanodryas cucullata	Hooded Robin				x												
	Petroicidae	Microeca fascinans	Jacky Winter													x			x
	Phasianidae	Phalacrocorax melanoleucos	Little Red Cormorant																x
	Phasianidae	Phalacrocorax varius	Pied Cormorant																x
	Phasianidae	Coturnix pectoralis	Stubble Quail		x	x	x			x		x							
	Phasianidae	Coturnix ypsilophora	Brown Quail													x	x		x
	Podargidae	Podargus strigoides	Tawny Frogmouth		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
	Podicipedidae	Tachybaptus novaehollandiae	Australasian Grebe													x	x	x	x
	Psittacidae	Alisterus scapularis	Australian King-Parrot															x	x
	Psittacidae	Glossopsitta concinna	Musk Lorikeet							x						x	x	x	x
	Psittacidae	Glossopsitta pusilla	Little Lorikeet			x	x												
	Psittacidae	Platycercus adscitus pileatus	Eastern Rosella		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
	Psittacidae	Psephotus varius	Mulga Parrot			x	x												
	Strigidae	Ninox novaeseelandiae	Southern Boobook			x	x			x		x							x
	Sturnidae	Sturnus vulgaris *	European Starling			x						x				x	x	x	x
	Sturnidae	Turdus merula *	Common Myna									x						x	x
	Sylviidae	Cincloramphus mathewsi	Rufous Songlark																x
	Sylviidae	Cisticola exilis	Golden-headed Cisticola																x
	Threskiornithidae	Threskiornis moluccus	Australian White Ibis		x	x	x												x
	Tytonidae	Tyto alba	Barn Owl									x				x			x
Mammals (non-flying)	Bovidae	Bos taurus*	Cow			x				x						x			x
	Canidae	Canis (lupus) familiaris *	Dog			x				x						x			
	Canidae	Vulpes vulpes *	European Red Fox			x				x						x	x	x	x
	Felidae	Felis catus*	Feral Cat			x				x									
	Leporidae	Lepus capensis *	Brown Hare																x
	Leporidae	Oryctolagus cuniculus *	European Rabbit			x				x						x	x		
	Macropodidae	Macropus giganteus	Eastern Grey Kangaroo			x				x	x					x			x
	Macropodidae	Macropus robustus	Wallaroo			x										x	x		
	Macropodidae	Macropus rufogriseus	Red-necked Wallaby			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 vulpecula	Common Brushtail Possum			x				x						x	x		
	Tachyglossidae	Tachyglossus aculeatus	Short-beak Echidna			x										x			
Mammals (Bats)	Emballonuridae	Saccolaimus flaviventris	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
	Molossidae	Mormopterus species 4	Undescribed Little Mastiff-bat @ 32kHz							x		x	x			x		x	x
	Molossidae	Tadarida australis	White-striped Free-tail (= Mastiff-bat) Bat			x				x		x				x		x	x
	Vespertilionidae	Chalinolobus gouldii	Gould's Wattled Bat			x				x		x	x			x		x	x
	Vespertilionidae	Chalinolobus morio	Chocolate Wattled Bat							x			x			x		x	x
	Vespertilionidae	Falsistrellus tasmaniensis	Eastern False Pipistrelle										x			x		x	
	Vespertilionidae	Miniopterus orianae oceanensis	Eastern Bent-wing Bat			x							x			x		x	x
	Vespertilionidae	Nyctophilus geoffroyi	Lesser Long-eared Bat			x													
	Vespertilionidae	Nyctophilus sp.										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	

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
	Vespertilionidae	*Scotorepens greyi*	Little Broad-nosed Bat										x						x
	Vespertilionidae	*Vespadelus darlingtoni*	Large Forest Bat			x				x		x							
	Vespertilionidae	*Vespadelus vulturnus*	Little Forest Bat							x			x	x	x	x	x	x	x
Reptile	Agamidae	*Pogona barbata*	Eastern Bearded Dragon											x	x				x
	Cheloniidae	*Chelodina longicollis*	Eastern Snake-necked Turtle	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			
	Gekkonidae	*Gehyra variegata* (egg shells)	Common Dtella																
	Gekkonidae	*Oedura robusta*	Robust Velvet Gecko													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*	Boulti Snake-lizard	x															
	Pygopodidae	*Lialis burtonis*	Burton's Snake-lizard	x				x											
	Scincidae	*Anomalopus leuckarti*	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	
	Scincidae	*Cryptoblepharus virgatus*	Wall Lizard																x
	Scincidae	*Ctenotus robustus*	Eastern Striped Skink	x								x		x		x			
	Scincidae	*Egernia striolata*	Tree skink						x							x		x	x
	Scincidae	*Eulamprus tenuis*	Greater Bar-sided Skink	x						x				x	x	x			
	Scincidae	*Lampropholis delicata*	Garden Sunskink																x
	Scincidae	*Lampropholis guichenoti*	Pale-flecked / Grass Garden Sunskink															x	
	Scincidae	*Menetia greyii*	Dwarf Skink	x				x	x							x		x	
	Scincidae	*Morethia boulengeri*	Boulenger's Morethia	x						x		x		x	x	x			x [1]
	Scincidae	Unknown Reptile eggshells	(Possibly *M. boulengeri*)					x	x							x			
	Scincidae	Unknown Reptile eggshells																	x
	Typhlopidae	*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 have not been previously recorded

Appendix D: Anabat Results, Spring 2011

Number of Definite, Probable, and Possible calls for Microbat species per condition class and monitoring plot for the 2011 monitoring survey undertaken across the BOA. Categories of confidence in species identification follow Mills *et. al* (1996).

Scientific Name	Common Name	Condition class (Site no.)									
		4			3				2	1	
		3	5	11	1	2	4	12	7	6	9
Chalinolobus gouldi	Gould's Wattled Bat	44	10	31	6	17	5	3	32	2	15
Chalinolobus morio	Chocolate Wattled Bat	11	5	32	6	11	10	2	31	2	30
Minopterus orianae oceanensis	**Eastern Bent-wing Bat**	1	4	12	7	8	1	2	8	2	120
Mormopterus species 3	Undescribed Little Mastiff-bat @ 25KHz	0	1	0	2	0	3	0	27	0	1
Mormopterus species 4	Undescribed Little Mastiff-bat @ 30KHz	10	1	0	9	1	19	5	1	0	4
Nyctophilus sp		0	1	1	3	0	1	1	0	0	2
Scotorepens greyi	Inland Broadnosed Bat	4	2	12	1	9	0	1	6	0	0
Tadarida australis	White-striped Freetail Bat	1	10	0	16	7	1	0	0	0	5
Vespadelus vulturnus	Little Forest Bat	15	7	6	6	5	4	3	28	2	157

Bold text denotes a threatened species

Appendix E: Bird Census Results, Spring 2011

Family	Scientific Name	Common name	Guild	Condition Class Site number; A = a.m.; B = p.m.																		Incidental
				4						3								2		1		
				3A	3B	5A	5B	11A	11B	1A	1B	2A	2B	4A	4B	12A	12B	7A	7B	6A	6B	9A	9B	
Acanthizidae	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Generalist																			x		
Acanthizidae	Gerygone olivacea	White-throated Gerygone	Generalist									x	x											
Accipitridae	Accipiter fasciatus	Brown Goshawk	Bird of Prey									x	x											
Accipitridae	Aquila audax	Wedge-tailed Eagle	Bird of Prey					x					x										x	
Accipitridae	Elanus axillaris	Black-shouldered Kite	Bird of Prey			x		x	x							x		x		x	x	x	x	
Anatidae	Anas gracilis	Grey Teal	Water bird																					x (at Dam 3)
Anatidae	Anas superciliosa	Pacific Black Duck	Water bird																			x		
Anatidae	Aythya australis	Hardhead	Water bird																					x (at Dam 3)
Anatidae	Chenonetta jubata	Australian Wood Duck	Water bird			x																		
Anatidae	Oxyura australis	Blue-billed Duck	Water bird																					x (at Dam 3)
Ardeidae	Egretta novaehollandiae	White-faced Heron	Water bird																					x (north of site 5)
Artamidae	Artamus cyanopterus	Dusky Woodswallow	Generalist							x					x									
Artamidae	Cracticus nigrogularis	Pied Butcherbird	Generalist	x	x	x		x	x						x		x					x		
Artamidae	Cracticus torquatus	Grey Butcherbird	Generalist												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		
Artamidae	Strepera graculina	Pied Currawong	Generalist																					x site 5 during night survey
Cacatuidae	Cacatua galerita	Sulphur-crested Cockatoo	Generalist	x		x	x	x					x	x	x	x		x	x	x				
Cacatuidae	Cacatua tenuirostris	Long-billed Corella	Generalist			x												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	
Campephagidae	Coracina novaehollandiae	Black-faced Cuckoo-shrike	Generalist					x	x														x	
Campephagidae	Lalage leucomela	White-winged Triller	Generalist							x	x													
Charadriidae	Elseyornis melanops	Black-fronted Dotterel	Water bird									x	x									x	x	
Charadriidae	Vanellus miles	Masked Lapwing	Ground forager																					x (entrance road)
Columbidae	Ocyphaps lophotes	Crested Pigeon	Generalist			x						x					x							
Corvidae	Corvus coronoides	Australian Raven	Generalist					x	x						x	x	x			x		x	x	
Cuculidae	Scythrops novaehollandiae	Channel-billed Cuckoo	Generalist									x												
Dicruridae	Grallina cyanoleuca	Magpie-lark	Ground forager	x				x		x		x								x				
Corcoracidae	Struthidea cinerea	Grey Partial	Generalist								x													

Family	Scientific Name	Common name	Guild	Condition Class Site number; A = a.m.; B = p.m.																		Incidental
				4						3								2		1		
				3A	3B	5A	5B	11A	11B	1A	1B	2A	2B	4A	4B	12A	12B	7A	7B	6A	6B	9A	9B	
Dicruridae	Rhipidura leucophrys	Willy Wagtail	Ground forager	x						x	x	x										x	x	
Estrildidae	Stagonopleura guttata	Diamond Firetail	Ground forager																			x		
Falconidae	Falco cenchroides	Nankeen Kestrel	Bird of Prey							x	x	x	x	x	x	x				x				
Falconidae	Falco subniger	Black Falcon	Bird of Prey																					x (between 3 and 5, also at 6)
Halcyonidae	Dacelo novaeguineae	Laughing Kookaburra	Generalist		x			x								x						x		
Halcyonidae	Todiramphus sanctus	Sacred Kingfisher	Generalist																			x		
Hirundinidae	Hirundo neoxena	Welcome Swallow	Canopy dweller	x			x					x										x		
Hirundinidae	Petrochelidon nigricans	Tree Martin	Canopy dweller									x		x										
Maluridae	Malurus cyaneus	Superb Fairywren	Generalist			x		x		x	x									x		x	x	
Meliphagidae	Manorina melanocephala	Noisy Miner	Generalist	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x			x		
Meliphagidae	Philemon corniculatus	Noisy Friarbird	Canopy dweller	x								x												
Meliphagidae	Plectorhyncha lanceolata	Striped Honeyeater	Generalist									x												
Motacillidae	Anthus australis	Richard's Pipit	Ground forager							x	x													
Pardalotidae	Pardalotus striatus	Striated Pardalote	Canopy dweller	x	x	x	x	x	x	x		x				x	x	x				x	x	
Petroicidae	Microeca fascinans	Jacky Winter	Generalist										x											
Phalacrocoracidae	Poliocephalus poliocephalus	Little Pied Cormorant	Water bird																					x (at site 2)
Phalacrocoracidae	Phalacrocorax varius	Pied Cormorant	Water bird		x																			
Phasianidae	Coturnix ypsilophora	Brown Quail	Ground forager		x		x	x								x	x							
Podicipedidae	Tachybaptus novaehollandiae	Australasian Grebe	Water bird									x										x	x	
Psittacidae	Alisterus scapularis	Australian King-Parrot	Generalist					x	x			x				x			x				x	
Psittacidae	Glossopsitta concinna	Musk Lorikeet	Generalist				x	x		x		x				x	x		x			x	x	
Psittacidae	Platycercus adscitus eximius	Eastern Rosella	Generalist	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	
Rhipiduridae	Rhipidura rufifrons	Rufous Fantail	Bird of Prey																					At 10/11 (during call playback)
Sturnidae	Sturnus vulgaris *	European Starling	Generalist	x	x	x	x	x		x	x		x	x	x			x		x	x	x	x	
Sturnidae	Turdus merula *	Common Myna	Generalist		x															x		x	x	
Sylviidae	Cincloramphus mathewsi	Rufous Songlark	Generalist	x						x	x	x												
Sylviidae	Cisticola exilis	Golden-headed	Ground																	x	x			

Family	Scientific Name	Common name	Guild	Condition Class Site number: A = a.m. / B = p.m.																				Incidental
				4						3								2		1				
				3A	3B	5A	5B	11A	11B	1A	1B	2A	2B	4A	4B	12A	12B	7A	7B	6A	6B	9A	9B	
		Ducks	Forager																					
Threskiornithidae	Threskiornis molucca	Australian White Ibis	Water bird											•										
Tytonidae	Tyto alba	Barn Owl	Bird of Prey																					At 3, 5, 10/11 (during spotlighting and call playback)
			Total for AM/PM	14	12	13	10	10	10	15	12	21	12	10	11	13	10	10	9	12	5	22	16	
			Total for Site		18		17		18		17		25		14		15		12		12		25	

Bold text denotes a threatened species

* Denotes an exotic species

Green text denotes new species for the study area recorded during the 2011 survey

Blue text denotes species recorded during the 2011 survey which were not recorded during the 2010 survey (species are not new records for the study area)

Red text denotes species recorded during the 2010 survey which were not recorded within monitoring sites during the 2011 survey (but were recorded opportunistically)

Appendix F: Herpetofauna Search Results, Spring 2011

Class	Family	Scientific Name	Common Name	Condition class (Site number)									Dam 1	Dam 2	Dam 3
				4			3				2	1			
				3	5	11	1	2	4	12	7	6	9			
Amphibia	Hylidae	*Litoria caerulea*	Green Tree Frog								x				
	Hylidae	*Litoria peronii*	Peron's Tree Frog	x	x	x								x	x
	Myobatrachidae	*Crinia signifera*	Common Eastern Froglet		x								x		
	Myobatrachidae	*Limnodynastes tasmaniensis*	Spotted Marsh Frog	x	x			x					x	x	x
	Myobatrachidae	*Uperoleia laevigata*	Smooth Toadlet						x ?						
Reptilia	Agamidae	*Pogona barbata*	Eastern Bearded Dragon	1											
	Cheluidae	*Chelodina longicolli*	Eastern Snake-necked Turtle			1		1							2
	Scincidae	*Anomalopus leuckarti*	Two-clawed Worm-skink			1									
	Scincidae	*Cryptoblepharus virgatus*	Wall Lizard	2	5	11	2				4	2	3			
	Scincidae	*Egernia striolata*	Tree skink		2		1	3	1	3		1	1			
	Scincidae	*Lampropholis delicata*	Garden Sunskink		1										
	Scincidae	*Morethia boulengeri*	Boulenger's Morethia						1 ?						
	Scincidae	Unknown Reptile eggshells									x				

Green text denotes new species for the Werris Creek Mine Site

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WOLLONGONG
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Austinmer NSW 2515
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DARWIN
16/56 Marina Boulevard
Cullen Bay NT 0820
T 0488 050 916

Appendix 6
Blast Monitoring Reports

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Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-18	4/04/2011	13:40	S10_8-9_Deseam	IB	NM	NM	<0.37	<109.9	<0.20	<109.9	<0.37	<109.9	<0.20	<109.9	NM	NM	10.00	120.0
11-19	4/04/2011	13:40	S9_14-15_Fcoal	IB	NM	NM	<0.37	<109.9	<0.20	<109.9	<0.37	<109.9	<0.20	<109.9	NM	NM	10.00	120.0
11-20	7/04/2011	14:12	S9_13_Gcoal	IB	<0.37	<109.9	0.28	110.2	0.34	108.7	0.58	113.2	NM	NM	<0.37	<109.9	10.00	120.0
11-21	11/04/2011	15:22	S10_11-12_Fseam	IB	<0.37	<109.9	<0.37	<109.9	<0.20	<109.9	0.48	108.2	NM	NM	<0.37	<109.9	10.00	120.0
11-22	15/04/2011	13:17	S9_17_Gseam	IB	NM	NM	0.35	111.5	0.53	109.8	0.42	106.2	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-23	14/04/2011	13:16	S10_11-12_Fseam	IB	NM	NM	<0.37	<109.9	<0.20	<109.9	<0.37	<109.9	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-24	18/04/2011	13:18	S10_19_330	IB	NM	NM	0.29	110.7	0.27	106.7	0.42	110.4	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-25	21/04/2011	13:17	S11_12_385	OB	NM	NM	<0.37	<109.9	0.83	107.6	1.12	110.2	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-26	29/04/2011	13:12	S10_8-9_Deseam Pt2	IB	<0.37	<109.9	<0.37	<109.9	<0.20	<109.9	<0.37	<109.9	NM	NM	NM	NM	10.00	120.0
TOTALS	**APRIL**	**# BLAST**	**9**	**AVERAGE**	**<0.37**	**<109.9**	**0.31**	**110.8**	**0.49**	**108.2**	**0.60**	**109.6**	**<0.20**	**<109.9**	**<0.37**	**<109.9**	**5.00**	**115.0**
TOTALS	**APRIL**	**# BLAST**	**9**	**HIGHEST**	**<0.37**	**<109.9**	**0.35**	**111.5**	**0.83**	**109.8**	**1.12**	**113.2**	**<0.20**	**<109.9**	**<0.37**	**<109.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**9**	**AVERAGE**	**<0.37**	**<109.9**	**0.31**	**110.8**	**0.49**	**108.2**	**0.60**	**109.6**	**<0.20**	**<109.9**	**<0.37**	**<109.9**	**5.00**	**115.0**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-27	4/05/2011	13.12	S12_5-7_385	OB	NM	NM	0.42	108.2	0.38	102.5	0.54	110.1	<0.20	<109.9	NM	NM	10.00	120.0
11-28	13/05/2011	13.21	S10_slip_340	IB	NM	NM	0.42	108.2	0.38	102.5	0.54	110.1	<0.20	<109.9	NM	NM	10.00	120.0
11-29	13/05/2011	13.21	S10_4-7_320TSB6	TS	NM	NM	<0.37	<109.9	0.95	95.5	0.97	108.6	<0.20	<109.9	NM	NM	10.00	120.0
11-30	19/05/2011	13.22	S9_8-9_300	IB	NM	NM	<0.37	<109.9	0.95	95.5	0.97	108.6	<0.20	<109.9	NM	NM	10.00	120.0
11-31	23/05/2011	10.15	S10_8-12_Fcoal	IB	NM	NM	<0.37	<109.9	<0.37	<109.9	0.52	100.8	<0.20	<109.9	NM	NM	10.00	120.0
11-33	30/05/2011	13.35	S10_12_13_Fcoal pt2	IB	NM	NM	<0.37	<109.9	<0.37	<109.9	0.45	105.4	<0.20	<109.9	NM	NM	10.00	120.0
TOTALS	**MAY**	**# BLAST**	**6**	**AVERAGE**	**NM**	**NM**	**0.42**	**108.2**	**0.67**	**99.0**	**0.67**	**107.3**	**<0.20**	**<109.9**	**NM**	**NM**	**5.00**	**115.0**
TOTALS	**MAY**	**# BLAST**	**6**	**HIGHEST**	**NM**	**NM**	**0.42**	**108.2**	**0.95**	**102.5**	**0.97**	**110.1**	**<0.20**	**<109.9**	**NM**	**NM**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**6**	**AVERAGE**	**<0.37**	**<109.9**	**0.36**	**109.5**	**0.58**	**103.6**	**0.63**	**108.5**	**<0.20**	**<109.9**	**<0.37**	**<109.9**	**5.00**	**115.0**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-32	3/06/2011	13:06	S11_8-11_385	OB	NM	NM	0.52	115.8	0.48	112.7	0.55	117.4	0.21	109.8	NM	NM	10.00	120.0
11-34	10/06/2011	13:10	S9_98-9_300	IB	NM	NM	<0.37	<109.9	0.45	99.9	0.60	107.0	<0.20	<109.9	NM	NM	10.00	120.0
11-35	16/06/2011	13:13	S12_11_385	OB	NM	NM	0.68	115.7	0.55	113.1	0.72	116.9	0.10	111.7	NM	NM	10.00	120.0
11-36	20/06/2011	13:15	S12_3-4_385	OB	NM	NM	1.05	110.1	1.12	103.1	NM	NM	0.42	105.6	<0.37	<109.9	10.00	120.0
11-37	14/06/2011	13:19	S9_9_300	IB	NM	NM	<0.37	<109.9	<0.37	<109.9	<0.37	<109.9	<0.20	<109.9	NM	NM	10.00	120.0
11-38	20/06/2011	13:15	S11_4-5_350Presplit	PS	NM	NM	1.05	110.1	1.12	103.1	NM	NM	0.42	105.6	<0.37	<109.9	10.00	120.0
11-39	22/06/2011	13:17	S12_8-9_385	OB	NM	NM	0.65	107.4	0.72	104.8	NM	NM	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-40	29/06/2011	13:14	S13_5-7_385	OB	NM	NM	0.07	110.1	<0.37	<109.9	0.70	114.0	<0.20	<109.9	NM	NM	10.00	120.0
11-41	24/06/2011	13:12	S11_3-5_385 Pt1	PS	NM	NM	0.57	95.0	1.07	91.9	1.92	99.1	0.42	92.9	NM	NM	10.00	120.0
11-42	30/06/2011	13:40	S10-9-10-Fcoal	IB	NM	NM	<0.37	<109.9	<0.37	<109.9	NM	NM	<0.20	<109.9	<0.37	<109.9	10.00	120.0
TOTALS	**JUNE**	**# BLAST**	**10**	**AVERAGE**	**NM**	**NM**	**0.66**	**109.2**	**0.79**	**104.1**	**0.90**	**110.9**	**0.31**	**105.1**	**<0.37**	**<109.9**	**5.00**	**115.0**
TOTALS	**JUNE**	**# BLAST**	**10**	**HIGHEST**	**NM**	**NM**	**1.05**	**115.8**	**1.12**	**113.1**	**1.92**	**117.4**	**0.42**	**111.7**	**<0.37**	**<109.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**10**	**AVERAGE**	**<0.37**	**<109.9**	**0.46**	**109.4**	**0.65**	**103.8**	**0.72**	**109.3**	**0.31**	**105.1**	**<0.37**	**<109.9**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**10**	**0%**	**0%**	**0%**	**8.0%**	**0%**	**0%**	**0%**	**9.5%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-43	1/07/2011	13:08	S11_2-4_350 W/R PS	PS	NM	NM	0.47	95.0	0.45	96.2	1.17	101.3	<0.20	<109.9	NM	NM	10.00	120.0
11-44	8/07/2011	13:25	S12_9-13_385	OB	NM	NM	NM	NM	0.52	106.9	1.22	114.0	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-45	6/07/2011	15:22	S10_9-11_Fseam Pt2	IB	NM	NM	NM	NM	<0.37	<109.9	<0.37	<109.9	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-46	13/07/2011	13:54	S10_6-8_300 TSB7	TS	NM	NM	0.50	99.0	0.57	94.7	0.8	102.2	<0.20	<109.9	NM	NM	10.00	120.0
11-47	14/07/2011	13:08	S11_7-9_350 PS	PS	NM	NM	0.37	93.4	0.67	94.7	0.9	101.3	<0.20	<109.9	NM	NM	10.00	120.0
11-48	19/07/2011	13:25	S11_7-8_365 TSB8	TS	NM	NM	0.65	110.6	0.72	106.3	1.25	106.3	<0.20	<109.9	NM	NM	10.00	120.0
11-49	26/07/2011	13:44	S11_5-6_365 TSB9	TS	NM	NM	0.65	99.9	0.57	83.0	1.25	107.8	<0.20	<109.9	NM	NM	10.00	120.0
TOTALS	**JULY**	**# BLAST**	7	**AVERAGE**	**NM**	**NM**	**0.53**	**99.6**	**0.58**	**97.0**	**1.10**	**105.5**	**<0.20**	**<109.9**	**<0.37**	**<109.9**	**5.00**	**115.0**
TOTALS	**JULY**	**# BLAST**	7	**HIGHEST**	**NM**	**NM**	**0.65**	**110.6**	**0.72**	**106.9**	**1.25**	**114.0**	**<0.20**	**<109.9**	**<0.37**	**<109.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	32	**AVERAGE**	**<0.37**	**<109.9**	**0.48**	**106.9**	**0.63**	**102.1**	**0.82**	**108.3**	**0.31**	**105.1**	**<0.37**	**<109.9**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	32	**0%**	**0%**	**0%**	**6.7%**	**0%**	**0%**	**0%**	**7.1%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-50	1/08/2011	13:12	S13_9-13_385	OB	NM	NM	0.77	83.0	0.50	99.4	1.12	108.6	<0.20	<109.9	NM	NM	10.00	120.0
11-51	3/08/2011	13:20	S10_12-13_Gcoal	IB	NM	NM	NM	NM	1.79	101.5	3.75	108.0	0.94	101.4	0.52	83.0	10.00	120.0
11-52	5/08/2011	13:23	S11_3-4_365 TSB10	TS	NM	NM	0.87	101.7	0.67	97.4	1.92	104.5	<0.20	<109.9	NM	NM	10.00	120.0
11-53	11/08/2011	13:22	S13_7-8_385	OB	NM	NM	NM	NM	0.40	94.7	0.80	101.7	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-54	10/08/2011	13:08	S11_9-10_350 P/S	PS	NM	NM	0.55	83.0	0.62	99.9	1.05	101.3	<0.20	<109.9	NM	NM	10.00	120.0
11-55	17/08/2011	10:38	S10_14-15_Gcoal	IB	NM	NM	1.62	83.0	1.98	96.8	2.20	101.3	0.69	89.4	NM	NM	10.00	120.0
11-56	25/08/2011	13:15	S10_18_Gcoal	IB	NM	NM	0.72	83.0	0.72	93.0	1.12	99.1	<0.20	<109.9	NM	NM	10.00	120.0
11-58	30/08/2011	15:42	S10_16_Gcoal	IB	NM	NM	NM	NM	1.59	104.8	1.90	110.0	0.73	103.3	0.55	105.5	10.00	120.0
TOTALS	**AUGUST**	**# BLAST**	**8**	**AVERAGE**	**NM**	**NM**	**0.91**	**86.7**	**1.03**	**98.4**	**1.73**	**104.3**	**0.79**	**98.0**	**0.54**	**94.3**	**5.00**	**115.0**
TOTALS	**AUGUST**	**# BLAST**	**8**	**HIGHEST**	**NM**	**NM**	**1.62**	**101.7**	**1.98**	**104.8**	**3.75**	**110.0**	**0.94**	**103.3**	**0.55**	**105.5**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**40**	**AVERAGE**	**<0.37**	**<109.9**	**1.62**	**101.7**	**1.98**	**104.8**	**3.75**	**110.0**	**0.94**	**103.3**	**0.55**	**105.5**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**40**	**0%**	**0%**	**0%**	**5.7%**	**0%**	**0%**	**0%**	**5.6%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra'		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-57	5/09/2011	13:10	S10_11_Gcoal	IB	NM	NM	1.07	83.0	1.22	96.2	1.55	101.3	0.42	95.4	NM	NM	10.00	120.0
11-59	12/09/2011	13:10	S10_12_Gcoal	IB	NM	NM	1.82	111.6	0.82	104.5	NM	NM	0.89	106.6	0.47	111.0	10.00	120.0
11-60	16/09/2011	13:18	S10_7-11_Gcoal	IB	NM	NM	1.22	99.0	0.60	89.4	1.92	102.6	0.58	92.9	NM	NM	10.00	120.0
11-61	21/09/2011	14:10	S11_9-10_365 TSB11	TS	NM	NM	2.19	109.8	1.69	103.4	3.47	108.2	0.58	101.4	NM	NM	10.00	120.0
11-62	29/09/2011	13:29	S11_18-22_375	OVBD	NM	NM	0.07	111.4	0.72	105.2	0.52	105.4	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-63	28/09/2011	13:15	S11_11-14_350 P/S Pt1	PS	NM	NM	0.85	83	1.07	95.5	NM	NM	0.34	97.3	<0.37	<109.9	10.00	120.0
TOTALS	**SEPTEMBER**	**# BLAST**	**6**	**AVERAGE**	**NM**	**NM**	**1.20**	**99.6**	**1.02**	**99.0**	**1.87**	**104.4**	**0.56**	**98.7**	**0.47**	**111.0**	**5.00**	**115.0**
TOTALS	**SEPTEMBER**	**# BLAST**	**6**	**HIGHEST**	**NM**	**NM**	**2.19**	**111.6**	**1.69**	**105.2**	**3.47**	**108.2**	**0.89**	**106.6**	**0.47**	**111.0**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**0**	**AVERAGE**	**<0.37**	**<109.9**	**0.67**	**102.4**	**0.76**	**101.0**	**1.14**	**107.0**	**0.55**	**100.6**	**0.50**	**102.6**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**46**	**0%**	**0%**	**0%**	**4.9%**	**0%**	**0%**	**0%**	**5.0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-64	4/10/2011	13:13	S11_11-14_350 P/S Pt2	PS	NM	NM	1.24	83	<0.37	<109.9	1.65	106.5	0.29	94.2	NM	NM	10.00	120.0
11-65	10/10/2011	13:16	S11_3-4_350 TSB12	THRU	NM	NM	<0.37	<109.9	0.45	103.1	NM	NM	<0.20	<109.9	0.67	102.2	10.00	120.0
11-66	13/10/2011	13:09	S11_11-14_350 Aseam	IB	NM	NM	0.87	83	0.92	99.0	1.07	109.6	0.44	98.9	NM	NM	10.00	120.0
11-67	14/10/2011	13:20	S13_2-3_385 + rocks	OVBD	NM	NM	<0.37	<109.9	<0.37	<109.9	NM	NM	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-68	19/10/2011	13:24	S11_16-17_370	IB	NM	NM	0.35	79.5	0.67	104.0	1.00	110.6	<0.20	<109.9	NM	NM	10.00	120.0
11-69	27/10/2011	13:27	S12S13_20-22_375	OVBD	NM	NM	0.7	113.3	1.25	106.3	NM	NM	0.24	103.3	<0.37	<109.9	10.00	120.0
11-70	31/10/2011	14:02	S11_14_15_370	IB	NM	NM	0.57	110.6	0.60	103.1	NM	NM	0.21	101.4	<0.37	<109.9	10.00	120.0
TOTALS	**OCTOBER**	**# BLAST**	**7**	**AVERAGE**	**NM**	**NM**	**0.75**	**93.9**	**0.78**	**103.1**	**1.24**	**108.9**	**0.30**	**99.5**	**0.67**	**102.2**	**5.00**	**115.0**
TOTALS	**OCTOBER**	**# BLAST**	**7**	**HIGHEST**	**NM**	**NM**	**1.24**	**113.3**	**1.25**	**106.3**	**1.65**	**110.6**	**0.44**	**103.3**	**0.67**	**102.2**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**53**	**AVERAGE**	**<0.37**	**<109.9**	**0.68**	**101.1**	**0.77**	**101.3**	**1.16**	**107.3**	**0.49**	**100.3**	**0.56**	**102.5**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**53**	**0%**	**0%**	**0%**	**4.2%**	**0%**	**0%**	**0%**	**4.7%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-71	4/11/2011	13:15	S12 S13_19-20 DE Coal UG	OVBD	NM	NM	0.4	101	1.22	100.7	2.02	107.3	0.44	91.3	NM	NM	10.00	120.0
11-72	8/11/2011	13:10	S12_15-18_330 PS	PS	NM	NM	0.07	108.4	1.22	93.0	2.27	97	0.39	92.9	NM	NM	10.00	120.0
11-73	14/11/2011	13:20	S12_2-4_365 TSB13	THRU	NM	NM	0.9	100.7	0.72	98.0	1.07	103	0.26	102.9	NM	NM	10.00	120.0
11-74	17/11/2011	13:51	S12_5-6_365 Pt1	OVBD	NM	NM	1.44	105.9	<0.37	<109.9	NM	NM	0.42	102.4	<0.37	<109.9	10.00	120.0
11-75	18/11/2011	13:06	S12_3-8_330 PS	PS	NM	NM	0.72	99	1.15	99.9	NM	NM	0.26	96.4	<0.37	<109.9	10.00	120.0
11-76	22/11/2011	13:20	S12_5-6_365 Pt2	IB	NM	NM	0.07	110.2	0.1	111.5	NM	NM	0.08	113.2	<0.37	<109.9	10.00	120.0
11-77	24/11/2011	13:30	S12-7-9_330 PS	PS	NM	NM	0.92	103.5	1.20	96.8	<0.37	<109.9	0.20	106	NM	NM	10.00	120.0
TOTALS	**NOVEMBER**	**# BLAST**	**7**	**AVERAGE**	**NM**	**NM**	**0.65**	**104.1**	**0.94**	**100.0**	**1.79**	**102.4**	**0.29**	**100.7**	**<0.37**	**<109.9**	**5.00**	**115.0**
TOTALS	**NOVEMBER**	**# BLAST**	**7**	**HIGHEST**	**NM**	**NM**	**1.44**	**110.2**	**1.22**	**111.5**	**2.27**	**107.3**	**0.44**	**113.2**	**<0.37**	**<109.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**60**	**AVERAGE**	**<0.37**	**<109.9**	**0.68**	**101.5**	**0.79**	**101.1**	**1.24**	**106.7**	**0.45**	**100.4**	**0.56**	**102.5**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**60**	**0%**	**0%**	**0%**	**3.6%**	**0%**	**0%**	**0%**	**4.3%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes*		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-78	1/12/2011	13:39	S11_6-7_350	IB	NM	NM	0.45	111.5	0.37	103.4	0.75	106.8	<0.20	<109.9	NM	NM	10.00	120.0
11-79	2/12/2011	13:30	S12_10-13_330 PS	PS	NM	NM	0.67	104.3	0.8	93.9	1.15	97.7	0.24	97.3	NM	NM	10.00	120.0
11-80	6/12/2011	13:15	S11_8-10_350 pt 1	IB	NM	NM	0.42	104.3	0.5	100.3	0.72	107.3	<0.20	<109.9	NM	NM	10.00	120.0
11-81	13/12/2011	13:13	S11_8-10_Ccoal Ramp	IB	NM	NM	0.75	112.8	0.75	107.5	1.17	114.6	<0.20	<109.9	NM	NM	10.00	120.0
11-82	14/12/2011	13:12	S11_8-10_350 pt 2	IB	NM	NM	0.42	105.9	0.47	100.7	0.72	108.2	<0.20	<109.9	NM	NM	10.00	120.0
11-83	16/12/2011	13:10	S12_7-9_Aseam	IB	NM	NM	0.6	109.7	0.47	107.5	NM	NM	<0.20	<109.9	<0.37	<109.9	10.00	120.0
11-84	23/12/2011	13:12	S11_10-11_350	IB	NM	NM	0.85	102.4	0.62	96.2	0.9	102.6	0.34	98.2	NM	NM	10.00	120.0
11-85	29/12/2011	16:16	S12_10-11_Aseam	IB	NM	NM	1.12	111.9	1.37	110.3	NM	NM	0.37	106.6	<0.37	<109.9	10.00	120.0
TOTALS	**DECEMBER**	**# BLAST**	**8**	**AVERAGE**	**NM**	**NM**	**0.66**	**107.9**	**0.67**	**102.5**	**0.90**	**106.5**	**0.32**	**100.7**	**<0.37**	**<109.9**	**5.00**	**115.0**
TOTALS	**DECEMBER**	**# BLAST**	**8**	**HIGHEST**	**NM**	**NM**	**1.12**	**112.8**	**1.37**	**110.3**	**1.17**	**114.6**	**0.37**	**106.6**	**<0.37**	**<109.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**68**	**AVERAGE**	**<0.37**	**<109.9**	**1.12**	**112.8**	**1.37**	**110.3**	**1.17**	**114.6**	**0.37**	**106.6**	**0.56**	**102.5**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**68**	**0%**	**0%**	**0%**	**3.2%**	**0%**	**0%**	**0%**	**3.8%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes*		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
11-86	4/01/2012	13:18	S12_15-17_370	IB	NM	NM	0.98	110.3	0.97	111.0	NM	NM	0.60	105.0	<0.37	<109.9	10.00	120.0
11-87	5/01/2012	13:42	S12_1-3_350 TSB14	THRU	NM	NM	0.97	98.5	0.45	94.2	NM	NM	<0.20	<109.9	<0.37	<109.9	10.00	120.0
12-01	11/01/2012	13:24	S11_10-12_350	IB	NM	NM	0.52	96.4	<0.37	<109.9	NM	NM	<0.20	<109.9	<0.37	<109.9	10.00	120.0
12-02	13/01/2012	13:12	S12_10-12_Aseam	IB	NM	NM	0.75	112.8	0.80	98.5	0.31	98.9	1.45	106.3	NM	NM	10.00	120.0
12-03	20/01/2012	13:28	S11_4-7_332 TSB15	THRU	NM	NM	1.14	106.3	1.62	100.7	1.97	106.3	0.47	104.6	NM	NM	10.00	120.0
12-04	25/01/2012	13:28	S12_13-14_Aseam	IB	NM	NM	0.90	106.6	0.75	106.8	1.12	111.0	0.26	100.3	NM	NM	10.00	120.0
TOTALS	**JANUARY**	**# BLAST**	**6**	**AVERAGE**	**NM**	**NM**	**0.88**	**105.5**	**0.92**	**102.2**	**1.13**	**105.4**	**0.70**	**104.1**	**<0.37**	**<109.9**	**5.00**	**115.0**
TOTALS	**JANUARY**	**# BLAST**	**6**	**HIGHEST**	**NM**	**NM**	**1.14**	**112.8**	**1.62**	**111.0**	**1.97**	**111.0**	**1.45**	**106.3**	**<0.37**	**<109.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**74**	**AVERAGE**	**<0.37**	**<109.9**	**0.69**	**0.0**	**0.00**	**0.0**	**0.00**	**0.0**	**0.00**	**0.0**	**0.00**	**0.0**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**74**	**0%**	**0%**	**0%**	**2.9%**	**0%**	**0%**	**0%**	**3.6%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes*		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
12-05	15/02/2012	13:37	S14_Black Pit #1	THRU	NM	NM	0.47	107.9	0.72	106.7	1.37	113.1	<0.20	<109.9	NM	NM	10.00	120.0
12-06	8/02/2012	13:10	S12_5_350	IB	NM	NM	0.62	101.7	0.8	99.9	1.15	103.8	0.34	100.3	NM	NM	10.00	120.0
12-07	17/02/2012	13:16	S11_5_Ccoal	IB	NM	NM	0.75	110.5	0.92	107.9	1.57	113.2	<0.20	<109.9	NM	NM	10.00	120.0
12-08	27/02/2012	13:10	S11_8_Ccoal	IB	NM	NM	<0.37	<109.9	1.25	105.7	<0.37	<109.9	0.31	104.6	NM	NM	10.00	120.0
TOTALS	**FEBRUARY**	**# BLAST**	**4**	**AVERAGE**	**NM**	**NM**	**0.61**	**106.7**	**0.92**	**105.1**	**1.36**	**110.0**	**0.33**	**102.5**	**<0.37**	**<109.9**	**5.00**	**115.0**
TOTALS	**FEBRUARY**	**# BLAST**	**4**	**HIGHEST**	**NM**	**NM**	**0.75**	**110.5**	**1.25**	**107.9**	**1.57**	**113.2**	**0.34**	**104.6**	**<0.37**	**<109.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**78**	**AVERAGE**	**<0.37**	**<109.9**	**0.69**	**102.9**	**0.80**	**101.7**	**1.21**	**106.8**	**0.45**	**101.2**	**0.56**	**102.5**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**78**	**0%**	**0%**	**0%**	**2.7%**	**0%**	**0%**	**0%**	**3.3%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results													
					Glenala		Greenslopes*		Tonsley Park		Cintra*		Werris Creek		Talavera		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)	Vib (mm/s)	OP (dB)	Vib (mm/s)	OP (dB)
12-09	13/03/2012	13:09			NM	NM	0.77	104.6	0.82	98.5	0.84	103.7	0.29	98.2	NM	NM	10.00	120.0
12-10	8/03/2012	14:09			NM	NM	0.07	108.7	1.05	108.0	1.12	110.1	0.31	107.2	NM	NM	10.00	120.0
12-11	19/03/2012	13:13			NM	NM	0.77	104.6	0.95	101.8	1.22	108.8	0.42	106.9	NM	NM	10.00	120.0
12-12	14/03/2012	13:13			NM	NM	0.47	95.7	NM	NM	NM	NM	NM	NM	NM	NM	10.00	120.0
12-13	22/03/2012	13:07			NM	NM	0.40	105.3	NM	NM	0.70	109.0	NM	NM	NM	NM	10.00	120.0
12-14	28/03/2012	13:09			NM	NM	0.45	95.0	0.60	91.9	1.12	96.2	NM	NM	NM	NM	10.00	120.0
TOTALS	**MARCH**	**# BLAST**	**6**	**AVERAGE**	**NM**	**NM**	**0.49**	**102.3**	**0.86**	**100.1**	**1.00**	**105.6**	**0.34**	**104.1**	**<0.37**	**<109.9**	**5.00**	**115.0**
TOTALS	**MARCH**	**# BLAST**	**6**	**HIGHEST**	**NM**	**NM**	**0.77**	**108.7**	**1.05**	**108.0**	**1.22**	**110.1**	**0.42**	**107.2**	**<0.37**	**<109.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**84**	**AVERAGE**	**<0.37**	**<109.9**	**0.00**	**0.0**	**0.00**	**0.0**	**0.00**	**0.0**	**0.00**	**0.0**	**0.56**	**102.5**	**5.00**	**115.0**
TOTALS	**ANNUAL**	**%**	**>115dB(L) or 5mm/s**	**84**	**0%**	**0%**	**0%**	**2.6%**	**0%**	**0%**	**0%**	**0.0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**5%**

Appendix 7
Monthly Operational Noise Monitoring

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SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

2 May 2011

Ref: 04035/9965

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

RE: MAY 2011 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Friday 29 and Saturday 30 April 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Mine's Noise Management Plan (revised November 2010). The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Railway Cottage" (previously denoted as "Fletcher")
"Tonsley Park"
"Greenslopes/Banool"
"Kyooma"

Additional measurements were also made on the road side near residential locations in Punyarra Street and Kurrara Street, Werris Creek. These locations are shown in **Figure 2**.

Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that on April 29 winds were moderate from the south east. The data from the met station shows wind speeds were generally higher than 5m/s during the day and evening. Observations at ground level were that winds at this height were at lower speeds than this (range 1 to 3m/s). The wind strength dropped during the night survey and swung to be more from the east.

The data showed that there was a temperature inversion for some parts of the night survey.

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ABN: 40 106 435 554
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PO Box 374 Waltsend NSW 2287
Phone: (02) 4954 2276
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The total measured Leq noise level is shown in the tables below. Where the noise from WCC was audible the Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall.

The noise criterion for the operational phase of the WCC project is **35 dB(A) $L_{eq\ (15\ min)}$** for all operating times. Mine noise from WCC is shown in bold type. Where noise from WCC is listed as inaudible, this means the noise levels from the mine were at least 10 dB below the background level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 29 April 2011 (Day)

Location	Time	dB(A).Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	2.13 pm	39	n/a	5.8/147	Wind (36), birds & insects (35), **WCC inaudible**
Glenara	2.30 pm	45	n/a	5.6/149	Birds & insects (44), wind (35), traffic (30), **WCC inaudible**
Railway Cottage	1.54 pm	39	n/a	5.1/132	Traffic (39), **WCC inaudible**
Tonsley Park	2.55 pm	43	n/a	5.7/136	Traffic (41), birds & insects (39), **WCC inaudible**
Greenslopes	3.36 pm	55	n/a	5.3/139	Train (52), birds & insects (50) traffic (45), **WCC barely audible**
Kyooma	1.30 pm	40	n/a	5.8/157	Birds & insects (38), wind (36), **WCC inaudible**
Kurrara St	1.05 pm	52	n/a	6.9/152	Traffic (52), birds & insects (37), **WCC inaudible**
Punyarra St	3.15 pm	44	n/a	5.1/133	Insects (41), traffic (40), wind (35), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 29 April 2011 (Evening)

Location	Time	dB(A).Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	7.00 pm	36	Lapse	6.0/134	Insects (35), traffic (30), **WCC inaudible**
Glenara	7.17 pm	38	Lapse	6.0/121	Traffic (38), insects (28), **WCC inaudible**
Railway Cottage	7.37 pm	41	Lapse	5.0/124	Insects (38), traffic (37), wind (30), **WCC inaudible**
Tonsley Park	9.18 pm	38	+2.1	3.5/133	Traffic (35), **WCC (33)**, insects (31)
Greenslopes	8.57 pm	43	Lapse	3.8/147	Traffic (42), **WCC (35)**, insects (32)
Kyooma	7.59 pm	37	Lapse	4.7/129	Insects (35), wind (32), **WCC inaudible**
Kurrara St	8.20 pm	36	Lapse	5.2/137	Traffic (32), **WCC (32)**, insects (27)
Punyarra St	8.37 pm	60	Lapse	5.1/140	Insects (60), traffic (33), **WCC (32)**

Table 3
WCC Noise Monitoring Results – 29/30 April 2011 (Night)

Location	Time	dB(A).Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	1.15 am	30	Lapse	2.6/121	**WCC (30)**
Glenara	12.57 am	36	Lapse	3.1/113	Traffic (36), **WCC (<25)**
Railway Cottage	12.37 am	29	+3.9	2.7/104	Traffic (29), **WCC inaudible**
Tonsley Park	11.15 pm	44	+3.2	2.6/136	Traffic (43), **WCC (38)**, insects (30)
Greenslopes	10.57 pm	45	+4.7	1.8/122	Traffic (43), **WCC (39)**, insects (34)
Kyooma	10.01 pm	25	+4.1	2.6/119	Insects (25), **WCC inaudible**
Kurrara St	10.21 pm	36	+3.1	1.9/129	**WCC (34)**, traffic (30), insects (26)
Punyarra St	10.38 pm	39	+2.6	1.6/140	Traffic (36), **WCC (34)**, insects (31)

The results shown in **Tables 1-3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC exceeded the criterion of 35 dB(A) Leq at the Tonsley Park and Greenslopes monitoring locations during the 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 all of the elevated noise levels were measured whilst there was a strong temperature inversion in place.

WCC has an agreement in place with the landowner at Tonsley Park to allow for noise up to 45 dB(A) Leq (15 min).

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) Lmax** 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 Lmax noise from WCC did not exceed the Lmax criterion 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

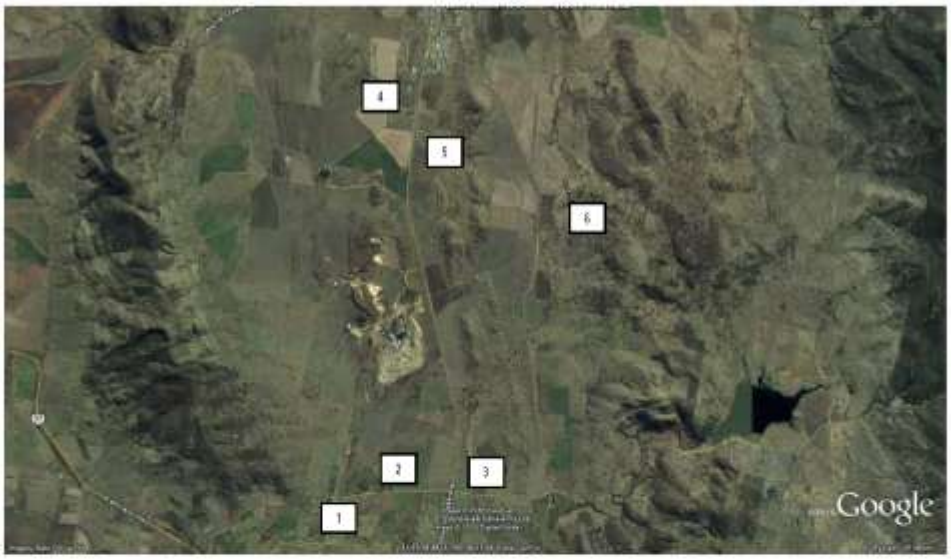

Figure 1 – Noise Monitoring Locations

Key
1 Almawillee
2 Glenara
3 Railway Cottage
4 Tonsley Park
5 Greenslopes/Banool
6 Kyooma

Figure 2 – Additional Noise Monitoring Locations

Key
7 Kurarra Street
8 Punyarra Street

24 May 2011

Ref: 04035/3980

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

RE: MAY 2011 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Friday 20 and Saturday 21 May 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Mine's Noise Management Plan (revised November 2010). The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Railway Cottage" (previously denoted as "Fletcher")
"Tonsley Park"
"Greenslopes/Banool"
"Kyooma"

Additional measurements were also made on the road side near residential locations in Punyarra Street and Kurrara Street, Werris Creek. These locations are shown in **Figure 2**.

Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that at the beginning of the survey on May 20 winds were light from the south west. Throughout the survey the winds varied to be generally from each of south westerly, south easterly, easterly and northerly directions.

The data showed that there was a strong temperature inversion from early evening which persisted throughout the night survey.

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The total measured Leq noise level is shown in the tables below. Where the noise from WCC was audible the Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall.

The noise criterion for the operational phase of the WCC project is **35 dB(A) $L_{eq\ (15\ min)}$** for all operating times. Mine noise from WCC is shown in bold type. Where noise from WCC is listed as inaudible, this means the noise levels from the mine were at least 10 dB below the background level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 20 May 2011 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	5.45 pm	37	n/a	3.2/134	Birds (37), **WCC inaudible**
Glenara	5.28 pm	38	n/a	3.1/141	Traffic (37), birds (30), **WCC inaudible**
Railway Cottage	5.12 pm	48	n/a	3.3/148	Traffic (48), **WCC inaudible**
Tonsley Park	3.25 pm	38	n/a	1.4/213	Traffic (37), birds & insects (30), **WCC (28)**
Greenslopes	3.45 pm	59	n/a	1.0/218	Traffic (58), birds & insects (50) **WCC (<25)**
Kyooma	4.52 pm	39	n/a	2.8/190	Birds & insects (38), **WCC (31)**
Kurrara St	4.04 pm	45	n/a	0.7/239	Traffic (45), birds & insects (33), **WCC inaudible**
Punyarra St	4.21 pm	39	n/a	1.6/209	Traffic (39), birds (30), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 20 May 2011 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	9.04 pm	36	+9	1.5/94	**WCC (35)**, insects (27)
Glenara	9.25 pm	40	+9	2.2/64	**WCC (38)**, insects (36)
Railway Cottage	8.46 pm	45	+9	1.9/102	Traffic (45), **WCC inaudible**
Tonsley Park	7.25 pm	46	+8	2.8/96	Train on spur (46?), **WCC inaudible**, insects (30)
Greenslopes	7.00 pm	49	+7	2.9/100	Birds (47), traffic (45), **WCC (28)**
Kyooma	8.23 pm	35	+9	2.0/94	Insects (35), **WCC inaudible**
Kurrara St	7.45 pm	40	+8	2.6/104	Train in town (40), insects (25), **WCC inaudible**
Punyarra St	8.02 pm	40	+9	2.3/91	Train in town (37), traffic (37), insects (30), **WCC inaudible**

*see text below tables in relation to rail noise

Table 3
WCC Noise Monitoring Results – 20/21 May 2011 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	12.32 am	32	+10	1.5/304	**WCC (32)**, insects (21)
Glenara	12.15 am	36	+10	1.2/267	Traffic (34), **WCC (32)**
Railway Cottage	12.56 am	34	+10	1.7/314	Traffic (33), insects (25), **WCC (25)**
Tonsley Park	10.00 pm	43	+10	1.8/23	Train in town (42), traffic (36), **WCC inaudible**
Greenslopes	10.18 pm	44	+10	0.9/352	Insects (43), traffic (37), **WCC inaudible**
Kyooma	11.10 pm	36	+10	2.1/38	Insects (36), **WCC inaudible**
Kurrara St	10.35 pm	43	+10	1.3/298	Train in town (43), insects (32), **WCC inaudible**
Punyarra St	10.52 pm	35	+10	1.4/319	Train in town (35), domestic noise (25), **WCC inaudible**

The results shown in **Tables 1-3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC exceeded the criterion of 35 dB(A) Leq at the Glenara monitoring location during the evening 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 all of the elevated noise levels were measured whilst there was a strong temperature inversion in place.

The train noise at Tonsley Park was measured whilst a train was on the Werris Creek mine rail spur and moving towards the main line. Coal loading was not being carried out during the course of the measurement.

The development consent for the mine has the following noise assessment criteria in relation to noise generated by shunting operations, 55 dB(A) Leq (24 hour) and 80 dB(A) Lmax. The measured train noise of 46 dB(A) Leq (15 min) equates to 26 dB(A) Leq (24 hour) which is significantly lower than the acceptable level from the development consent. The measured Lmax noise was 65 dB(A) from the train horn. This is also significantly lower than the acceptable level from the development consent.

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) Lmax** 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 Lmax noise from WCC did not exceed the Lmax criterion 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

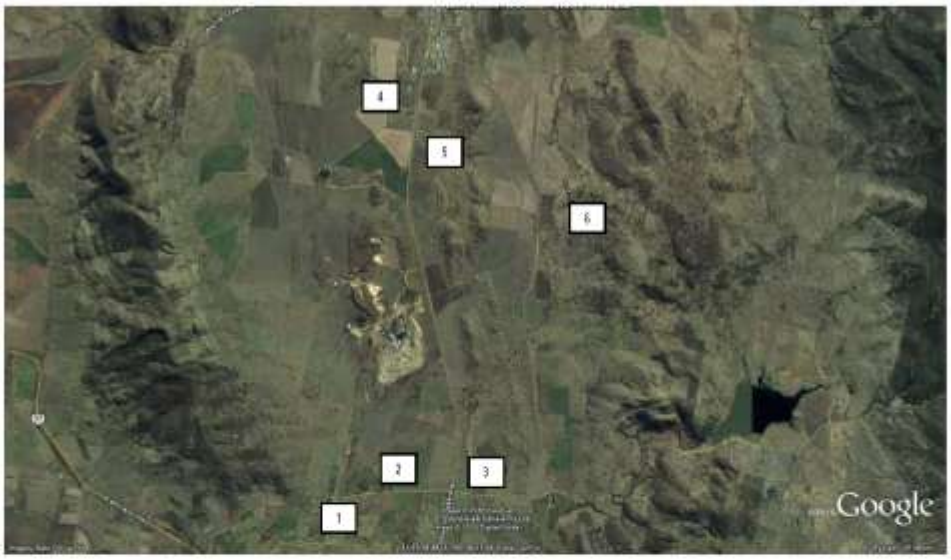

Figure 1 – Noise Monitoring Locations

Key
1 Almawillee
2 Glenara
3 Railway Cottage
4 Tonsley Park
5 Greenslopes/Banool
6 Kyooma

Figure 2 – Additional Noise Monitoring Locations

Key
7 Kurarra Street
8 Punyarra Street

27 June 2011

Ref: 04035/4020

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

RE: JUNE 2011 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 Friday 24 and Saturday 25 June 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Mine's Noise Management Plan (revised November 2010). The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Railway Cottage" (previously denoted as "Fletcher")
"Tonsley Park"
"Greenslopes/Banool"
"Kyooma"

Additional measurements were also made on the road side near residential locations in Punyarra Street and Kurrara Street, Werris Creek. These locations are shown in **Figure 2**.

Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that at the beginning of the survey on June 24 winds were light from the north north west. During the evening and night periods winds were calm.

The data showed that there was a strong temperature inversion from late afternoon which persisted throughout the night survey.

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The total measured Leq noise level is shown in the tables below. Where the noise from WCC was audible the Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall. The noise criterion for the operational phase of the WCC project is **35 dB(A) $L_{eq\ (15\ min)}$** for all operating times. Mine noise from WCC is shown in bold type. Where noise from WCC is listed as inaudible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 24 June 2011 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	3:14 pm	33	n/a	1.9/265	Birds (33), **WCC (<20)**
Glenara	5:23 pm	38	+6.6	1.3/329	**WCC (37)**, traffic (33)
Railway Cottage	2:55 pm	39	n/a	2.7/283	Traffic (39), birds (30), insects (24), **WCC barely audible**
Tonsley Park	1:35 pm	35	n/a	2.1/301	Train in Werris Ck (34), birds (26), **WCC inaudible**
Greenslopes	1:54 pm	42	n/a	1.7/279	Traffic (42), birds (32) **WCC inaudible**
Kyooma	2:33 pm	38	n/a	2.3/304	Birds (38), **WCC (27)**
Kurrara St	2:12 pm	40	n/a	2.4/323	Train in Werris Ck (38), traffic (34), birds (33), **WCC inaudible**
Punyarra St	1:15 pm	40	n/a	2.7/298	Traffic (36), train in Werris Ck (36), domestic noise (35), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 24 June 2011 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	7:03 pm	38	+8.7	Calm	**WCC (37)**, traffic (31)
Glenara	7:20 pm	39	+8.8	Calm	Traffic (38), **WCC (33)**
Railway Cottage	7:43 pm	46	+8.5	Calm	Traffic (46), **WCC (<30)**
Tonsley Park	9:25 pm	36	+8.8	0.1/324	**WCC (35)**, traffic (28)
Greenslopes	9:05 pm	42	+8.2	0.1/324	**WCC (40)**, traffic (37)
Kyooma	8:05 pm	36	+8.5	Calm	**WCC (36)**
Kurrara St	8:47 pm	41	+8.2	Calm	Train in Werris Ck (38), traffic (37), **WCC (<30)**
Punyarra St	8:29 pm	43	+8.4	Calm	Trains in Werris Ck (42), traffic (36), **WCC (33)**

Table 3
WCC Noise Monitoring Results – 24/25 June 2011 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	10:02 pm	40	+7.5	Calm	**WCC (33)**, traffic (34)
Glenara	10:19 pm	40	+7.5	0.1/324	**WCC (33)**, traffic (34)
Railway Cottage	10:44 pm	32	+7.7	0.1/178	**WCC (32)**
Tonsley Park	12:33 am	43	+7.4	0.1/62	Train loading (41), **WCC (30)**
Greenslopes	12:52 am	47	+8.5	Calm	**WCC (45)**, traffic (40), train on main line (35)
Kyooma	11:05 pm	35	+7.9	Calm	**WCC (35)**
Kurrara St	1:10 am	44	+8.5	Calm	Train in Werris Ck (44), **WCC (35)**
Punyarra St	11:33 pm	36	+8.2	Calm	**WCC (34)**, train in Werris Ck (32)

The results shown in **Tables 1 - 3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC exceeded the criterion of 35 dB(A) Leq at the Glenara monitoring location during the afternoon and night monitoring period, at Almawillee and Greenslopes during the evening and night, at Kyooma during the evening and Tonsley park during the night.

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 all of the elevated noise levels were measured whilst there was a strong temperature inversion in place (i.e. >+3° C/100m) and, therefore, under non-compliant atmospheric conditions.

A train was being loaded at the mine loading facility from approximately 12.30 am on Saturday 25th. The noise from the train loading was measureable at Tonsley Park. At Kurrara Street the noise from train loading at the mine was not audible or measureable above noise from three locos at idle in the rail yards at Werris Creek which is part of the main rail line. Noise from the train loading was not audible at Greenslopes.

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) Lmax** 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 Lmax noise from WCC exceeded the Lmax criterion at the Greenslopes monitoring location. A noise level of 51 Lmax was attributable to an impact noise.

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

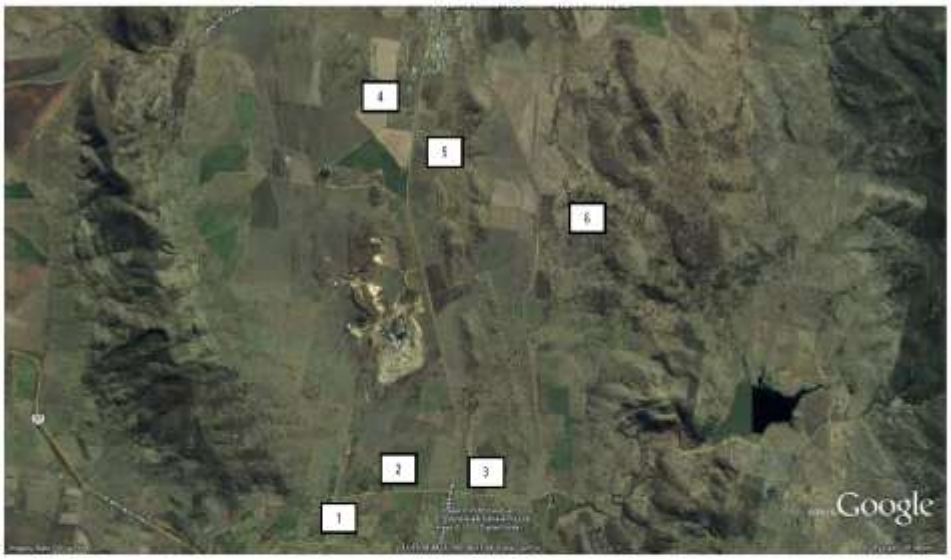

Figure 1 – Noise Monitoring Locations

Key
1 Almawillee
2 Glenara
3 Railway Cottage
4 Tonsley Park
5 Greenslopes/Banool
6 Kyooma

Figure 2 – Additional Noise Monitoring Locations

Key
7 Kurarra Street
8 Punyarra Street

28 July 2011

Ref: 04035/4059

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

RE: JULY 2011 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 25 and Tuesday 26 July 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Mine's Noise Management Plan (revised November 2010). The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Railway Cottage" (previously denoted as "Fletcher")
"Tonsley Park"
"Greenslopes/Banool"
"Kyooma"

Additional measurements were also made on the road side near residential locations in Punyarra Street and Kurrara Street, Werris Creek. These locations are shown in **Figure 2**.

Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that at the beginning of the survey on July 25 winds were moderate from the north west. During the evening and night periods winds persisted from the north west, dropping in intensity after midnight.

The data showed that there was a mild temperature inversion from early evening which persisted throughout the night survey.

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The total measured Leq noise level is shown in the tables below. Where the noise from WCC was audible the Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall. The noise criterion for the operational phase of the WCC project is **35 dB(A) $L_{eq\ (15\ min)}$** for all operating times. Mine noise from WCC is shown in bold type. Where noise from WCC is listed as inaudible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 25 July 2011 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	4:15 pm	44	n/a	6.9/313	Wind in trees (43), birds (38), **WCC (<20)**
Glenara	4:32 pm	45	n/a	5.8/320	Birds & insects (44), **WCC (34)**, traffic (30)
Railway Cottage	3:56 pm	47	n/a	7.1/311	Traffic (47), birds & insects (35), **WCC (32)**
Tonsley Park	2:10 pm	38	n/a	5.5/333	Birds & insects (36), traffic (30), domestic noise (30), **WCC inaudible**
Greenslopes	2:30 pm	48	n/a	6.7/320	Traffic (47), wind (40),birds (35) **WCC inaudible**
Kyooma	3:31 pm	46	n/a	6.6/314	Wind (45), birds (41), **WCC inaudible**
Kurrara St	2:50 pm	46	n/a	8.3/308	Trains in Werris Ck (43), traffic (43), dog (35), **WCC inaudible**
Punyarra St	3:07 pm	44	n/a	6.5/314	Trains in Werris Ck (40), domestic noise (38), dogs (38), traffic (38), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 25 July 2011 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	9:18 pm	33	+1.6	3.8/334	**WCC (32)**, plane (25)
Glenara	9:35 pm	34	+1.3	3.9/330	Traffic (32), **WCC (30)**
Railway Cottage	9:00 pm	48	+2.0	4.2/318	Traffic (48), **WCC (34)**
Tonsley Park	7:00 pm	38	+1.5	5.9/307	Traffic (37), train (30), **WCC inaudible**
Greenslopes	7:25 pm	47	+1.5	4.5/303	Traffic (47), **WCC (31)**
Kyooma	8:30 pm	37	+3.9	5.0/306	**WCC (37)**, insects (25)
Kurrara St	7:48 pm	47	+1.5	4.4/306	Train in Werris Ck (46), traffic (40), **WCC inaudible**
Punyarra St	8:05 pm	43	+3.4	4.8/307	Trains in Werris Ck (43), traffic (30), **WCC inaudible**

Table 3
WCC Noise Monitoring Results – 25/26 July 2011 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	12:50 am	33	+4.5	3.1/313	**WCC (33)**
Glenara	01:07 am	34	+4.2	3.1/329	**WCC (34)**
Railway Cottage	12:32 am	46	+4.4	3.5/313	Traffic (46), **WCC (34)**
Tonsley Park	10:00 pm	41	+1.3	3.8/321	Trains in Werris Ck (40), traffic (35), **WCC inaudible**
Greenslopes	10:20 pm	42	+1.8	3.4/323	Traffic (41), **WCC (36)**
Kyooma	11:17 pm	38	+2.8	1.9/324	Trains (36), **WCC (35)**
Kurrara St	10:57 pm	42	+1.8	3.0/315	Trains in Werris Ck (42), **WCC inaudible**
Punyarra St	10:57 pm	32	+2.5	3.0/315	Trains in Werris Ck (32), **WCC inaudible**

The results shown in **Tables 1 - 3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC exceeded the criterion of 35 dB(A) Leq at the Kyooma monitoring location during the evening monitoring period and Greenslopes during the night.

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 all of the elevated noise levels were measured whilst there was a strong temperature inversion in place (i.e. >+3° C/100m) (Kyooma evening) and/or high winds (Kyooma evening and Greenslopes night). The elevated noise levels were, therefore, measured 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) Lmax** 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 Lmax noise from WCC did not exceed the Lmax criterion 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

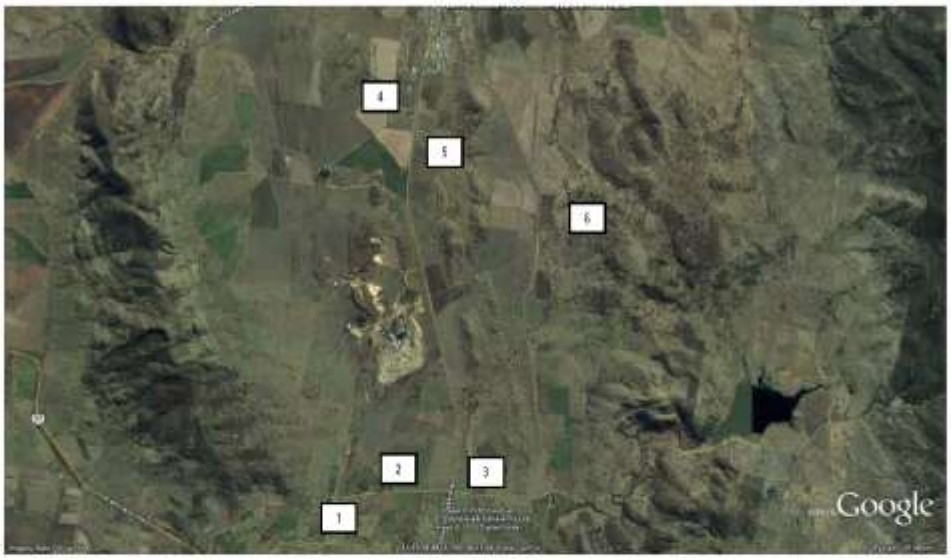

Figure 1 – Noise Monitoring Locations

Key
1 Almawillee
2 Glenara
3 Railway Cottage
4 Tonsley Park
5 Greenslopes/Banool
6 Kyooma

Figure 2 – Additional Noise Monitoring Locations

Key
7 Kurarra Street
8 Punyarra Street

15 August 2011

Ref: 04035/4083

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

RE: AUGUST 2011 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 11 and Friday 12 August 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Mine's Noise Management Plan (revised November 2010). The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Railway Cottage" (previously denoted as "Fletcher")
"Tonsley Park"
"Greenslopes/Banool"
"Kyooma"

Additional measurements were also made on the road side near residential locations in Punyarra Street and at the reserve behind houses in Kurrara Street, Werris Creek. These locations are shown in **Figure 2**.

Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that at the beginning of the survey on August 11 winds were moderate from the north west. During the evening and night periods winds dropped in intensity and became variable from the north west to the south east.

The data showed that there was a moderate to strong temperature inversion from early evening which persisted throughout the night survey.

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The total measured Leq noise level is shown in the tables below. Where the noise from WCC was audible the Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall. The noise criterion for the operational phase of the WCC project is **35 dB(A) $L_{eq\ (15\ min)}$** for all operating times. Mine noise from WCC is shown in bold type. Where noise from WCC is listed as inaudible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 11 and 12 August 2011 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	4:38 pm	38	n/a	2.3/222	Birds (35), traffic (33), tractor (28), dogs (27), **WCC inaudible**
Glenara	4:20 pm	36	n/a	2.9/272	Birds (34), traffic (32), **WCC (<30)**
Railway Cottage	2:30 pm	49	n/a	4.6/294	Traffic (48), birds (43), **WCC (30)**
Tonsley Park	3:58 pm	39	n/a	3.3/262	Birds (39), train in werris creek (28), **WCC inaudible**
Greenslopes	3:40 pm	46	n/a	3.7/264	Traffic (43), rail works (43),birds (30) **WCC barely audible**
Kyooma	2:55 pm	50	n/a	4.3/296	Birds (50), **WCC (25)**
Kurrara St	8:35 am (12/8)	43	n/a	0.3/180	Traffic (40), rail works (40), **WCC (33)**, birds (29)
Punyarra St	3:19 pm	45	n/a	3.9/290	Trains in Werris Ck (40), domestic noise (38), dogs (38), traffic (38), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 11 August 2011 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	7:38 pm	32	+4.0	2.4/179	Traffic (29), irrigator (29), **WCC inaudible**
Glenara	7:55 pm	33	+4.3	2.3/170	Traffic (33), **WCC inaudible**
Railway Cottage	7:20 pm	36	+2.7	2.8/185	Traffic (36), **WCC inaudible**
Tonsley Park	8:17 pm	37	+5.4	2.2/168	**WCC (34)**, traffic (33), plane (28)
Greenslopes	8:35 pm	43	+6.7	1.1/156	**WCC (42)**, traffic (35)
Kyooma	9:35 pm	40	+7.2	0.9/162	**WCC (40)**
Kurrara St	8:54 pm	38	+6.8	2.2/168	Traffic (36), **WCC (34)**
Punyarra St	9:13 pm	36	+6.7	0.5/181	Traffic (33), **WCC (30)**, domestic noise (30)

Table 3
WCC Noise Monitoring Results – 11/12 August 2011 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	12:10 am	27	+8.4	0.5/202	**WCC (27)**
Glenara	12:27 am	30	+8.2	0.6/108	**WCC (29)**, traffic (23)
Railway Cottage	12:50 am	28	+8.2	1.0/300	**WCC (28)**
Tonsley Park	10:02 pm	38	+7.4	0.8/154	Traffic (36), **WCC (32)**
Greenslopes	10:22 pm	40	+7.4	0.8/207	**WCC (38)**, traffic (35)
Kyooma	11:05 pm	35	+7.9	0.9/231	**WCC (35)**
Kurrara St	11:45 pm	38	+8.1	1.0/174	**WCC (38)**
Punyarra St	11:25 pm	40	+7.7	0.6/274	Traffic (37), **WCC (35)**, domestic noise (30)

The results shown in **Tables 1 - 3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC exceeded the criterion of 35 dB(A) Leq at the Greenslopes monitoring location during the evening and night, the Kyooma monitoring location during the evening and the Kurrara Street monitoring location during the night.

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 all of the elevated noise levels were measured whilst there was a strong temperature inversion in place (i.e. >+3° C/100m). The elevated noise levels were, therefore, measured 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) Lmax** 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 Lmax noise from WCC did not exceed the Lmax criterion 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

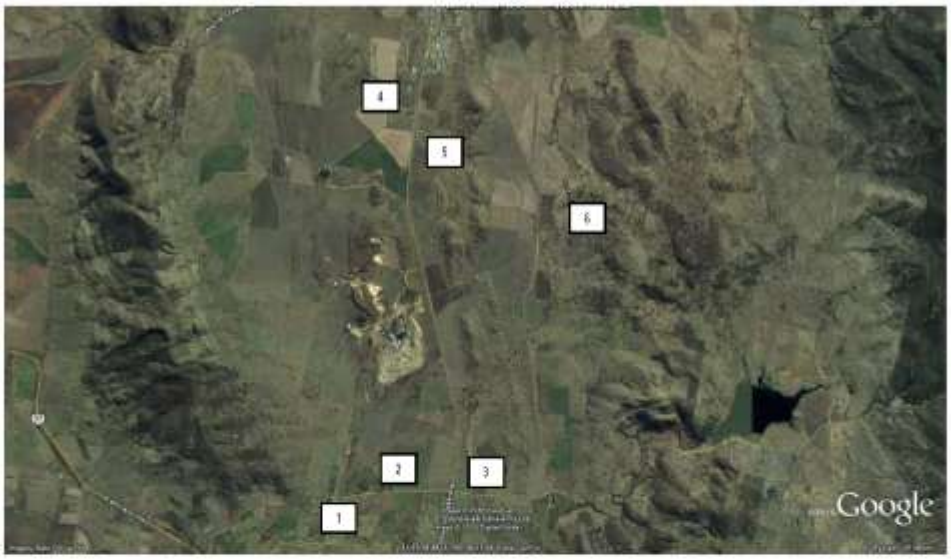

Figure 1 – Noise Monitoring Locations

Key
1 Almawillee
2 Glenara
3 Railway Cottage
4 Tonsley Park
5 Greenslopes/Banool
6 Kyooma

Figure 2 – Additional Noise Monitoring Locations

Key
7 Kurarra Street
8 Punyarra Street

SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

16 September 2011

Ref: 04035/4117

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

RE: SEPTEMBER 2011 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 14 and Thursday 15 September 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Mine's Noise Management Plan (revised November 2010). The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Railway Cottage" (previously denoted as "Fletcher")
"Tonsley Park"
"Greenslopes/Banool"
"Kyooma"

Additional measurements were also made on the road side near residential locations in Punyarra Street and at the reserve behind houses in Kurrara Street, Werris Creek. These locations are shown in **Figure 2**.

Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that at the beginning of the survey on September 14 winds were moderate from the west north west to north west. During the evening and night periods winds dropped in intensity and became variable from the north west to the north.

The data showed that there was a moderate to strong temperature inversion from early evening which persisted throughout the night survey.

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The total measured Leq noise level is shown in the tables below. Where the noise from WCC was audible the Bruel & Kjaer "*Evaluator*" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall. The noise criterion for the operational phase of the WCC project is **35 dB(A) $L_{eq\ (15\ min)}$** for all operating times. Mine noise from WCC is shown in bold type. Where noise from WCC is listed as inaudible, this means the noise levels from the mine were at least 10 dB below the ambient level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 14 September 2011 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	4:42 pm	34	n/a	5.7/299	Wind (31), birds (30), **WCC (<25)**
Glenara	4:23 pm	41	n/a	5.7/303	Wind in trees (38), birds (36), traffic (32), **WCC barely audible**
Railway Cottage	5:00 pm	38	n/a	4.8/283	Traffic (38), birds (26), **WCC inaudible**
Tonsley Park	2:40 pm	39	n/a	4.4/293	Traffic (39), **WCC inaudible**
Greenslopes	3:00 pm	46	n/a	4.5/299	Traffic (45), birds (40), **WCC inaudible**
Kyooma	4:00 pm	42	n/a	5.3/308	Birds (42), **WCC (< 30)**
Kurrara St	3:18 pm	44	n/a	5.1/302	Traffic (43), birds (36), **WCC inaudible**
Punyarra St	3:35 pm	40	n/a	3.8/289	Traffic (38), birds (33), trains (32), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 15 September 2011 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	9:43 pm	32	+11.1	2.7/342	**WCC (32)**, frogs (24)
Glenara	9:22 pm	36	+10.0	3.1/333	Traffic (33), **WCC (33)**
Railway Cottage	7:15 pm	46	+8.0	3.4/305	Traffic (46), **WCC (32)**
Tonsley Park	8:57 pm	31	+10.6	3.1/330	**WCC (31)**
Greenslopes	8:37 pm	40	+10.3	3.0/325	Traffic (38), **WCC (36)**
Kyooma	7:35 pm	32	+9.9	3.6/303	**WCC (32)**
Kurrara St	8:18 pm	36	+9.5	3.2/317	Birds (33), **WCC (32)**, traffic (26)
Punyarra St	8:01 pm	40	+9.8	2.9/315	Traffic (39), trains (32), **WCC inaudible**

Table 3
WCC Noise Monitoring Results – 14/15 September 2011 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	12:15 am	32	+10.0	0.7/97	**WCC (32)**
Glenara	11:56 pm	34	+9.7	0.1/23	**WCC (33)**, traffic (27)
Railway Cottage	12:35 am	28	+10.4	0.9/132	Traffic (28), **WCC inaudible**
Tonsley Park	11:30 pm	41	+9.5	2.0/303	Trains (41), **WCC inaudible**
Greenslopes	11:11 pm	31	+9.9	2.0/310	**WCC (31)**
Kyooma	10:10 pm	41	+11.3	2.2/335	**WCC (41)**
Kurrara St	10:53 pm	38	+9.9	2.0/320	Trains (38), **WCC (30)**
Punyarra St	10:35 pm	38	+11.2	1.9/333	Traffic (35), trains (35), **WCC (30)**

The results shown in **Tables 1 - 3** indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC exceeded the criterion of 35 dB(A) Leq at the Greenslopes monitoring location during the evening and at Kyooma monitoring location during the night.

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 all of the elevated noise levels were measured whilst there was a strong temperature inversion in place (i.e. >+3° C/100m). The elevated noise levels were, therefore, measured 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) Lmax** 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 Lmax noise from WCC did not exceed the Lmax criterion 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

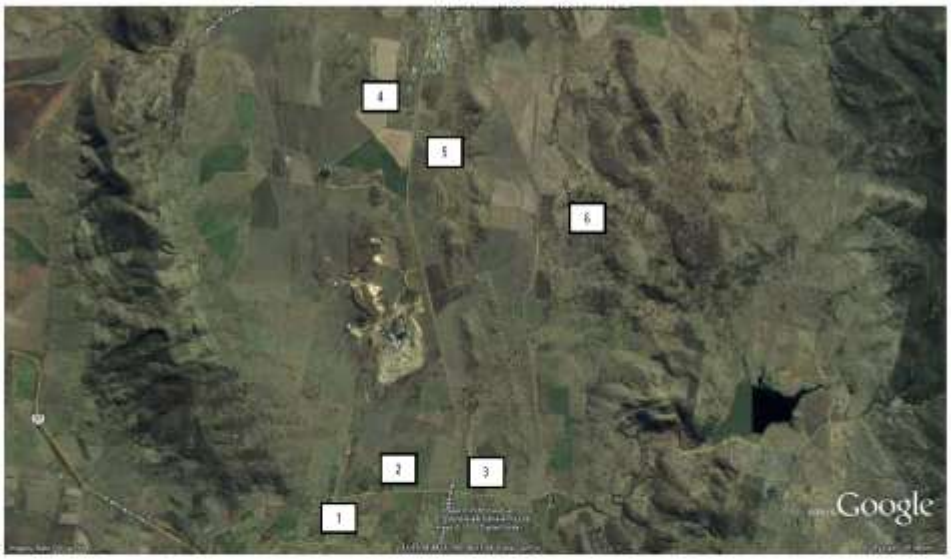

Figure 1 – Noise Monitoring Locations

Key
1 Almawillee
2 Glenara
3 Railway Cottage
4 Tonsley Park
5 Greenslopes/Banool
6 Kyooma

Figure 2 – Additional Noise Monitoring Locations

Key
7 Kurarra Street
8 Punyarra Street

SPECTRUMACOUSTICS
NOISE AND VIBRATION CONSULTANTS

3 November 2011

Ref: 04035/4173

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

RE: OCTOBER 2011 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 31st October and Tuesday 1st November, 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Project Approval PA10_0059. The monitoring locations and noise criteria for each are detailed below in extract from the Approval and shown on the attached **Figure 1**. The actual monitoring locations representative of the various receptor areas are shown in bold and underlined in the extract below (note that R18 is now mine owned).

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, (incl. **R5**, **R103** and **locations in Werris Creek**)	35	35	45

Notes: To interpret the locations referred to in the table, see ***Figure 1****; 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.

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Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm). Note that the day time circuit was commenced on the afternoon of October 31 and completed during the morning of November 1.

Attended noise monitoring was conducted with a Brüel & Kjær Type 2250 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 "Sound Level Meters" and has current NATA calibration. Field calibration is carried out at the start and end of each monitoring period. A-weighted noise levels were measured over 15-minute periods with data acquired at 1-second statistical intervals and the meter set to "fast" response. Each one-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.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data show that throughout the survey on October 31 (and early morning of November 1) winds were moderate, generally from the south. During the evening and night periods the wind dropped in intensity. Wind speeds measured at approximately 2m above ground level (with a hand held anemometer) were consistently lower than those at the automatic weather station. The data showed that a temperature inversion was not a significant feature of the atmosphere throughout the night survey.

The total measured Leq noise level 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 inaudible, 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.

Table 1
WCC Noise Monitoring Results – 31 October (pm) and 1 November (am) 2011 (Day)

Location	Time	dB(A) Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	3:05 pm	43	35	n/a	6.5/175	Birds (42), traffic (35), **WCC inaudible**
R9 Gedhurst	3:22 pm	42	37	n/a	6.2/186	Birds (42), traffic (30), **WCC inaudible**
R11 Glenara	3:40 pm	42	39	n/a	6.6/201	Traffic (38), wind (37), birds (37), **WCC inaudible**
R12 Railway Cottage	4:18 pm	37	38	n/a	6.5/197	Traffic (37), **WCC inaudible**
R14 Greenslopes	7:09 am	39	39	n/a	0.6/353	Traffic (36), **WCC (34)**, insects (32)
R20 Tonsley Park	4:40 pm	48	39	n/a	7.0/192	Traffic (46), train (41), birds (40), **WCC inaudible**
R24 Hazeldene	4:00 pm	40	37	n/a	6.0/185	Traffic (39), birds (32), **WCC inaudible**
R96 Kyooma	8:07 am	43	38	n/a	1.4/237	Birds (43), **WCC barely audible**
R98 Talavera	8:30 am	40	36	n/a	0.9/298	Birds (40), **WCC (<30)**
R103 Parsons	5:10 pm	45	35	n/a	6.7/193	Train in Werris Creek (45), **WCC inaudible**
Kurrara St	7:28 am	43	35	n/a	1.5/258	Birds & insects (42), train (34), traffic (33), **WCC (30)**

Coronation Avenue	7:46 am	44	35	n/a	1.6/253	Birds (44), road works (35), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 31 October (Evening)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	6:48 pm	37	35	n/a	5.0/183	Birds & insects (35), traffic (32), **WCC inaudible**
R9 Gedhurst	7:07 pm	35	37	n/a	3.9/173	Birds (35), traffic (25), **WCC inaudible**
R11 Glenara	7:25 pm	40	39	n/a	3.7/161	Birds (39), traffic (33), **WCC inaudible**
R12 Railway Cottage	8:00 pm	38	38	n/a	3.7/186	Traffic (37), birds & insects (30), **WCC inaudible**
R14 Greenslopes	9:01 pm	46	39	n/a	2.8/172	Traffic (45), **WCC (34)**, insects (33)
R20 Torsley Park	9:20 pm	43	37	n/a	2.2/194	Insects (42), traffic (33), train (33), **WCC (30)**
R24 Hazeldene	7:42 pm	39	37	n/a	3.8/166	Birds & insects (39), traffic (28), **WCC inaudible**
R96 Kyooma	6:00 pm	40	37	n/a	5.6/195	Birds (40), **WCC barely audible**
R98 Talavera	6:23 pm	36	36	n/a	5.8/190	Birds (36), **WCC inaudible**
R103 Parsons	9:40 pm	44	35	n/a	2.9/193	Train (43), insects (37), **WCC inaudible**
Kurrara St	8:25 pm	45	35	n/a	2.2/172	Frogs (43), traffic (38), birds (35), domestic noise (36), **WCC inaudible**
Coronation Avenue	8:42 pm	47	35	n/a	2.5/179	Insects (46), dogs (39), traffic (32), **WCC inaudible**

Table 3
WCC Noise Monitoring Results – 31 October (pm) and 1 November (am) (Night)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	10:02 pm	30	35	n/a	2.5/199	Traffic (29), insects (22), **WCC inaudible**
R9 Gedhurst	10:21 pm	30	37	n/a	2.9/199	**WCC (29)**, insects (22)
R11 Glenara	10:38 pm	27	39	n/a	3.2/197	Insects (25), traffic (22), **WCC (<20)**
R12 Railway Cottage	11:12 pm	21	38	n/a	3.2/183	Insects (21), **WCC inaudible**
R14 Greenslopes	12:26 am	34	39	n/a	4.4/181	**WCC (33)**, insects (27)
R20 Torsley Park	12:50 am	34	37	n/a	3.9/196	**WCC (34)**, insects (21)
R24 Hazeldene	10:55 pm	40	37	n/a	3.1/187	Traffic (39), birds (32), **WCC inaudible**
R96 Kyooma	11:54 pm	25	37	n/a	3.6/175	**WCC (23)**, insects (20)
R98 Talavera	11:33 pm	26	36	n/a	3.1/167	**WCC (24)**, insects (22)
R103 Parsons	1:10 am	43	35	n/a	3.7/195	Train (43), **WCC inaudible**
Kurrara St	1:30 am	47	35	n/a	3.9/185	Frogs (47), train (37), **WCC (30)**
Coronation Avenue	1:50 am	30	35	n/a	4.1/181	Train (28), **WCC (25)**

The results shown in **Tables 1 - 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 location at any time during the survey.

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 L1 (1 min) noise from WCC did not exceed the criterion 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

Figure 1 – Noise Monitoring Locations

SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

5 December 2011

Ref: 04035/4207

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

RE: NOVEMBER 2011 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 30th November and Thursday 1st December, 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Project Approval PA10_0059. The monitoring locations and noise criteria for each are detailed below in extract from the Approval and shown on the attached **Figure 1**. The actual monitoring locations representative of the various receptor areas are shown in bold and underlined in the extract below (note that R18 is now mine owned).

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, (incl. **R5, R103** and **locations in Werris Creek**)	35	35	45

*Notes: To interpret the locations referred to in the table, see **Figure 1**; 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

Additional monitoring was carried out at the Davidson property on Werris Creek Stock Road. As there is no residence on the property the monitoring was carried out on the roadside near the farm gate (see Figure 1).

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Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm). Note that rain on the afternoon of November 30 meant that the day time circuit was carried out during the morning of December 1.

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 15-minute periods with data acquired at 1-second statistical intervals and the meter set to "fast" response. Each one-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.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data show that during the early evening of November 30 winds were light from a north westerly direction. During the late evening and night the wind remained light but swung round to the south. During the day on December 1 the winds were moderate from the south to south east. The data showed that a temperature inversion was not a feature of the atmosphere throughout the night survey.

The total measured Leq noise level 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 inaudible, 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.

Table 1
WCC Noise Monitoring Results –1 December 2011 (Day)

Location	Time	dB(A) Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	9:05 am	43	35	n/a	6.9/165	Birds (42), traffic (35), **WCC inaudible**
R9 Gedhurst	9:23 am	45	37	n/a	7.0/170	Birds & insects (44), traffic (38), **WCC inaudible**
R11 Glenara	9:42 am	47	39	n/a	6.9/179	Birds & insects (47), traffic (32), **WCC inaudible**
R12 Railway Cottage	10:40 am	43	38	n/a	8.1/174	Traffic (42), birds & insects (35), **WCC inaudible**
R14 Greenslopes	8:32 am	45	39	n/a	6.0/166	Birds & insects (45), tractor (30), **WCC (25)**
R20 Tonsley Park	8:43 am	43	39	n/a	6.2/164	Traffic (42), birds & insects (35), **WCC inaudible**
R24 Hazeldene	10:03 am	46	37	n/a	7.0/181	Birds & insects (46), traffic (35), **WCC inaudible**
Davidson	9:43 am	53	37	n/a	7.1/181	Birds (53), WCC inaudible
R96 Kyooma	9:43 am	60	38	n/a	6.9/179	Wind in trees (50), birds (40), **WCC inaudible**
R98 Talavera	10:18 am	45	36	n/a	7.7/175	Birds (43), wind in trees (42), **WCC inaudible**
R103 Parsons	8:25 am	54	35	n/a	6.0/166	Trains (53), dogs (47), **WCC inaudible**
Kurrara St	9:02 am	51	35	n/a	6.9/165	Birds & insects (51), traffic (42), **WCC inaudible**
Coronation Avenue	9:20 am	59	35	n/a	7.0/170	Birds & insects (58), traffic (35), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 30 November (Evening)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	7:28 pm	40	35	n/a	1.6/332	Birds & insects (37), frogs (32), **WCC (33)**, dog (30)
R9 Gedhurst	7:50 pm	50	37	n/a	2.2/305	Birds & insects (50), cattle (32), **WCC (30)**
R11 Glenara	8:07 pm	51	39	n/a	1.5/291	Birds & insects (51), traffic (30), **WCC (28)**
R12 Railway Cottage	8:42 pm	47	38	n/a	3.7/186	Insects (44), traffic (43), **WCC inaudible**
R14 Greenslopes	9:05 pm	50	39	n/a	1.4/336	Frogs (47), insects (46), **WCC (35)**
R20 Tonsley Park	9:40 pm	48	37	n/a	1.3/179	Insects (44), traffic (42), train (40), **WCC inaudible**
R24 Hazeldene	8:25 pm	42	37	n/a	1.4/280	Birds & insects (42), traffic (33), **WCC inaudible**
Davidson	8:39 pm	38	37	n/a	1.4/280	Birds & insects (37), **WCC (30)**
R96 Kyooma	8:05 pm	36	37	n/a	1.5/291	Insects (35), **WCC (30)**
R98 Talavera	7:30 pm	43	36	n/a	1.6/291	Birds & insects (42), **WCC (33)**, plane (30)
R103 Parsons	9:28 pm	42	35	n/a	1.5/187	Train (39), insects (37), frogs (33), **WCC inaudible**
Kurrara St	9:19 pm	48	35	n/a	1.1/250	Birds & insects (48), traffic (35), **WCC (25)**
Coronation Avenue	9:00 pm	59	35	n/a	1.0/312	Local traffic (59), insects (48), **WCC inaudible**

Table 3
WCC Noise Monitoring Results –30 November (Night)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	10:03 pm	50	35	Lapse	1.8/191	Frogs & insects (50), **WCC inaudible**
R9 Gedhurst	10:22 pm	43	37	Lapse	2.4/214	Frogs & insects (43), traffic (30), **WCC barely audible**
R11 Glenara	10:49 pm	44	39	Lapse	1.8/190	Frogs & insects (44), traffic (28), **WCC (<25)**
R12 Railway Cottage	11:39 pm	38	38	Lapse	1.1/137	Frogs & insects (37), traffic (30), **WCC (25)**
R14 Greenslopes	12:07 am	46	39	Lapse	1.0/107	Insects (43), frogs (41), **WCC (39)**
R20 Tonsley Park	11:50 pm	40	37	Lapse	1.0/140	Insects (40), traffic (29), **WCC inaudible**
R24 Hazeldene	10:03 pm	41	37	Lapse	1.2/149	Traffic (39), frogs & insects (36), **WCC inaudible**
Davidson	10:24 pm	37	37	Lapse	2.4/214	Insects (37), **WCC (29)**
R96 Kyooma	11:29 pm	39	37	Lapse	2.0/206	**WCC (36)**, insects (36)
R98 Talavera	10:05 pm	44	36	Lapse	1.8/191	Birds & insects (44), **WCC (27)**
R103 Parsons	12:09 am	49	35	Lapse	1.0/107	Dogs (49), insects (35), train (32), **WCC inaudible**
Kurrara St	11:29 pm	51	35	Lapse	1.2/126	Frogs (51), traffic (35), **WCC (<25)**
Coronation Avenue	11:07 pm	37	35	Lapse	1.5/161	Traffic (36), insects (31), **WCC inaudible**

The results shown in **Tables 1 - 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.

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 highest L1 (1 min) noise from WCC was 45 dB(A) at the Greenslopes monitoring location. It must be noted that the sleep disturbance criterion is applicable at a point 1m from a bedroom window. For practical purposes the noise measurement location at Greesnlopes is approximately 30m from the residence (at a location agreed upon with the resident). In addition to this, the internal layout of the residence is not known so the bedroom windows cannot be identified. It is, therefore, not possible to accurately determine compliance with the sleep disturbance criterion based on the data obtained.

At all other monitoring locations the L1 (1 min) noise levels were lower than 45.

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

Figure 1 – Noise Monitoring Locations

20 December 2011

Ref: 04035/4221

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

RE: DECEMBER 2011 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 14th December, 2011.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Project Approval PA10_0059. The monitoring locations and noise criteria for each are detailed below in extract from the Approval and shown on the attached **Figure 1**. The actual monitoring locations representative of the various receptor areas are shown in bold and underlined in the extract below (note that R18 is now mine owned).

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, (incl. **R5**, **R103** and **locations in Werris Creek**)	35	35	45

Notes: To interpret the locations referred to in the table, see ***Figure 1****, 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.

Additional monitoring was carried out at the Davidson property on Werris Creek Stock Road. As there is no residence on the property the monitoring was carried out on the roadside near the farm gate (see Figure 1).

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Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

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 15-minute periods with data acquired at 1-second statistical intervals and the meter set to "fast" response. Each one-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.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data show that during the afternoon of December 14 winds were light from a south to south westerly direction. During the late evening the wind was stronger and more from south. At night the wind remained from the south but wind speeds dropped. The data showed that there was a mild temperature inversion from about 11 pm.

The total measured Leq noise level 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 inaudible, 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.

Table 1
WCC Noise Monitoring Results –14 December 2011 (Day)

Location	Time	dB(A) Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	1:52 pm	38	35	n/a	3.1/238	Birds (37), traffic (31), **WCC inaudible**
R9 Gedhurst	2:10 pm	36	37	n/a	2.7/213	Birds & insects (35), traffic (30), **WCC inaudible**
R11 Glenara	2:26 pm	45	39	n/a	3.6/225	Blackhoe (44), birds & insects (38), **WCC inaudible**
R12 Railway Cottage	3:00 pm	42	38	n/a	4.9/186	Traffic (42), birds & insects (32), **WCC inaudible**
R14 Greenslopes	1:09 pm	40	39	n/a	2.6/203	Insects (36), **WCC (35)**, traffic (35)
R20 Torsley Park	1:28 pm	36	39	n/a	3.2/221	Traffic (35), insects (30), **WCC inaudible**
R24 Hazeldene	2:43 pm	42	37	n/a	3.7/241	Birds & insects (42), traffic (35), **WCC inaudible**
Davidson	2:56 pm	41	37	n/a	4.9/186	Birds & insects (41), traffic (30), **WCC (30)**
R96 Kyooma	2:32 pm	38	38	n/a	3.6/225	Insects (35), **WCC (35)**
R98 Talavera	3:21 pm	38	36	n/a	4.7/204	Insects (34), **WCC (33)**, traffic (31), train (30)
R103 Parsons	1:08 pm	39	35	n/a	2.6/203	Trains (37), birds (34), traffic (30), **WCC inaudible**
Kurrara St	1:29 pm	51	35	n/a	3.2/221	Traffic (51), insects (38), **WCC inaudible**
Coronation Avenue	1:51 pm	43	35	n/a	3.1/238	Traffic (40), trains (38), birds & insects (33), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 14 December (Evening)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	8:05 pm	40	35	n/a	4.9/152	Birds & insects (39), traffic (34), **WCC inaudible**
R9 Gedhurst	8:22 pm	38	37	n/a	4.8/164	Birds, insects & frogs (38), traffic (25), **WCC inaudible**
R11 Glenara	8:38 pm	49	39	n/a	5.0/171	Birds & insects (49), traffic (32), **WCC inaudible**
R12 Railway Cottage	9:15 pm	42	38	n/a	5.3/177	Traffic (40), insects & frogs (37), **WCC inaudible**
R14 Greenslopes	9:28 pm	44	39	n/a	5.0/179	Insects & frogs (42), traffic (35), **WCC (33)**
R20 Tonsley Park	7:34 pm	47	37	n/a	5.3/168	Birds & insects (46), **WCC (37)**, traffic (28)
R24 Hazeldene	8:56 pm	51	37	n/a	5.4/177	Train (49), traffic (45), insects & frogs (42), **WCC inaudible**
Davidson	8:01 pm	48	37	n/a	4.9/152	Insects (48), **WCC (25)**
R96 Kyooma	7:38 pm	40	37	n/a	5.1/166	Birds & insects (37), **WCC (33)**, traffic (33)
R98 Talavera	7:11 pm	42	36	n/a	5.8/169	Insects (40), traffic (35), plane (32), **WCC (30)**
R103 Parsons	7:13 pm	49	35	n/a	5.8/169	Birds & insects (46), train (45), domestic noise (40), **WCC inaudible**
Kurrara St	8:47 pm	52	35	n/a	5.2/176	Traffic (50), insects & frogs (46), train (40) **WCC inaudible**
Coronation Avenue	8:22 pm	40	35	n/a	4.8/164	Insects (36), trains (35), traffic (34), **WCC inaudible**

Table 3
WCC Noise Monitoring Results –14 December (Night)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	11:49 pm	44	35	<2	2.4/202	Frogs & insects (44), traffic (30), **WCC inaudible**
R9 Gedhurst	11:30 pm	42	37	<2	2.5/206	Birds, insects & frogs (41), **WCC (35)**
R11 Glenara	11:13 pm	37	39	<2	2.2/184	Birds & insects (37), **WCC (<25)**
R12 Railway Cottage	10:40 pm	39	38	Lapse	2.3/174	Traffic (37), insects (36), **WCC inaudible**
R14 Greenslopes	11:44 am	41	39	<2	2.4/202	Traffic (38), insects (36), **WCC (34)**
R20 Tonsley Park	10:18 am	51	37	Lapse	2.6/183	Insects & frogs (51), **WCC (37)**, traffic (32)
R24 Hazeldene	10:56 pm	42	37	Lapse	2.1/162	Traffic (40), frogs & insects (38), **WCC inaudible**
Davidson	10:48 pm	47	37	Lapse	2.2/173	Insects (47), **WCC (<20)**
R96 Kyooma	10:26 pm	39	37	Lapse	2.5/176	Insects (39), **WCC (<20)**
R98 Talavera	10:01 pm	40	36	Lapse	3.5/175	Insects (40), **WCC inaudible**
R103 Parsons	10:01 am	45	35	Lapse	3.5/175	Train (43), insects (40), **WCC inaudible**
Kurrara St	11:24 pm	47	35	<2	2.3/195	Frogs (47), traffic (35), **WCC (26)**
Coronation Avenue	11:06 pm	45	35	<2	2.1/173	Insects (45), traffic (30), **WCC inaudible**

The results shown in **Tables 1 - 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.

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

Figure 1 – Noise Monitoring Locations

SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

31 January 2012

Ref: 04035/4263

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

RE: JANUARY 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 24th January, 2012.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Project Approval PA10_0059. The monitoring locations and noise criteria for each are detailed below in extract from the Approval and shown on the attached **Figure 1**. The actual monitoring locations representative of the various receptor areas are shown in bold and underlined in the extract below (note that R14 and R18 are now mine owned).

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, (incl. **R5**, **R103** and **locations in Werris Creek**)	35	35	45

Notes: To interpret the locations referred to in the table, see ***Figure 1****, 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.

Additional monitoring was carried out at the Davidson property on Werris Creek Stock Road. As there is no residence on the property the monitoring was carried out on the roadside near the farm gate (see Figure 1).

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Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

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 15-minute periods with data acquired at 1-second statistical intervals and the meter set to "fast" response. Each one-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.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data show that throughout the entire survey the winds were generally from the east. Wind speeds gradually decreased from the beginning of the day time survey until the end of the night time survey. The data showed that there was a mild temperature inversion from about 9 pm.

The total measured Leq noise level 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 inaudible, 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.

Table 1
WCC Noise Monitoring Results –24 January 2012 (Day)

Location	Time	dB(A) Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	2:20 pm	36	35	n/a	4.7/94	Birds (31), traffic (30), **WCC (30)**, dog (26)
R9 Gedhurst	2:37 pm	38	37	n/a	5.4/74	Birds & insects (35), traffic (34), cattle (30), **WCC inaudible**
R11 Glenara	4:24 pm	46	39	n/a	6.0/103	Traffic (44), birds & insects (42), **WCC inaudible**
R12 Railway Cottage	4:38 pm	41	38	n/a	4.9/119	Traffic (40), birds & insects (35), **WCC inaudible**
R20 Tonsley Park	4:01 pm	42	39	n/a	6.7/109	Traffic (40), birds (38), **WCC faintly audible**
R24 Hazeldene	4:41 pm	54	37	n/a	4.9/119	Birds & insects (54), traffic (45), **WCC inaudible**
Davidson	2:30 pm	41	37	n/a	6.6/86	Birds & insects (41), sheep (30), **WCC inaudible**
R96 Kyooma	2:12 pm	40	38	n/a	4.7/94	Birds & insects (40), **WCC (<20)**
R98 Talavera	1:45 pm	43	36	n/a	3.9/59	Birds & insects (43), **WCC (25)**
R103 Parsons	1:50 pm	38	35	n/a	3.9/59	Birds & insects (36), traffic (34), **WCC inaudible**
Kurrara St	4:16 pm	54	35	n/a	5.9/103	Traffic (53), birds (46), **WCC inaudible**
Coronation Avenue	3:57 pm	55	35	n/a	6.7/109	Traffic (54), birds & insects (48), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 24 January 2012 (Evening)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	7:45 pm	38	35	n/a	4.1/90	Birds & insects (37), traffic (31), **WCC faintly audible**
R9 Gedhurst	8:04 pm	41	37	n/a	4.0/83	Birds & insects (41), traffic (30), **WCC inaudible**
R11 Glenara	8:22 pm	41	39	n/a	3.0/93	Birds & insects (40), traffic (33), **WCC inaudible**
R12 Railway Cottage	9:09 pm	43	38	n/a	1.6/110	Insects (41), traffic (30), **WCC inaudible**
R20 Tonsley Park	8:44 pm	46	37	n/a	2.1/116	Insects (45), trains (39) **WCC inaudible**
R24 Hazeldene	8:46 pm	41	37	n/a	2.1/116	Birds & insects (40), traffic (37), **WCC inaudible**
Davidson	7:51 pm	41	37	n/a	4.0/86	Insects (41), cattle (30), **WCC faintly audible**
R96 Kyooma	7:34 pm	35	37	n/a	3.4/64	Birds & insects (35), **WCC (<20)**
R98 Talavera	7:12 pm	39	36	n/a	3.5/79	Birds & insects (39), train (30), **WCC (20)**
R103 Parsons	7:17 pm	40	35	n/a	3.5/79	Birds & insects (36), train (35), traffic (34), **WCC inaudible**
Kurrara St	8:25 pm	40	35	n/a	3.0/93	Insects & frogs (38), train (37) **WCC inaudible**
Coronation Avenue	8:08 pm	56	35	n/a	3.6/86	Insects (56), trains (42), traffic (40), **WCC inaudible**

Table 3
WCC Noise Monitoring Results –24 January 2012 (Night)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/ 100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	10:27 pm	40	35	<3	3.1/89	Insects (38), traffic (35), **WCC (25)**
R9 Gedhurst	10:46 pm	36	37	<3	3.9/94	**WCC (32)**, insects (31), traffic (31)
R11 Glenara	11:06 pm	38	39	<3	3.3/89	Insects (36), traffic (32), **WCC (30)**
R12 Railway Cottage	11:52 pm	40	38	<3	2.8/119	Traffic (40), insects (31), **WCC inaudible**
R20 Tonsley Park	11:43 am	46	37	<3	2.8/122	Insects (45), trains (38), traffic (32), **WCC (30)**
R24 Hazeldene	11:30 pm	37	37	<3	3.5/113	Insects (37), **WCC (25)**, traffic (22)
Davidson	10:52 pm	43	37	<3	3.7/88	Insects (43), **WCC (<20)**
R96 Kyooma	10:33 pm	43	37	<3	3.1/89	Insects (43), dog (26), **WCC (<20)**
R98 Talavera	10:00 pm	39	36	<3	2.2/97	Insects (39), **WCC inaudible**
R103 Parsons	10:00 am	45	35	<3	2.2/97	Insects (45), train (35), traffic (30), **WCC inaudible**
Kurrara St	11:25 pm	44	35	<3	3.5/89	Frogs & insects (43), trains (37), **WCC inaudible**
Coronation Avenue	11:08 pm	35	35	<3	3.3/89	Traffic (33), insects (30), **WCC inaudible**

The results shown in **Tables 1 - 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.

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
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Review:

Neil Pennington
Acoustical Consultant

Figure 1 – Noise Monitoring Locations

SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

17 February 2012

Ref: 04035/4272

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

RE: FEBRUARY 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 Wednesday 8th February, 2012.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Project Approval PA10_0059. The monitoring locations and noise criteria for each are detailed below in extract from the Approval and shown on the attached **Figure 1**. The actual monitoring locations representative of the various receptor areas are shown in bold and underlined in the extract below (note that R14 and R18 are now mine owned and, therefore, no monitoring is carried out there).

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, (incl. **R5**, **R103** and **locations in Werris Creek**)	35	35	45

*Notes: To interpret the locations referred to in the table, see **Figure 1**; 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

Additional monitoring was carried out at the Davidson property on Werris Creek Stock Road. As there is no residence on the property the monitoring was carried out on the roadside near the farm gate (see Figure 1).

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Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

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 15-minute periods with data acquired at 1-second statistical intervals and the meter set to "fast" response. Each one-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.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data show that throughout the entire survey the winds were generally from the southeast. Wind speeds gradually decreased from the beginning of the day time survey until the end of the night time survey. The data showed that there was a mild temperature inversion from about 9 pm.

The total measured Leq noise level 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.

Table 1
WCC Noise Monitoring Results – 8 February 2012 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	1:53 pm	45	35	n/a	4.6/143	Birds (42), traffic (42), WCC (<30)
R9 Gedhurst	2:12 pm	44	37	n/a	5.6/136	Machine (41), Traffic (38), birds (38), WCC (<25)
R11 Glenara	2:35 pm	45	39	n/a	6.1/114	Traffic (42), wind (42), **WCC inaudible**
R12 Railway Cottage	1:00 pm	41	38	n/a	4.4/108	Wind (39), Traffic (37), **WCC inaudible**
R20 Tonsley Park	1:26 pm	45	39	n/a	3.6/139	Traffic (42), birds (41), **WCC inaudible**
R24 Hazeldene	2:50 pm	45	37	n/a	6/123	Traffic (44), wind (36), birds (35), **WCC inaudible**
Davidson	2:14 pm	41	37	n/a	5.6/136	Wind (38), thunder (36), windmill (32), WCC (<30)
R96 Kyooma	1:41 pm	39	38	n/a	4.6/143	Wind (36), plane (35), **WCC (25)**
R98 Talavera	1:20 pm	36	36	n/a	3.6/139	Wind (34), plane (30), insects (28), **WCC (24)**
R103 Parsons	1:05 pm	43	35	n/a	4.4/108	Machine (41), birds (36), traffic (34), WCC (<25)
Kurrara St	2:51 pm	53	35	n/a	6/123	Traffic (50), train (48), **WCC inaudible**
Coronation Avenue	2:34 pm	48	35	n/a	6.1/114	Workmen (45), Wind (42), traffic (42), WCC (<30)

Table 2
WCC Noise Monitoring Results – 8 February 2012 (Evening)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	8:00 pm	44	35	n/a	5.4/152	Insects (42), traffic (38), WCC inaudible
R9 Gedhurst	8:34 pm	39	37	n/a	5.2/162	Birds & insects (37), traffic (33), WCC inaudible
R11 Glenara	9:07 pm	38	39	n/a	4.0/150	Birds & insects (35), traffic (33), WCC inaudible
R12 Railway Cottage	7:01 pm	44	38	n/a	7.5/130	Wind (41), traffic (38), plane (35), WCC inaudible
R20 Tonsley Park	7:31 pm	45	37	n/a	6.7/148	Insects (43), traffic (39) WCC (30)
R24 Hazeldene	9:28 pm	42	37	n/a	3.4/134	Traffic (40), Birds & insects (36), WCC inaudible
Davidson	8:05 pm	43	37	n/a	5.4/152	Insects (42), wind (35), WCC (<30)
R96 Kyooma	7:45 pm	40	37	n/a	6.2/156	Wind (37), insects (37), WCC (<30)
R98 Talavera	7:22 pm	51	36	n/a	6.4/134	Insects (50), traffic (42), WCC (<30)
R103 Parsons	7:12 pm	52	35	n/a	6.4/134	Birds (51), train (42), traffic (40), WCC inaudible
Kurrara St	8:46 pm	45	35	n/a	5.4/159	Insects (43), traffic (39), WCC (<30)
Coronation Avenue	8:25 pm	53	35	n/a	5.2/162	Traffic (51), insects (47), WCC inaudible

Table 3
WCC Noise Monitoring Results – 8-9 February 2012 (Night)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	12:28 am	41	35	<3	1.7/106	Insects (35), traffic (34), WCC (<30)
R9 Gedhurst	12:45 am	38	37	<3	1.7/123	Insects (39), traffic (37), WCC (<25)
R11 Glenara	1:02 am	42	39	<3	1.9/121	Insects (41), traffic (35), WCC (<25)
R12 Railway Cottage	10:08 pm	37	38	<3	3.9/122	Insects (36), traffic (31), WCC (<30)
R20 Tonsley Park	12:05 am	44	37	<3	3.6/104	Insects (45), trains (38), traffic (32), WCC (30)
R24 Hazeldene	1:22 am	45	37	<3	1.7/159	Insects (44), traffic (35), WCC (<25)
Davidson	10:59 pm	46	37	<3	4.1/105	Insects (43), train (31), WCC (<30)
R96 Kyooma	10:43 pm	37	37	<3	2.9/118	Insects (36), WCC (<30)
R98 Talavera	10:24 pm	45	36	<3	2.1/128	Insects (44), traffic (36), WCC (<30)
R103 Parsons	11:49 pm	44	35	<3	3.6/104	Train (40), Insects (39), WCC inaudible
Kurrara St	11:30 pm	45	35	<3	1.9/144	Trains (42), Insects (37), traffic (36), WCC (<25)
Coronation Avenue	11:14 pm	39	35	<3	3.2/121	Insects (36), train (36), WCC inaudible

The results shown in **Tables 1 - 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.

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
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Figure 1 – Noise Monitoring Locations

SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

26 March 2012

Ref: 04036/4313

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

RE: MARCH 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 22nd March, 2012.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Project Approval PA10_0059. The monitoring locations and noise criteria for each are detailed below in extract from the Approval and shown on the attached **Figure 1**. The actual monitoring locations representative of the various receptor areas are shown in bold and underlined in the extract below (note that R14 and R18 are now mine owned and, therefore, no monitoring is carried out there).

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, (incl. **R5**, **R103** and **locations in Werris Creek**)	35	35	45

*Notes: To interpret the locations referred to in the table, see **Figure 1**, 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.

Additional monitoring was carried out at the Davidson property on Werris Creek Stock Road. As there is no residence on the property the monitoring was carried out on the roadside near the farm gate (see Figure 1).

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Three sets of measurements were made over the "circuit", one during the day time period (before 6 pm), one during the evening period (from 6 pm – 10 pm) and one at night (after 10 pm).

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 15-minute periods with data acquired at 1-second statistical intervals and the meter set to "fast" response. Each one-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.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speed and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data show that throughout the day time survey winds were light and variable in direction. During the evening the wind was light from the south and in the night the wind turned from the north and increased in speed. The data showed that there was a mild temperature inversion throughout the night time survey.

The total measured Leq noise level 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.

Table 1
WCC Noise Monitoring Results – 22 March 2012 (Day)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	3:54 pm	35	35	n/a	1.3/210	Birds & insects (33), **WCC (31)**
R9 Gedhurst	4:15 pm	34	37	n/a	1.0/259	**WCC (31)**, birds & insects (30), traffic (30)
R11 Glenara	4:38 pm	36	39	n/a	1.2/339	Birds & insects (34), **WCC (30)**, traffic (27)
R12 Railway Cottage	2:45 pm	47	38	n/a	1.3/76	Train (47), traffic (28), **WCC (<25)**
R20 Tonsley Park	3:23 pm	35	39	n/a	1.1/121	Traffic (33), birds & insects (30), **WCC inaudible**
R24 Hazeldene	5:00 pm	37	37	n/a	1.4/26	Birds & insects (36), **WCC (29)**, traffic (28)
Davidson	4:03 pm	41	37	n/a	1.3/210	Birds & insects (41), **WCC (21)**
R96 Kyooma	3:45 pm	37	38	n/a	1.2/204	Birds & insects (37), **WCC (<20)**
R98 Talavera	3:12 pm	38	36	n/a	1.1/101	Birds & insects (38), **WCC (<20)**
R103 Parsons	3:00 pm	36	35	n/a	1.3/99	Train (36), dog (30), **WCC inaudible**
Kurrara St	4:49 pm	49	35	n/a	1.9/353	Birds & insects (47), traffic (43), train (40), **WCC inaudible**
Coronation Avenue	4:32 pm	37	35	n/a	0.5/325	Birds & insects (33), traffic (33), train (30), **WCC inaudible**

Table 2
WCC Noise Monitoring Results – 22 March 2012 (Evening)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	7:52 pm	47	35	n/a	2.0/132	Insects (44), dogs (42), domestic noise (37), traffic (38), WCC (33), traffic (30)
R9 Gedhurst	8:12 pm	40	37	n/a	0.7/30	Train (37), insects (36), WCC (32)
R11 Glenara	8:32 pm	51	39	n/a	1.4/174	Insects (51), traffic (34), WCC (32)
R12 Railway Cottage	6:50 pm	44	38	n/a	1.0/175	Traffic (43), birds & insects (36), WCC (31)
R20 Tonsley Park	7:21 pm	45	37	n/a	2.0/189	Insects (43), trains (38), dog (38), WCC (33)
R24 Hazeldene	8:50 pm	44	37	n/a	1.1/93	Insects (44), traffic (30), WCC (25)
Davidson	7:50 pm	55	37	n/a	2.0/132	Insects (55), WCC (<20)
R96 Kyooma	7:32 pm	40	37	n/a	2.1/189	Insects (40), WCC (<20)
R98 Talavera	7:10 pm	48	36	n/a	1.3/187	Insects (48), WCC (<20)
R103 Parsons	7:03 pm	49	35	n/a	0.8/186	Train (47), insects (44), WCC inaudible
Kurrara St	8:32 pm	52	35	n/a	1.4/174	Insects (52), traffic (28), WCC inaudible
Coronation Avenue	8:12 pm	44	35	n/a	0.7/30	Insects (42), train (38), WCC inaudible

Table 3
WCC Noise Monitoring Results – 22 March 2012 (Night)

Location	Time	dB(A), Leq	Criterion dB(A) Leq	Inversion °C/100m	Wind speed/ dir	Identified Noise Sources
R5 Rosehill	10:43 pm	40	35	+1.5	6.3/341	Insects (40), WCC (27)
R9 Gedhurst	11:00 pm	36	37	+1.8	6.1/340	Insects (34), WCC (32)
R11 Glenara	11:17 pm	51	39	+2.1	6.1/336	Insects (51), WCC (32), traffic (30)
R12 Railway Cottage	10:00 pm	45	38	+1.9	5.3/344	Insects (45), WCC (31)
R20 Tonsley Park	10:18 pm	57	37	+1.4	6.2/346	Insects (57), trains (30), WCC inaudible
R24 Hazeldene	11:38 pm	44	37	+2.9	5.6/330	Insects (44), traffic (31), WCC 31)
Davidson	10:58 pm	52	37	+1.8	6.1/340	Insects (52), WCC barely audible
R96 Kyooma	10:41 pm	40	37	+1.5	6.3/341	Insects (40), WCC barely audible
R98 Talavera	10:21 pm	56	36	+1.4	6.2/346	Insects (56), WCC (<20)
R103 Parsons	10:00 pm	44	35	+1.9	5.3/344	Train (41), insects (41), WCC inaudible
Kurrara St	11:43 pm	46	35	+3.1	5.4/329	Insects (46), train (23), WCC inaudible
Coronation Avenue	11:24 pm	40	35	+2.4	6.0/333	Insects (40), train (20), WCC inaudible

The results shown in **Tables 1 - 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.

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

Figure 1 – Noise Monitoring Locations

Appendix 8
Monthly Meteorological Data

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Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/04/2011	20.5	14.2	27.3	20.2	14.2	26.6	62.9	39.0	84.0	2.4	0.5	5.3	144	1022.7	187.125	898.000	0
2/04/2011	20.7	16.5	27.7	20.2	16.4	26.4	63.9	40.0	77.0	3.0	0.2	9	207	1021.0	167.750	944.000	0
3/04/2011	20.7	14.1	26.3	20.4	13.8	25.6	55.3	35.0	81.0	2.7	0.5	4.9	167	1023.2	247.563	983.000	0
4/04/2011	18.6	12.6	24.8	18.2	12.6	23.8	56.7	36.0	73.0	3.8	0	8.4	163	1025.7	229.958	982.000	0
5/04/2011	18.0	13.5	22.9	17.3	13.4	21.6	63.9	47.0	79.0	6.1	1.6	10	133	1028.2	237.013	812.000	0
6/04/2011	18.0	12.5	23.5	17.4	12.5	22.4	62.7	42.0	82.0	5.5	1.5	10.3	137	1028.0	234.613	877.000	0
7/04/2011	17.3	12.4	23.1	16.8	12.3	22.1	69.8	52.0	83.0	5.4	1.3	11.1	138	1028.7	162.990	896.000	0
8/04/2011	18.1	12.4	25	17.6	12.3	24.1	63.8	42.0	83.0	2.9	1.1	7.2	124	1028.4	199.417	958.000	0
9/04/2011	19.2	11.3	25.9	19.0	11.9	25.1	55.1	34.0	83.0	1.3	0	2.9	195	1023.9	189.979	837.000	0
10/04/2011	19.3	15	26.7	18.7	14.8	25.8	61.9	34.0	87.0	4.7	1.3	9.9	318	1015.4	169.792	887.000	0
11/04/2011	15.4	12.5	18.4	14.8	11.9	17.6	64.8	48.0	87.0	3.8	1.5	7.4	313	1013.2	183.550	880.000	0
12/04/2011	14.7	9.7	19	14.3	9.3	18.3	55.8	42.0	74.0	3.9	1.8	7.8	324	1016.9	152.148	907.000	0
13/04/2011	16.4	8.4	21.9	16.2	8.4	21.1	51.5	36.0	77.0	3.1	0.1	6.4	294	1017.3	189.591	732.000	0
14/04/2011	16.0	10	23	15.8	10.4	21.5	53.8	33.0	71.0	2.2	0.1	6.1	260	1015.9	188.917	782.000	0
15/04/2011	16.3	9.8	21.9	16.1	10.1	21.1	56.8	32.0	81.0	1.9	0.1	4.6	197	1016.6	151.146	788.000	0
16/04/2011	14.9	13	17.4	14.4	12.3	16.8	80.2	71.0	88.0	2.4	0.1	5.8	147	1018.7	65.583	394.000	0
17/04/2011	16.2	12.7	19.9	15.8	12.5	19.3	72.0	57.0	84.0	5.9	1.3	10.2	138	1022.2	167.281	1046.000	0
18/04/2011	17.4	10.3	24.5	17.2	11	23.5	62.4	41.0	82.0	1.9	0	5.4	145	1021.7	197.438	730.000	0
19/04/2011	19.1	11.8	25.5	19.0	12.1	24.9	59.5	38.0	84.0	1.8	0.1	4.2	175	1021.0	198.302	740.000	0
20/04/2011	19.3	15.2	24.8	19.1	15.4	24	62.5	47.0	78.0	1.5	0.2	3.4	222	1019.7	133.813	814.000	0
21/04/2011	19.3	15.5	23.8	19.0	15.2	22.8	60.4	42.0	78.0	2.3	0.4	4.8	246	1016.3	129.000	1061.000	0
22/04/2011	18.8	12.7	26	18.6	12.5	25.1	54.0	33.0	73.0	3.2	0.1	7.4	237	1015.2	164.063	762.000	0
23/04/2011	16.8	10.2	24.2	16.6	10.9	23.8	58.4	36.0	74.0	3.0	0.2	6.1	149	1019.7	171.302	647.000	0
24/04/2011	18.2	11.4	25.4	17.9	11.7	24.8	63.2	37.0	82.0	2.0	0.3	3.6	183	1022.8	163.938	660.000	0
25/04/2011	17.9	12.4	24.2	17.6	12.8	23.4	68.7	44.0	85.0	3.2	0.3	8.1	146	1025.1	157.646	670.000	0
26/04/2011	16.7	12.7	22.8	16.3	12.6	21.7	67.7	49.0	86.0	5.6	2	11.1	144	1027.4	171.375	765.000	0
27/04/2011	15.1	11.3	20.2	14.6	11.4	19.1	66.6	50.0	79.0	5.7	1.5	8.7	138	1027.5	148.229	857.000	0
28/04/2011	15.0	10.7	21.3	14.7	10.6	20.3	68.7	46.0	81.0	3.6	0.3	7.9	134	1025.2	72.369	654.000	0
29/04/2011	15.7	10.9	21.2	15.3	11	20.8	69.8	51.0	82.0	4.3	1.4	7.5	136	1023.7	137.896	785.000	0
30/04/2011	16.6	10.9	22.9	16.3	11.1	21.9	71.1	48.0	88.0	3.8	1.3	7.6	138	1021.0	159.781	635.000	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/05/2011	15.9	9.9	21.3	15.7	10.4	20.5	66.8	47.0	86.0	3.5	0.5	7.7	132	1018.2	162.740	702.000	0
2/05/2011	14.7	9.9	21.3	14.5	9.8	20.5	65.8	34.0	83.0	1.9	0.2	5.9	187	1016.6	154.667	671.000	0
3/05/2011	15.3	12.3	18.9	15.0	12.2	18.1	62.7	44.0	78.0	1.4	0.1	3.4	208	1015.6	54.083	281.000	0
4/05/2011	14.9	10.8	19.9	14.7	10.8	19.2	64.9	44.0	84.0	3.4	0.9	8	142	1017.7	150.469	715.000	0
5/05/2011	13.8	8.3	19.3	13.6	9.4	18.5	63.7	43.0	84.0	3.8	0.3	7.5	135	1021.5	163.635	721.000	0
6/05/2011	12.8	7	19	12.5	7.4	18.3	61.3	42.0	76.0	2.7	0.2	5.7	160	1022.7	146.219	646.000	0
7/05/2011	14.0	6.1	21	14.0	6	20.7	49.4	28.0	79.0	1.3	0	3.9	212	1018.6	146.432	584.000	0
8/05/2011	15.7	10	20.9	15.4	10.4	19.9	41.3	31.0	55.0	2.4	0.1	5.1	279	1015.0	127.932	707.000	0
9/05/2011	13.3	8.8	18.9	13.1	8.9	17.8	56.3	41.0	71.0	3.5	0	8.6	154	1013.7	126.594	634.000	0
10/05/2011	11.7	7.4	16.7	11.4	7.6	15.7	62.9	45.0	81.0	4.1	0.3	7.8	172	1015.4	133.542	632.000	0
11/05/2011	9.6	5.2	15.7	9.1	5	14.3	58.5	39.0	73.0	4.2	0.7	7	305	1015.4	155.514	652.000	0
12/05/2011	10.3	8.1	13.6	9.5	7.4	12.2	57.4	42.0	79.0	4.8	1.7	8.8	278	1015.3	138.563	637.000	0
13/05/2011	11.9	8.4	15.9	11.3	7.7	15.4	65.9	52.0	76.0	4.2	1.8	7.1	304	1016.8	70.448	824.000	0
14/05/2011	11.0	7.5	16	10.4	7.1	14.8	53.6	29.0	76.0	4.6	0.5	8.5	226	1020.8	135.781	633.000	0
15/05/2011	9.7	1.8	17.2	9.7	2.4	16.4	48.4	32.0	72.0	1.2	0.1	2.9	178	1030.0	152.688	616.000	0
16/05/2011	12.3	4.1	19.6	12.3	5.5	18.7	39.6	25.0	60.0	1.4	0.1	3.3	256	1030.8	153.432	606.000	0
17/05/2011	12.5	5.7	20.6	12.5	5.9	19.7	38.4	22.0	54.0	1.7	0	4.6	214	1029.7	147.583	596.000	0
18/05/2011	9.7	7.8	14	10.0	8	14	63.2	52.0	70.0	1.4	0.1	2.6	167	1031.4	0.438	11.000	0
19/05/2011	15.2	10.5	21.2	15.0	10.5	20.3	60.1	42.0	75.0	1.3	0.2	3	151	1030.7	101.115	692.000	0
20/05/2011	13.4	10.8	16.4	13.5	11.3	16.6	67.1	50.0	77.0	1.6	0.1	3.4	202	1028.9	0.625	17.000	0
21/05/2011	16.0	11.5	21.1	15.9	12.2	20.4	56.2	45.0	67.0	1.2	0	2.9	221	1026.1	107.250	634.000	0
22/05/2011	14.1	13.2	15.3	14.5	13.5	15.4	59.6	57.0	63.0	1.9	0.7	2.9	314	1023.7	0.607	16.000	0
23/05/2011	15.2	12.6	18.2	14.7	11.9	17.6	75.2	58.0	87.0	5.6	1	10.5	290	1011.1	66.323	753.000	0
24/05/2011	11.0	9.9	12.6	10.3	9.2	12.2	83.6	74.0	88.0	3.4	1.6	6	324	1009.3	53.988	562.000	0
25/05/2011	10.6	8.8	13.4	10.1	8	12.9	76.1	63.0	86.0	3.3	0.4	8.5	228	1013.0	50.573	236.000	0
26/05/2011	10.6	8	14.4	10.3	7.7	13.8	72.9	64.0	82.0	1.9	0.2	6	159	1018.5	64.548	668.000	0
27/05/2011	9.7	5	15.5	9.4	4.6	14.6	72.3	49.0	88.0	2.4	0.1	5	248	1021.2	134.302	542.000	0
28/05/2011	11.3	5	18.1	11.2	5.5	17.6	65.4	42.0	81.0	1.6	0	5.3	160	1023.6	136.823	633.000	0
29/05/2011	12.4	8.5	17.5	12.3	8.7	16.8	67.8	48.0	79.0	1.5	0.2	3.4	157	1023.8	17.588	179.000	0
30/05/2011	10.5	9.5	12.4	9.8	8.8	11.9	86.7	76.0	89.0	2.1	0.3	5.5	234	1020.3	27.646	170.000	0
31/05/2011	11.4	9	16.1	11.0	8.3	16	81.7	61.0	90.0	2.8	0	5.8	205	1017.9	82.646	641.000	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/06/2011	13.8	9.6	17.9	13.7	9.9	17.9	74.9	62.0	85.0	7.2	2	12.3	142	1021.9	92.781	475.000	0
2/06/2011	13.8	10.9	18.2	13.6	10.8	17.5	74.6	60.0	83.0	3.3	0.2	6.7	143	1023.4	95.313	758.000	0
3/06/2011	12.8	7.6	17.3	12.7	8.1	16.7	71.4	54.0	87.0	1.6	0	3.8	230	1020.5	121.781	589.000	0
4/06/2011	12.8	5.3	18	12.6	5.6	17.4	70.3	57.0	87.0	2.6	0	5	292	1019.5	115.333	648.000	0
5/06/2011	14.1	9.8	18	13.7	9.9	17.3	65.9	52.0	81.0	3.6	0.3	6.9	289	1018.3	102.729	563.000	0
6/06/2011	11.5	6.2	16.1	11.1	6.6	15.2	64.9	48.0	83.0	2.5	0.1	6.6	264	1019.9	115.458	465.000	0
7/06/2011	10.0	5.6	15.1	9.6	5.8	14	65.0	48.0	83.0	3.3	0.3	6.9	275	1020.7	99.438	729.000	0
8/06/2011	9.0	5.4	11.9	8.3	5	10.8	57.6	40.0	73.0	3.9	0.5	6.5	276	1019.5	132.607	542.000	0
9/06/2011	5.7	0.2	11.5	5.0	0	10.8	67.0	52.0	78.0	3.5	0.7	8.2	317	1020.0	125.594	593.000	0
10/06/2011	8.5	3.8	13.7	8.0	3.4	12.8	68.4	52.0	80.0	2.6	0.3	4.7	268	1020.7	106.469	458.000	0
11/06/2011	10.5	6.5	14.2	10.2	7	13.3	73.2	65.0	81.0	5.7	0.8	10.9	142	1023.6	87.083	624.000	0
12/06/2011	11.4	9.6	13.7	10.9	9.3	13	80.1	71.0	85.0	5.8	3	9.8	150	1022.5	46.052	283.000	0
13/06/2011	11.8	10.3	14.6	11.4	10	13.9	77.0	63.0	85.0	7.1	4.5	12.8	142	1019.6	40.750	354.000	0
14/06/2011	12.8	11.2	14.9	12.5	10.9	14.5	75.3	66.0	85.0	7.3	3.7	10.6	148	1016.2	40.979	409.000	0
15/06/2011	12.6	10.5	15.7	12.3	10.5	15.2	78.3	64.0	87.0	6.6	3.6	10.2	143	1018.2	59.510	399.000	0
16/06/2011	12.6	9.1	16.4	12.4	9.2	15.7	73.9	56.0	88.0	4.3	1	8.4	159	1018.8	106.677	547.000	0
17/06/2011	12.3	7.2	15.3	11.7	6.8	14.7	59.5	44.0	87.0	5.9	2.1	9.1	269	1014.2	123.985	512.000	0
18/06/2011	10.2	5.4	15.1	9.5	4.8	13.8	62.6	48.0	77.0	3.1	0.5	7.2	270	1016.4	108.052	464.000	0
19/06/2011	11.3	6.8	14.9	10.8	7.2	14.2	61.8	49.0	78.0	2.6	0.4	5.3	275	1018.9	151.056	584.000	0
20/06/2011	9.2	2.8	14.7	9.0	2.8	13.7	68.2	51.0	85.0	2.8	0.2	5.6	302	1019.1	121.698	720.000	0
21/06/2011	10.6	5.2	17	10.0	4.5	16.3	68.3	44.0	84.0	6.1	0.4	13.1	307	1013.3	101.927	537.000	0
22/06/2011	7.0	3.7	11.1	6.3	3	10.3	75.2	56.0	88.0	4.4	2	7.2	310	1018.4	87.750	522.000	0
23/06/2011	7.1	2.7	12	6.9	3	11.3	77.2	68.0	85.0	2.2	0.1	5	277	1023.6	49.548	320.000	0
24/06/2011	9.4	3.6	45.4	9.3	3.6	46.4	73.7	50.0	89.0	0.9	0	2.7	232	1028.3	121.542	496.000	0
25/06/2011	10.7	3.4	18	10.7	4.4	17.1	64.5	43.0	84.0	1.1	0	3.7	245	1030.5	121.865	496.000	0
26/06/2011	12.5	8	18.1	12.4	8.2	17	66.1	50.0	80.0	2.3	0	5.5	305	1029.3	118.469	493.000	0
27/06/2011	11.5	5	17.6	11.5	5.1	16.8	65.6	48.0	86.0	2.1	0.1	3.9	200	1029.5	110.240	585.000	0
28/06/2011	13.2	7.5	18.3	13.0	7.7	17.6	60.8	47.0	79.0	3.3	0.9	6.7	122	1032.5	127.175	524.000	0
29/06/2011	12.0	8.5	17.1	11.8	8.8	15.9	70.8	48.0	84.0	4.1	1.5	7.6	126	1035.2	91.656	683.000	0
30/06/2011	11.3	7.8	15.9	11.0	7.9	15	68.0	49.0	81.0	3.8	0.9	8.8	136	1035.2	102.896	571.000	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/07/2011	10.7	6.9	15.7	10.4	7	15.1	74.4	60.0	82.0	3.0	0.5	6.7	139	1030.0	118.375	602.000	0
2/07/2011	10.3	4.7	17.8	10.4	5.2	17.1	70.5	47.0	87.0	1.0	0.1	2.6	184	1026.3	123.381	509.000	0
3/07/2011	11.8	8.5	16	11.6	9	15.1	67.1	57.0	78.0	2.4	0.3	4.4	287	1023.0	59.125	344.000	0
4/07/2011	13.6	10.4	17.8	13.4	10.5	17.2	63.7	55.0	70.0	5.3	1.2	10.4	316	1018.6	43.500	571.000	0
5/07/2011	11.3	8.5	14.5	10.6	8	13.5	54.2	39.0	71.0	7.1	3.3	11.8	291	1016.8	116.646	692.000	0
6/07/2011	10.4	6.6	14	9.7	6.1	13	52.6	42.0	64.0	5.5	3.2	8.8	305	1017.0	109.083	600.000	0
7/07/2011	10.8	6.5	14.1	10.2	6.2	12.9	58.1	49.0	74.0	5.4	0.2	9.5	270	1019.8	111.097	614.000	0
8/07/2011	8.2	1.5	100.9	7.7	1.9	103.1	65.6	45.0	85.0	2.8	0.5	11.9	307	1025.3	129.198	522.000	0
9/07/2011	7.3	0.5	11.7	6.6	0	10.7	61.9	48.0	81.0	3.5	0.9	5.4	308	1023.9	183.750	534.000	0
10/07/2011	7.4	1	12.7	7.0	1	11.7	62.3	47.0	81.0	4.3	0.1	7.9	292	1021.2	87.625	677.000	0
11/07/2011	10.2	5.2	14.7	9.5	5.1	13.6	55.3	43.0	66.0	4.2	1.3	7.3	285	1023.2	120.417	490.000	0
12/07/2011	7.6	0.7	14.3	7.3	0.9	13.4	60.5	41.0	80.0	1.6	0.1	4	279	1025.5	127.802	515.000	0
13/07/2011	7.8	4.7	10.3	7.4	4.8	9.4	67.4	58.0	81.0	2.8	0.2	6.2	309	1023.6	23.536	204.000	0
14/07/2011	8.0	4.8	12	7.5	4.5	11.3	71.7	55.0	87.0	2.7	0.1	5.1	213	1027.7	99.458	560.000	0
15/07/2011	9.5	5	15.1	9.2	5	14.1	62.0	46.0	75.0	3.3	0.4	6.8	113	1032.3	106.427	537.000	0
16/07/2011	11.5	7.5	15	11.0	7.2	14.2	62.4	49.0	73.0	2.5	0.1	4.5	103	1028.7	77.979	351.000	0
17/07/2011	12.1	8.7	16.3	11.6	8.4	15.5	73.0	59.0	84.0	1.2	0.1	2.5	223	1024.6	115.611	707.000	0
18/07/2011	10.5	7.3	15.1	10.1	7	14.1	79.8	62.0	88.0	2.3	0	5.9	254	1021.0	91.448	616.000	0
19/07/2011	7.1	3.3	11.1	6.5	3.2	9.8	75.1	52.0	86.0	4.3	0.5	7	281	1018.2	58.885	500.000	0
20/07/2011	11.4	8	15.9	11.0	7.5	15	71.6	59.0	81.0	5.2	1.2	12.3	224	1015.5	64.510	619.000	0
21/07/2011	11.0	8.6	14.6	10.6	8.2	13.6	73.5	59.0	82.0	4.7	1.7	7.8	169	1016.8	61.500	501.000	0
22/07/2011	11.1	9.2	14.4	10.5	8.9	13.5	76.0	63.0	85.0	6.0	1.5	10.1	159	1017.8	64.977	660.000	0
23/07/2011	10.1	7.2	12.7	9.6	7.1	11.9	72.6	62.0	81.0	4.8	1.6	9.9	147	1020.3	78.625	801.000	0
24/07/2011	9.8	3.5	15.5	9.5	4.3	14.3	64.7	42.0	87.0	1.4	0	4.4	226	1021.0	135.271	583.000	0
25/07/2011	10.4	4.4	16.2	10.0	4.2	15.3	61.6	46.0	76.0	3.4	0.2	9	305	1021.2	103.177	560.000	0
26/07/2011	10.9	6.8	15.1	10.3	6.6	14	64.9	44.0	81.0	3.1	1.4	6.5	295	1023.5	131.431	656.000	0
27/07/2011	9.5	0.8	32.5	9.4	1.9	32.9	62.6	38.0	87.0	2.2	0	5.5	162	1028.0	129.927	520.000	0
28/07/2011	10.7	4.3	16.9	10.6	4.6	16.4	59.5	37.0	82.0	1.2	0.1	3.2	190	1029.2	130.865	515.000	0
29/07/2011	11.4	5.9	18	11.3	5.8	17.4	54.9	36.0	74.0	1.5	0.1	3.4	226	1027.5	131.229	518.000	0
30/07/2011	11.7	6.3	17.7	11.6	6.8	16.8	52.4	37.0	66.0	1.5	0	4.3	257	1024.8	130.021	606.000	0
31/07/2011	14.2	8.9	18.7	14.0	9.7	17.9	48.4	38.0	59.0	2.0	0.2	3.7	266	1023.5	158.000	509.000	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/08/2011	14.2	8.1	20.6	14.1	8.5	19.6	50.7	37.0	65.0	1.6	0	3.8	272	1024.0	113.990	623.000	0
2/08/2011	15.0	8.7	21.9	15.1	9.4	21.2	48.8	29.0	67.0	1.5	0.1	3.7	250	1025.1	133.469	518.000	0
3/08/2011	15.2	8.8	21.7	15.2	9.1	21	46.9	33.0	59.0	1.4	0.1	4.1	246	1026.6	126.354	593.000	0
4/08/2011	15.4	10	22.5	15.4	10.3	21.8	49.9	35.0	65.0	1.9	0.2	5.4	232	1028.6	141.226	538.000	0
5/08/2011	15.5	10.1	20.1	15.2	10.4	19.2	48.8	38.0	63.0	3.4	1.8	5.8	330	1027.8	136.500	530.000	0
6/08/2011	15.8	12	19.9	15.4	11.9	19.2	58.1	43.0	66.0	4.4	0.4	8.1	299	1023.3	70.323	429.000	0
7/08/2011	13.1	9.6	14.9	12.7	9.4	14.4	76.9	64.0	85.0	4.2	0.8	8.3	281	1018.5	30.542	211.000	0
8/08/2011	9.4	5.4	13.4	9.1	5.1	12.3	74.7	58.0	89.0	3.6	0	9.1	295	1013.9	112.698	595.000	0
9/08/2011	9.6	7.8	11.9	9.0	7	10.9	68.9	59.0	82.0	5.0	1.7	8.9	286	1011.4	126.264	732.000	0
10/08/2011	8.5	3.5	12.6	8.1	3.8	12	69.0	50.0	83.0	3.1	0.4	7.7	309	1011.2	87.619	768.000	0
11/08/2011	10.0	6.7	13.9	9.4	5.9	12.9	68.4	53.0	87.0	2.1	0	5.3	271	1012.2	119.250	740.000	0
12/08/2011	9.5	3.7	15.1	9.3	4.3	14.4	73.0	55.0	85.0	2.6	0	8.7	162	1019.6	116.760	704.000	0
13/08/2011	11.4	4.6	18.2	11.2	5.1	17.2	61.9	39.0	85.0	1.5	0	3.6	198	1023.9	159.635	733.000	0
14/08/2011	12.6	8.9	18.8	12.3	9	17.7	65.0	41.0	77.0	1.9	0.5	4.8	202	1024.6	97.844	813.000	0
15/08/2011	12.0	5.8	18.4	11.7	5.7	17.2	64.7	39.0	84.0	2.0	0.3	4.6	158	1024.4	149.469	688.000	0
16/08/2011	13.8	8.4	19.4	13.5	8.6	18.9	57.6	41.0	77.0	1.4	0.1	3.9	186	1020.6	141.042	763.000	0
17/08/2011	14.4	12.1	16.4	14.0	11.7	15.9	67.1	60.0	77.0	5.0	0.4	10.4	54	1016.0	50.083	467.000	0
18/08/2011	10.9	8.5	14.4	10.3	7.8	14	67.2	46.0	85.0	6.2	1.2	13.3	286	1015.7	116.863	739.000	0
19/08/2011	9.4	6.9	13.1	8.8	6.4	12.2	76.9	64.0	88.0	2.5	0.2	4.8	266	1018.5	70.313	550.000	0
20/08/2011	11.4	7.4	16.1	11.1	7.6	15.4	73.3	53.0	88.0	6.1	0.2	11.8	138	1026.4	143.385	772.000	0
21/08/2011	11.6	8.4	16.4	11.3	8.3	15.4	74.4	58.0	84.0	5.7	2	10	138	1032.0	130.646	824.000	0
22/08/2011	10.9	9.6	15.1	10.5	9.3	14	76.9	66.0	84.0	5.0	1.4	8	155	1035.0	83.917	861.000	0
23/08/2011	13.3	8.6	19.4	12.9	8.4	18.5	66.6	48.0	80.0	3.8	1.3	6.7	130	1032.8	188.198	732.000	0
24/08/2011	13.5	6.5	20.9	13.3	6.7	20.6	64.3	40.0	84.0	1.7	0.1	4.1	177	1028.9	195.823	721.000	0
25/08/2011	14.7	8	21.5	14.5	8	20.7	52.8	29.0	78.0	1.6	0.4	3	253	1026.5	201.927	731.000	0
26/08/2011	15.9	7.9	23.4	15.8	8.2	23.3	46.7	28.0	64.0	1.7	0	4.2	178	1024.9	205.010	763.000	0
27/08/2011	14.6	10	17.5	14.4	9.9	16.9	70.3	50.0	89.0	1.4	0.1	4.2	226	1021.8	60.104	375.000	0
28/08/2011	13.7	6.4	20.7	13.3	6.2	19.8	67.7	34.0	90.0	1.7	0	4.6	293	1021.1	194.042	719.000	0
29/08/2011	16.1	9.2	22.5	15.9	9.6	21.8	53.2	37.0	72.0	2.5	0	6.4	258	1019.7	174.552	758.000	0
30/08/2011	14.9	9.1	22.1	14.6	9.4	20.8	63.9	36.0	80.0	2.6	0.3	6.8	172	1020.8	162.917	747.000	0
31/08/2011	13.4	7.6	21.7	13.3	7.8	20.9	64.7	34.0	87.0	1.7	0	4.2	205	1023.1	53.750	417.000	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/09/2011	15.9	11	21.9	15.5	11.1	21	53.9	35.0	74.0	1.8	0.1	4.5	228	1023.9	166.000	675.000	0
2/09/2011	13.6	8.6	19.3	13.3	9	18.1	64.1	46.0	86.0	4.3	1.4	8.3	132	1027.7	180.854	690.000	0
3/09/2011	13.7	6.7	21.9	13.4	6.4	20.8	55.1	30.0	73.0	1.9	0.3	4.8	150	1029.3	191.417	702.000	0
4/09/2011	15.6	10.2	21.3	15.0	10	20.6	53.7	36.0	71.0	1.5	0	3.8	194	1029.0	232.736	733.000	0
5/09/2011	16.1	10.5	22.7	15.8	10.6	21.6	49.4	35.0	63.0	2.3	0.7	5	299	1027.6	193.104	684.000	0
6/09/2011	16.6	11.2	21.9	16.1	10.9	20.9	50.9	36.0	68.0	3.9	1.3	8	315	1022.7	197.333	879.000	0
7/09/2011	17.9	12	24	17.5	12.3	23	48.0	35.0	60.0	3.6	0	9	283	1019.4	188.865	999.000	0
8/09/2011	14.0	9.5	19	13.7	8.9	18.3	72.5	54.0	88.0	2.5	0.1	6.9	212	1019.8	76.125	752.000	0
9/09/2011	10.2	6.9	12.6	9.6	6.4	11.7	74.2	58.0	88.0	4.9	0.3	7.8	254	1013.1	95.361	915.000	0
10/09/2011	9.3	5.2	13.3	8.5	4.6	12.2	62.8	46.0	82.0	5.1	2.4	8.1	271	1015.7	175.906	936.000	0
11/09/2011	10.3	6.1	13.9	9.6	5.5	13	60.6	43.0	78.0	4.6	1.8	8.5	297	1018.2	164.208	1029.000	0
12/09/2011	10.7	5.1	16.1	10.2	4.8	15.2	63.8	42.0	85.0	2.9	0.1	7	198	1024.4	177.365	894.000	0
13/09/2011	11.8	4.6	19.1	11.5	5.1	17.9	55.7	33.0	77.0	2.5	0.1	5.1	282	1028.4	208.440	708.000	0
14/09/2011	14.9	6.8	22.3	14.7	7	21.5	43.3	24.0	65.0	2.9	0.1	6.2	302	1026.3	216.344	799.000	0
15/09/2011	16.2	7	23.6	16.0	8.2	22.4	39.8	26.0	63.0	3.5	0	10.5	253	1023.9	206.104	875.000	0
16/09/2011	18.4	9.2	26.6	18.3	9.8	25.6	39.6	24.0	60.0	3.4	0.1	7	272	1020.9	232.313	833.000	0
17/09/2011	21.2	12.7	28	20.9	13.4	27.2	34.0	23.0	49.0	3.8	0.3	6.7	320	1019.7	239.667	828.000	0
18/09/2011	22.1	13.1	28.9	22.0	14.3	28	33.2	21.0	50.0	4.0	0.5	9.4	267	1019.7	180.205	748.000	0
19/09/2011	21.5	12.3	28	21.4	13	27.3	36.1	26.0	57.0	4.1	0.1	8	278	1018.7	200.375	740.000	0
20/09/2011	20.2	11.9	25.1	19.8	12.1	24.2	35.9	28.0	42.0	8.5	2.2	14.6	288	1014.2	150.010	848.000	0
21/09/2011	14.9	7.9	21.1	14.7	8.8	20.4	39.8	29.0	55.0	1.7	0.3	5.6	196	1022.4	244.177	822.000	0
22/09/2011	16.7	8.2	25.2	16.8	9	24.2	44.0	29.0	61.0	2.1	0.1	6.2	282	1023.3	185.536	873.000	0
23/09/2011	20.4	13.9	27.3	20.2	13.9	26.2	44.2	30.0	61.0	2.2	0.1	6.2	244	1020.6	247.896	891.000	0
24/09/2011	19.3	10.5	27.8	18.8	10.4	26.6	51.3	23.0	79.0	3.0	0.4	6.2	203	1017.8	217.094	877.000	0
25/09/2011	14.8	10	20.4	14.0	9.7	18.7	69.7	54.0	84.0	6.0	0.7	11.8	153	1016.7	184.010	997.000	0
26/09/2011	14.3	9.2	19.7	13.7	9	18.7	60.8	38.0	81.0	4.7	1.3	8.4	124	1021.3	224.167	1213.000	0
27/09/2011	16.0	9.2	22.4	15.6	9.3	21.6	47.7	35.0	65.0	1.4	0.2	3.8	152	1020.8	220.948	840.000	0
28/09/2011	16.4	14.4	19.3	16.0	14.3	18.3	65.7	53.0	84.0	4.0	0.6	7.7	280	1016.0	72.063	440.000	0
29/09/2011	13.6	8.9	18.1	13.1	7.8	17.4	72.4	42.0	87.0	8.4	1	16.3	304	1006.7	143.916	974.000	0
30/09/2011	12.7	7.4	17	12.3	6.9	16.4	58.9	43.0	78.0	4.9	1.3	8.9	301	1010.4	194.938	1042.000	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/10/2011	9.2	7.6	11.3	8.7	6.8	11.6	78.7	62.0	86.0	2.6	0.1	9.3	241	1008.8	48.885	514.000	0
2/10/2011	10.0	7.5	12.5	9.4	6.8	12	79.6	72.0	88.0	4.5	0.4	11.2	179	1015.8	76.500	561.000	0
3/10/2011	12.0	8.7	16.2	11.6	8.6	15.5	68.4	50.0	81.0	5.1	2	8.1	144	1022.4	208.406	1213.000	0
4/10/2011	12.9	6.6	18.8	12.5	7	17.8	64.8	48.0	81.0	4.1	0.2	7.8	143	1023.9	247.159	797.000	0
5/10/2011	14.0	7.2	108.7	13.6	7.4	107	67.1	51.0	79.0	2.0	0.4	9	180	1021.5	127.542	1043.000	0
6/10/2011	14.4	12.2	15.8	13.9	12	15.3	80.0	68.0	86.0	1.1	0	2.1	175	1016.6	68.736	296.000	0
7/10/2011	16.9	12.3	21.7	16.4	12.2	21	72.3	52.0	88.0	1.4	0	3.7	242	1013.9	155.250	1051.000	0
8/10/2011	18.0	13.6	22.2	17.6	13.4	21.4	65.8	45.0	84.0	2.6	0.3	5.5	242	1011.5	177.938	1020.000	0
9/10/2011	15.7	10.9	22.1	15.4	10.9	20.9	66.4	36.0	87.0	3.2	0.1	8.6	254	1012.0	137.583	795.000	0
10/10/2011	16.2	10	21.6	15.9	10.7	20.6	51.8	35.0	76.0	2.9	0.2	7.5	256	1011.7	221.125	1141.000	0
11/10/2011	15.7	9.2	21.8	15.4	9.7	20.6	49.6	28.0	71.0	1.9	0.1	7	234	1013.5	284.458	1048.000	0
12/10/2011	16.9	9.1	104.8	16.8	10.2	102.9	48.9	28.0	68.0	2.2	0.4	4.8	151	1017.4	301.438	967.000	0
13/10/2011	17.0	10.1	24.2	16.6	9.9	23.4	63.6	46.0	82.0	3.2	0.4	6.5	123	1019.8	203.677	1197.000	0
14/10/2011	19.2	15	24.9	18.9	14.9	24.3	63.7	48.0	72.0	1.9	0.1	6.1	166	1017.5	175.479	982.000	0
15/10/2011	18.4	15	22.5	18.0	14.5	21.9	73.8	55.0	89.0	2.3	0.1	5.5	188	1012.0	146.688	899.000	0
16/10/2011	18.2	13.5	23.7	18.0	13.6	22.8	63.2	41.0	85.0	3.0	0.3	5.7	231	1017.5	220.381	1082.000	0
17/10/2011	16.4	11.8	22.6	16.0	12	22	59.0	39.0	80.0	5.0	2	8.1	128	1028.7	296.729	1020.000	0
18/10/2011	14.9	8.2	22.1	14.5	8.4	21.3	58.7	38.0	77.0	2.7	0.1	6.8	145	1033.0	287.000	918.000	0
19/10/2011	17.5	10.3	24.7	17.2	10.3	24.3	54.0	31.0	76.0	1.4	0.1	4.3	185	1030.2	280.198	969.000	0
20/10/2011	25.2	13.6	513.6	24.7	13.7	513.7	48.2	32.0	66.0	1.9	0	33.4	217	1028.0	311.365	1014.000	0
21/10/2011	21.8	14.3	27.3	21.5	14.3	27	44.5	29.0	67.0	1.6	0.3	3.6	169	1025.9	363.595	1008.000	0
22/10/2011	23.0	16.9	29.3	22.6	16.9	29.1	44.9	30.0	59.0	2.0	0.5	5.5	192	1024.2	294.021	1001.000	0
23/10/2011	22.7	17.2	28.2	22.3	17.4	27.8	44.7	30.0	59.0	1.8	0.1	4.2	178	1022.5	279.094	1113.000	0
24/10/2011	22.0	17.2	27.7	21.4	17.1	26.7	49.8	36.0	62.0	4.0	1.6	7.3	272	1018.4	359.145	1111.000	0
25/10/2011	21.3	15.3	27.6	20.8	14.9	26.8	58.4	43.0	83.0	3.4	0.7	8	180	1014.1	178.511	1117.000	0
26/10/2011	16.2	12.2	20.2	15.5	11.8	19.1	71.2	60.0	86.0	6.4	3.4	9.9	177	1018.6	179.010	961.000	0
27/10/2011	17.9	11.6	23.9	17.3	11.6	23	63.3	50.0	78.0	3.6	1.5	6.9	160	1020.5	243.271	1198.000	0
28/10/2011	20.9	13	27.2	20.5	13.1	26.7	57.1	41.0	77.0	1.5	0.3	4.1	166	1018.1	277.500	1251.000	0
29/10/2011	21.5	18.2	23.4	21.0	18.3	22.8	71.3	62.0	84.0	2.9	0.4	6.4	179	1015.4	142.400	658.000	0
30/10/2011	20.6	16.4	26.3	20.4	16.9	25.5	66.4	40.0	85.0	3.5	0.2	7.7	263	1014.8	199.990	1126.000	0
31/10/2011	17.5	9.3	23.4	17.1	10.5	22.2	52.8	38.0	75.0	4.4	1.5	7	179	1019.6	328.635	1053.000	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/11/2011	18.7	11	25.5	18.2	10.9	24.8	58.2	39.0	83.0	2.3	0.3	5	228	1018.5	301.958	1161.000	0
2/11/2011	21.7	13.5	29	21.3	14.1	27.6	45.9	28.0	73.0	3.7	0.3	7.5	172	1012.6	242.869	1106.000	0
3/11/2011	19.1	12.1	25	18.6	12.3	23.9	54.2	38.0	75.0	2.9	0.5	6.2	199	1012.8	269.781	1193.000	0
4/11/2011	19.4	11.1	27.1	18.9	11.1	25.8	59.7	35.0	86.0	2.8	0.3	6.2	196	1017.3	338.313	1208.000	0
5/11/2011	22.0	13.6	28.9	21.5	13.7	28.6	55.0	35.0	80.0	1.9	0.5	3.8	205	1018.3	283.073	1207.000	0
6/11/2011	21.4	18.2	25.3	20.9	17.9	24.2	65.8	52.0	86.0	2.7	0.2	7.1	141	1017.1	145.798	855.000	0
7/11/2011	22.9	17.2	29.8	22.5	17.4	28.8	66.3	44.0	87.0	2.6	0.1	5.7	228	1016.4	234.510	1306.000	0
8/11/2011	26.5	21.2	32.7	26.0	21	31.7	50.1	32.0	67.0	4.4	0.7	9.6	226	1017.0	295.083	1022.000	0
9/11/2011	26.5	19.6	31.9	26.0	19.6	31.3	49.6	31.0	75.0	4.1	0.4	8.1	197	1016.8	215.844	1113.000	0
10/11/2011	25.4	22.3	27.7	24.9	21.8	26.9	49.5	44.0	62.0	5.4	2.2	8.6	191	1016.5	152.929	1060.000	0
11/11/2011	22.8	14.8	30.8	22.3	14.7	29.5	57.0	36.0	77.0	3.0	0.3	7.1	170	1020.7	290.698	1186.000	0
12/11/2011	23.8	18.2	31.4	23.3	17.8	30.5	54.5	27.0	71.0	3.3	0.9	7.8	198	1018.1	240.896	1128.000	0
13/11/2011	20.6	17.4	26.6	20.3	17.2	25.4	68.7	49.0	80.0	3.0	0.2	8.3	121	1016.2	122.708	824.000	0
14/11/2011	24.9	16.2	32.5	24.6	16.2	31.9	57.2	36.0	82.0	3.8	0.2	7.1	175	1014.5	299.542	926.000	0
15/11/2011	29.1	20.4	36	28.9	20.5	35.5	45.0	26.0	67.0	2.2	0	5.7	233	1015.5	290.580	932.000	0
16/11/2011	22.9	17.5	26.8	22.8	17.1	26.8	67.8	54.0	84.0	4.4	0	8.9	126	1018.9	68.490	560.000	0
17/11/2011	19.9	16.2	25.5	19.5	15.7	24.8	78.7	59.0	88.0	2.7	0.2	7.2	184	1019.9	113.000	614.000	0
18/11/2011	22.2	17.6	27.7	21.8	17.1	27.4	70.4	48.0	89.0	2.4	0.3	5	145	1018.6	292.333	1335.000	0
19/11/2011	25.5	19.1	31.1	25.2	19.5	30.7	55.8	37.0	77.0	3.2	0.1	6	201	1016.6	253.333	1189.000	0
20/11/2011	24.6	19.8	31.3	24.2	19.5	30.5	56.0	34.0	85.0	4.7	0.1	12.8	165	1015.8	292.229	1179.000	0
21/11/2011	21.5	18	25.8	21.2	17.8	25.1	71.8	53.0	85.0	2.9	0.8	5.7	137	1016.2	145.369	987.000	0
22/11/2011	23.6	17.3	29.4	23.1	16.9	28.5	58.9	40.0	85.0	5.2	1.1	9.7	97	1012.2	255.646	991.000	0
23/11/2011	16.7	15.1	20.6	16.2	14.5	20.1	85.2	74.0	89.0	3.9	0.2	8.3	201	1015.4	33.208	150.000	0
24/11/2011	18.4	14.2	23	17.9	13.7	22.3	72.8	59.0	87.0	5.0	3.4	7.6	175	1021.6	156.479	763.000	0
25/11/2011	17.9	15	21.1	17.4	14.5	20.9	87.6	77.0	90.0	2.8	0.4	6.5	168	1019.6	47.125	198.000	0
26/11/2011	21.5	17.8	25.6	21.1	17.3	25.3	70.5	45.0	89.0	5.8	1	12	194	1011.9	207.865	1238.000	0
27/11/2011	22.7	14.6	28.4	22.4	14.3	27.6	49.7	33.0	79.0	4.3	0.5	12.2	220	1013.2	326.115	962.000	0
28/11/2011	25.9	18.2	31.2	25.8	19	30.6	46.0	31.9	68.0	1.8	0	4.7	157	1016.6	196.689	949.400	0
29/11/2011	26.5	21.5	31.1	26.0	21.4	30.3	53.7	41.1	66.8	3.4	0	8.2	118	1017.4	272.683	961.600	0
30/11/2011	23.2	19	28.3	22.7	18.8	27.3	65.9	44.7	85.2	4.2	0.2	8.8	112	1015.8	163.082	853.200	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Rain	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/12/2011	23.1	19	28.6	22.7	18.7	27.4	66.1	44.3	85.3	3.4	0.6	9.6	5	8.2	1015.8	161.700	903.400	0
2/12/2011	17.7	12.3	20.7	17.2	12.3	19.7	73.5	57.7	88.3	5.8	0	249	169	10	1018.1	201.900	1201.300	0
3/12/2011	15.6	10.2	21.6	15.0	10.2	20.3	61.8	42.6	74.8	4.7	0.4	10.1	162	0	1020.2	267.800	1160.100	0
4/12/2011	17.5	9.4	24.7	17.1	9.2	24.1	55.7	35.0	80.2	0.9	0.1	5	167	0	1019.0	329.100	1116.900	0
5/12/2011	20.0	13.6	28.2	19.4	13.1	27.1	56.7	30.8	77.5	0.6	0.1	10	229	0	1015.4	288.100	1174.400	0
6/12/2011	16.3	10.9	22.1	15.5	10.9	20.8	58.9	44.3	75.1	6.2	1.7	9.8	167	0	1017.6	327.600	1130.700	0
7/12/2011	16.4	11.6	22	15.7	11.3	20.9	57.9	46.7	70.5	3.7	1.8	7	154	0	1016.9	242.100	1121.700	0
8/12/2011	14.9	12.9	17.5	14.4	12.5	16.9	76.6	66.0	87.3	2.9	1.5	5.1	176	6	1014.4	99.400	482.900	0
9/12/2011	18.3	14.5	23.2	17.9	14	22.7	73.6	50.1	89.7	2.4	0.3	5.9	161	2.6	1012.5	136.000	770.100	0
10/12/2011	20.3	14.1	25.9	19.9	14	25.7	61.0	43.1	78.0	1.8	0.2	5.3	163	0	1013.1	258.500	1147.100	0
11/12/2011	19.5	16.8	23.5	19.1	16.2	23.1	74.2	60.2	85.7	0.7	0	5.5	102	5.4	1009.9	139.700	821.200	0
12/12/2011	19.2	15.4	26.7	18.8	15.3	25.7	79.3	50.4	88.5	0.1	0	11.6	297	19	1006.4	188.000	1188.100	0
13/12/2011	17.9	16	21.7	17.5	16	20.9	81.9	65.3	89.1	3.4	0.7	9.3	194	15.2	1006.3	134.600	1042.300	0
14/12/2011	19.7	13.2	26.5	19.3	13.3	25.7	64.0	33.1	88.1	1.6	0	7.6	263	0	1008.7	318.400	1189.200	0
15/12/2011	18.8	13.1	24.8	18.4	13	23.8	63.7	41.1	85.0	3.4	0.7	7.3	188	0	1014.6	370.800	1223.500	0
16/12/2011	18.7	12.8	25	18.3	12.9	24.4	62.4	44.7	78.5	2.9	0.2	7.3	171	0	1017.7	302.400	1125.200	0
17/12/2011	19.1	12.8	25.4	18.6	12.6	24.2	59.3	36.1	81.8	3.4	0.5	7.7	175	0	1019.8	377.000	1105.400	0
18/12/2011	18.6	11.4	25.6	18.2	11.8	24.5	58.4	40.9	77.6	2.5	0.1	7.1	179	0	1021.0	357.000	1099.200	0
19/12/2011	21.2	15.4	26.6	20.7	15.4	26	54.1	42.9	66.2	1.7	0	4.5	13	0	1017.6	277.900	1227.200	0
20/12/2011	20.2	18.3	23	19.7	17.7	22	69.7	56.3	85.0	3.3	0	7.6	16	5	1013.7	94.300	647.300	0
21/12/2011	21.8	17	27.6	21.5	17	26.9	70.4	47.1	87.1	0.6	0	6.6	176	0.2	1013.8	280.500	1504.600	0
22/12/2011	21.3	16	27.2	20.8	15.9	26.1	69.9	52.5	85.0	2.3	0.3	8.8	170	1.4	1016.0	241.500	1207.600	0
23/12/2011	20.8	16.7	27	20.3	16.7	25.6	71.7	49.6	82.3	1.0	0.1	8.4	158	0.6	1016.5	245.900	1366.600	0
24/12/2011	21.2	16.6	25.9	20.8	16.7	24.9	71.0	55.9	85.9	0.7	0.1	8.2	122	1	1014.3	211.200	1384.400	0
25/12/2011	22.5	16.2	29.3	22.2	16.2	28.3	64.0	42.3	84.6	2.3	0.3	9.1	168	0	1012.7	324.400	1205.900	0
26/12/2011	23.4	15.3	29.6	23.0	15.8	29.2	58.6	41.9	81.3	0.7	0	4.7	111	0	1011.1	307.700	1240.100	0
27/12/2011	22.5	17.8	25.5	21.9	17.8	24.6	63.8	53.2	79.5	1.9	0	10.3	336	2	1009.1	161.800	823.200	0
28/12/2011	20.1	15	25.3	19.6	15.3	24	67.4	49.4	85.5	4.3	0	10.1	177	0	1009.6	320.700	1209.300	0
29/12/2011	19.7	14.1	26.4	19.1	13.9	25.2	61.2	38.4	79.8	4.8	0.5	8.9	175	0	1011.7	335.300	995.100	0
30/12/2011	19.9	13	26.2	19.3	13.7	24.7	58.0	43.8	78.9	5.5	1.9	10.2	166	0	1014.0	331.300	1070.900	0
31/12/2011	19.8	12.9	26.2	19.3	13.3	25	54.1	39.0	73.4	3.4	1.1	7.1	147	0	1017.8	324.200	1045.400	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Rain	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/01/2012	20.7	13.7	27.9	20.3	14.1	26.6	57.5	38.0	77.4	3.0	0.2	8.2	176	0	1018.5	304.700	1191.500	0
2/01/2012	22.4	14.2	30.6	22.1	14.4	29.6	47.8	21.5	79.0	1.6	0	7.2	175	0	1017.2	344.700	997.700	0
3/01/2012	24.1	14.1	32	23.9	14.6	31.5	43.4	23.8	71.5	0.9	0	5.6	199	0	1017.5	339.700	989.700	0
4/01/2012	26.4	19.2	33.1	26.0	18.9	33	46.7	29.1	68.7	1.0	0	4.8	332	0	1017.8	331.800	971.900	0
5/01/2012	27.5	21.9	32.8	27.2	21.7	32.5	46.7	37.7	58.9	1.5	0	6.2	340	0	1015.8	247.400	1040.700	0
6/01/2012	25.1	19.1	32.6	24.6	18.5	32.1	62.0	37.5	85.1	0.5	0	16.9	188	13.2	1015.3	240.800	1067.100	0
7/01/2012	21.8	16.5	28.1	21.3	16.3	26.8	70.2	51.3	87.9	2.7	0	7.9	177	0	1014.6	282.700	1280.700	0
8/01/2012	23.8	14.9	31.7	23.3	14.8	31.2	60.7	40.4	82.7	0.9	0	5.2	349	0	1014.0	353.000	1172.700	0
9/01/2012	28.1	22.5	34.3	27.5	22.2	33.2	57.5	42.6	84.6	4.3	0.5	8.5	10	6.6	1009.1	276.700	1262.600	0
10/01/2012	25.2	20.5	30.7	24.7	21.2	29.8	63.9	30.9	88.3	2.0	0	9.4	295	0.2	1009.2	303.200	1289.400	0
11/01/2012	22.6	14.7	28.8	22.3	14.9	27.7	44.8	28.6	68.4	1.6	0	7.1	272	0	1011.3	357.300	1218.600	0
12/01/2012	22.4	17	28	21.8	17	26.6	40.6	27.1	58.1	4.3	0	10.9	296	0	1009.9	381.100	1204.900	0
13/01/2012	19.0	11.8	25.8	18.5	11.9	24.4	36.9	24.7	48.9	3.0	0	7.5	193	0	1014.9	390.200	1149.900	0
14/01/2012	21.2	12.3	28	20.8	12.8	27	47.8	32.7	70.0	0.8	0	4.9	344	0	1015.9	331.400	1298.300	0
15/01/2012	22.6	17.7	29.5	22.0	17.3	28.4	52.6	34.5	71.9	0.7	0	9.6	53	0	1014.9	270.700	1334.200	0
16/01/2012	19.1	16.1	24.3	18.6	15.7	23.2	67.9	41.0	86.2	1.8	0	7.6	125	3.6	1018.3	138.900	713.100	0
17/01/2012	21.0	15.9	27.2	20.4	15.6	26.1	61.3	40.9	85.8	3.4	0.8	8.3	133	0.6	1020.3	272.400	1311.500	0
18/01/2012	22.0	14.4	28.8	21.4	14.6	27.6	57.5	41.2	76.0	4.3	1.3	9.3	136	0	1020.5	327.700	1260.100	0
19/01/2012	24.1	16	31.7	23.7	15.9	33.3	56.2	31.1	81.2	2.3	0	8.1	165	0	1016.4	325.900	1111.000	0
20/01/2012	25.0	17.3	31.8	24.8	17.5	30.6	53.3	31.3	75.8	3.1	0	9	125	0	1015.9	291.900	1084.200	0
21/01/2012	24.8	16.2	32.5	24.4	16.3	31.2	52.7	31.7	78.1	2.1	0.1	7.1	115	0	1015.4	314.400	1231.300	0
22/01/2012	22.6	18	29.5	22.2	18	27.9	61.3	32.6	78.5	3.3	0	10.3	130	0	1015.5	189.200	1147.600	0
23/01/2012	21.2	16.8	26.4	20.6	16.6	24.8	64.2	49.7	76.5	6.5	2	11.9	132	0	1018.8	277.000	1249.000	0
24/01/2012	22.2	17.2	27.9	21.5	17.1	26.6	57.9	41.3	78.4	5.6	2	10.4	108	0	1018.5	263.000	1313.700	0
25/01/2012	21.4	17	27.1	21.1	17	26.1	69.5	50.7	83.8	3.3	0.8	7.6	124	3.6	1015.5	163.800	961.400	0
26/01/2012	20.3	18.4	22	19.9	18	21.6	82.7	67.8	88.4	3.1	1.3	5.7	156	15.4	1012.6	82.600	481.500	0
27/01/2012	22.8	19.8	27.2	22.5	19.6	25.8	70.4	60.5	80.2	4.2	1.2	9.1	135	0	1011.7	181.900	1213.400	0
28/01/2012	22.5	20	25.5	22.2	19.9	24.8	67.2	58.4	77.2	4.1	1.7	7.2	126	0.8	1014.7	146.000	542.200	0
29/01/2012	22.0	18.3	25.6	21.7	18.5	24.8	65.7	50.6	78.1	2.3	0.1	6.5	104	0	1013.7	111.900	516.600	0
30/01/2012	22.6	20	27.1	22.2	19.8	26.5	68.3	52.9	86.6	1.4	0	6.8	36	3.4	1009.9	112.200	591.000	0
31/01/2012	23.4	20.2	27.7	23.1	19.7	27.3	76.9	67.6	86.5	5.7	1.1	12.4	342	8.4	1006.8	102.500	882.800	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Rain	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/02/2012	22.8	20.8	25.6	22.4	20.7	25	83.9	75.7	88.5	0.6	0	7.3	350	7.4	1008.6	103.800	507.400	0
2/02/2012	18.3	16.9	20.8	17.9	16.3	20.8	86.7	74.6	89.4	3.7	0.2	7.9	136	41	1011.4	57.600	333.900	0
3/02/2012	17.6	16.3	19	17.2	15.7	19	86.3	78.3	90.1	2.9	0.5	13.4	121	51.8	1009.3	59.200	229.900	0
4/02/2012	18.9	16.4	21.9	18.5	15.9	21.2	83.0	72.5	88.1	0.5	0	6.3	23	9.4	1006.5	105.500	642.600	0
5/02/2012	22.4	17.9	27.1	22.0	17.6	26.9	71.8	51.6	89.8	0.6	0	4.5	227	0	1005.4	236.800	1108.000	0
6/02/2012	24.6	17	30.8	24.4	17.4	29.8	60.4	37.1	83.8	0.9	0	4.9	291	0	1003.6	314.500	1063.300	0
7/02/2012	25.8	20.3	32.6	25.3	20.3	31.7	64.0	43.0	82.5	0.5	0	9.5	250	0	1002.7	285.000	969.100	0
8/02/2012	-99.0	-99	-99	-99.0	-99	-99	-99.0	-99.0	-99.0	-99.0	-99	-99	-99	-99	-99.0	-99.000	-99.000	0
9/02/2012	23.8	19.4	27.8	23.1	19.4	26.3	63.0	50.3	75.9	4.8	1.3	7.6	129	0	1009.7	290.900	1133.700	0
10/02/2012	22.3	16	28.9	21.9	16.2	28.2	61.0	41.8	80.0	1.8	0.2	8.9	113	0	1011.8	251.300	1226.300	0
11/02/2012	21.6	18.1	28.3	21.1	18.4	27.1	61.9	41.2	76.9	0.7	0	10	315	0	1011.9	203.300	1040.300	0
12/02/2012	21.7	15.5	28.8	21.2	15.1	27.7	64.7	36.8	87.6	0.9	0	9.5	223	3	1011.6	262.900	1127.000	0
13/02/2012	22.4	15.7	28.6	22.1	15.6	27.6	58.7	34.6	84.9	1.3	0	4.5	175	0	1014.8	263.800	1061.600	0
14/02/2012	22.4	16.2	30.3	22.1	16.3	29	56.7	30.8	77.8	1.8	0.1	8.8	148	0	1017.1	260.900	1048.900	0
15/02/2012	22.0	14.1	29.4	21.6	14.1	27.7	55.6	33.1	76.9	3.1	0.8	9.6	139	0	1019.3	300.000	1023.200	0
16/02/2012	21.3	14.1	28.4	20.8	14.3	26.8	62.6	38.5	84.8	2.7	0	12.1	133	0	1020.0	284.300	1072.000	0
17/02/2012	22.4	15.4	29.1	22.1	15.8	28.3	54.4	29.3	77.2	1.6	0.1	6	161	0	1019.2	318.600	1148.500	0
18/02/2012	23.5	16.4	30.5	23.2	16.5	29.8	54.0	33.1	80.3	1.1	0	4.9	151	0	1017.8	314.500	1014.900	0
19/02/2012	23.9	17.1	31	23.6	16.9	31.1	54.5	35.5	86.2	1.3	0	19.2	197	0.6	1017.5	279.000	1033.300	0
20/02/2012	24.1	16.8	31.3	23.6	17	30.6	59.0	38.6	80.2	1.9	0	7.2	151	0	1017.1	291.400	1110.000	0
21/02/2012	22.2	19.3	29.7	21.6	18.8	29.1	76.5	51.6	88.7	2.5	0	8.9	146	15.4	1013.5	186.600	1090.800	0
22/02/2012	20.9	17.2	25	20.3	17.6	23.8	76.1	56.7	89.8	3.2	0	7.9	152	0	1011.7	252.100	1148.600	0
23/02/2012	20.6	16.2	25.3	20.4	16.5	24.6	69.5	52.5	80.9	2.6	0.8	5.7	132	0	1015.6	164.200	740.100	0
24/02/2012	22.5	15.3	29.4	22.2	15.3	28.7	61.1	38.5	83.1	2.4	0	6.6	126	0	1019.9	316.200	1034.400	0
25/02/2012	24.0	16.8	30.8	23.7	17.3	29.7	52.9	32.4	77.3	3.1	0	7.3	145	0	1022.1	319.700	1008.600	0
26/02/2012	23.0	16.4	28.4	22.7	16.6	27.7	56.7	46.2	67.8	1.8	0	5	180	0	1022.3	164.200	692.100	0
27/02/2012	21.5	19.3	23.8	21.0	18.6	23.4	74.7	56.9	88.6	1.9	0.2	4.2	239	3	1021.4	74.900	390.600	0
28/02/2012	23.4	19.5	28.2	23.0	19.5	27.3	61.7	43.9	86.5	1.8	0	4.4	256	0	1019.0	200.000	1195.000	0
29/02/2012	25.1	20.2	30.4	24.7	20.2	29.5	59.3	44.9	73.0	2.5	0	4.9	249	0	1016.5	273.200	1150.900	0

Date	Average Temp	Min Temp	Max Temp	Average 10m Temp	Average 10m Min Temp	Average 10m Max Temp	Average RH (%)	Min RH (%)	Max RH (%)	Average WS	Min WS	Max WS	Wind Direction	Rain	Average Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/03/2012	25.3	19.9	30.5	25.0	19.8	30.0	61.4	45.1	75.3	3.2	0.0	8.2	223	1.4	1014.3	229.646	1098.682	0
2/03/2012	26.2	21.0	30.4	25.8	21.2	29.7	58.1	40.0	75.0	3.2	0.0	12.7	153	0.0	1009.8	216.339	895.256	0
3/03/2012	21.6	19.4	25.2	21.1	18.6	24.8	79.3	70.6	88.6	2.4	0.0	7.0	97	3.0	1012.1	68.818	340.186	0
4/03/2012	20.9	16.1	25.9	20.4	15.5	25.3	74.4	58.5	90.0	1.8	0.4	5.9	61	21.8	1016.9	133.631	894.757	0
5/03/2012	24.9	19.0	30.3	24.5	18.9	29.5	61.3	44.2	77.8	2.4	0.0	6.7	296	0.0	1015.0	254.806	910.094	0
6/03/2012	21.8	17.2	24.7	21.5	17.1	25.3	78.7	65.8	88.4	0.5	0.0	5.8	135	6.4	1014.5	72.083	598.686	0
7/03/2012	19.8	15.8	24.8	19.5	15.8	23.8	68.4	52.9	82.9	4.5	1.9	8.4	113	0.0	1016.6	187.034	967.884	0
8/03/2012	17.1	13.8	20.7	16.7	13.9	19.7	68.8	51.8	80.8	5.5	3.0	8.6	113	0.6	1016.3	185.026	1058.132	0
9/03/2012	17.3	10.5	23.3	16.8	10.6	22.1	64.9	46.2	85.2	2.3	0.0	7.4	255	0.0	1012.6	229.504	922.023	0
10/03/2012	20.1	12.8	26.6	19.6	13.1	25.2	56.5	38.1	78.2	2.3	0.0	8.0	245	0.0	1013.2	252.547	1004.452	0
11/03/2012	21.1	14.2	27.5	20.9	14.3	26.5	53.0	30.5	78.3	1.2	0.0	5.5	135	0.0	1015.4	271.714	899.025	0
12/03/2012	20.7	19.6	21.9	21.1	19.9	22.3	55.2	50.5	59.2	1.7	0.0	2.8	70	0.0	1018.5	0.025	0.000	0
13/03/2012	25.0	21.4	28.5	24.5	21.2	27.8	50.0	40.4	61.2	2.0	0.2	6.2	78	0.0	1019.8	345.350	995.055	0
14/03/2012	22.3	16.6	27.7	22.0	16.7	27.0	58.1	40.3	75.2	0.9	0.0	4.0	58	0.0	1019.4	224.027	997.780	0
15/03/2012	23.4	19.1	28.0	22.9	18.9	27.4	58.8	47.5	71.0	0.6	0.0	7.3	14	0.0	1016.7	187.813	1017.599	0
16/03/2012	24.3	19.0	29.6	23.8	18.9	28.5	58.4	45.3	73.1	1.6	0.2	5.2	313	0.0	1013.8	219.058	1071.833	0
17/03/2012	21.5	17.7	24.2	21.1	17.6	24.2	76.1	62.2	87.5	0.2	0.0	5.8	224	12.8	1015.3	73.824	463.102	0
18/03/2012	19.0	15.2	23.4	18.6	15.6	22.3	67.1	47.8	84.6	6.2	2.5	10.7	104	0.0	1020.1	260.550	994.689	0
19/03/2012	18.7	13.8	24.0	18.3	14.2	22.7	69.3	50.4	84.4	5.4	2.7	9.2	113	0.0	1020.4	173.986	925.702	0
20/03/2012	20.9	16.3	26.9	20.4	16.3	25.9	69.6	49.3	86.0	4.3	0.7	8.1	96	0.0	1016.9	205.746	952.261	0
21/03/2012	21.5	14.8	28.5	21.4	14.2	27.8	66.1	41.9	87.4	1.4	0.0	5.0	132	0.0	1009.9	209.667	932.784	0
22/03/2012	23.6	17.2	30.1	23.4	17.6	29.5	59.0	38.2	77.0	0.5	0.0	6.7	333	0.0	1007.6	170.625	866.660	0
23/03/2012	21.2	13.9	25.8	20.6	14.1	24.3	54.7	32.4	75.4	3.1	0.3	9.5	252	0.0	1008.1	214.870	902.814	0
24/03/2012	16.2	9.9	23.2	15.9	9.7	22.5	51.5	32.6	68.6	2.4	0.0	5.4	133	0.0	1015.6	222.758	759.106	0
25/03/2012	18.3	11.1	26.3	18.2	11.1	25.6	55.8	36.5	72.2	1.9	0.3	5.7	91	0.0	1019.9	192.756	947.202	0
26/03/2012	19.4	15.1	24.5	19.1	15.1	23.6	62.0	49.5	74.1	1.8	0.1	4.9	112	0.0	1022.3	162.775	917.299	0
27/03/2012	20.8	14.9	27.1	20.4	14.9	26.1	56.9	35.2	75.8	1.1	0.0	6.5	84	0.0	1023.0	193.166	853.104	0
28/03/2012	21.4	16.4	27.1	21.0	16.2	26.6	54.5	35.0	70.6	0.8	0.0	5.0	81	0.0	1021.9	198.428	971.551	0
29/03/2012	20.7	15.6	27.3	20.2	15.5	25.9	60.7	34.4	81.3	0.8	0.0	6.8	141	0.0	1019.5	167.231	836.915	0
30/03/2012	19.5	13.6	26.1	19.2	13.7	25.2	65.0	37.7	83.8	1.7	0.0	8.5	128	0.0	1018.5	178.053	873.008	0

Appendix 9
Complaints Database

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WHITEHAVEN COAL

2011-2012 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
1	106	11/4/2011 10:30pm	Noise (Mine)	C	Message left on EO voice mail	Noise heard from mine during evening only 11/4/11 and specifically can hear dozer tracks.	North westerly winds and temperature inversion probably enhanced noise towards Werris Creek. Night shift mining locations were the quietest possible configuration.	Property immediately visited. Written response sent.
2	107	14/4/2011 1pm	Noise (Mine)	C	Rang EO mobile	Noise heard from mine during evening only 13/4/11 and specifically can hear dozer tracks.	North westerly winds and temperature inversion probably enhanced noise towards Werris Creek. Night shift mining locations were the quietest possible configuration.	Attended noise monitoring to be undertaken at residence in April. Written response sent.
3	108	14/4/2011 5:15pm	Dust (Mine)	Q	Rang Complaints Line	Dust observed on 14/4/11 from the coal mine observed moving to the east.	Temperature inversion was present that evening trapping dust and concentrating so that is was visible. Wind was blowing away from complainant's residence.	Property immediately inspected and tank water sample taken for analysis of potable water quality. Written response sent.
4	109	20/4/2011 11pm	Noise (Mine)	L	Rang EO mobile	Noise heard from mine during evening only 20/4/11.	Westerly winds probably enhanced noise towards Quipolly. Night shift mining locations were the quietest possible configuration.	Property immediately visited. Written response sent.
5	110	28/4/2011 8:45am	Noise (Rail Load Out)	OEH/A	Rang EO phone	Noise heard from rail load out facility during evening and nights on weekend 16&17/4/11.	South easterly wind unlikely to enhance noise towards Werris Creek. Only operations were dozers working on coal stockpile. Continuous noise monitor measured levels with compliance criteria.	Attended noise monitoring to be undertaken at residence in April. Written response sent to OEH and complainant.
6	111	10/5/2011 3pm	Noise (Rail Load Out)	OEH/A	Email to EO	Noise from loader, dozers and train shunting on 13th, 14th and 26th April 2011 and 8th May 2011.	13/4 & 14/4 & 8/5 Adverse met conditions could have enhanced RLO noise levels towards Werris Creek but not applicable against compliance criteria. 26/4 No activities onsite. Attended noise monitoring indicates levels within compliance.	Undertook attended noise monitoring in April 2011. Continuous noise monitor nearby at "Greenslopes". Written response to OEH and complainant provided.
7	112	11/5/2011 8pm	Noise (Mine)	L	Message left on EO voice mail	Terrible noise from mine on 10th & 11th May 2011.	Mining locations were elevated because no overburden inventory inpit. Adverse weather conditions could have enhanced mining noise levels towards Quipolly but not applicable against compliance criteria.	Continuous noise monitor to be relocated to "Hazeldene". Written response to complainant provided.
8	113	17/5/2011 11am	Dust (Mine)	R/ Anonymous	Rang EO phone	Four individuals from the Barnes sub-division adjacent to golf course concerned at the amount of dust from mine in early mornings.	Temperature inversions in mornings concentrate dust in mornings so is visible but overall daily dust emissions at same rate and monitoring result are still within compliance. Review of water cart dust suppression L/bcm fallen 17% compared to previous year even though water cart capacity (number and size) has increased over the past year.	Written response to complainant provided.

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YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
9	114	19/5/2011 4pm	Dust (Blast)	J	In person to EO	Mine blast on 6th May caused grayish dust cloud to blow over their property.	WCC did not blast on that date. Council quarry had been in use during that period.	Written response to complainant provided.
10	115	20/5/2011 9:30am	Dust (Mine)	OEH/ Anonymous	Rang EO phone	Werris Creek Road passerby had never seen dust so bad across the road coming from a drill.	Inspection by EO and Superintendent did not identify significant dust. Drill and scrappers located close to road. All drills were using dust sprays and wind was westerly blowing away from the road.	Written response to OEH provided.
11	116	19/5/2011 2:29pm	Blast (OP/ Vibration)	OEH/A	Email to EO	Complainant impacted by blast on 19th May 2011 at 1:25pm.	Blast results were in compliance. Wind was a light SW towards Werris Creek.	Written response to OEH and complainant provided.
12 & 13	117 & 118	1/6/2011 5:36pm	Noise (Rail Load Out)	OEH/A	Email to EO	Noise from rail load out on the evenings of Friday 27th and Monday 30th May 2011.	One train on each evening was loaded. Temperature inversion present on 27/5 and high winds 30/5 however weather conditions would have limited noise propagation from RLO to Werris Creek. Noise levels not an exceedance of noise criteria due to adverse weather conditions.	Complainant's residence apart of attended noise monitoring program. Written response to OEH and complainant provided.
14 to 22	119 to 127	3/6/2011 Various	Blast (OP/ Vibration)	OEH/ Various (9 Werris Creek residents)	Rang EO phone & mobile, Crushing Plant & Mine office, Complaints Line	Blast #32 (32 S10-9-11-385) was fired at 13:07 on 3rd June 2011 in Strip 10 near to the natural surface on the western side of the pit resulted in loud noise and house shaking experienced.	Video confirmed that a hole "rifled"/stemming ejection due to stemming contamination from muddy bench conditions causing elevated overpressure. South westerly wind blowing towards Werris Creek could have enhanced overpressure effects of the blast. Blast monitoring results were in compliance at all community monitors albeit with two locations recording elevated results over 115dBL.	Written response to OEH and complainant provided. EO to inspect alleged house defects.
23	128	14/6/2011 1:16pm	Blast (OP/ Vibration)	O	Rang EO phone	Blast #37 (37 S9-9-GCoal) was fired at 13:19 on 14th June 2011 in Strip 9 right in the bottom of the pit resulted in shaking his house, the worst blast yet. Complainant noticing new cracks in gyprock.	The blast was small and in pit, Blast Engineer would not have thought that it could cause any community issues. South easterly wind could have enhanced overpressure effects. Blast monitoring results were in compliance at all community monitors with none of the community monitors triggering a result.	Written response to OEH and complainant provided. EO to inspect alleged house defects.
24	129	15/6/2011 9am	Lights (Mine)	OEH/A	Rang EM mobile	Lights from the mine were shining brightly at her property all night.	Light monitoring camera set up on southern edge of Werris Creek capture a bright light shining towards Werris Creek. Lighting plant was positioned on RL445m orientated north (Werris Creek is north-north east) and was relocated before next night shift.	Written response to complainant provided.

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YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
25	130	16/6/2011 11:21am	Noise (Rail Load Out)	OEH/A	Email to EO	Noise from rail load out on the evenings of Thursday 9th, Friday 10th, Monday 13th and Wednesday 15th June 2011.	No trains during the evenings, however two trains finished being loaded late afternoon 13/6 & 15/6. Adverse weather conditions present on each day potentially influence noise propagation from RLO to Werris Creek. Noise levels not an exceedance of noise criteria due to adverse weather conditions.	OEH requested specific attended monitoring during Train Loading from Kurrara St. Written response to OEH and complainant provided.
26 to 45	131 to 148, 150 & 151	16/6/2011 Various	Blast (OP/ Vibration)	OEH/ Various (20 Werris Creek residents)	Rang EO phone & mobile, Crushing Plant & Mine office, Complaints Line	Blast #36 (36 S12-13-385) was fired at 13:13 on 16th June 2011 in Strip 12 near to the natural surface on the western side of the pit resulted in loud noise and house shaking experienced.	Video confirmed that a hole "rifled"/stemming ejection due to stemming contamination from muddy bench conditions causing elevated overpressure. Southerly wind blowing towards Werris Creek could have enhanced overpressure effects of the blast. Blast monitoring results were in compliance at all community monitors albeit with two locations recording elevated results over 115dB(L).	Written response to OEH and complainant provided. Several investigations into blasting practices launched by Orica and Whitehaven Coal. EO to inspect alleged house defects.
46	149	20/6/2011 1:20pm	Blast (OP/ Vibration)	OEH/A	Rang EM mobile	Blast #35 (35 S12_3-4_385) was fired at 13:15 on 20th June 2011 in Strip 12 near to the natural surface on the very western edge of the open cut and shook the complainants house.	Given the rifling issues with the two previous (#36 on 16th June and #32 on 3rd June), this shot was loaded with an extra metre of stemming loaded into each hole. Also the shotfirers checked each hole with a pole to confirm that no holes have been under loaded with stemming due to slumping or hang ups within each hole and the blast initiation direction was changed orientated to the west. Blast monitoring results were in compliance at all community monitors around 6dB(L) less than previous blasts.	Written response to OEH and complainant provided.
47	152	22/6/2011 2:15pm	Blast (OP/ Vibration)	I	Rang EO mobile	Blast #39 (S12_8-9_385) was fired at 13:17 on 22nd June 2011 in Strip 12 near to the natural surface towards the centre of the pit and shook the complainants house.	Blast monitoring results were in compliance at all community monitors. South easterly wind could have enhanced overpressure effects.	EO to inspect alleged house defects. Written response to complainant provided.
48	153	4/7/2011 10:30am	Noise (Rail Load Out)	OEH/A	Rang EO phone	Noise from the coal loader 2nd July from 7:12pm to 10:30pm was loud and pretty ordinary. However noise from the coal loader 3rd July from 7:24pm until 2:20am was audible but at an acceptable level.	One train loaded each evening with dozers working until 4:30am and 5:30am respectively. Adverse weather conditions present on each day potentially influence noise propagation from RLO to Werris Creek. Noise levels not an exceedance of noise criteria due to adverse weather conditions.	OEH requested additional specific attended monitoring during Train Loading from Kurrara St. Written response to OEH and complainant provided.

WHITEHAVEN COAL

2011-2012 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
49	154	4/7/2011 6:44pm	Noise (Mine)	L	Message left on EO voice mail	Mine is very noisy on 4th July 2011 as well as the week beginning 20th June 2011.	Dump location was on the exposed eastern side of RL410m dump. Adverse weathers conditions could have enhanced mining noise levels towards Quipolly but not applicable against compliance criteria. Continuous noise monitor recorded elevated noise levels with mining noise a major component.	OCE relocated the dump back to protected centre of RL410m dump. The continuous noise monitor is stationed at complainant's residence "Hazeldene". Written response to complainant provided.
50	155	22/7/2011 10:30am	Noise (Rail Load Out)	OEH/A	Email to EO	No issues with noise from the coal loader on 16th and 18th July however noise from the coal loader 17th July from 11pm onwards was very loud.	One train loaded each evening with dozers working until 12am, 4am and 3:30am respectively. Adverse weather conditions present on 17th and 18th July only that could potentially influence noise propagation from RLO to Werris Creek. Noise levels not an exceedance of noise criteria due to adverse weather conditions.	OEH requested additional specific attended monitoring during Train Loading from Kurrara St. Written response to OEH and complainant provided.
51	156	26/7/2011 2:17pm	Blast (time)	OEH/DoP/A	Rang Complaints Line	Complainant alleges WCC blasted at 2:03pm outside time advertised and WCC is not allowed to do that.	Blast #49 (S11_5-6_365 TSB9) fired at 1:44pm. Not sure of difference in time. Advertised blast times in Werris Creek Flyer are indicative while approved blasting hours are 9am to 5pm.	Written response to OEH, DoP and complainant provided.
52	157	2/8/2011 10:15pm	Noise (Mine)	L	Message left on EO voice mail	The trains and mine were very noisy tonight 2nd August 2011 as well as last night 1st August 2011.	Dump location was the centre of RL430m dump. Adverse weathers conditions could have enhanced mining noise levels towards Quipolly but not applicable against compliance criteria. Continuous noise monitor recorded elevated noise levels with mining noise a major component.	No other dump options so OCE instructed truck operators to keep revs below 1500 rpm. The continuous noise monitor is stationed at complainant's residence "Hazeldene". Written response to complainant provided.
53	158	3/8/2011 10:45am	Dust Visual	T	Rang EO phone	The mine is in general very dusty and visually intrusive from the road and the dust some mornings causes a haze over the top of the mine.	No specific dates provided so no investigation undertaken.	A letter response will be provided to the complainant outlining rehabilitation and dust monitoring programs and results.
54 to 63	159 to 168	3/8/2011 Various	Blast (OP/ Vibration)	OEH/ Various (10 Werris Creek residents)	Rang EO phone & mobile, Complaints Line	Blast #51 (S10_12-13_GCoal) was fired at 13:24 on 3rd August 2011 in Strip 10 in the bottom of the pit resulted in higher than normal vibration causing excessive shaking of houses.	Blast performed as designed. Weather conditions did not enhance overpressure effects of the blast. Blast monitoring results were in compliance at all community monitors.	Written response to OEH and complainant provided. Several investigations into blasting practices launched by Orica and Whitehaven Coal. EO to inspect alleged house defects.

2011-2012 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
64	169	9/8/2011 8:30am	Light	A	Rang EM phone	Lights shining into her backyard on Friday night 5th August 2011 up until 11:30pm but by 12am they appeared to have been redirected in pit.	The Light camera on Friday night all night a light source moving around and varying in intensity. OCE Lighting Plant Set Up and Inspection form confirms that the lighting plant was set up correctly on the RL430m dump. Probable source of light was dozers working at the dump face.	Operators to confirm that lights are set up correctly on dozers. Written response to complainant provided.
65 to 71	170 to 175, 177	17/8/2011 Various	Blast (OP/ Vibration)	Various (7 Werris Creek residents)	Rang EO phone & mobile, Complaints Line	Blast #55 (S10_14-15_GCoal) was fired at 10:39 on 17th August 2011 in Strip 10 in the bottom of the pit resulted in higher than normal vibration causing excessive shaking of houses.	Blast performed as designed. Weather conditions did not enhance overpressure effects of the blast. Blast monitoring results were in compliance at all community monitors.	Written response to complainant provided. Several investigations into blasting practices launched by Orica and Whitehaven Coal. EO to inspect alleged house defects.
72	176	17/8/2011 8:23pm	Noise (Mine)	L	Message left on EO voice mail	The mine is very noisy tonight 17th August 2011 as well as the previous nights 15th/16th August 2011.	Dump location was the centre of RL430m dump. Adverse weathers conditions could have enhanced mining noise levels towards Quipolly but not applicable against compliance criteria. Continuous noise monitor recorded elevated noise levels with mining noise a major component.	PM & OCE relocated dump to RL300m in pit. The continuous noise monitor is stationed at complainant's residence "Hazeldene". Written response to complainant provided.
73	178	24/8/2011 9:33pm	Noise (Mine)	L	Message left on EO voice mail	The mine is very noisy tonight 24th August 2011 and that the mine might be able to do something about it.	Dump location was the centre of RL430m dump. Adverse weather conditions could have enhanced mining noise levels towards Quipolly but not applicable against compliance criteria. Continuous noise monitor recorded elevated noise levels with mining noise a major component.	OCE relocated dump to RL360m in pit. The continuous noise monitor is stationed at complainant's residence "Hazeldene". Written response to complainant provided.
74	179	29/8/2011 7:45pm	Noise (Mine)	L	Message left on EO voice mail	The mine is very noisy tonight 29th August 2011.	Dump location was in pit to RL360m dump. Adverse weathers conditions could have enhanced mining noise levels towards Quipolly but not applicable against compliance criteria. Continuous noise monitor recorded elevated noise levels with mining noise a major component.	OCE requested Coal trucks to minimise revs to 1500 rpm when tipping off. The continuous noise monitor is stationed at complainant's residence "Hazeldene". Written response to complainant provided.
75	180	30/8/2011 3:46pm	Blast (OP/ Vibration)	U	Rang Complaints Line	Blast #58 (S10_16_GCoal) was fired at 15:42 on 30th August 2011 in Strip 10 in the bottom of the pit resulted in higher than normal vibration causing excessive shaking of house.	Blast performed as designed. Weather conditions could have enhanced overpressure effects of the blast. Blast monitoring results were in compliance at all community monitors.	Written response to complainant provided. Several investigations into blasting practices launched by Orica and Whitehaven Coal. EO to inspect alleged house defects.

WHITEHAVEN COAL

2011-2012 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
76 & 77	181 & 182	12/9/2011 Various	Blast (OP/ Vibration)	O & OEH/A	Rang Complaints Line	Blast #59 (S10_12_GCoal) was fired at 13:09 on 12th September 2011 in Strip 10 in the bottom of the pit resulted in higher than normal vibration causing excessive shaking of house.	Blast performed as designed. Weather conditions were unlikely to enhance overpressure effects of the blast. Blast monitoring results were in compliance at all community monitors.	Written response to complainants provided. Several investigations into blasting practices launched by Orica and Whitehaven Coal.
78 & 79	183 & 184	16/9/2011 Various	Blast (OP/ Vibration)	L & M	Rang Complaints Line	Blast #60 (S10_7-11_GCoal) was fired at 13:18 on 16th September 2011 in Strip 10 in the bottom of the pit resulted in higher than normal vibration causing excessive shaking of house.	Blast performed as designed. Weather conditions could have enhanced overpressure effects of the blast. Blast monitoring results were in compliance at all community monitors.	Written response to complainants provided. Several investigations into blasting practices launched by Orica and Whitehaven Coal.
80 to 82	185 to 187	21/9/2011 Various	Blast (OP/ Vibration)	Anonymous, V & W	Rang Complaints Line	Blast #61 (S11_9-10_385) was fired at 14:10 on 21st September 2011 in Strip 11 in the upper horizon of the pit resulted in higher than normal vibration causing excessive shaking of house.	Blast performed as designed. Weather conditions were unlikely to enhance overpressure effects of the blast. Blast monitoring results were in compliance at all community monitors.	Written response to complainants provided. Several investigations into blasting practices launched by Orica and Whitehaven Coal.
83	188	20/9/2011 10:00am	Noise (Rail Load Out), Lights (Rail Load Out), Truck Coal Spillage	A/OEH	Rang EM phone and email to EO	Rail Load Out was loud from 10:15pm to 12am and noisy until 3:30am on 20th September 2011. Rail Load Out lights flashed all over the place at 2:40am on 20th September 2011. On 16th September 2011 at 11am, coal from truck "M21" fell onto Werris Creek Road in front of their vehicle.	One train loaded between 7pm and 9pm. South westerly wind and temperature inversion likely to enhance noise propagation to Werris Creek. Adverse weather conditions not applicable against compliance criteria. Lighting camera did not identify any lights from open cut on 20th September and lighting plants set up to the west at Rail Load Out, dozers on stockpile were the only potential source of light. Based on the information provided by Mountain Industries, it is unlikely that coal could spill from the trailer of "M21" on 16th September 2011, WCC was not able to confirm whether coal was actually spilled or not.	Written response to complainant provided. Mountain Industries to review induction and work method statement to strengthen tarping and cleaning off hang up coal procedures and haul route via Taylors Lane.
84	189	14/10/2011 10:02am	Blast (OP/ Vibration)	OEH/ Anonymous	Rang EO phone	Blast #66 (S11_11-14_Aseam) was fired at 13:09 on 13th October 2011 was louder than normal.	All blast results were in compliance with blasting criteria and performed as designed. The weather conditions were unlikely to enhance overpressure effects of the blast towards Werris Creek.	Written response to OEH provided.
85	190	17/10/2011 9:47am	Blast (OP/ Vibration)	OEH/ Anonymous	Email to EO	Complainant alleged to OEH that a blast on either 11th or 12th October 2011 broke the windows of his step fathers home	WCC did not blast on 11th or 12th October 2011. Given the low levels of the blasts on 10th and 13th October, they were unlikely to have caused any windows to break.	Written response to OEH provided.

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YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
86	191	24/10/2011 9:47pm	Noise (Mine)	L	Rang EO mobile	Complainant indicated that the mine was noisy tonight (Monday night 24th October 2011) for the first time in many weeks. The noise wasn't unbearable but significantly noiser than last week.	Based on current in-pit blasted overburden inventory, the location of excavators and the in-pit dump location represents the "quietest" available configuration for mining operations The prevailing northerly winds would have enhanced noise emissions towards the complainants residence. The noise levels measured under adverse weather conditions (high winds) are not subject to noise criteria.	Letter response will be provided to the complainant.
87	192	25/10/2011 9:10am	Blast (OP/ Vibration)	X	Rang EO mobile	Complainant stated that the last couple of weeks there have been cracks appearing in her house in Quipolly and is most likely due to the mine's blasts.	No specific blasts or periods of blasts identified by the complainant.	EO inspected complainant's property and took photos of the building defects. Letter response will be provided to the complainant.
88	193	18/10/2011 3:25pm	Noise (Rail Load Out), Lights (Mine)	A/OEH	Email to EO	Complainant stated that Monday night 17th October was impacted by intrusive lighting from the overburden dump from 9:10pm until 0:30am in bursts of 15 to 20 minutes at a time. Also the train shunting noise was loud all evening until 0:30am.	Lighting camera did not identify any lights from the overburden dump area on 17th and 18th October. There were no trains loaded or on the WCC rail spur during the time period, indicating that the source of the rail shunting noise was from ARTC/Pacific National rail yards at Werris Creek.	A written response sent to OEH and the complainant.
89	194	26/10/2011 12:26pm	Noise (Rail Load Out), Lights (Mine)	A/OEH	Email to EO	Sunday and Monday mornings 23rd and 24th October at 1:15am and 1:45am respectively there was a lot of noise and very bright lights from the coal loader. Also on 25th October from 7:45pm to 1:45am the noise from the coal loader and the train was amazing loud.	Lighting camera did not identify any lights from the overburden dump area on 23rd and 24th October. There were no trains loaded 23rd October but a train was loaded on 24th October at 1:15am and 25th October at 6:27pm. The meteorological conditions in the early mornings of the 23rd and 24th October were unlikely to have enhanced noise emissions from WCC, however the prevailing wind direction on 25th October could have enhanced noise emissions from WCC.	A written response sent to OEH and the complainant.
90	195	28/10/2011 4:11pm	Blast (OP/ Vibration)	A/OEH	Email to EO	Complainant alleged that a loud blast shook the whole house on Thursday 27th October 2011 at 1:27pm and the coal mine closed the Werris Creek Road for 20 minutes while blasting.	All blast results were in compliance with blasting criteria and performed as designed. The weather conditions could have enhanced overpressure effects of the blast towards Werris Creek. Discussions with onsite personnel involved with the road closure said that the road was closed for 12 minutes.	A written response sent to OEH and the complainant.

2011-2012 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
91	196	4/11/2011 9:19pm	Blast (Fume)	Y/OEH	Email to EO	Complainant stated that there was a "big blast on 4th November 2011 after 1pm with a lot of orange smoke".	Blast #71 (S12-S13_19-20_DE Coal UG) was fired at 13:10 on 4th November 2011 with the blast results in compliance. The blast was in an area above the former underground workings that had many cavities and voids in the ground. The blast was designed to collapse the old workings so that it could be excavated safely however a fume cloud with a rating of 4 was generated and dispersed onsite.	A written response sent to OEH and the complainant.
92	197	16/11/2011 7:50am	Noise (Rail Load Out), Lights (Mine)	A/OEH	Email to EO	Complainant stated that there were lights on her property most of the night (Tuesday 15th November 2011) and the mine was noisy.	The Light Monitoring Camera does not show any lighting impacts, however it is possible that the dozer headlights pushing coal from the west to the east in the direction of Werris Creek could have been the source of the lighting complaint. Given the prevailing weather conditions, noise from the Train Load Out Facility (in particular 16th November) could have potentially been enhanced towards Werris Creek.	A written response was sent to the complainant and OEH.
93	198	22/11/2011 2:16pm	Noise (Rail Load Out)	A/OEH	Email to EO	Complainant alleged excessive noise on 2nd, 3rd and 4th November 2011.	While the dozers would have been working until 3:30am on those nights, however the timing of the trains does not match the times outlined by the complainant. The source of train noise is more likely to have originated from Werris Creek Rail Yard.	A written response was sent to the complainant and OEH.
94	199	9/12/2011 5:12pm	Noise (Rail Load Out)	A/OEH	Email to EO	Complainant alleged excessive noise on 5th and 8th December 2011 due to train shunting and coal loading activities.	No trains were loaded at WCC on 5th or 8th December, most likely source of noise is from Werris Creek Rail Yard.	A written response was sent to the complainant and OEH.
95	200	19/12/2011 10:01am	Blast (OP/ Vibration)	Anonymous/ OEH	Email to EO	Complainant alleged that a large blast was fired on 16th December between 1:30pm and 2pm.	Blast #83 (S12_7-9_Aseam) was fired at 13:10 on 16th December 2011 was an overburden blast in the centre of the pit at RL385 level. Blast was small and all results were within compliance limits.	A written response was sent to the OEH.
96	201	24/11/2011 9:00am	Noise (Mine)	Z	Raised at CCC	Complainant alleged to CCC member that the evening of Monday 21st November the mine was noisier than usual. Noise was particularly worse when the trucks were dumping up on the top of dump of an evening.	While trucks were not dumping on top of the dump on 21st November 2011, dumping had recently been occurring on the RL445m level. The dump locations shifted in pit at dark.	Follow up phone call to complainant confirmed that noise was quieter after dark when trucks moved in pit.

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YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
97	202	24/11/2011 9:00am	Dust (Mine)	M	Raised at CCC	Complainant alleges that dust from the mine is coating their outdoor area.	Wind roses for August and September do not indicate that the mine is the likely source of the increase in dust levels. The complainant had recently plowed and sown the paddock adjacent to their home and dust deposition gauge which is the likely source of dust.	A written response was sent to the complainant.
98	203	22/12/2011 10:24pm	Noise (Mine)	L	Phone to EO	Complainant stated that the mine was very noisy Thursday night 22nd December 2011.	Mining operations and dump locations were just below the natural surface. Between 8:30pm and 2am the wind was a north easterly which could have propagated noise towards complainant's residence.	A written response was sent to the complainant.
99	204	11/01/2012 1:35pm	Dust (Mine)	AA	Phone to Community Liaison Officer	Complainant suffers from asthma and believes the symptoms have worsened and that this year is the dustiest seen for 50 years due to WCC.	No specific incident to investigate. WCC is currently utilizing five water carts to manage dust emissions. The local area has predominant NW-SE winds, WCC is not a major source of dust for Werris Creek because SW winds only occur on average 15% of the time.	A written response was sent to the complainant.
100	205	18/01/2012 4:18pm	Noise (Rail Load Out) Lights (Mine)	A/OEH	Email to EO	Complainant alleged that the on 3rd January 2012 the coal loader was noisy particularly at 11:30pm and that there was light spill from the coal mine.	The coal crushing plant ran until 3:30am and the dozers pushed up at the rail load out facility until 1am after loading a train that arrived at 7:47pm and departed 9pm. The meteorological conditions were unlikely to enhance noise impacts that would be continuous or persistent. A review of photos and lighting camera indicates that no lighting plants were visible to Werris Creek from either open cut or rail load out facility.	A written response was sent to the complainant and OEH.
101	206	18/01/2012 4:18pm	Noise (Rail Load Out) Lights (Mine)	A/OEH	Email to EO	Complainant alleged that the 18th January 2012 trains were revving their engines from 1am to 2:30am when she went to bed and that they were impacted at 1:30am by light.	The meteorological conditions were unlikely to enhance noise impacts as there no night shift operations on 17th January 2012. A review of photos and lighting camera indicates that no lighting plants were visible to Werris Creek from either open cut or rail load out facility.	A written response was sent to the complainant and OEH.
102	207	20/01/2012 1:44pm	Blast (OP/ Vibration)	AB	Phone to EO	Complainant said that the mine blast shook his house and this was the first blast that had ever felt.	Blast #03 (S11_4-7_350) was fired at 13:28 on 20th January 2012 was a thru-seam blast on the west edge and middle horizon of the pit. Blast results were within compliance limits.	A written response was sent to the complainant.
103	208	20/01/2012 1:45pm	Blast (OP/ Vibration)	AC	Phone to EO	Complainant said that the mine blast shook his house and knocked two photo frames off a cupboard. The level of vibration is not acceptable.	Blast #03 (S11_4-7_350) was fired at 13:28 on 20th January 2012 was a thru-seam blast on the west edge and middle horizon of the pit. Blast results were within compliance limits.	A written response was sent to the complainant.

WHITEHAVEN COAL

2011-2012 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
104	209	25/01/2012 1:55pm	Blast (OP/ Vibration)	0	Phone to EO	Complainant said that the mine blast at 1:30pm gave his house a fair thump and saw orange smoke.	Blast #04 (S12_13-18_Aseam) was fired at 13:28 on 25th January 2012 was an overburden blast in the weathered material on the crest of the ridge, centre of the pit. Blast results were within compliance limits.	A written response was sent to the complainant.
105	210	20/01/2012 2:51pm	Blast (OP/ Vibration)	A/OEH	Email to EO	Complainant alleged to OEH that a blast from Werris Creek Coal Mine today at 13:30hrs had shook all her back windows. Mrs Campbell claimed that she is unable to sell her home because of the mining activities.	Blast #04 (S12_13-18_Aseam) was fired at 13:28 on 25th January 2012 was an overburden blast in the weathered material on the crest of the ridge, centre of the pit. Blast results were within compliance limits.	A written response was sent to the complainant and OEH.
106	211	8/02/2012 7:39am	Noise (Rail Load Out) from Train	AC	Phone to EO	Complainant alleged that a train arriving on the Werris Creek Rail Spur was travelling in excess of the maximum speed of 15km/h which was very noisy as train line 50m from back door.	Initial response from coal delivery contractor found that the driver did not exceed the rail spur speed limit and that these style of locomotives do not record speed. However further investigation by rail transport contractor found that the locomotives do record speed which found that the train driver had exceed the rail spur speed limit of 15km/h due to testing a recently repaired locomotive engine.	Initial written response provided to complainant. Train driver has been disciplined by rail transport contractor and entire crew of train drivers refresher toolbox talk on WCC site rules. A final written response was sent to the complainant.
107	212	9/02/2012 1:18pm	Lights (Mine)	A	Phone to EM	Complainant stated that on Wednesday 8th February 2012 at 1:30am could see two lights from WCC but were not intrusive. However on Thursday 9th February 2012 at 12:05am, could see three lights, with the additional third light shining impacting on their residence.	A review of open cut operations indicates that at least two lighting plants would have been visible to Werris Creek, one on the east RL430m dump and centre RL440m ramp. The "additional third lighting plant" was the lighting plant on the centre RL440m ramp. The lighting plant was set up in accordance with WCC consent conditions at 30o away from Werris Creek but still noticeable to people in town.	The centre RL440m ramp lighting plant was relocated to the east RL430m dump for the next night shift. A written response was sent to the complainant.
108	213	15/02/2012 3:13pm	Noise (Rail Load Out)	EPA/A	Email to EO	Complainant alleged to the EPA that noise from train movements at WCC had interrupted their sleep at 2:25am on 7th February 2012.	The last train loaded at night by Werris Creek Coal was on the 4th February 2012. Any train shunting at 2:25am on 7th February 2012 is unrelated to WCC activities.	A written response was sent to EPA and the complainant.
109	214	15/02/2012 2:35pm	Blast (OP/ Vibration)	EPA/A	Phone to EM	Complainant alleged to the EPA that a blast from WCC had shaken the back windows and entire house.	Blast #05 (S13_13-18_BlackSeam1) was fired at 13:37 on 15th February 2012 was a blast in the weathered material on the ridge in front of the pit down to RL385m. Blast results were within compliance limits.	A written response was sent to EPA and the complainant.

2011-2012 Complaints Register

YTD	#	Complaint Date/Time	Issue	Complainant	Method	Nature of Complaint	Investigation	Action Taken / Follow-up
110	215	22/02/2012 12:30pm	Noise (Rail Load Out) Lights (Mine)	A	Phone to EM	Complainant stated that on Monday 20th, Tuesday 21st and Wednesday 22nd February 2012 that was impacted with lights shining directly at the property from the open cut.	A review of the lighting camera time lapse video did not identify any potential point source lighting impacts between the 20th and 23rd February 2012. The camera did not identify any lights from the mine on Tuesday and Wednesday nights 21st and 22nd February, with a only a general glow of lights visible on Monday night 20th February 2012.	A written response was sent to the complainant.
111	216	2/03/2012 9:11am	Noise Light	EPA/A	Email to EO	Complainant indicated on 25th February 2012 there was noise and intrusive lighting coming from the coal loader from 7pm to 2:45am. The coal loader was also very noisy mainly from bulldozers and lights on Thursday night 1st March 2012 from 9pm to 0:15am.	Dozers working away from Werris Creek and lighting plants were oriented to the north west and west. The weather conditions could have propagated noise towards Werris Creek from the Rail Load Out Facility on the Saturday and Monday night however Thursday night weather conditions would have been unlikely to enhance noise emissions.	Written response sent to EPA and complainant.
112	217	8/03/2012 11:37pm	Noise	C	Text message to EO	Complainant stated that noise from WCC was very clear and loud at their house tonight and WCC needed to look at what was in operation at 11:24pm as the machinery was very noisy.	Both the wind direction and temperature inversion are considered to represent noise enhancing conditions and likely to have enhanced mining noise levels.	Written response sent to complainant.
113	218	16/03/2012 10:58pm	Noise	L	Message left on EO voice mail	Complainant stated that mine was very loud tonight	The wind direction and temperature inversion were likely to result in noise enhancement at the complainant's residence.	Noise Control Operator position created for night shift to review real time noise levels and audio. Written response sent to complainant.
114	219	28/03/2012 10:34am	Light	A	Phone to EO	Lights from WCC were shining at complainants residence after midnight	Lighting camera confirms glow of mine lights visible. Lighting plant inspection confirms all lights are orientated away from Werris Creek.	One lighting plant was removed by OCE. Written response sent to complainant.
115	220	29/03/2012 9:10am	Dust	Z	Phone to Open Cut Office	Complainant indicated that mine was very dusty this morning.	Small patch of spontaneous combustion in pit had caused hazy conditions in the morning. Strong inversion present trapping smoke and dust.	Spontaneous combustion dug out and put out. Written response sent to complainant.
116	221	30/03/2012 10:42pm	Noise	L	Phone to EO	Complainant stated that mine was very noisy at 10:30pm	The wind direction was likely to result in noise enhancement at the complainant's residence however it is not obvious whether mining noise or road truck/traffic noise that caused levels above the Hazeldene criteria of 37dBA.	OCE shutdown all operations at 10:50pm when contacted by Noise Control Operator. OCE sent operator to Quipolly to investigate road noise. Written response sent to complainant.
117	222	30/03/2012 9:13am	Light	DoP/A	Phone to EO	Lights from WCC were shining at complainants residence after midnight	Lighting camera confirms glow of mine lights visible. Lighting plant inspection confirms all lights are orientated away from Werris Creek.	Pre Shift Instruction to dozer operators on variable light switches to dim lights. Written response sent to DoP and complainant.

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Appendix 10
Independent Environmental Audit Action Plan 2011

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Werris Creek Coal (WCC) Independent Environmental Audit Action Plan v1 2011

DEVELOPMENT CONSENT DA 172-7-2004 NON COMPLIANCES – Total Number 7

Condition	Clause	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Schedule 4 (Condition 7)	Ensure noise generated does not exceed criteria at any residence on privately-owned land.	The results of noise monitoring should be closely monitored and operations adjusted as required to reduce impacts.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Noise Management Plan outlining the measures to be implemented to ensure that noise levels are within the compliance criteria.	COMPLETE Draft Noise Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
Schedule 4 (Condition 28)	Except under EPL, shall comply with s120 POEO Act (note: s120 makes it an offence to pollute any waters).	The results of water monitoring should be closely monitored and operations adjusted as required to reduce impacts.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Site Water Management Plan outlining the measures to be implemented to ensure discharge water quality remains within compliance criteria.	COMPLETE Draft Site Water Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
Schedule 4 (Condition 29)	Except under EPL, ensure discharges from licensed discharge points comply with limits in Table 13.	The results of water monitoring should be closely monitored and operations adjusted as required to reduce impacts.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Site Water Management Plan outlining the measures to be implemented to ensure discharge water quality remains within compliance criteria.	COMPLETE Draft Site Water Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
Schedule 4 (Condition 39)	Before 30 June 2010, must implement suitable arrangements for long term security of the offsets in the BOS to D-G's satisfaction (either through Deed of Agreement with Minister, rezoning land under LEP, caveats on title under Conveyancing Act 1919).	It is recommended that WCC follows up with DP&I to bring these negotiations to a close.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will implement suitable arrangements for the long term security of the Life of Mine BOS (incorporating the BOS outlined in ELA (2010) Biodiversity Offset Strategy and Management Plan for WCC).	Long term security of the Life of Mine BOS not required until December 2012.
Schedule 6 (Condition 1f)	Environmental Management Strategy (EMS) must be updated following each Independent Environmental Audit.	It is recommended that WCC ensures this review and update (if required) of the EMS is actually undertaken following the current audit.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a revised EMS.	COMPLETE Draft Environmental Management Strategy submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
Schedule 6 (Condition 2)	Three months after completing Independent Environmental Audit, must review and revise (if necessary) the EMS to D-G's satisfaction.	It is recommended that WCC ensures this review and update (if required) of the EMS is actually undertaken following the current audit.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a revised EMS.	COMPLETE Draft Environmental Management Strategy submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
Schedule 6 (Condition 7)	The Community Consultative Committee shall meet at least four times/year, or as determined by D-G.	None.	Whitehaven Coal are committed to holding regular WCC CCC meetings in accordance with Project Approval 10_0059. Next meeting is 24th November 2011 and will be the fourth meeting in 2011.	COMPLETE WCC held four CCC meetings in 2010 and four CCC meetings in 2011.

DEVELOPMENT CONSENT DA 172-7-2004 RECOMMENDATIONS (Does not include Non Compliance Recommendations) – Total Number 1

Condition	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Schedule 4 (Condition 59a)	It is recommended that a waste register be maintained recording types and quantities of wastes, and the final destinations for those wastes after being removed offsite by contractors.	Whitehaven Coal will comply with the Waste Management requirements outlined in Project Approval 10_0059 when approved; including waste registers by March 2012.	COMPLETE Waste types, quantities and destinations tracked in End Of Month Environmental Report by February 2012.

STATEMENT OF ENVIRONMENTAL EFFECTS (R.W. Corkery & Co Pty Limited, 2009) NON COMPLIANCE – Total Number 1

Condition	Clause	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 2.11.7	The biodiversity offset would be secured in the long term by notation on title, and the offset areas managed in accordance with a management plan to be developed in consultation with the OEH and DP&I.	It is recommended that WCC follows up with DP&I to bring these negotiations to a close.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will implement suitable arrangements for the long term security of the Life of Mine BOS (incorporating the BOS outlined in ELA (2010) Biodiversity Offset Strategy and Management Plan for WCC).	Long term security of the Life of Mine BOS not required until December 2012.

Werris Creek Coal (WCC) Independent Environmental Audit Action Plan v1 2011

STATEMENT OF ENVIRONMENTAL EFFECTS (R.W. Corkery & Co Pty Limited, 2009) RECOMMENDATIONS (Does not include Non Compliance Recommendations) – Total Number 2

Condition	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 2.5.4.4, 2.11.6 & 4.9.5	It is recommended that the soil stockpile inventory be revised and updated to better reflect the location of different soil types as there are two very different topsoil types/qualities stripped at the site.	Whitehaven Coal already maintains a soil register identifying topsoil and subsoil stockpiles. There is no additional benefit to separating different types of topsoil as existing stockpiles already contain a mixture of different topsoil types. Also stockpiling different topsoil types will not make any difference to the final land use as 95% of rehabilitation is to a Woodland Ecological Community land use regardless of the soil type. However, Whitehaven Coal will preferentially use the more productive soils on areas that are to be rehabilitated to higher land capabilities (Class III).	COMPLETE Life of Mine MOP approved as Rehabilitation Management Plan 2nd May 2012 includes requirement for thicker soils to be rehabilitated in areas of higher land capability.
Section 4.2.4.1	It is recommended that the gravel at the refuelling point be recontoured to improve the capture and filtering of hydrocarbon spills and dirty water into the oil/water separators and containment areas.	Whitehaven Coal will regrade the Workshop Fuel Farm Fill Point with additional gravel by December 2011.	COMPLETE Re-contouring of Fuel Farm Fill Point completed 17th November 2011.

ENVIRONMENTAL PROTECTION LICENCE NON COMPLIANCES – Total Number 6

Condition	Clause	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
L1.1	Must comply with s120 POEO Act in relation to pollution of waters except as otherwise provided for in the EPL.	The results of water monitoring should be closely monitored and operations adjusted as required to reduce impacts.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Site Water Management Plan outlining the measures to be implemented to ensure discharge water quality remains within compliance criteria.	COMPLETE Draft Site Water Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
L3.1	Must not exceed concentrations of discharged pollutants at monitoring/discharge points specified in Tables of EPL.	The results of water monitoring should be closely monitored and operations adjusted as required to reduce impacts.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Site Water Management Plan outlining the measures to be implemented to ensure discharge water quality remains within compliance criteria.	COMPLETE Draft Site Water Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
L3.2	Specified percentage of pH samples must be within the specified ranges in Table of EPL.	The results of water monitoring should be closely monitored and operations adjusted as required to reduce impacts.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Site Water Management Plan outlining the measures to be implemented to ensure discharge water quality remains within compliance criteria.	COMPLETE Draft Site Water Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
L3.4	Total Suspended Solids concentration limits specified for Points 10, 12 and 14 may be exceeded for water discharged from sediment basins provided that: Discharge occurs solely as a result of rainfall measured at the premises exceeding 39.2mm over five consecutive days prior to discharge. All practical measures implemented to dewater sediment dams within 5 days of this rainfall so that they have sufficient capacity to store run off from a 39.2mm, 5 day rainfall event.	The results of water monitoring should be closely monitored and operations adjusted as required to reduce impacts.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Site Water Management Plan outlining the measures to be implemented to ensure discharge water quality remains within compliance criteria.	COMPLETE Draft Site Water Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
L6.1	Noise from premises not exceed: An LA1(1minute) noise emission criterion of 45 dB(A) at night. At all other times (including the night), an L_{Aeq}(15minute) noise emission criterion of 35 dB(A), except as expressly provided by this licence.	The results of noise monitoring should be closely monitored and operations adjusted as required to reduce impacts.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Noise Management Plan outlining the measures to be implemented to ensure that noise levels are within the compliance criteria.	COMPLETE Draft Noise Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.

Werris Creek Coal (WCC) Independent Environmental Audit Action Plan v1 2011

Condition	Clause	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
M2.1	For each monitoring/discharge point or utilisation area on Page 19 EPL, must monitor concentration of each pollutant specified, in manner specified.	None.	Whitehaven Coal is committed to ensuring that all monitoring is conducted at the required frequency as specified in the relevant management plans required by Project Approval 10_0059.	COMPLETE Draft Environmental Management Strategy submitted to DP&I in accordance with PA 10_0059 on 30th April 2012 includes summary of WCC environmental monitoring programs discussed in other management plans.

ABORIGINAL AND CULTURAL HERITAGE MANAGEMENT PLAN NON COMPLIANCE – Total Number 1

Condition	Clause	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 3.4	Poster identifying the types of cultural heritage material that may be located on the site during mining operations as well as basic actions / responses has been prepared by WCC's consultant archaeologist. Copies are exhibited within employee lunch rooms.	It is recommended that posters identifying the types of cultural heritage material that may be located on the site during mining operations as well as basic actions/responses or similar be displayed in staff lunchrooms.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Aboriginal Cultural Heritage Management Plan outlining the measures to be implemented to educate WCC employees and contractors on cultural heritage.	Heritage Management Plan currently being prepared and due for submission in June 2012.

ABORIGINAL AND CULTURAL HERITAGE MANAGEMENT PLAN RECOMMENDATION (Does not include Non Compliance Recommendations) – Total Number 1

Condition	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 2.5	It is recommended that WCC follow up on this request from the Taylor family regarding the Wollemi Pines.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Aboriginal Cultural Heritage Management Plan in consultation with indigenous stakeholders including any reasonable requirements associated with the relocation of the "Narrawolga" Axe Grinding Grooves.	Heritage Management Plan currently being prepared and due for submission in June 2012.

BUSHFIRE MANAGEMENT PLAN NON COMPLIANCE – Total Number 1

Condition	Clause	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 2.5	This Plan will be reviewed annually with any substantial amendments to procedures agreed with the Rural Fire Service and Liverpool Plains Shire Council prior to implementation.	It is recommended that the Plan be reviewed sometime in the near future.	Whitehaven Coal will comply with the Bushfire Management requirements outlined in Project Approval 10_0059 when approved.	Bushfire Management Plan not required by PA10_0059 however update to existing document planned for 2012.

AIR QUALITY MONITORING PROGRAM NON COMPLIANCE – Total Number 1

Condition	Clause	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 2.0	Will determine compliance with limitations set out in Conditions of Consent, DA-172-7-2004 and maintain monitoring requirements of the EPL-12290.	None.	Whitehaven Coal is committed to ensuring that all monitoring is conducted at the required frequency as specified in the Air Quality & Greenhouse Gas Management Plan required by Project Approval 10_0059 when approved.	COMPLETE Draft Air Quality and Greenhouse Gas Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.

Werris Creek Coal (WCC) Independent Environmental Audit Action Plan v1 2011

SITE WATER MANAGEMENT PLAN NON COMPLIANCES – Total Number 3

Condition	Clause	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 7.2.2	All monitoring results are compared to baseline monitoring data which was obtained at the commencement of operations. Groundwater levels will be assessed to the nearest 0.01m and all monitoring locations surveyed to AHD so relative levels can be determined.	None.	Whitehaven Coal is committed to ensuring that all monitoring is conducted at the required frequency as specified in the Site Water Management Plan required by Project Approval 10_0059 when approved.	COMPLETE Draft Site Water Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
Section 7.2.2	Table 13 SWMP identifies the monitoring point locations, frequency and the parameters of monitoring. Table 14 SWMP describes the unit of measure and sampling method for each parameter listed.	None.	Whitehaven Coal is committed to ensuring that all monitoring is conducted at the required frequency as specified in the Site Water Management Plan required by Project Approval 10_0059 when approved.	COMPLETE Draft Site Water Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.
Section 9.0	The Environmental Officer at Werris Creek Coal Mine is responsible for the implementation of this SWMP. When the Environmental Officer is absent, WCC would nominate alternative personnel.	None.	Whitehaven Coal is committed to ensuring that all monitoring is conducted at the required frequency as specified in the Site Water Management Plan required by Project Approval 10_0059 when approved.	COMPLETE Draft Site Water Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.

SITE WATER MANAGEMENT PLAN RECOMMENDATION (Does not include Non Compliance Recommendations) – Total Number 1

Condition	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 6.3	References are made to baseline data being collected, and to trigger values being established, however the baseline data is not clearly compared against new monitoring data. It is recommended that this comparison to baseline data is clarified.	In accordance with the timeframe outlined in Project Approval 10_0059, Whitehaven Coal will prepare a Site Water Management Plan outlining the baseline data and established trigger values to be used for comparison with new monitoring data.	COMPLETE Draft Site Water Management Plan submitted to DP&I in accordance with PA 10_0059 on 30th April 2012.

WASTE MANAGEMENT PLAN NON COMPLIANCE – Total Number 1

Condition	Clause	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 6.0	Waste management data has been documented and is reported in each Annual Environmental Management Report (AEMR). The information includes the quantities and type of waste removed off site for recycling or disposal, the contractor engaged to remove the wastes, and the final destination for all waste products. Details will also be provided on the success of the WMP implemented and any areas that require improvements, included and highlighted.	It is recommended that a waste register be maintained recording types and quantities of wastes, and the final destinations for those wastes after being removed offsite by contractors.	Whitehaven Coal will comply with the Waste Management requirements outlined in Project Approval 10_0059 when approved; including waste registers by March 2012.	COMPLETE Waste types, quantities and destinations tracked in End Of Month Environmental Report by February 2012.

WASTE MANAGEMENT PLAN RECOMMENDATION (Does not include Non Compliance Recommendations) – Total Number 2

Condition	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 5.3 & 5.5	It is recommended that a waste register be maintained recording types and quantities of wastes, and the final destinations for those wastes after being removed offsite by contractors.	Whitehaven Coal will comply with the Waste Management requirements outlined in Project Approval 10_0059 when approved; including waste registers by March 2012.	COMPLETE Waste types, quantities and destinations tracked in End Of Month Environmental Report by February 2012.
Section 5.1	It is recommended that clearer written instructions be erected onsite to provide guidance on how wastes are separated and recycled.	Whitehaven Coal will comply with the Waste Management requirements outlined in Project Approval 10_0059 when approved; including signage by March 2012.	COMPLETE Waste types, quantities and destinations tracked in End Of Month Environmental Report by February 2012.

Werris Creek Coal (WCC) Independent Environmental Audit Action Plan v1 2011

LANDSCAPE MANAGEMENT PLAN RECOMMENDATION (Does not include Non Compliance Recommendations) – Total Number 1

Condition	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 5.1.3	It is recommended that the soil stockpile inventory be revised and updated to better reflect the location of different soil types as there are two very different topsoil types/qualities stripped at the site.	Whitehaven Coal already maintains a soil register identifying topsoil and subsoil stockpiles. There is no additional benefit to separating different types of topsoil as existing stockpiles already contain a mixture of different topsoil types. Also stockpiling different topsoil types will not make any difference to the final land use as 95% of rehabilitation is to a Woodland Ecological Community land use regardless of the soil type. However, Whitehaven Coal will preferentially use the more productive soils on areas that are to be rehabilitated to higher land capabilities (Class III).	COMPLETE Life of Mine MOP approved as Rehabilitation Management Plan 2nd May 2012 includes requirement for thicker soils to be rehabilitated in areas of higher land capability.

NOISE MANAGEMENT PROTOCOL AND PROGRAM RECOMMENDATION (Does not include Non Compliance Recommendations) – Total Number 1

Condition	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Pages 12 to 14	It is recommended that in future, the Spectrum Acoustics reports contain an introductory section clearly outlining the methodology, criteria and equipment employed as part of this monitoring at WCC.	Whitehaven Coal will engage Spectrum Acoustics to amend the Monthly Attended Noise Monitoring Report by November 2011.	COMPLETE Monitoring Attended Noise Monitoring Report amended with additional detail on monitoring methodology, criteria and equipment by October 2011.

BIODIVERSITY OFFSET MANAGEMENT PLAN NON COMPLIANCE – Total Number 3

Condition	Clause	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
4.14	Feral Cats will be controlled opportunistically when observed (i.e. Shooting by person with firearms licence using high powered calibre rifle as humanely as possible e.g. single shot to head).	It is recommended that triggers and targets for feral cat control be established within the BOMP that are related to a management outcome.	Update in the revised BOMP as per the due date in the WCC Life Of Mine Project Approval 10_ 0059	Biodiversity Offset Management Plan currently being prepared and due for submission in June 2012.
4.14	Fox control through baiting program across BOA twice/year (autumn and spring). Use 1080 poison baits.	It is recommended that triggers and targets for fox control be established within the BOMP that are related to a management outcome.	Update in the revised BOMP as per the due date in the WCC Life Of Mine Project Approval 10_ 0059	Biodiversity Offset Management Plan currently being prepared and due for submission in June 2012.
5, Table 11	Rabbit control undertaken annually in summer.	It is recommended that triggers and targets for rabbit control be established within the BOMP that are related to a management outcome (e.g. successful regeneration of natives within offset area). It is recommended that the conflict between this section and section 4.13.1 be resolved.	Update in the revised BOMP as per the due date in the WCC Life Of Mine Project Approval 10_ 0059	Biodiversity Offset Management Plan currently being prepared and due for submission in June 2012.

BIODIVERSITY OFFSET MANAGEMENT PLAN RECOMMENDATION (Does not include Non Compliance Recommendations) – Total Number 7

Condition	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
General	It is recommended that the BOMP be revised to consolidate discussion of management actions into one section only. Currently the BOMP contains three sections with management actions (Section 3: Management Strategies, Section 4: Management Actions, and Section 5: Management Strategy). Management actions should be listed in one section and not included in other sections of the document. This would ensure internal consistency within the document and improve the ability of WCC to comply with requirements of the BOMP.	Update in the revised BOMP as per the due date in the WCC Life Of Mine Project Approval 10_ 0059	Biodiversity Offset Management Plan currently being prepared and due for submission in June 2012.

Werris Creek Coal (WCC) Independent Environmental Audit Action Plan v1 2011

Condition	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
General	A flora species of significance was noted to be adjacent to the biodiversity offset area (and possibly within the offset area) and is not mentioned in the BOMP (despite being pictured on the front cover). Tiger Orchid (Cymbidium canaliculatum) is part of an Endangered Population (listed under the Threatened Species Conservation Act 1999) in the Hunter Valley catchment. Although the population and species is not listed in the Namoi catchment, the presence of the species close to the offset area should be mentioned in the report.	Update in the revised BOMP as per the due date in the WCC Life Of Mine Project Approval 10_ 0059	Biodiversity Offset Management Plan currently being prepared and due for submission in June 2012.
Sections 3.2.1, 3.2.2, 3.2.3 and 3.2.4	It is recommended that this section (relating to management zones for weed control) be rewritten to consolidate and improve the clarity of the information. For example, Section 3.2 currently describes various management zones with specific weed control measures and targeted weed species for each zone. However in Table 11 of Section 5.1 the management actions and comments are the same for each zone. The audit revealed that some weeds are being targeted in the weed control program, but not others. The auditors were satisfied that the weed control program being implemented is satisfactorily targeting the highest risk weed species. It is therefore recommended that the wording of the BOMP be revised to require weed management control of noxious weeds or priority weeds of concern on the site using the most appropriate and cost-effective methods.	Update in the revised BOMP as per the due date in the WCC Life Of Mine Project Approval 10_ 0059	Biodiversity Offset Management Plan currently being prepared and due for submission in June 2012.
Section 3.2.7	It is recommended that the BOMP be revised to clarify the requirement for future dam management, which is currently ambiguous. The requirement for filling in dams for the stated goal of macropod control may not be appropriate as there is no evidence that Eastern Grey Kangaroo numbers can be controlled by dam closure (Olsen and Low, 2006). The management action makes the assumption that macropods are overabundant and that removing dams will reduce macropod density. In order to justify these management actions, macropod grazing pressure data would need to be collected as part of a monitoring program in order to determine whether macropod densities are likely to be unsustainable in the grassy woodland community. Evidence of dam usage by animals should be monitored and analysed before actions to remove the dams are implemented.	Update in the revised BOMP as per the due date in the WCC Life Of Mine Project Approval 10_ 0059	Biodiversity Offset Management Plan currently being prepared and due for submission in June 2012.

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Condition	AECOM Audit Team Recommendation	Whitehaven Response and Due Date	Status
Section 4.13.1,Section 4.14 and Section 5.1 Table 11	It was identified that rabbit and fox control programs were required; however no feral animal control programs have been implemented as yet. Rabbits are known to occur on the site (BOA Monitoring Report Spring 2010). This Section 4.13.1 requirement relating to rabbits also appears to conflict with the requirements in section 5, Table 11. There is a lack of definition regarding timing for control and the size of a rabbit population that requires control that allows compliance to be recorded on this requirement. It is recommended that targets be established within the BOMP for each management action. For example, in Section 4.13 the current wording states that feral animal control is required after an increase in feral animal numbers. However, feral animal numbers are not monitored as part of the annual flora and fauna monitoring. Therefore data are not collected to identify that this requirement has been triggered. A suggestion to improve measurability is to add targets and triggers which relate to specific management outcomes to the BOMP. During the site inspection, evidence of rabbits was noted but there was no clear evidence of environmental damage or degradation as a result of the presence of the rabbits.	Update in the revised BOMP as per the due date in the WCC Life Of Mine Project Approval 10_ 0059	Biodiversity Offset Management Plan currently being prepared and due for submission in June 2012.
Section 8.4	Section 3.5.2 of the AEMR 2010-2011 contains a summary of the progress that was made under the BOMP during its first year of implementation. However, in future it would be best to make it clearer that this section contains the concluding remarks in relation to the BOMP's annual performance.	The AEMR 2011-2012 will be amended to include a dedicated summary section in the document.	COMPLETE The AEMR 2011-2012 contains dedicated annual summary of BOMP implementation actions taken.
Section 9.1	It is recommended that at the next appropriate opportunity, this section be reworded to state that the BOMP would be updated and submitted at a "minimum" of every three years for approval (rather than at a maximum of every three years as it currently states). This is required to align with the consent requirement (Schedule 4, Condition 41) which requires the BOMP to be amended as required after annual review to the satisfaction of the Director-General.	Update in the revised BOMP as per the due date in the WCC Life Of Mine Project Approval 10_ 0059	Biodiversity Offset Management Plan currently being prepared and due for submission in June 2012.

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