WERRIS CREEK COAL

ANNUAL ENVIRONMENTAL MANAGEMENT REPORT

2010-2011

Name of Mine:	WERRIS CREEK No. 2 COAL MINE
Mining Titles/Leases (Leaseholder):	Mining Lease 1563 (Creek Resources Pty Ltd & Betalpha Pty Ltd) Exploration Lease 5993 (Creek Resources Pty Ltd & Betalpha Pty Ltd) Exploration Lease 7422 (Werris Creek Coal Pty Limited)
MOP Commencement Date: MOP Completion Date:	01 October 2009 31 December 2012
AEMR Commencement Date: AEMR Completion Date:	01 April 2010 31 March 2011
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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2(a)	Environment Protection Licence 12290
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Appendix 3	Air Quality Monitoring Results
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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 (Mining Act 1992) Condition 2 and the Development Consent (DA 172-7-2004) Condition 5 (Schedule 6) for the Werris Creek No. 2 Coal Mine.

This AEMR has been prepared in accordance with Industry and Investment NSW (formerly Department of Primary Industries – Mineral Resources) Director-General's guidelines titled "Environmental Management Guidelines for Industry – Guidelines to the Mining, Rehabilitation and Environmental Management Process", Version 3 dated January 2006.

This report provides a detailed review of WCC's environmental management over the annual reporting period 1st April 2010 to 31st March 2011 including performance and forecasts relating to:

- The current Mining Operations Plan (MOP);
- Development Consent DA 172-7-2004 MOD5 conditions and commitments;
- Environmental Protection Licence (EPL) 12290;
- Any other requirements of the Industry and Investment NSW (I&I NSW); Department of Environment, Climate Change and Water (DECCW) including NSW Office Of Water (NOW), Liverpool Plains Shire Council (LPSC) and Department of Planning (DoP) 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 Industry and Investment NSW:

Mr Michael Lloyd
Regional Environmental Officer
Industry and Investment NSW
PO Box 344
HUNTER REGION MAIL CENTRE NSW 2310

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

Senior Planner Att: **Mr Colin Phillips**
Mining and Extractive Industries
Department of Planning
GPO Box 39
SYDNEY NSW 2001

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: **Christie Jackson**
PO Box 550
TAMWORTH NSW 2340

Werris Creek Coal Mine **Att:** **Mr Ron Short**
Community Consultative Committee Chairman

1 INTRODUCTION

This Annual Environmental Management Report (AEMR) is the sixth 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 2011.

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 679 ha area covered by Mining Lease 1563 (ML 1563).

The current Mining Operations Plan (MOP) covers a 3 year period from the 1st October 2009 to 31st December 2012.

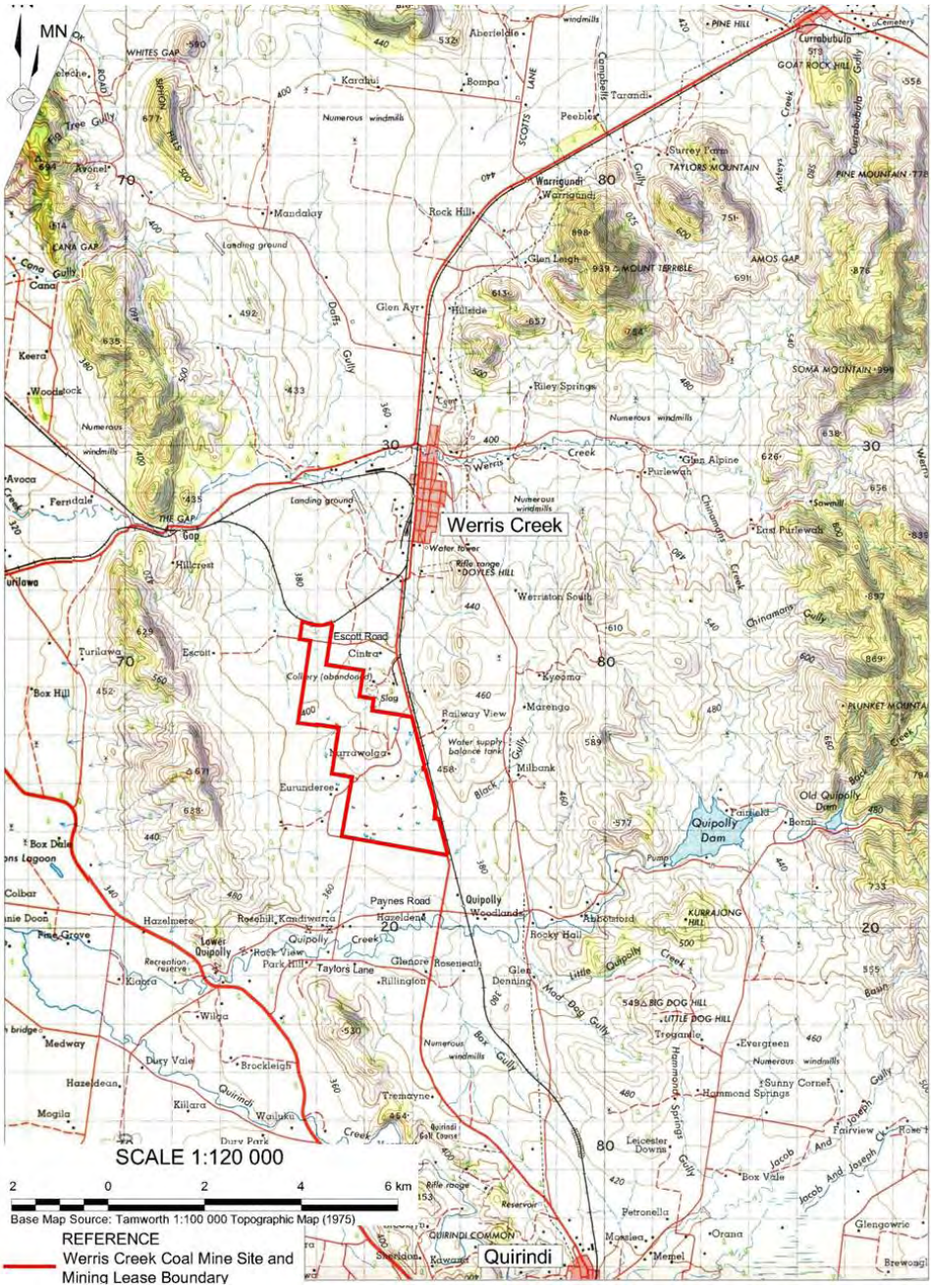


Figure 1.1 WCC Mine Site and Locality

1.1 CONSENT, LEASES AND LICENCES

All applicable consents, leases and licences held by WCC for the 2010-2011 period are identified in **Table 1.1**. A full copy of DA 172-7-2004 MOD5 is appended in **Appendix 1**, EPL 12290 in **Appendix 2(a)** and ML 1563 in **Appendix 2(b)**.

Table 1.1 Consents, Leases and Licences

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Department of Infrastructure and Planning 1	Development Consent (DA 172-7-2004)	18 February 2005	7 April 2020	Expiry is 15 years after the commencement of the consent (April 2005).
	Modification MOD1	19 October 2005	7 April 2020	Approval granted to allow until 31 January 2006 for the construction of the mine access road.
	Modification MOD2	6 March 2007	7 April 2020	Approval was granted for alternative management of the Aboriginal heritage 'Narrawolga Site', as well as, mining an additional 280,000 tonnes of coal and moving about 1.34 million bank cubic metres of overburden.
Department of Planning	Modification MOD3	17 September 2008	7 April 2020	Approval was given to: construct a 35ML dam and make other changes to the water management system; increase to the amount of coal despatched by road to 50,000tpa; and increase the capacity of the coal stockpile at the rail load-out facility to 100,000 tonnes and its height to 15m.
	Modification MOD4	15 April 2008	7 April 2020	Approval was given to: construct a precursor storage facility (prill and emulsion); and modify the biodiversity offset strategy for the mine.
	Modification MOD5	6 October 2009	7 April 2020	Approval was given to: modify the open cut and overburden emplacement layout; progressively construct up to four water storage dams for dewatered groundwater; and modify the biodiversity offset strategy for the mine.
Department of Mineral Resources [2]	EL 5993	18 September 2002	17 September 2013	Renewed 10 April 2006 and 1 May 2009
	ML 1563	23 March 2005	23 March 2026	Mining Lease granted for 21 years.
	Mining Operations Plan		31 December 2012	First MOP approved 7 April 2005 MOP Amendment 28 November 2006 MOP Amendment 20 July 2007 MOP Amendment 4 April 2008 New MOP approved 21 August 2008 MOP Amendment 21 November 2008 MOP Amendment 9 November 2009
Department of Primary Industries [2]	EL 7422	26 November 2009	25 November 2011	

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Environment Protection Authority [3]	Environment Protection Licence No. 12290	18 April 2005	Anniversary date: 01 April Review Date: 14 April 2013	
	Radiation Licence RL41800		8 February 2013	
Department of Infrastructure, Planning and Natural Resources [4]	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		5 June 2011	2 x 60000L Above Ground Diesel Tanks
Liverpool Plains Shire Council	On-Site Sewerage Management Systems 04/06 05/06	 1 March 2006 1 March 2006		

[1] Now known as Minister for Planning; [2] Now known as Industry and Investment NSW – Mineral Resources (I&I NSW – MR); [3] Now known as Department of Environment, Climate Change and Water (DECCW); [4] Now known as Department of Environment, Climate Change and Water – NSW Office of Water (DECCW (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 2010-2011

Date	Title	Details
16th June 2010	EPL 12290	Amendment of coal processing and drilling hours until 4am. Change noise monitoring period to 15 minutes. Procedure developed for implementing continuous noise monitoring system.
16th August 2010	Energy Savings Action Plan	Approval of Energy Savings Action Plan.
26th August 2010	Blast Monitoring Program	Approval of revised Blast Monitoring Program.
29th November 2010	Noise Monitoring Program	Approval of revised Noise Monitoring Program.
14th December 2010	Biodiversity Offset Strategy and Management Plan	Approval of Biodiversity Offset Strategy and Management Plan.
23rd December 2010	EPL 12290	Amendment of Noise Monitoring Program and Blast Monitoring Program; remove standing water level requirement for MW3; relocation of weather station to RL445m and amend discharge sampling to monitor only the receiving catchment.

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 Casper Dieben	WHC General Manager	02 6742 4337	27/11/2007 – Present
Mr Brian Cullen	WHC General Manager	02 6742 4337	11/1/2008 – Present
Mr Michael Post	WCC Project Manager	02 6763 6001	01/01/2009 – Present
Mr Danny Young	WHC Environmental Group Manager	02 6742 4337	11/1/2008 – Present
Mr Des George	WCC Manager Mining Engineering	02 6763 6001	01/04/2008 – 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;
- R.W. Corkery & Associates Pty Ltd;
- Kelley Covey Group Pty Ltd;
- Horizon Surveying Pty Ltd;
- AECOM Pty Ltd;
- Department of Lands - Soil Services; and
- Spectrum Acoustics.

1.3 ANNUAL AEMR REVIEW & INSPECTION

The Annual Environmental Inspection was held at WCC on 14th July 2010 to review compliance with environmental requirements of relevant approval instruments including the Mining Lease, MOP and the AEMR. During the inspection, Michael Lloyd (I&I NSW) reported that there was general compliance with the relevant statutory approval instruments administered by I&I NSW. The inspection also noted that the rehabilitation was progressing according to the rehabilitation plan.

There were no actions raised from either the site inspection or review of the AEMR.

2 OPERATIONS DURING THE REPORTING PERIOD

Extent of operations at the WCC mine is presented in **Figure 2.1** for the beginning of the 2010-2011 period.

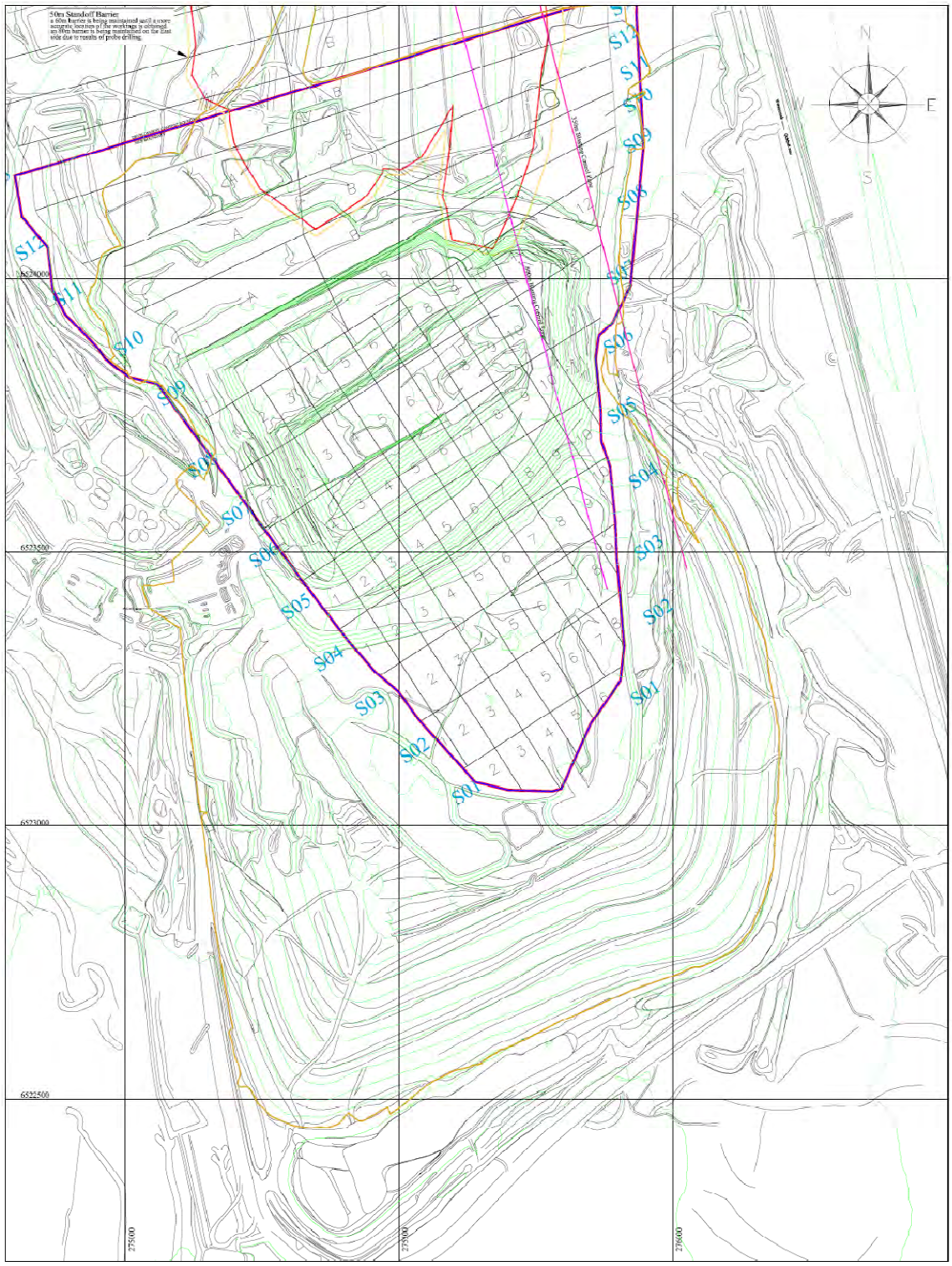


Figure 2.1 Werris Creek Coal Mining Operations as at end of March 2010

Extent of operations at the WCC mine is presented in **Figure 2.2** for the end of the 2010-2011 period.

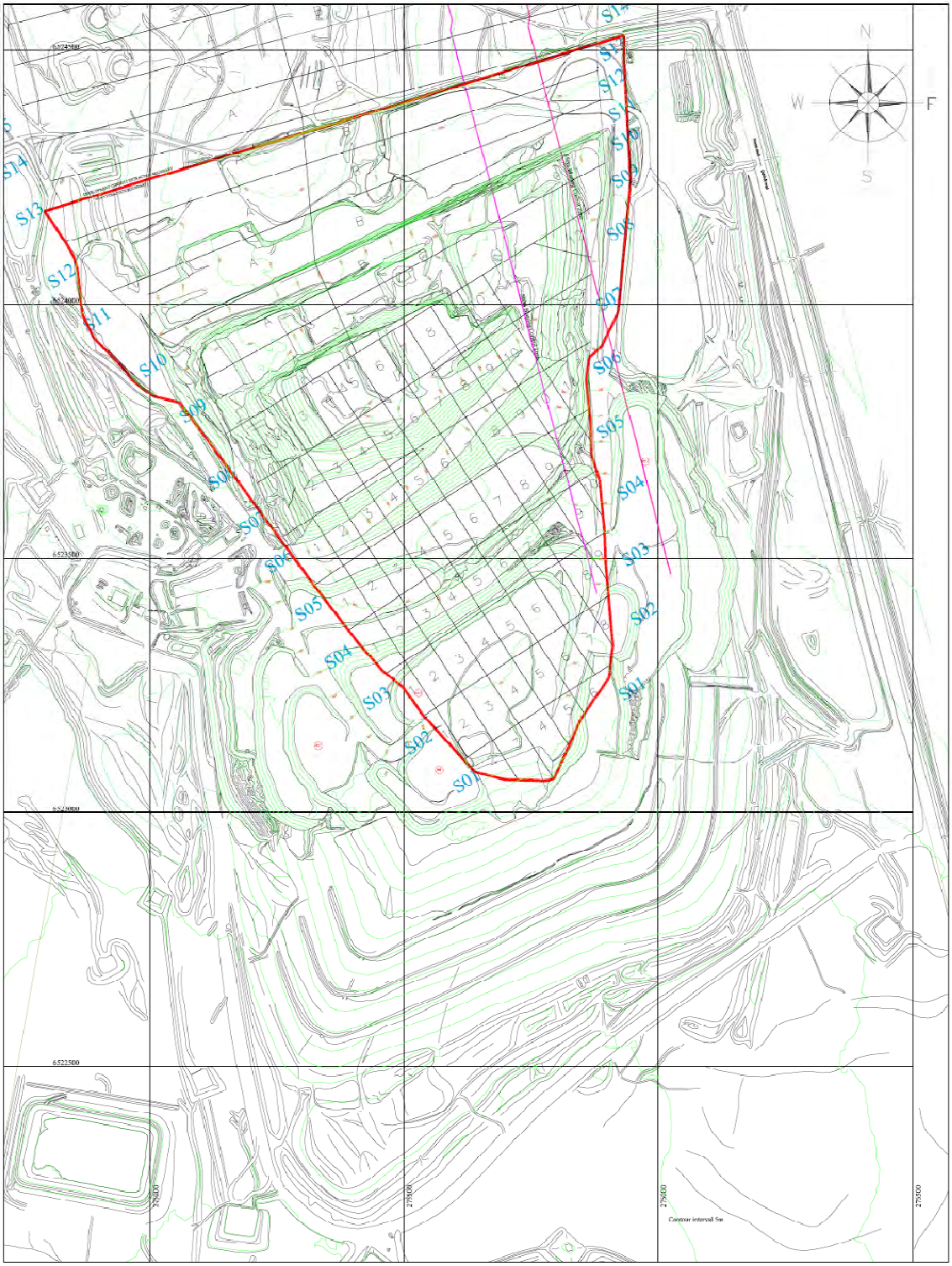


Figure 2.2 Werris Creek Coal Mining Operations as at March 2011

2.1 EXPLORATION

2.1.1 Drilling Program

Thirty-seven open holes and four cored holes, plus redrills, were drilled during the reporting period. Five open holes were drilled in the pit using a blast hole drill. Total meterage was 4,661.46m. All boreholes were geologically and geophysically logged. Coal cores were sampled and analysed in increments of ~0.5m to distinguish low and high ash horizons and to facilitate selective mining where possible.

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, 2009) identified the coal resource as a 'Measured' or 'Indicated' resource with less than 8% of the coal remaining 'Inferred' at WCC. Coxhead (2009) reports the coal resource as 38 million tonnes (**Table 2.1**).

Table 2.1 Werris Creek Coal Resource Summary

Category	ML 1563	EL5967	EL7422
Measured	22.11Mt	7.34Mt	0.51Mt
Indicated	3.62Mt	1.17Mt	-
Inferred	1.57Mt	1.07Mt	0.04Mt
TOTAL	**27.30Mt**	**9.58Mt**	**0.55Mt**

The most recent reserve statement was compiled in June 2010 (Minarco-Mineconsult, 2010) identifying a proved and probable reserve of 22.06 million tonnes within ML 1563 at 13% moisture (**Table 2.2**). This reserve excludes the coal removed by the former Werris Creek Colliery.

Table 2.2 Werris Creek Coal Reserve Summary

Category	ML 1563
Proved Reserves	18.82Mt
Probable Reserves	3.24Mt
Proved + Probable	**22.06Mt**

2.2 LAND PREPARATION

Land preparation activities undertaken at the Werris Creek Coal Mine during the reporting period were conducted in accordance with the MOP for:

- Additional surface disturbance increased 26.0ha for 2010-2011. Vegetation removal in advance of the active pit over was 6.4ha. All clearing works were undertaken following a pre-start clearing check;

- 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 was revised down to 1,104,980m^3.

Figure 2.3 shows the locations of the soil stockpile areas as of March 2011.

2.3 CONSTRUCTION

During the period, the only construction activity was the northern 200ML Dam cell (also referred to as the Underground Water Storage Dam in Statement of Environmental Effects 2009). As part of DA 172-7-2004 MOD5 approval, surface storage of 400ML was required for dewatering the former underground colliery workings in advance of mining into the southern section of the workings. The northern 200ML Dam was constructed through the "turkey nest" method using four scrappers, two rollers and a water cart completed in May 2010. The dam footprint was 300m by 150m and was constructed to a permeability standard of $1x10^{-9}$m/s.

Planned construction activities for the next period include the southern 200ML Dam cell and the Orica explosives reload facility.

2.4 MINING

During the 2010-2011 period, a total of 10,341,738bcm of overburden was removed to produce 1,323,205t of ROM coal at an average overburden to coal stripping ratio of 7.8:1 (**Table 2.3**). The estimated waste rock movement in the MOP has been exceeded due to additional rehandling of overburden material in the mining process.

During 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. A total of 25,980m^3 of additional soil was stripped with WCC reaching it maximum disturbed area during the period. The estimated soil to be stripped in the MOP will not be achieved due to thinner skeletal soil on the ridge top at WCC not yielding the same volume original estimated. An additional 15,040m^3 of soil was respread on rehabilitation areas.

Table 2.3 Cumulative Production and Waste Summary

	Start of Reporting Period 1 April 2010	At end of Reporting Period 31 March 2011	End of MOP Period (estimated) 31 December 2012
Soil Stripped (m^3)	1,147,010	1,172,990	1,341,500
Soil Used/Spread(m^3)	234,649	249,689	536,600
Waste Rock (bcm)	32,880,569	43,222,307	40,856,470
ROM coal (t)	5,324,638	6,647,843	9,834,000
Product coal (t)	5,324,638	6,647,843	9,834,000

2.5 PROCESSING

Processing, involving crushing and screening, is undertaken at an average rate of 500t/hr (maximum 650t/hr) 21 hours per day Monday to Friday and if required 15 hours on Saturdays.

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 details the current location and layout of the coal processing area beyond the western perimeter of the open cut mine and includes some additional area on the southern ROM pad boundary for operational and coal blending requirements.

Figure 2.4 presents a schematic of coal movements, outputs and yields for the reporting period and shows that a total of 1,542,333t coal was processed through the crusher. Domestic coal produced includes 49,987t trucked by road and 77,477t railed offsite. Total coal railed offsite (domestic and export) was 1,522,039t.

Figure 2.3 WCC Soil Register and Stockpile Locations

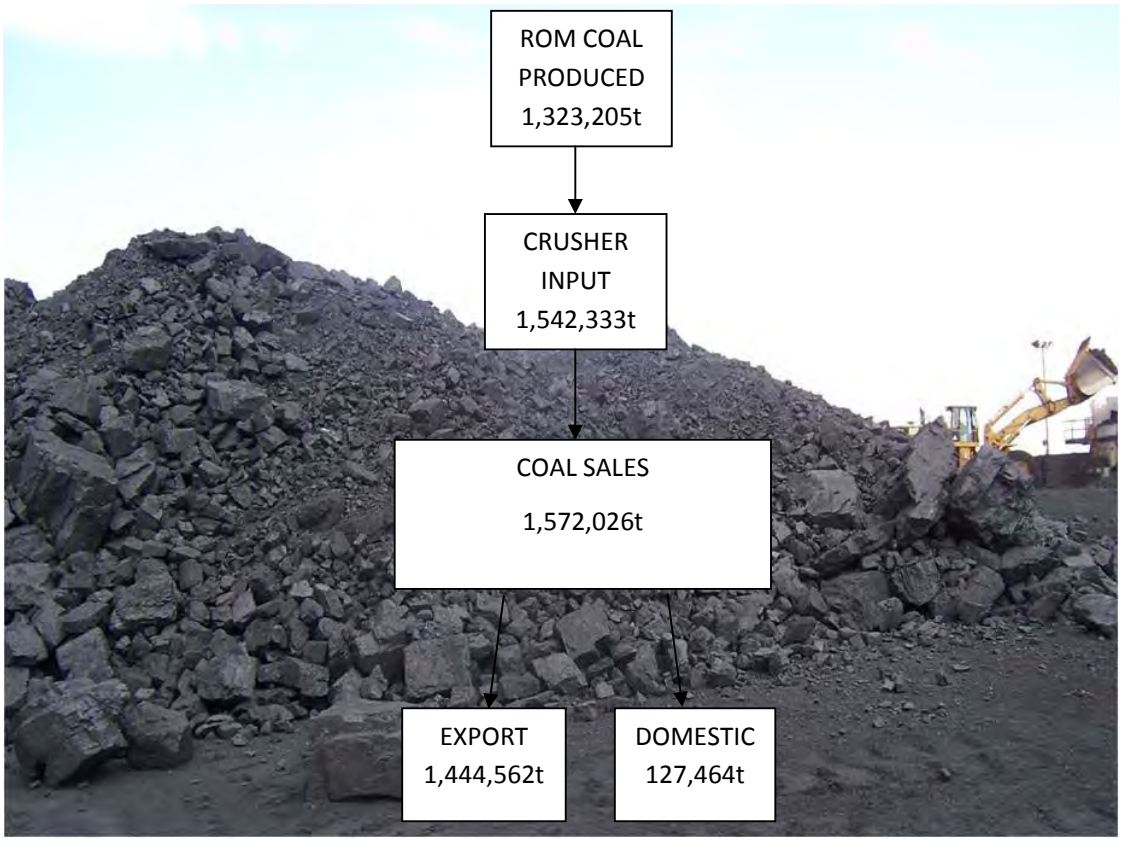


Figure 2.4 Coal Movements and Production Summary for 2010-2011 Period

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

2.6 WASTE MANAGEMENT

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.

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

General domestic-type wastes

- All non recyclable general wastes originating from the site office, amenities and ablutions buildings, together with routine maintenance consumables from the daily servicing of equipment are disposed of in mobile garbage bins. Bins are collected regularly and contents placed in large waste storage receptacles positioned adjacent to the workshop building. Rubbish is then removed by Cleanaway, the licensed waste collection contractor. Waste collection was undertaken on a fortnightly basis.

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

Oils and grease

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

Waste Batteries and Tyres

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

Sewage

- WCC has a biocycle sewage treatment system approved by Liverpool Plains Shire Council that is serviced by a licensed waste collection and disposal contractor as required.

Overburden and Interburden

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

Coal Processing Plant Residues

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

2.7 COAL STOCKPILES

The Product Coal/Rail Load Out Coal Stockpile is limited to 100,000t coal and the ROM Coal Stockpile is also limited to 100,000t ROM coal. At the end of the AEMR period 63,535t of coal was stored at the rail load-out facility and 10,595t of coal was stored at the ROM and crushed coal processing area.

2.8 WATER MANAGEMENT

2.8.1 Discharges

WCC maintain three licensed discharge points (LDP) 10, 12 and 14 in accordance with EPL 12290, which correspond to the 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 water quality is within the criteria specified in EPL 12290, however if a rainfall event greater than 39.2mm occurs in a 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 2011.

A summary of each discharge event is presented in **Table 2.4.** All discharge events were in compliance with both DA 172-7-2004 MOD 5 and EPL 12290, except for the discharge 16th November 2010 from SB2 which exceeded the upper pH limit by 0.09. Monitoring results taken at the time of the discharge did not indicate any impact to the water quality of Quipolly Creek. Discharge events with TSS >50mg/L occurred for SB9 on the 12th August, 11th November and 10th December 2010 and SB10 on the 28th July and 28th November 2010 due to five day rainfall event greater than 39.2mm. A wet weather discharge occurred from SB2 on 25th October 2010 however water quality was within criteria. Further discussion of water monitoring data is presented in **Section 3.3** and all surface water monitoring data has been included in **Appendix 4 (a).**

Table 2.4 WCC Discharge Event Summary

Date	Dam	pH	EC (µS/cm)	TSS (mg/L)	O&G (mg/L)	Type	5 Day Rain (mm)	Compliance
5/05/2010	SB9	7.98	173	46	<5	Controlled	N/A	Compliant
12/07/2010	SB9	8.02	290	13	<5	Wet Weather	45.8	Compliant
28/07/2010	SB2	8.33	393	17	<5	Wet Weather	55.8	Compliant
28/07/2010	SB9	7.64	268	22	<5	Wet Weather	55.8	Compliant
28/07/2010	SB10	7.92	199	132	<5	Wet Weather	55.8	Compliant
12/08/2010	SB2	7.52	389	6	<5	Wet Weather	40.4	Compliant
12/08/2010	SB9	7.63	121	73	<5	Wet Weather	40.4	Compliant
25/10/2010	SB2	8.27	417	16	<5	Wet Weather	28.0	Compliant
2/11/2010	SB2	8.34	427	20	<5	Controlled	N/A	Compliant
11/11/2010	SB9	7.38	164	160	<5	Wet Weather	40.2	Compliant
16/11/2010	SB2	**8.59**	397	11	<5	Wet Weather	41.6	NON COMPLIANT
16/11/2010	SB9	7.53	157	26	5	Wet Weather	41.6	Compliant
23/11/2010	SB9	7.57	149	31	<5	Controlled	N/A	Compliant
29/11/2010	SB2	8.36	444	22	<5	Controlled	N/A	Compliant
10/12/2010	SB2	8.05	406	25	<5	Wet Weather	52.5	Compliant
10/12/2010	SB9	7.25	95	137	<5	Wet Weather	52.5	Compliant
10/12/2010	SB10	7.22	179	314	<5	Wet Weather	52.5	Compliant
15/12/2010	SB2	7.95	242	7	<5	Controlled	N/A	Compliant
18/12/2010	SB9	7.36	131	31	<5	Controlled	N/A	Compliant
7/03/2011	SB2	7.95	333	18	<5	Controlled	N/A	Compliant
7/03/2011	SB9	7.81	148	15	<5	Controlled	N/A	Compliant
Criteria		**8.5**	**N/A**	**50**	**10**		**39.2**	

Bold Text – results outside criteria

2.8.2 Predicted Water Balance

An updated site water balance was prepared by GSS Environmental in compliance with Schedule 3, Condition 31 of DA-172-7-2004 and submitted to DoP as a component of the March 2009 Site Water Management Plan. The water balance summarises water management on site for dry, average and wet years segregated for each water stream. The results for the void water balance, dirty water balance and clean water balance are presented in **Tables 2.5**, **2.6** and **2.7** respectfully.

Table 2.5 Void Water Balance

		Avg Yr (ML)	Dry Yr (ML)	Wet Yr (ML)
Inputs	Rainfall Runoff	108.8	73.7	145.9
	Groundwater Inflow	52	52	52
	Total	161	126	198
Outputs	Evaporation	33	33	33
	Dust Suppression and Crushing/Screening Operations	128	93	117
	Total	161 *	126 *	150
	Excess (+ve) or Deficit (-ve)	0	0	+48
* Dust Suppression and Crushing/Screening Operations requirements for a Dry Year total 143 ML and for a Average Year total 130ML, however only 93 ML in a Dry year and 128ML in an Average year is taken from the Void water system as this is all that is available, and the remaining requirements are sourced from other sources.				

The void water balance shows that for dry and average years, 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 (48 ML) that would need to be stored on-site. WCC has a combined void water storage capacity of 255 ML, (VWD1 – 20ML, VWD2 – 35ML and VWD3 – 200ML) this provides for 207ML of additional storage capacity to be retained for precautionary measures excluding water stored from the former underground workings. If void water exceeds the capacity of the mine to use for dust suppression or storage within the void water dams; it will be stored within the two 200ML Dams or allowed to accumulate in the void. Whilst this may disrupt mining operations, it will prevent the off-site discharge of void water.

Table 2.6 Dirty Water Balance

		Avg Yr (ML)	Dry Yr (ML)	Wet Yr (ML)
Inputs	Rainfall Runoff	364.1	249.6	487.6
	Total	364	250	488
Outputs	Evaporation	48	48	48
	Dust Suppression and Crushing/Screening Operations	2 *	50 *	0 *
	Total	50	98	48
	Excess (+ve) or Deficit (-ve)	+314	+151	+439
* 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 dirty water will be treated within the sediment basin dams and discharged from the LDPs of EPL 12290.

Table 2.7 Clean Water Balance

		Avg Yr (ML)	Dry Yr (ML)	Wet Yr (ML)
Inputs	Rainfall Runoff	656	445	881
	Total	656	445	881
Outputs	Evaporation	33	33	33
	Dust Suppression and Crushing/Screening Operations	0 *	0 *	0 *
	Total	33	33	33
	Excess (+ve) or Deficit (-ve)	+624	+412	+848
* The Dust Suppression and Crushing/Screening Operations requirements are sourced from the Void and Dirty water system. A maximum of 47.53 ML can be sourced from the Clean water, in accordance with the calculated Maximum Harvestable Right.				

The clean water balance shows that for dry, average and wet years there is an excess of clean water. This water will be discharged off-site. As water within the clean water catchment does not interact with disturbed surfaces of the mining operation, there is no requirement to further capture and/or treat this water prior to it discharging off site.

2.8.3 Stored Water

Table 2.8 presents an estimate of the volume of stored water at the beginning and end of the 2010-2011 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)	9.5	13.95	13.95
Dirty Water (in Sediment Basins)	32.1	52.4	75.05
Void Water (in Void Water Dams)	41.0	155.0	255.0

Table 2.9 Detail on Individual Dams Water Storage

Label	Function	Capacity (ML)	Source of Capacity	Storage @ 31/03/2011 (ML)
Clean Water Storage Dams				
SD4	Clean water capture and use Diversion of Clean water around mine	5.05	Surveyed	4.5
SD5	Clean water capture and use Diversion of Clean water around mine	4.0	Surveyed	3.0
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**		**11.5**
Dirty Water Ancillary Dams				
Farm 2	Ancillary to Dirty Water System	0.4	Estimated	0.4
Farm 3	Ancillary to Dirty Water System	0.4	Estimated	0.4
Farm 4	Ancillary to Dirty Water System	4.2	Estimated	4.2
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**		**15.4**

Label	Function	Capacity (ML)	Source of Capacity	Storage @ 31/03/2011 (ML)
Dirty Water Sediment Basins				
SB10	Northern Area – Dirty water capture, treatment and use EPL discharge point (NO. 14)	2.85	Surveyed	2.5
SB8	Middle Area – Dirty water capture, treatment and use	3.0	Estimated	3.0
SB9	Middle Area – Dirty water capture, treatment and use EPL discharge point (NO. 12)	4.0	Estimated	3.5
SB1	Southern Area – Dirty water capture, treatment and use	7.0	Estimated	7.0
SB2	Southern area – Dirty water capture, treatment and use EPL discharge point (NO. 10)	8.5	Surveyed	8.0
SB3	Southern Area – Dirty water capture, treatment and use	6.5	Estimated	6.0
SB4	Southern Area – Dirty water capture, treatment and use	2. 5	Estimated	2.0
SB5	Southern Area – Dirty water capture, treatment and use	1.4	Estimated	1.0
SB6	Southern Area – Dirty water capture, treatment and use	4.5	Estimated	4.0
SB7	Southern Area – Dirty water capture, treatment and use	2.5	Estimated	0
Total Capacity of All Dirty Water Dams		**58.9**		**37.0**
Void Water Dams				
VWD1	Southern Area – Void water storage	20.0	Surveyed	20.0
VWD2	Middle Area – Void water storage.	35.0	Surveyed	35.0
VWD3	2000ML Dam North – Underground Water Storage.	200.0	Surveyed	100.0
Total Capacity of Void Water Dams		**255.0**		**155.0**

The changes to the water management system during the period included the removal of SD2, SD3 and SD3A clean water dams and the construction of VWD3 (200ML Dam North). The clean water dams were removed due to the eastern extension of the mine and relocation of soil stockpiles requiring modification of the eastern clean water diversion system. The 200ML Dam North was constructed to hold water stored within the former Werris Creek underground colliery.

2.8.4 Water Usage and Consumption

Actual water usage for the reporting period from April 2010 to March 2011 has been collated from site water meters, water cart loads and dam storage levels. The major water stream of the overall site water management system at WCC is void water; however this year void water significantly increased due to the high rainfall into the open cut and the need to increase dewatering of the former underground colliery ahead of mining. This resulted in increased pit dewatering and bore extraction of 30ML and 105ML respectively compared to 2009-2010 period. **Table 2.10** summarises total water usage and consumption for 2010-2011 reporting period. Clean water stream has not been included in the water usage balance because it is not used by WCC and subsequently is not measured.

Table 2.10 WCC Water Usage 2010-2011

WATER INPUTS			**+715.9ML**
Void Water	**Total Bore Extraction (90BL252588)**		**126.6ML**
	Total Pit Dewatering		**150.3ML**
		Rainfall Interception	137.3ML
		Incidental Groundwater	13.0ML
Dirty Water	**Rainfall Interception**		**439.0ML**
WATER OUTPUTS			**-573.0ML**
	Total Dust Suppression		**140.3ML**
		Haul Roads (Void)	138.7ML
		Haul Roads (Dirty)	1.6ML
		Crushing Plant	6.0ML
		Rail Load Out	4.2ML
	Other		**14.0ML**
		Workshop	14.0ML
	Licenced Discharge Points		**418.7ML**
		Controlled	17.9ML
		Wet Weather	400.8ML
NET WATER			**+142.9ML**

Note: Evaporation losses has been assumed as final storage levels of dams onsite have been used in estimating water inputs

The balance of the void and dirty water from **Table 2.10** is net gain of 142.9ML for 2010-2011. The net gain is observed in the increased water storage onsite over the period, particularly VWD3 (200ML Dam North), which at the end of March 2011 was at 100ML.

For the 2010-2011 period, WCC extracted 126.6ML of water from the bore into the former underground workings and 150.3ML from pit dewatering. The remaining water stored within the former underground colliery is estimated to be 60ML based on the old survey plans of the workings that have been digitised and monthly water level readings. However this estimate could vary depending on the accuracy of the original survey, roof falls and perched/trapped water stored within parts of the old workings.

A recent groundwater model prepared for WCC as part of the "Life of Mine Project Groundwater Impact Assessment" (RCA, 2010) updated the aquifer parameters based on actual monitoring demonstrating limited drawdown in local bores and assuming that the former underground colliery had been dewatered, predicted in Year 3 (2013) that only 13ML would be intercepted by the pit. This is well down on the predictions from the State of Environmental Effects Groundwater Impact Assessment (RCA, 2009) that in Year 3 (2012) that 78.5ML would be intercepted by the pit. Given that the former underground colliery is nearing being completely dewatered from the original estimate stored of 330ML, it is most likely that the incidental groundwater make would be in the vicinity of 13ML. This is further backed by the high rainfall for the period (134mm above the Quirindi long term average) resulting in runoff of 137.3ML being the major source of void water, similar to the predicted void water balance rainfall runoff volume in **Table 5.8**.

WCC holds 90PT982801 for the extraction of up to 50ML per annum via bore licence 90BL252588 from the underground workings. During the current period, WCC were approved by State Water for two temporary transfers of 100ML water allocation each from 90PT982809 and 90PT982819 at WHCs other operations. When you combine the volume of water pumped via the bore and the incidental groundwater make, WCC extracted only 139.6ML in the 12 month period. Even if the incidental groundwater make was closer to 78.5ML during the year, WCC still had 45ML unused of its approved water extraction entitlement. These values will be updated for the end of June 2011 for full water year reporting to State Water and NOW.

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 (EP) are transported onto site by the mine blasting contractor. Emulsion is stored in a 27t tank with AN stored separately. Two licensed explosives magazines are maintained on ML 1563 as shown on **Plan 4**, one for storage of detonators and the other for boosters.

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 Orica Mining Services Security Plan and managed by Orica. Orica are currently the licence holders to both store and manufacture explosives at the WCC.

2.10 Other Infrastructure Management

WCC has acquired the additional two neighbouring properties of "Marengo" and "Plain View" since the previous period. The acquisitions are as a result of future proposed projects and to alleviate any current or future environmental impacts on these residents. **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
"Narrawolga"	1st July 2004*
"Eurunderee"	1st March 2005*
"Hillview"	28th July 2006*
"The Colliery"	14th February 2008
"Railway View"	5th June 2008
"Preston Park"	20th October 2008
"Branga"	20th October 2008
"Escott"	7th November 2009**
"Cintra"	31st March 2010
"Marengo"	17th May 2010
"Plain View"	7th February 2011

* Whitehaven Coal acquired took 100% ownership on 7th July 2010; ** Zeolight Australia property also become a project related property through the property 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 period 1,492,362t 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 1,444,562t of export coal was loaded onto 296 trains during the reporting period. During the reporting period 49,987t of coal was transported by road to domestic markets by 1,551 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.

3.0 ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

The following sub-sections of this document discuss the implementation and effectiveness of the various environmental control strategies adopted by WCC, together with monitoring data for the 2010-2011 period.

3.1 AIR QUALITY

3.1.1 Air Quality Criteria and Monitoring Program

The air quality criteria applicable to WCC are specified in Condition 1, Schedule 4 of DA 172-7-2004 summarised in **Table 3.1**. The assumed background levels prior to the commencement of WCC used in the *"Statement of Environmental Effects for a Modification to the Mining Area and Related Activities at the Werris Creek Coal Mine"* (R.W. Corkery & Co. Pty Ltd, 2009) are also outlined below.

Table 3.1 Air Quality Impact Assessment Criteria

Pollutant	Averaging Period	Criterion	Background Level
Total Suspended Particulate (TSP) Matter	Annual	90µg/m^3	28µg/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	3.6g/m^2/month	0.6g/m^2/month

The Air Quality Monitoring Program undertaken by WCC included deposited dust, total suspended particulates (TSP) and PM10 particulates. During the period, two additional deposited dust gauges were added to the network following a request by the owners of "Mountain View" and "Glenara" in the Quipolly area. 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 our operations. During the period, WCC used larger capacity water carts onsite, up from three water carts for the previous period in recognition of the increased production requiring more dust suppression capacity. Water carts currently onsite include one 30,000L Volvo wobbly, one 36,000L capacity semi trailer, one 15,000L hire truck and 12,000L water cart dedicated to the active mining operations area and the coal processing and product coal stockpile areas. From daily load counts undertaken by the water cart operators, WCC used approximately 12ML per month of water for dust suppression activities, equating to 140.3ML for 2010-2011. The dust suppression water is primarily sourced from pit dewatering activities.

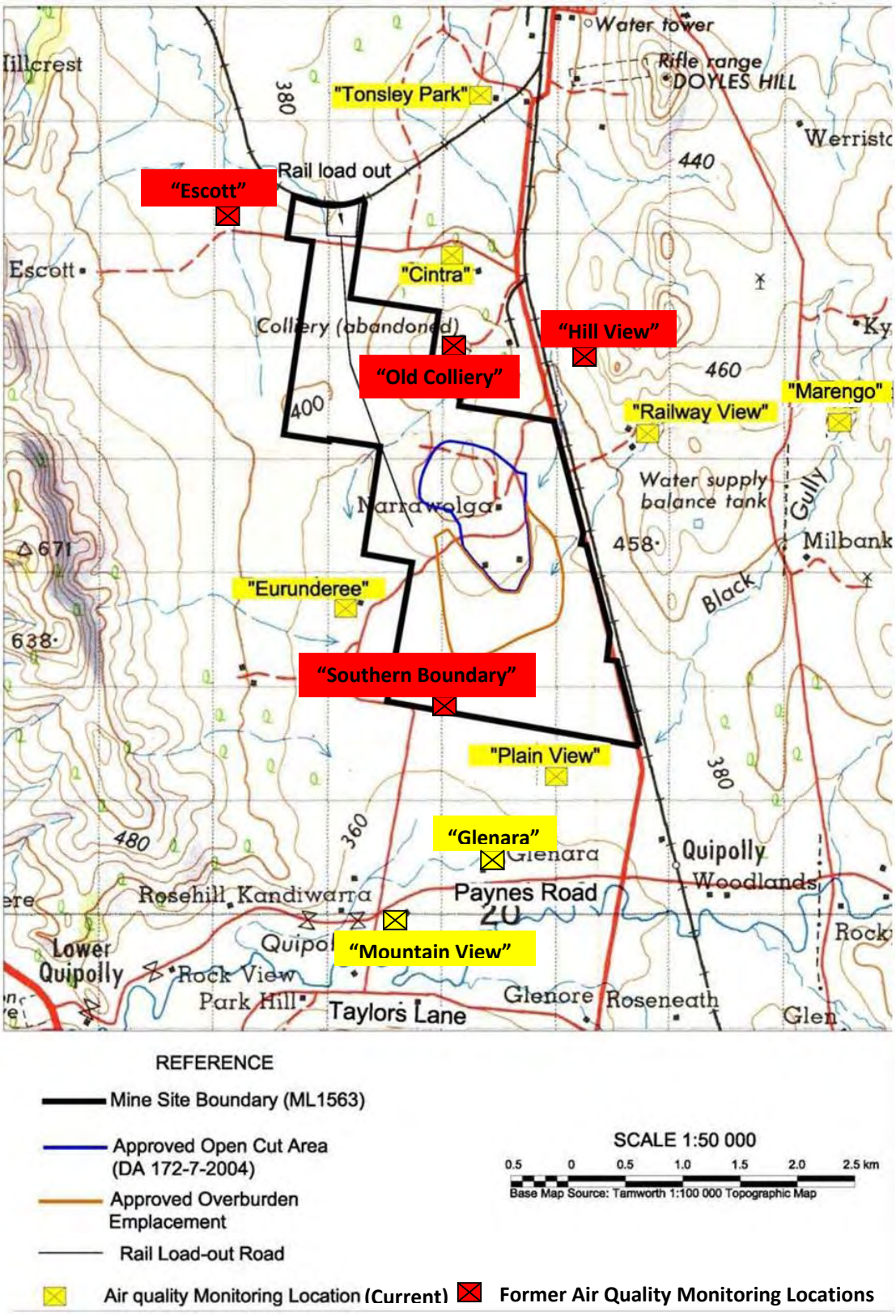


Figure 3.1 Air Quality Monitoring Network

WCC also employ further management controls to minimise dust generation onsite that include:

- 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 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 the minimum required for mining operations with revegetation undertaken as soon as practicable once areas are no longer needed; and
- Where possible all vehicles must be driven to the conditions to minimise trafficable dust generation and utilise existing tracks onsite;

3.1.3 Dust Deposition Monitoring

The dust deposition monitoring requirements for WCC are based on particulate matter that is solely generated onsite by WCC related activities. Dust results can be influenced by sources not from WCC activities and therefore these are excluded from annual averages. Excluded results range from 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 for the last 12 months indicate that at the privately owned neighbouring properties, WCC did not exceed our development consent annual average limits for any month during the 12 month period in **Table 3.3**. The only elevated monthly result was recorded at the "Railway View" property located immediately east of the open cut pit, which is owned by WCC. In all cases, the actual annual average dust deposition results are below the dust levels predicted 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 2010 to March 2011 (g/m^2/month)

	WC2	WC5	WC7	WC8	WC9	WC10	WC11	DA
	Cintra	Railway View	Tonsley Park	Plain View	Marengo	Mountain View	Glenara	Limit
April 2010	*2.0*	*1.6*	0.9	0.7	*0.4*	-	-	**3.6**
May 2010	*1.2*	*1.0*	1.0	5.1[c]	*0.4*	-	-	**3.6**
June 2010	*2.1*	*1.6*	1.2	2.0	*2.0*	-	-	**3.6**
July 2010	*0.7*	*0.8*	0.7	0.5	*0.4*	-	-	**3.6**
August 2010	*0.5*	*0.9*	0.6	0.9	*0.3*	0.7*	-	**3.6**
September 2010	*1.4*[c]	*0.6*	0.5	0.8	*0.5*	0.7	-	**3.6**
October 2010	*6.6*[c]	*0.5*	0.6	0.9	*0.9*	0.9	-	**3.6**
November 2010	*2.0*	*1.0*	0.9	1.0	*0.8*	0.9	2.1*	**3.6**
December 2010	*0.6*	***3.9***	0.6	0.6	*7.8*[#]	0.4	1.6	**3.6**
January 2011	*1.5*	*0.7*	0.7	0.6	*0.6*	0.4	1.0	**3.6**
February 2011	*1.4*	*0.8*	0.6	*0.7*	*0.4*	1.2	1.0	**3.6**
March 2011	*1.6*	*1.6*	0.7	*0.7*	*0.9*	2.2	0.6	**3.6**
MEAN	***1.4***	***1.3***	**0.8**	***0.9***	***0.7***	**0.9**	**1.3**	**3.6**
MINIMUM	*0.5*	*0.5*	0.5	*0.5*	*0.3*	0.4	0.6	**-**
MAXIMUM	*2.1*	*3.9*	1.2	*2.0*	*2.0*	2.2	2.1	**-**
PREDICTED	*4.9*	*2.8*	2.0	*1.0*	*1.9*	2.1	1.8	**3.6**

* Dust deposition monitoring gauges commissioned during the period; **Bold** Individual month result above annual average criteria; *Italics* Properties owned by Werris Creek Coal; [c] 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)

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. Most notably the influence of broader climatic events such as the prevailing drought conditions during 2005-2006, changing to average rainfall conditions in 2007-2008, can have a more significant impact on the ambient dust levels rather than the impacts of WCC alone.

All actual monitoring results are below the dust deposition levels predicted in Environmental Impact Statements for WCC and at the majority of the sites, the levels have been similar to the background dust deposition levels prior to mining commencing. The only exception was WC6 Southern Boundary that was on mine owned land but adjacent to a neighbours paddock that was seasonally cropped. Monitoring at WC6 has been discontinued as results did not reflect mining dust levels or impacts at community receptors.

Table 3.4 Dust Deposition Monitoring Results April 2010 to March 2011 (g/m^2/month)

ID	Property	Back-ground	Predicted	2005/ 2006	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	DA Limit
WC1	***Escott***	*1.6*	*2.3**	*0.6*	*0.8*	*0.7*	*0.5*	*0.7*	*-*	*3.6*
WC2	***Cintra***	*0.6*	*4.9***	*1.2*	*1.4*	*1.1*	*1.3*	*1.6*	*1.4*	*3.6*
WC3	***Old Colliery***	*1.6*	*2.6**	*1.5*	*2.3*	*2.9*	*3.7*	*2.5*	*-*	*3.6*
WC4	***Hill View***	*1.6*	*2.9**	*0.8*	*0.9*	*0.7*	*0.7*	*1.2*	*-*	*3.6*
WC5	***Railway View***	*0.6*	*2.8***	*2.0*	*1.2*	*0.6*	*0.7*	*1.1*	*1.3*	*3.6*
WC6	***Southern Boundary***		*1.0****	*5.4*	*9.4*	*5.1*	*4.8*	*2.3*	*-*	*3.6*
WC7	***Tonsley Park***	*0.6*	*2.0***	*1.3*	*2.3*	*1.6*	*0.9*	*1.3*	*0.8*	*3.6*
WC8	***Plain View***		*1.0****	*-*	*-*	*-*	*-*	*1.9*	*0.9*	*3.6*
WC9	***Marengo***	*0.6*	*1.9***	*-*	*-*	*-*	*-*	*1.5*	*0.7*	*3.6*
WC10	***Mountain View***	*1.6*	*2.1**	*-*	*-*	*-*	*-*	*-*	*0.9*	*3.6*
WC11	***Glenara***	*0.6*	*1.8***	*-*	*-*	*-*	*-*	*-*	*1.3*	*3.6*

Italics Properties owned by Werris Creek Coal

* From "Environmental Impact Statement for the Proposed Werris Creek Coal Mine" (August 2004)

** From "Statement of Environmental Effects for a Modification to the Mining Area and Related Activities at the Werris Creek Coal Mine" (March 2009)

*** From "Environmental Assessment for Werris Creek Coal Mine Life of Mine Project" (December 2010)

3.1.4 TSP and PM10 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 3.5** summarizing the monthly averages. Overall, both TSP and PM_{10} levels were below the annual average criteria set by the Development Consent (30µg/m^3 and 90µg/m^3 respectively, which is 30 and 90 thousandths of a gram per metre cubed of air) and the PM_{10} levels did not at any time exceed the daily limit of 50µg/m^3. However, there were seven 24 hour (short term) periods at "Cintra", "Railway View" and "Eurunderee" that PM_{10} exceeded 30µg/m^3 (but less than 50µg/m^3) from the 61 occasions recorded at each monitor over the last 12 months. On each occasion, WCC operations would have been the likely source due to the pre-dominate wind direction on those days. WCC own "Cintra", "Railway View" and "Eurunderee" in recognition that these properties have the potential to be impacted by the mining operations.

Table 3.5 TSP and PM10 Dust Monitoring Results April 2010 to March 2011 (µg/m3)

	WCHV1	WCHV2	*WCHV3*	*WCHV4*	PM10	PM10	*WCTSP*	TSP
	Cintra	Tonsley Park	*Railway View*	*Eurunderee*	Daily Criteria	Annual Criteria	*Railway View*	Annual Criteria
April 2010	*15.8*	7.4	*8.2*	*9.0*	-	**30**	*23.2*	**90**
May 2010	*22.0*	12.4	*11.0*	*12.0*	-	**30**	*36.4*	**90**
June 2010	*8.0*	6.2	*7.2*	*4.2*	-	**30**	*14.5*	**90**
July 2010	*15.2*	15.0	*10.0*	*13.6*	-	**30**	*18.0*	**90**
August 2010	*17.0*	17.8	*18.8*	*14.8*	-	**30**	*30.4*	**90**
September 2010	*7.8*	6.4	*7.0*	*5.2*	-	**30**	*21.8*	**90**
October 2010	*8.0*	6.2	*8.0*	*5.6*	-	**30**	*30.2*	**90**
November 2010	*10.6*	9.9	*10.6*	*11.0*	-	**30**	*31.5*	**90**
December 2010	*9.9*	9.4	*11.4*	*11.6*	-	**30**	*27.2*	**90**
January 2011	*8.0*	8.9	*9.9*	*10.7*	-	**30**	*21.4*	**90**
February 2011	*17.7*	16.6	*19.3*	*23.1*	-	**30**	*37.0*	**90**
March 2011	*12.8*	9.5	*12.9*	*9.7*	-	**30**	*35.3*	**90**
MEAN	*12.7*	10.5	*11.2*	*10.9*	-	**30**	*27.6*	**90**
MINIMUM	*1.0*	0.0	*0.0*	*1.0*	-	-	*1.0*	-
MAXIMUM	*38.3*	25.5	*46.0*	*45.9*	**50**	-	*78.5*	-
PREDICTED DAILY	*58.8*	48.9	*43.0*	-	**50**	-	-	-
PREDICTED ANNUAL	*21.1*	16.3	*17.0*	-	-	**30**	-	**90**

Italics Properties owned by Werris Creek Coal

WCC has undertaken PM_{10} and TSP dust monitoring since 2005 and the annual averages since that time are presented in **Table 3.6**. The actual annual monitoring results for all properties do show an increasing trend of PM_{10} and TSP dust levels since 2005, which reflect the increased production levels and size of WCC operations plus the reduced distance to neighbouring properties over that time. The 2010-2011 period shows the average dust levels falling due to the consistently higher rainfall over the last year. The actual annual average dust levels have been at or below the Environmental Impact Statement predicted levels, slightly above the pre-mining background levels and have remained well below the compliance criteria outlined in the development consent.

Table 3.6 TSP and PM10 Dust Monitoring Annual Averages since 2005 (µg/m3)

ID	Property	Back-ground	Predicted	2005/ 2006	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	Criteria
WCHV1	***Cintra*****	*15.1*	*21.1*	-	-	-	-	*19.2*	*13.7*	**30**
WCHV2	**Tonsley Park****	15.1	16.3	12.1	11.4	12.1	12.1	16.4	11.2	**30**
WCHV3	***Railway View****	*15.1*	*17.0*	*11.0*	*11.5*	*12.1*	*11.8*	*15.0*	*12.2*	**30**
WCHV4	***Eurunderee***	*15.1*	-	*13.5*	*15.4*	*16.8*	*16.9*	*17.7*	*12.2*	**30**
WCTSP	***Railway View***	*N/A*	-	*21.6*	*24.8*	*25.0*	*25.9*	*35.7*	*29.7*	**90**
	Old Colliery*	*15.1*	*16.0*	*10.5*	*13.5*	*16.0*	*13.6*	-	-	**30**

Italics Properties owned by Werris Creek Coal; * From "Environmental Impact Statement for the Proposed Werris Creek Coal Mine" (August 2004)
** From "Statement of Environmental Effects for a Modification to the Mining Area and Related Activities at the Werris Creek Coal Mine" (March 2009)

Based on the dust deposition and HVAS results discussed above, it is indicative that WCC does appropriately manage and minimise potential offsite dust impacts from its activities and that actual dust monitoring over the last six years shows that WCC has complied with its air quality commitments and development consent conditions over that time.

3.1.5 Greenhouse Gas (GHG)

Diesel combustion during the reporting period increased 33% to 12,155,391L 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 3.7**.

Table 3.7 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

Electricity usage increased nearly 50% for 2010-2011 to 1,506,725 kWh due to the crushing plant starting a second (night) shift working until 4am. 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 3.8**.

Table 3.8 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

During the Reporting Period, a total of 7,402 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 3.9**.

Table 3.9 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

The total GHG emissions for WCC increased 34% for 2010-2011 mainly due to the 17% increase in the production rate for the same period following the trend since 2005 of production related increases in GHG emissions. **Table 3.10** presents the CO_2 equivalent GHG emissions since 2005.

Table 3.10 Total GHG Emissions by WCC since 2005

	CO_2 Equivalent Tonnes
2005-2006	15,757
2006-2007	17,260
2007-2008	22,161
2008-2009	20,423
2009-2010	26,481
2010-2011	35,477

The *"Statement of Environmental Effects for a Modification to the Mining Area and Related Activities at the Werris Creek Coal Mine"* (R.W. Corkery & Co. Pty Ltd, 2009) estimated for Scope 1 and Scope 2 GHG emissions on Diesel Consumption (operations), Explosives and Purchased Electricity that 33,717 CO_2-e tonnes would be emitted by WCC. The 2010-2011 GHG emissions are in line with estimation, albeit slightly above due to maintaining production flexibility for site management.

In accordance with Schedule 4 Condition 58 of DA 174-7-2004, DoP approved WCC's Energy Savings Action Plan (ESAP) on 16th August 2010. Projects identified for further review in the ESAP for energy and greenhouse gas emissions reductions include:

- a review of the air compressor system;
- upgrade of crushing plant to reduce the number of conveyors and remove diesel power packs; and
- Investigate replacing coal transport by semi trailers with conveyor system.

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 in onsite dams and offsite water courses. The basis to 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 (contaminated water).

Methods for the management of erosion and sediment control at the Werris Creek Coal Mine are presented in the current MOP and in Section 5.0 of the Site Water Management Plan (GSS Environmental, 2009) and include:

- The segregation of water streams with all water from clean, dirty or void water catchments retained onsite for dust suppression;
- Sediment Basins (SB) within the dirty water system are used to slow water flow and aid detention time to encourage settlement of solids;
- Three SBs are licenced discharge points (as per EPL 12290) designed to retain up to 39.2mm rainfall events over 5 day periods before spilling (wet weather discharge) and are to be maintained in a drawn down state. Flocculants are used where necessary to clarify water quality prior to undertaking controlled discharges;
- 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 in SB at licenced discharge points are treated to ensure that the pH of the discharge waters are maintained with EPL 12290 limits between 6.5 and 8.5 to avoid impacting on offsite water quality.

Saline water within the void water system is managed by preferentially using this water for dust suppression onsite and stored within impermeable (<$1x10^{-9}$m/s) storage dams that are designed for zero discharge. Water from the dirty water system that has issues with pH or suspended solids can also be 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 first spill sumps and under/over weirs are being installed at the licenced discharge points and rail load out facility to improve containment in case of hydrocarbon spills through the course of mining operations.

The WCC surface water monitoring program is summarised in **Table 3.11** and **Figure 3.2**.

Table 3.11 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	Quarterly	
Contaminated Water SB6	Quarterly	

3.2.2 Performance

The annual average of the routine quarterly (not including discharge water quality) results collected from Clean, Dirty and Void Water Dams as well as quarterly monitoring of Quipolly and Werris Creeks' are presented in **Table 3.12** and detailed results included in **Appendix 4(a)** with locations as shown on **Figure 3.2**.

Table 3.12 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	8.18	995	3	<5
VWD2	27	4	8.52	836	89	<5
VWD3	-	2	8.20	871	11	<5
SB2	10	4	8.40	408	29	<5
SB6	-	4	7.91	502	27	<5
SB9	12	4	7.90	158	117	<5
SB10	14	3	7.78	213	222	<5
SD4	-	3	8.74	253	79	<5
SD5	-	2	9.02	231	40	<5

Dam/ Creek	Monitoring Site (EPA No)	Number of Samples	pH	Conductivity (µS/cm)	Suspended Solids (mg/L)	Grease & Oil (mg/L)
QCU	-	3	7.68	457	29	<5
QCD	-	3	7.52	586	18	<5
WCU	-	3	7.75	818	26	<5
WCD	-	3	7.97	679	21	<5
BGD	-	4	8.21	418	129	5

The dry start to the reporting period meant that SB10, SD4, SD5, QCU and QCD were dry at the time of the quarterly sampling. VWD3 (200ML Dam North) was constructed and commissioned during the reporting period. BGD (Black Gully Downstream) was added to the surface water monitoring program during the reporting period following a water quality complaint from a neighbouring property owner. When WCC discharges to Quipolly Creek, Black Gully collects drainage off the WCC site and flows to its confluence with Quipolly Creek.

The most noticeable change from previous results to onsite water quality is the "freshening" of void water due to the significant rainfall collected in pit during the reporting period. The other clean and dirty water dams were within the historical variation in water quality onsite, depending on the length of time since last rainfall before being sampled. The *"2010-2011 Annual Review of Surface Water and Ground Water Monitoring Report"* conducted by GeoTerra Pty Ltd (2011) identified that water quality within Quipolly Creek and Werris Creek can be impacted by elevated suspended solids, particularly in Werris Creek. The agricultural land use of the district is likely the source of elevated suspended solids in each catchment both upstream and downstream; indicating that the suspended solid load is independent of WCC discharge events.

The licenced discharge points SB2, SB9 and SB10 discharge water quality monitoring results and comparison with compliance criteria is discussed in **Section 2.8.1**. **Table 3.13** below demonstrates that from the 21 individual discharges there were 16 sampling events during the reporting period, the water quality in Quipolly and Werris Creeks was not impacted as a result of WCC operations. GeoTerra (2011) identified no impact on either Quipolly or Werris Creeks' water quality as a result of surface water discharges by WCC during the period. This is consistent with the prediction in *"Statement of Environmental Effects for a Modification to the Mining Area and Related Activities at the Werris Creek Coal Mine"* (R.W. Corkery & Co. Pty Ltd, 2009) that WCC would not impact on the pH, suspended solids or conductivity of waters discharged from the site. The 2010/2011 Annual Review of Surface Water and Ground Water Monitoring report has been included as **Appendix 4(b).**

Table 3.13 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	26	14	Minimum	7.02	256	1	<5
			Average	7.42	633	24	<5
			Maximum	8.20	1790	63	<5
Quipolly Downstream	25	14	Minimum	7.20	231	6	<5
			Average	7.62	692	21	<5
			Maximum	7.99	1010	105	<5
Werris Upstream	24	2	Minimum	7.49	299	65	<5
			Average	7.58	755	79	7
			Maximum	7.67	1210	92	7
Werris Downstream	23	2	Minimum	7.69	273	32	<5
			Average	7.70	702	169	<5
			Maximum	7.71	1130	305	<5

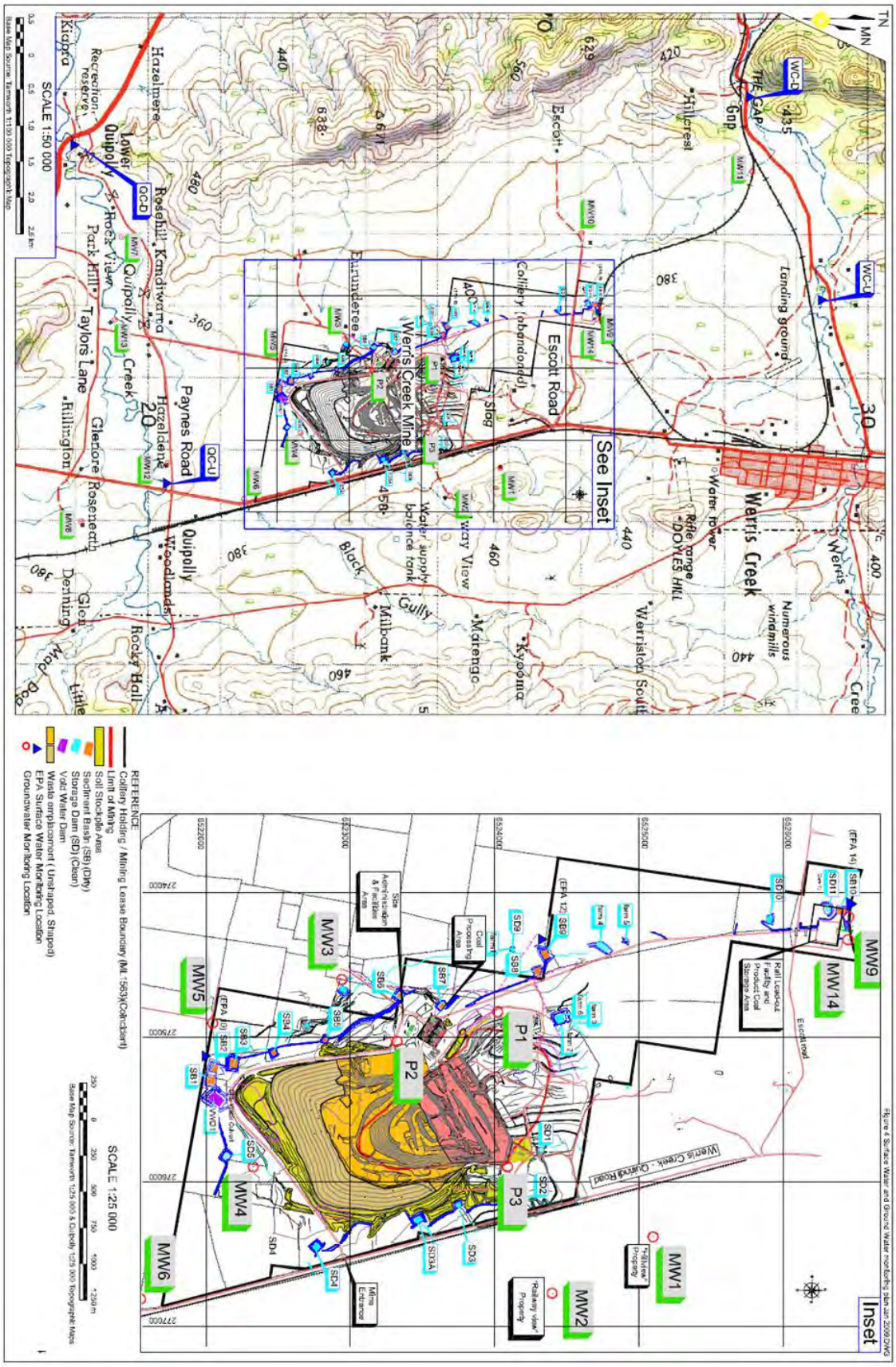


Figure 3.2 Water Monitoring Network

3.3 GROUNDWATER

3.3.1 Management

The management of groundwater at WCC is separated based on the objective; 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 is discussed in more detail in **Section 2.8** and **3.3.1**.

WCC currently monitor groundwater in 37 bores and piezometers onsite and at neighbouring properties to measure potential impacts on aquifer groundwater quality and groundwater availability. Sources of potential contamination by mining operations to groundwater quality could be from hydrocarbon spills and leaks or changes to pH and EC due to acid rock drainage. There are three key aquifers corresponding to the main geological units in the area. The aquifers and the corresponding bores and piezometers measuring groundwater are outlined in **Table 3.14** and the groundwater monitoring program is summarised in **Table 3.15**. Key piezometers required to be monitored under EPL 12290 (MW1 to MW6 corresponding to EPL ID 17 to 22) are shown in **Figure 3.2**. **Figure 3.3** displays the conceptual groundwater system in WCC and the interaction between the coal measure, Werrie Basalt and Quipolly Creek Alluvium aquifers and the underlying basement strata.

Table 3.14 Aquifer Monitoring Locations

Aquifer	Bore/Piezometer
Coal Measures	UG Bore
Werrie Basalt	MW1, MW2, MW3, MW4 (removed), MW4B, MW5, MW5B (test), MW6, MW8, MW9, MW10, MW14, MW14B (test), MW19A, MW20, MW24A, MW25A, MW25B, P1, P2, P3 (removed)
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

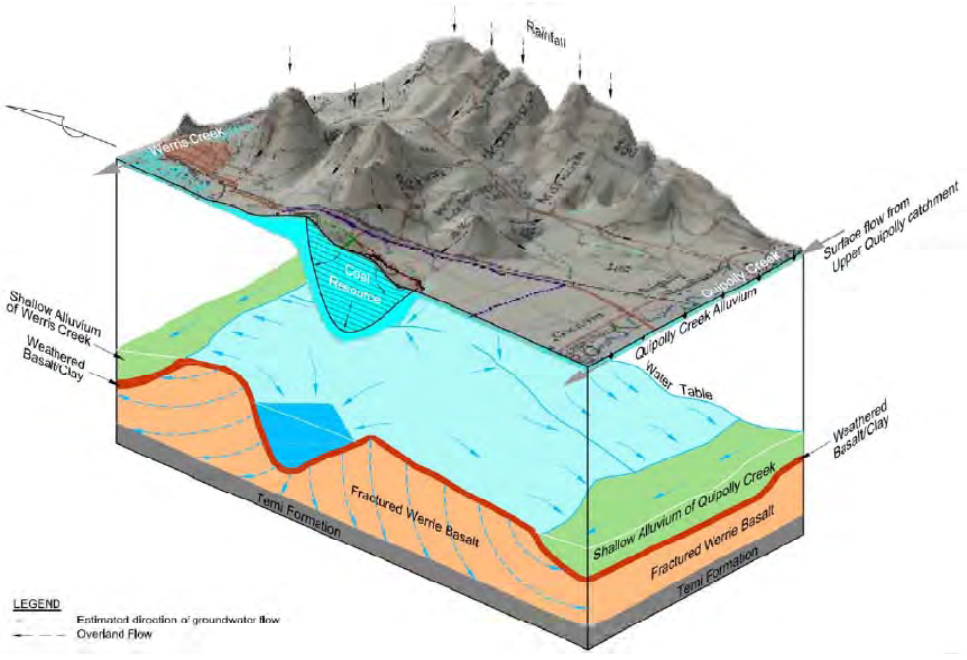


Figure 3.3 Conceptual Hydrogeological Model at WCC (taken from RCA, 2010)

Table 3.15 Groundwater Monitoring Program

Parameters	Frequency	Bore/Piezometers
Standing Water Level	Continuous	P1, P2 & MW7 (Data Logger)
Standing Water Level	At least Quarterly	MW1, MW 2, MW 3, MW4B, MW 5, MW6, MW7, MW7B, MW8, MW9, MW10, MW12, MW13, MW13B, MW13D, MW14, MW15, MW16, MW17A, MW18A, MW18B, MW19A, MW20, MW21A, MW21B, MW22A, MW22B, MW23A, MW23B, MW24A, MW25A, MW25B, MW26, P1, P2, UG Bore
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

An additional 20 groundwater bores at neighbouring properties were added to the monitoring program during the reporting period to improve the understanding in particular of the Quipolly Creek Alluvium aquifer and measure potential mining impacts at specific properties following two complaints regarding drops in water levels during the period.

WCC received approval from NOW and DoP in 2005 for the Groundwater Contingency Plan which outlines the following trigger levels in **Table 3.16** which are regularly compared with actual monitoring results during the reporting period.

Table 3.16 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. Given the potential for impact on the environment and neighbouring bore water users, monitoring focuses on the Werrie Basalt and Quipolly Creek Alluvium aquifers. **Table 3.17** 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 catchment divide towards Quipolly Creek in the south and

Werris Creek in the north respectively. **Appendix 4(c)** presents detailed groundwater monitoring data since 2005 including the 2010-2011 period. All groundwater sampling and analyses were undertaken by ACIRL/ALS Pty Ltd.

Table 3.17 Selected Werrie Basalt and Quipolly Creek Alluvium Analysis 2010-2011

Site	Date	Level (mbgl*)	Field pH	Field EC (µS/cm)	Total Petroleum (C10-C36) Hydrocarbons (µg/L)
Quipolly Creek Alluvium Aquifer					
MW12	20/5/10	9.52	8.2#	488#	-
	8/9/10	7.59	7.17	505	-
	11/1/11	6.43	7.20	361	-
	16/3/11	6.13	7.15	440	<50
	Average	**8.30**	**7.17**	**435**	**<50**
MW7	19/5/10	4.55	8.2#	479#	-
	8/9/10	4.15	7.01	535	-
	10/1/11	4.16	7.16	463	-
	7/4/11	4.33	7.29	565	<50
	Average	**4.28**	**7.13**	**521**	**<50**
Werris Basalt Aquifer					
MW5	19/5/10	9.29	7.5#	4080#	-
	9/9/10	8.41	7.33	1902	-
	6/1/11	7.81	7.01	2230	-
	15/3/11	7.19	6.95	2178	<50
	Average	**8.18**	**7.10**	**2103**	**<50**
MW14	19/5/10	16.72	8.1#	1830#	-
	9/9/10	15.88	7.01	1220	-
	6/1/11	15.59	7.03	1090	-
	15/3/11	15.29	6.98	1020	<50
	Average	**15.87**	**7.01**	**1137**	**<50**

* mbgl – meters below ground level; # faulty field meter reading not used in the average

Condition 36 of DA 172-7-2004 Schedule 4 specifies that an independent review of water monitoring results is undertaken annually. The 2010-2011 Annual Review of Surface Water and Ground Water Monitoring report was conducted by GeoTerra Pty Ltd and is included as **Appendix 4(b).**

Key GeoTerra (2011) conclusions for groundwater level and water quality monitoring undertaken for the period are:

- No sustained fall in groundwater levels greater than 15% compared to the baseline "natural" saturated thickness within the Quipolly Creek Alluvium and Werrie Basalt aquifer bores and piezometers. No observable regional groundwater depressurisation due to WCC mining operations;
- No sustained change in groundwater pH or EC greater than 15% compared to the baseline "natural" condition, and pH and EC results within ANZECC (Agriculture Irrigation and Livestock) criteria within the Quipolly Creek Alluvium and Werrie Basalt aquifer;
- During the period (April 2010 to March 2011), heavy rainfall recharged both Quipolly Creek Alluvium and Werrie Basalt aquifers leading to significant water table rises across the whole area. Many bores and piezometers were at the highest water levels ever recorded since monitoring began in 2005. The increased rainfall recharge has also "freshened" groundwater quality within both the Quipolly Creek Alluvium and Werrie Basalt aquifers' pH and EC levels lowering. This reverses the previous trend since monitoring began during the decade long drought of increasing pH and EC levels;

- A number of bores associated with agricultural land uses recorded 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; and
- The monitoring of water levels either side of the clay aquitard layer between the coal measures and Werrie Basalt determined that the aquitard was effective at limiting groundwater inflow into the mine and subsequently mitigating depressurisation of the Werrie Basalt and Quipolly Creek Alluvium aquifers. Between piezometers P1 and P2 (installed with 20m of the clay aquitard) and the base of the open cut pit shows that at least 90m differential of head between the two aquifers.

Consistent with GeoTerra (2011) conclusions, the significant rainfall recharge of local aquifers is apparent in **Table 3.17** and **Appendix 4(c)** with all bores and piezometers monitored from April 2010 to March 2011 water levels rising (mbgl reducing). The most significant gains in water levels were higher in the aquifer catchments with MW12 rising over 3m and MW5 rising over 2m.

As discussed in Section 2.8.4, the predicted drawdown and water loss to the Werrie Basalt and Quipolly Alluvium aquifers in the *"Statement of Environmental Effects for a Modification to the Mining Area and Related Activities at the Werris Creek Coal Mine"* (R.W. Corkery & Co. Pty Ltd, 2009) is not being observed. Also as predicted there has 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.

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 the ML 1563 area.

3.5 BIODIVERSITY

3.5.1 Management

DoP approved the WCC Biodiversity Offset Strategy and Management Plan (BOMP – ELA, 2010) on 14th December 2010 to meet Condition 40 of DA 174-7-2004 Schedule 4. The Biodiversity Offset Area (BOA) covers 362 hectares (ha) (**Figure 3.4**) and consists of 272.04ha of remnant native vegetation in various condition classes on the properties "Narrawolga", "Eurunderee" and "Railway View" that have been acquired or surplus to mining requirements. The remainder of the BOA is made up of rehabilitation and other non-vegetated areas. Given the overlap with rehabilitation, the Landscape Management Plan has been aligned with the BOMP in particular the revegetation and monitoring methodologies.

The 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 three EECs (made up of a five separate vegetation communities) that have been identified and targeted for restoration (within the BOA and rehabilitation areas) at WCC comprise of:

- Native Vegetation on Cracking Clay Soils of the Liverpool Plains;
- Brigalow Community; and
- White Box, Yellow Box, Blakely's Red Gum Woodland.

3.5.2 Implementation and Performance

During the period, WCC received approval for the BOMP in December 2010, however to date DoP have not agreed with wording of caveat to be placed on BOA land titles to secure management of biodiversity outcomes in perpetuity.

In accordance with the BOMP, Quarterly Visual Inspections are documented with only one informal and one documented inspection completed in the period due to the late approval of the BOMP. **Table 3.18** summarises the findings identified in the October2010 and January 2011 inspection.

Table 3.18 Biodiversity Offset Area Quarterly Visual Inspection Findings

Date	BOA Site	Comment	Action	Status
15/10/10	Eurunderee	Weeds – Pattersons Curse and St Johns Wort.	Add to weed control program.	Contractor sprayed Curse and Wort Nov & Dec 2010
27/1/11	Eurunderee	Old rubbish dump to be removed and site stablised	Organise contractor to clean up site and dispose of "General (Non-Putricible) Solid Waste" inpit.	Completed Feb 2011 and cover crop sown.
27/1/11	Eurunderee Narrawolga Rehabilitation Railway View	Weeds – St Barnabys & Saffron Thistle. Evidence of dead St Johns Wort.	Add to weed control program.	Weeds went rank. Action retained on program.
27/1/11	Eurunderee Narrawolga Site 12	Limited overstorey species.	Add to revegetation program.	Action retained on program.
27/1/11	Eurunderee	Annual monitoring identified fox den.	Add to pest control program.	Action retained on program.

Figure 3.4 WCC Biodiversity Offset Area

Date	BOA Site	Comment	Action	Status
27/1/11	Eurunderee Railway View	New fencing to be completed and old fences still to be removed.	Contractor engaged for fencing work.	New fence completed and old fences has been removed Apr 2011.
27/1/11	Narrawolga Rehabilitation	No rocky habitat.	Add to habitat augmentation program.	Action retained on program.
27/1/11	Rehabilitation Black Gully	Rehab Old erosion rills. Black Gully erosion still active.	Watch.	Watch.
27/1/11	Rehabilitation	Limited overstorey species.	Add to revegetation program.	Action retained on program.

The key management actions implemented by WCC for the BOA has been the extensive weed control, fencing and rubbish dump remediation programs. The weed control program commenced prior to approval of the BOMP due to the severe St Johns Wort and Pattersons Curse infestations from the wet winter and spring on the former agricultural land of Eurunderee requiring 200 hours of spraying. Approximately 10km of new fencing and maintenance to existing fencing was undertaken from November to February mainly on Eurunderee and Railway View with the last of the old fences being removed in April 2011 (**Figure 3.5**). A former rubbish dump on the Eurunderee property was cleaned up and remediated during February 2011 with **Figure 3.6a** and **3.6b** demonstrating the site condition before and after cleanup activities.

Figure 3.5 New BOA boundary fence (left) installed on cadastral boundary and removal of old "give and take" fence (centre)

Figure 3.6a and 3.6b Old Eurunderee Rubbish Dump Pre and Post Clean Up and Remediation

The BOMP annual review was completed in March 2011 in accordance with the BOMP. Actions identified in addition to the visual inspection were review the 2011-2012 bushfire program, add woody debris and nest boxes to habitat program and that the BOMP be amended to include existing hayshed and soil stockpiles within BOA and modify the monitoring replicates and LFA frequencies.

3.5.3 Vegetation Monitoring

An independent ecological consultancy (ELA) was engaged to undertake the baseline BOA annual flora and fauna monitoring program from 5th November 2010 to 11th November 2010 in accordance with the flora and fauna monitoring program in the BOMP prior to its approval (**Appendix 5** *"WCC Biodiversity Offset Area Annual Monitoring Report (BOA AMR) Spring 2010"*, ELA 2011). While flora and fauna monitoring has been undertaken at WCC over the last six years, with the establishment of the BOA and increasing rehabilitation areas it was decided to change the focus from impact monitoring to biodiversity restoration monitoring. The results of previous monitoring programs were used to develop the new monitoring methodology, however by combining flora and fauna (previously separate) into one biodiversity monitoring program new baseline sites was established within the BOA so that a pre-restoration management (i.e. active grazing) point was available once the BOMP was approved in December 2010. In total, 12 monitoring sites were established in spring 2010 across 362ha BOA (including 52ha of rehabilitation) with the number of sites to be increased pending further rehabilitation and biodiversity offset areas established (**Figure 3.7**). A summary of the flora monitoring methodology is that a minimum of one site for every 5ha of each vegetation type/condition zone with up to 4 replicates while rehabilitation sites will be established every 30ha completed. At each of the 12 monitoring sites a nested 50m transect and 50m x 20m plot was established for the two vegetation assessment methods of Landscape Function Analysis (LFA) and a modified Biometric Assessment Methodology (modified BAM). **Table 3.19** (taken from the BOA AMR, ELA 2011) outlines the number of monitoring plots per vegetation community type/condition class.

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	4 (1, 2, 8, 12)	3-4
	2	6.72	1 (7)	3-4
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	3	25.33	1 (4)	3-4#
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.

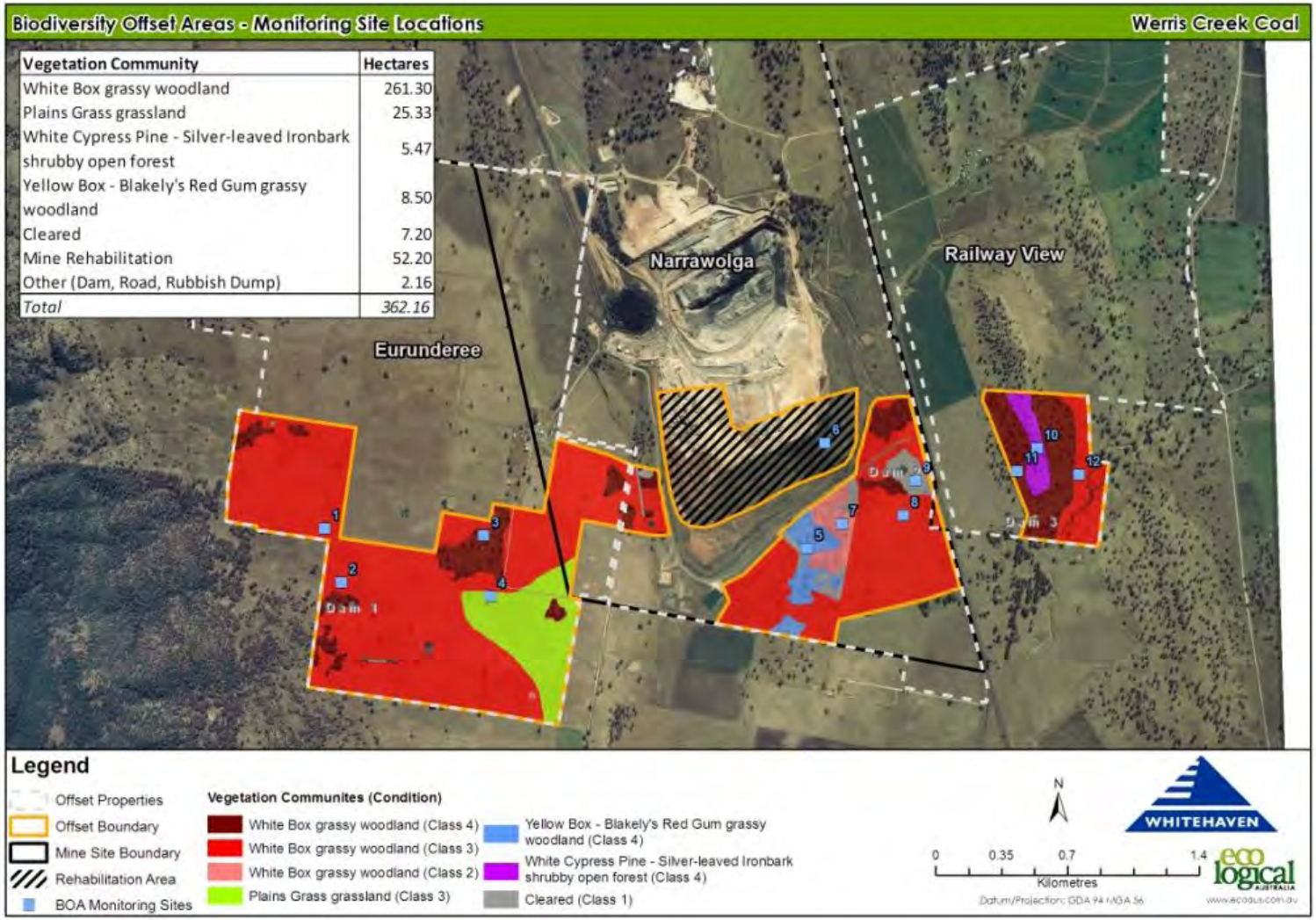


Figure 3.7 Biodiversity Offset Area Annual Monitoring Program Sites

All sites (including Site 6 on the rehabilitation) recorded high landscape organisation and soil surface assessment scores which reflects the generally high quality soils of the area and subsequent high vegetation ground cover. Given the target ecological community for restoration across the majority of the BOA and rehabilitation areas is the grassy White Box woodland EEC, these scores are actually higher than what would be expected for a benchmark condition reflecting the higher input of resources into the system as a consequence of the previous agricultural land uses across the BOA. While counter intuitive, it is hoped that ongoing LFA monitoring will identify a downward trend in landscape organisation and soil surface assessment scores as more passive management actions attempt to achieve biodiversity restoration. For more detail on LFA results refer to **Appendix 5**.

The modified BAM measures the floristics of each monitoring site and compares the results against the completion criteria (**Section 5.5** Sustainable Growth and Development 2.1 to 2.4) established in the BOMP. The completion criteria is aligned to the biometric benchmark vegetation community scores in the Vegetation Types Database (DECCW, 2008) for each vegetation community (White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions in the Namoi Catchment) to be restored in the BOA and rehabilitation area at WCC. **Table 3.20** summarises the spring 2010 scores against the benchmark/completion criteria for each monitoring site or refer to **Appendix 5** for more detail on each sites biometric scores.

Table 3.20 Monitoring Site Results compared to Benchmark/Completion Criteria

Biometric Vegetation Type	Condition Class (Site No.)	Native Species # (Completion Criteria)	Overstorey Cover % (Completion Criteria)	Midstorey Cover % (Completion Criteria)	Combined Groundcover (Completion Criteria) %	All Completion Criteria met?
White Box grassy woodland	4 (3)	8 (23)	5 (6-25)	0 (0-5)	32 (45)	No
	4 (11)	19 (23)	26 (6-25)	0 (0-5)	40 (45)	No
	3 (1)	2 (23)	0 (6-25)	0 (0-5)	4 (45)	No
	3 (2)	10 (23)	0 (6-25)	0 (0-5)	32 (45)	No
	3 (4)	21 (23)	0 (6-25)	0 (0-5)	56 (45)	No
	3 (8)	2 (23)	0 (6-25)	0 (0-5)	4 (45)	No
	3 (12)	5 (23)	0 (6-25)	0 (0-5)	33 (45)	No
	2 (7)	10 (23)	0 (6-25)	0 (0-5)	20 (45)	No
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	9 (23)	5 (6-25)	0 (0-5)	50 (45)	No
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	7 (30)	0 (6-40)	0 (6-25)	36 (45)	No
Cleared land (Mine Rehab Site)	1 (6)	3 (23)	0 (6-25)	0 (0-5)	0 (45)	No
Cleared land (formerly cultivated land)	1 (9)	5 (23)	0 (6-25)	0 (0-5)	8 (45)	No

As this is the baseline vegetation monitoring as per the BOMP methodology, there is no direct comparison with previous year's vegetation monitoring results. Site 11 (Condition 4 White Box grassy

woodland) is close to meeting the benchmark native species richness and is just over the required benchmark overstorey coverage. Site 3 (Condition 4 White Box grassy woodland) and 5 (Condition 4 Yellow Box – Blakely's Red Gum grassy woodland) almost meet the minimum overstorey coverage benchmark. Site 4 (Condition 3 White Box grassy woodland) almost meets the benchmark species richness. Site 4 and 5 already exceed the minimum combined native groundcover coverage.

As expected all sites do not meet each completion criteria given it is the first year of the restoration management program in the BOMP. At the time of monitoring in November, some sites and areas of the BOA were ceasing grazing, and the condition of both the rehabilitation area and BOA reflected the previous land use and disturbance history.

3.5.4 Fauna Monitoring

The fauna monitoring program was run concurrently with the vegetation monitoring program during spring 2010. The objective of the fauna monitoring methodology was to target known or potential threatened species at WCC guided by previous fauna monitoring results and recognising that fauna assemblages have a slow recovery time to re-colonise rehabilitation areas and BOA as restoration progresses. Being the first year of the BOMP monitoring program, all species groups were monitored to establish the baseline condition however annual fauna monitoring programs thereafter will focus on woodland birds and microbats, which represent all the threatened species previously recorded onsite until such time that the BOA condition improves such that it is likely to support habitat for a greater range of species.

A summary of the fauna monitoring methodology is that 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 of the monitoring sites established had fauna monitoring undertaken 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 spring 2010 period.

Table 3.21 Monitoring Site Results compared to Benchmark/Completion Criteria

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

Method	Detail	Requirement per Site
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.

Summary of the monitoring results for bats and birds follows, however for full details on fauna monitoring see **Appendix 5**.

During spring 2010, no megachiropteran bats were recorded during the monitoring survey, which is consistent with previous monitoring at WCC. Eleven microbat species were identified through ultra-sonic call detection (i.e. anabat recordings) across the 10 fauna monitoring sites during the Spring 2010 monitoring period representing approximately 73% (11 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/available in the BOA (**Figure 3.8**). Unexpectedly Site 9 (Class 1 cleared) recorded the highest diversity and abundance however this was most likely due to the presence of an adjacent dam with microbats travelling through this area. Species of 'above' and 'below' canopy guilds were recorded at all sites except Site 3 and 5 (Condition 4) and Site 4 (Condition 3) due to the low prey availability and higher insect activity where canopies were absent (ELA 2011. 'Above canopy' microbats did not show a preference for vegetation with or without trees (Condition 2 and 4) (ELA, 2011). Where they did occur at sites with a canopy, Site 11 (Condition 4) was notably in close proximity to Class 3 vegetation with a high level of insect activity, and the activity at Site 7 (Condition 2) has been associated with passing individuals rather than individuals utilising the site (ELA, 2011).

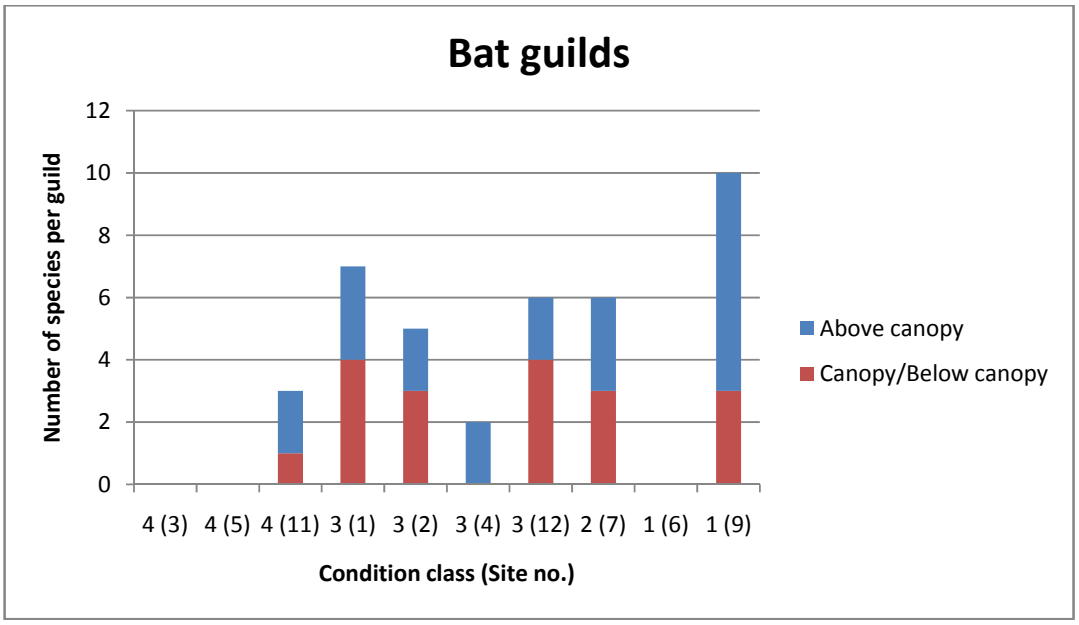


Figure 3.8 Microbat species abundance across BOA, presented in terms of 'guilds'.

A total of 34 bird species were recorded during the spring 2010 monitoring program, which represents approximately 50% of the total number of species recorded at WCC since 2004 (ELA, 2010). Two new species were recorded, including Australian King-Parrot (*Alisterus scapularis*) and Channel-billed Cuckoo (*Scythrops novaehollandiae*). The latter species is a listed migratory species under the EPBC Act. One previously recorded threatened species, Little Eagle (*Hieraaetus morphnoides*), was recorded in the BOA.

Condition 1 sites recorded both the highest and the lowest totals of bird species diversity. Site 9 recorded the highest diversity of bird species within the BOA, showing a higher diversity than that recorded within the Condition 4 vegetation. Whilst this is a low condition site (Condition 1), previously cleared and with low structural diversity, this result is likely to be a reflection of Site 9 being positioned directly adjacent to a dam, where species of all guilds would attend to utilise this watering point.

Sites 5 and 7 also showed a high number and diversity of species, with both sites being positioned at the centre of the BOA, between watering points within and external to the BOA, and both sites maintaining high structural diversity with canopy and coarse woody debris present, providing an array of habitat features.

Site 6 (rehabilitation) displayed a paucity of bird species in terms of both numbers and diversity. This is likely associated with the short period since first rehabilitation post mining. It is noted that the only bird species to be recorded within Site 6 was the Nankeen Kestrel (*Falco cenchroides*), which occurred as a flyover.

The prevalence of bird guilds measured in terms of number of species is presented in **Figure 3.9**. All guilds were represented within the BOA, with no specific trends recognised due to condition class or availability habitat niche.

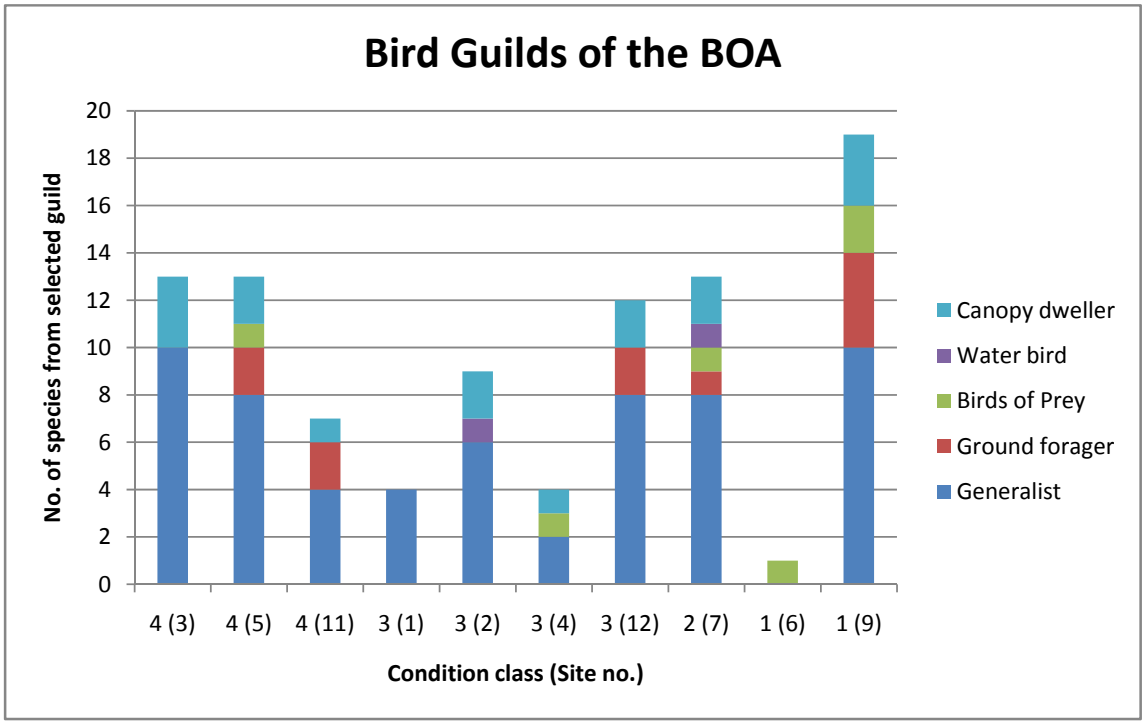


Figure 3.9 Abundance of species from selected bird guilds of the BOA.

3.6 WEEDS

During the Reporting Period, WCC maintained its weed control program focusing on noxious weeds of Spiny Burrgrass, St Johns Wort and Bathurst Burrs. No infestations of Spiny Burrgrass were identified most likely due to the above average rainfall. However, major infestations of St Johns Wort and Pattersons Curse across the new BOA were influenced by the wet spring conditions. Approximately 15ha of Patterson Curse and 35ha of St Johns Wort were treated during the period. Also thistles, in particular St Barnabys Thistle, were targeted for treatment on the rehabilitation areas and across the majority of soil stockpiles onsite totalling approximately 30ha.

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.

3.7 BLASTING

3.7.1 Blast Criteria and Control Procedures

Blasting criteria for WCC are nominated in DA 172-7-2004, Schedule 4 Conditions 18 to 23 and Conditions O1 and L8 of EPL 12290 and specify that:

- Blasting must only be carried out between 9.00 am and 5.00 pm, Monday to Friday for Stage 2 operations. No blasting is allowed on Saturdays, Sundays or Public Holidays without the prior approval of the DECCW;
- No more than one blast per day can be undertaken unless with the approval of DECCW;

The overpressure level from blasting operations must not:

- Exceed 115dB(L) for more than 5% of the total number of blasts over a period of 12 months; and
- Exceed 120dB(L) at any time;

Ground vibration peak particle velocity from the blasting operations must not:

- Exceed 5mm/s for more than 5% of the total number of blasts over a period of 12 months; and
- Exceed 10mm/s at any time, when measured at any point within 30 metres of any affected non-project related residence or other noise sensitive location.

A revised Blast Monitoring Program was approved by DoP and DECCW in August 2010 which modified the blast monitoring locations following property acquisitions over the previous 12 months made by WCC. The current blast monitoring program is outlined in **Table 3.22** and locations identified in **Figure 3.10**.

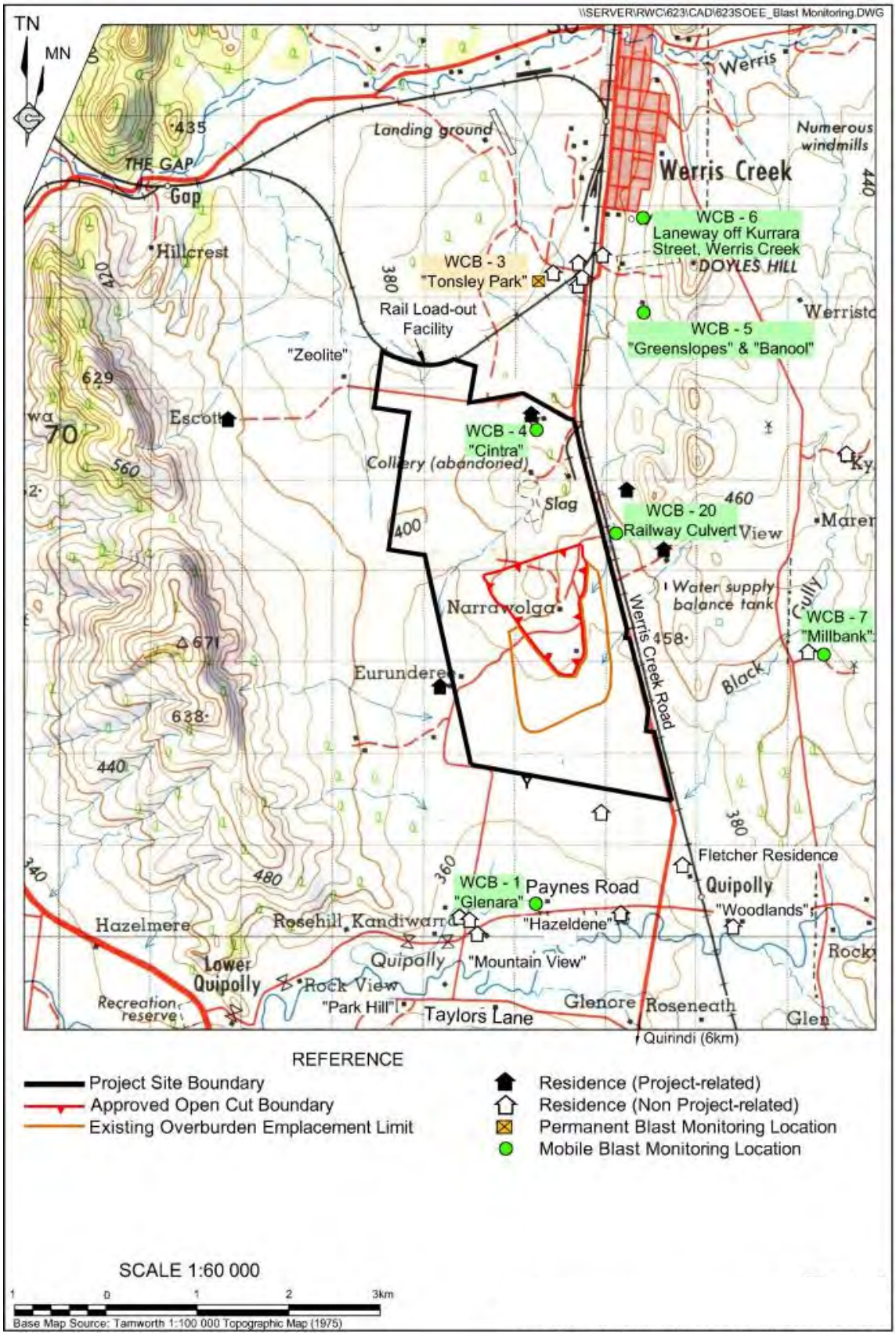


Figure 3.10 WCC Blast Monitoring Program

Table 3.22 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 Performance

During the reporting period, a total of 102 blasts were fired by the blast contractor, Orica Mining Services. The number of blasts has reduced from the previous year as fewer blasts improve production efficiency. There were no exceedances of the maximum limit of 10mm/s or 120dB(L) for the period at any privately owned residences (**Table 3.23**). There were only two blasts for the whole period that recorded results above 5mm/s or 115dB(L), both at Cintra with the first on the 15th June 2010 measuring 118.0dB(L) and 24th November 2010 recording 115.5dB(L). This is marginally above what was predicted in the *"Statement of Environmental Effects for a Modification to the Mining Area and Related Activities at the Werris Creek Coal Mine"* (R.W. Corkery & Co. Pty Ltd, 2009), however Cintra is now a project related property since it was purchased in March 2010. The blast results at other locations are consistent with the levels originally predicted. No blasts were missed at any monitoring location during the period. Detailed blast monitoring results are included in **Appendix 6**.

Table 3.23 WCC 2010-2011 Blast Monitoring Results Summary

Month	Blasts		Glenala		Marengo*		Tonsley Park		Cintra*		Werris Creek	
			mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)
April 2010	8	Ave	<0.37	<111.9	1.01	104.2	0.61	100.0	0.96	104.4	NM	NM
		Max	<0.37	<111.9	1.45	109.5	0.90	106.6	1.25	110.4	NM	NM
May 2010	13	Ave	<0.37	<111.9	0.60	104.8	0.75	100.4	0.94	105.1	NM	NM
		Max	<0.37	<111.9	0.70	109.0	1.08	107.1	1.49	110.2	NM	NM
June 2010	12	Ave	<0.37	<111.9	0.48	106.0	0.75	103.0	0.95	108.5	NM	NM
		Max	<0.37	<111.9	0.54	110.1	1.03	110.0	1.60	118.0	NM	NM
July 2010	11	Ave	<0.37	<111.9	0.07	112.9	0.68	105.4	1.18	112.8	<0.37	<111.9
		Max	<0.37	<111.9	0.07	112.9	0.98	111.1	1.50	117.7	<0.37	<111.9
August 2010	8	Ave	0.10	114.7	0.25	108.6	0.56	103.2	0.48	108.9	<0.37	<111.9
		Max	0.10	114.7	0.42	112.2	0.83	109.7	1.49	114.3	<0.37	<111.9
September 2010	8	Ave	<0.37	<111.9	NM	NM	0.67	105.8	0.94	110.8	<0.37	<111.9
		Max	<0.37	<111.9	NM	NM	1.05	107.2	1.17	112.0	<0.37	<111.9
October 2010	9	Ave	<0.37	<111.9	NM	NM	0.62	102.1	0.87	109.7	<0.37	<111.9
		Max	<0.37	<111.9	NM	NM	0.97	113.3	1.12	113.7	<0.37	<111.9
November 2010	10	Ave	<0.37	<111.9	NM	NM	0.71	101.3	0.80	108.5	<0.37	<111.9
		Max	<0.37	<111.9	NM	NM	1.00	105.6	2.39	115.5	<0.37	<111.9
December 2010	6	Ave	<0.37	<111.9	NM	NM	0.82	101.0	0.51	103.6	<0.37	<111.9
		Max	<0.37	<111.9	NM	NM	1.32	109.0	0.75	113.8	<0.37	<111.9
January 2011	5	Ave	NM	NM	NM	NM	0.45	107.3	0.89	112.4	<0.37	<111.9
		Max	NM	NM	NM	NM	0.55	109.1	1.47	114.2	<0.37	<111.9
Annual		**Ave**	-	-	**0.48**	**107.3**	-	-	-	-	-	-

Month	Blasts		Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek	
			mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)	mm/s	dB(L)
February 2011	6	Ave	NM	NM	0.70	110.1	0.72	102.2	1.07	107.8	0.51	94.1
		Max	NM	NM	0.70	110.1	1.10	109.5	1.82	113.0	0.51	94.1
March 2011	6	Ave	NM	NM	1.04	100.6	0.76	95.2	0.86	104.0	0.45	97.0
		Max	NM	NM	1.07	101.5	1.01	100.2	1.44	110.3	0.48	99.8
Annual	**102**	**Ave**	**0.10**	**114.7**	**0.59**	**106.7**	**0.68**	**102.2**	**0.87**	**108.0**	**0.48**	**95.6**
		Max	**0.10**	**114.7**	**1.07**	**110.1**	**1.32**	**113.3**	**2.39**	**118.0**	**0.51**	**99.8**

* Indicates project related properties not subject to blasting criteria; NM – Not monitored.

3.8 OPERATIONAL NOISE

3.8.1 Management

The noise emission criteria applicable to WCC are outlined in EPL 12290 and DA 172-7-2004 Schedule 4 Conditions 7 and 8 (**Tables 3.24** and **3.25**) as summarised below:

EPL 12290 L6.1 Noise from the premises must not exceed:

- an $L_{A1(1\ minute)}$ noise emission criteria of 45 dB(A) at night; and
- At all other times (including at night), a $L_{Aeq\ (15minute)}$ noise emission criterion of 35 dB (A), except as expressly provided by this licence.

The noise emission criteria in L6.1 apply under all meteorological conditions except:

- during rain and wind speeds (at 10m height) greater than 3m/s; and
- Under "non-significant weather conditions".

Table 3.24 Noise Impact Assessment Criteria dB(A) at any residence on privately owned land

Day $L_{Aeq(15\ minute)}$	Evening $L_{Aeq(15minute)}$	Night $L_{Aeq(15minute)}$	Night $L_{A1(1\ minute)}$
35	35	35	45

Table 3.25 Rail Shunting Noise Criteria dB(A) at any residence on privately owned land

Day / Evening / Night Leq(24 Hour)	Day / Evening / Night LA(Max)	Property
55	80	Any residence on privately owned Land

The WCC noise monitoring program undertakes three 15 minutes noise measurements corresponding to the day, evening and night time periods at six properties as outlined in **Figure 3.11**.

A revised Noise Monitoring Program was approved by DoP and DECCW in December 2010 for amended monitoring locations following property acquisitions and procedures for continuous noise monitoring and truck operation noise mitigation. Key operational noise management undertaken by WCC includes:

- Specific mining activities are only undertaken within the allowed Stage 2 operating hours as outlined in Schedule 4 Condition 15 of DA 174-7-2004 and EPL 12290;
- Regular and preventative maintenance scheduling of mining equipment to ensure that sound power levels specified in the Noise Management Protocol are achieved;
- 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);

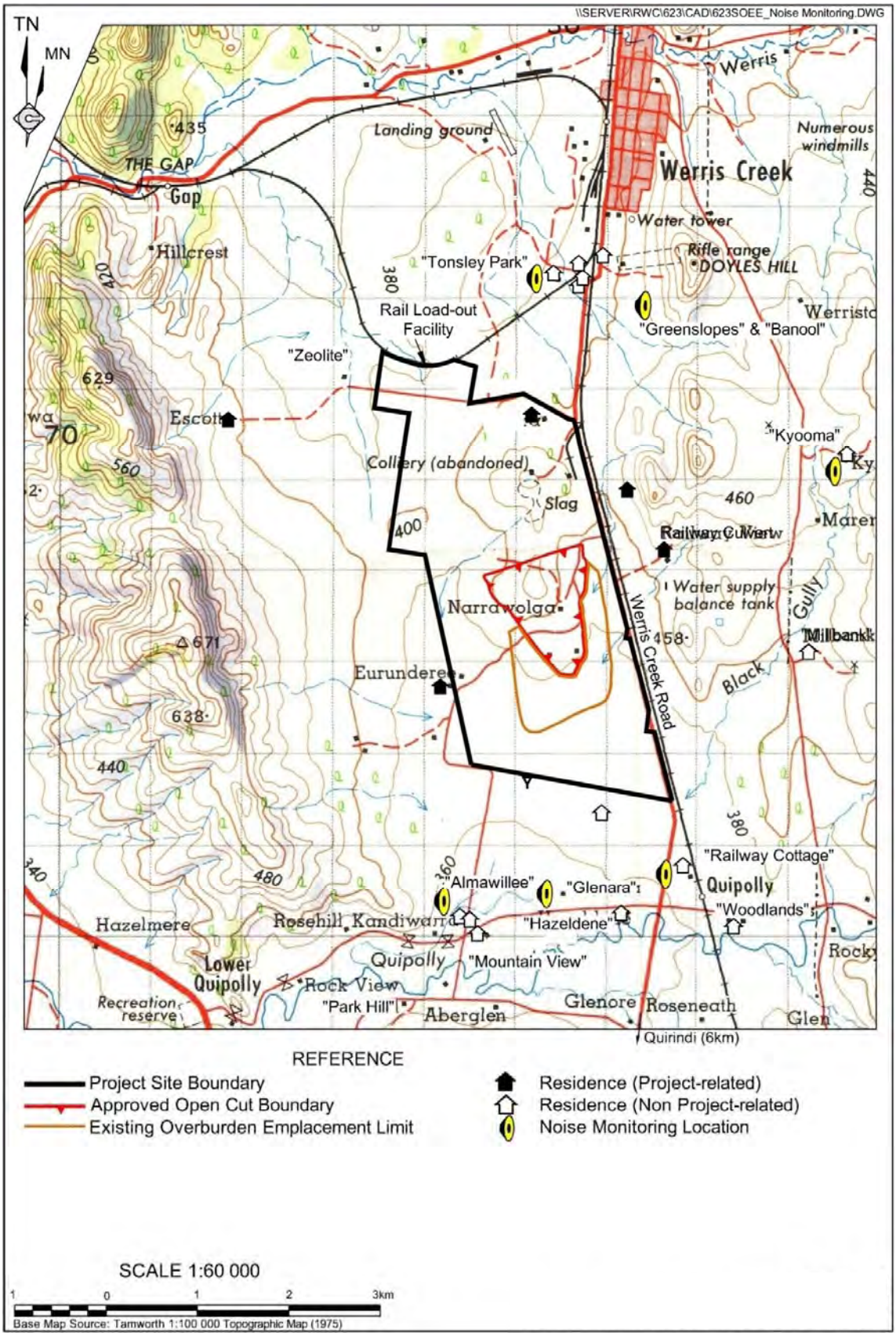


Figure 3.11 WCC Noise Monitoring Locations

- Implementation 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 so that when necessary modifications to the mining operations can occur;
- 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 operator 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.

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 3.26** with full reports provided in **Appendix 7**. The noise levels are for WCC noise sources only excluding other ambient noises. Adverse weather conditions at WCC resulted in numerous occasions in 2010-2011 where noise levels from mining operations were elevated above the 35dB(A) criteria. WCC have investigated additional noise mitigation methods as part of the "Life of Mine" Project such as noise attenuation of trucks and dozers that modelling indicates WCC would be able to achieve 35dB(A) criteria at neighbouring properties under all weather conditions.

Table 3.26 WCC Noise Monitoring Results for 2010-2011

Month	Period	Almawillee	Glenara	Cintra*	Marengo*	Tonsley Park	Railway Cottage
April 2010	Day	17	Inaudible	20	<15	Inaudible	<15
	Evening	30	34	35	Barely audible	35	31
	Night	20	26	42	Inaudible	29	25
May 2010	Day	Inaudible	Inaudible	38	Inaudible	Inaudible	Inaudible
	Evening	36#	34#	40#	24#	Inaudible#	Inaudible#
	Night	37#	32#	39#	30#	Inaudible#	31#
June 2010	Day	Inaudible	Inaudible	35	Inaudible	Inaudible	Inaudible
	Evening	35#	39#	43#	Inaudible#	37#	36#
	Night	30#	32#	32#	25#	30#	33#
July 2010	Day	Inaudible	Inaudible	36	Inaudible	33	Inaudible
	Evening	28#	<25#	34#	Inaudible#	<30#	Inaudible#
	Night	Inaudible#	Barely audible#	36#	Inaudible#	<25#	30#
August 2010	Day	Barely audible	Inaudible	<30	35	Inaudible	Inaudible
	Evening	29#	<30#	30#	40#	Inaudible#	33#
	Night	Inaudible#	Barely audible#	33#	38#	32#	Inaudible#

Month	Period	Almawillee	Glenara	Cintra*	Marengo*	Tonsley Park	Railway Cottage
September 2010	Day	30	34	34	27	Inaudible	Inaudible
	Evening	25	28	25	37	32	27
	Night	<20	30	27	38	32	31
October 2010	Day	32	25	40	30	28	Inaudible
	Evening	Barely audible#	**36**	38#	32#	40#	33#
	Night	Inaudible#	Inaudible#	41#	40	36#	Barely audible
November 2010	Day	Inaudible	25	40	Barely audible	34	Inaudible
	Evening	Inaudible#	Inaudible#	38#	30#	31#	Inaudible#
	Night	30	<30#	36	<25	<24	<30
Month	**Period**	**Almawillee**	**Glenara**	**Railway Cottage**	**Tonsley Park**	**Greenslopes**	**Kyooma**
December 2010	Day	30	33	Inaudible	Inaudible	Inaudible	Inaudible
	Evening	38#	38#	39#	Inaudible#	Inaudible#	Inaudible#
	Night	34#	33	33#	Inaudible#	Inaudible#	Inaudible#
January 2011	Day	Inaudible	Inaudible	Inaudible	Inaudible	Inaudible	<20
	Evening	Inaudible#	Inaudible#	Inaudible#	Inaudible#	Inaudible#	Inaudible#
	Night	Inaudible#	Inaudible	Inaudible	Inaudible	Inaudible	Inaudible
February 2011	Day	Inaudible	20	Inaudible	Inaudible	Inaudible	27
	Evening	Inaudible#	Inaudible#	Inaudible#	25#	26#	Inaudible#
	Night	Inaudible#	<20	Inaudible	Inaudible	Inaudible	Inaudible
March 2011	Day	Inaudible#	<25#	Inaudible#	<25#	36#	37#
	Evening	Inaudible#	Inaudible#	Inaudible#	36#	40#	38#
	Night	Inaudible#	Inaudible#	Inaudible#	34#	42#	38#

Bold Text – Exceedance of noise limit* Project related property; # Temperature Inversion >3°C/100m or Wind Speed >3m/s

During the period, attended noise monitoring identified one exceedance of noise criteria summarised in **Table 3.27** on the 27th October 2010 at the privately owned "Glenara" property, located approximately 2.5km south of the mine site. The attended noise monitoring period started at 8:08pm and recorded an Leq 15 minute noise level at 40dB(A), of which the specific contribution by WCC operations was measured to be 36dB(A). Prior to the evening period a moderate north-north westerly wind predominated during the daylight hours, however between 8pm and 10pm, a significant weather change was recorded by the onsite meteorological station with the wind conditions becoming suddenly calm before a strong southerly wind picked up and continued right through the night and the following day. It was during this calm period at 8:08pm that the attended noise monitoring measured the slight exceedance at the "Glenara" property.

Table 3.27 Summary of Noise Exceedances for 2010-2011

Location	Date	Time	Inversion °C/100m	Wind Speed/ direction	Noise Level dB(A)	
					Ambient	WCC only
Glenara	27/10/2010	8:08 PM	<3	Calm	40	36

The investigation into the incident found that all excavators were appropriately located for night time operations either in pit or for the 1900 excavator in Strip 13 had a 20m high wall to the north and east of its work area. The night shift dump location was moved towards the centre of the overburden emplacement area at RL430m to maximise the shielding of noise emissions by the upper levels of the overburden emplacement to RL445m.

The “Glenara” evening noise exceedance was an isolated occurrence as it was the only elevated noise result measured for the southern (Quipolly) monitoring locations with all other monitoring locations/periods recording noise levels below 35dB(A). The slight exceedance measured at the “Glenara” property (36dB(A)) was less than the ambient noise recorded to be 40dB(A) Leq at the property and was the same noise level given to traffic noise from Werris Creek Road (~1km east). The “Glenara” property owners and DECCW were promptly notified of the noise exceedance. No complaint was received from the property owner or from other neighbours on that night. DECCW replied accepting that Werris Creek Coal have diligently implemented a range of noise management protocols in an attempt to appropriately manage noise impacts on the receptors located to the south of the mine site and given the short duration and minor nature of the exceedance, DECCW did not intend to take any further action with respect this matter.

3.9 VISUAL AMENITY

3.9.1 Management

Various mining activities and/or features of the Werris Creek Coal Mine 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. Where practical the mine has been designed to minimise the duration and/or extent of any visual impact.

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

- Tree screen plantings along the south-east margin of ML 1563 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.

3.9.2 Performance

With the acquisition of all private neighbouring properties with direct views into the pit, the visual impacts of the operation on surrounding landholders has been substantially reduced. Also the tree screens and visual bunds installed along Werris Creek Road during the previous period have been stabilised and planted out becoming effective at mitigating passing views of the mining operations.

During the reporting period there were a number of complaints made in regard to visual impact from lighting plants with WCC now documenting inspections and lighting plant locations to mitigate the risk of direct offsite lighting. In addition, WCC has also worked on developing a lighting monitoring camera to be set up in Werris Creek aimed at the mine to capture what lights were visible at what times.

3.10 CULTURAL HERITAGE MANAGEMENT

WCC manage cultural heritage issues and impacts through the Archaeological & Cultural Heritage Management Plan which allowed for the relocation of the "Narrawolga" Site undertaken in March 2007 in accordance with Condition 45A of DA 172-7-2004 MOD 2. The storage area for the axe grinding grooves is located adjacent to the mine site and has been fenced off with the actual "grooved" rocks supported on crusher dust to provide stability to the blocks. Tarps have been installed over the grooves to protect the rocks from additional weathering. Members of the aboriginal community inspected the "Narrawolga" axe grinding grooves during the June 2010 Life of Mine Project cultural heritage survey and were satisfied that the grooves were not being impacted at their storage location and the area is being maintained.

At the completion of mining and rehabilitation, the Archaeological & Cultural Heritage Management Plan allows for the axe-grinding grooves to be returned to their original location adjacent to the current site facilities, in consultation with the local Aboriginal community.

3.11 EUROPEAN HERITAGE

With the removal of the "Narrawolga" residence, there are no other buildings located on the mine site or items that would have any heritage status.

3.12 SPONTANEOUS COMBUSTION

3.12.1 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 EIS 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.

3.12.2 Occurrence and Management

There were no reported instances of spontaneous combustion (sponcom) on site during the reporting period. 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 are recorded.

A procedure for the minimisation of spontaneous combustion occurrences on site is also listed under page 10, point xiv, of the current Bushfire Management Plan and under section 5.13.2 of the Stockpile Management Procedure for WHC.

3.13 BUSHFIRE MANAGEMENT

The Bushfire Management Plan was completed and forwarded to Department of Planning on 3rd August 2007. During the commissioning of this document consultation between the Werris Creek

Rural Fire Service and WCC staff was undertaken. Members of the Rural Fire Service were inducted onto the site and provided input into the development of the Bushfire Management Plan.

At this stage the procedural use of the management plan has not been used as the site has not experienced a bush fire since the management plans conception.

3.14 MINE SUBSIDENCE

Mine subsidence is not considered an issue at the Werris Creek Coal Mine. The presence however of the old underground workings known as Werris Creek Colliery has resulted in the commissioning of survey investigations to more accurately define the location and extent of these former workings.

3.15 HYDROCARBON CONTAMINATION

3.15.1 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.

If any major spillage were to occur, they would be treated in accordance with the three-phase system identified in the approved Groundwater Contingency Plan.

3.15.2 Performance

There were no reported hydrocarbon incidents during the period.

3.16 METHANE DRAINAGE / VENTILATION

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

3.17 PUBLIC SAFETY

3.17.1 Management

WCC is located 4 km south of Werris Creek Township and is accessed from Werris Creek Road. The access road into the mine is locked when no mine-related personnel are at the mine. The site is fenced and appropriate signs are installed.

Trucks carrying product coal to the Rail Siding are required to travel at low speed through the intersection with Escott Road, after giving way to any approaching traffic travelling along Escott Road. Signs are installed along Escott Road and adjacent to the rail load-out road at the intersection. Gates are positioned on either side of Escott Road and are locked to prevent public access outside of operational hours.

Employees are inducted in safe working practices and regular follow-up safety meetings, toolbox talks and reviews are held.

Visitors to the mine are required to report to the mine office and unauthorised personnel are not permitted to move around the mine area unaccompanied. WCC conducts site visits as required for approved visitors. Procedures are in place to ensure the area around each blast site is clear of personnel and that all surrounding residents are advised in advance of proposed blasts.

3.17.2 Performance

The procedures in place have been effective throughout the reporting period, however two complaints were received regarding the potential for unauthorised access to the mine site by children on weekends. WCC thoroughly investigated the matter, with staff present onsite on weekends or other passersby to the site not being able to verify the presence of children. However in response to the complaints and direction received from I&I NSW, WCC increased security patrols on weekends as well as establishing a protocol for closing the main site access gate during periods of limited operations. There has been no other examples of unauthorised access prior to or since the complaints were made in February 2011.

3.18 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.

3.19 METEOROLOGICAL MONITORING

WCC maintain an onsite weather station in accordance with EPL 12290 requirements. During the period, WCC relocated the weather station in September 2010 from the northern prestrip to the top level of the overburden emplacement as well as upgrading the communication software to enable weather data to be linked with the mobile continuous noise monitoring trailer. Not only does the software upgrade improve the reliability of the weather station with the data available real time over the internet, but the calculation of temperature inversions has improved. The previous weather station was only able to calculate a temperature inversion by inferring the lapse rate between the 2m and 10m temperature probes over a 100m elevation. The new system enables the onsite weather

station located at RL445.5m with the 10m probe at RL455.5m to compare temperatures with the mobile noise trailer when it is located in the Quipolly valley at RL360m, an elevation difference of 95m and when extrapolated to 100m there is minimal error.

Table 3.28 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. Overall the 12 month period to the end of March 2011, WCC was well above the mean rainfall for Quirindi historically, 817.4mm versus 684mm respectively and 210mm more than the rainfall in the previous year. Significantly nine months of the year were near to or well above the longterm Quirindi monthly averages. The temperatures recorded onsite were consistent with the long-term averages with July and January the coldest and hottest months respectively. The 90th percentile night time lapse rates (worst case temperature inversions) are presented below since monitoring commenced in September 2010.

Table 3.28 Rainfall and Temperature Records for 2010-2011 period

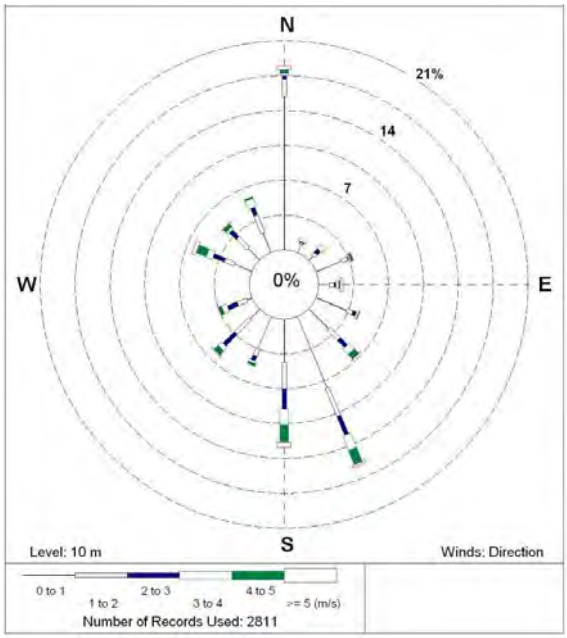
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec*	Jan*	Feb	Mar*	Total
Rainfall (mm)		25.6	41.4	37.0	110.2	72.2	40.6	60.6	99.8	110.0	78.2	86.0	55.8	817.4
BOM Average (mm)		42.0	44.4	51.3	48.5	45.4	46.6	60.7	64.8	80.9	80.7	65.1	53.0	683.8
Temperature	**WCC Min (°C)**	5.9	0.6	-1.6	-0.5	-0.2	4.4	3.3	7.8	8.7	15.4	12.2	12.5	5.7
	WCC Avg (°C)	18.1	13.4	10.0	10.4	10.2	14.9	17.0	19.7	21.7	26.4	25.7	21.9	17.5
	WCC Max (°C)	28.2	25.4	19.7	19.5	21.1	24.4	27.4	29.7	34.7	40.1	36.8	33.2	28.4
	Q BOM Min (°C)	8.9	5.1	2.8	1.6	2.4	5.0	8.7	11.9	14.8	16.4	16.1	13.5	8.9
	Q BOM Max (°C)	24.9	20.5	16.6	15.9	17.9	21.5	25.2	28.5	31.2	32.2	31.3	29.3	24.6
90% Lapse (°C/100m)		-	-	-	-	-	7.9	6.3	4.3	4.7	6.8	3.6	4.6	5.5

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. * December & January temperature data is a composite of the old and new meterology stations. December, January & March rainfall is a compositive of the Sentinex meterology stations of onsite with noise trailer data.

Weather station reliability for the reporting period was greater than 97%. During September, the weather station was physically relocated from the former position to the top of the overburden emplacement and was not recording data for a 6 day period. For December and January, the old meteorology equipment was run in parallel with the new meteorology system so that no data was missed during this wet commissioning period.

Wind speed and direction data is collected from the WCC meteorological station in 15 minute intervals for use to monitor environmental impacts for operations and/or specific activities undertaken at WCC. From **Figure 3.12**, WCC has a prevailing NW and SE wind axis with the former direction prevailing during winter and early spring, with the latter direction prevalent for the remainder of the year. The October and November windrose's were found to be approximately 45^{o} to the east off north following the relocation of the meteorology station and was correctly orientated at the start of December.

Detailed meteorological results for each month of the reporting period are presented in **Appendix 8**.



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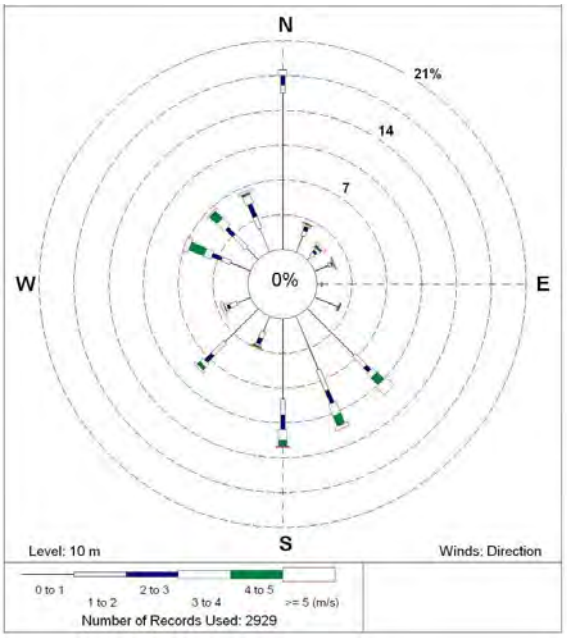

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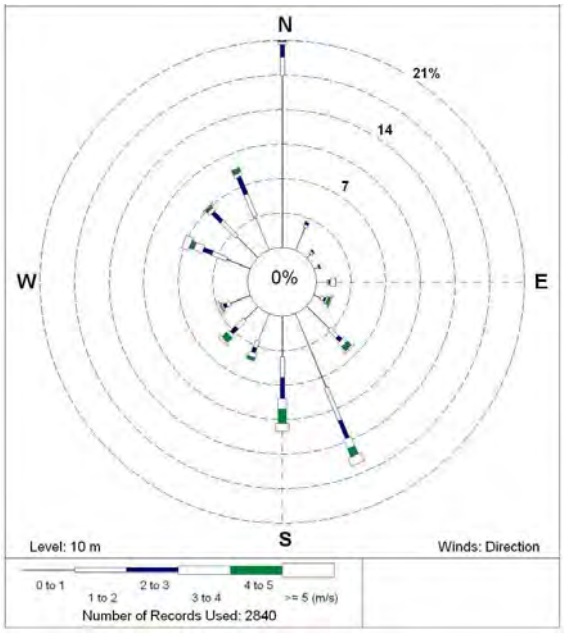

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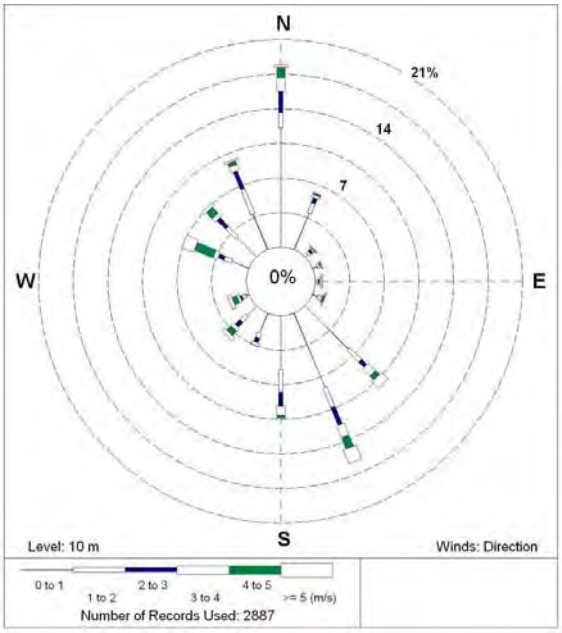

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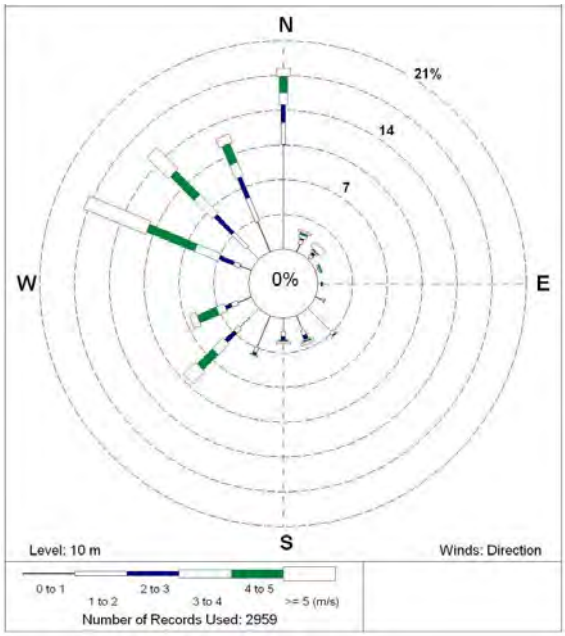

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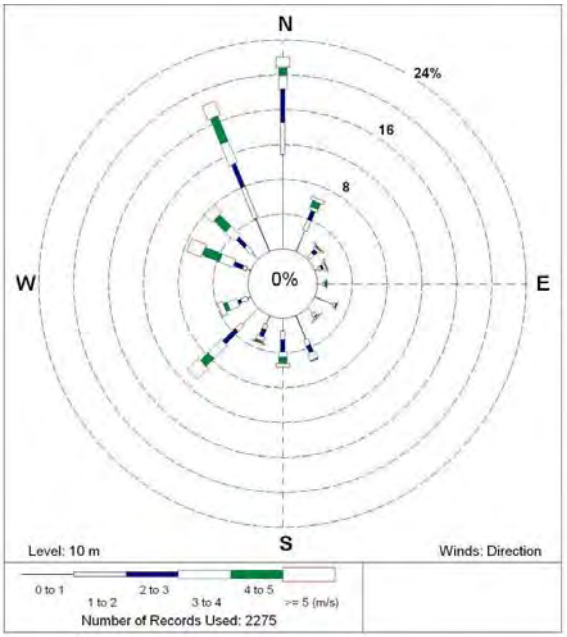

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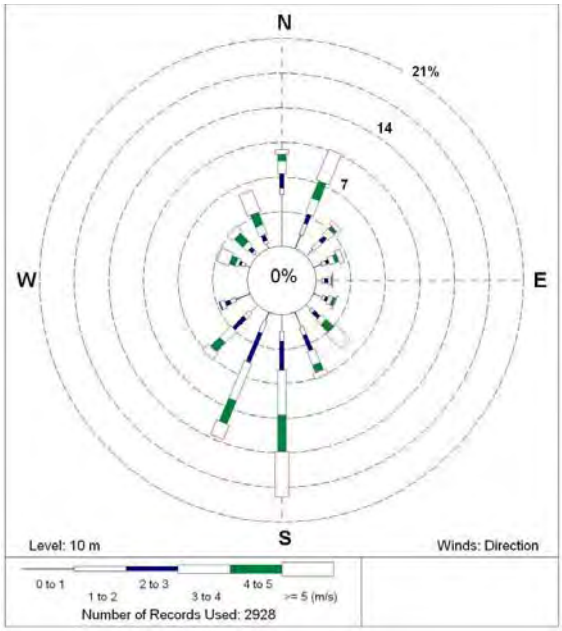
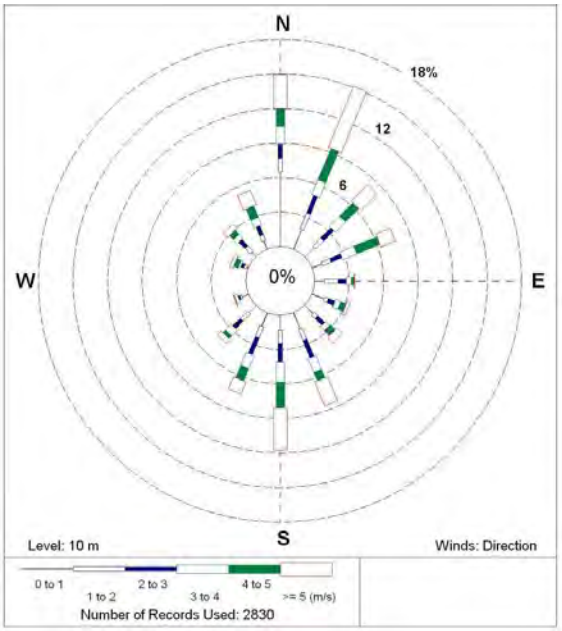


October 2010



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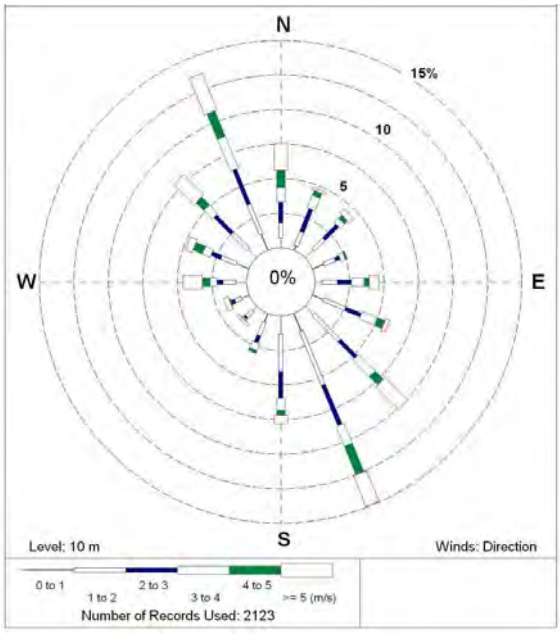

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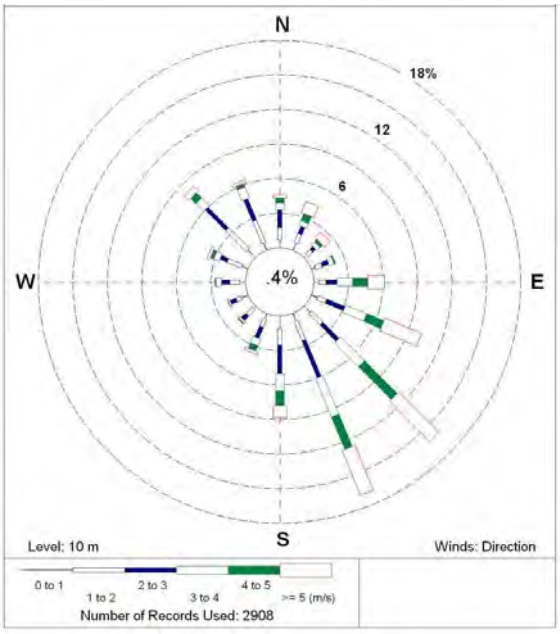

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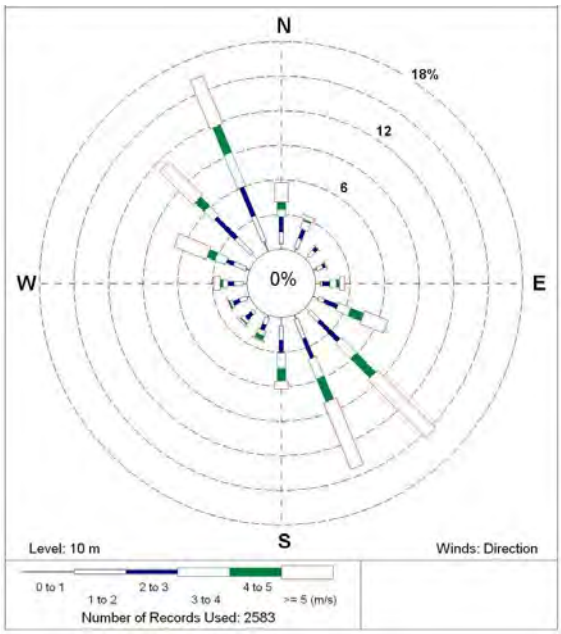

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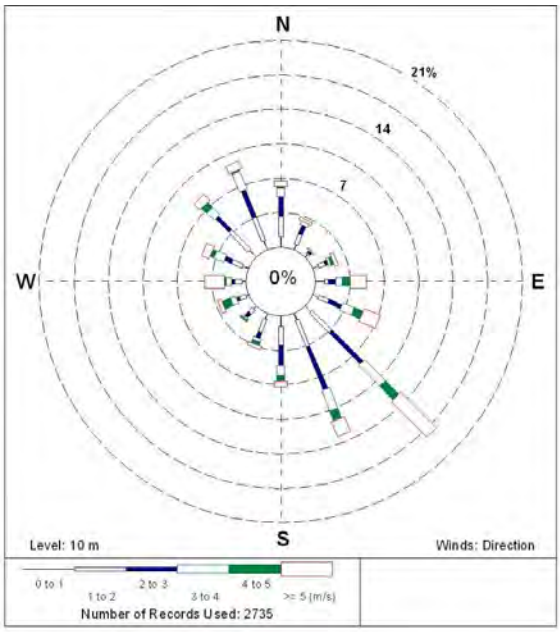

March 2011

Figure 3.12 WCC Windroses for April 2010 to March 2011

4.0 COMMUNITY RELATIONS

4.1 ENVIRONMENTAL COMPLAINTS

WCC maintains a designated community complaints line on the (02) 67687001 which is regularly published via community newsletters, in the Werris Creek Flyer and signposted on the front entrance to the mine site. During the period, the community complaints line was upgraded from a recorded message bank to a PABX based system that the callers can determine whether to be directly transferred to the Environmental Officer, transferred to the Open Cut Examiner on shift for instantaneous operation response or leave a message for the Environmental Officer to return during business hours. In the event of a complaint, details pertaining to the complainant, nature of the complaint are recorded on a "Complaints Form" and with the details of the investigation and any action taken also recorded on the form.

For the 2010-2011 period there were 52 complaints received by WCC, which is a significant increase from the previous years (**Figure 4.1**). 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 the population of 1500. **Figure 4.2** demonstrates the trend of complaints away from adjacent property owners (all subsequently acquired by WCC) and Quipolly residents in 2005-2006 and 2006-2007; to greater than 80% of complaints are from Werris Creek residents in 2010-2011. Also during the period, WCC undertook a consultation program including a Community Open Day for the "Life of Mine" Project, the mine also increased the height of the overburden emplacement dump by 35m and expanded the dump footprint towards Werris Creek Road. All of these instances would have increased local residents (particularly in Werris Creek) awareness of WCC.

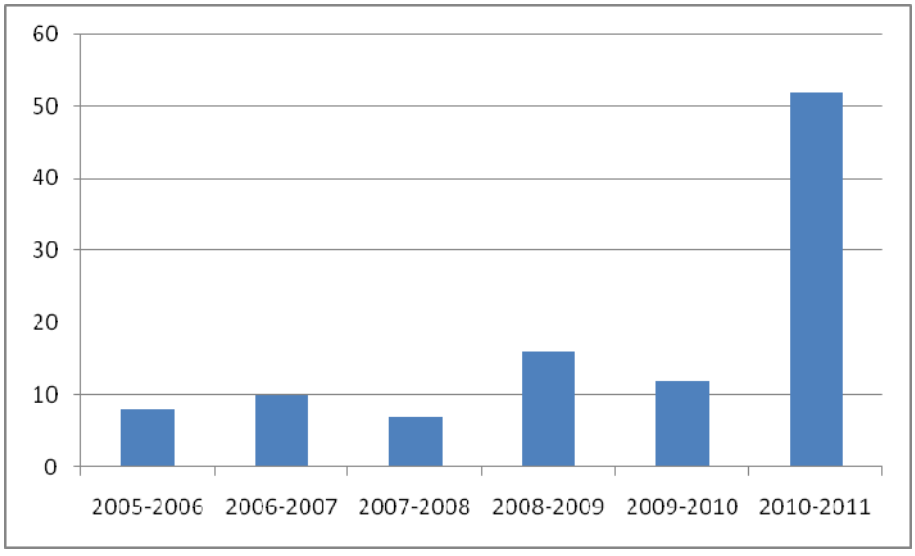

Figure 4.1 Total Number of Complaints Received by WCC from 2005-2006 to 2010-2011

The most common complaint issue for 2010-2011 was blasting (overpressure/vibration) with lighting and noise (mine and rail load out facility) the next most common. As seen in **Table 4.1**, blasting and noise issues have been the most common complaints for WCC since the mine commenced in 2005.

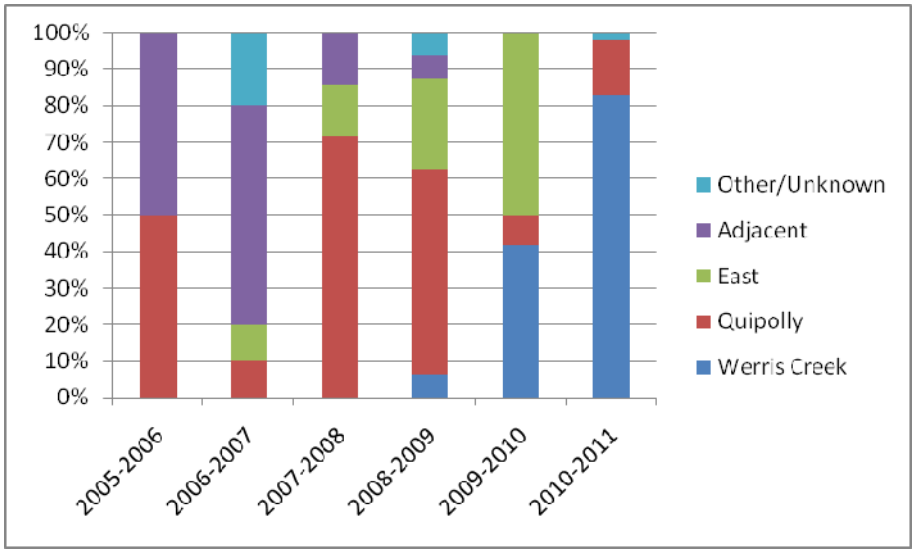

Figure 4.2 Locations of Complaints Received by WCC 2005 to 2011

Table 4.1 WCC Complaint Issues from 2005 to 2011

Issue	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Blast - Vibration/ Overpressure	3	4	1	2	7	22
Lights	1	1	1	-	-	15
Noise - Mine	1	3	4	10	4	6
Noise - RLO	-	-	-	-	-	7
Dust - Mine	1	2	-	3	-	5
Dust - RLO	-	-	-	1	-	-
Groundwater - Level	1	-	-	-	-	3
Blast - Dust/Fume	-	-	-	-	2	3
Site Security	-	-	-	-	-	2
Clearing	-	-	-	-	-	1
Surface Water	1	-	2	-	-	-
Trains	-	1	-	-	-	-
Complaints Line	-	1	-	-	-	-

Of the 52 complaints received in the reporting period, 28 complaints came from one resident at Werris Creek. There were four other complainants who made multiple complaints and 13 complainants with an individual complaint (**Figure 4.3**). The one complainant with 28 individual complaints in 2010-2011 has privately and publicly stated that they want the mine to purchase their property. While this one major complainant has influenced the complaints analysis, it is still noted by WCC that there were 11 other complainants from Werris Creek in 2010-2011, all of which are first time complainants.

During 2010-2011, WCC have made a concerted effort to address, where possible, all the issues raised by complaints. While not every complainant has had each complaint satisfactorily resolved to their liking, WCC have implemented significant procedural and practice changes during the reporting period in recognition of community concerns, particularly of Werris Creek residents, as mining operations have increased production levels and progresses closer to town. A summary of changes and other actions WCC have made responding to complaints include:

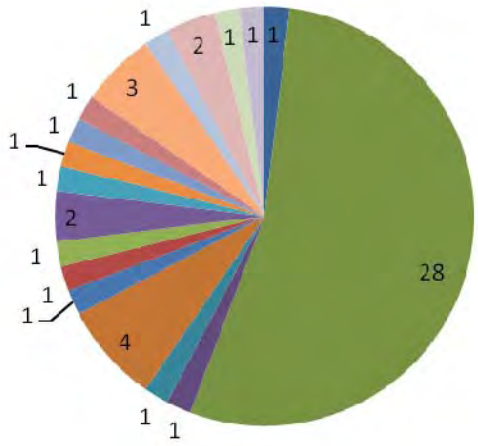

Figure 4.3 Number of Complaints per Complainant for 2010-2011

- The contracted Orica blasting engineers reviewed their blasting practices of shots with minimal burden that present an elevated overpressure result risk. A change to thru-seam blasting on the steeply dipping sections of the mine has removed the need to undertake wedge shots which were attributed to four complaints results during the period. Also the blasting of oversize rocks has improved with shots now undertaken in pit (if a rock is found on the prestrip it is pushed in pit) and only using detonators to crack rocks instead of explosives. The blasting review is continuing to further determine if other changes can be made to address the perceived impacts of blasting by the Werris Creek community;

- Voluntarily hiring a continuous noise monitor to monitor real time mining operational noise levels, then purchasing a permanent mobile trailer mounted continuous noise monitoring system after becoming a requirement of EPL 12290;

- Developing a "Noise Management & Mitigation Procedure" for integrating noise planning into nightly operational scheduling as well as implementing a response system to alarms generated by the continuous noise monitor when noise levels approach compliance limits incorporated into the revised Noise Management Protocol;

- Developing a "Truck Operation Noise Management Procedure" to specifically educate operators of methods to mitigate unnecessary truck revving and fan hum noise emissions incorporated into the revised Noise Management Protocol;

- Undertaken structural inspections of complainant's homes following allegations of damage due to blasting. Findings to date have identified that vibration levels are well below levels that could cause damage and that any damage is more likely due to reactive clay soils that are common in the Liverpool Plains area;

- Revised the Blast Monitoring Program to include new monitoring locations on the southern edge of Werris Creek;

- Implemented night shift inspections by the Open Cut Examiner of lighting plants from community locations including Werris Creek;

- Developed an industry first Visual Lighting Monitoring system to monitor night time lighting exposure in Werris Creek; and

- Increased the number of bores being monitored located on Quipolly properties as part of the groundwater monitoring network.

A summary of the nature of each complaint, the investigation and response for 2010-2011 are presented in **Appendix 9**.

4.2 COMMUNITY LIAISON

There have been 18 Community Consultative Committee (CCC) meetings held since WCC commenced operations in 2005 with details of the meetings held summarised in **Table 4.2**.

Table 4.2 Community Consultative Committee Meetings since 2005

AEMR Reporting period	No. of meetings	CCC meeting dates	No. Of Attendees
1 June 2005 - 31 March 2006	2	23 June 2005 13 October 2005	11 (5 community representatives) not recorded
1 April 2006 - 31 March 2007	1	22 August 2006	9 (3 community representatives)
1 April 2007 - 31 March 2008	4	14 June 2007 28 August 2007 13 December 2007 21 February 2008	7 (2 community representatives) 6 (1 community representatives) 10 (6 community representatives) 9 (5 community representatives)
1 April 2008 - 31 March 2009	4	5th June 2008 4th September 2008 17th February 2009 12th March 2009	9 (4 community representatives) 8 (4 community representatives) 10 (4 community representatives) 7 (3 community representatives)
1 April 2009 - 31 March 2010	3	29th July 2009 19th November 2009 11th March 2010	7 (3 community representatives) 10 (5 community representatives) 9 (4 community representatives)
1 April 2010 - 31 March 2011	4	27th May 2010 16th September 2010 25th November 2010 24th February 2011	10 (4 community representatives) 10 (5 community representatives) 10 (4 community representatives) 4 (2 community representatives)

The frequency of meetings during the 2010-2011 reporting period was held every quarter during the year for a total of four CCC meetings. The meetings were generally well attended, except for the February 2011 meeting which had a number of late apologies due to personal or farming commitments. The meetings continue to have strong representation from the Liverpool Plains Shire Council and local community members in attendance willing to participate. CCC members are provided with the quarterly environmental monitoring data for the previous three months before each meeting and an agenda is circulated with a number of mine related topics discussed with enthusiasm during the meetings. Every second meeting a tour of the mine is given prior to the meeting.

Also during the 2010-2011, WCC released three community newsletters for the Winter, Spring and Summer periods. The local scouts group was used to deliver the two page colour newsletter and was

appreciated by some members of the community that WCC was taking the time to improve communication and transparency of its operations.

4.3 EMPLOYMENT STATUS, DEMOGRAPHY, SOCIO-ECONOMIC CONTRIBUTIONS

4.3.1 Employment Status and Demography

Due to the increase in mining activities, employment and contractors onsite increased during the period. WCC currently employees 87 full-time equivalent personnel, with a further 20 full-time casual staff employed at the mine. Of the full-time employees, 37 live locally in the Liverpool Plains Shire with the majority of the regular contractors based in Werris Creek or Quirindi.

4.3.2 Social and Economic Contributions

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

In additional to the direct social and economic contribution, during the past 12 months WCC has contributed over $20,000 to events and services in the local area including:

- Westpac Rescue Helicopter;
- Werris Creek Community Shed;
- Werris Creek Signal Singers;
- Spring Ridge Rural Fire Brigade;
- Werris Creek Pre-School;
- Werris Creek Hospital;
- Werris Creek Variety Club Bash participants;
- Quirindi Show 2010; and
- Currabubula Red Cross Art Show.

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.

5.0 REHABILITATION

Rehabilitation requirements at WCC following open cut mining and other activities associated with the mining process will be implemented to achieve the rehabilitation objectives specified within **Table 5.1**.

Table 5.1 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-instated Class III Land Capability commensurate with the agricultural land use on and adjacent to WCC; • To re-instated 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 woodland:
    - White Box, Yellow Box, Blakely's Red Gum (Box Gum) Woodland; and
    - Brigalow Community.

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 **Figure 5.1** and **Table 5.2** provides a progressive rehabilitation target up to and after the completion of mining.

Rehabilitation strategies have been developed to target achieving sustainable final land uses as identified above by restoring within rehabilitation areas:

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

Table 5.2 WCC Rehabilitation Program

Land Use	2010 (ha)	2011 (ha)	2012 (ha)	2013 + (ha)	TOTAL (ha)
Class III Land Capability	0	0	0	34	34
Box Gum Woodland	44	27	57	79.5	207.5
Brigalow Community	0	7.5	0	9	16.5

Note: Based on draft Landscape Management Plan to be finalised based on consultation/feedback from government agencies

Figure 5.1 WCC Rehabilitation Schedule and Revegetation Planning

5.1 BUILDINGS

There have been no additions/changes to buildings on site. No additional buildings have been removed and therefore no rehabilitation of building sites was necessary during the reporting period.

5.2 REHABILITATION PERFORMANCE

During the period, works across the southern, eastern and western rehabilitation and road side areas were undertaken. In total, 17.91ha of final rehabilitation to Box Gum Woodland plus 2.82ha of Box Gum Woodland tree screen planting and 8.09ha of temporary (cover crop sown) rehabilitation was established with a summary of the individual rehabilitation programs outlined in **Table 5.3** and **Figure 5.2**.

Table 5.3 WCC Rehabilitation Program Summary 2010-2011

Domain:	3	**Sub Domain:**	1009WCCTS1	**Reveg Date:**	September 2010	**Area:**	1.4ha
Name:	LOM Woodland Tree Screen	**Land Use:**	Tree Screen	**Seed/Plant:**	Woodland & quick growing species		
Description/Methodology: Site preparation involved fencing out cattle in a paddock a 30m wide belt from Werris Creek Road around to Cintra Hill to establish a tree screen ahead of the Acoustic Bund required for the LOM Project. Five rows were ripped to 0.5m and herbicide sprayed to kill off grass in August. First row was planted with Acacia species every 2.5m. Second and fourth row was planted interchanging between White Box and quick growing species spaced at 5m. Third and fifth row was planted with only quick growing species 8m apart. In total 740 trees were planted. Each tree was planted with a fertiliser pill and water saving crystals. Irrigation was set up from two bores onsite. Once the Acoustic Bund is built and revegetated the quick growing trees can be cleared so can meet grassy White Box Woodland community. **Status/Progress:** Good rainfall for 2010-2011 has limited the use of irrigation still achieving a high survival (>90%) and growth (~1m). Further grass and weed control is required.							
Domain:	3	**Sub Domain:**	1009WCCTS2	**Reveg Date:**	September 2010	**Area:**	1.42ha
Name:	Werris Creek Road Tree Screen	**Land Use:**	Tree Screen	**Seed/Plant:**	Woodland & quick growing species		
Description/Methodology: Sub soil was used construct a 5m visual bund parallel to Werris Creek Road and 10cm of topsoil spread over the road side face in March. Oats cover crop was sown in April. Three rows were planted with the top row being Acacia species every 2.5m. Second and third rows were planted at the top and base of the bund with White Box every 10m. In total 450 trees were planted. Each tree was planted with a fertiliser pill and water saving crystals. Irrigation was set up from a nearby clean water dam. Once the overburden emplacement keys in with the visual bund, the Acacia species can be cleared and join the rehabilitation to meet grassy White Box Woodland community. **Status/Progress:** Good rainfall for 2010-2011 has limited the use of irrigation, however new eastern diversion drainage diverted water from clean water dam and ran dry during summer. To date the tree screen has had poor to moderate survival of plants (~50%). Grass and weed control is required.							
Domain:	3	**Sub Domain:**	1010WCCWR1	**Reveg Date:**	October 2010	**Area:**	1.50ha
Name:	Western Rehabilitation Zone A	**Land Use:**	Ecological Community	**Seed/Plant:**	Grassy White Box Woodland species		
Description/Methodology: Area was shaped and subsoil applied to 0.2m depth prior to January 2008. Area harrowed and resown with Oats cover crop in March 2010. Trees 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. Irrigation was set up from a nearby dirty water dam and watered for the first month after planting. Trees were planted at a 10mx10m aiming to replicate a 100 stem/ha density. Zone A grassy White Box Woodland overstorey species ratio was White Box, Yellow Box, Blakelys Red Gum and Rough Barked Apple at 3:3:1:1. **Status/Progress:** Good rainfall for 2010-2011 has achieved a moderate to good survival of plants (>50%) to date. Additional grass and weed control is required.							
Domain:	3	**Sub Domain:**	1011WCCWR1	**Reveg Date:**	November 2010	**Area:**	3.90ha
Name:	Western Rehabilitation Zone B&C	**Land Use:**	Ecological Community	**Seed/Plant:**	Grassy White Box Woodland species		
Description/Methodology: Area was shaped and subsoil applied to 0.2m depth prior to January 2008. Area harrowed and resown with Oats cover crop in March 2010. Trees 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. Plants were watered in with 1L at time of planting. Trees were planted at a 10mx10m aiming to replicate a 100 stem/ha density. Zone B & C grassy White Box Woodland overstorey species ratio was White Box, Yellow Box, White Cypress Pine and Tumbledown Red Gum at 12:1:1:1. **Status/Progress:** Good rainfall for 2010-2011 has achieved a good survival of plants (>75%) to date.							

Domain:	3	Sub Domain:	1012WCCWR1	Reveg Date:	December 2010	Area:	6.59ha
Name:	Southern Rehabilitation Zone A		Land Use:	Ecological Community	Seed/Plant:	Grassy White Box Woodland species	
Description/Methodology: Area was shaped and subsoil applied to 0.8m depth prior to January 2008. Area harrowed and resown with Oats cover crop in March 2010. Trees 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. Irrigation was set up from a nearby dirty water dam and watered for the first two weeks after planting. Trees were planted at a 10mx10m aiming to replicate a 100 stem/ha density. Zone A grassy White Box Woodland overstorey species ratio was White Box, Yellow Box, Blakelys Red Gum and Rough Barked Apple at 3:3:1:1. **Status/Progress:** Poor mortality of plants due to limited watering due to Christmas period stopped irrigation and no significant rain fall for several months. Also high rate of herbivory by rabbits/hares also affected survival. Maintenance to control weeds and grass and tree replanting will be required.							
Domain:	3	Sub Domain:	1101WCCWR1	Reveg Date:	January 2011	Area:	3.11ha
Name:	Southern Rehabilitation Zone B		Land Use:	Ecological Community	Seed/Plant:	Grassy White Box Woodland species	
Description/Methodology: Area was shaped and subsoil applied to 0.8m depth prior to January 2008. Area harrowed and resown with Oats cover crop in March 2010. Trees 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. Plants were watered in with 1L at time of planting. Trees were planted at a 10mx10m aiming to replicate a 100 stem/ha density. Zone B grassy White Box Woodland overstorey species ratio was White Box, Yellow Box, White Cypress Pine and Tumbledown Red Gum at 12:1:1:1. **Status/Progress:** Good rainfall in February and March 2011 has achieved a good survival of plants (>75%) to date.							
Domain:	3	Sub Domain:	1102WCCWR1	Reveg Date:	February 2011	Area:	2.81ha
Name:	Southern Rehabilitation Zone C		Land Use:	Ecological Community	Seed/Plant:	Grassy White Box Woodland species	
Description/Methodology: Area was shaped and subsoil applied to 0.8m depth prior to January 2008. Area harrowed and resown with Oats cover crop in March 2010. Trees 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. Plants were watered in with 1L at time of planting. Trees were planted at a 10mx10m aiming to replicate a 100 stem/ha density. Zone C grassy White Box Woodland overstorey species ratio was White Box, Yellow Box, White Cypress Pine and Tumbledown Red Gum at 12:1:1:1. **Status/Progress:** Good rainfall in February and March 2011 has achieved a good survival of plants (>75%) to date.							
Domain:	3	Sub Domain:	1102WCCTR1	Reveg Date:	February 2011	Area:	3.76ha
Name:	Southern Temporary Rehabilitation		Land Use:	Temp Rehab	Seed/Plant:	Cover Crop	
Description/Methodology: Area was shaped in September and topsoil/subsoil applied to 0.2m depth each in November. Area was harrowed to improve aeration and infiltration of the soil. The ripping also improves seed/soil contact prior to germination. A rear mounted seeder attached to the back of a light vehicle applied an Oats (winter) cover crop at 50t/ha followed by the dozer running back over the seeding area with harrows to bury the seed. **Status/Progress:** Good germination to date as Autumn has had good rainfall.							
Domain:	3	Sub Domain:	1103WCCTR1	Reveg Date:	March 2011	Area:	4.33ha
Name:	Southern Temporary Rehabilitation		Land Use:	Temp Rehab	Seed/Plant:	Cover Crop	
Description/Methodology: Area was shaped and subsoil applied to 0.2m depth prior to January 2008. Area was harrowed to break up the surface weed vegetation before re-ripping the soil to improve aeration and infiltration of the soil. The ripping also improves seed/soil contact prior to germination. A rear mounted seeder attached to the back of a light vehicle applied an Oats (winter) cover crop at 50t/ha followed by the dozer running back over the seeding area with harrows to bury the seed. **Status/Progress:** Good germination to date as Autumn has had good rainfall.							

WCC rehabilitation methods have been developed to restore grassy White Box Woodland vegetation community meeting the EEC standard while also achieving minimal erosion and mitigating weed infestations. The first step after soil is respread is to sow a seasonal cover crop as soon as practicable to stabilise the soil preventing erosion and out compete potential colonising weed species. The final revegetation stage focuses on a "top down" restoration strategy of planting overstorey species at the required woodland densities. The lower storey woodland species are being hand sown in between the planted trees with herbicide spraying to limit weed and exotic grass competition. **Table 5.4** outlines the key 23 species (but not limited to) being revegetated to met the required native species richness outlined in the DECCW biometric vegetation community benchmark for grassy White Box Woodland (**Section 5.5 Table 5.8**).

Figure 5.2 WCC Rehabilitation Status as at the end March 2010

Table 5.4 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*

5.3 REHABILITATION STATUS

For the 2010-2011 period, the area of final rehabilitation to Box Gum Woodland was 20.73ha (including tree screens 2.82ha) and 8.09ha of temporary rehabilitation. The additional rehabilitation was a result of the overburden emplacement area reaching the upper height of RL445m and allowing bulk shaping from RL410m to RL445m on the southern rehabilitation area.

The "*Statement of Environmental Effects (2009) for a Modification to the Mining Area and Related Activities"* presented an indicative rehabilitation strategy for WCC but did not outline a schedule for the completion of rehabilitation. The Mining Operations Plan (MOP) for the WCC amendment (2009) presents the indicative rehabilitation strategy and outlines that 92.1ha will be completed by the end of the MOP period at the end of 2012. The main document outlining the schedule of rehabilitation activities required to achieve the overall rehabilitation strategy is the draft Landscape Management Plan (LMP) (AECOM, 2010a) prepared in accordance with Condition 65 of Schedule 4 DA 172-7-2004 MOD5. The LMP rehabilitation schedule was presented in **Table 5.2** and **Figure 5.1** requiring that 44ha of rehabilitation would be completed by the end 2010 period. **Table 5.5** summarises the year on year progress of rehabilitation (**Figure 5.2**) against WCC rehabilitation commitments.

Table 5.5 WCC Annual Rehabilitation Progress

Period	Woodland Ecological Community		Agriculture	Annual	Annual LMP (ha)
	Box Gum(ha)	Brigalow(ha)	Class 3 (ha)	Total (ha)	Commitment
2008-2009	14.31	0	0	14.31	14.31
2009-2010	-5.12	0	0	-5.12	-5.12
2010-2011	20.73	0	0	20.73	34.81
Cumulative Total				**29.92**	**44.00**

WCC fell short of the rehabilitation target for 2010 by 14ha. The shortfall was due to a timing issue of equipment availability with a large dozer and scrappers only arriving onsite to shape and prepare the next rehabilitation areas in March 2011. Subsequently by the end of April, WCC had shaped and spread soil over an extra 11ha together with the 8ha of temporary rehabilitation already available exceeds the 14ha shortfall. WCC is confident that the 2011 rehabilitation target of 34.5ha will be achievable with bulk shaping of the extension to the eastern emplacement area and on top of the overburden emplacement to make the additional 30ha of rehabilitation required. **Tables 5.6** and **5.7** outline the disturbance status and maintenance works currently for WCC.

Table 5.6 Rehabilitation Summary

	Area Affected (hectares)			
	This Report Period (as of 31/3/11)	**Last Report Period (as of 31/3/10)**	**Next Report Period (estimated) (as at 31/03/12)**	
A: MINE LEASE AREA				
A1 Mine Lease(s) Area	679			
B: DISTURBED AREA				
B1 Infrastructure area (other disturbed areas to be rehabilitated at closure including facilities, roads)	91.0 (Note 1)	76.0 (Note 1)	91.0	
B2 Active Mining Area (excluding items B3 - B5 below)	64.4	61.0	55.5	
B3 Waste emplacements, (active/unshaped/in or out-of-pit)	85.7	75.8	95.0	
B4 Tailings emplacements, (active/unshaped/uncapped)	0	0	0	
B5 Shaped waste emplacement (awaits final vegetation)	7.1	0	5.0	
ALL DISTURBED AREAS	248.2	212.8	246.5	F1
C: REHABILITATION PROGRESS				
C1 Total Rehabilitated area (except for maintenance)	38.0	17.1	78.5	F2
D: REHABILITATION ON SLOPES				
D1 Less than or equal to 10 degrees	38.0	34.5	78.5	
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	29.9	12.0	78.5	
E3 Plantations and crops	0	0	0	
E4 Other (include nonvegetative outcomes)	8.1	22.5	0	

Note 1: Includes Infrastructure (21ha), Laydown Area (3ha), Orica (3ha) Sediment Dams and Basins (14ha) and Topsoil / Subsoil stockpile areas (50ha)

Table 5.7 Maintenance Activities on Rehabilitated Land

	Area Treated (ha)		
Nature of Treatment	**Report period**	**Next period**	**Comment/control strategies/ treatment detail**
Additional erosion control works (drains re-contouring, rock protection)	7	As required	Eastern and Northern Drainage Diversion
Re-covering (detail - further topsoil, subsoil sealing etc)	8.1	0	Temporary Rehabilitation
Soil treatment (detail - fertilizer, lime, gypsum etc)	0	As required	
Treatment/Management (detail - grazing, cropping, slashing etc)	25	As required	Scalping soil stockpiles
Re-seeding/Replanting (detail - species density, season etc)	25	As required	Reseeding soil stockpiles
Adversely Affected by Weeds (detail - type and treatment)	65	As required	St Johns Wort, Patterson Curse, St Barnabys Thistle
Feral animal control (detail - additional fencing, trapping, baiting etc)	0	As required	

With the extension of the eastern emplacement area during the period, new eastern clean water diversion drains were constructed right along the whole eastern boundary of the open cut. Following the heavy rain from winter to summer seasons, additional work was undertaken with the main eastern drain to repair erosion and rock/geofabric armour to prevent further erosion. The northern diversion drainage was also installed linking into the eastern diversion drainage to prevent water runoff upslope (north) from running into the pit area at WCC.

The main soil stockpiles located adjacent to the mine entrance road that were established in 2005 were scalped to remove weed infestation, ripped to improve aeration and infiltration for soil health and reseeded with an Oats cover crop in February 2011.

5.4 REHABILITATION MONITORING

The LMP 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 rehabilitation quarterly visual inspections, vegetation monitoring and fauna monitoring is discussed in **Section 3.6** as they have been integrated with the biodiversity monitoring program.

To date given the limited area of rehabilitation, only one site (Site 6) has been set up for the visual inspection, vegetation and fauna monitoring programs.

The soil analysis monitoring was not completed during the period; however soil will be sampled early in the next period. No land capability assessment was undertaken because no Class III agriculture rehabilitation has been completed to date.

Routine photo monitoring of the rehabilitation is undertaken by WCC from two established locations to the south east and south west of the rehabilitation areas. **Figure 5.3a** displays the photopoint (south east) one month after planting in July 2008 and **Plate 5.3b** shows progress after 21 months in March 2010. From **Plate 5.4** the key changes to the rehabilitation has been the advancement of the White Box tubestock planted 33 months ago. Exotic grasses are still present, however the other noticeable change is the increase in height of the overburden emplacement.

Figure 5.3 South East Rehabilitation Area a (left) July 2008 and b (right) March 2010

Figure 5.4 South East Rehabilitation Area at end of March 2011

Plate 5.5a displays the photopoint (south west) during contour and erosion maintenance in March 2010 and **Plate 5.5b** displays the good Oats cover crop after seven months in October 2010. From **Plate 5.6** the improvement in groundcover even still in 2011 is evident and the increase in the height of the overburden emplacement is also noticeable.

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

Figure 5.6 South West Rehabilitation Area at end of March 2011

5.5 COMPLETION CRITERIA

The draft LMP (AECOM, 2010a) has outlined the completion criteria for the rehabilitation and biodiversity offset areas to achieve the designated final land uses for WCC, i.e. that they would be sustainable and self supporting beyond mine closure. The completion criteria have been broken into categories aligned to the WCC rehabilitation objectives (**Table 5.1**):

- Integrated Landscapes;
- Sustainable Growth and Development; and

- Land Use.

Separate completion criteria have been established for the two different final land uses proposed for WCC of Class III Land Capability Agriculture and Woodland Ecological Community. An excerpt from the completion criteria has been included in **Table 5.8** for Woodland Ecological Community land use criteria of "Sustainable Growth and Development". For the Woodland Ecological Community land use, data from the DECCW Biobanking Vegetation Database has been used to establish the benchmark "standard" to be achieved and what the monitoring programs will compare against to determine the annual status and the trend towards being able to "sign off" on the final land uses.

Table 5.8 WCC Completion Criteria for Woodland Sustainable Growth & Development

Criteria and Intent	Measure	Standard	Remedial Action
2.1 Is there appropriate native plant species richness for the restored Ecological Community?	Vegetation monitoring (EFA score) by ecologist will determine native plant species richness.	Native plant species numbers (per 400m²): • Box Gum Woodland 23 • Tumbledown Gum Woodland 30 • Brigalow Woodland 20 • Liverpool Plains Grassland 17	Undertake maintenance rehabilitation by re-sowing / replanting missing plant species to achieve desired species richness.
2.2 Is there an appropriate density/structure of native Over Storey species?	Vegetation monitoring (EFA score) by ecologist will determine native plant species richness.	Over Storey cover range between: • Box Gum Woodland 0-25% • Tumbledown Gum Woodland 6-40% • Brigalow Woodland 0-25% • Liverpool Plains Grassland 0-0%	Undertake maintenance rehabilitation by re-sowing / replanting missing plant species to achieve desired species richness.
2.3 Is there an appropriate density/structure of native Mid Storey species?	Vegetation monitoring (EFA score) by ecologist will determine native plant species richness.	Mid Storey cover range between: • Box Gum Woodland 0-5% • Tumbledown Gum Woodland 6-25% • Brigalow Woodland 0-5% • Liverpool Plains Grassland 0-0%	Undertake maintenance rehabilitation by re-sowing / replanting missing plant species to achieve desired species richness.
2.4 Is there appropriate native ground cover?	Vegetation monitoring (EFA score) by ecologist will determine native plant species richness.	Bare ground and litter not to exceed: • Box Gum Woodland 55% • Tumbledown Gum Woodland 55% • Brigalow Woodland 65% • Liverpool Plains Grassland 50%	Undertake maintenance rehabilitation either apply mulch and/or by re-sowing / replanting missing plant species to achieve desired coverage.

Table 3.20 in **Section 3.6.3** compares both rehabilitation (Site 6) and biodiversity offset areas to the above completion criteria. Not surprising, no biodiversity offset or rehabilitation areas have achieved the completion criteria yet.

5.6 REHABILITATION TRIALS AND RESEARCH

No rehabilitation trials were undertaken at the WCC during 2010-2011.

5.7 MINE CLOSURE

During 2010, WCC prepared a Mine Closure Plan (MCP – AECOM, 2010b) and a Final Void Management Plan (FVMP – AECOM, 2010c) covering the rehabilitation and management procedures for the ultimate closure of the site and final mining void. Currently, WCC is approved to cease mining operations in 2012, however there is a currently a Project Application being assessed by DoP for the WCC Life of Mine Project which would extend operations for up to 20 years, and therefore both the MCP and FVMP were conceptual in detail. The MCP and FVMP covers from the cessation of mining with a remaining final void requiring management to mitigate potential safety risks as well as any potential environmental impacts.

The MCP 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 5.9**.

Table 5.9 Final Land Use Options for WCC Domains

Domain	Description	Land Uses
1	Mining	a) Woodland Ecological Community b) Class III (Land Capability) Agriculture c) Water Storage
2	Coal Processing and Train Load Out	a) Woodland Ecological Community
3	Rehabilitation and Biodiversity Offset Area	a) Woodland Ecological Community
4	Water Management	a) Woodland Ecological Community b) Class III (Land Capability) Agriculture
5	Buffer Land	a) Woodland Ecological Community

6.0 ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

WCC have made substantial progress during the 2010-2011 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 2010-2011 period:

- Community consultation included four Community Consultative Committee meetings, a Community Open Day at the Werris Creek Bowling and Tennis Club 20th October 2010 and three Community Newsletters distributed to Quipolly and Werris Creek residents;
- Revised the following Management Plans to the satisfaction of DoP and DECCW:
    - revised Noise Monitoring Program;
    - revised Blast Monitoring Program;
    - Energy Savings Action Plan;
    - Biodiversity Offset Strategy and Management Plan;
- Purchased a mobile continuous noise monitor trailer system for real time monitoring and operation response to mining noise;
- Installation of new eastern and northern diversion clean water drainage system. Construction of the northern 200ML Dam cell;
- Relocation and upgrade to the onsite meteorological station software to enable improve temperature inversion monitoring and calculation; and
- Completed 21ha of rehabilitation and established the Biodiversity Offset Area including construction of a visual bund and tree screens along Werris Creek Road to reduce visual impact to road users.

WCC targets for the 2011 / 2012 period:

- Obtain a Project Approval for the WCC Life of Mine Project, EPL variation and new MOP approval;
- Continue woodland restoration and revegetation programs for Biodiversity Offset (20ha) and Rehabilitation (34.5ha plus 14ha) Areas;
- Construction of new dirty and clean water management drainage around the future eastern emplacement expansion and construction of the south 200ML Dam cell (formerly known as Underground Water Dams);
- Continue to resolve complaints with new measures to address lighting and blasting impacts through the implementation of the Visual Lighting camera system and continuing the blasting review by the contracted Orica blasting engineers;
- Finalise Landscape Management Plan, Mine Closure Plan, Final Void Management Plan and Rail Spur Management Plans in accordance with DA 174-7-2004;
- 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.

WERRIS CREEK COAL
AEMR 2010-2011

PLANS

PLAN 3 Land Preparation
PLAN 4 Mining Activities
PLAN 5 Rehabilitation

N 6 526 000
N 6 525 000
N 6 524 000
E 276 000
E 275 000
0 100 200 300 400 500metres
N E S W
MAIN NORTHERN RLY
WERRIS CREEK - QUIRINDI ROAD
QUIRINDI 12 kms
WERRIS CREEK 2.5 kms
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

LEGEND
Colliery Holding / Lease Boundary
Current Extraction Approval Area
Area to be disturbed
DA Consent Boundary

TOPSOIL MAPPING UNITS AND STRIPPING DEPTHS
4 NIL
3 900mm
2 1300mm
1 950mm
All depths are in millimetres
14 Soil test pit

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

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

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

Drawing No.	Revision No.
000000-3	1

Date	Scale:	Drawn	Checked	Approved	Sheet Size
20-5-2011	1:4000	NG	AW	CD	A0

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

MW9
MW14
SB10 (EPA 14)
PRODUCT STOCKPILE
AN RELOAD
(EPA 12) SB9
VWD2
COAL PREP
MW3
VWD3
(EPA 10) SB2
VWD4
MW5
VWD1
MW4
MW1
WERRIS CREEK 2.5 kms
WERRIS CREEK - QUIRINDI ROAD
MAIN NORTHERN RLY
QUIRINDI 12 kms
E 275 000
E 276 000
N 6 526 000
N 6 525 000
N 6 524 000
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. Floor levels have been derived
From the recent drilling geological model."

LEGEND

- Colliery Holding / Lease Boundary
- Current Extraction Approval Area
- Area to be disturbed
- DA Consent Boundary
- Topsoil Stockpiles (includes vegetation stacking)
- Infrastructure Areas
- Proposed Topsoil Stripping Areas
- MW10 Groundwater Monitoring Site
- EPA Discharge Points
- Underground mine water dams

Mining Sequence

- 2011 / 2012

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

REVISIONS				
REV.				
DATE				
BY				
DESCRIPTION				
CHK.				
REV.				
DATE				
BY				
DESCRIPTION				
CHK.				

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

Date	Drawn	Checked	Approved	Drawing No.
20/5/2011	NG	AW	CD	000000-4
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WERRIS CREEK MINE - AEMR PLAN
PROPOSED REHABILITATION - PLAN 5

WERRIS CREEK 2.5 kms

WERRIS CREEK - QUIRINDI ROAD

MAIN NORTHERN RLY

QUIRINDI 12 kms

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. Floor levels have been derived
From the recent drilling geological model."

SD10 SD11 (Dam 1) SB10 SD9 SB8 SB9 SB7 SB6 SB5 SB4 SB3 SB2 SB1 SD4 SD5 VWD1 VWD2 VWD3 VWD4 farm 1 farm 3 farm 4 farm 5

2010 2011 2012 2013

E 274 000 E 275 000 E 276 000

N 6 526 000 N 6526000 N 6 525 000 N 6525000 N 6524000 N 6 524 000 N 6522000

Colliery Holding / Lease Boundary
Current Extraction Approval Area
Area to be disturbed
DA Consent Boundary
Existing Natural Timber
Active Mining Area
Existing Rehabilitation Area (2010)
Future Rehabilitated Area (Pasture)
Shaped Overburden
Unshaped Overburden
Infrastructure
Rehabilitation Schedule
Rehabilitated to Woodland
Water Management (Clean)
Water Management (Dirty)
Water Management (Void)
Water Flume
Underground Workings

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

REVISIONS					
REV.					
DATE					
BY					
DESCRIPTION					
CHK.					
REV.					
DATE					
BY					
DESCRIPTION					
CHK.					

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

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Date	Scale:	Drawn	Checked	Approved	Drawing No.
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Revision No.	Sheet Size
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WERRIS CREEK COAL
AEMR 2010-2011

APPENDIX 1

CONSOLIDATED DEVELOPMENT CONSENT

DA 172-7-2004 MOD5

Development Consent

Section 80 of the *Environmental Planning and Assessment Act 1979*

I, the Minister for Infrastructure and Planning, approve the Development Application referred to in schedule 1, subject to the conditions in schedules 3 to 6.

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 on-going environmental management of the development.

Craig Knowles MP
Minister for Infrastructure and Planning
Minister for Natural Resources

SIGNED BY MINISTER KNOWLES ON 18 FEBRUARY 2005
Sydney, 2005 File No: S03/03677

Red type represents 19 October 2005 modification.
Blue type represents 6 March 2007 modification.
Green type represents 17 September 2008 modification.
Orange type represents 15 April 2009 modification.
Purple type represents ... September 2009 Modification.

SCHEDULE 1

Development Application:	DA-172-7-2004.
Applicant:	Werris Creek Coal Pty Limited.
Consent Authority:	Minister for Infrastructure and Planning.
Land:	See Appendix 1 and Figure i.
Proposed Development:	Construction and operation of the Werris Creek Coal Mine, about 4 kilometres south of Werris Creek, in general accordance with the Environmental Impact Statement for the *Proposed Werris Creek Coal Mine*, which includes: • undertaking open cut coal mining operations over an area of approximately 80 hectares; • constructing and operating coal screening and crushing equipment; • constructing and operating a rail load-out facility; • transporting export coal by a private haul road to the rail load-out facility; • transporting coal from the coal processing area via the mine access road and the Quirindi to Werris Creek Road to domestic markets;

	• producing up to 2 million tonnes per year of Run-of-Mine (ROM) coal; • installation of a mine access road, various support services, structures and transportable buildings; and • progressive shaping and rehabilitation of the mine area and other areas of disturbance.
State Significant Development:	The proposal is classified as State significant development, under section 76A(7) of the *Environmental Planning and Assessment Act 1979*, because it involves coal-mining related development that requires a new mining lease under section 63 of the *Mining Act 1992*.
Integrated Development:	The proposal is classified as integrated development, under section 91 of the *Environmental Planning and Assessment Act 1979*, because it requires additional approvals under the: • *Protection of the Environment Operations Act 1997;* • *Water Act 1912; and* • *Roads Act 1993.*
Designated Development:	The proposal is classified as designated development, under section 77A of the *Environmental Planning and Assessment Act 1979*, because it is for a coal mine that would "*produce or process more than 500 tonnes of coal a day*", and consequently meets the criteria for designated development in schedule 3 of the *Environmental Planning and Assessment Regulation 2000.*

Note:
(a) To find out when this consent becomes effective, see section 83 of the Environmental Planning and Assessment Act 1979 (EP&A Act);
(b) To find out when this consent is liable to lapse, see section 95 of the EP&A Act; and
(c) To find out about appeal rights, see section 97 of the EP&A Act.

SCHEDULE 2
DEFINITIONS

AEMR	Annual Environmental Management Report
ANZECC	Australian and New Zealand Environment Consultative Council
Applicant	Werris Creek Coal Pty Limited, or its successors in title
BCA	Building Code of Australia
Bore	Any bore or well or excavation or other work connected or proposed to be connected with sources of sub-surface water, and used or proposed to be used or capable of being used to obtain supplies of such water whether the water flows naturally at all times or has to be raised whether wholly or at times by pumping or other artificial means
CCC	Community Consultative Committee
Council	Liverpool Plains Shire Council
DA	Development Application
Day	Day is the period from 7 am to 6 pm on Monday to Saturday, and 8 am to 6 pm on Sundays and Public Holidays
DECCW	Department of Environment, Climate Change and Water
Department	The Department of Planning
Director-General	Director-General of Department of Planning, or delegate
DII	Department of Industry and Investment
NOW	NSW Office of Water within DECCW
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPL	Environment Protection Licence
Evening	Evening is the period from 6 pm to 10 pm
GTA	General Term of Approval
Land	Land means the whole of a lot in a current plan registered at the Land Titles Office at the date of this consent
Minister	Minister for Infrastructure and Planning, or delegate
MOP	Mining Operations Plan
Mtpa	Million tonnes per annum
Night	Night is the period from midnight to 7 am and 10 pm to midnight Monday to Saturday and midnight to 8 am and 10 pm to midnight on Sundays and public holidays
NP&W Act	*National Parks and Wildlife Act 1974*
PCA	Principal Certifying Authority appointed under Section 109E of the Act
Privately-owned land	Land excluding land owned by a mining company, where: • a private agreement does not exist between the Applicant and the land owner; and • there are no land acquisition provisions requiring the Applicant to purchase the land upon request from the land owner
Reasonable and Feasible	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. Feasible relates to engineering corrections and what is practical to build
ROM coal	Run-of-mine coal
DTI	Department of Transport and Infrastructure
Site	Land to which the DA applies
tpa	tonnes per annum

SCHEDULE 3
ADMINISTRATIVE CONDITIONS

Obligation to Minimise Harm to the Environment

1. The Applicant shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.

Terms of Approval

2. The Applicant shall carry out the development generally in accordance with the:
   (a) DA 172-7-2004;
   (b) EIS titled *Environmental Impact Statement for the Proposed Werris Creek Coal Mine*, and *Specialist Consultant Studies Compendium*, dated August 2004, and prepared by R.W. Corkery & Co. Pty. Limited;
   (c) letter from the Applicant, dated 1 December 2004, indicating the relocated position of the mine access entrance and road;
   (d) document titled, *Application to Modify Conditions 4(48) and 4(51) of Development Consent DA 172-7-2004*, dated October 2005, prepared by Werris Creek Coal Pty Ltd;
   (e) document titled, *Application to Modify Condition 44 of Development Consent DA 172-7-2004*, dated 11 December 2006, prepared by Werris Creek Coal Pty Ltd;
   (f) the Statement of Environmental Effects titled *Statement of Environmental Effects for Minor Modifications to Werris Creek Coal Mine prepared by Werris Creek Coal Pty Limited* and dated June 2008 (the SEE);
   (g) the Response to Submissions titled *Werris Creek Coal Pty Ltd Response to Public and Government Agency Submissions Modification Application to DA 172-7-2004 (MOD 3)* prepared by Werris Creek Coal Pty Limited and dated July 2008; and
   (h) the Statement of Environmental Effects titled *Statement of Environmental Effects – Precursor Storage Facility at Werris Creek Coal Mine & Alternate Biodiversity Offset Area for Werris Creek Coal Mine* prepared by Werris Creek Coal Pty Limited and dated November 2008;
   (i) *Statement of Environmental Effects for a Modification to the Mining Area and Related Activities at the Werris Creek Coal Mine* prepared by RW Corkery & Co Pty Limited, dated March 2009;
   (j) *Responses to Submissions for the Statement of Environmental Effects for a Modification to the Mining Area and Related Activities at the Werris Creek Coal Mine* prepared by RW Corkery & Co Pty Limited, dated July and August 2009; and
   (k) the conditions of this consent.

3. If there is any inconsistency between the above documents, the latter document shall prevail over the former to the extent of the inconsistency. However, the conditions of this consent shall prevail over all other documents to the extent of any inconsistency.

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

4A. The Applicant shall prepare revisions of any strategies, plans or programs required under this consent if directed to do so by the Director-General. Such revisions shall be prepared to the satisfaction of, and within a timeframe approved by, the Director-General.

Limits on Approval

5. This consent lapses 15 years after the date it commences.

6. The Applicant shall not extract more than 2 million tonnes of ROM coal a year from the development.

7. The Applicant shall not transport more than 50,000 tonnes of saleable coal a year from the development by public road.

7A. The Applicant shall ensure the rail load-out coal stockpile does not:
   (a) exceed 15 m in height; and
   (b) contain more than 100,000 tonnes of coal.

Structural Adequacy

8. The Applicant shall ensure that all new buildings and structures are constructed in accordance with the relevant requirements of the BCA.

   Note:
   (a) Under Part 4A of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works.
   (b) Part 8 of the EP&A Regulation sets out the requirements for the certification of development.

Demolition

9. The Applicant shall ensure that any demolition work is carried out in accordance with *AS 2601-2001: The Demolition of Structures*, or its latest version.

Operation of Plant and Equipment

10. The Applicant shall ensure that all plant and equipment used at the site, or to transport coal off-site, are:
   (a) maintained in a proper and efficient condition; and
   (b) operated in a proper and efficient manner.

Section 94 Contributions

11. Before carrying out any development, or as otherwise agreed by Council, the Applicant shall pay Council:
   - $20,000 towards the operation of the Werris Creek Rail Museum; and
   - $15,000 towards the provision of youth facilities for Werris Creek,

   as a community enhancement program for the Werris Creek area.

12. Prior to 31 December 2008, the Applicant shall enter into a road maintenance agreement with Council regarding public roads maintained with Council funds and used for the transport of saleable coal from the development, to the satisfaction of Council. If agreement cannot be reached, the matter shall be referred to the Director-General for resolution.

SCHEDULE 4
SPECIFIC ENVIRONMENTAL CONDITIONS

AIR QUALITY

Impact Assessment Criteria

1. The Applicant shall ensure that dust emissions generated by the development do not cause exceedances of the air quality criteria listed in Tables 1, 2 and 3 at any residence on, or on more than 25 percent of, any privately-owned land.

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

Table 1: Long-term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging period	Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3

Table 2: Short-term Impact Assessment Criterion for Particulate Matter

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	3.6 g/m^2/month

Table 3: Long-term Impact Assessment Criteria for Deposited Dust

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 1991, AS 3580.10.1-1991: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

Land Acquisition Criteria

2. If the dust emissions generated by the development exceed the criteria in Tables 4, 5 and 6 at any residence on, or on more than 25 percent of, any privately-owned land, the Applicant shall, upon receiving a written request for acquisition from the landowner, initiate an independent review in accordance with conditions 4-9 of schedule 5 and, if required, acquire the land in accordance with the procedures in conditions 10-12 of schedule 5.

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

Table 4: Long-term Land Acquisition Criteria for Particulate Matter

Pollutant	Averaging period	Criterion	Percentile[1]	Basis
Particulate matter < 10 µm (PM_{10})	24 hour	150 µg/m^3	99[2]	Total[3]
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3	98.6	Increment[4]

Table 5: Short-term Land Acquisition Criteria for Particulate Matter

[1]Based on the number of block 24 hour averages in an annual period.
[2]Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Director-General in consultation with the DECCW.
[3]Background PM_{10} concentrations due to all other sources plus the incremental increase in PM_{10} concentrations due to the mine alone.
[4]Incremental increase in PM_{10} concentrations due to the mine alone.

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	3.6 g/m^2/month

Table 6: Long-term Land Acquisition Criteria for Deposited Dust

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 1991, AS 3580.10.1-1991: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

[1]Operating Conditions

3. The Applicant shall carry out the development in a way that prevents and/or minimises the air pollution generated by the development.

4. The Applicant shall:
   (a) ensure any visible air pollution generated by the development is assessed regularly, and that mining operations are relocated, modified, and/or stopped as required to minimise air quality impacts on privately-owned land and ensure the visibility and safety of motorists using the surrounding public roads is not compromised;
   (b) ensure that trucks entering and leaving the site carrying loads are covered at all times, except during loading and unloading; and
   (c) implement all practicable measures to minimise the off-site odour and fume emissions generated by any spontaneous combustion or blasting at the development,

   to the satisfaction of the Director-General.

Additional Air Quality Mitigation Measures

5. Upon receiving a written request from any landowner where subsequent dust monitoring shows the dust generated by the development is greater than the deposited dust criteria in Table 6, the Applicant shall, in consultation with the landowner, install a first flush system (or similar) on any water tank used as a drinking water supply on the land. If within 3 months of receiving this request, the Applicant and the landowner 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.

[1] Incorporates DECCW GTA

[2]**Monitoring**

6. Within 3 months of this consent, the Applicant shall prepare and implement a detailed Air Quality Monitoring Program in consultation with the DECCW, and to the satisfaction of the Director-General. The Air Quality Monitoring Program shall include an air quality monitoring protocol for evaluating compliance with the air quality impact assessment and land acquisition criteria in this consent.

[3]**NOISE**

Noise Impact Assessment Criteria

7. The Applicant shall ensure that the noise generated by the development does not exceed the noise impact assessment criteria presented in Table 7 at any residence on privately-owned land.

Day (Construction Stage) $L_{Aeq(15\ minute)}$	*Day (Operational Stage)* $L_{Aeq(15\ minute)}$	*Evening* $L_{Aeq(15\ minute)}$	*Night* $L_{Aeq(15\ minute)}$	*Night* $L_{A1(1\ minute)}$
40	*35*	*35*	*35*	*45*

Table 7: Noise Impact Assessment Criteria dB(A)

Note:

(a) Noise from the development is to be measured at the most affected point or within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary,

(b) To determine compliance with the $LA_{eq(15\ minute)}$ noise limits in the above table, where it can be demonstrated that direct measurement of noise from the development is impractical, the DECCW may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.

(c) Noise from the development is to be measured at 1 metre from the dwelling façade to determine compliance with the $L_{A1(1\ minute)}$ noise limits in the above table.

(d) The noise emission limits identified in the above table apply under meteorological conditions of:
i wind speeds of up to 3 m/s at 10 metres above ground level; or
ii Temperature inversion conditions of up to 3°C/100m, and wind speeds of up to 2 m/s at 10 metres above ground level.

(e) "Construction Stage" applies Monday to Saturday, excluding public holidays, until 6 months after the commencement of operations, or the completion of the 15 metre high acoustic bund, whichever occurs first.

Rail Noise Impact Assessment Criteria

8. The Applicant shall ensure that the noise generated by shunting operations associated with the development does not exceed the noise impact assessment criteria presented in Table 8.

Day/Evening/Night $L_{Aeq(24\ hour)}$	*Day/Evening/Night* $L_{A(max)}$	*Property*
55	*80*	*Any residence on privately-owned land.*

Table 8: Rail Shunting Noise Criteria dB(A)

Note: Shunting operations directly related to coal loading activities are subject to noise impact criteria in Table 7.

[2] Incorporates DECCW GTA
[3] Incorporates DECCW GTA

Land Acquisition Criteria

9. If the noise generated by the development exceeds the criteria in Table 9, the Applicant shall, upon receiving a written request from the landowner, initiate an independent review in accordance with the procedures in conditions 4-9 of schedule 5 and, if required, acquire the land in accordance with the procedures in conditions 10-12 of schedule 5.

Day/Evening/Night $L_{Aeq(15\ minute)}$	*Property*
40	*All privately-owned land.*

Table 9: Land Acquisition Criteria dB(A)

Note: The provisions of this condition do not apply during the Construction Stage of the mine.

[4]**Operating Conditions**

10. The Applicant shall ensure that all reversing alarms fitted to vehicles on the site shall be of a mid-high frequency broadband type as described in the EIS.

Rail Spur Management Plan

11. The Applicant shall prepare and implement a detailed Rail Spur Management Plan for shunting operations associated with the development, in consultation with the Australian Rail Track Corporation and the company providing rail freight services to the Applicant. The Applicant shall not carry out any shunting operations before the Director-General has approved this Plan. This plan must include:
(a) a noise monitoring program for privately-owned residences in proximity to the spur line to the development's rail load-out facilities;
(b) measures to reduce noise and vibration impacts on impacted residences; and
(c) measures to avoid or minimise impacts other than noise and vibration including, but not limited to, train headlights and interruption of public road access across the spur line,
to the satisfaction of the Director-General.

Operating Hours – Construction Stage

12. The Applicant is permitted to operate the development between 7 am to 6 pm Monday to Friday and 8 am to 6 pm Saturday, excluding public holidays, during the "Construction Stage" as defined in condition 7. Construction activities must not commence until 8 am during temperature inversion conditions, southeast winds exceeding 3 m/s and northwest winds exceeding 3 m/s, unless approved by the DECCW. The Applicant shall notify the Department of the date of commencement of construction activities.

Operating Hours – Stage 1 Operations

13. On completion of the eastern acoustic bund to a height of 15 metres, the Applicant is permitted to operate the development between 7 am and 10 pm Monday to Friday and 8 am to 2 pm Saturday, excluding public holidays. Operations must not commence until 8 am during temperature inversion conditions, southeast winds exceeding 3 m/s and northwest winds exceeding 3 m/s unless approved by the DECCW. The Applicant shall notify the Department of the date of commencement of Stage 1 operations.

14. In addition to the permitted operational hours set out in condition 13, the Applicant may operate the train load-out facility between 2 pm and 10 pm Saturday, excluding public holidays, and maintenance operations may be conducted 24 hrs a day, Monday to Saturday.

[4] Incorporates DECCW GTA

Operating Hours – Stage 2 Operations

15. The Applicant shall undertake an acoustical validation study, in a manner approved by the DECCW, of predicted noise impacts contained in the EIS against measured noise impacts of the development during the initial 6 months of its operation (or other time agreed by the Director-General). If, following consideration of the acoustical validation study, the DECCW and the Director-General are satisfied that predicted noise impacts are unlikely to be exceeded by the development, the Applicant may progress to Stage 2 operating hours.

Stage 2 operating hours are defined as:
(a) midnight to 4 am; and 7 am to midnight Monday to Friday;
(b) midnight to 4 am; and 7 am to 2 pm Saturday;
(c) on-site processing of coal is permitted between the additional hours of 2 pm to 10 pm Saturday;
(d) overburden removal and emplacement is permitted at any time Monday to Saturday; and
(e) operation of the coal load-out facility and maintenance activities is permitted at any time Monday to Sunday

These hours may be varied, with the approval of the DECCW, if the Director-General is satisfied that the amenity of residents in the locality will not be adversely affected.

Note: Stage 2 operating hours do not apply to blasting (see conditions 20 & 23) or to the dispatch of coal by road (see condition 52).

Monitoring

16. Before carrying out any development, the Applicant shall prepare a Noise Monitoring Program for the development in consultation with the DECCW, and to the satisfaction of the Director-General, which includes a noise monitoring protocol for evaluating compliance with the criteria in conditions 7, 8, and 9.

Additional Noise Mitigation Measures

16A. If noise monitoring shows the noise generated by the development is equal to or greater than 38 dB(A) $L_{Aeq(15\ minute)}$ at any privately-owned residence (except where a written negotiated noise agreement is in place or the landowner has requested acquisition); then upon receiving a written request from the landowner, the Applicant shall implement reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the landowner. If within 3 months of receiving this request from the landowner, the Applicant and the landowner 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.

METEOROLOGICAL MONITORING

17. Within 6 months of this consent, the Applicant shall ensure that there is a suitable meteorological station operating in the vicinity of the development in accordance with the requirements in *Approved Methods for Sampling of Air Pollutants in New South Wales*, and to the satisfaction of the DECCW and the Director-General.

BLASTING & VIBRATION

Airblast Overpressure Limits

18. The Applicant shall ensure that the airblast overpressure level from blasting at the development does not exceed the criteria in Table 10 at any residence on privately-owned land.

Airblast overpressure level (dB(Lin Peak))	Allowable exceedance
115	5% of the total number of blasts in a 12 month period
120	0%

Table 10: Airblast Overpressure Impact Assessment Criteria

Note: The overpressure values in Table 12 apply when the measurements are performed with equipment having a lower cut-off frequency of 2 Hz or less. If the instrumentation has a higher cut-off frequency a correction of 5 dB should be added to the measured value. Equipment with a lower cut-off frequency exceeding 10 Hz should not be used.

Ground Vibration Impact Assessment Criteria

19. The Applicant shall ensure that the ground vibration level from blasting at the development does not exceed the criteria in Table 11 at any residence on privately-owned land or noise sensitive location as defined in the DECCW's Industrial Noise Policy.

Peak particle velocity (mm/s)	Allowable exceedance
5	5% of the total number of blasts in a 12 month period
10	0%

Table 11: Ground Vibration Impact Assessment Criteria

Blasting Hours

20. The Applicant shall only carry out blasting at the development between 10 am and 4 pm Monday to Friday during the Construction Stage and 9 am to 5 pm for Stages 1 and 2, except as further restricted by condition 22. No blasting is allowed on Saturdays, Sundays, public holidays or any other time without the written approval of the DECCW.

Blasting Frequency

21. The Applicant shall not carry out more than 1 blast a day at the site without the written approval of the DECCW.

Monitoring

22. Prior to carrying out any blasting, the Applicant shall prepare and implement a detailed Blasting Monitoring Program for the development in consultation with the DECCW and to the satisfaction of the Director-General. The Applicant shall monitor the airblast overpressure and ground vibration impacts of blasting operations of the development at privately-owned residences or noise sensitive locations as defined in the DECCW's Industrial Noise Policy, using the units of measurement, frequency, sampling method, and locations specified in Table 12.

Parameter	Units of Measure	Frequency	Sampling Method	Measurement Location
Airblast overpressure	dB(Lin Peak)	During every blast	AS2187.2-1993[1]	Not less than 3.5 m from a building or structure
Peak particle velocity	mm/s	During every blast	AS2187.2-1993	Not more than 30 m from a building or structure

Table 12: Airblast Overpressure and Ground Vibration Monitoring

[1]Standards Australia, 1993, AS2187.2-1993: Explosives - Storage, Transport and Use - Use of Explosives.

Blasting in Proximity to the Quirindi to Werris Creek Road

23. The Applicant shall prepare and implement a Traffic Management Plan in consultation with Council and the DII, and to the satisfaction of the Director-General for blasting activities that require the temporary periodic closure of the Quirindi to Werris Creek Road. This plan shall include measures to ensure:
    - adequate warning is given to road users prior to blasting;
    - follow up inspections are made to ensure that public roads are safe and clear of debris; and
    - blasting does not occur at any time which delays the transportation of children to or from school.

Public Notice

24. During the life of the development, the Applicant shall:
    (a) operate a blasting hotline, or alternate system agreed to by the Director-General, to enable the public to get up-to-date information on blasting operations at the development; and
    (b) notify the landowner/occupier of any land within 2 km of the development about this hotline or system on an annual basis.

Property Inspections

25. Before carrying out any blasting, the Applicant shall advise all landowners within 2 km of the development, and any other landowner nominated by the Director-General, that they are entitled to a property inspection.

26. If the Applicant receives a written request for a property inspection from any landowner within 2 km of the development, or any other landowner nominated by the Director-General, the Applicant shall within 3 months of receiving this request:
    (a) commission a suitably qualified person, whose appointment has been approved by the Director-General, to inspect the condition of any building or structure on the land, and recommend measures to mitigate any potential blasting impacts; and
    (b) give the landowner a copy of this property inspection report.

Property Investigations

27. If any landowner within a 2 km of the development, or any other landowner nominated by the Director-General, claims that his/her property, including vibration-sensitive infrastructure such as water supply or underground irrigation mains, has been damaged as a result of blasting at the development, the Applicant shall within 3 months of receiving this request:
    (a) commission a suitably qualified 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 investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant shall repair the damages to the satisfaction of the Director-General.

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

If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 2).

[5]SURFACE & GROUND WATER

Pollution of Waters

28. Except as may be expressly provided by a DECCW licence, the Applicant shall comply with section 120 of the *Protection of the Environment Operations Act 1997* during the carrying out of the development.

Discharge Limits

29. Except as may be expressly provided by a DECCW Licence, the Applicant shall ensure that the discharges from any licenced discharge point comply with the limits in Table 13.

Pollutant	Units of measure	50 percentile concentration limit	90 percentile concentration limit	100 percentile concentration limit
pH				6.5 ≤ pH ≤8.5
Total Suspended Solids	mg/L	20	35	50
Grease & Oil	mg/L			10

Table 13: Discharge Limits

Note: This condition does not authorise the discharge or emission of any other pollutants.

[6]Groundwater Contingency Plan

30. Within 6 months of this consent, the Applicant shall prepare a Groundwater Contingency Plan to the satisfaction of the Director-General. This Plan shall:
    (a) include a program to establish the natural variability of groundwater quality and quantity;
    (b) establish trigger levels, benchmarks and contingency criteria;
    (c) provide measures to mitigate any impacts of the mine on the quality or quantity of groundwater supplies available on privately-owned land; and
    (d) provide for negotiated agreements with affected landowners, including compensation where mining impacts result in increased extraction costs for landowners.

[7]Site Water Balance

31. Each year, the Applicant shall:
    (a) review the site water balance for the development against the predictions in the EIS;
    (b) re-calculate the site water balance for the development; and

[5] Incorporates DECCW GTA
[6] Incorporates Department's GTA
[7] This should differentiate between licensed extracted water (from surface or groundwater sources), incidental water encountered in mining operations, and Harvestable Right water. These calculations must exclude the clean water system, including any sediment control structures, and any dams in the mine lease area which fall under the Maximum Harvestable Right Dam Capacity; include any dams that are licensable under Section 205 of the Water Act 1912, and water harvested from any non-harvestable rights dam on the mine lease area; address balances of inflows, licenced water extractions, and any transfers of water from the site; include an accounting system for water budgets; and include a salt budget.

(c) report the results of this review in the AEMR,
to the satisfaction of the Director-General.

Site Water Management Plan

32. Before carrying out any development, the Applicant shall prepare a Site Water Management Plan for the development in consultation with DECCW, and to the satisfaction of the Director-General. This plan must include:
(a) the predicted site water balance;
(b) an Erosion and Sediment Control Plan;
(c) a Surface Water Monitoring Program;
(d) a Groundwater Management Plan; and
(e) a strategy for the decommissioning of water management structures on the site.

33. The Erosion and Sediment Control Plan shall:
(a) be consistent with the requirements of the Department of Housing's *Managing Urban Stormwater: Soils and Construction* manual;
(b) identify activities for the construction and operational phases of the development that could cause soil erosion and generate sediment;
(c) describe the location, function, and capacity of erosion and sediment control structures; and
(d) describe measures to minimise soil erosion and the potential for the migration of sediments to downstream waters.

34. The Surface Water Monitoring Program shall include:
(a) surface water impact assessment criteria;
(b) a program to monitor the land in waste water utilisation area(s) and receiving waters;
(c) a program to monitor the quality of water contained in, or discharged from, water storages (including the mining void) associated with the development;
(d) a program to monitor surface water flows and quality upstream and downstream of the confluence of the Northern catchment into Werris Creek and the Southern catchment into Quipolly Creek; and
(e) a program to monitor the effectiveness of the Erosion and Sediment Control Plan.

35. [8]The Groundwater Management Plan must cover the full cycle of operation from pre-mining to completion of rehabilitation/restoration of all groundwater. This plan must include:
(a) clearly defined objectives for the Groundwater Management Plan;
(b) release criteria applicable to the objectives of the Groundwater Management Plan;
(c) identification of monitoring bores and piezometers which are representative of those areas likely to be impacted within and around the operational area;
(d) inclusion of at least one monitoring bore at a location outside the predicted influence of the mine, within the regional fractured rock layers;
(e) inclusion of bores representative of groundwater use in the area, including the shallow aquifer adjacent to Quipolly Creek;
(f) pre-mining and post-mining, for a period of 10 years after mining has ceased, monitoring of watertable levels and water quality;
(g) analytes to be monitored;
(h) procedures for sampling and monitoring;
(i) frequency of readings in relation to all specified parameters;
(j) levels of readings indicating contamination/impacts of the groundwater; and
(k) procedures for investigation of detected contamination/impacts.

[9]Independent Review of Monitoring

36. The Applicant shall provide to the Department an annual review and report on surface and groundwater monitoring and observable trends. The report is to be completed by a suitably qualified and independent hydrogeologist, whose appointment has been approved by the Director-General.

[8] Incorporates Department's GTAs
[9] Incorporates Department's GTA

Final Void Management

37. At least 3 years before the cessation of mining, or as otherwise directed by the Director-General, the Applicant shall prepare and implement a Final Void Management Plan, in consultation with the DII and DECCW, and to the satisfaction of the Director-General. This plan must:
(a) investigate options for the future use of the final void;
(b) re-assess the potential groundwater impacts of the development; and
(c) describe what actions and measures would be implemented to:
- minimise any potential adverse impacts associated with the final void; and
- manage, and monitor the potential impacts of, the final void over time.

FAUNA & FLORA

Biodiversity Offset Strategy

38. The Applicant shall implement the Biodiversity Offset Strategy (as summarised in Table 16 and shown in the figure in Appendix 3) in accordance with best practice flora and fauna management, and to the satisfaction of the Director-General.

Component	*Location*	*Size (ha)*
White Box Yellow Box Blakely's Red Gum Woodland endangered ecological community (22 ha) and Native Vegetation on Cracking Clay Soils of the Liverpool Plains endangered ecological community (102 ha)	south west of the mine	124
Area remaining from the original "200 ha" offset	south east and east of the open cut	77
Potential Linkage of remnant White Box, rehabilitation and plantings	south and south west of the open cut	129
White Box Yellow Box Blakely's Red Gum Woodland endangered ecological community	"Railway View"	20
Tumbledown Gum Woodland Community	"Railway View"	4.5
Cleared land	"Railway View"	7.5
Total Offset Area		**362**

Table 16: Biodiversity Offset Strategy

Agreement to Conserve Offset Areas

39. Prior to 30 June 2009, the Applicant shall implement suitable arrangements to provide long-term security for the offset in the Biodiversity Offset Strategy to the satisfaction of the Director-General.

Note: The long-term security of the offset can be achieved through one, or a combination, of the following: Deed of Agreement with the Minister, rezoning the land under the Liverpool Plains Local Environment Plan, caveats on the title under the Conveyancing Act 1919, etc..

Biodiversity Offset Management Plan

40. Prior to 31 August 2009, the Applicant shall prepare and subsequently implement a Management Plan for the Biodiversity Offset Strategy to the satisfaction of the Director-General. This plan must include:
(a) a description of the Biodiversity Offset Strategy in broad terms, including its objectives and its relationship to the mine's Rehabilitation Management Plan;
(b) assessment and completion criteria for the Biodiversity Offset Strategy;

(c) a detailed flora and fauna monitoring program for the Biodiversity Offset Strategy that is based on sound statistical principles; and
(d) a detailed description of the procedures to be applied within the Biodiversity Offset lands, including;
- erosion and sedimentation control;
- soil and water management;
- bushfire management;
- exclusion of domestic livestock grazing;
- weed management, targeting major woody and noxious weeds;
- retention of regrowth native vegetation;
- maintaining availability of a suitable fire control unit on site;
- limiting human access to the offset area to authorised personnel only;
- retaining all dead timber and fallen logs;
- retaining bush rock in situ;
- carrying out infill planting of native vegetation tubestock; and
- feral animal control.

Annual Review of Biodiversity Offset Management Plan

41. The Applicant shall:
(a) annually review performance under the Biodiversity Offset Management Plan; and
(b) if necessary, revise the Biodiversity Offset Strategy,
to the satisfaction of the Director-General.

Independent Audit of the Biodiversity Offset Management Plan

42. Prior to 31 August 2011, and every 3 years thereafter, the Applicant shall commission, and pay the full cost of, an Independent Audit of the Biodiversity Offset Management Plan. This audit must:
(a) be conducted by a suitably qualified, experienced, and independent person whose appointment has been approved by the Director-General;
(b) assess the performance of the Biodiversity Offset Management Plan; and
(c) if necessary, recommend actions or measures to improve the performance of the Biodiversity Offset Management Plan.

Conservation Bond

41. Following the independent audit of the Biodiversity Offset Strategy at the end of year 6 of the development, or prior to the cessation of mining, whichever occurs first, the Applicant shall lodge a reasonable conservation bond with the Department to ensure that there are sufficient resources available to fully implement the Biodiversity Offset Strategy. The amount of the bond shall be set by the Director-General, in consultation with the Applicant, and reflect the costs, at that time, of fully implementing the Biodiversity Offset Strategy. The Director-General, in consultation with the Applicant, may adjust the amount of the bond after any subsequent independent audit of the Biodiversity Offset Strategy.

ABORIGINAL & EUROPEAN HERITAGE

Conservation of the "Narrawolga Site"

42. The Applicant shall manage the removal, re-location and protection of the axe-grinding grooves known as the *"Narrawolga Site"* in accordance with the information accompanying modification application DA 172-7-2004 MOD-2 and to the satisfaction of the Director-General.

Archaeology and Cultural Heritage Management Plan

43. The Applicant shall prepare and implement an Archaeology and Cultural Heritage Management Plan, in consultation with the DECCW and the Nungaroo LALC. This plan must:

(a) describe in detail a conservation program for Aboriginal cultural heritage during the development;
(b) establish a consultation protocol, including regular meetings, with the local Nungaroo LALC for Aboriginal cultural heritage management on-site during the development;
(c) make provision for the local Aboriginal community to monitor works at the development that occur in areas considered by the local Aboriginal community to be culturally sensitive;
(d) describe the procedures that would be implemented if any heritage or archaeological sites were discovered during the development;
(e) describe a contingency plan and reporting procedure should damage to Aboriginal sites or places occur at the development; and
(f) describe the induction and training program to be undertaken by all employees and contractors in respect of cultural heritage awareness and protection.

The Applicant shall not carry out any development before the Director-General has approved this plan.

45A. Prior to 31 May 2007, the Applicant shall revise the Werris Creek Coal Mine Archaeology and Cultural Heritage Management Plan in respect of the ongoing management of the *"Narrawolga Site"*, in consultation with the DECCW, the Nungaroo LALC and other representatives of the local Aboriginal community, to the satisfaction of the Director-General.

"Narrawolga" Homestead

44. The Applicant shall, within 12 months of the date of this consent, ensure that a qualified heritage architect fully and appropriately records the "Narrawolga" homestead building in a report that:
- records the material elements of the building; and
- identifies materials to be recovered during the demolition of the building for reuse.

The Applicant shall implement the recommendations of the report and provide a copy of the report to Council.

Reporting

45. The Applicant shall give a detailed progress report on the measures implemented to preserve and protect Aboriginal cultural heritage in the AEMR.

TRAFFIC & TRANSPORT

[10]New Mine Access Road Intersection to Werris Creek Road

46. The Applicant shall:
(a) prior to 31 January 2006, design and construct a mine access road from the mine site to the Quirindi to Werris Creek Road;
(b) prior to construction of the mine site access road / Quirindi to Werris Creek Road intersection, produce a Traffic Management Plan for its construction and operation;
(c) maintain the intersection for the life of the mine; and
(d) provide street lighting in accordance with local electricity authority guidelines,
to the satisfaction of Council.

[11]Escott Road and Coal Haul Road Intersection

47. The Applicant shall:
(a) prior to the use of the coal haul road from the mine site to rail load-out facility, design and construct the intersection of the coal haul road and Escott Road;
(b) prior to construction of the intersection, produce a Traffic Management Plan for its construction and operation;

[10] Incorporates Council GTA
[11] Incorporates Council GTA

(c) maintain the intersection for the life of the mine; and
(d) provide street lighting in accordance with local electricity authority guidelines,
to the satisfaction of Council.

[12]Escott Road and Werris Creek Road Intersection

48. The Applicant shall maintain the Escott Road/Werris Creek Road intersection for the life of the mine to the satisfaction of Council.

Internal Roads

49. The Applicant shall tar seal the:
(a) mine access road prior to 31 January 2006; and
(b) coal haul road from the mine to the rail load-out facilities prior to its use to transport coal.

Coal Haulage

52. The Applicant shall only haul coal from the site by road between the hours of;
(a) 7 am to 6 pm Monday to Friday;
(b) 7 am to 2 pm Saturday; and
(c) at no time on public holidays.

Coal haulage by road must not commence until 8 am during temperature inversion conditions, southeast winds exceeding 3 m/s and northwest winds exceeding 3 m/s, unless approved by the DECCW.

53. The Applicant shall ensure that spillage from coal haulage vehicles is minimised and that sediment-laden runoff from roads is effectively managed to prevent harm to the environment.

Monitoring

54. The Applicant shall:
(a) keep records of the:
- amount of coal transported from the site each year; and
- number of coal haulage truck movements generated by the development; and

(b) include these records in the AEMR.

VISUAL IMPACT

Visual Amenity

55. The Applicant shall carry out the development in a way that prevents and/or minimises the visual impacts of the development, including:
(a) design and construction of development infrastructure in a manner that minimises visual contrasts;
(b) progressive rehabilitation of mine overburden emplacements (particularly outer batters), including partial rehabilitation of temporarily inactive areas and proposed topsoil storage stockpiles; and
(c) construction of a 15 metre high acoustic/visual bund along the eastern perimeter of the overburden emplacement (parallel to the Quirindi to Werris Creek Road) during the Construction Stage of the mine,
(d) tree planting on the northern and eastern sides of the coal stockpile and rail load-out facility,
to the satisfaction of the Director-General.

56. If a landowner of any privately-owned residence having direct views of the mine or train load-out facility of less than 2 km distance requests the Applicant in writing to investigate ways to minimise the visual impact of the development on his/her dwelling, the Applicant shall within 3 months:

[12] Incorporates Council GTA

(a) commission a suitably qualified person whose appointment has been approved by the Director-General, to investigate ways to minimise the visual impacts from the development on the landowner's dwelling; and
(b) give the landowner a copy of the visual impact mitigation report.

If both parties agree on the measures that should be implemented to minimise the visual impact from the development, then the Applicant shall implement these measures to the satisfaction of the Director-General.

If the Applicant and the landowner disagree on the measures that should be implemented to minimise the visual impact from the development, then either party may refer the matter to the Director-General for resolution.

If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 2).

Lighting Emissions

57. The Applicant shall:
(a) take all practicable measures to mitigate off-site lighting impacts from the development; and
(b) 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.

GREENHOUSE GAS EMISSIONS

58. The Applicant shall: shall implement an Energy Savings Action Plan for the project to the satisfaction of the Director-General. This plan must:

a) be prepared in accordance with the *Guidelines for Energy Savings Action Plans* (DEUS, 2005), or its latest version;

b) include consideration of energy use by mobile equipment and investigate ways to reduce greenhouse gas emissions generated by the development; including the use of mains electric power to operate equipment associated with the coal processing plant and the rail load-out facility; and

c) be submitted to the Director-General for approval prior to 30 June 2010; and

d) include a program to monitor the effectiveness of measures to reduce energy use on site.

The Applicant must also report on greenhouse gas monitoring and management measures in the AEMR, to the satisfaction of the Director-General.

WASTE MANAGEMENT

59. The Applicant shall:
(a) monitor the amount of waste generated by the development;
(b) investigate ways to minimise waste generated by the development;
(c) implement reasonable and feasible measures to minimise waste generated by the development; and
(d) report on waste and management and minimisation in the AEMR,
to the satisfaction of the Director-General.

60. The Applicant shall not cause, permit or allow any waste generated outside the mine to be received at the mine for storage, treatment, processing, reprocessing or disposal, or any waste generated at the mine to be disposed at the mine, except as expressly permitted by a DECCW licence.

Note: This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste that requires a licence under the Protection of the Environment Operations Act 1997.

HAZARDS MANAGEMENT

Spontaneous Combustion

61. The Applicant shall:
    (a) take the necessary measures to prevent, as far as is practical, spontaneous combustion on the site; and
    (b) manage any spontaneous combustion on-site to the satisfaction of the DII.

Dangerous Goods

62. The Applicant shall ensure that the storage, handling, and transport of:
    (a) dangerous goods is done in accordance with the relevant *Australian Standards*, particularly *AS1940* and *AS1596*, and the *Dangerous Goods Code*; and
    (b) explosives are managed in accordance with the requirements of the DII.

BUSHFIRE MANAGEMENT

63. The Applicant shall:
    (a) ensure that the development 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 on-site during the development.

64. The Applicant shall prepare and implement a Bushfire Management Plan for the site, to the satisfaction of Council and the Rural Fire Service.

MINE CLOSURE STRATEGY

Landscape Management Plan

65. The Applicant shall prepare and implement a detailed Landscape Management Plan for the development to the satisfaction of the DII and the Director-General. This plan must:
    (a) be prepared in consultation with DECCW, NOW and DII by a suitably qualified expert;
    (b) be submitted to the Director-General for approval prior to 30 April 2010 or as otherwise approved by the Director-General, and include:
        - a Rehabilitation Management Plan; and
        - a Mine Closure Plan.

    Note: The Department accepts that the initial Landscape Management Plan may not include the Mine Closure Plan. However, if this occurs, the Applicant will be required to seek approval from the Director-General for an alternative timetable for the completion and approval of the Mine Closure Plan.

Rehabilitation Management Plan

66. The Rehabilitation Management Plan must include:
    (a) objectives for rehabilitation of the site;
    (b) a description of the short, medium, and long term measures that would be implemented to:
        - rehabilitate the site;
        - manage the remnant vegetation and habitat on the site;
        - maximise effective habitat linkages to surrounding vegetated lands;
        - conserve and reuse topsoil;
        - control weeds, feral pests and access; and
        - manage any potential conflicts between the rehabilitation works and Aboriginal cultural heritage;
    (c) detailed performance and completion criteria for the rehabilitation of the site;
    (d) a discussion of its relationship with the Biodiversity Offset Management Plan;
    (e) a detailed description of how the performance of the rehabilitation of the mine would be monitored over time to achieve the stated objectives;

    (f) a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and
    (g) details of who (by person and/or position) is responsible for monitoring, reviewing, and implementing the plan.

    Note: Reference to "rehabilitation" in this consent includes all works associated with the rehabilitation and restoration of the site as described in the documents listed in condition 1.

Mine Closure Plan

67. The Mine Closure Plan must:
    (a) define the objectives and criteria for mine closure;
    (b) investigate options for the future use of the site, including the final void;
    (c) investigate ways to minimise the adverse socio-economic effects associated with mine closure, including reduction in local employment levels;
    (d) describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the development; and
    (e) describe how the performance of these measures would be monitored over time.

SCHEDULE 5
ADDITIONAL PROCEDURES FOR AIR QUALITY & NOISE MANAGEMENT

Notification of Landowners

1. If the air dispersion and/or noise model predictions in the documents listed in condition 2 of schedule 3 identify that the air pollution and/or noise generated by the development are likely to be greater than the air quality and/or noise impact assessment criteria in schedule 4, then the Applicant shall notify the relevant landowners and/or existing or future tenants (including tenants of mine-owned properties) accordingly before it carries out any development.

2. If the results of the air quality and/or noise monitoring required in schedule 4 identify that the air pollution and/or noise generated by the development is greater than any of the air quality and/or noise criteria in schedule 4, except where this is predicted in the EIS, then the Applicant shall notify the Director-General and the affected landowners and/or existing or future tenants (including tenants of mine-owned properties) accordingly, and provide quarterly monitoring results to each of these parties until the results show that the development is complying with the air quality and/or noise criteria in schedule 4.

3. Within 6 months of this consent, the Applicant shall develop a brochure to advise landowners and/or existing or future tenants (including tenants of mine-owned properties) of the possible health and amenity impacts associated with exposure to particulate matter, in consultation with NSW Health, and to the satisfaction of the Director-General.

   The Applicant shall review relevant human health studies and update this brochure every 3 years, to the satisfaction of the Director-General.

   The Applicant shall provide this brochure (and associated updates) to all landowners and/or existing or future tenants (including tenants of mine-owned properties) of properties where the monitoring results identify that the mine is exceeding the air quality land acquisition criteria in schedule 4.

Independent Review

4. If a landowner considers the development to be exceeding the air quality and/or noise criteria in schedule 4, except where this is predicted in the EIS, then he/she may ask the Applicant in writing for an independent review of the air pollution and/or noise impacts of the development on his/her land.

   If the Director-General is satisfied that an independent review is warranted, the Applicant shall within 3 months of the Director-General advising that an independent review is warranted:
   (a) consult with the landowner to determine his/her concerns;
   (b) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to conduct air quality and/or noise monitoring on the land, to determine whether the development is complying with the relevant air quality and/or noise criteria in schedule 4, and identify the source(s) and scale of any air quality and/or noise impact on the land, and the development's contribution to this impact;
   (c) give the Director-General and landowner a copy of the independent review.

5. If the independent review determines that the development is complying with the relevant air quality and/or noise criteria in schedule 4, then the Applicant may discontinue the independent review with the approval of the Director-General.

6. If the independent review determines that the development is not complying with the relevant air quality and/or noise criteria in schedule 4, and that the development is primarily responsible for this non-compliance, then the Applicant shall:
   (a) take all practicable measures, in consultation with the landowner, to ensure that the development complies with the relevant air quality and/or noise criteria; and

   (b) conduct further air quality and/or noise monitoring to determine whether these measures ensure compliance; or
   (c) secure a written agreement with the landowner to allow exceedances of the air quality and/or noise criteria in schedule 4,

   to the satisfaction of the Director-General.

   If the additional monitoring referred to above subsequently determines that the development is complying with the relevant air quality and/or noise criteria in schedule 4, then the Applicant may discontinue the independent review with the approval of the Director-General.

   If the measures referred to in (a) do not achieve compliance with the air quality and/or noise land acquisition criteria in schedule 4, and the Applicant cannot secure a written agreement with the landowner to allow these exceedances within 3 months, then the Applicant shall, upon receiving a written request from the landowner, acquire the landowner's land in accordance with the procedures in conditions 10-12 below.

7. If the independent review determines that the relevant air quality and/or noise criteria in schedule 4 are being exceeded, but that more than one development is responsible for this non-compliance, then the Applicant shall:
   (a) take all practicable measures with the relevant development/s, in consultation with the landowner, to ensure that the relevant air quality and/or noise criteria are complied with; and
   (b) conduct further air quality and/or noise monitoring to determine whether these measures ensure compliance; or
   (c) secure a written agreement with the landowner to allow exceedances of the air quality and/or noise criteria in schedule 4,

   to the satisfaction of the Director-General.

8. If the independent review determines that the relevant air quality and/or noise land acquisition criteria in schedule 4 are being exceeded at the residence and/or on the landowner's land, and that more than one development is responsible for this non-compliance, and the Applicant cannot secure a written agreement with the landowner to allow these exceedances within 3 months, then upon receiving a written request from the landowner, the Applicant shall acquire all or part of the landowner's land on as equitable a basis as possible with the relevant development/s in accordance with the procedures in conditions 10-12 below.

   If the Applicant is unable to finalise an agreement with the landowner and/or other development/s, then the Applicant or landowner may refer the matter to the Director-General for resolution.

   If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process.

   If, following the Independent Dispute Resolution Process, the Director-General decides that the Applicant shall acquire all or part of the landowner's land, then the Applicant shall acquire this land in accordance with the procedures in conditions 10-12 below.

9. If the landowner disputes the results of the independent review, either the Applicant or the landowner may refer the matter to the Director-General for resolution.

   If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process.

Land Acquisition

10. Within 3 months of receiving a written request from a landowner with acquisition rights, the Applicant shall make a binding written offer to the landowner based on:
   (a) the current market value of the landowner's interest in the property at the date of this written request, as if the property was unaffected by the development the subject of the DA, 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 property 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;

(b) the reasonable costs associated with:
- relocating within the Liverpool Plains local government area, or to any other local government area determined 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 required; and

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

However, if at the end of this period, the Applicant 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 shall request the President of the Australian Property Institute to appoint a qualified independent valuer or Fellow of the Institute, to consider submissions from both parties, and determine a fair and reasonable acquisition price for the land, and/or terms upon which the land is to be acquired.

If either party disputes the independent valuer's determination, then the independent valuer should refer the matter back to the Director-General.

Upon receiving such a referral, the Director-General shall appoint a panel comprising the:
(i) appointed independent valuer;
(ii) Director-General and/or nominee/s; and
(iii) President of the Law Society of NSW or nominee,
to consider submissions from both parties, including meeting with the parties individually if requested, and to determine a fair and reasonable acquisition price for the land, and/or the terms upon which the land is to be acquired.

Within 14 days of receiving the panel's determination, the Applicant shall make a written offer to purchase the land at a price not less than the panel's determination.

If the landowner refuses to accept this offer within 6 months of the date of the Applicant's offer, the Applicant's obligations to acquire the land shall cease, unless otherwise agreed by the Director-General.

11. The Applicant shall bear the costs of any valuation or survey assessment requested by the independent valuer, panel, or the Director-General and the costs of determination referred above.

12. If the Applicant and landowner agree that only part of the land shall be acquired, then the Applicant shall pay all reasonable costs associated with obtaining Council approval for any plan of subdivision, and registration of the plan at the Office of the Registrar-General.

SCHEDULE 6
ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING AND REPORTING

ENVIRONMENTAL MANAGEMENT STRATEGY

1. Before carrying out any development, the Applicant shall prepare and subsequently implement an Environmental Management Strategy for the development to the satisfaction of the Director-General. This strategy must:
   (a) provide the strategic context for environmental management of the development;
   (b) identify the statutory requirements that apply to the development;
   (c) describe in general how the environmental performance of the development would be monitored and managed during the development;
   (d) describe the procedures that would be implemented to:
   - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
   - receive, handle, respond to, and record complaints;
   - resolve any disputes that may arise during the course of the development;
   - respond to any non-compliance;
   - manage cumulative impacts; and
   - respond to emergencies;

   (e) describe the role, responsibility, authority, and accountability of all the key personnel, involved in environmental management of the development; and
   (f) be updated following each Independent Environmental Audit required by condition 6 below.

2. Within 3 months of the completion of the Independent Environmental Audit (see condition 6 below), the Applicant shall review, and if necessary revise, the Environmental Management Strategy to the satisfaction of the Director-General.

ENVIRONMENTAL MONITORING PROGRAM

3. Within 6 months of the date of this consent, the Applicant shall prepare an Environmental Monitoring Program for the development in consultation with relevant agencies, and to the satisfaction of the Director-General. This program must consolidate the various monitoring requirements in schedule 4 of this consent into a single document.

4. Within 3 months of the completion of the Independent Environmental Audit (see condition 6 below), the Applicant shall review, and if necessary revise, the Environmental Monitoring Program to the satisfaction of the Director-General.

ANNUAL REPORTING

5. Each year, the Applicant shall prepare an AEMR to the satisfaction of the Director-General. This report must:
   (a) identify the standards and performance measures that apply to the development;
   (b) include a summary of the complaints received during the past year, and compare this to the complaints received in the previous 5 years;
   (c) include a summary of the monitoring results on the development during the past year,
   (d) include an analysis of these monitoring results against the relevant:
   - limits/criteria in this consent;
   - monitoring results from previous years; and
   - predictions in the EIS;

   (e) identify any trends in the monitoring over the life of the development;
   (f) identify and discuss any non-compliance during the previous year; and
   (g) describe what actions were, or are being, taken to ensure compliance.

INDEPENDENT ENVIRONMENTAL AUDIT

6. At the end of Year 3 of the development, and every 3 years thereafter, unless the Director-General directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:

(a) be conducted by a suitably qualified, experienced, and independent person whose appointment has been endorsed by the Director-General;
(b) be consistent with *ISO 19011:2002 – Guidelines for Quality and/or Environmental Systems Auditing*, or equivalent updated versions of these guidelines;
(c) assess the environmental performance of the development, and its effects on the surrounding environment;
(d) assess whether the development is complying with the relevant standards, performance measures, and statutory requirements;
(e) review the adequacy of the Applicant's Environmental Management Strategy and Environmental Monitoring Program; and
(f) if necessary, recommend measures or actions to improve the environmental performance of the development, and/or the environmental management and monitoring systems.

7. Within 6 weeks of completing this audit, or as otherwise agreed by the Director-General, the Applicant shall submit a copy of the audit report to the Director-General with a response to any recommendations contained in the audit report.

A Within 3 months of submitting the audit report to the Director-General, the Applicant shall review and if necessary revise the strategies/plans/programs required under this consent, to the satisfaction of the Director-General.

COMMUNITY CONSULTATIVE COMMITTEE

7. Within 3 months of the date of this consent, the Applicant shall establish a Community Consultative Committee to oversee the environmental performance of the development. This committee shall:
(a) be comprised of:
- 2 representatives from the Applicant, including the person responsible for environmental management at the mine;
- 1 representative from Council; and
- at least 3 representatives from the local community,

whose appointment has been approved by the Director-General in consultation with the Council;
(b) be chaired by the representative from Council or by a third party as approved by the Director-General;
(c) meet at least four times a year, or as determined by the Director-General; and
(d) review and provide advice on the environmental performance of the development, including any construction or environmental management plans, monitoring results, audit reports, or complaints.

Note: If the Director-General approves a third party to chair the Committee, the Applicant shall pay that person the reasonable costs of carrying out the duties of the position.

8. The Applicant shall, at its own expense:
(a) ensure that 2 of its representatives attend the Committee's meetings;
(b) provide the Committee with regular information on the environmental performance and management of the development;
(c) provide meeting facilities for the Committee;
(d) arrange site inspections for the Committee, if necessary;
(e) take minutes of the Committee's meetings;
(f) make these minutes available at Council within 14 days of the Committee meeting, or as agreed to by the Committee;
(g) respond to any advice or recommendations the Committee may have in relation to the environmental management or performance of the development; and
(h) forward a copy of the minutes of each Committee meeting, and any responses to the Committee's recommendations to the Director-General within a month of the Committee meeting.

ACCESS TO INFORMATION

9. Within 1 month of the approval of any management plan/strategy or monitoring program required under this consent (or any subsequent revision of these management plans/strategies or monitoring programs), the completion of the independent audits required under this consent (see conditions 42 of schedule 4 and condition 6 of schedule 6), or the completion of the AEMR (see condition 5 above), the Applicant shall:
(a) provide a copy of the relevant document/s to the Council, relevant agencies and the Community Consultative Committee; and
(b) ensure that a copy of the relevant documents is made publicly available at Council,
to the satisfaction of the Director-General.

10. During the life of the development, the Applicant shall:
(a) make the results of the monitoring required under this consent publicly available at the mine; and
(b) update these results on a regular basis (at least every 2 months),
to the satisfaction of the Director-General.

APPENDIX 1
SCHEDULE OF LAND

Freehold Land

DESCRIPTION	
Lot 1	DP 186633
Part Lot 271 *	DP 257307
Lots 19, 20, 73-75, 109,110,112,120,121,123, 126-130,133,135	DP 751017
Part Lots 83, 131, 132, 217, 225	DP 751017
Lots 1-4	DP 1022826
Part Lots 3 and 4	DP 1037145

Crown Land Descriptions

Council Roads
Council public roads east of Lots 130, 133 135, Part Lot 83, Part Lot 217 and Part Lot 225 in DP751017.
Council public roads north of Lots 129 and 130 in DP 751017.
Council public road through Part Lot 271 DP 257307.

Crown Roads

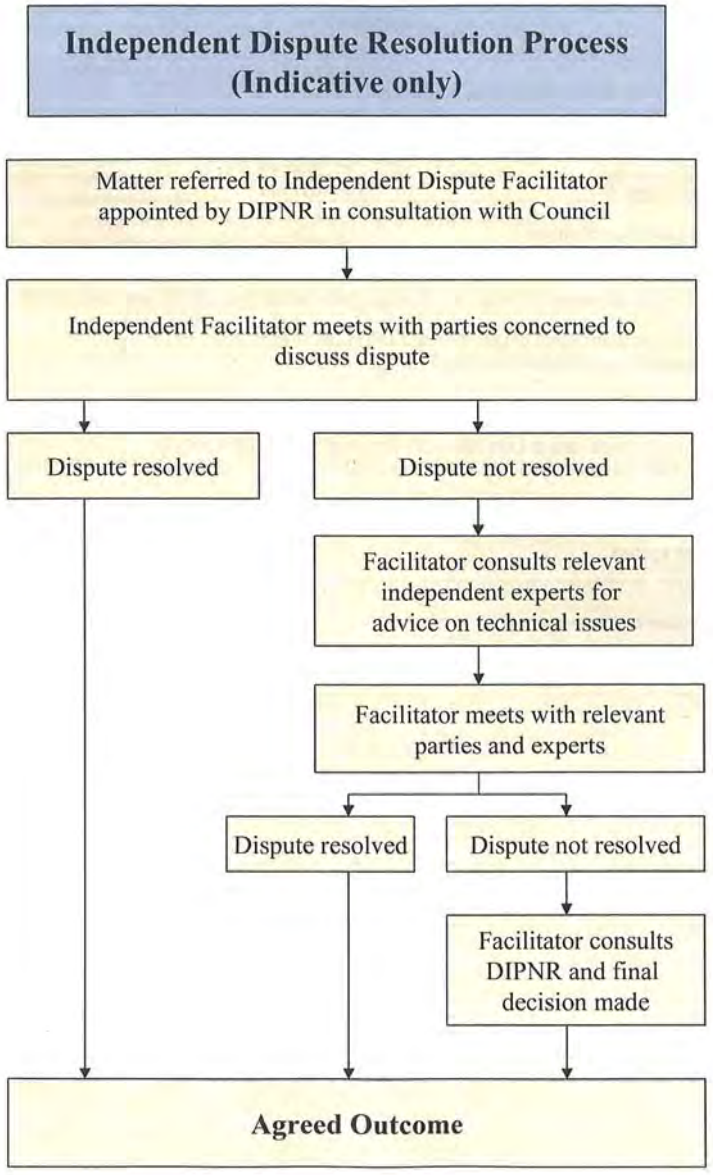
Crown public roads east of Lots 126, 127, 128, Part Lot 132 DP 751017.
Crown public roads south of Part Lot 132, Part Lot 83, Part Lot 225 and Lot 109 DP 751017.

Railway Land

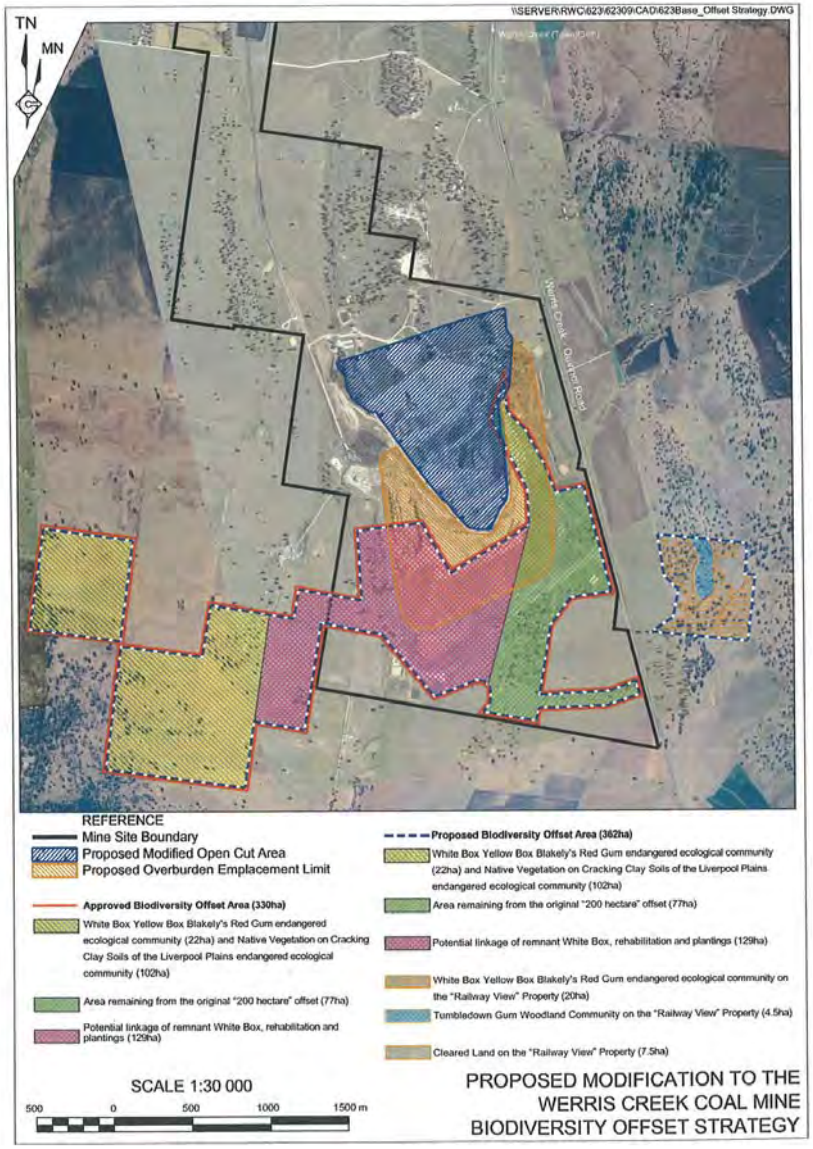
Lot 2 DP 431951

* under conversion to freehold

APPENDIX 2
INDEPENDENT DISPUTE RESOLUTION PROCESS



APPENDIX 3
LOCATION OF BIODIVERSITY OFFSET STRATEGY



WERRIS CREEK COAL
AEMR 2010-2011

APPENDIX 2

LICENCE AND LEASE

(a) Environment Protection Licence 12290

(b) Mining Lease 1563

Environment Protection Licence

Licence - 12290

Licence Details	
Number:	12290
Anniversary Date:	01-April
Review Due Date:	23-Jun-2014

Licensee

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

Licence Type

Premises

Premises

Werris Creek Coal Mine
Werris Creek Quirindi Road
WERRIS CREEK NSW 2341

Scheduled Activity

Mining for coal
Coal works

Fee Based Activity	Scale
Coal works	0 - 2000000 T loaded
Mining for coal	> 500000 - 2000000 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
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Information about this licence

Dictionary

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

Responsibilities of licensee

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

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

Variation of licence conditions

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

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

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

Duration of licence

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

Licence review

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

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

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

The EPA publication "A Guide to Licensing" contains information about how to calculate your licence fees.

The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

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

Transfer of licence

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

Public register and access to monitoring data

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

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

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

This licence is issued to:

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

subject to the conditions which follow.

1 Administrative conditions

A1 What the licence authorises and regulates

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

Fee Based Activity	**Scale**
Coal works	0 - 2000000 T loaded
Mining for coal	> 500000 - 2000000 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 to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
Werris Creek Coal Mine
Werris Creek Quirindi 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 premise comprises the following land.

Freehold Land

Lot 1 DP 186633.
Lots 19, 20, 73, 74, 75, 109, 110, 112, 120, 121, 123, 126, 127, 128, 129, 130, 133 & 135 DP 751017;
Part lots 83, 131, 132, 217 & 225 DP 751017.
Part lot 2 DP 1085891.
Part lot 4 DP 1022826
Lots 1, 2 & 3 DP 1022826.
Part lots 3 & 4 DP1037145.

Crown Land Descriptions

Council Roads
Council public roads east of lots 130, 133, 135, part lot 83, part lot 217 and part lot 225 in DP 751017.
Council public roads north of lots 129 and 130 in DP 751017.
Council public road through part lot 2 DP 1085891.

Crown Roads
Crown public roads east of lots 126, 127, 128, part lot 132 DP 751017.
Crown public roads south of part lot 132, part lot 83, part lot 225 and lot 109 DP 751017.

Railway Land
Lot 2 DP 431951.

A3 Other activities

A3.1 This licence applies to all other activities carried on at the premises, including:

Crushing, Grinding or Separating Works

A4 Information supplied to the EPA

A4.1 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.

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2 Discharges to air and water and applications to land

P1 Location of monitoring/discharge points and areas

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

Air

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Description of Location
1	Ambient Air Monitoring / Air Discharge Quality	Ambient Air Monitoring / Air Discharge Quality	Within 100 metres of the residence marked as "Tonsley Park" in Figure 1 of the Air Quality Monitoring Program dated August 2009 that was submitted to EPA on 22-9-09 and which is kept on file LIC07/2029-09.
2	Ambient Air Monitoring / Air Discharge Quality	Ambient Air Monitoring / Air Discharge Quality	Within 100 metres of the residence marked as "Eurunderee" on Figure 2 of the Air Quality Monitoring Program dated August 2009 that was submitted to EPA on 22-9-09 and which is kept on file LIC07/2029-09.
4	Ambient Air Monitoring / Air Discharge Quality	Ambient Air Monitoring / Air Discharge Quality	Within 100 metres of the residence marked as "Railway View" on Figures 1 and 2 in the Air Quality Monitoring Program dated August 2009 that was submitted to EPA on 22-9-09 and which is kept on file LIC07/2029-09.
7	Ambient Air Monitoring / Air Discharge Quality	Ambient Air Monitoring / Air Discharge Quality	Within 100 metres of the residence marked as "Cintra" on Figures 1 and 2 of the Air Quality Monitoring Program dated Auguist 2009 that was submitted to EPA on 22-9-09 and which is kept on file LIC07/2029-09.
8	Ambient Air Monitoring / Air Discharge Quality	Ambient Air Monitoring / Air Discharge Quality	Within 100 metres of the residence marked as "Plain View" in Figure 1 of the Air Quality Monitoring Program dated August 2009 that was submitted to EPA on 22-9-09 and which is kept on file LIC07/2029-09.
9	Ambient Weather Monitoring.		Weather station located on the top level of the overburden emplacement at RL 445m

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.

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Water and land

EPA identification no.	Type of monitoring point	Type of discharge point	Description of location
10	Wet Weather Discharge / Discharge Water Quality Monitoring.	Wet Weather Discharge / Discharge Water Quality Monitoring.	Point SB2 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.
12	Wet Weather Discharge / Discharge Water Quality Monitoring	Wet Weather Discharge / Discharge Water Quality Monitoring	Point SB9 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.
14	Wet Weather Discharge / Discharge Water Quality Monitoring	Wet Weather Discharge / Discharge Water Quality Monitoring	Point SB10 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.
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 VWD1 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.
17	Groundwater Quality Monitoring		Point MW-1 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.

EPA identification no.	Type of monitoring point	Type of discharge point	Description of location
18	Groundwater Quality Monitoring		Point MW-2 marked on Figure 4 in the Site Water Management Plan for Werris Creek Coal Mine dated March 2009 submitted to EPA on 22-9-09 and which is kept on file LIC07/2029-09.
19	Groundwater Quality Monitoring		Point MW-3 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.
20	Groundwater Quality Monitoring		Point MW-4 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.
21	Groundwater Quality Monitoring		Point MW-5 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.
22	Groundwater Quality Monitoring		Point MW-6 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.
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.

EPA identification no.	Type of monitoring point	Type of discharge point	Description of location
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 VWD2 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.

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 Load limits

L2.1 Not applicable.

L2.2 Not applicable.

L3 Concentration limits

L3.1 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.

L3.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L3.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

Water and Land

POINTS 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

L3.4 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.

L4 Volume and mass limits

L4.1 Not applicable.

L5 Waste

L5.1 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.

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L5.2 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.

L6 Noise Limits

L6.1 Noise from the premises must not exceed:

(a) an $L_{A1\ (1\ minute)}$ noise emission criterion of 45 dB(A) at night; and
(b) at all other times (including at night), an $L_{Aeq\ (15\ minute)}$ noise emission criterion of 35 dB(A), except as expressly provided by this licence.

L6.2 Noise from the premises is to be measured at a point within 30 metres of any non-project related residence to determine compliance with this condition.

L6.3 **Definitions**

$L_{Aeq\ (15\ minute)}$ is the equivalent continuous noise level- the level of noise equivalent to the energy-average of noise levels occurring over a measurement period (i.e. 15 minutes).

$L_{A1\ (1\ minute)}$ is the A-weighted sound pressure level that is exceeded for 1 per cent of the time over a 1 minute measurement period.

Night is the period between midnight to 7am and 10pm to midnight Monday to Saturday and midnight to 8am and 10pm to midnight Sundays and Public Holidays.

L6.4 **Noise Management**

Note: For the purpose of noise measures required for this condition, the L_{Aeq} noise level must be measured or computed at any point within 30 metres of any non-project related residence over a period of 15 minutes using "FAST" response on the sound level meter.

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.

L6.5 The noise emission limits identified in this licence apply under all meteorological conditions except:
(a) during rain and wind speeds (at 10m height) greater than 3m/s; and
(b) under "non-significant weather conditions".

Note: Field meteorological indicators for non-significant weather conditions are described in the NSW Industrial Noise Policy, Chapter 5 and Appendix E in relation to wind and temperature inversions.

L6.6 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.

L6.7 The noise limits set by condition L6.1 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.

L7 Hours of operation

L7.1 All construction activities at the premises must only be conducted between 7am to 10pm Mondays to Fridays, 8am to 6pm on Saturdays and at no time on Sundays and Public Holidays.

L7.2 Activities at the premises, other than construction work, may only be carried out at the times specified in the table below:

Permitted Operating Hours		
Activity	**Monday to Friday**	**Saturday**
Vegetation clearing / soil removal	7 am to 8 pm	
Drilling	Midnight to 4 am; and 7 am to midnight	Midnight to 4 am; and 7 am to 2 pm
Blasting	9 am to 5 pm	
Overburden removal & emplacement	24 hours	24 hours
Internal transport of coal products to ROM stockpiles	Midnight to 4 am; and 7 am to midnight	Midnight to 4 am; and 7 am to 2 pm
On-site processing	Midnight to 4 am; and 7 am to midnight	Midnight to 4 am; and 7 am to 2 pm
Coal transport to rail load-out facility	Midnight to 4 am; and 7 am to midnight	Midnight to 4 am; and 7 am to 2 pm
Maintenance	24 hours	24 hours *
Coal loading to trains	24 hours	24 hours *
Coal loading to trucks for domestic market	7 am to 6 pm	7 am to 2 pm
Rehabilitation	7 am to 10 pm	7 am to 2 pm
* Note: and Sundays, if required		

L7.3 This condition does not apply to the delivery of material outside the hours of operation permitted by condition L7.1 or L7.2, if that delivery is required by police or other authorities for safety reasons; and/or the operation or personnel or equipment are endangered. In such circumstances, prior notification is provided to the EPA and affected residents as soon as possible, or within a reasonable period in the case of emergency.

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L7.4 The hours of operation specified in conditions L7.1 or L7.2 may be varied with written consent if the EPA is satisfied that the amenity of the residents in the locality will not be adversely affected.

L8 Blasting

L8.1 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.

L8.2 The overpressure level from blasting operations at the premises must not exceed 115dB (Lin Peak) 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.

L8.3 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 10mm/sec 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.

L8.4 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5mm/sec 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.

L8.5 Blasting operations at the premises may only take place between 9:00am-5:00pm Monday to Friday. (Where compelling safety reasons exist, the Authority may permit a blast to occur outside the abovementioned hours. Prior written (or facsimile) notification of any such blast must be made to the Authority).

L8.6 The hours of operation for blasting operations specified in condition L7.2 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.

L8.7 Blasting at the premises is limited to 1 blast on each day on which blasting is permitted.

Note: Additional blasts are permitted where it is demonstrated to be necessary for safety reasons and the EPA and neighbours have been notified of the intended blast prior to the additional blast being fired.

L8.8 To determine compliance with condition(s) L8.1, L8.2, L8.3 and L8.4:

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 a school or hospital - for all blasts carried out in or on the premises; and
b) Instrumentation used to measure the airblast overpressure and ground vibration levels must meet the requirements of Australian Standard AS 2187.2-2006.

L9 Potentially offensive odour

L9.1 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 Stormwater/ Sediment Control- Operation Phase

O4.1 A Stormwater Management Scheme must prepared for the development and must be implemented. Implementation of the Scheme must mitigate the impacts of stormwater run- off from and within the premises following the completion of construction activities. The Scheme should be consistent with the current Stormwater Management Plan for the catchments on the site.

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O5 Waste Water Utilisation Areas

O5.1 Waste water must only be applied to the following areas: Point 15 defined in condition P1.3 of this licence.

O5.2 Spray from waste water application must not drift beyond the boundary of the waste water utilisation area to which it is applied.

O6 Maintaining Waste Water Utilisation Areas

O6.1 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.

O7 Noise

O7.1 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:

POINTS 1,4,7

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

POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
PM10	micrograms per cubic metre	Every 6 days	AM-18

POINT 8

Pollutant	Units of measure	Frequency	Sampling Method
Solid Particles	grams per square metre per month	Continuous	AM-19

POINTS 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
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
pH	pH	Special Frequency 1	Grab sample

POINTS 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
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
pH	pH	Every 3 months	Grab sample

POINTS 17,18,20,21,22

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
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
pH	pH	Every 6 months	Representative sample

POINT 19

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
Phosphorus (total)	milligrams per litre	Every 6 months	Representative sample
Reactive Phosphorus	milligrams per litre	Every 6 months	Representative sample
pH	pH	Every 6 months	Representative sample

POINTS 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
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
pH	pH	Special Frequency 2	Special Method 1

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.

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 - Measurement				AM-1 & AM-4 & Special method 2 AM-2 & AM-4 & Special method 2

For the purposes of this condition, ***Special method 2*** means that the applicant must install a permanent meteorological monitoring station and logger. The location of the site chosen for the station and details of equipment, measurement and maintenance/service procedures and schedules to be installed and maintained must be submitted in writing to the EPA and approved in writing by the EPA before any sampling or analysis is carried out. The meteorological monitoring station must be calibrated at least once every 12 months. The EPA is to be provided with the data on request in a Microsoft ® Office software compatible format.

POINTS: Within 30 metres of the residences on the properties "Almawille", "Glenara", "Kyooma", "Tonsley Park", "Greenslopes & Banool" and "Railway Cottage" marked on the map entitled *Figure 1 – Noise Monitoring Locations* in the Noise Management Protocol & Noise Management Program for the Werris Creek Coal Mine dated November 2010 that was submitted to EPA by e-mail on 23 November 2010 and which is kept on file LIC07/2029-11.

Parameter	Units of measure	Frequency	Sampling Method
Ambient Noise	$L_{Aeq\ (15\ minute)}$ L_{Amax} L_{A1} L_{A10} L_{A90} L_{Amin}	Every month for a minimum of 15 minutes (continuously) during full mining operations for day, evening and night time periods as defined by the EPA's Industrial Noise Policy (INP)	Attended Type 1 Noise Meter

Note: The frequency of monitoring and the parameters to be monitored may be varied by the EPA once the variability of the noise impact is established.

POINTS: Within 30 metres of the residence on the property "Tonsley Park" as marked on the map entitled *Figure 1 – Blast Monitoring Locations* in the Werris Creek Coal Blast Monitoring Program dated July 2010 that was submitted to EPA by e-mail on 7 September 2010 and which is kept on file LIC07/2029-11.

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

POINTS: Within 30 metres of the residences on the properties "Glenara", "Greenslopes & Banool", "Millbank" and at the location labelled "Laneway off Kurrara Street, Werris Creek" marked on the map entitled *Figure 1 – Blast Monitoring Locations* in the Werris Creek Coal Blast Monitoring Program dated July 2010 that was submitted to EPA by e-mail on 7 September 2010 and which is kept on file LIC07/2029-11.

Parameter	Units of measure	Frequency	Sampling Method
Blast Noise	dB (Lin Peak)	At a minimum of three of the above locations during every blast	Type 1 Noise/Blast Logger
Blast Vibration	mm/s	At a minimum of three of the above locations during every blast	Geophone Logger or similar

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 2002 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 Recording of pollution complaints

M4.1 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.

M4.2 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.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 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.

M5.2 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.

M5.3 Conditions M5.1 and M5.2 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.

M6 Requirement to monitor volume or mass

M6.1 Not applicable.

6 Reporting conditions

Section 55 Protection of the Environment Operations Act 1997
Environment Protection Licence
Licence - 12290

R1 Annual return documents

What documents must an Annual Return contain?

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.
A copy of the form in which the Annual Return must be supplied to the EPA accompanies this licence. Before 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.

Period covered by Annual Return

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.

Deadline for Annual Return

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').

Notification where actual load can not be calculated

R1.6 Not applicable.

Licensee must retain copy of Annual Return

R1.7 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.

Certifying of Statement of Compliance and signing of Monitoring and Complaints Summary

R1.8 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.

R1.9 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 the EPA of incidents causing or threatening material harm to the environment as soon as practicable 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.

General conditions

G1 Copy of licence kept at the premises

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.

Pollution studies and reduction programs

U1 Noise Monitoring and Assessment Program

U1.1 Completed.

Special conditions

Dictionary

General Dictionary

In this licence, unless the contrary is indicated, the terms below have the following meanings:

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

Environment Protection Licence

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 1998
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 1998
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
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 1998.
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 (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment 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

Section 55 Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 12290

load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
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*.
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 - 23-Dec-2010

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.

N.S.W. STAMP DUTY
CL No. 1846988 COAL MINING LEASE
2003•••2004•••2005

MINING LEASE

MINING ACT 1992

NO. **1563**

DATED **23rd March 2005**

THE MINISTER FOR MINERAL RESOURCES

OF THE STATE

OF NEW SOUTH WALES

TO

Creek Resources Pty Limited
(A. C. N. 100 228 886)

AND

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

RECORDED in the Department of Primary Industries, Mineral Resources

this **fifth** day of **April 2005** A.D.

at the hour of **10:00**

o'clock in the fore noon.

Director-General

MINING ACT 1992

MINING LEASE

THIS DEED made the **twenty third** day of **March** **Two thousand and five** in pursuance of the provisions of the Mining Act 1992 (hereinafter called "the Act") BETWEEN **THE HONOURABLE KERRY ARTHUR HICKEY MINISTER FOR MINERAL RESOURCES** of the State of New South Wales (hereinafter called "the Minister" which expression shall where the context admits or requires include the successors in office of the Minister and the person acting as such Minister for the time being) AND **Creek Resources Pty Limited (A. C. N. 100 228 886) and Betalpha Pty Limited (A. C. N. 105 663 518)** (which with its successors and transferees is hereinafter called "the lease holder")

WHEREAS

(a) in conformity with the Act application was made for a mining lease over the lands hereinafter described; and

(b) all conditions and things required to be done and performed before granting a mining lease under the Act have been done and performed NOW THIS DEED WITNESSETH that in consideration of the observance and performance of the covenants contained in this Deed and the payment of royalty by the lease holder, the Minister in pursuance of the provisions of the Act DOES HEREBY demise and lease to the lease holder ALL THAT piece or parcel of land containing by admeasurement of **678.5 hectares** and more particularly described and delineated in the plan catalogue No. **M27037** attached for the purpose of prospecting and mining for **coal**.

TO HOLD the said land together with any appurtenances thereon subject to:

(a) such rights and interests as may be lawfully subsisting therein or which may be reserved by the Act at the date of this Deed; and

(b) such conditions, provisos and stipulations as are contained in this Deed UNTO the lease holder from and including the date of this Deed for the period of **twenty one (21) years** for the purpose as stated and for no other purpose.

1. THAT in this lease except insofar as the context otherwise indicates or requires:

   (a) any reference to an Act includes that Act and any Act amending or in substitution for the same; "Director-General" means the person for the time being holding office or acting as Director-General, Department of Mineral Resources, Sydney; the word "mine" has the meaning assigned to it by the Act; words importing the singular number shall include the plural, the masculine gender the feminine or neuter gender and vice versa; and

(b) any covenant on the part of two or more persons shall be deemed to bind them jointly and severally.

2. THAT the lease holder shall during the said term pay to the Minister in Sydney in respect of all such minerals as stated, recovered from the land hereby demised, royalty at the rate or rates prescribed by the Act and the Regulations thereunder at the time the minerals are recovered, or at the rate or rates fixed by the Minister from time to time during the term of this demise in exercise of the power in that behalf conferred upon him by the Act.

3. THAT the lease holder shall at all times during the term of this lease keep and preserve the said mine from all avoidable injury or damage and also the levels, drifts, shafts, watercourses, roadways, works, erections and fixtures therein and thereon in good repair and condition and in such state and condition shall on the expiration or sooner determination of the said term or any renewal thereof deliver possession of the land and the premises hereby demised to the Minister or other persons authorised to receive possession thereof.

4. THAT the conditions and provisions set forth in the Schedule of Mining Lease Conditions 2004 herein and numbered:- **1 to 21 (inclusive), 23, 24, 25, 29, 30 and 31** are embodied and incorporated within this Deed as conditions and provisions of the lease hereby granted.

PROVIDED always and it is hereby declared as follows:

(a) THAT this lease is granted subject to amendment as provided under Section 79 of the Act.

(b) THAT if the lease holder at any time during the term of this demise -

(i) fails to fulfil or contravenes the covenants and conditions herein contained; or

(ii) fails to comply with any provision of the Act or the Regulations with which the lease holder is required to comply; or

(iii) fails to comply with the requirements of any agreement or assessment in relation to the payment of compensation,

this lease may be cancelled by the Minister by instrument in writing and the cancellation shall have effect from and including the date on which notice of the cancellation is served on the lease holder or on such later date as is specified in the notice; and any liability incurred by the lease holder before the cancellation took effect shall not be affected.

(c) THAT no implied covenant for title or for quiet enjoyment shall be contained herein.

(d) THAT all the conditions and provisions contained in the Mining Act 1992 and the Regulations thereunder, the Mines Inspection Act 1901 and the Coal Mines Regulation Act 1982 or any other law hereafter to be passed or prescribed shall be incorporated within this Deed as conditions and provisions of the lease granted. The lease holder hereby covenants to observe, fulfil and perform the same.

(e) THAT such of the provisions and conditions declared and contained in this Deed as requiring anything to be done or not to be done by the lease holder, shall be read and construed as covenants by the lease holder with the Minister which are to be observed and performed.

IN WITNESS WHEREOF the parties hereto have executed this Deed the day and year first abovewritten.

SIGNED SEALED AND DELIVERED
BY

The Honourable Kerry Arthur Hickey
as such Minister as aforesaid

.....
Minister

in the presence of

.....
Witness

SIGNED SEALED AND DELIVERED
by the said

Creek Resources Pty Limited
(A. C. N. 100 228 886)

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

in the presence of

.....
Witness

SIGNED IN ACCORDANCE WITH THE CONSTITUTION BY:

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

K ROSS - DIRECTOR

in the presence of

.....
Witness
LIQUIDATOR - 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.

WERRIS CREEK COAL
AEMR 2010-2011

APPENDIX 3

AIR QUALITY MONITORING RESULTS

(a) Deposited Dust Monitoring Results

(b) High Volume Air Sampler Results

Deposited Dust - Werris Creek Coal Mine 2010-2011

MONTH	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	ANNUAL AVERAGE LIMIT
April 2010	2.0	1.6	0.9	0.7	0.4			3.6
May 2010	1.2	1.0	1.0	c5.1*	0.4			3.6
June 2010	2.1	1.6	1.2	2.0	2.0			3.6
July 2010	0.7	0.8	0.7	0.5	0.4			3.6
August 2010	0.5	0.9	0.6	0.9	0.3	0.7		3.6
September 2010	1.4*	0.6	0.5	0.8	0.5	0.7		3.6
October 2010	6.6*	0.5	0.6	0.9	0.9	0.9		3.6
November 2010	2.0	1.0	0.9	1.0	0.8	0.9	2.1	3.6
December 2010	0.6	3.9	0.6	0.6	c7.8	0.4	1.6	3.6
January 2011	1.5	0.7	0.7	0.6	0.6	0.4	1.0	3.6
February 2011	1.4	0.8	0.6	0.7	0.4	1.2	1.0	3.6
March 2011	1.6	1.6	0.7	0.7	0.9	2.2	0.6	3.6
ANNUAL AVERAGE	**1.4**	**1.3**	**0.8**	**0.9**	**0.7**	**0.9**	**1.3**	**3.6**
MINIMUM	**0.5**	**0.5**	**0.5**	**0.5**	**0.3**	**0.4**	**0.6**	**3.6**
MAXIMUM	**2.1**	**3.9**	**1.2**	**2.0**	**2.0**	**2.2**	**2.1**	**3.6**

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 avera

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 Annual Average	TSP annual Annual Average
01-Apr-10	23		19.2	9		16.4	9		15.1	8		17.9	17		35.7	50	30	90
07-Apr-10	6		19.2	5		16.3	3		15.1	7		17.9	10		35.6	50	30	90
13-Apr-10	36		19.4	17		16.2	22		15.1	12		17.7	63		35.9	50	30	90
19-Apr-10	8		19.3	2		16.0	4		14.9	14		17.8	14		35.6	50	30	90
25-Apr-10	6	**15.8**	19.0	4	**7.4**	15.9	3	**8.2**	14.8	4	**9.0**	17.5	12	**23.2**	35.5	50	30	90
01-May-10	13		18.8	10		15.9	9		14.7	9		17.6	25		35.5	50	30	90
07-May-10	25		18.8	13		15.6	14		14.7	15		17.5	45		35.6	50	30	90
13-May-10	33		18.9	17		15.5	15		14.7	19		17.6	42		35.8	50	30	90
19-May-10	34		19.3	16		15.6	12		14.8	6		17.3	57		36.5	50	30	90
25-May-10	5	**22.0**	19.2	6	**12.4**	15.6	5	**11.0**	14.8	11	**12.0**	17.1	13	**36.4**	36.5	50	30	90
31-May-10	1		19.2	0		15.6	6		14.9	1		16.6	e1		37.1	50	30	90
06-Jun-10	6		19.2	6		15.6	8		15.0	3		16.3	8		37.1	50	30	90
12-Jun-10	5		19.1	9		15.7	4		15.0	4		16.0	11		37.2	50	30	90
18-Jun-10	9		19.1	8		15.7	7		15.0	5		15.7	17		37.2	50	30	90
24-Jun-10	19	**8.0**	19.2	8	**6.2**	15.8	11	**7.2**	15.2	8	**4.2**	15.5	22	**14.5**	37.5	50	30	90
30-Jun-10	21		20.1	16		16.4	15		16.0	14		16.3	30		39.2	50	30	90
06-Jul-10	14		20.1	13		16.3	9		15.8	13		16.2	19		38.8	50	30	90
12-Jul-10	11		20.2	11		16.4	7		15.9	8		16.2	12		38.8	50	30	90
18-Jul-10	17		20.3	20		16.5	9		16.0	10		16.2	14		38.7	50	30	90
24-Jul-10	13	**15.2**	20.2	15	**15.0**	16.3	10	**10.0**	15.9	23	**13.6**	16.4	15	**18.0**	38.6	50	30	90
30-Jul-10	14		20.1	16		16.1	13		15.8	14		16.2	15		38.3	50	30	90
05-Aug-10	17		20.3	19		16.1	25		15.9	14		16.4	56		38.5	50	30	90
11-Aug-10	16		20.2	17		16.0	16		15.8	15		16.2	19		38.1	50	30	90
17-Aug-10	22		20.2	21		16.0	23		15.8	17		16.2	41		38.3	50	30	90
23-Aug-10	16	**17.0**	20.5	16	**17.8**	16.2	17	**18.8**	15.8	14	**14.8**	16.1	21	**30.4**	38.6	50	30	90
29-Aug-10	6		20.1	9		15.9	5		15.5	5		14.5	10		37.9	50	30	90
04-Sep-10	4		20.0	5		15.8	4		15.4	3		14.4	12		36.8	50	30	90
10-Sep-10	2		19.5	1		15.2	2		15.0	2		13.8	14		35.8	50	30	90
16-Sep-10	6		19.1	3		14.7	7		14.6	5		13.3	25		35.0	50	30	90
22-Sep-10	21	**7.8**	19.1	14	**6.4**	14.8	17	**7.0**	14.8	11	**5.2**	13.5	48	**21.8**	35.3	50	30	90
28-Sep-10	19		19.2	14		15.0	16		14.8	13		13.5	42		34.6	50	30	90
04-Oct-10	6		18.9	4		14.5	5		13.9	4		13.5	12		32.6	50	30	90
10-Oct-10	3		18.9	5		14.6	0		13.9	1		13.2	12		32.7	50	30	90
16-Oct-10	2		18.4	0		14.4	4		13.7	1		13.2	20		32.4	50	30	90
22-Oct-10	10	**8.0**	18.5	8	**6.2**	14.4	15	**8.0**	13.9	9	**5.6**	13.3	65	**30.2**	33.3	50	30	90
28-Oct-10	20		18.5	13		14.3	14		13.9	13		13.5	56		33.8	50	30	90
03-Nov-10	9		17.6	8		13.9	13		13.6	10		13.4	36		33.5	50	30	90
09-Nov-10	10		17.2	8		13.5	10		13.3	16		13.5	30		33.3	50	30	90
15-Nov-10	9		17.0	13		13.6	8		13.3	9		13.4	20		32.8	50	30	90
21-Nov-10	6	**10.6**	16.0	8	**9.9**	13.0	9	**10.6**	13.2	7	**11.0**	13.3	16	**31.5**	32.2	50	30	90
27-Nov-10	11		15.3	11		12.4	12		12.8	20		13.4	24		31.6	50	30	90
03-Dec-10	10		15.1	9		12.3	7		12.6	12		13.4	10		30.7	50	30	90
09-Dec-10	8		15.0	9		12.2	6		12.4	9		13.3	13		29.8	50	30	90
15-Dec-10	12		15.1	9		12.2	22		12.6	10		13.2	64		30.7	50	30	90
21-Dec-10	9	**9.9**	15.0	9	**9.4**	12.0	11	**11.4**	12.6	8	**11.6**	13.1	26	**27.2**	30.7	50	30	90
27-Dec-10	5		14.6	3		11.7	3		12.3	3		13.0	10		30.1	50	30	90
02-Jan-11	12		14.5	20		11.7	16		12.1	15		13.0	29		29.4	50	30	90
08-Jan-11	4		14.0	5		11.3	5		11.7	6		12.9	8		28.8	50	30	90
14-Jan-11	8		13.8	9		11.2	19		11.8	21		13.0	47		29.1	50	30	90
20-Jan-11	10	**8.0**	13.9	8	**8.9**	11.1	6	**9.9**	11.7	9	**10.7**	12.7	15	**21.4**	29.1	50	30	90
26-Jan-11	38		14.1	23		11.1	46		12.1	31		12.9	79		29.7	50	30	90
01-Feb-11	22		14.2	26		11.3	28		12.4	46		12.4	48		30.1	50	30	90
07-Feb-11	12		14.1	13		11.3	8		12.3	12		12.4	21		30.0	50	30	90
13-Feb-11	7		14.0	6		11.2	6		12.3	7		12.2	16		30.0	50	30	90
19-Feb-11	9	**17.7**	13.7	15	**16.6**	11.2	8	**19.3**	12.2	20	**23.1**	12.2	22	**37.0**	29.7	50	30	90
25-Feb-11	18		13.9	14		11.4	27		12.6	14		12.3	68		30.7	50	30	90
03-Mar-11	18		13.7	14		11.2	19		12.5	12		12.1	43		30.4	50	30	90
09-Mar-11	9		13.4	7		10.9	10		11.8	11		11.9	34		28.8	50	30	90
15-Mar-11	14			6			8			6			25			50	30	90
21-Mar-11	11		13.6	12		11.0	5		11.8	7		11.9	27		29.1	50	30	90
27-Mar-11	7	**12.8**	12.7	3	**9.5**	10.5	8	**12.9**	11.2	8	**9.7**	10.9	15	**35.3**	27.6	50	30	90
Min	**1.0**			**0.0**			**0.0**			**1.0**			**7.6**					
Max	**38.3**			**25.5**			**46.0**			**45.9**			**78.5**					
Capture	**100%**			**100%**			**100%**			**100%**			**100%**					

WERRIS CREEK COAL
AEMR 2010-2011

APPENDIX 4

WATER QUALITY MONITORING RESULTS

(a) Surface Water Monitoring Results

(b) Surface Water and Groundwater 2010-2011 Annual Review – GeoTerra Pty Ltd

(c) Groundwater Monitoring Results

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**

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**	

SB9

EPL ID 12

Sample Date	Type	pH - lab	Electrical Conductivity uS/cm - lab	Suspended Solids	Nitrite as N mg/L	Nitrate as N mg/L	Nitrite + Nitrate as N mg/L	Total Kjeldahl Nitrogen as N mg/L	Total Nitrogen as N mg/L	Total Phosphorus as P mg/L	Reactive Phosphorus as P mg/L	Oil and Grease
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**

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**

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**	

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**	

VWD1

EPL ID 16

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	**8.18**	**994.75**	**61.00**		**1.94**			**2.75**	**0.52**	**0.03**	
Number of samples	Quarterly	**4**	**4**	**3**		**4**			**4**	**1**	**2**	

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**	

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**	

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**

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**

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**

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**

200MLD

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**	

GeoTerra

WERRIS CREEK COAL PTY LTD
SURFACE WATER AND GROUNDWATER
2010 / 2011 MONITORING
ANNUAL REVIEW
Werris Creek, NSW

WRC4-R1B
25 May 2011

GeoTerra Pty Ltd **ABN 82 117 674 941**
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WRC4-R1B (25 MAY, 2011)

GeoTerra

Werris Creek Coal Pty Ltd
1435 Quirindi Road
WERRIS CREEK NSW 2341

Attention: Andrew Wright

Andrew,

RE: 2010/11 Surface Water and Groundwater Monitoring Annual Review

Please find enclosed a copy of the above mentioned report.

Yours faithfully

GeoTerra Pty Ltd

Andrew Dawkins (AuSIMM CP-Env)
Managing Geoscientist

Distribution: Original — GeoTerra Pty Ltd
1 electronic copy — Werris Creek Coal Pty Ltd

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1. INTRODUCTION

This document provides a review of groundwater and surface water monitoring at the Werris Creek Coal Mine that has been conducted since 5 May 2004 at private bore and piezometer locations MW1 – MW26, piezometers P1, P2 and P3, as well as surface water locations within Quipolly Creek, Werris Creek and Black Gully.

This report covers the annual monitoring period from 1st April 2010 to 31st March 2011 with the latest data up to 4 April 2011.

The review is prepared in accordance with the Development Consent DA172-7-2004 (Condition 36 - Schedule 4 Independent Review of Monitoring). The consent condition states that;

"The Applicant shall provide to the Department an annual review and report on surface and groundwater monitoring and observable trends. The report is to be completed by a suitably qualified and independent hydrogeologist, whose appointment has been approved by the Director-General."

A subsequent approval from the Department of Planning indicated the review should address;

- *Any trends or impacts in the quality or quantity of alluvial groundwater resources associated with Quipolly Creek;*
- *Any evidence of movement of groundwater through the low permeability layer at the base of the mine's coal seam aquifers to the underlying local and regional aquifers;*
- *Any trends in groundwater quality or availability in private groundwater bores in the vicinity of the mine, and;*
- *A comparison of any trends in water monitoring against trigger levels contained in the mine's Groundwater Contingency Plan and surface water impact assessment criteria in the mine's Surface Water Monitoring Program.*

A Development Application for the "Life of Mine" project, which includes expansion into currently abandoned underground workings to the north of the current pit was submitted on 18th October 2010, however the expansion application has not yet been approved by the Department of Planning.

This document accounts for the findings and conclusions of the groundwater study conducted for the "Life of Mine Project" development application (RCA Australia, 2009) and the Development Consent DA172-7-2004 conditions of approval as outlined above.

1.1 Mining Progress

The mine commenced operation on 11 April, 2005 and has been excavated to approximately RL 269m, or 11m below surface as of April 2011, compared to 280m at the end of March, 2010.

2. GENERAL GROUNDWATER DESCRIPTION

Groundwater within the vicinity of the Werris Creek Coal Mine is contained within three principal aquifers;

- Permian Coal Measures;
- Werrie Basalt; and
- Quaternary sediments.

The Permian coal measures comprise a closed basin surrounded by weathered basalt and low permeability claystone. Flow rates and storage capacities are low in the coal measures aquifer with groundwater flow calculated to be approximately 1m/year from north to south.

Within this aquifer, groundwater generally occurs at between 10m and 30m below the surface, with the water being a calcium - bicarbonate geochemical type.

Groundwater occurs in the Werrie Basalt between 7m (MW4) and 52.4m (MW1) below natural ground level. This aquifer is recharged by direct infiltration of rainfall and also from runoff from the surrounding Carboniferous sandstone ridges which drive the flow of groundwater south towards Quipolly Creek. Based on the average permeability and gradient, groundwater flow within the Werrie Basalt is calculated to approximate 3m/year. Minimal flow is expected to occur between the Permian coal measures and Werrie Basalt as the upper layers of weathered basalt effectively form an impermeable barrier between the two water-bearing strata. The water within the Werrie Basalt aquifer is a sodium-bicarbonate type.

Within the Quipolly Creek alluvium, to the south of the mine, groundwater occurs at approximately 3.1 - 9.6m below surface level within high permeability quaternary alluvial sediments. This aquifer is recharged through direct infiltration of rainfall, and from the upper catchment of the Quipolly Creek to the east, with groundwater flow to the west at an estimated rate of 150m/year. Water within the alluvial aquifer is a sodium - bicarbonate type.

Minor interaction between the Werrie Basalt and this alluvial aquifer would be expected as south-flowing groundwater within the basalt strata meets the westerly-flowing groundwater of alluvial sediments.

Based on the most recent groundwater modelling (RCA Australia, 2010) a 1.0m maximum drawdown envelope is expected for the “Life Of Mine” Project in the immediate vicinity of the pit shell, decreasing to less than 0.1m at boundary of the Mine Lease area.

This prediction is relevant to the current mining operations because it based on current observed groundwater trends not identifying any significant impacts to either the Werrie Basalt (outside of the Mining Lease area) or Quipolly Creek Alluvium aquifers.

Drawdown in the overlying coal measures and connection to the creek based aquifers is not predicted to be significant, as the coal measures phreatic water level ranges from 10 - 30m below surface and the Quipolly Creek alluvium is up to 3km south of the proposed and existing mine workings.

Werris Creek is interpreted to not have any impact on alluvial aquifers in the vicinity of the WCC Site vicinity (RCA Australia, 2010).

3. MONITORING PROGRAM AND TRIGGER LEVELS

3.1 Groundwater Level

The approved Site Water Management Plan for the Werris Creek Coal Mine (GSS Environmental, 2009) and the Groundwater Contingency Plan for the Werris Creek Coal Mine (Werris Creek Coal, 2005) identify groundwater monitoring bores shown on **Drawing 1** that were selected to enable assessment of groundwater level and water quality impacts (if any) on local groundwater aquifers as a consequence of mining and associated activities.

Table 1 reproduces details on the “approved” monitoring frequency, parameters and sampling method for each site.

Notwithstanding the frequency of sampling identified in **Table 1**, WCC during its first year of operation initiated sampling on a more frequent basis in order to gain an understanding of natural variability and response times. This was achieved through monitoring additional private landholder bores at Sites MW10 to MW13 and assessing their groundwater chemistry and water level fluctuations, as well as installing a pressure transducer logger array to monitor standing water levels in MW7 between September 2005 and April 2006.

The MW7 logger was re-started in May 2010, although there were logger installation and reliability difficulties, and it was subsequently re-established in January 2011.

Groundwater level monitoring is also conducted via the “UG Bore” which was drilled into the decommissioned underground workings to the north of the pit.

To date, the suite of bores and piezometers used to regularly monitor groundwater level and water quality has expanded up to MW26 as summarised in **Appendix A**.

Table 1 Site Water Management Plan Groundwater Monitoring Programme

MONITORING BORE	PARAMETER	UNITS	METHOD
QUARTERLY			
MW-1 *2, MW-2 *2, MW-3 *2, MW-4B *2, MW-5 *2, MW-6 *2, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16 and MW-17A & 17B	Standing water level (except MW2 & MW11)	m	In-situ
	pH		In-situ
	EC		In-situ
	Total Nitrogen		Representative Sample
	Nitrate Nitrogen		Representative Sample
	Total Phosphorus		Representative Sample
	Reactive Phosphorus		Representative Sample
ANNUALLY			
MW-1 *2, MW-2 *2, MW-3 *2, MW-4B *2, MW-5 *2, MW-6 *2, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16 and MW-17A & 17B	Oil and Grease	mg/L	Representative Sample
	TPH	mg/L	Representative Sample
	Arsenic	mg/L	Representative Sample
	Cadmium	mg/L	Representative Sample
	Chromium	mg/L	Representative Sample
	Nickel	mg/L	Representative Sample
	Lead	mg/L	Representative Sample
	Copper	mg/L	Representative Sample
	Manganese	mg/L	Representative Sample
	Zinc	mg/L	Representative Sample
	Sodium	mg/L	Representative Sample
	Potassium	mg/L	Representative Sample
	Calcium	mg/L	Representative Sample
	Chloride	mg/L	Representative Sample
	Sulphate	mg/L	Representative Sample
	Total Alkalinity	mg/L	Representative Sample
	Conductivity	uS/cm	Representative Sample

Note:

*1 As presented in the approved Site Water Management Plan

*2 Parameters highlighted in bold are those identified in EPL12290, where the frequency of monitoring and parameters may be varied by DECCW once the variability of the groundwater quality is established

Note: Additional bores and piezometers have been added to this suite since the SWMP was prepared

Table 2 presents groundwater level and chemistry trigger levels as agreed with the NSW Office of Water (NOW) at Tamworth.

The trigger levels are assessed against a benchmark of the natural conditions which have been or are currently being established through the baseline monitoring program.

Table 2 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

In the event that monitoring indicates a trigger has been reached or is being approached, WCC are required to commission a hydrogeologist to review the data, with the outcomes of that review, including any recommendations, being subject to discussion and agreement with the NOW hydrogeologists.

If the saturated thickness trigger level is achieved in any bore, WCC are required to notify the affected landowner(s) and, if WCC's and NOW's hydrogeologists are of the opinion that the reduction is a consequence of mining, initiate mitigation measures.

An independent authority may also be used where a dispute arises as to the cause of the change, given that groundwater supply and quality can be affected by non-mining related factors such as bore siltation, aquifer depletion by large scale agricultural users, bacterial infection, fertilizer contamination etc.

3.1.1 Groundwater Quality

With respect to groundwater chemistry, WCC recognises that a change in the beneficial use of the water should not occur as a consequence of its mining or mining-related activities.

Groundwater is primarily used for irrigation and watering of livestock, and therefore the ANZECC 2000 irrigation and livestock guidelines will be used as trigger levels as shown in **Table 3**.

A trigger of pH or EC will initially lead to an increase in the analytes monitored and/or frequency of sampling to confirm the magnitude and extent of the change in water chemistry and to verify that the change is a consequence of mining.

Table 3 Groundwater Assessment Criteria

Analyte	ANZECC Guideline Levels*	
	Agricultural Irrigation mg/L	Livestock mg/L
Arsenic (total)	0.1	0.5
Cadmium	0.01	0.01
Chromium (Total)	-	-
Chromium (VI)	0.1	1
Copper	0.2	0.4
Lead	2	0.1
Manganese	0.2	-
Mercury (total)	0.002	0.002
Nickel	0.2	1
Zinc	5/2	20
Calcium	-	1000
Conductivity (µs/cm)	1900 – 4500[@]	2000 – 5000[#]
Magnesium	230 – 460[@]	-
Chloride	350 – 700[@]	-
Sulphate	-	1 000
Total Petroleum Hydrocarbons	<0.01^	

[@] For moderately tolerant crops

[#] Poultry – sheep value / long term trigger value

^ There are no guidelines for this parameter but as levels of this are not naturally occurring in the area, the trigger level should be set at typical detection limits.

- No published values

Source: NEPM Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater ANZECC

3.2 Groundwater Mitigation Measures

3.2.1 Groundwater Quantity

If monitoring identifies a reduction in a bore's saturated thickness in excess of a trigger level which is a consequence of mining, WCC will enter into negotiations with the affected landowners to formulate an agreement which provides for one or a combination of:

- re-establishment of saturated thickness in the affected bore(s) through bore deepening;
- establishment of additional bores to provide a yield at least equivalent to the affected bore prior to mining;
- provision of access to alternative sources of water; and
- monetary compensation to reflect water extraction costs as a consequence of lowering pumps or installation of additional or alternative pumping equipment.

3.3 Surface Water Monitoring

The Surface Water Monitoring Plan (The Plan) was prepared in compliance with Consent *Condition 4(3)* of DA 172-7-2004 and the General Terms of Approval (GTAs) of the Department of Environment and Climate Change and Water, which is now called the Office or Environment and Heritage (OEH).

Regularly monitored discharging surface water dams on the site include SB2 (or Licensed Discharge Point 10 – LDP10) and SB9 (LDP12) which drain toward Quipolly Creek as well as SB10 (LDP14) which drains to Werris Creek. Regularly monitored surface water dams, which do not discharge off site, include SB6, SD4, SD5, VWD1, VWD2 and 200ML as shown in **Table 4**.

In regard to Werris Creek and Quipolly Creek, the monitoring plan addresses the surface water impact assessment criteria and a program to monitor surface water flows and quality upstream and downstream of the confluence of the northern catchment into Werris Creek and the southern catchment into Quipolly Creek.

An additional creek based surface water monitoring site was added at Black Gully - down (BGD) in May 2010. There is no Black Gully - up (BGU) site as the creek is ephemeral and rarely has water in its headwaters.

The location of all regional surface water and groundwater monitoring points are presented on **Drawing 1**, whilst a figure of the site dams is shown in **Appendix B**, whilst **Table 4** identifies the monitoring point locations, type of monitoring point along with a brief description (where relevant) of the location.

Table 4 Surface Water Monitoring Locations

Identification No.	Type of Monitoring Point	Description of Location
WC-U, WC-D, QC-U, QC-D, BG-D	Stream Water Quality Monitoring	Upstream and downstream of the confluence of the northern catchment into Werris Creek and the southern catchment into Quipolly Creek
SB 6 SD4, SD5 VWD1, VWD2 200MLD	Surface Water Dam Water Quality Monitoring	At locations shown in Appendix C
SB2, 9, 10	Discharge Dam Water Quality Monitoring	At locations shown in Appendix C

Table 5 presents the parameters to be monitored, frequency of monitoring and sampling methods.

Table 5 Surface Water Monitoring Parameters

Pollutant	Unit of measure	Frequency	Sampling Method
Total Suspended Solids	mg/L	Within 12 hours after any overflow from a sediment dam(s) on the premises occurring.	Grab sample
Grease & Oil	mg/L		Grab sample
pH			Grab sample
Conductivity	µS/cm		Grab sample
Total Phosphorus	mg/L		Grab sample
Reactive Phosphorus	mg/L		Grab sample
Total Nitrogen	mg/L		Grab sample
Nitrate Nitrogen	mg/L		Grab sample
Note: The frequency of monitoring and the pollutant/s to be monitored may be varied by OEH once the variability of the water quality is established.			

3.3.1 Surface Water Assessment Criteria

The surface water assessment criteria for Werris Creek and Quipolly Creek as outlined in the SWMP, as shown in **Table 6,** is for pH to be within the pH 6.5 to 8.5 range, whilst the monitored values for all other parameters will be plotted to identify any trends over time.

Table 6 Surface Water Trigger Levels

Pollutant	Unit of measure	50% concentration limit	90% concentration limit	3DGM concentration limit	100% concentration limit
Total Suspended Solids	mg/L	20	35	-	50
Grease & Oil	mg/L	-	-	-	10
pH		-	-	-	6.5 – 8.5

OEH will be notified in the event of increasing levels of any parameter or exceedances of ANZECC guideline levels for agricultural use (NEPM, 1999).

4. GROUNDWATER MONITORING RESULTS

4.1 Quipolly Creek Alluvium

Groundwater monitoring conducted between 31st March 2010 and 6th April 2011 (with reference to monitoring conducted since June 2005) in wells MW7 and MW13 and piezometers / bores MW12, 15, 16, 21B, 22A, 22B, 23A, 23B and MW26 as shown in **Figures 1** to **4,** indicates the following observations.

4.1.1 Groundwater Level

The available data for the last monitoring year since March 2010, as shown in **Figures 1 and 2**, indicates that groundwater levels in the Quipolly Creek alluvium has risen and are at the highest levels ever recorded since monitoring commenced in 2005. The only exception was MW23A and MW23B on the Rocky View property, which fell by 0.23m and 0.27m respectively due to the first measurement being taken at the height of the groundwater rise which has since started declined following the cessation of heavy rainfall consistent with water levels in other bores in **Figure 2**.

The effect of short term pumping from the MW7 well is also shown in **Figure 2**.

No sustained fall in groundwater levels of greater than 15% compared to the baseline "natural" saturated thickness has occurred in the Quipolly Creek Alluvial aquifer in the 2010 / 2011 monitoring period.

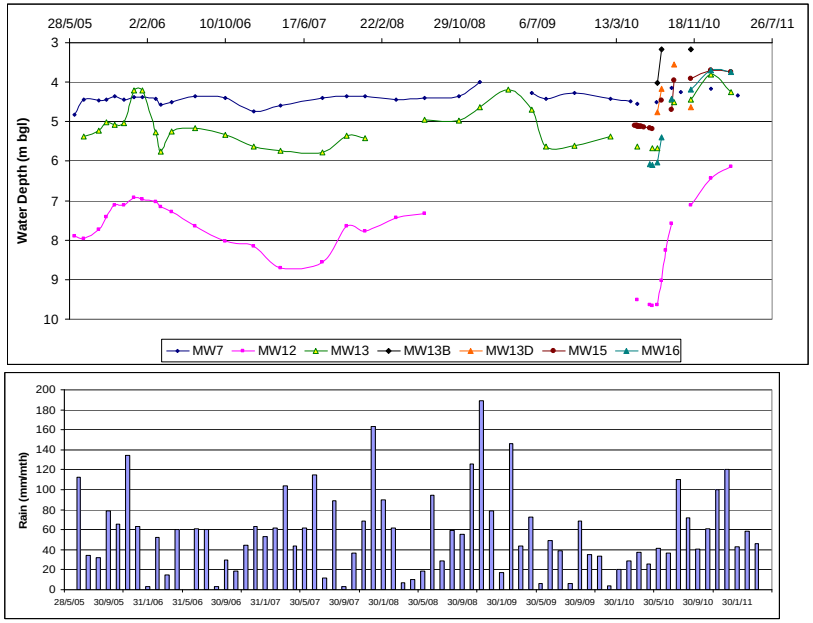

Figure 1 **Quipolly Ck Alluvium Standing Water Level and Monthly Rainfall (A)**

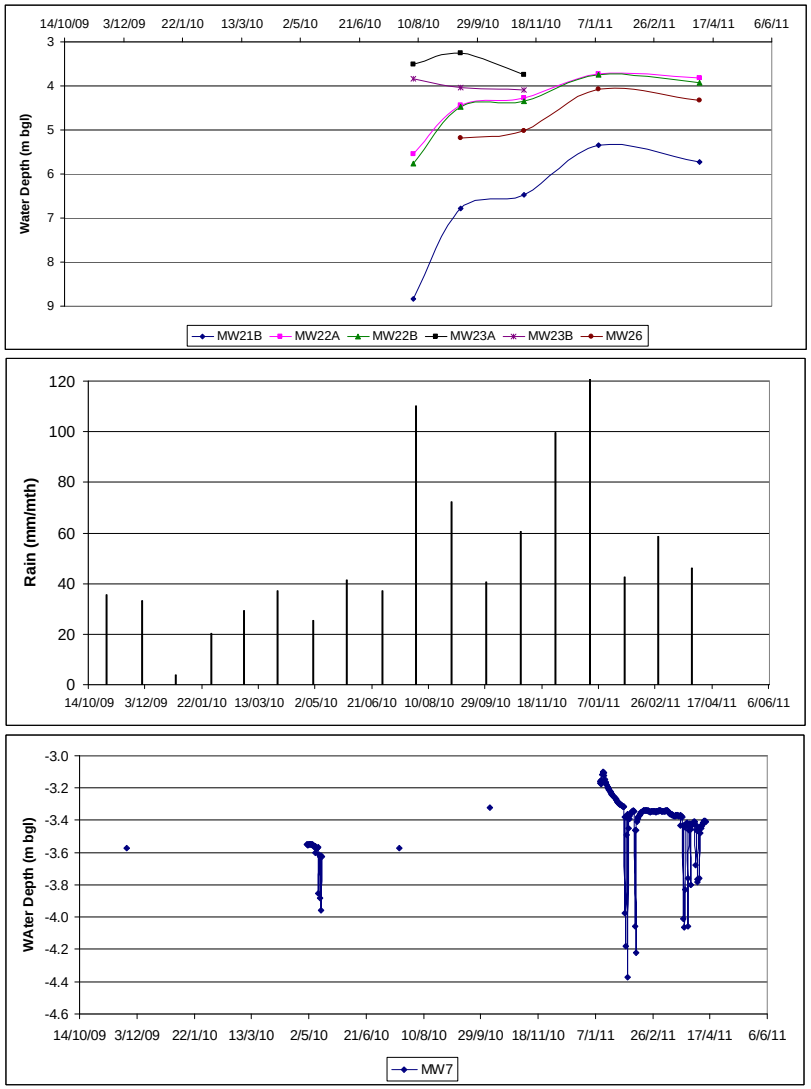

Figure 2 **Quipolly Ck Alluvium Standing Water Level and Monthly Rainfall (B)**

4.1.2 Electrical Conductivity

As shown in **Figure 3**, since the end of March 2010, salinity in all monitored bores, piezometers and wells has fallen, apart from MW13, which marginally rose from 840 - 887µS/cm.

Appendix B indicates the Quipolly Creek alluvium has a salinity range between 380µS/cm and 1610µS/cm.

All samples are within the ANZECC (Agriculture Irrigation and Livestock) criteria.

No sustained rise in salinity of greater than 15% was monitored in 2010 / 2011

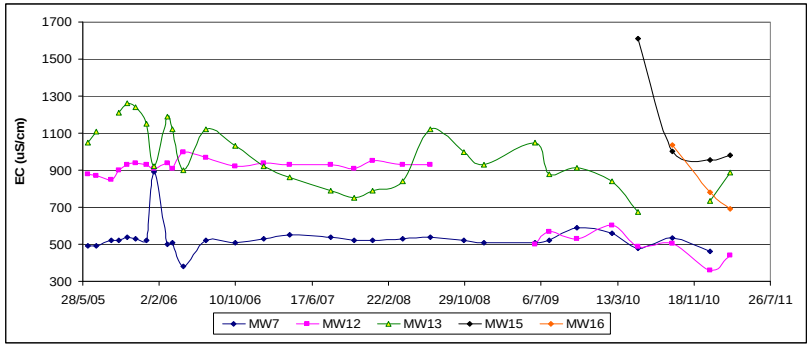

Figure 3 Quipolly Creek Alluvium Electrical Conductivity

4.1.3 pH

As shown in **Figure 4** and **Appendix B**, since March 2010, groundwater pH in the Quipolly Creek alluvium has generally become slightly more alkaline in association with increased rainfall recharge since the drought ended, however all groundwater was monitored to be within the ANZECC criteria of 6.5 – 8.5.

It should be noted that pH is measured in a logarithmic scale, and therefore adherence to the ANZECC 2000 criteria range is more appropriate than using a numerical change of more / less than 15%.

All samples are within the ANZECC criteria of 6.5 to 8.5.

No sustained rise or fall in pH was monitored during the 2010 / 2011 monitoring period

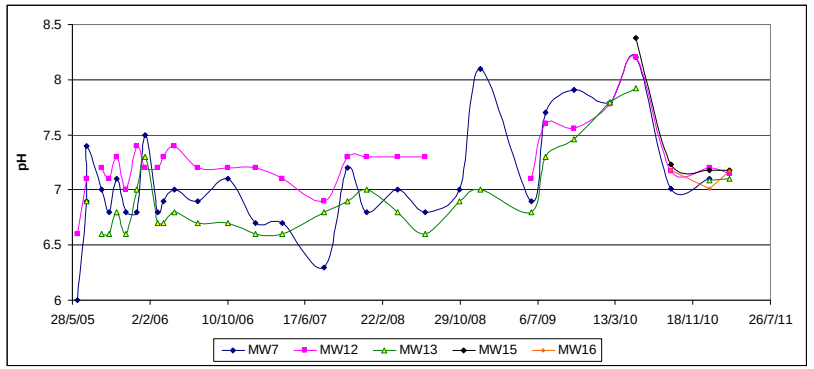

Figure 4 Quipolly Creek Alluvium pH

4.1.4 Laboratory Analyses

As can be seen from **Table 7** and **Appendix B**, the Quipolly Creek alluvial groundwater generally exceeded the ANZECC Agricultural Irrigation Long Term Trigger Value for Total Phosphorous (0.05mg/L) in the last year in MW7, 13, 15 and MW16.

The ANZECC Agricultural Irrigation Long Term Trigger Value for Total Nitrogen (5mg/L) was also exceeded in MW16 during the monitoring period, which is consistent with the long term characteristic of elevated nitrogen in the aquifer and is not interpreted to be attributable to the mine's activities.

Table 7 Quipolly Creek Alluvium Groundwater Criteria Exceedances (2010/11)

BORE / PIEZOMETER	Property	Type	Purpose	TN (LTV Irrig)	TP (LTV Irrig)
MW7	Rosehill	Well	Stk Dom		0.24
MW13	Parkhill	Well	irrigation		0.11
MW15	Capp	Well	Stk Dom		0.12
MW16	Mountain View	Bore	Stk Dom	23.3	0.15

NOTE : Value Shown was the highest concentration reached in the 2010 / 2011 period

Total Phosphorous Agricultural Irrigation LTV was generally exceeded in MW7, 13, 15 and MW16, whilst the ANZECC Agricultural Irrigation Long Term Trigger Value for Total Nitrogen was exceeded in MW16.

4.1.5 Quipolly Creek Alluvium Summary

No Quipolly Creek alluvial aquifer groundwater quality or quantity trigger values, as outlined in the Groundwater Contingency Plan for the Werris Creek Coal Mine for standing water level, EC or pH have been attained or exceeded in the 2010 / 2011 monitoring period.

4.1 Black Gully Alluvium

Black Gully is an ephemeral water course located between the mine and the Quipolly Creek, with the Black Creek alluvium being hydraulically interconnected with the Quipolly Creek alluvium in its lower reaches.

Groundwater monitoring conducted between 8th July 2010 and 6th April 2011 in MW17A, 18A, 18B and MW21A as shown in **Figures 5** to **7** indicates the following observations.

4.1.1 Groundwater Level

The available data for the last monitoring year since July 2010, as shown in **Figure 5**, indicates monitored groundwater levels in the Black Gully alluvium has risen.

No sustained fall in groundwater levels of greater than 15% compared to the baseline "natural" saturated thickness has occurred in the Black Gully alluvial aquifer in the 2010 / 2011 monitoring period.

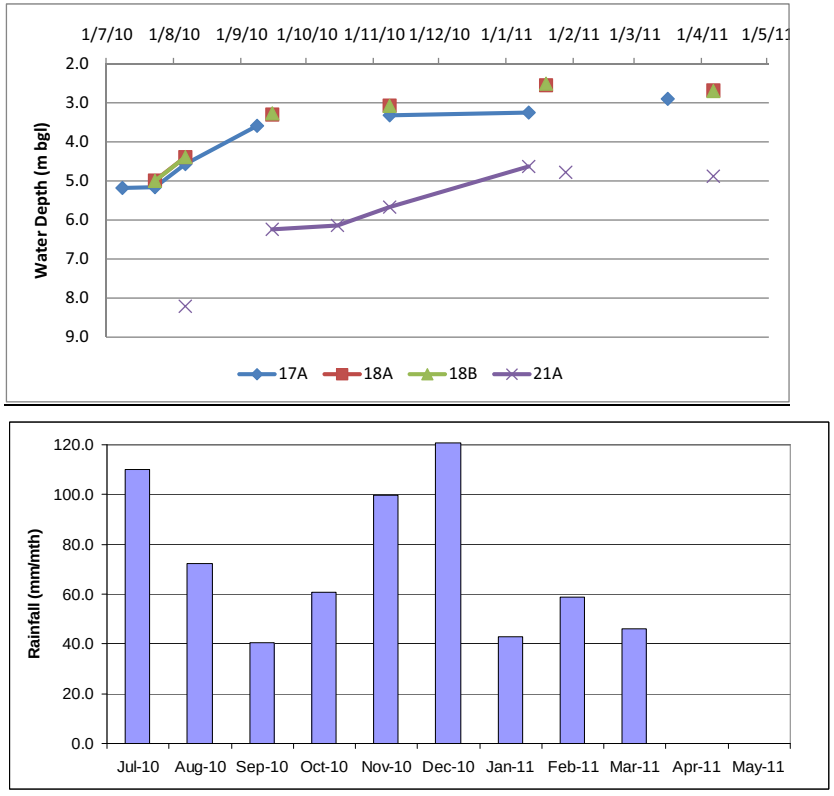

Figure 5 Black Gully Alluvium Standing Water Level and Monthly Rainfall (A)

4.1.2 Electrical Conductivity

As shown in **Figure 6**, since January 2011, salinity in the Black Gully alluvium has fallen from 781 - 770µS/cm.

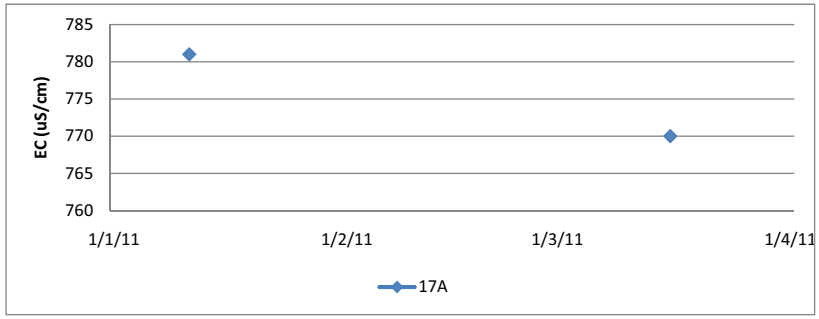

Figure 6 Black Gully Alluvium Electrical Conductivity

All samples are within the ANZECC (Agriculture Irrigation and Livestock) criteria.

No sustained rise in salinity of greater than 15% was monitored in 2010 / 2011

4.1.3 pH

As shown in **Figure 7**, since January 2011, groundwater pH in the Black Gully alluvium has generally become slightly more alkaline in association with increased rainfall recharge, however all groundwater was monitored to be within the ANZECC criteria of 6.5 – 8.5.

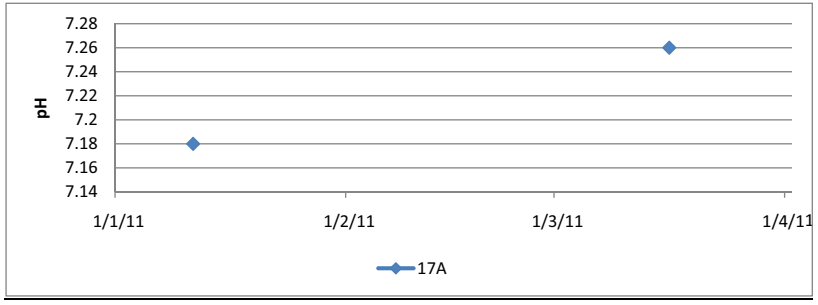

Figure 7 Black Gully Alluvium pH

All samples are within the ANZECC criteria of 6.5 to 8.5.

No sustained rise or fall in pH was monitored during the 2010 / 2011 monitoring period

4.1.4 *Laboratory Analyses*

As can be seen from **Table 8** and **Appendix B**, the Black Gully alluvial groundwater generally exceeded the ANZECC Agricultural Irrigation Long Term Trigger Value (LTV) for Total Phosphorous (0.05mg/L) in the last year in MW17A, with the groundwater in MW17A being elevated, or above the LTV, in all samples.

It is interpreted that the elevated phosphorous is not due to the mine's activities.

Table 8 Black Gully Alluvium Groundwater Criteria Exceedances (2010/11)

	Property	Type	Purpose	TP (LTV Irrig)
MW17A	Andrews	Bore	Stk Dom	0.09

NOTE : Value Shown was the highest concentration reached in the 2010 / 2011 period

Total Phosphorous Agricultural Irrigation LTV was generally exceeded in MW17A.

4.1.5 *Black Gully Alluvium Summary*

No Black Gully alluvial aquifer groundwater quality or quantity trigger values, as outlined in the Groundwater Contingency Plan for the Werris Creek Coal Mine for standing water level, EC or pH have been attained or exceeded in the 2010 / 2011 monitoring period.

4.2 Werrie Basalt and Coal Measures

The results of groundwater monitoring of private bores and Werris Creek Coal Mine piezometers in the Werrie Basalt (MW1, 2, 3, 4, 4B, 5, 5B, 6, 8, 9, 10, 14, 14B, 17B, 19A and MW20, as well as P1, P2 and P3) are presented in the following sub-sections.

The UG (Underground) Bore which represents the coal measures aquifer to the north of the open cut mine has also been included in **Figure 1** for reference.

No water quality data is currently tested for the UG Bore.

The private bores are located within the properties shown in **Appendix A**.

4.2.1 *Groundwater Levels*

As shown in **Figures 8** and **9**, all groundwater levels in the Werrie Basalt have risen above the monitored levels that were observed in March 2010 and are at levels matching the highest levels observed since monitoring commenced in 2005.

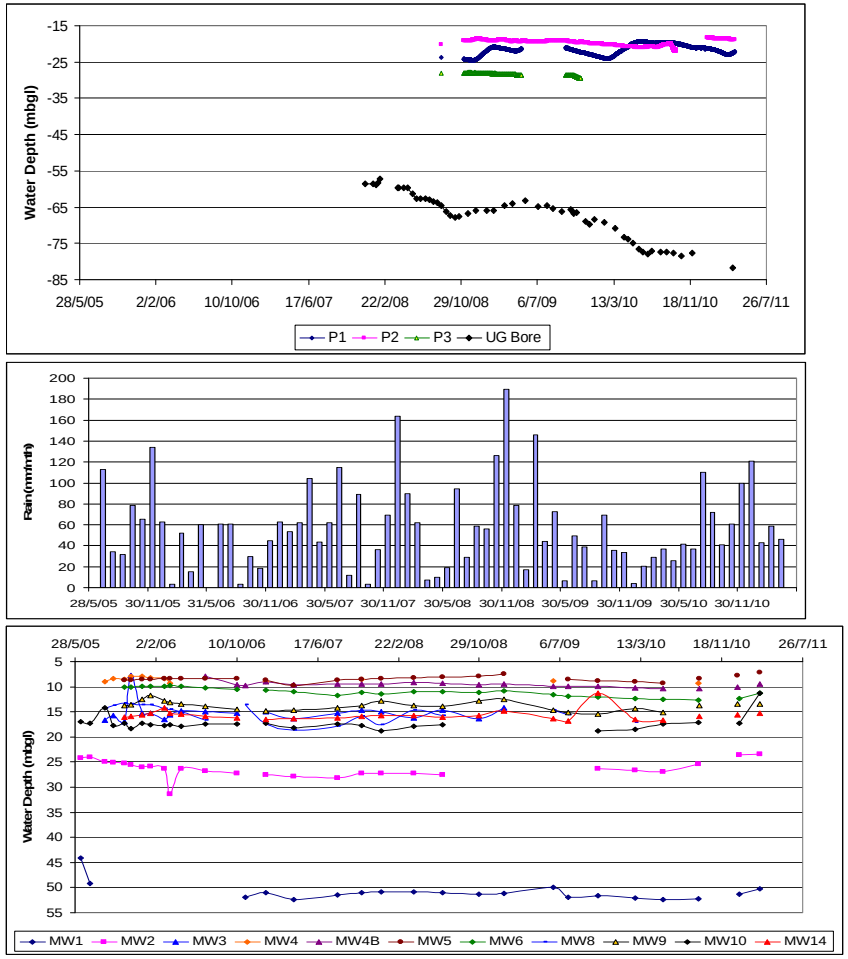

Figure 8 Werrie Basalt and Decommissioned Underground Groundwater Levels and Rainfall (A)

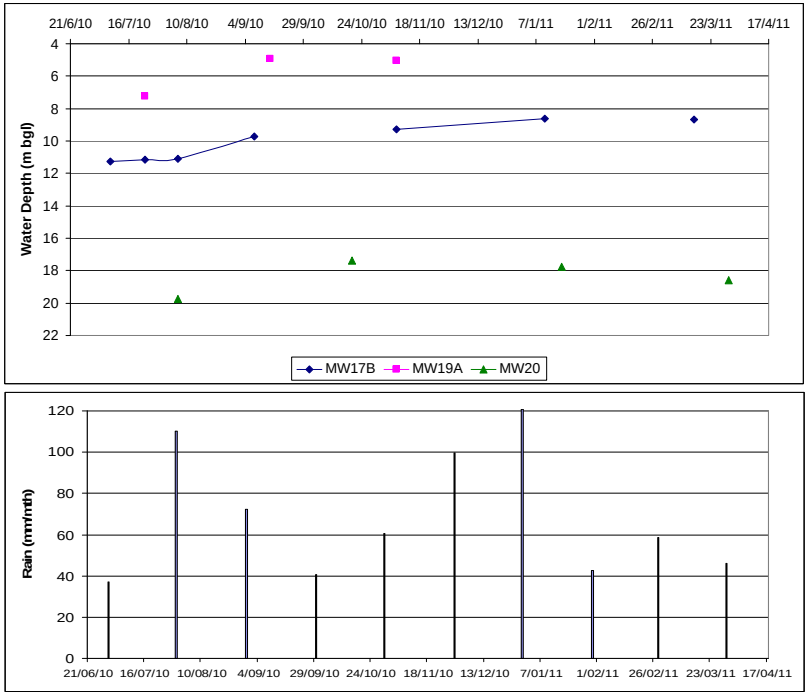

Figure 9 Werrie Basalt Groundwater Levels and Rainfall (B)

4.2.2 Groundwater Flow From the Coal Measures to Underlying Basalt Aquifers

All of the bores and piezometers originally described within the Environmental Impact Statement for the coal mine that were suitable for monitoring the potential flow of groundwater through the base of the coal seam to the underlying local and regional aquifers have been removed through excavation of the Werris Creek Open Cut.

In accordance with the DoP's directive that the mine should monitor;

- *any evidence of movement of groundwater through the low permeability layer at the base of the mine's coal seam aquifers to the underlying local and regional aquifers;*

The UG Bore in the underground workings to the north of the open cut has been monitoring coal measure aquifer groundwater levels since December 2007.

In addition, the mine installed three piezometers adjacent to the active mine area in August 2008 to monitor standing water levels in the Werrie Basalt aquifer underneath the basal coal seam. Locations of the bores are shown in **Drawing 1**.

A cross section east to west through Piezometers P1 and P3 is shown in **Figure 10**.

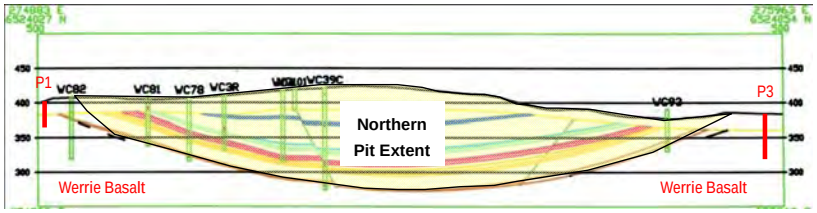

Figure 10 P1 to P3 Cross Section

As shown in **Figure 8**, monitoring of groundwater levels since December 2007 within the old underground workings has shown a gradual depressurisation in accordance with the open cut mine depressurisation of the coal measures aquifer.

The UG Bore was 81.7mbgl on 6th April 2011, which equates to a water table level at RL331.3m within the remaining coal measure aquifer. Approximately 500m to the south is the current open cut pit floor, which has been dewatered to RL269m.

Piezometers P1 and P2, which have been installed into the Werrie Basalt aquifer within 20m of the clay aquitard subcrop between the basalt and coal measure aquifer, were at 23.09mbgl and 19.79mbgl which corresponds to RL 368.2m and 356.5m respectively.

Given that the Werrie Basalt aquifer water table is approximately 80m above the pit floor within a short distance of the pit demonstrates the effectiveness of the clay aquitard in mitigating groundwater flow between the basalt and coal measure aquifer and preventing adverse drawdown in privates bores.

While P1 and P2 demonstrate some drawdown impacts due to mining, as expected given their proximity to the mine, the observed drawdown in surrounding Werrie Basalt bores diminishes with distance from the lease boundary consistent with RCA (2010) predictions.

During the monitoring period, no evidence of depressurisation of groundwater through the low permeability layer at the base of the mine's coal seam aquifers to the underlying local and regional aquifers has been observed.

4.2.3 Electrical Conductivity

As shown in **Figure 11**, salinity has fallen in all bores, wells and piezometers in the Werrie Basalt since March 2010 due to rainfall recharging the aquifer.

As indicated in Appendix B, groundwater salinity in the Werrie Basalt ranges from 560 - 4110µS/cm.

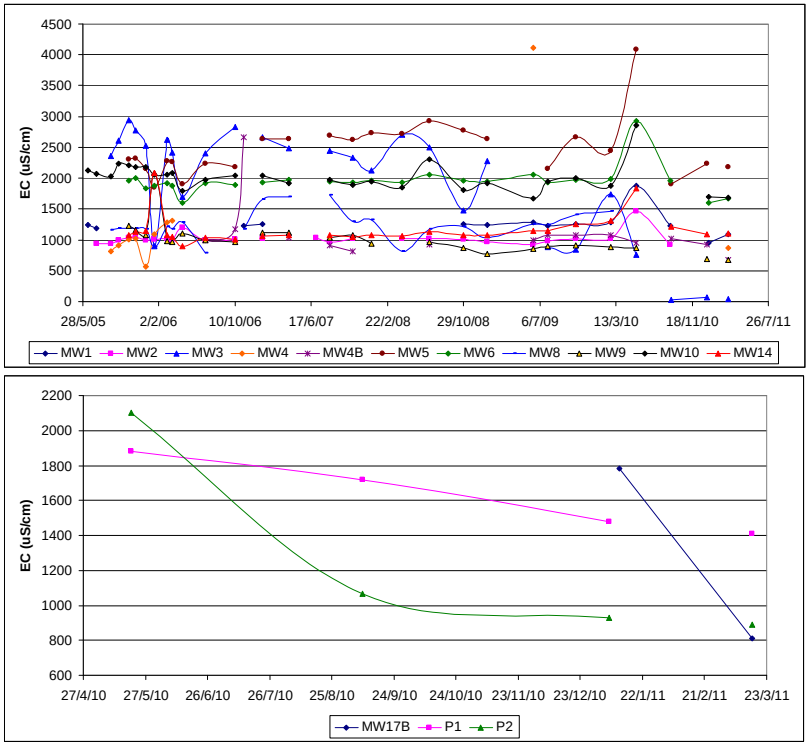

Figure 11 Werrie Basalt Electrical Conductivity

All samples are within the ANZECC (Agriculture Irrigation and Livestock) criteria.

No sustained rise of greater than 15% change in comparison to the baseline "natural" range was monitored during the 2010 / 2011 monitoring period.

4.2.4 pH

As shown in **Figure 12** and **Appendix B**, since March 2010, groundwater pH in the Werrie Basalt has generally become slightly more acidic, however all groundwater was monitored to be within the ANZECC criteria of 6.5 – 8.5. The recent lowering of pH levels reverses the previous five year trend of increasing alkalinity, and is consistent with the increased rainfall recharge of the aquifers.

All samples are within the ANZECC criteria of 6.5 to 8.5.

No sustained rise or fall of greater than 15% change in pH was monitored during the 2010 / 2011 monitoring period

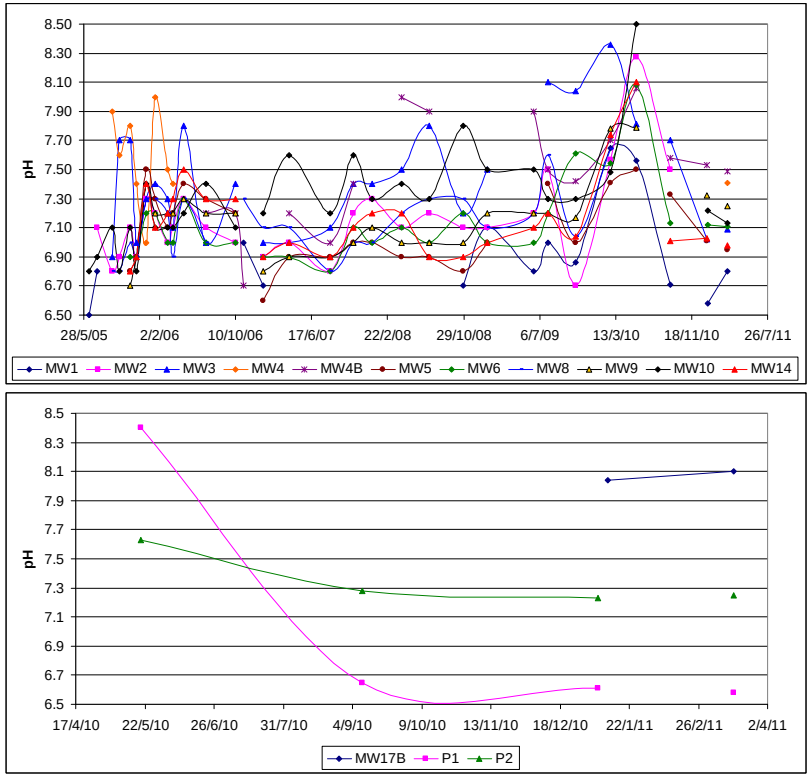

Figure 12 Werrie Basalt pH

4.2.5 Laboratory Analyses

As can be seen from **Table 9** and **Appendix B**, the Werrie Basalt groundwater generally exceeded the ANZECC Agricultural Irrigation Long Term Trigger Value for Total Phosphorous (0.05mg/L) and Total Nitrogen (5mg/L) in the last year in the majority of bores and piezometers. The elevated or above LTV nutrients are a generic feature in the entire sampling suite within the Werrie Basalt as shown in Table 9, and are not interpreted to be due to the mine's influence.

In addition, the manganese Agricultural Irrigation Long Term Trigger Value was exceeded in P1, P2, MW4B and MW6, as was zinc in MW3 during the monitoring period.

The lead ANZECC 2000 Livestock criteria was also exceeded in P1.

Table 9 Werrie Basalt Groundwater Criteria Exceedances (2010/11)

	Property	Type	Purpose	TN (LTV Irrig)	TP (LTV Irrig)	Mn (LTV Irrig)	Zinc (LTV Irrig)	Lead (Livestock)
P1	WCC Pty Ltd	Piezo	Monitoring		0.14	0.376		0.195
P2	WCC Pty Ltd	Piezo	Monitoring	5.7	2.14	0.952		
MW1	Hillview	Bore	Stk Dom	10.0	0.28			
MW2	Railway View	Bore	Stk Dom	7.4	0.15			
MW3	Eurunderee	Bore	Stk Dom		0.19		30.7	
MW4B	WCC Pty Ltd	Bore	Monitoring		0.32	0.448		
MW5	WCC Pty Ltd	Piezo	Monitoring	10.9				
MW6	WCC Pty Ltd	Piezo	Monitoring	6.0	0.14	0.272		
MW8	Roseneath	Bore	Stk Dom	6.2	0.14			
MW9	WCC Pty Ltd	Piezo	Monitoring	6.3	0.11			
MW10	Turnbulls	Bore	Domestic	25.7	0.15			
MW14	WCC Pty Ltd	Piezo	Monitoring	18.6	0.17			
MW25A				6.8				
MW25B				8.2	0.06			

NOTE : Value Shown was the highest concentration reached in the 2010 / 2011 period

Total phosphorous and total nitrogen Agricultural Irrigation LTV was generally exceeded in the Werrie Basalt, along with the ANZECC Agricultural Irrigation Long Term Trigger Value for Manganese in P1, P2, MW4B and MW6, whilst the zinc level was exceeded in MW3 and the lead (Livestock) ANZECC 2000 criteria was exceeded in P1.

4.2.1 Werrie Basalt Summary

No private bore groundwater quality or quantity trigger values as outlined in the Groundwater Contingency Plan for the Werris Creek Coal Mine for standing water level, EC or pH have been attained or exceeded in the 2010 / 2011 monitoring period.

4.1 Currabubula Formation

4.1.1 Groundwater Levels

Standing water levels in MW11 are not monitored as it is not possible to obtain readings with the current bore set up.

4.1.1 *Electrical Conductivity*

As shown in **Figure 13**, since March 2010, salinity in the Currabubula Formation has fallen from 1410 - 10920µS/cm.

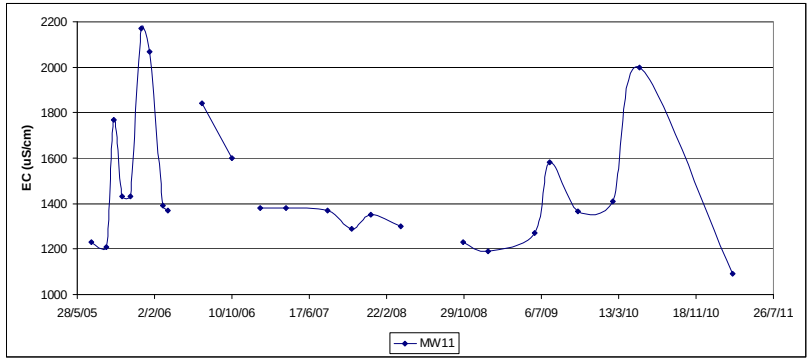

Figure 13 Currabubula Formation Electrical Conductivity

All samples are within the ANZECC (Agriculture Irrigation and Livestock) criteria.

No sustained rise in salinity of greater than 15% was monitored in 2010 / 2011

4.1.2 *pH*

As shown in **Figure 14**, since March 2010, groundwater pH in the Currabubula Formation has become slightly more alkaline, however all groundwater was monitored to be within the ANZECC criteria of 6.5 – 8.5.

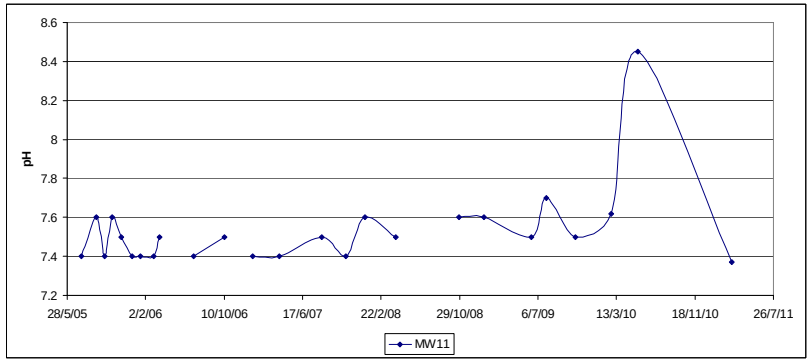

Figure 14 Currabubula Formation pH

All samples are within the ANZECC criteria of 6.5 to 8.5.

No sustained rise or fall in pH was monitored during the 2010 / 2011 monitoring period

4.1.3 *Laboratory Analyses*

As can be seen from **Table 10** and **Appendix B**, the Currabubula Formation groundwater generally exceeded the ANZECC Agricultural Irrigation Long Term Trigger Value for Total Phosphorous (0.05mg/L) and Total Nitrogen in the last year in MW11.

Table 10 Currabubula Formation Groundwater Criteria Exceedances (2010/11)

	Property	Type	Purpose	TN (LTV Irrig)	TP (LTV Irrig)
MW11	Turnbulls Gap	Bore		10.8	0.08

NOTE : Value Shown was the highest concentration reached in the 2010 / 2011 period

Total Phosphorous and total nitrogen Agricultural Irrigation LTV was generally exceeded in MW11.

4.1.4 *Currabubula Alluvium Summary*

No Currabubula Formation groundwater quality or quantity trigger values, as outlined in the Groundwater Contingency Plan for the Werris Creek Coal Mine for standing water level, EC or pH have been attained or exceeded in the 2010 / 2011 monitoring period.

4.1.5 *Currabubula Formation Summary*

No groundwater quality or quantity trigger values, as outlined in the Groundwater Contingency Plan for the Werris Creek Coal Mine, have been attained or exceeded in the 2009 / 2010 monitoring period.

5. ONSITE AND OFFSITE SURFACE WATER MONITOING

There were 19 monitored surface water discharges in the 2010 / 2011 monitoring period into Quipolly Creek via Black Gully from licensed discharge points SB2 and SB9.

Two discharges to Werris Creek also occurred from licensed point SB10 on 28/7/10 and 10/12/10 as shown in **Appendix C**.

Surface water triggers exceeded in water discharged from the licensed discharge dams during the 2010 / 2011 monitoring period included;

- SB2 (16/11/2010) with a pH of 8.59 into Quipolly Creek
- SB9 (11/11/2010*) with total suspended solids of 160mg/L into Quipolly Creek
- SB9 (10/12/2010*) with total suspended solids of 137mg/L into Quipolly Creek
- SB10 (28/7/2010*) with total suspended solids of 132mg/L into Werris Creek, and
- SB10 (10/12/2010*) with total suspended solids of 314mg/L into Werris Creek.

(* Greater than 39.2mm of rain fell in the 5 day period prior to discharge and EPL 12290 Condition 3 L3.4(a) allows total suspended solids to be exceeded if 39.2mm of rainfall occurs over any consecutive 5 day period)

Even though the SB2 wet discharge event on 16th November 2010 resulted in a marginal pH exceedance of 0.09, there was sufficient dilution from SB9 discharging and other run off in the catchment such that Quipolly Creek (down) did not show any evidence of impact.

Although **Appendix C** shows other dams with above surface water criteria TSS and / or pH, they do not discharge off site, and are therefore not covered by the criteria.

In addition, SB2, SB9 and SB10 had above surface water criteria TSS or pH outside of the dates shown above, but as they did not discharge off site, the surface water criteria also does not apply.

Monitoring conducted in the local creeks indicated that the surface water criteria was exceeded in;

- Quipolly Creek (up) for total suspended solids on 11/11/10 (controlled discharge) and 8/12/10 (no discharge)
- Quipolly Creek (down) for total suspended solids on 12/8/10 (wet weather discharge) and 10/12/10 (wet weather discharge)
- Werris Creek for total suspended solids, both up and downstream, on most occasions (only two wet weather discharges in the period), and;
- Black Gully (down) for total suspended solids on most occasions, as well as oil and grease on 20/5/10 (no discharge)

However, it should be noted that the surface water triggers can exceed the criteria for both up and downstream sites, and that the surface water discharge compliance criteria only apply to the licensed dam water that discharges off site.

Werris Creek has naturally high suspended solids irrespective of WCC discharge events, whilst the two Quipolly Creek (down) samples that exceeded the total suspended solid trigger during wet weather events would have also had substantial runoff from the overall catchment, which is mostly used for agricultural activities. It is not interpreted that the mine discharge alone would have been the cause of the above trigger level values in Quipolly Creek.

Surface water triggers exceeded in water discharged from the licensed discharge dams during the 2010 / 2011 monitoring period included;

- *SB2 (16/11/2010) with a pH of 8.59 into Quipolly Creek with negligible impact monitored in the receiving waters*

6. CONCLUSIONS

Surface water and groundwater level and water quality monitoring for the April 2010 to March 2011 period has shown no significant exceedance of trigger values (water level, pH or EC) or ANZECC 2000 Agricultural or Irrigation criteria. There were minor exceedance of Nitrogen and Phosphorus ANZECC 2000 guidelines at a number of private bores due to the agricultural land use and not as a result of mining operations.

Groundwater levels were generally rising due to increased rainfall recharge.

A distinctive difference between the Werrie Basalt and the other formations is observable in regard to the degree of elevated total nitrogen and phosphorous in the basalt, along with occasional elevated manganese, zinc and lead.

No observable regional groundwater depressurisation due to the operation of the mine was observed.

Due to the increased rain, 19 discharge events from the mine to Quipolly Creek, and two discharge events to Werris Creek occurred during the monitoring period, however no significant detrimental effect can be identified on the receiving waters of Quipolly or Werris Creeks from the five above surface water criteria discharges from the licensed discharge points at dams SB2, SB9 and SB10.

In general, the water quality of both Quipolly Creek and Werris Creek, both upstream and downstream, have above trigger level total suspended solids in with Werris Creek having a distinctively higher suspended sediment load.

No investigations related to above criteria surface water or groundwater impacts due to mining are required.

7. REFERENCES

ANZECC, 2000 An Introduction to the Australian and New Zealand Guidelines For Fresh and Marine Water Quality

Geoterra, 2009 Werris Creek Coal Pty Ltd Surface Water and Groundwater 2008/2009 Monitoring Annual Review

GSS Environmental, 2009 Site Water Management Plan, Werris Creek Coal Mine

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Soil Services, 2004 Surface Water Assessment, Proposed Werris Creek Coal Mine

Werris Creek Coal, 2005 Groundwater Contingency Plan for the Werris Creek Coal Mine

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APPENDIX A
WELL, BORE AND PIEZOMETER DATA SUMMARY

GeoTerra

Werris Creek		Coal	Mine	Bore	And	Piezometer	Summary			
	Property	GW No.	Type	Purpose	Total Depth	Install Date	Install SWL	Flow Depth mbgl	Yield L/sec	Slotted Depth
QUIPOLLY CK	**ALLUVIUM**									
MW7	Rosehill	966349	Well	Stk Dom						
MW12	Hazeldene	35072	Bore	Stock	12.1					
MW13	Parkhill	60408	Well	irrigaton	5.5	1965				
MW13B	Parkhill									
MW13D	Parkhill									
MW15	Capp		Well	Stk Dom						
MW16	Mountain View		Bore	Stk Dom						
MW21B	Glenara		Bore	Stk Dom						
MW22A	Gedhurst		Well	Stk Dom						
MW22B	Gedhurst		Well	Irrigation						
MW23A	Rocky View		Well	Stk Dom						
MW23B	Rocky View		Well	Irrigation						
MW26	Meadholme		Well	Stk Dom						
BLACK GULLY	**ALLUVIUM**									
MW17A	Andrews		Bore	Stk Dom						
MW18A	Almawillee		Bore	Domestic						
MW18B	Almawillee		Well	Irrigation						
MW21A	Glenara		Bore	Stk Dom						

Werris	Creek	Coal	Mine	Bore	And	Piezometer	Summary			
	Property	GW No.	Type	Purpose	Total	Install	Install	Flow Depth	Yield	Slotted
					Depth	Date	SWL	mbgl	L/sec	Depth
WERRIE	**BASALT**									
P1	WCC Pty Ltd		Piezo	Monitoring	42	2008		35		39-42
P2	WCC Pty Ltd		Piezo	Monitoring	25	2008		25		22-25
P3	WCC Pty Ltd		Piezo	Monitoring	61	2008		60		58-61
MW1	Hillview	966036	Bore	Stk Dom	63	2003	49	59.5 - 60	1.26	54-60
MW2	Railway View	966127	Bore	Stk Dom	65.5	2003	26.2	47.3 - 47.6 / 54.9 - 55.2	0.37 / 0.37	45-56
MW3	Eurunderee	965729	Bore	Stk Dom	39.6	2002	15.2	36.5 - 36.8	0.6	36-38.5
MW4	WCC Pty Ltd		Bore	Monitoring		2005				
MW4B	WCC Pty Ltd		Bore	Monitoring						
MW5	WCC Pty Ltd		Piezo	Monitoring	28	2005	8.7	24-27		22-28
MW5B	WCC Pty Ltd		Bore	Monitoring	43	2010	9.06			30-43
MW6	WCC Pty Ltd		Piezo	Monitoring	16	2005	10	12-13		Oct-16
MW8	Roseneath	902638	Bore	Stk Dom	42.7	1995	16.4	22.9-23.2 / 35.1-35.4	0.31 / 0.31	22.5-36
MW9	WCC Pty Ltd		Piezo	Monitoring	28	2005	13.78	26-28		24-27
MW10	Turnbulls	965745	Bore	Domestic	22	2002	14-18	15.3-15.6 / 19.8-20.2	1.26	15-21
MW14	WCC Pty Ltd		Piezo	Monitoring	26	2005	16.02	20-26		22-25
MW14B	Cintra		Bore	Test	43	2010	16.53			24-43
MW17B	Andrews									
MW19A	McCullock		Well	Irrigation						
MW20	Tonsley Park		Bore	Domestic						
MW24A										
MW25A										
MW25B										
	CURRABUBULA FM									
MW11	Tumbulls Gap		Bore							

APPENDIX B
GROUNDWATER QUALITY MONITORING

APPENDIX C

DAM AND CREEK WATER QUALITY AND CREEK DISCHARGE SUMMARY

Quipolly Ck

	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
	Trigger		6.5-8.5		20-50								10
QCU	5/05/2010	Controlled	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
QCD	5/05/2010	Controlled	7.99	1010	8	<0.01	<0.01	<0.01	0.3	0.3	0.15	0.02	<5
QCU	12/07/2010	Wet Weather	7.41	17.9	41		0.03	0.03	0.5	0.5	0.08	0.02	<5
QCD	12/07/2010	Wet Weather	7.72	920	6		0.04	0.04	<0.1	<0.1	0.18	0.03	<5
QCU	28/07/2010	Wet Weather	7.45	1680	33	<0.01	<0.01	<0.01	2.2	2.2	0.17	0.04	<5
QCD	28/07/2010	Wet Weather	7.2	813	6	<0.01	0.07	0.07	0.4	0.5	0.08	0.04	<5
QCU	12/08/2010	Wet Weather	7.6	256	22	<0.01	0.18	0.18	0.8	1	0.22	0.1	<5
QCD	12/08/2010	Wet Weather	7.39	231	105	<0.01	0.25	0.25	0.8	1	0.32	0.39	<5
QCU	19/08/2010	Quarterly	8.13	285	10		0.24	0.25	0.9	1.2	0.18	0.09	<5
QCD	19/08/2010	Quarterly	7.8	468	18		0.03	0.18	1.1	1.3	0.15	0.14	<5
QCU	25/10/2010	Wet Weather	7.89	370	20	0.02	0.22	0.23	1.8	2	0.18	0.12	<5
QCD	25/10/2010	Wet Weather	7.81	924	7	<0.01	0.07	0.07	0.3	0.4	0.07	0.07	<5
QCU	2/11/2010	Controlled	7.23	546	1	<0.01	0.39	0.39	0.1	0.5	0.08	0.02	<5
QCD	2/11/2010	Controlled	7.68	808	10	<0.01	0.35	0.35	0.2	0.6	0.11	0.1	<5
QCU	11/11/2010	Wet Weather	7.06	523	63	<0.01	0.66	0.66	1.2	1.9	0.21	0.01	<5
QCD	11/11/2010	Wet Weather	7.71	897	9	<0.01	0.03	0.03	0.4	0.4	0.31	0.1	<5
QCU	16/11/2010	Wet Weather	8.2	316	6	<0.01	0.49	0.49	0.8	1.3	0.09	0.08	<5
QCD	16/11/2010	Wet Weather	7.57	488	19	<0.01	0.86	0.86	0.9	1.8	0.18	0.2	<5
QCU	23/11/2010	Controlled	7.27	428	<5	<0.01	0.27	0.27	0.6	0.9	0.2	0.07	<5
QCD	23/11/2010	Controlled	7.54	563	18	0.02	0.14	0.16	0.7	0.9	0.31	0.11	<5
QCU	29/11/2010	Controlled	7.02	591	<5	0.02	0.88	0.9	0.9	1.8	0.08	0.04	<5
QCD	29/11/2010	Controlled	7.69	866	14	<0.01	0.15	0.15	0.6	0.8	0.2	0.08	<5
QCU	8/12/2010	Quarterly	7.58	593	70	<0.01	0.15	0.15	0.9	1	0.24	0.22	<5
QCD	8/12/2010	Quarterly	7.02	560	<5	0.02	0.56	0.59	0.3	0.9	0.15	0.03	<5
QCU	10/12/2010	Wet Weather	7.84	286	22	<0.01	0.02	0.02	<0.1	<0.1	0.18	0.18	<5
QCD	10/12/2010	Wet Weather	7.66	240	55	0.03	<0.01	0.03	1.5	1.5	0.4	0.37	<5
QCU	15/12/2010	Controlled	7.39	362	<5	<0.01	0.11	0.11	0.8	0.9	0.18	0.16	<5
QCD	15/12/2010	Controlled	7.41	471	12	<0.01	0.15	0.15	0.7	0.8	0.24	0.29	<5
QCU	18/12/2010	Controlled	7.05	661	<5	<0.01	0.8	0.8	<0.1	0.8	0.07	0.05	<5
QCD	18/12/2010	Controlled	7.6	777	13	<0.01	0.3	0.3	<0.1	0.3	0.12	0.11	<5
QCU	17/01/2011	Non-routine	8.19	589	<5	<0.01	0.59	0.59	0.4	1	0.08	0.06	<5
QCD	17/01/2011	Non-routine	7.69	705	24	<0.01	0.16	0.16	0.5	0.7	0.18	0.1	<5
QCU	3/03/2011	Quarterly	7.33	493	6	<0.01	0.54	0.54	<0.1	0.5	0.09	0.08	<5
QCD	3/03/2011	Quarterly	7.75	729	17	<0.01	0.12	0.12	0.1	0.2	0.22	0.08	<5
QCU	7/03/2011	Controlled	7.04	414	6	<0.01	0.57	0.57	0.4	1	0.15	0.05	<5
QCD	7/03/2011	Controlled	7.77	686	17	<0.01	0.12	0.12	0.2	0.3	0.2	0.08	<5
QCU	29/03/2011	Non-routine	7.67	368	10	<0.01	0.61	0.61	0.2	0.8	0.17	0.11	<5
QCD	29/03/2011	Non-routine	8.05	766	19	<0.01	0.02	0.02	<0.1	<0.1	0.07	0.04	<5

denotes increase from upstream to downstream monitoring sites

denotes exceeds surface water trigger level

Werris Creek

	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
	Trigger		**6.5-8.5**		**20-50**								**10**
WCU	28/07/2010	Wet Weather	7.49	1210	92	0.01	3.8	3.81	2.2	6	0.13	0.08	<5
WCD	28/07/2010	Wet Weather	7.71	1130	32	0.03	0.9	0.93	1.7	2.6	0.29	0.2	<5
WCU	12/08/2010	Non-routine	7.62	323	148	<0.01	0.81	0.81	0.8	1.6	0.43	0.4	<5
WCD	12/08/2010	Non-routine	7.6	324	130	<0.01	0.68	0.68	0.6	1.3	0.42	0.4	<5
WCU	19/08/2010	Quarterly	7.85	618	8		0.53	0.53	1.1	1.6	0.26	0.12	<5
WCD	19/08/2010	Quarterly	8.2	811	28	<0.01	0.54	0.56	0.6	1.2	0.53	0.2	<5
WCU	25/10/2010	Non-routine	7.83	549	13	0.38	0.4	0.78	1.9	2.7	0.86	0.81	<5
WCD	25/10/2010	Non-routine	7.86	587	200	<0.01	25.2	25.2	5.5	30.7	0.41	0.3	<5
WCU	11/11/2010	Non-routine	7.44	382	504	0.02	1.77	1.79	3.1	4.9	1.69	0.62	<5
WCD	11/11/2010	Non-routine	7.64	443	1640	0.09	19.4	19.4	4.2	23.6	1.27	0.34	<5
WCU	16/11/2010	Non-routine	7.79	370	56	<0.01	1.07	1.07	1.1	2.2	0.52	0.58	7
WCD	16/11/2010	Non-routine	7.69	426	690	0.11	10.5	10.6	3.2	13.8	0.54	0.46	<5
WCU	8/12/2010	Quarterly	7.79	667	56	0.02	1.17	1.18	2.8	4	0.97	0.68	<5
WCD	8/12/2010	Quarterly	7.49	177	14	<0.01	0.03	0.03	2	2	0.6	0.6	<5
WCU	10/12/2010	Wet Weather	7.67	299	65	<0.01	0.19	0.19	1.4	1.6	0.59	0.56	<5
WCD	10/12/2010	Wet Weather	7.69	273	305	0.01	1.78	1.79	2.2	4	0.69	0.64	<5
WCU	3/03/2011	Quarterly	7.62	1170	15	0.03	3.38	3.41	0.4	3.8	0.07	0.03	<5
WCD	3/03/2011	Quarterly	8.23	1050	20	<0.01	0.05	0.05	0.1	0.2	0.23	0.14	<5

denotes increase from upstream to downstream monitoring sites

denotes exceeds surface water trigger level

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
Trigger		**6.5-8.5**		**20-50**								**10**
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

denotes exceeds surface water trigger level

WERRIS CREEK COAL DAM DISCHARGE REGISTER 2010/2011

Dam	Date	Pump	Flow L/m	Hours	Volume (kL)	Cumulative (ML)	Sampled	Type	Comply
SB9	4/01/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB9	15/02/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB9	5/05/2010	Robin 3"	800	5	240	0.24	Yes	Controlled	Yes
SB9	6/05/2010	Robin 3"	800	5	240	0.48		Controlled	Yes
SB9	7/05/2010	Robin 3"	800	5	240	0.72		Controlled	Yes
SB9	8/05/2010	Robin 3"	800	5	240	0.96		Controlled	Yes
SB9	10/05/2010	Robin 3"	800	5	240	1.2		Controlled	Yes
SB9	12/07/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB2	28/07/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB9	28/07/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB10	28/07/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB2	12/08/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB9	12/08/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB2	25/10/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB2	1/11/2010	Robin 3"	800	6	288	0.288	Yes	Controlled	Yes
SB2	2/11/2010	Robin 3"	800	9	432	0.72		Controlled	Yes
SB2	3/11/2010	Robin 3"	800	6	288	1.008		Controlled	Yes
SB2	4/11/2010	Robin 3"	800	6	288	1.296		Controlled	Yes
SB2	5/11/2010	Robin 3"	800	6	288	1.584		Controlled	Yes
SB2	8/11/2010	Robin 3"	800	10	480	2.064		Controlled	Yes
SB2	9/11/2010	Robin 3"	800	10	480	2.544		Controlled	Yes
SB2	10/11/2010	Robin 3"	800	5	240	2.784		Controlled	Yes
SB9	11/11/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB2	16/11/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	NO
SB9	16/11/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB9	23/11/2010	420	1800	17.2	1857.6	1.8576	Yes	Controlled	Yes
SB9	24/11/2010	420	1800	7	756	2.6136		Controlled	Yes
SB2	29/11/2010	Robin 3"	600	10	360	0.36	Yes	Controlled	Yes
SB2	30/11/2010	Robin 3"	600	10	360	0.72		Controlled	Yes
SB2	1/12/2010	Robin 3"	600	10	360	1.08		Controlled	Yes
SB2	2/12/2010	Robin 3"	600	10	360	1.44		Controlled	Yes
SB2	3/12/2010	Robin 3"	600	10	360	1.80		Controlled	Yes
SB2	4/12/2010	Robin 3"	600	10	360	2.16		Controlled	Yes
SB2	5/12/2010	Robin 3"	600	10	360	2.52		Controlled	Yes
SB2	10/12/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB9	10/12/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB10	10/12/2010	Overflow	NA	NA	NA	NA	Yes	Wet Weather	Yes
SB2	15/12/2010	Robin 3"	600	10	360	0.36	Yes	Controlled	Yes
	16/12/2010	Robin 3"	600	10	360	0.72		Controlled	Yes
	17/12/2010	Robin 3"	600	10	360	1.08		Controlled	Yes
	18/12/2010	Robin 3"	600	10	360	1.44		Controlled	Yes
	19/12/2010	Robin 3"	600	10	360	1.80		Controlled	Yes
SB9	18/12/2010	420	1800	13	1404	1.404	Yes	Controlled	Yes
	19/12/2010	420	1800	10.1	1090.8	2.4948		Controlled	Yes
SB2	7/03/2011	Robin 3"	600	10	360	0.36	Yes	Controlled	Yes
	8/03/2011	Robin 3"	600	15	540	0.90		Controlled	Yes
	9/03/2011	Robin 3"	600	15	540	1.44		Controlled	Yes
	10/03/2011	Robin 3"	600	15	540	1.98		Controlled	Yes
	11/03/2011	Robin 3"	600	10	360	2.34		Controlled	Yes
SB9	7/03/2011	420	1800	10	1080	1.08	Yes	Controlled	Yes
	8/03/2011	420	1800	10.1	1090.8	2.1708		Controlled	Yes

Sample Date	Trigger	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
			6.5-8.5		20-50								10
SB2	11/05/2010	Quarterly	8.77	457	<1	<0.01	0.01	0.01	0.3	0.3	0.04	0.01	<5
SB2	28/07/2010	Wet Weather	8.33	393	17	<0.01	<0.01	<0.01	0.7	0.7	0.04	0.03	<5
SB2	12/08/2010	Wet Weather	7.52	389	6	<0.01	0.23	0.23	0.5	0.7	0.16	0.1	<5
SB2	19/08/2010	Quarterly	8.05	363	38	0	0.01	0.01	1	1	0.26	0.09	<5
SB2	25/10/2010	Wet Weather	8.27	417	16	<0.01	<0.01	<0.01	0.8	0.8	0.06	0.01	<5
SB2	2/11/2010	Controlled	8.34	427	20	<0.01	0.03	0.03	0.3	0.3	<0.01	<0.01	<5
SB2	16/11/2010	Wet Weather	8.59	397	11	<0.01	0.54	0.54	1	1.5	0.02	<0.01	<5
SB2	23/11/2010	Non-routine	8.64	411	13	<0.01	<0.01	<0.01	0.8	0.8	0.17	<0.01	<5
SB2	29/11/2010	Controlled	8.36	444	22	<0.01	0.01	0.01	0.7	0.7	<0.01	<0.01	<5
SB2	8/12/2010	Quarterly	8.71	422	11	<0.01	0.04	0.04	0.9	0.9	0.04	<0.01	<5
SB2	10/12/2010	Wet Weather	8.05	406	25	<0.01	0.02	0.02	1	1	0.04	0.02	<5
SB2	15/12/2010	Controlled	7.95	242	7	<0.01	0.01	0.01	0.2	0.2	0.04	0.05	<5
SB2	17/01/2011	Non-routine	8.72	418	20	<0.01	<0.01	<0.01	0.5	0.5	0.11	0.02	<5
SB2	3/03/2011	Quarterly	8.06	388	37	<0.01	0.02	0.02	0.1	0.1	<0.01	<0.01	<5
SB2	7/03/2011	Controlled	7.95	333	18	<0.01	0.02	0.02	0.3	0.3	<0.01	<0.01	<5
SB2	29/03/2011	Non-routine	8.96	346	28	<0.01	0.01	0.01	0.3	0.3	0.2	<0.01	<5
SB6	11/05/2010	Quarterly	8.01	515	60	0.03	9.71	9.74	1.9	11.6	0.14	0.05	<5
SB6	19/08/2010	Quarterly	7.69	476	20		11.8	12.1	4.3	16.4	0.08	<0.01	<5
SB6	8/12/2010	Quarterly	8.16	582	8	1.13	17.8	18.9	4.3	23.2	0.09	<0.01	<5
SB6	3/03/2011	Quarterly	7.76	434	20	0.24	9.94	10.2	3.1	13.3	0.05	<0.01	<5

denotes exceeds surface water trigger level

	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	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
	Trigger		**6.5-8.5**		**20-50**								**10**
SB9	28/04/2010	Non-routine	7.82	171	30								
SB9	5/05/2010	Controlled	7.98	173	46	0.02	<0.01	<0.01	1.6	1.6	0.35	0.04	<5
SB9	11/05/2010	Quarterly	8.08	180	120	<0.01	0.01	0.01	1.2	1.2	0.13	0.03	7
SB9	25/06/2010	Non-routine	8.55	245	3								<5
SB9	12/07/2010	Wet Weather	8.02	290	13		0.38	0.4	1.2	1.6	0.13	0.01	<5
SB9	28/07/2010	Wet Weather	7.64	268	22	0.02	0.58	0.59	1.5	2.1	0.11	0.05	<5
SB9	12/08/2010	Wet Weather	7.63	121	73	<0.01	0.41	0.41	0.8	1.2	0.28	0.18	<5
SB9	19/08/2010	Quarterly	7.66	131	295		0.4	0.4	1.1	1.5	0.38	0.16	<5
SB9	28/09/2010	Non-routine	8.24	133	42		0.03	0.03	1.5	1.5	0.36	0.04	10
SB9	11/11/2010	Wet Weather	7.38	164	160	0.01	0.34	0.35	1.8	2.2	0.41	0.04	<5
SB9	16/11/2010	Wet Weather	7.53	157	26	<0.01	0.81	0.81	1	1.8	0.06	0.05	5
SB9	23/11/2010	Controlled	7.57	149	31	<0.01	0.19	0.19	1.2	1.4	0.24	0.05	<5
SB9	8/12/2010	Quarterly	7.84	170	23	0.01	0.21	0.22	1	1.2	0.19	0.04	<5
SB9	10/12/2010	Wet Weather	7.25	95	137	<0.01	0.09	0.09	1.6	1.7	0.22	0.21	<5
SB9	18/12/2010	Controlled	7.36	131	31	<0.01	0.02	0.02	1.1	1.1	0.11	0.07	<5
SB9	3/03/2011	Quarterly	8	149	30	0.01	<0.01	0.02	<0.1	<0.1	<0.01	<0.01	<5
SB9	7/03/2011	Controlled	7.81	148	15	<0.01	0.03	0.03	1.4	1.4	0.14	<0.01	<5
SB9	29/03/2011	Non-routine	8.69	149	20	<0.01	0.29	0.29	1.1	1.4	0.22	<0.01	<5
SB10	28/07/2010	Wet Weather	7.92	199	132	0.01	1.07	1.08	1.6	2.7	0.17	0.11	<5
SB10	12/08/2010	Non-routine	7.3	91	68	<0.01	0.03	0.03	1.3	1.3	0.82	0.68	<5
SB10	19/08/2010	Quarterly	7.65	190	365		0.87	0.87	0.7	1.6	0.28	0.17	<5
SB10	16/11/2010	Non-routine	7.49	276	108	0.05	4.55	4.6	2.2	6.8	0.13	0.15	11
SB10	8/12/2010	Quarterly	7.71	274	148	0.02	2.33	2.35	1.6	4	0.18	0.17	<5
SB10	10/12/2010	Wet Weather	7.22	179	314	<0.01	0.76	0.76	<0.1	0.8	0.42	0.29	<5
SB10	3/03/2011	Quarterly	7.99	176	153	<0.01	0.17	0.17	<0.1	0.2	0.07	0.05	<5

denotes exceeds surface water trigger level

	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
	Trigger		**6.5-8.5**		**20-50**								**10**
SD4	11/05/2010	Quarterly	8.7	343	214	<0.01	0.02	0.02	0.8	0.8	0.23	0.02	<5
SD4	8/12/2010	Quarterly	9.18	196	8	<0.01	0.03	0.03	1.3	1.3	0.76	0.64	<5
SD4	3/03/2011	Quarterly	8.33	220	15	<0.01	0.03	0.03	0.6	0.6	0.78	0.76	<5
SD5	8/12/2010	Quarterly	8.48	212	43	<0.01	0.06	0.06	2.9	3	0.81	0.6	<5
SD5	3/03/2011	Quarterly	9.55	250	36	0.01	<0.01	0.02	1	1	0.24	0.2	<5
VWD1	11/05/2010	Quarterly	7.9	1220	148	0.04	2.31	2.35	0.8	3.2	<0.01	0.01	<5
VWD1	19/08/2010	Quarterly	8.13	1010	16		1.32	1.32	1.1	2.4	0.52	0.04	<5
VWD1	8/12/2010	Quarterly	8.27	941	<5	0.06	3.3	3.36	1.2	4.6	<0.01	<0.01	<5
VWD1	3/03/2011	Quarterly	8.43	808	19	0.02	0.81	0.84	<0.1	0.8	<0.01	<0.01	<5
VWD2	11/05/2010	Quarterly	7.89	1200	280	0.35	14.4	14.7	4.6	19.3	0.01	<0.01	<5
VWD2	19/08/2010	Quarterly	8.56	839	16	0	4.53	4.61	2.6	7.2	0.91	0.01	<5
VWD2	8/12/2010	Quarterly	8.8	646	8	0.05	2.01	2.06	0.9	3	0.25	<0.01	<5
VWD2	3/03/2011	Quarterly	8.81	659	51	0.02	0.02	0.04	<0.1	<0.1	<0.1	<0.01	<5
200ML	8/12/2010	Quarterly	8.09	912	<5	0.04	3.16	3.2	1	4.2	<0.01	<0.01	<5
200ML	3/03/2011	Quarterly	8.31	830	11	0.02	0.92	0.94	0.4	1.3	0.09	<0.01	<5

denotes exceeds surface water trigger level

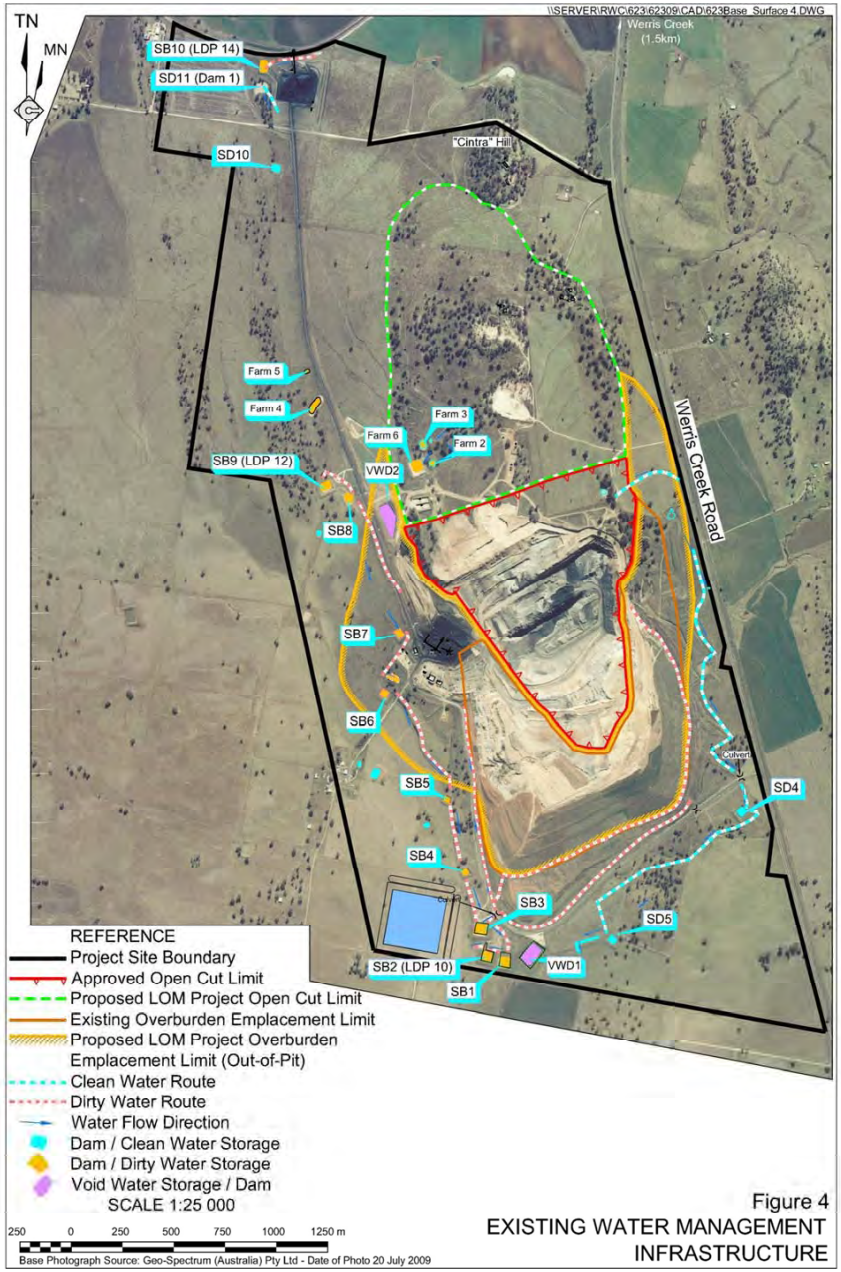


Figure 4
EXISTING WATER MANAGEMENT INFRASTRUCTURE

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**

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%						
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**

Piezo ID	MW3			Other Name		Eurunderee	
Aquifer	Werrie Basalt			Ground RL		367.267	
Coordinates	274594.69	6522940		EPL ID 19		Stick Up	0.4m/0.95m
Sample Date	Depth to Ground - metres	pH - field	Electrical Conductivity uS/cm - field	Nitrates_ mg N/L	Total Nitrogen_ mg/L	Total Phosphorus mg/L	Phosphorus - reactive mg/L
Jun-05	Site Not Sampled - Managers Request						
Jul-05	Site Not Sampled - Managers Request						
Aug-05	16.73	6.9	2360	3.8	4.0	0.06	0.04
Sep-05	15.66	7.7	2610	2.3	2.5	0.44	0.18
Oct-05	16.95	7.7	2940	0.83	2.0	2.30	0.28
Nov-05	7.76	7.0	2770	2.8	3.8	1.70	0.16
Dec-05	15.33	7.3	2530	3.2	3.6	0.27	0.27
Jan-06	15.35	7.4	900	2.2	2.2	0.06	0.02
Feb-06	16.45	7.3	2620	2.7	3.6	0.22	0.08
Mar-06	15.53	7.1	2410	4.0	4.2	0.06	0.04
Apr-06	14.85	7.8	1700	6.4	8.5	0.98	0.37
Jul-06	14.95	7.0	2400	3.8	3.9	0.44	0.08
Oct-06	15.34	7.4	2830	1.1	2.1	0.66	0.2
Jan-07	14.95	7.0	2670	2.4	2.8	0.37	0.18
Apr-07	16.32	7.0	2480	4.1	4.4	0.10	0.07
Jul-07	Sampling postponed due to unsafe access following wet weather						
Aug-07	15.33	7.1	2450	3.9	4.6	0.09	0.05
Nov-07	14.7	7.4	2330	0.54	3.6	1.5	0.29
Jan-08	14.94	7.4	2130	0.28	3.7	0.5	0.39
Apr-08	16.19	7.5	2710	1.3	2.6	0.4	0.11
Jul-08	14.61	7.8	2500	0.7	1.7	0.18	0.15
Oct-08	16.38	7.2	1480	0.13	2.2	1.9	0.14
Jan-09	14.13	7.5	2280	0.27	2.3	2.3	0.06
Apr-09	No sample taken - contract change over						
Jun-09	No access						
Aug-09	N/A	8.1	890	Testing for these analytes not undertaken			
Nov-09	N/A	8.04	840	Testing for these analytes not undertaken			
23/02/2010	N/A	8.36	1742	0.54	0.7	<0.01	0.01
19/05/2010	N/A	7.81	760	0.89	0.9	0.19	<0.01
9/09/2010	N/A	7.7	25	0.42	0.4	0.03	0.02
6/01/2011	N/A	7.02	73	0.03	0.8	<0.01	0.02
15/03/2011	N/A	7.09	42	0.28	0.5	<0.01	0.02

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					
Apr-09	No sample taken - contract change over							
Jun-09	9.88		7.9	990	Testing for these analytes not undertaken			
Aug-09	9.86		7.5	1070	Testing for these analytes not undertaken			
Nov-09	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**

Piezo ID	MW5				Other Name		Narrawolga/Eurundere 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**

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

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**

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			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**

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					

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**

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**

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**

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**	

Piezo ID	MW12			Other Name		Hazeldene Bore	
Aquifer	Alluvium (Quipolly Creek)			Ground RL (m)		360.179	
Coordinates	276311.8		6520489	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%						
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**

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**

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					
		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					
		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**

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%						
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**

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**

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%						
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**		**7.18**	**770**	**0.76**	**1.1**	**0.05**	**0.08**
Highest	**5.18**		**7.26**	**781**	**0.86**	**1.2**	**0.09**	**0.08**
Mean	**3.95**		**7.22**	**775.50**	**0.81**	**1.15**	**0.07**	**0.08**
Number of samples	**8**		**2**	**2**	**2**	**2**	**2**	**2**

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%						
8/11/2010	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%	1810	8.11	0.1	0.6	0.04	0.01
Lowest	**6**		**8.04**	**8.11**	**0.11**	**0.6**	**0.04**	**0.01**
Highest	**11.26**		**1810**	**1784**	**0.24**	**0.6**	**0.04**	**0.01**
Mean	**9.48**		**909.02**	**896.06**	**0.18**	**0.60**	**0.04**	**0.01**
Number of samples	**8**		**2**	**2**	**2**	**2**	**1**	**1**

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**		**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**
Number of samples	**6**		**0**	**0**	**0**	**0**	**0**	**0**

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**		**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**
Number of samples	**7**		**0**	**0**	**0**	**0**	**0**	**0**

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**		**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**
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		6527437				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**		**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**
Number of samples	**4**		**0**	**0**	**0**	**0**	**0**	**0**

Piezo ID	MW21a				Other Name		Ryans Windmill	
Aquifer	Alluvium (Black Gully)				Ground RL		357.191	
Coordinates	275669		6520609				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					

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					

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					

Piezo ID	MW22b				Other Name		Smith Irrigation	
Aquifer	Quipolly Alluvium				Ground RL		354.222	
Coordinates	274916.8		6520035				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					

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				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					

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**

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**

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	

WERRIS CREEK COAL
AEMR 2010-2011

APPENDIX 5

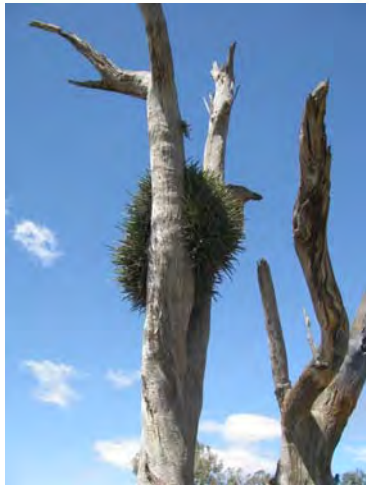
BIODIVERSITY OFFSET AREA ANNUAL MONITORING REPORT SPRING 2010 – Eco Logical Australia Pty Ltd

Werris Creek Coal Mine – Biodiversity Offset Area

Annual Monitoring Report

Spring 2010

Prepared for
Werris Creek Coal Pty Ltd.



DOCUMENT TRACKING

ITEM	DETAIL
Project Name	Werris Creek Coal Mine Biodiversity Offset Area Annual Monitoring Report
Project Number	10SUTENV-0018
Prepared by	Lucas McKinnon, Robert Humphries
Approved by	Robert Humphries
Status	Final
Last saved on	23rd May 2011

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Abbreviations

ABBREVIATION	DESCRIPTION
BOA	Biodiversity Offset Area
BOAAMR	Biodiversity Offset Area Annual Monitoring Report
BOMP	Biodiversity Offset Monitoring Program
BOSMP	Biodiversity Offset Strategy and Management Plan
CoA	Condition of Approval
CWD	Coarse Woody Debris
DECCW	NSW Department of Environment, Climate Change and Water
DNG	Derived Native Grassland
EEC	Endangered Ecological Community
EFA	Ecosystem Function Analysis
EIS	Environmental Impact Statement
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GCNRC	Geoff Cunningham Natural Resource Consultants
HBT	Hollow Bearing Tree
LFA	Landscape Function Analysis
NW Act	NSW *Noxious Weeds Act 1993*
TSC Act	NSW *Threatened Species Conservation 1995*
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 2010a) and condition of approval number 41 of DA-172-7-2004.

This is the first BOA AMR and therefore represents the baseline data to assess the progressive trajectory of the BOA towards self sustainability and meeting the completion criteria specified in Section 10 of the BOSMP.

Consistent with the BOSMP, 12 replicated permanent monitoring sites were set up across the BOA to assess the baseline Landscape function, vegetation dynamics and fauna composition.

This annual monitoring report provides the results of the baseline assessment using Landscape Function Analysis, Biometric vegetation condition assessment and standard census of the key vertebrate fauna groups (ground mammals, bats, nocturnal birds and mammals, diurnal birds, reptiles and amphibians) and compares these assemblages to the benchmark condition or completion criteria for vegetation communities and pre-clearing species lists.

The results illustrate the varied condition of the BOA with those sites classified as being in Vegetation Condition Class 4 (intact, albeit modified, remnants) being closest to the completion criteria and having good representation of LFA, species richness, canopy cover, midstorey and ground cover) than sites classified as condition classes 3, 2 and 1 (derived native grasslands, scattered paddock trees in modified pastures and cleared land/rehabilitated land respectively). As the landscape around the Werris Creek mine site has had a long history of grazing and cropping, there are no pristine areas to act as 'analogue or control sites", so the class 4 areas have been utilised to fulfil this role and compare progressive improvements in landscape function and biodiversity values.

No new threatened flora or fauna species were recorded during the 2010 monitoring.

Issues identified during the monitoring period included a large influx of annual weeds following a warm, wet spring. It is recommended that treatment of annual weeds is managed prior to the next monitoring season (Spring 2011), through the use of spraying, slashing or burning. A fox den was also recorded in a stag tree within the bounds of the BOA. It is recommended that the stag is fumigated at a time the den is occupied.

The results of the Landscape Function Analysis were positive, with a fairly homogenous Landscape Organisation Index. The Soil Surface Assessment returned high indices for site stability, nutrients and infiltration, with "analogue sites" (Class 4 vegetation) returning similar values to those of Class 3, 2 and 1 sites. Given the results of the Landscape Function Analysis, it is not considered necessary that monitoring of LFA is undertaken across the entire BOA each year. Future monitoring should be reduced to include analogue and rehabilitation sites only. It is recommended that LFA for the entire BOA is undertaken again after 5 years, to provide a perspective on any changes that may have taken place during this time.

Consistent with the commitments in the BOSMP, the flora and fauna monitoring program, with the exception of ground mammals, will be repeated in spring 2011.

1 Introduction

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 (ELA 2010a) and condition of approval number 41 of DA-172-7-2004.

The WCC Biodiversity Offset Area (BOA) covers an area of 362.16 hectares (ha) and consists of 261.3 ha of remnant *White Box-Grassy Woodland of the Nandewar and Brigalow Belt South Bioregions* (listed as the White Box Yellow Box Blakely's Red Gum woodland endangered ecological community (EEC) on Schedule 1 of the TSC Act), 25.33 ha of *Plains Grass grassland on basaltic black earth soils mainly on the Liverpool Plain in the Brigalow Belt South Bioregion* (listed as Native Vegetation of Cracking Clay Soils on the Liverpool Plains EEC on Schedule 1 of the TSC Act), 8.5 ha of *Yellow Box – Blakely's Red Gum Grassy Woodland of the Nandewar Bioregion* (a component of the listed White Box Yellow Box Blakely's Red Gum woodland EEC) and 5.47 ha of White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum shrubby open forest of the Nandewar Bioregion. The vegetation has been mapped in 4 condition classes (including cleared land) on the former 'Narrawolga', 'Eurunderee' and 'Railway View' properties surrounding the Werris Creek mine lease area (WCC No.2 Mine DA 172-7-2004 MOD5). The offset area also includes 52.2 ha of mine rehabilitation for a corridor linking the eastern and western sections of the BOA providing landscape connectivity.

The offset properties are located approximately six kilometres south of the township of Werris Creek, and 45 km south west of Tamworth in northern NSW (**Figure 1** and **2**). The properties have been acquired by WCC to provide the biodiversity offset requirements for the current and proposed future operations at the WCC No.2 Mine.

Conditions of Approval (CoA) No.40 for the construction and operation of the Werris Creek Coal Mine requires WCC to prepare and subsequently implement a Plan of Management for the Biodiversity Offset Strategy.

This BOA AMR addresses the annual flora and fauna monitoring program (Section 7 and 8 of the BOMP). In particular, this BOA AMR identifies the specific methodologies and results of the first year of monitoring within the BOA. These results will become the baseline for future biodiversity monitoring within the BOA.

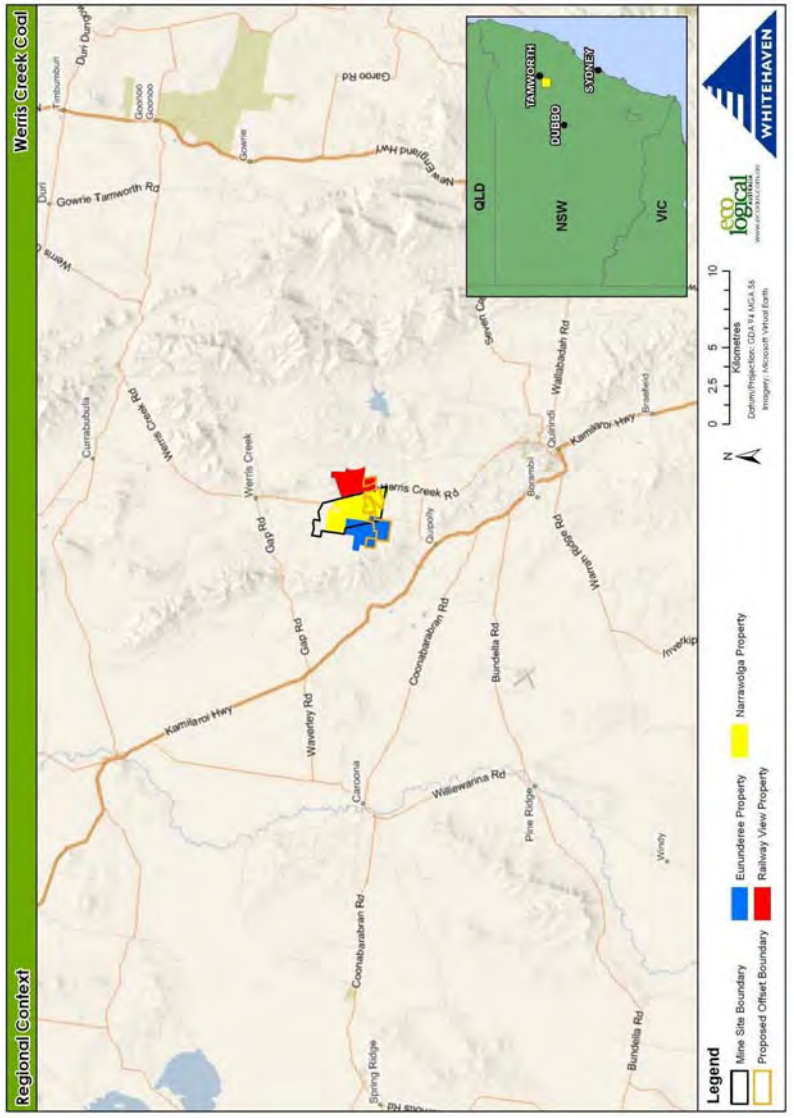


Figure 1: Regional Context of Biodiversity Offset Area

2 Description of the Offset Site

2.1 LOCATION IN A REGIONAL CONTEXT

The WCC BOA is located approximately 6 km south of the township of Werris Creek in northern NSW and is approximately 45 km south west of Tamworth (**Figure 1**). The offset site covers 362.16 ha of the former "Narrawolga', 'Eurunderee' and 'Railway View' properties, including 52.2 ha of mine rehabilitation.

2.2 CLIMATIC INFORMATION

The annual rainfall as measured at Quirindi Post Office ranges from 337 mm/year to 1149 mm/year, with an average of 684 mm (BOM 2010). The region is predominantly a summer rainfall area, with rains often in short duration, and high intensity rain events or thunderstorms (Ringrose-Voase *et al.* 2003).

Maximum and minimum air temperatures as measured at Quirindi Post Office, range from 13.2˚C to 37.3˚C, with an average of 24.6˚C (BOM 2010).

In Gunnedah, annual average pan evaporation (Epan) is 1884 mm. With a maximum monthly average of 263 mm in December and a minimum of 60 mm in June, Epan exceeds rainfall in all months. This pattern is true across most of the catchment (Ringrose-Voase et al. 2003).

Frost incidence is the other important climatic gradient. While temperatures vary as expected with elevation, there is a trend for more frequent frosts in the narrow alluvial valleys in the south of the catchment (e.g. near Pine Ridge) due to topographic effects compared to the broader alluvial plains in the north (Ringrose-Voase et al. 2003).

2.3 VEGETATION

Four vegetation types have been mapped on site and are described in accordance with the biometric vegetation types used as a statewide standard by DECCW (DECCW 2011). Vegetation types were mapped across the entire property, and trimmed to the boundary of the offset site after the mapping was completed. The offset site largely consists of the threatened ecological community, '*White Box - Yellow Box - Blakely's Red Gum Woodland*' (**Figure 2**).

It is noted that GCNRC (2004) identified large areas of clear/cultivated land and '*Native Vegetation on Cracking Clay Soils of the Liverpool Plains*', as part of the assessment of the original development application. Whilst mapping the vegetation for the proposed BOA, ELA noted that the majority of the grassland areas were more closely aligned to the '*White Box Grassy Woodland of the Nandewar and Brigalow belt south bioregions*' due to the frequent occurrence of previously ring barked White Box trees and White Box regeneration, though for the purposes of this monitoring report the original mapping has been retained.

2.4 VEGETATION CONDITION

The condition of each vegetation community has been assigned to one of four condition classes based on the presence/absence of a canopy layer and whether the ground cover was greater than or less than 50% native ground cover (Figure 2). The four condition classes are:

1. <50% native ground cover with no native canopy present (Cleared Land);
2. <50% native ground cover with a native canopy present (Scattered Trees/Paddock Trees in Poor Condition);
3. >50% native ground cover with no native canopy present (Derived Native Grasslands in Moderate-Good Condition); and
4. >50% native ground cover with a native canopy present (Native Vegetation in Moderate – Good Condition).

The area and proportion of each vegetation type within the BOA is shown in **Table 1**.

Table 1: Area of Biometric Vegetation Types in Biodiversity Offset Area

BIOMETRIC VEGETATION TYPE	CONDITION CLASS	AREA OF SITE (HA)	AREA OF SITE (%)
White Box grassy woodland of the Nandewar and Brigalow belt south bioregions	4	44.10	12.18
	3	210.49	58.12
	2	6.72	1.85
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	3	25.33	6.99
Yellow Box – Blakely's Red Gum grassy woodland of the Nandewar Bioregion	4	8.50	2.35
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Gum shrubby open forest of the Nandewar and Brigalow belt south bioregions	4	5.47	1.51
Mine Rehabilitation Area	1	52.2	14.41
Cleared Land (<50% native ground cover)	1	7.20	1.99
Other non vegetated areas (Internal roads, dams and rubbish dump)	N/A	2.16	0.60
Total		**362.16**	**100.0**

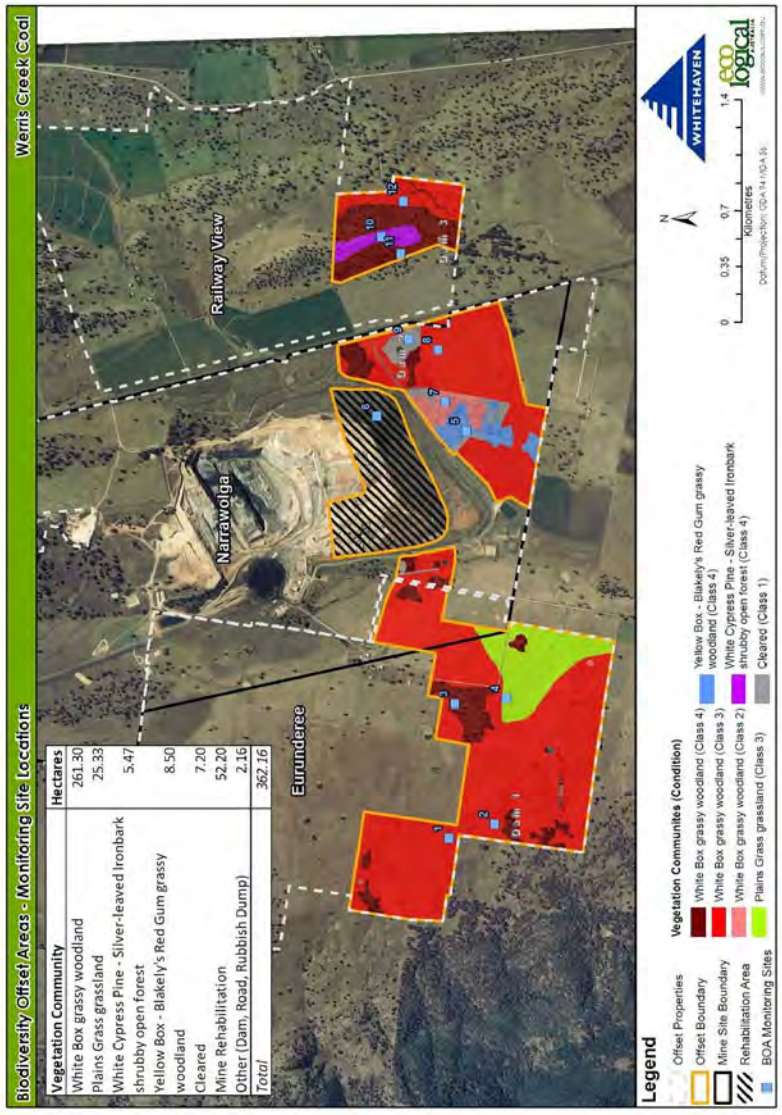


Figure 2: Vegetation types (condition class) and monitoring point locations of the Werris Creek BOA.

2.5 VEGETATION COMMUNITY DESCRIPTIONS

2.5.1 White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions

This community ranges in condition from Condition Class 1 – 4. It generally has a sparse canopy dominated by *Eucalyptus albens* (White Box) with *E. melliodora* (Yellow Box) occasionally present. In some management zones there is prolific regeneration of one or both of these overstorey species. The midstorey is absent with no shrubs observed at all. The understorey consists of a mix of native and introduced flora. The native understorey species include *Calotis lappulacea* (Yellow Burr-Daisy), *Einadia hastata* (Berry Saltbush), *Eremophila debilis* (Amulla) and *Wahlenbergia communis* (Tufted Bluebell), with native grasses dominating large areas including *Aristida ramosa* (Purple Wiregrass), *Austrostipa verticillata* (Slender Bamboo Grass), *Bothriochloa macra* (Red Grass), *Chloris truncata* (Windmill Grass), *Dichanthium sericeum* (Queensland Bluegrass), *Sporobolus elongatus* (Slender Rat's Tail Grass) (**Plate 1**).

Introduced flora recorded in this community includes *Carthamus lanatus* (Saffron Thistle), *Centaurea solstitialis (*St Barnaby's Thistle), *Echium plantagineum* (Paterson's Curse), *Hypericum perforatum* (St John's Wort), *Hypochaeris radicata* (Cats Ear), *Marrubium vulgare* (Horehound) and *Opuntia* spp. (Prickly Pear).

This community is representative of the endangered ecological community '*White Box Yellow Box Blakely's Red Gum Woodland* (as described in the final determination of the NSW Scientific Committee)' listed as an endangered ecological community on Schedule 1 Part 3 of the TSC Act and also meets the definition of the Commonwealth listed '*White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands*' critically endangered ecological community listed on the EPBC Act.

Plate 1: White Box-Grassy Woodland of the Nandewar and Brigalow belt south bioregions

2.5.2 Yellow Box- Blakely's Red Gum grassy woodland of the Nandewar Bioregion

At the southern end of the BOA area is a patch of remnant woodland where Yellow Box (*E. melliodora*) is the dominant canopy species, though the understorey composition remains much the same as the White Box grassy woodland vegetation community described above (**Plate 2**).

The dominance of Yellow Box in this area was considered significantly different to warrant mapping and recording this area as a separate biometric vegetation type even though it is a component of the same listed threatened ecological community (White Box- Yellow Box- Blakely's Red Gum Grassy Woodland).

Plate 2: Yellow Box – Blakely's Red Gum grassy woodland

2.5.3 White Cypress Pine – Silver-leaved Ironbark – Tumbledown Gum shrubby open forest of the Nandewar and Brigalow belt south bioregions (Condition Class 4)

This community is represented in condition class 4. It consisted of a sparse canopy comprised of *E. dealbata* (Tumbledown Red Gum) with the occasional *E. albens* and *E. melliodora* particularly on the lower slopes. As the property has been subject to historical grazing by livestock, there are limited midstorey and understorey species present. The only midstorey species observed was *Brachychiton populneus* (Kurrajong), while understorey species included, *W. communis* and native grasses similar to the White Box Grassy Woodland community, including *A. ramosa*, *B. macra*, *C. truncata* and *S. elongatus*.

Introduced flora recorded in this vegetation community includes *C. lanatus*, *C. solstitialis* and *E. plantagineum*.

Plate 3: White Cypress Pine – Silver-leaved Ironbark – Tumbledown Gum shrubby open forest of the Nandewar and Brigalow belt south bioregions

2.5.4 Plains Grass grassland on basaltic black earth soils mainly on the Liverpool Plain in the Brigalow Belt South Bioregion

This community is represented by one condition class, class 3, although it is a natural grassland community rather than a derived grassland. The canopy was very sparse and contained the occasional *Angophora floribunda* (Rough-barked Apple) and very occasionally on the edges of the community *E. albens*. Native understorey species included *C. lappulacea, E. hastata*, and *Oxalis perennans* (Wood Sorrel), while native grasses were dominated by *A. ramosa*, *Austrodanthonia tenuior* (Wallaby Grass), *A. aristiglumis* (Plains Grass), *A. verticillata*, *C. truncata* and *D. sericeum.*

Introduced flora recorded in this vegetation community included *C. lanatus*, *E. plantagineum*, *H. perforatum*, *Lepidium bonariense* (Peppercress) and *Lycium ferocissimum* (African Boxthorn).

This community is representative of the endangered ecological community "*Native Vegetation on Cracking Clay Soils of the Liverpool Plains* (as described in the final determination of the NSW Scientific Committee)" listed as an endangered ecological community on Schedule 1 Part 3 of the TSC Act.

It is noted that the majority of the grassland areas with this mapped vegetation unit were more closely aligned to the 'White Box Grassy Woodland of the Nandewar and Brigalow belt south bioregions' than the 'Native vegetation on Cracking Clay Soils', due to the frequent occurrence of previously ring barked White Box trees and White Box regeneration. Whilst this is the case on the ground, a decision has been made to retain the original mapping for the purposes of this monitoring period. It is expected that this area will regenerate into White Box grassy woodland with time, should this be the case a decision to revise the mapping accordingly may be required.

Plate 4: Plains Grass grassland on basaltic black earth soils mainly on the Liverpool Plain in the Brigalow Belt South Bioregion

2.6 THREATENED FLORA AND FAUNA RECORDED WITHIN THE BOA

The CoA for the WCC mine site do not include any requirements to provide habitat for any specific threatened species, although it is expected that the vegetation types protected in the offset area will provide habitat for a range of threatened species. It is noted that the Environmental Impact Statement for the WCC mine which is immediately adjacent to the BOA and previously supporting the same vegetation communities recorded five threatened bird and four threatened bat species (**Table 2**) listed under the NSW *Threatened Species Conservation* Act 1995. These species and others are likely to utilise habitat in the offset area as its condition is enhanced, particularly the canopy and shrub layer.

Table 2: Threatened fauna recorded from the WCC mine

SPECIES NAME	COMMON NAME	STATUS
	Threatened Birds	
Climacteris picumnus	Brown treecreeper	Vulnerable
*Glossopsitta pusilla**	Little Lorikeet	Vulnerable
Hieraaetus morphnoides	Little Eagle	Vulnerable
Melanodryas cucullata	Hooded Robin	Vulnerable
Stagonopleura guttata	Diamond Firetail	Vulnerable
	Threatened Bats	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheath-tail Bat	Vulnerable
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable

*This species has recently been listed as Vulnerable and was not listed at the time the EIS was conducted.

No threatened flora species were observed on the WCC mine site as part of the EIS or the Life of Mine Project Biodiversity Impact Assessment (ELA, 2010).

Baseline flora and fauna inventories are included in **Appendices B** and **C**.

2.7 INTRODUCED FLORA OF THE BOA

Sixty one exotic species were observed during the spring monitoring across the BOA. The most abundant weed species recorded during the November survey period included, the herbs, *Anagallis arvensis* (Blue Pimpernel), Hirschfeldia incana (Hairy Brassica), Hypochaeris radicata (Flatweed), *Trifolium arvense* (Hare's-foot Clover), *T. campestre* (Hope Clover) and *T. repens* (White Clover). The most common and abundant grasses included, *Avena sativa* (Oats), *Bromus molliformis* (Soft Brome), *Lolium perenne* (Perennial Ryegrass) and *Vulpia* sp.

Of these, two weed species are listed as noxious weeds in the Liverpool Plains Shire Council under the NSW *Noxious Weeds Act 1993*, these species are listed in **Table 3**.

Table 3: List of Noxious Weeds observed during the monitoring period November 2010.

Species name	Common name	Noxious weed category	Legal requirements for treatment	Recommend control method(s)
Echium plantagineum	Patterson's Curse	4	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	Spot Spray using a broadleaf herbicide (e.g. metsulfuron methyl)
Hypericum perforatum	St. Johns Wort			

3 Flora and Fauna Monitoring Methodology

Section 7 of the BOMP (ELA 2010a) outlines the proposed flora and fauna monitoring program for the BOA and is restated here.

3.1 FLORA

Vegetation monitoring utilised the Ecosystem Function Analysis (EFA) method developed by the CSIRO specifically targeting restoration programs and activities. EFA has been undertaken within the BOA (including the mine rehabilitation component) to:

- Compare monitoring results against rehabilitation and biodiversity offset area objectives;
- Identify issues, trends and actions for areas requiring improvement;
- Link implementation records to determine causes and explain results;
- Assess effectiveness of environmental controls implemented;
- Where necessary, identify modifications required for the monitoring program, practices or areas requiring research;
- Compare flora species present against revegetation species used and analogue (benchmark) sites;
- Assess vegetation health;
- Assess vegetation structure (upper, mid and lower storey); and
- Where applicable, assess native fauna species diversity and the effectiveness of habitat creation for target fauna species.

EFA includes:

- Landscape Function Analysis; and
- Vegetation Assessment.

Mine rehabilitation:

- One site per 30 ha of revegetation per vegetation community (to allow for the expansion of rehabilitation areas over time).

Biodiversity Offset Area:

- A minimum of one site in each vegetation type and condition zones (where condition zones are made up of patches less than 5 ha in area [i.e. cleared land, Class 2 White Box Grassy Woodland, Class 4 White Cypress Pine, Class 4 Yellow Box] and 3-4 replicate plots in each vegetation type/condition class with patches greater than 5 ha) as mapped within this BOMP (**Table 4**).

Table 4: Number of monitoring plots per vegetation type and condition class.

Biometric vegetation type	Condition class	Area (ha)	Plots	Number of Plots	Number of plots required
White Box grassy woodland of the Nandewar and Brigalow belt south bioregions	4	44.1	3, 11	2	3-4
	3	210.49	1, 2, 8, 12	4	3-4
	2	6.72	7	1	3-4##
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	3	25.33	4	1	3-4#
Yellow Box – Blakely's Red Gum grassy woodland of the Nandewar Bioregion	4	8.5	5	1	3-4#
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Gum shrubby open forest of the Nandewar and Brigalow belt south bioregions	4	5.47	10	1	3-4##
Mine Rehabilitation Area	1	52.2	6	1	2
Cleared Land (<50% native ground cover)	1	7.2	9	1	1
Other non vegetated areas (Internal roads, dams and rubbish dump)	N/A	2.16	N/A		
Total		**362.16**		**12**	

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.

It is also recommended that the replication for vegetation types <5ha in area be modified to <10 ha

Each LFA and vegetation monitoring site has been permanently marked by a star picket at the start and end of a 50m transect, established perpendicular to the contour (**Figure 2**).

3.1.1 Landscape Function Analysis

Landscape Function Analysis (LFA) was undertaken at the same locations as, and in conjunction with, the flora survey sites. LFA was undertaken between the 1st and 6th November 2010 by Lucas McKinnon and Luke Geelen of ELA. The methods completed were consistent with Tongway and Hindley (2005).

LFA assesses the landscape's ability to retain water and nutrients within the system. In terms of LFA, a soil landscape that is on a trajectory toward self sustainability (in context of vegetative cover and soil stability) would have:

- A high Landscape Organisation Index (LOI), i.e., a low number of bare soil patches (referred to as inter-patches) between obstruction components (referred to as patches) in the soil landscape, which would affect wind and water movement and the introduction and transportation of resources into and out of the system; and
- High Soil Surface Assessment indices, indicating that the site had favourable Nutrient, Infiltration and Stability characteristics.

At each monitoring site, a 20m x 50m (0.1ha) nested quadrat was established. Each quadrat was established using the following technique:

- each site was randomly selected within the desired monitoring stratification type;
- a 50 m tape measure was laid out down slope (according to the requirements of LFA);
- the start and end point of each transect was permanently marked with a metal star picket;
- each start and end point was recorded using GPS and photographs were taken at the at the start of each transect; and
- each star picket was marked with a length of high visibility flagging tape (or similar) to maximise the visibility of the transects and quadrats.

Within each nested quadrat LFA attributes were recorded on field data sheets in accordance with four main components of the method, as follows:

- Geographic setting of the site;
- Landscape organisation; and
- Soil surface assessment.

Geographic Setting of the Site

A description of each site was recorded, including position in the landscape, GPS coordinates (GDA94 Zone 55), compass bearing of the transect, slope, aspect, vegetation type and its landuse. The following topographic classification was also used:

- Crest;
- Upper slope;
- Mid slope;
- Lower slope;
- Closed depression, or lake;
- Flat; and
- Open depression or stream channel.

Landscape Organisation

The objective of this step is to map the spatial pattern of resource loss or accumulation at a site. The procedure is as follows:

- Locate the transect directly downslope. The tape measure was made taut prior to recording measurements. In this case a 50m tape measure was used in the 20x50m nested quadrat.
- Collect a continuous record of patch/inter-patch classification on the transect.

According to LFA, **patches** are long-lived/term features that obstruct or divert water flow and/or collect/filter out material from run-off (such as perennial grass plants, rocks > 10 cm, tree branches in contact with the soil) and where there is evidence of resource accumulation. **Inter-patches** are zones where resources such as water, soil materials and litter may be mobilised and freely transported either downslope when water is the active motive agent or down-wind when aeolian processes are active.

The following was recorded for each patch/inter-patch encountered along the transect:

- The distance and interval along the tape;
- The patch width (only necessary for patches); and
- The patch/inter-patch identification.
- Rill survey was not undertaken as no rill erosion was observed during the November 2010 survey period.

All data were entered into the LFA spreadsheets and were used to calculate the results of the LFA.

Soil Surface Assessment

Each patch/inter-patch type identified in the landscape organisation log was subject to soil surface properties classified according to the Soil Surface Assessment (SSA) Method, via a set of query zones located within examples of each patch and inter-patch type. In selecting query zones the following guidelines were observed:

1. Observations of soil surface features were made using the landscape organisation transect tape to define the query zone. Each SSA feature was estimated on a linear basis. Percentages were calculated according to the length of the particular query zone (i.e. standard line intercept rules).
2. It is suggested that a minimum of five replicates of each patch type are taken where possible for statistical reliability. However, given the homogeneity of the understorey within the BOA (See Section 4 - Results and Appendix A – Photo monitoring points), sampling of five replicates was not always possible due to paucity of a given patch/inter-patch type (Patch types ranged from 1 – 4), with a common example being “log” patches that may have only occurred once along a given transect.
3. Query zones were distributed along the full length of the transect.
4. The actual query zone was sited symmetrically within the selected zone patch/inter-patch.
5. The query zones were measured centimetres (cm) along the 50m transect, and the patch width was measured to a maximum of 10m.

Within each query zone the appropriate score (refer to LFA manual) for each soil surface assessment indicators were recorded, with indicators including:

1. Rainsplash protection
2. Perennial vegetation cover
3. Litter cover, origin and decomposition
4. Cryptogram cover

5. Crust brokenness
6. Soil erosion type and severity
7. Deposited materials
8. Soil surface roughness
9. Surface nature (resistance to disturbance)
10. Slake test
11. Soil surface nature

The LFA data sheets and spreadsheets were used to calculate the results of the SSA.

3.1.2 Vegetation assessment

Vegetation assessment is the other component of the EFA monitoring tool. An assessment of woody species density, species richness, ground cover and canopy cover all contribute to the findings of the LFA in terms of available nutrients, soil stability and water infiltration within 1m either side of the transect.

For each transect, additional flora monitoring was undertaken to enable a comparative measurement of the vegetation status against the completion criteria in the BOSMP. Using the starting point of each LFA transect (marked with fluorescent yellow paint on the star picket), components of the Biometric Assessment Methodology measured the status of vegetation condition for each replicate against the completion criteria in the BOSMP. The additional monitoring using the Biometric Assessment Methodology, as displayed in **Figure 3** included:

- Native plant species number and cover per 400m^2 (20m x 20m quadrat);
- Native overstorey and midstorey cover range measured at 10 points along a 50m transect;
- Native and exotic understorey cover range at 50 points along a 50m transect;
- Number of trees with hollows;
- Proportion regeneration of overstorey species present;
- Measure of coarse woody debris present (i.e. total length of fallens logs); and

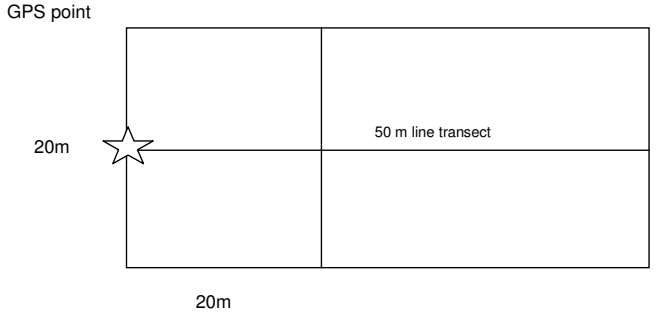


Figure 3: LFA and Vegetation Assessment nested quadrat and transect

To assist the analysis of EFA vegetation monitoring results over time, ELA has developed an ‘MS Excel’ based Vegetation Monitoring Database. The Vegetation Monitoring Database includes a complete flora species register for species recorded across the Werris Creek Coal mine area, including plot data from previous survey and the yearly monitoring within the BOA.

Photo Monitoring Points

Photo monitoring points were taken from both ends of the 50m transect looking along the transect line for comparison of site condition over time (**Appendix A**).

3.2 FAUNA

Fauna assessment was undertaken during the period of 1st – 7th November 2010 by Lucas McKinnon, Lucas Geelen, Prudence Coffey and Rebecca McCue. Surveys specifically targeted threatened species previously recorded within the Mine Lease, or with potential to occur within the area (

Table 5). The targeted fauna monitoring was directed by the numerous previous fauna survey work with sufficient data indicating that there is limited presence of native ground mammals.

The first year of monitoring covered all species groups to establish baseline data sets for ongoing comparison (i.e. ongoing data collected will be directly comparable using the same methodology), however annual fauna monitoring programs thereafter will focus on woodland birds and microbats, which represent all of the threatened species previously recorded onsite, as these and other mobile species such as reptiles will provide more information on the progress of woodland restoration than other fauna groups, particularly in the first 10 years of restoration activity. After this time the fauna monitoring program will be expanded to cover other species groups (including ground mammals) as the BOA (including rehabilitation) regenerates and develops sufficient habitat niches to support additional species.

An 'MS Excel' style database has been developed to maintain a fauna species register based on the likelihood that a species would be present and documenting from previous monitoring programs actual species recorded onsite.

The number of fauna monitoring replicates is consistent with the requirements of the BOSMP, as follows:

Mine rehabilitation;

- One site per 60 ha of revegetation of each ecological community (to allow for the expansion of rehabilitation areas over time);

Biodiversity Offset Area;

- 10 sites were selected for survey of ground mammals, birds and reptiles distributed across all vegetation types and condition classes,
- 3 replicates for vegetation condition classes with patches greater than 5 ha in area and one for vegetation condition classes with patches less than 5# ha in area were undertaken.
- Frogs were surveyed opportunistically, with specific searches and call identification undertaken at dams across the BOA.

As for the vegetation monitoring plots it is recommended that the number of replicates for vegetation classes with small areas within the Boa be increased to 10 ha from 5ha.

The fauna monitoring sites were selected at the most relevant vegetation monitoring sites for consistency. The White Cypress Pine – Silver-leaved Ironbark – Tumbledown Gum community was too small to fit a standard fauna monitoring plot. One Class 3 White Box grassy woodland site was also excluded as four replicates plots where already in place in Class 3 vegetation. **Table 5** outlines the fauna monitoring methods undertaken at the site during the Spring survey of 2010.

Table 5: Fauna Monitoring methods and intensity in each vegetation community/condition class

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.

3.3 WEATHER CONDITIONS

Weather conditions during the monitoring were considered adequate for the surveys. Temperatures were mild, with very little rainfall recorded during the fauna monitoring, however, rain was recorded during the flora monitoring, as shown in **Table 6** (temperature records from the nearest weather station, Quirindi, NSW; BoM 2011).

Table 6: Weather conditions during the spring monitoring period.

Date (November 2010)	Min Temp (°C)	Max Temp (°C)	Rainfall (mm)	Wind (km/h)	9am Temp (°C)	3pm Temp (°C)
1st	14.2	21.8	3.2	Calm	18.2	n/a
2nd	5.6	20.0	12.0	Calm	11.4	n/a
3rd	4.4	24.2	0	Calm	15.0	n/a
4th	9.6	24.6	0	Calm	18.4	n/a
5th	10.2	16.8	2.8	4	14.0	n/a
6th	10.4	21.5	2.8	4	12.6	n/a
7th	8.4	28.0	1.0	Calm	19.2	n/a

4 Results and Discussion

The results for landscape function analysis and floristic surveys are presented according to each of the 12 monitoring sites in **Appendix B**. The following section provides a summary of the floristics, LFA and vegetation dynamics for the sites to allow ease of reference when comparing to any future monitoring events.

4.1 FLORA

4.1.1 Landscape Function Analysis

Landscape Organisation

The LFA assessment indicated a high Landscape Organisation Index (LOI) i.e. a low number of bare soil patches (inter-patches) between obstruction components (patches) in the soil landscape, which affects wind and water movement and the introduction and transportation of resources into and out of the system.

The landscape organisation analysis identified strongly homogenous landscape across the site, with 7 of 12 sites maintaining a consistent 'patch' type for the entire transect or query zone (**Figure 4**). An 'inter-patch' was only recorded for one site (Site 3 – Condition Class 4) during the analysis (i.e. BSL = Bare soil litter).

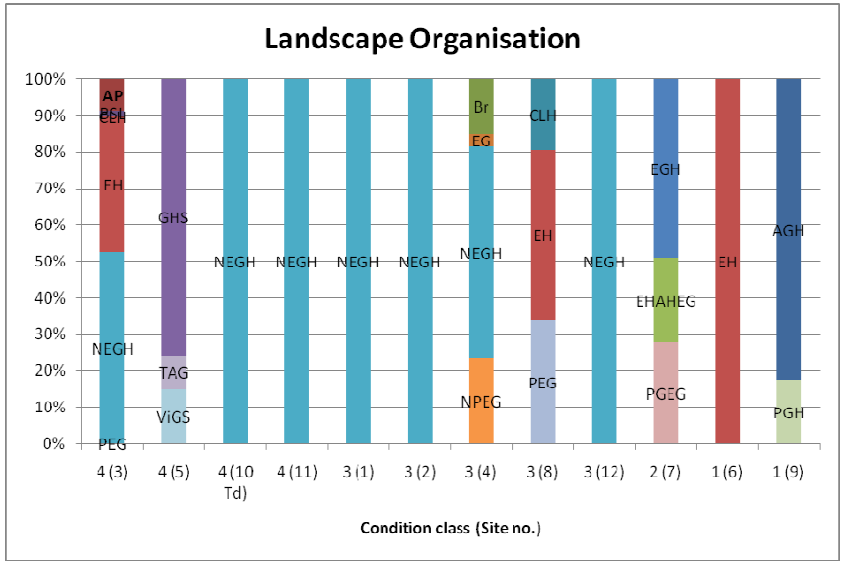


Figure 4: Landscape organisation of patch / inter-patch types across the BOA.

(Td = Tumbledown Gum community)

LEGEND			
Patch / Inter-patch	**Code**	**Patch / Inter-patch**	**Code**
Annual Grass/Herb	AGH	Grass/Herb sward	GHS
Asperula Patch	AP	Nat. & Ex. Grass/Herb	NEGH
Bare soil litter *	BSL	Nat. Perennial/Ex. Grass	NPEG
Bromus	Br	Perennial Exotic Grass	PEG
Chloris/Lolium/Herb	CLH	Perennial Grass/Ex. Grass	PGEG
Ex. Herb/Annual Herb/Ex. Grass	EHAHEG	Perennial Grass/Herb	PGH
Exotic Grass	EG	Trifolium-Anagallis-Grass	TAG
Exotic Grass & Herb	EGH	Vicia-Grass sward	ViGS
Exotic Herb	EH		

* = Inter-patch

Soil Surface Assessment (Stability, Infiltration and Nutrient levels)

The assessment indicated high Soil Surface Assessment indices, indicating that the site had favourable Nutrient, Infiltration and Stability characteristics.

The graphs below provide a summary of the soil stability, nutrient and infiltration levels across the site, segregated by vegetation condition class and monitoring site (**Figure 5**, **Figure 6** and **Figure 7**).

The analysis produced high SSA indices, which were consistent across the site. Importantly, the indices for the 'analogue' sites (Class 4 vegetation) where in the same order as those of the lower condition vegetation (Classes 3, 2, and 1).

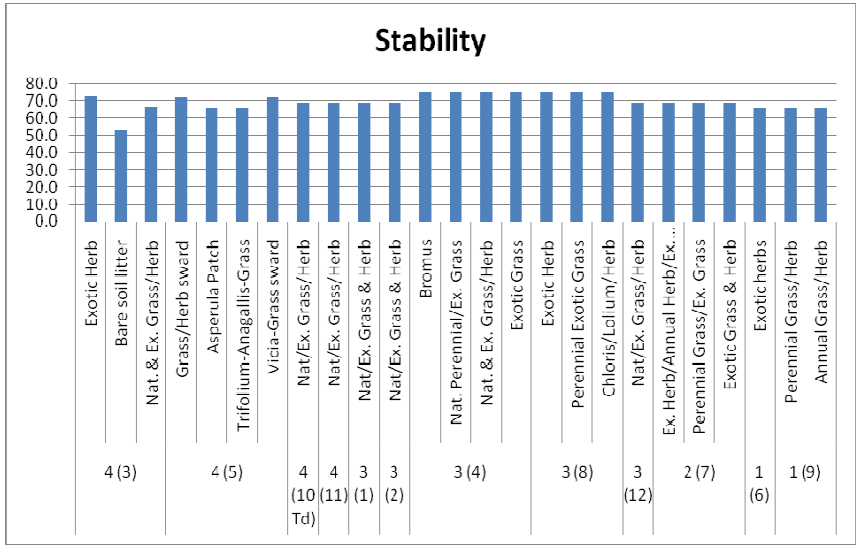


Figure 5: Soil stability across the BOA.

Note: X-axis labels refer to patch types across the monitoring plots; secondary X-axis labels refer to Condition class, with the site no. provided in brackets.

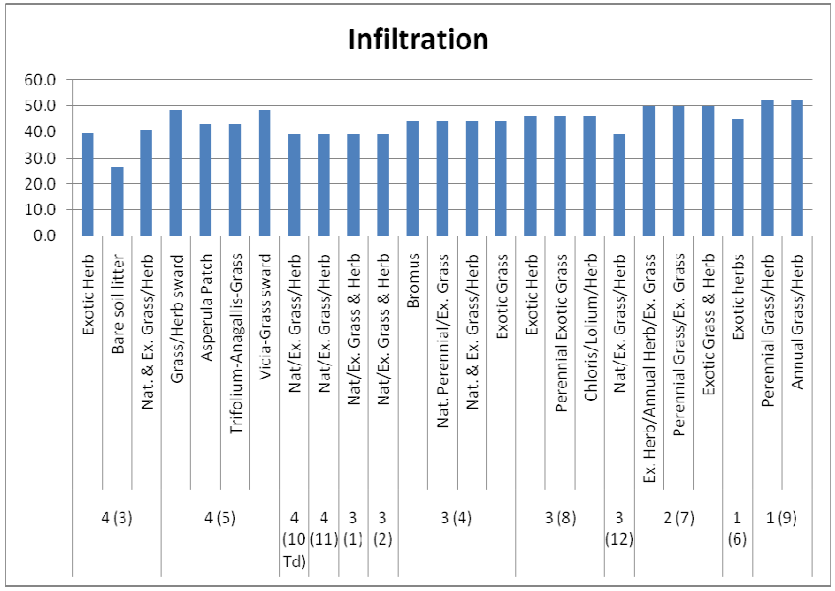


Figure 6: Soil infiltration levels across the BOA.

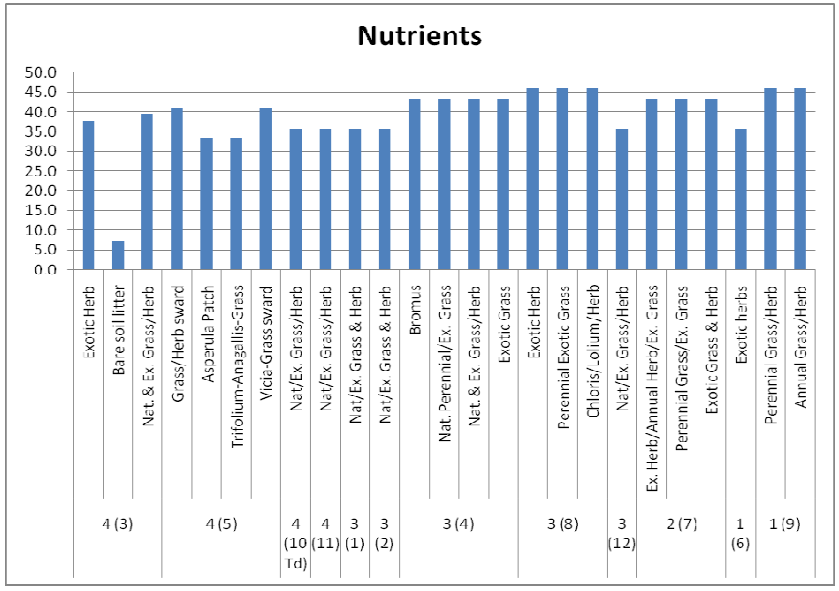


Figure 7: Soil nutrient levels across the BOA.

4.1.2 Vegetation Monitoring

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

Flora species richness

There was a large variation between sites in terms of native species diversity, with only two sites showing a near benchmark native species richness, and the remainder <50% of the benchmark. The number of native species in each monitoring plot ranged from 2-21, with Site 4 (Class 3) and Site 11 (Class 4) already near the benchmark species richness or completion criteria for White Box grassy woodlands (**Table 7**).

This exotic vegetation was dominated by annual species, which experienced a flush due to recent rains and warm weather. Treatment of annuals by spraying, slashing or burning in subsequent years will reduce this dominance and allow for the recovery of native species towards benchmark levels and the completion criteria.

Table 7: Floristic summary as compared to Biometric Benchmarks and Completion Criteria.

Biometric Vegetation Type	Condition Class (Site No.)	No. Native Species	No. Exotic Species (annual)	Benchmark / Completion Criteria	Completion Criteria met?
White Box grassy woodland	4 (3)	8	25 (23)	23	No
	4 (11)	19	19 (17)	23	No
	3 (1)	2	11 (9)	23	No
	3 (2)	10	20 (17)	23	No
	3 (4)	21	19 (16)	23	No
	3 (8)	2	9 (8)	23	No
	3 (12)	5	15 (13)	23	No
	2 (7)	10	11 (9)	23	No
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	9	14 (12)	23	No
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	7	19 (16)	30	No
Cleared land (Mine Rehab Site)	1 (6)	3	16 (14)	23	No
Cleared land (formerly cultivated land)	1 (9)	5	20 (14)	23	No
Cumulative totals of BOA	**12**	**52**	**61 (50)**		

Whilst the Class 3 and 4 vegetation generally showed higher native species richness, one Class 3 site (Site 8) had the lowest native species diversity within the BOA, with only 2 natives recorded within the 400m^2 monitoring plot (**Table 7** and **Figure 8**).

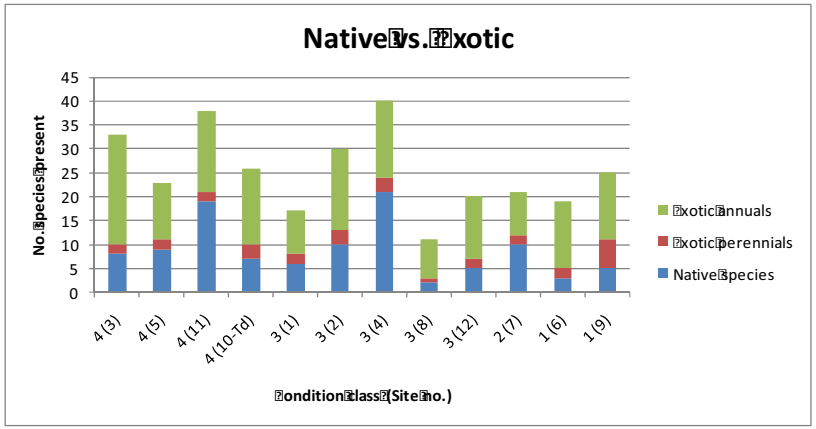


Figure 8: Number of native and exotic species identified at each monitoring site.

Only two sites maintained a native species richness > or = 50% (Sites 3 and 11), though given the recent wet weather and time year of survey (spring), this figure provides a disproportionate view of the condition of the vegetation in terms of species richness throughout the year as the site was heavily dominated by annual exotic vegetation (**Figure 9**).

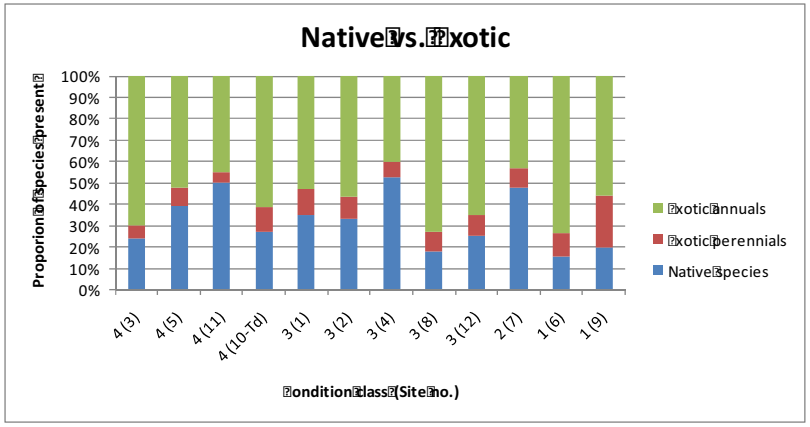


Figure 9: Proportion of native vs. exotic species within each monitoring site.

Vegetation density and structure

Figure 10 presents the projected foliage cover (PFC) of each strata level, including the exotic flora PFC of all strata. As would be expected, native overstorey cover is only present within the Class 4 and 2 vegetation condition classes (condition class 3 and 1 having no canopy) , with only one site recording native shrubs. Whilst one shrub species was recorded at Site 4, it would not be considered a shrub layer, as the species recorded, *Maireana enchylaenoides* (Wingless Bluebush) is a woody species that only grows to approximately 20cm in height.

The results show the density of vegetation across the BOA clearly dominated by exotic species cover during the monitoring period. As discussed above, this was due to a flush of annuals due to favourable wet and warm conditions experienced at the site in the month prior to survey.

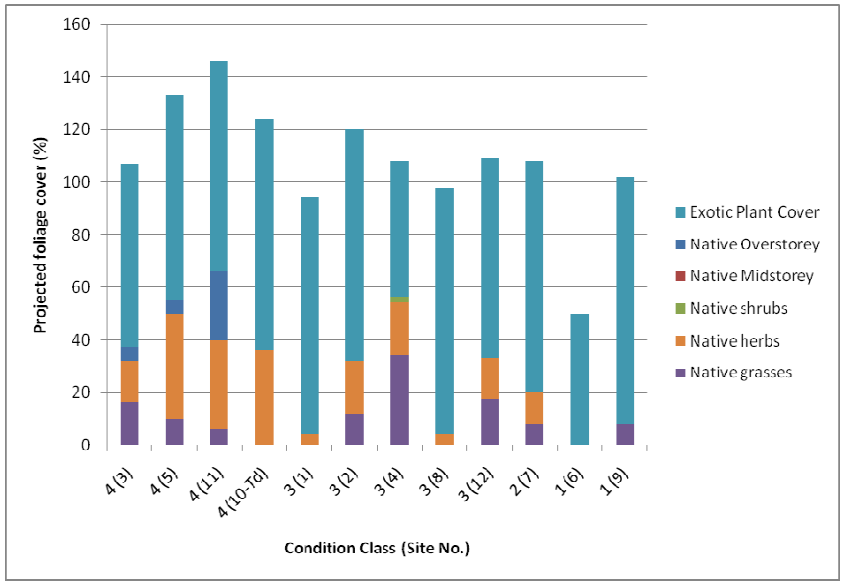


Figure 10: Projected foliage cover of each vegetation stratum at each monitoring site.

Completion criteria

Native overstorey cover

The completion criteria for overstorey cover has been met for one plot in condition class 4 (Plot number 11) (**Table 8**).

Site 5 (Yellow Box - Blakely's Red Gum grassy woodland) is close to achieving the completion criteria, with a projected foliage cover (PFC) of 5%, and a completion criteria of 6%.

Whilst Site 10 is in a Class 4 vegetation condition it recorded a 0% PFC (the completion criteria for this variable being 6-40%). Whilst there was overstorey vegetation present within the larger 0.1 ha monitoring plot, the strata level did not project into the centre of the plot where the transect is situated.

Table 8: Native overstorey cover in comparison with Completion Criteria.

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

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 tabulated in **Appendix B**, and provided as a component of the Vegetation Management Database.

Overstorey regeneration

The regeneration of overstorey species was recorded at four of the 12 monitoring sites. Two of these sites (Sites 5 and 7) recorded two overstorey species regenerating, *Eucalyptus albens* (White Box) and *E. melliodora* (Yellow Box). White Box regeneration was present at the other two regenerating sites (Sites 4 and 11).

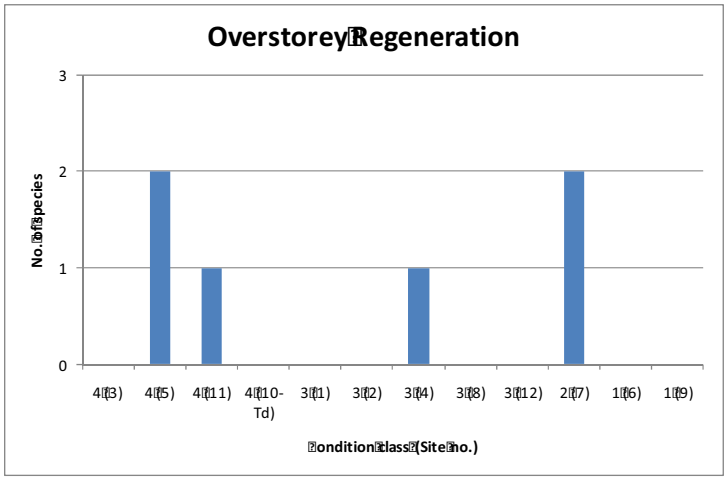


Figure 11: Number of overstorey tree species regenerating at each monitoring site.

Coarse woody debris (CWD)

Coarse woody debris (CWD) was present at three of the 12 monitoring sites, reflecting predominantly those sites with an overstorey (i.e. Class 2 and 4). By contrast, the nine sites with no CWD included two Class 4 sites (Sites 3 and 10), which have only recently been destocked from cattle grazing and were quite possibly subject to selective CWD removal.

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 two of the 12 sites did have benchmark levels (greater than 20m long) of CWD present (**Table 9**).

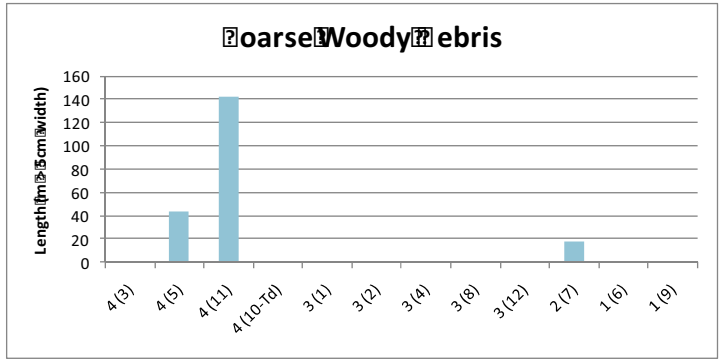


Figure 12: Coarse woody debris recorded within each monitoring plot (0.1ha)

Table 9: Coarse woody debris in comparison with Biometric Benchmarks.

Biometric Vegetation Type	Condition Class (Site No.)	Coarse Woody Debris (m)	Biometric Benchmark (m)	Meets Biometric Benchmark?
White Box grassy woodland	4 (3)	0	20	No
	4 (11)	142		Yes
	3 (1)	0		No
	3 (2)	0		No
	3 (4)	0		No
	3 (8)	0		No
	3 (12)	0		No
	2 (7)	18		No
Yellow Box – Blakely's Red Gum grassy woodland	4 (5)	43	20	Yes
White Cypress Pine – Silver-leaved Ironbark – Tumbledown Red Gum open shrubby forest	4 (10)	0	30	No
Cleared land (Mine Rehab Site)	1 (6)	0	20	No
Cleared land (formerly cultivated land)	1 (9)	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 at two of the 12 sites (Sites 5 and 7) (**Figure 13**). Whilst other sites maintained mature overstorey canopy (Sites 3, 10 and 11), adequate hollows for faunal habitation were not detected.

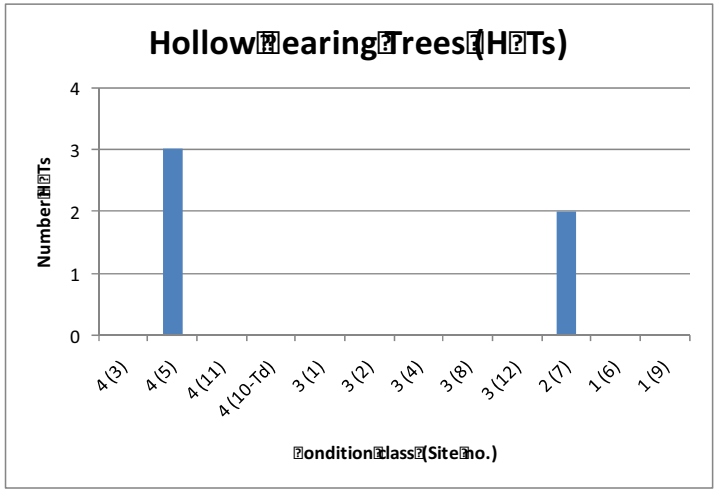


Figure 13: Number of hollow bearing trees (HBTs) within each monitoring plot (0.1ha).

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 did have benchmark numbers of HBTs present (**Table 10**).

Table 10: Hollow bearing trees in comparison with Biometric Benchmarks.

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

4.2 FAUNA

4.2.1 Bats (Chiroptera)

Megachiropteran (fruit bats)

There were no megachiropteran bats recorded onsite during the monitoring survey, or previously within the Werris Creek Coal mine area.

Microchiropteran (microbats)

Diversity and abundance

Eleven microbat species were identified through ultra-sonic call detection (i.e. Anabat recordings) across the 10 fauna monitoring sites during the Spring 2010 monitoring period (**Table 11**). This represents ~75% (11 of 15) of the total number of species recorded across the Werris Creek mine site since 2004 (ELA 2010b). No new bat species were recorded.

The four species absent from the BOA during the Spring 2010 survey period included Lesser Long-eared Bat *(Nyctophilus geoffroyi*), Little Broad-nosed Bat (*Scotorepens greyii),* Large Forest Bat (*Vespadelus darlingtoni*), and the threatened Greater Broad-nosed Bat (*Scoteanax rueppellii*).

Table 11: Bat species of the Werris Creek Coal Mine and activity within the BOA, Spring 2010.

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

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

The highest diversity and abundance of microbats was recorded at Site 9, a Class 1 site (**Figure 14** and **Figure** 15). This is most likely due to the presence of a dam adjacent to Site 9, where microbats would come to water throughout the evening. A large amount of feeding buzzes and social calls for the White-striped Free-tail Bat (*Austronomus australis*) were noted throughout the night at Site 12, ending around 5.30am. It is considered likely that this species is likely to have a roost in close proximity to Site 12.

Whilst activity was recorded at Site 7 (Class 2), calls from this site were noted as "muffled" and the pulses were very spread out, usually seen when bats move through open areas. It is likely that these calls came from bats foraging outside of Site 7 or moving across paddocks (Class 3 vegetation) adjacent to the site.

The absence of microbats from 2 of 3 Class 4 sites may be associated with low prey availability, Given that the majority of the activity and diversity was recorded at sites with no canopy (Classes 3 and 1), it is most likely that insect activity was higher in these areas. Microbats were also notably absent from Site 6 (the rehabilitation site), which is likely to be associated with the reconstructed nature of this site, leading to a low insect presence, or possibly the close proximity of the mining operations.

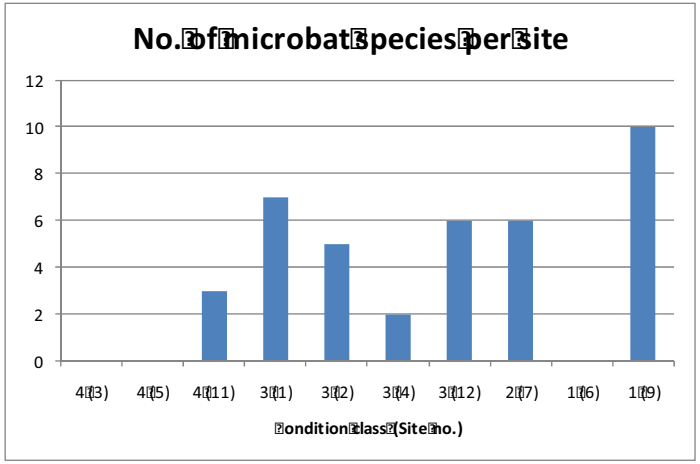
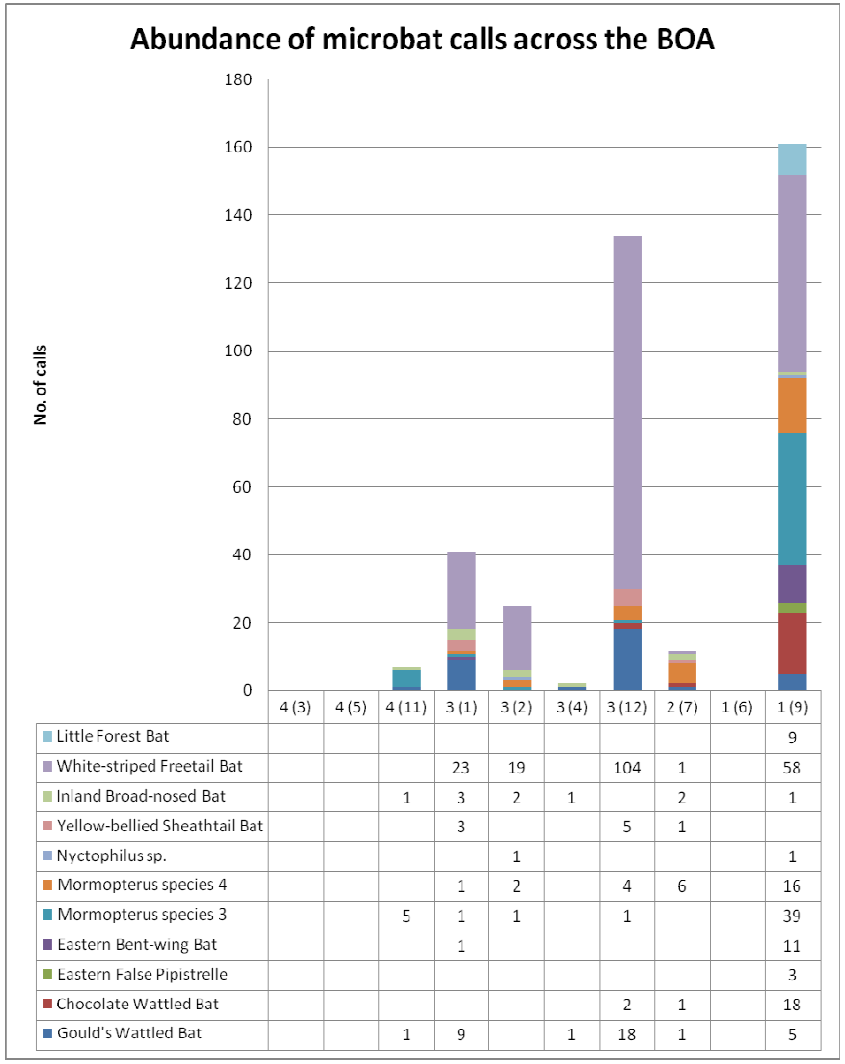


Figure 14: Number of microbat species recorded at each fauna monitoring site.



	4 (3)	4 (5)	4 (11)	3 (1)	3 (2)	3 (4)	3 (12)	2 (7)	1 (6)	1 (9)
Little Forest Bat										9
White-striped Freetail Bat				23	19		104	1		58
Inland Broad-nosed Bat			1	3	2	1		2		1
Yellow-bellied Sheathtail Bat				3			5	1		
Nyctophilus sp.					1					1
Mormopterus species 4				1	2		4	6		16
Mormopterus species 3			5	1	1		1			39
Eastern Bent-wing Bat				1						11
Eastern False Pipistrelle										3
Chocolate Wattled Bat							2	1		18
Gould's Wattled Bat			1	9		1	18	1		5

Figure 15: Microbat calls recorded during the Spring 2010 monitoring period across the BOA.

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 (**Table 12**). Many microbats will use more than one niche when foraging (e.g. sub-canopy, forest edges and below canopy). **Table 12** shows the range of habitat niches used by the species recorded on site when foraging.

Table 12: Preferred foraging niche or 'guild' of microbat species recorded during Spring 2010.

Species	Guilds				
	ABOVE CANOPY	CANOPY	BELOW CANOPY	FOREST EDGES	GRASSLANDS
Mormopterus species 3	Y				
Mormopterus species 4	Y				
Nyctophilus sp.		Y	Y		
Gould's Wattled Bat		Y	Y	Y	
Chocolate Wattled Bat		Y			
Eastern False Pipistrelle		Y			
Eastern Bent-wing Bat		Y			Y
Yellow-bellied Sheath-tail Bat	Y			Y	Y
Inland Broad-nosed Bat				Y	Y
White-striped Free-tail Bat	Y				
Little Forest Bat			Y		Y

Given the variety of habitat niches used by these species, it was considered useful to further delineate their guilds into 'above canopy' and 'below canopy' foragers, to broadly compare 'guild' or 'habitat niche' with condition class of the vegetation across the BOA (**Figure 16**).

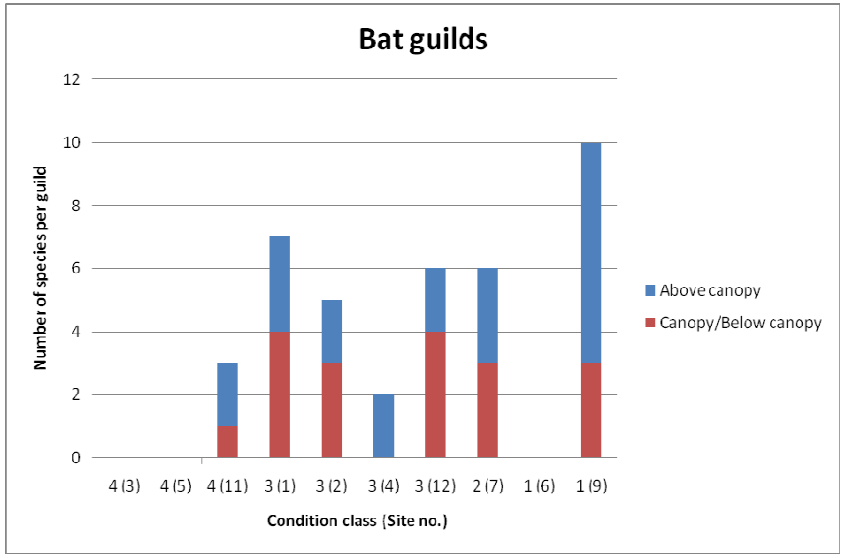


Figure 16: Species abundance across BOA, presented in terms of 'guilds'.

Where present, species of both 'above' and 'below' canopy guilds were recorded at all but one site, Site 4 (Class 3). The calls recorded at this site were noticeably lower than other sites (**Figure 15**) and these records may have been from individuals passing through this area, given that no 'below canopy' species were recorded at this site. Microbats of the 'above canopy' guild did not show a preference for vegetation with a canopy (Classes 2 and 4). Where they did occur at sites with a canopy, Site 11 (Class 4) was notably in close proximity to Class 3 vegetation with a high level of activity, and as noted earlier the activity at Site 7 (Class 2) has been associated with passing individuals rather than individuals utilising the site.

A full summary of the Anabat analysis is included in **Appendix C**.

4.2.2 Diurnal Birds

An inventory of bird species recorded within each monitoring site is presented in **Table 13**. A total of 34 bird species were recorded during the Spring 2010 monitoring program, which represents ~50% of the total number of species recorded at the Werris Creek mine site since 2004 (ELA 2010b) (**Appendix C**). Two new species were recorded, including Australian King-Parrot (*Alisterus scapularis*) and Channel-billed Cuckoo (*Scythrops novaehollandiae*). The latter species is a listed migratory species under the EPBC Act. One previously recorded threatened species, Little Eagle (*Hieraaetus morphnoides*), was recorded in the BOA.

Class 1 sites recorded both the highest and the lowest totals of bird species diversity. Site 9 recorded the highest diversity of bird species within the BOA, showing a higher diversity than that recorded within the Class 4 vegetation. Whilst this is a low condition site (Class 1), previously cleared and with low structural diversity, this result is likely to be a reflection of Site 9 being positioned directly adjacent to Dam 2, where species of all guilds would attend to utilise this watering point.

Sites 5 and 7 also showed a high number and diversity of species, with both sites being positioned at the centre of the BOA, between watering points within and external to the BOA, and both sites maintaining high structural diversity with canopy and coarse woody debris present, providing an array of habitat features.

Site 6, the rehabilitation site, displayed a paucity of bird species in terms of both numbers and diversity. This is likely associated with its reconstructed nature post mining. It is noted that the only bird species to be recorded within Site 6 was the Nankeen Kestrel (*Falco cenchroides*), which occurred as a flyover.

Table 13: Inventory of avifauna recorded during census periods of monitoring sites within the BOA.

FAMILY	SPECIES	COMMON NAME	GUILD	Condition Class Site no.; A = a.m.; B = p.m.																							
				4								3								2				1			
				3		3		5		11		1		2		4		12		7		6		9		6	
				A	B	B	A	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	B	B
Accipitridae	*Hieraaetus morphnoides+*	Little Eagle	Bird of Prey															X									
Anatidae	*Anas superciliosa*	Pacific Black Duck	Water bird											X						X							
	Egretta novaehollandiae	White-faced Heron	Water bird					X																			
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird	Generalist	X		X		X						X													
	Cracticus torquatus	Grey Butcherbird	Generalist									X								X		X		X			
	Gymnorhina tibicen	Australian Magpie	Generalist	X		X				X				X		X		X		X		X		X			
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo	Generalist	X		X		X				X															
	Eolophus roseicapillus	Galah	Generalist	X				X		X		X		X		X		X		X		X		X		X	

FAMILY	SPECIES	COMMON NAME	GUILD	Condition Class Site no.; A = a.m.; B = p.m.																			
				4						3								2		1			
				3A	3B	5A	5B	11A	11B	1A	1B	2A	2B	4A	4B	12A	12B	7A	7B	6A	6B	9A	9B
	Nymphicus hollandicus	Cockatiel	Generalist												X								
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	Generalist	X	X			X															
Columbidae	*Ocyphaps lophotes**	Crested Pigeon	Generalist																X				
Corvidae	*Corvus mellori*	Little Raven	Ground forager	X	X		X	X		X	X	X	X	X	X	X		X	X	X		X	
Cuculidae	*Scythrops novaehollandiae*+	Channel-billed Cuckoo	Generalist							X				X	X								
Dicruridae	*Grallina cyanoleuca*	Magpie-lark	Ground forager			X		X		X			X			X				X		X	X
	Rhipidura leucophrys	Willie Wagtail	Ground forager	X						X		X										X	
Falconidae	*Falco berigora*	Brown Falcon	Bird of Prey			X	X											X					X
	Falco cenchroides	Nankeen Kestrel	Bird of Prey							X				X						X		X	

FAMILY	SPECIES	COMMON NAME	GUILD	Condition Class Site no.; A = a.m.; B = p.m.																			
				4						3								2		1			
				3A	3B	5A	5B	11A	11B	1A	1B	2A	2B	4A	4B	12A	12B	7A	7B	6A	6B	9A	9B
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	Generalist									X											
Hirundinidae	*Hirundo ariel*	Fairy Martin	Canopy dweller																				X
	Petrochelidon nigricans	Tree Martin	Canopy dweller	X	X																	X	X
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater	Generalist	X																			
	Lichenostomus penicillatus	White-plumed Honeyeater	Generalist																X				
	Manorina melanocephala	Noisy Miner	Generalist	X	X	X	X	X				X	X			X	X	X	X	X			
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush	Ground forager							X													X
	Pachycephala rufiventris	Rufous Whistler	Canopy dweller									X	X										
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote	Canopy dweller	X	X	X	X	X		X	X	X	X	X	X	X		X	X			X	X

FAMILY	SPECIES	COMMON NAME	GUILD	Condition Class Site no.; A = a.m.; B = p.m.																	
				4						3								2		1			
				3A	3B	5A	5B	11A	11B	1A	1B	2A	2B	4A	4B	12A	12B	7A	7B	6A	6B	9A	9B
	Pardalotus striatus	Striated Pardalote	Canopy dweller	X		X	X	X			X	X	X	X		X	X	X	X	X		X	X
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe	Water bird										X										
Psittacidae	*Alisterus scapularis*	Australian King-Parrot	Generalist			X	X											X					
	Glossopsitta concinna	Musk Lorikeet	Generalist		X		X	X								X	X	X	X				
	Platycercus adscitus eximius	Eastern Rosella	Generalist	X	X	X	X	X		X	X	X	X	X	X			X	X			X	
	Psephotus haematonotus	Red-rumped Parrot	Generalist	X		X	X			X	X			X	X			X	X			X	
Sturnidae	*Sturnus vulgaris**	European Starling	Generalist	X	X	X	X	X		X		X	X		X	X	X	X	X	X		X	X
	*Turdus merula**	Common Myna	Generalist																			X	
Total				13		13		7		4		9		4		12		13		1		19	

Note: A = a.m.; B = p.m.; + = threatened species, NSW TSC Act 1995; * introduced species; ^ = migratory species, Commonwealth EPBC Act.

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**. All guilds were represented within the BOA, with no specific trends recognised due to condition class / availability habitat niche.

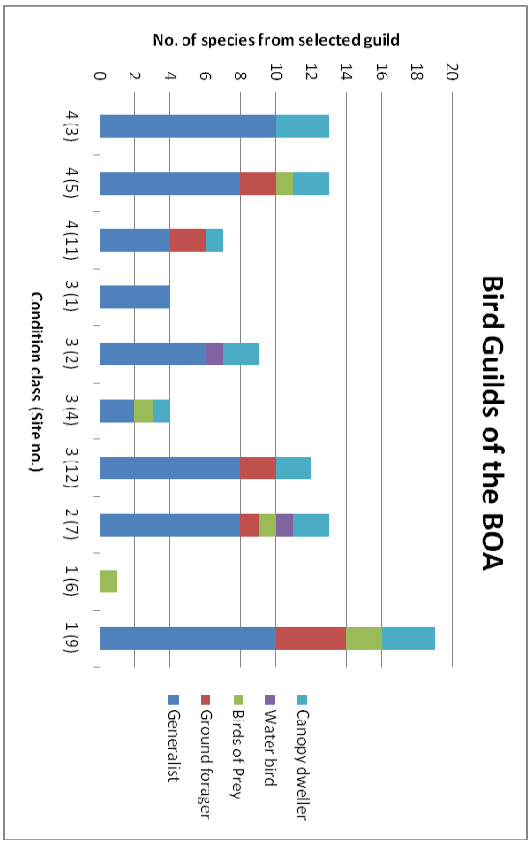


Figure 17: Abundance of species from selected bird guilds of the BOA.

Canopy dwellers

Canopy dwellers were found at all but two sites. Sites 1 and 6, reflecting the lack of canopy at these sites. The presence of canopy dwelling species in other Class 3 vegetation with no canopy (i.e. Sites 2, 4 and 12), is likely to be a reflection of flyovers from adjacent woodland.

Water birds

It was expected that the permanent dam structures in proximity to Sites 2 and 9 would attract water birds, though none were recorded at Site 9. Rather, water birds were recorded at Sites 2 and 7. Site 2 is in close proximity to Dam 1, though Site 7 is approximately 500m from Dam 2. Both records were of Pacific Black Duck, and again are likely to reflect flyovers from these water habitats.

Birds of prey

Birds of prey were recorded across all condition classes, though not at all sites. This guild was expected to be present in vegetation of all condition classes, reflecting either soaring in search of prey above Class 1 and 3 vegetation (i.e. with no canopy cover), or perching in the canopy of living or stag trees within Class 2 and 4 vegetation. It is noted that the only bird species to be recorded at Site 6 was the Nankeen Kestrel, which occurred as a flyover. This result is in stark contrast to Site 9, the other Class 1 site within the BOA.

Ground foragers

Ground foraging species were also found across all condition classes, though not at all sites. It is notable that this guild was present at each site with course woody debris (CWD) present (Sites 2, 5 and 7), and noticeably absent from the majority of sites without it (Sites 1, 2, 3, 4, and 6) (**Figure 12**). This is possibly a reflection of the higher prevalence of food resources (invertebrates and reptiles) using the CWD resource for foraging / refuge. The highest diversity in ground foraging species however was at Site 12. Whilst this site did not maintain any CWD, this could be due to this sites location between a large erosion gully and woodland, with the site providing a cross over point between habitats and opportunistic foraging potential.

Generalists

As would be expected, generalists were represented across all condition classes and at all but one of the monitoring sites (Site 6). They also displayed the most diversity in terms of number of species recorded. The absence of generalists from Site 6, the rehabilitation site, is likely to be associated with its reconstructed nature post mining.

4.2.3 Nocturnal birds and mammals

Spotlighting and Nocturnal Call playback

Spotlighting survey consistently recorded only two species across the BOA, these were *Macropus giganteus* (Eastern Grey Kangaroo) and *Macropus robustus* (Wallaroo).

Call playback was undertaken for the nocturnal birds, Barking Owl, Sooty Owl, Masked Owl, Powerful Owl, Southern Boobook, Tawny Frogmouth and Owlet Night Jar, along with the Koala. No species were detected during call playback.

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

Small mammal trapping and hair tubes

Fauna transects resulted in only two captures across the BOA during the monitoring period. On both occasions the species captured was, *Mus musculus* (House Mouse). Both captures occurred in the lower quality condition vegetation, with one capture occurring in the Class 1 vegetation of the rehabilitation area at Site 6, and the other in the Class 2 White Box grassy woodland vegetation, at Site 7 (**Table 14**).

Positive identification of three mammals were made through hairtube sampling, including House Mouse, *Rattus rattus* (Black Rat) and *Felis catus* (Feral Cat). A further hair sample at Site 7 was an unconfirmed Rattus sp., which is most likely the Black Rat, given a positive identification was made at the same site.

Table 14: Results of mammal trapping and hairtube sampling.

Biometric Vegetation Type	Condition Class (Site No.)	Species	Common name	Identification method
White Box grassy woodland	3 (2)	*Mus musculus**	House Mouse	Hairtube
	2 (7)	*Rattus rattus**	Black Rat	Hair tube, Elliot trap
		Rattus sp*	*Rattus* sp.	
		*Felis catus**	Feral Cat	
Cleared land (Mine Rehab Site)	1 (6)	*Mus musculus**	House Mouse	Hairtube, Elliot trap

Nest Box inspections

Nest boxes were not installed at any of the sites during the Spring 2010 survey.

Opportunistic sightings

Two opportunistic fauna records were made during the survey period. Echidna (*Tachyglossus aculeatus*) diggings were noted beneath a log in Class 4 vegetation at site 5, and a European Fox (*Vulpes vulpes*) den was identified within a stag tree in Class 3 vegetation in close proximity to Site 2.

4.2.4 Scats, Tracks, and diggings

See '*Opportunistic sightings*' in **Section 4.2.3**.

4.2.5 Herpetological Searches (including dam inspections)

Seven reptile and 4 amphibian species were recorded during the spring 2010 monitoring period. This compares to a total of 26 reptile and 9 amphibian species recorded at the Werris Creek mine site since 2004 (ELA 2010b) (**Appendix C**). **Table 15** outlines the results of the herpetological searches across the BOA.

Table 15: Results of herpetological survey undertaken across the BOA during the monitoring survey.

Class	Family	Scientific Name	Common Name	Condition class (Site no.)										Dam 1	Dam 2	Dam 3
				4 (3)	4 (5)	4 (11)	3 (1)	3 (2)	3 (4)	3 (12)	2 (7)	1 (6)	1 (9)			
Amphibia	Hylidae	*Litoria peronii*	Peron's Tree Frog											X	X	X
	Myobatrachidae	*Crinia signifera*	Common Eastern Froglet											X		
		Neobatrachus sudelli	Painted Burrowing Frog												X	X
		Uperoleia laevigata	Smooth Toadlet											X		X
Total				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**2**	**3**
Reptilia	Cheluidae	*Chelodina longicollis*	Eastern Snake-necked Turtle					1						X		X
	Elapidae	*Pseudonaja textilis*	Eastern Brown Snake	1												
	Scincidae	*Cryptoblepharus pulcher*	Elegant Snake-eyed Skink			~10							5			
		Egernia striolata	Tree skink			3					1					
		Lampropholis guichenoti	Pale-flecked Garden Sunskink	1	4	~10							5			
		Menetia greyii	Dwarf Skink			1										
Total				**2**	**4**	**>24**	**0**	**1**	**0**	**0**	**1**	**0**	**5**	**1**	**0**	**1**

5 Recommendations and Conclusion

This report has provided a baseline for future monitoring and the methodologies here entailed should be followed (in conjunction with the BOSMP) in subsequent years in order to detect changes to species diversity and abundance, highlight improvements in site condition and provide a perspective of management success through an increased trajectory towards increased biodiversity and the biometric benchmarks.

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

- Treatment of annual weeds with the use of a combination of spraying, slashing and burning. Neither action is suggested above the other, as each management action may be better suited to specific sites within the BOA;
- Placement of coarse woody debris into areas that currently do maintain this resource to encourage fauna species diversity;
- Introduction of next boxes into appropriate habitat should be considered to encourage microbats and native avifauna;
- The fumigation of the stag tree that is currently acting as a fox den, located in close proximity to Site 2.

This monitoring report makes the following recommended changes to the BOSMP:

- The number of monitoring replicates for Vegetation classes <5 ha be increased to <10 ha.
- Given the results of the Landscape Function Analysis, it is not considered necessary that monitoring of LFA is undertaken across the entire BOA. Future monitoring should be reduced to include analogue and rehabilitation sites only. It is recommended that LFA for the entire BOA is undertaken again after 5 years, to provide a perspective on any changes that may have taken place during this time.

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Appendix A: Photo Monitoring Points

White Box grassy woodland – Class 4 (intact woodland)

Site 3

Plate 5 Photo monitoring point, Site 3, looking east

Plate 6: Photo monitoring point, Site 3, looking west.

Site 11

Plate 7: Photo monitoring point, Site 11, looking west.

Plate 8: Photo monitoring point, Site 11, looking east.

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

Site 1

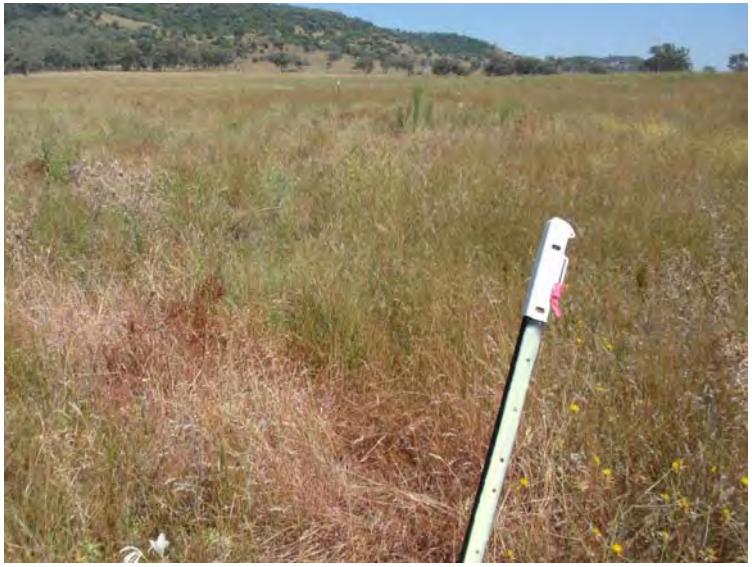

Plate 9: Photo monitoring point. Site 1, looking upslope to the north-west.

Plate 10: Photo monitoring point. Site 1, looking downslope to the south-east.

Site 2

Plate 11: Photo monitoring point. Site 2, looking downslope to the south-west.

Plate 12: Photo monitoring point, Site 2, looking north-east.

Site 4

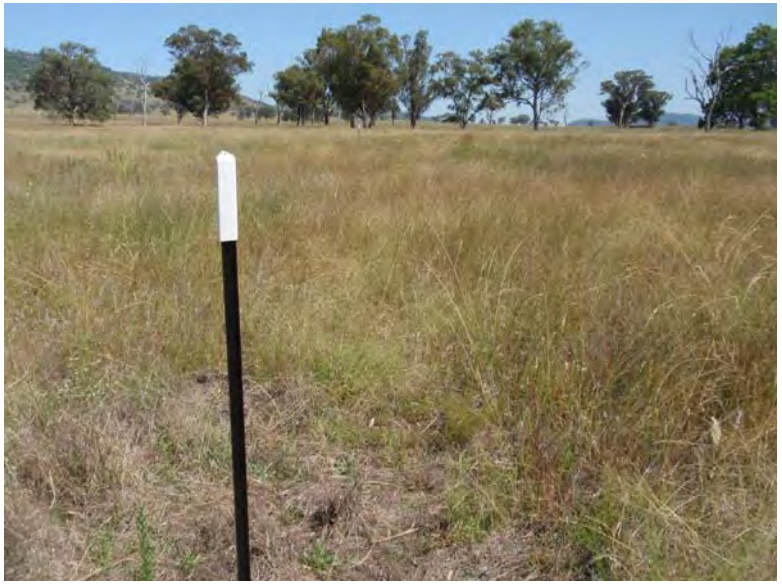

Plate 13: Photo monitoring point, Site 4, looking north.

Plate 14: Photo monitoring point, Site 4, looking south.

Site 8

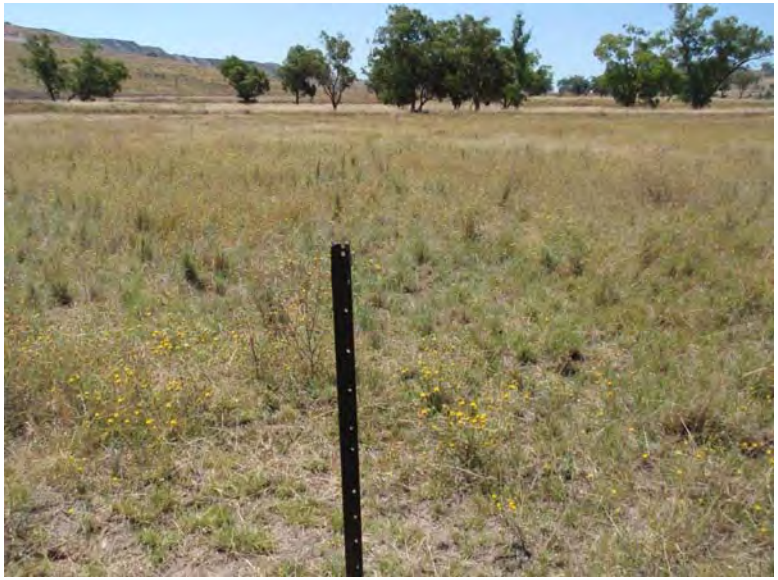

Plate 15: Photo monitoring point, Site 8, looking north-east.

Plate 16: Photo monitoring point, Site 8, looking south-east.

Site 12

Plate 17: Photo monitoring point, Site 12, looking east.

Plate 18: Photo monitoring point, Site 12, looking west.

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

Site 5

Plate 19: Photo monitoring point, Site 5, looking south-east.

Plate 20: Photo monitoring point, Site 3, looking north-west.

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

Site 10

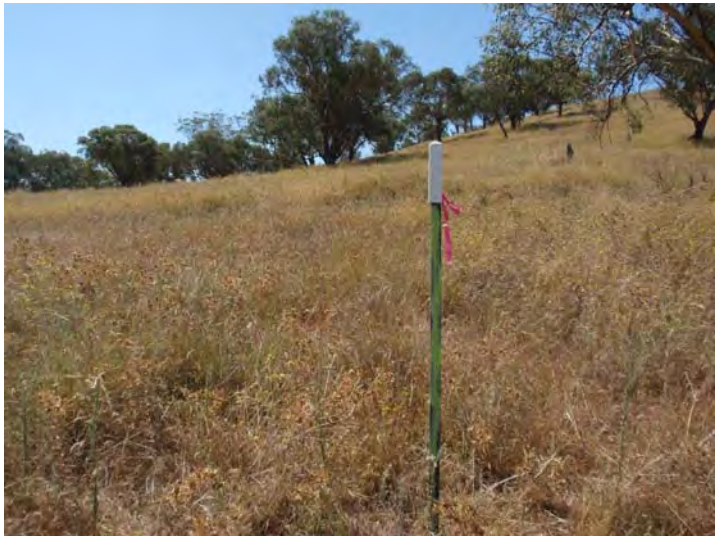

Plate 21 Photo monitoring point, Site 10, looking north.

Plate 22: Photo monitoring point, Site 10, looking south.

Appendix B: Biometric Condition Assessment and Flora Inventory

Summary of Biometric Assessment Methodology variables

Condition Class (Plot No)	Native species richness	Native overstorey PFC	Native midstorey PFC	Native Groundcover (shrubs)	Native Groundcover (grasses)	Native Groundcover (other)	Exotic plant cover	Exotic species (cover)	No. of Hollow bearing trees (HBTs)	Overstorey regen (No of species).	Coarse woody debris (m)
4 (3)	8 (23)	5	0	0	16	16	70	25	0	0	0
4 (5)	9 (23)	5	0	0	10	40	78	14	3	2	43
4 (11)	19 (23)	26	0	0	6	34	80	19	0	1	142
4 (10-Td)	7	0	0	0	0	36	88	19	0	0	0
3 (1)	6	0	0	0	0	4	90	11	0	0	0
3 (2)	10	0	0	0	12	20	88	20	0	0	0
3 (4)	21	0	0	2	34	20	52	19	0	1	0
3 (8)	2	0	0	0	0	4	94	9	0	0	0
3 (12)	5	0	0	0	17	16	76	15	0	0	0
2 (7)	10	0	0	0	8	12	88	11	2	2	18
1 (6)	3	0	0	0	0	0	50	16	0	0	0
1 (9)	5	0	0	0	8	0	94	20	0	0	0

Biodiversity Offset Area plot data

Scientific Name	Common name	Growth Form	Native/ Exotic	Important species	Annual/ Perennial	Family	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10 Td)		4 (11)		3 (12)	
Aira sp.		Grass	Exotic		Annual	Poaceae	0	0	1	10	0	0	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ajuga australis	Austral Bugle	Herb	Native	Important	Perennial	Lamiaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	0	0
Ammi majus	Bishops-weed	Herb	Exotic		Annual	Apiaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	20	0	0	0	0	0	0
Anagallis arvensis	Blue Pimpernel	Herb	Exotic		A or P	Myrsinaceae	0	0	1	500	1	200	1	100	1	20	1	1000	0	0	5	500	1	100	0	0	0	0	0	0
Aristida sp.		Grass	Native		Perennial	Poaceae	0	0	0	0	0	0	0	0	1	100	0	0	20	200	0	0	0	0	0	0	0	0	0	0
Arthropodium sp.		Herb	Native		Perennial	Anthericaceae	0	0	1	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asperula conferta	Common Woodruff	Herb	Native	Important	Perennial	Rubiaceae	0	0	0	0	0	0	0	0	1	1000	0	0	0	0	0	0	0	0	0	0	1	500	0	0
Austrodanthonia spp.		Grass	Native		Perennial	Poaceae	0	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa aristiglumis	Plains Grass	Grass	Native		Perennial	Poaceae	0	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	30	1000	0	0	0	0	25	1000
Austrostipa bigeniculata		Grass	Native		Perennial	Poaceae	0	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	100	0	0
Austrostipa scabra	Speargrass	Grass	Native		Perennial	Poaceae	0	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	100	0	0
Austrostipa sp.		Grass	Native		Perennial	Poaceae	0	0	0	0	1	100	1	50	1	100	0	0	20	500	0	0	0	0	0	0	0	0	0	0
Avena sativa	Oats	Grass	Exotic		Annual	Poaceae	1	100	1	1000	0	0	1	50	0	0	1	1000	20	500	0	0	1	20	0	0	0	0	1	100
Avena sp.		Grass	Exotic		Annual	Poaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	500	0	0	0	0	0	0	0	0
Boerhavia dominii		Herb	Native		Perennial	Nyctagynaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	50	0	0
Bothriochloa macra	Redgrass, Redleg Grass	Grass	Native		Perennial	Poaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	0	0

Scientific Name	Common name	Growth Form	Native/ Exotic	Important species	Annual/ Perennial	Family	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10 Td)		4 (11)		3 (12)	
Briza minor	Shivery Grass	Grass	Exotic		Annual	Poaceae	1	100	1	500	0	0	1	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus hordeaceus	Soft Brome	Grass	Exotic		Annual	Poaceae	0	0	10	100	1	500	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromus molliformis	Silky Brome, Soft Brome	Grass	Exotic		Annual	Poaceae	0	0	10	1000	1	500	25	1000	5	100	0	0	5	100	0	0	1	500	10	500	1	100	25	1000
Bromus. diandrus	Great Brome	Grass	Exotic		Annual	Poaceae	0	0	10	100	0	0	0	0	5	100	1	10	0	0	0	0	1	20	0	0	0	0	0	0
Bulbine bulbosa	Bulbine Lily, Native Onion, Native Leek, Golden Lily	Herb	Native	Important	Perennial	Asphodelaceae	0	0	0	0	0	0	0	0	1	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calotis lappulacea	Yellow Burr-daisy, Yellow Daisy-burr	Herb	Native	Important	Perennial	Asteraceae	0	0	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capsella bursa-pastoris	Shepherd's Purse	Herb	Exotic		Annual	Brassicaceae	0	0	1	10	1	10	0	0	0	0	0	0	0	0	0	0	0	0	1	50	1	1	0	0
Carduus tenuiflorus	Winged Slender Thistle	Herb	Exotic		Annual	Asteraceae	1	50	1	5	0	0	1	10	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Carex inversa		Herb	Native		Perennial	Cyperaceae	0	0	0	0	0	0	1	20	0	0	0	0	0	0	0	0	0	0	0	0	1	50	0	0
Carthamus lanatus	Saffron Thistle	Herb	Exotic		Annual	Asteraceae	0	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	0	0
Centaurea solstitialis	Maltese Cockspur, Cockspur Thistle, Saucy Jack	Herb	Exotic		Annual	Asteraceae	0	0	0	0	0	0	0	0	1	50	1	100	1	20	1	100	0	0	1	10	0	0	1	100
Cerastium glomeratum	Mouse-ear Chickweed	Herb	Exotic		Annual	Caryophyllaceae	0	0	2	1000	0	0	1	100	0	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0
Cheilanthes austrotenuifolia	Rock Fern	Herb	Native		Perennial	Adiantaceae	0	0	0	0	0	0	1	50	0	0	0	0	1	50	0	0	0	0	0	0	0	0	0	0

Scientific Name	Common name	Growth Form	Native/ Exotic	Important species	Annual/ Perennial	Family	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10 Td)		4 (11)		3 (12)	
Cheilanthes sieberi	Narrow Rock Fern	Fern	Native		Perennial	Adiantaceae	0	0	1	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	20	0	0	0	0
Chloris truncata	Windmill Grass	Grass	Native		Perennial	Poaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	500	0	0	0	0	0	0	0	0
Chloris ventricosa	Tall Chloris	Grass	Native		Perennial	Poaceae	0	0	0	0	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chondrilla juncea	Skeleton-weed	Herb	Exotic		Perennial	Asteraceae	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum apiculatum	Yellow Buttons, Common Everlasting	Herb	Native	Important	Perennial	Asteraceae	0	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysocephalum semipapposum	Clustered Everlasting	Herb	Native		Perennial	Poaceae	0	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirsium vulgare	Spear Thistle	Herb	Exotic		Annual	Asteraceae	0	0	1	5	0	0	0	0	0	0	0	0	0	0	0	0	1	50	5	100	0	0	1	50
Conyza sp.	Fleabane	Herb	Exotic		Annual	Asteraceae	0	0	0	0	0	0	0	0	0	0	1	100	0	0	0	0	0	0	0	0	1	1	0	0
Cyclospermum leptophyllum	Slender Celery	Herb	Exotic		Annual	Apiaceae	0	0	0	0	0	0	0	0	0	0	1	1000	0	0	0	0	0	0	0	0	0	0	0	0
Cynodon dactylon	Couch, Bermudagrass	Grass	Native		Perennial	Poaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	0	0	0	0	0	0
Cyperus gracilis	Slender Flat-sedge	Sedge	Native		Perennial	Cyperaceae	0	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus sp.		Sedge	Native		Perennial	Cyperaceae	0	0	0	0	0	0	0	0	0	0	0	0	1	50	0	0	0	0	0	0	0	0	0	0
Daucus glochidiatus	Native Carrot	Herb	Native	Important	Annual	Apiaceae	5	100	1	1000	2	1000	0	0	1	50	0	0	1	100	0	0	0	0	1	500	1	20	1	500
Dichondra repens	Kidney Grass, Kidney Weed	Herb	Native		Perennial	Convolvulaceae	0	0	1	1000	1	1000	0	0	1	20	1	5	1	50	0	0	0	0	0	0	1	500	0	0

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Dichopogon fimbriatus	Nodding Chocolate Lily	Herb	Native	Important	Perennial	Anthericaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
Echium plantagineum	Paterson's Curse, Salvation Jane	Herb	Exotic		Annual	Boraginaceae	0	0	0	0	1	1	8	100	0	0	0	0	0	0	0	0	0	0	1	20	1	1	0	0
Enneapogon nigricans	Niggerheads	Grass	Native		Perennial	Poaceae	0	0	2	1000	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erodium cicutarium	Common Storksbill	Herb	Exotic		Annual	Geraniaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Eucalyptus (Revegetation)		Tree	Native		Perennial	Myrtaceae	0	0	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus albens	White Box	Tree	Native		Perennial	Myrtaceae	0	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Eucalyptus dealbata	Tumbledown Red Gum	Tree	Native		Perennial	Myrtaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0
Eucalyptus melliodora		Tree	Native		Perennial	Myrtaceae	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euchiton sphaericus		Herb	Native		Annual	Asteraceae	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	50	1	100
Fumaria sp.		Herb	Exotic		Annual	Fumariaceae	0	0	0	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0	0	0	0	0	0	0
Galium divaricatum	Slender Bedstraw	Herb	Native		Annual	Rubiaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	50	0	0	0	0	0	0
Geranium solanderi	Native Geranium	Herb	Native		Perennial	Geraniaceae	0	0	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	500	1	5	0	0
Goodenia sp.		Herb	Native		Perennial	Goodeniaceae	0	0	0	0	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hirschfeldia incana	Hairy Brassica	Herb	Exotic		Annual	Brassicaceae	1	500	1	10	1	1	0	0	1	500	1	10	20	500	1	10	1	50	1	20	1	10	20	500
Hordeum leporinum	Barley-grass	Grass	Exotic		Annual	Poaceae	0	0	0	0	0	0	1	10	0	0	0	0	0	0	0	0	0	0	1	100	0	0	0	0

Scientific Name	Common name	Growth Form	Native/ Exotic	Important species	Annual/ Perennial	Family	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10 Td)		4 (11)		3 (12)	
Hypericum gramineum	Small St John's Wort	Herb	Native	Important	Perennial	Clusiaceae	1	50	2	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypericum perforatum	St John's Wort	Shrub	Exotic		Annual	Clusiaceae	0	0	0	0	0	0	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypochaeris glabra	Annual	Herb	Exotic		Perennial	Asteraceae	0	0	0	0	1	1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypochaeris radicata	Flatweed, Cat's-ear	Herb	Exotic		Perennial	Asteraceae	1	50	2	1000	0	0	5	1000	0	0	0	0	0	0	1	500	1	50	1	50	1	1000	0	0
Juncus sp.		Sedge	Native		Perennial	Juncaceae	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	1	2	0	0	0	0	0	0
Juncus subsecundus		Sedge	Native		Perennial	Juncaceae	0	0	0	0	0	0	1	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lactuca serriola	Prickly Lettuce	Herb	Exotic		Biennial	Asteraceae	0	0	0	0	0	0	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lolium perenne	Perennial Ryegrass	Grass	Exotic		Perennial	Poaceae	50	1000	2	1000	1	500	5	500	5	100	0	0	20	500	0	0	5	1000	10	1000	2	1000	5	100
Lolium rigidum	Wimmera Ryegrass	Grass	Exotic		Annual	Poaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1000	0	0	0	0	0	0
Maireana enchylaenoides	Wingless Bluebush	Shrub	Native		Perennial	Chenopodiaceae	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iridaceae	Unknown Lily	Herb	Exotic		Annual	Iridaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Medicago polymorpha	Burr Medic	Herb	Exotic		Annual	Fabaceae - Faboideae	0	0	0	0	0	0	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicago sativa	Lucerne	Herb	Exotic		Perennial	Fabaceae - Faboideae	0	0	0	0	0	0	0	0	1	50	0	0	0	0	0	0	2	1000	0	0	0	0	0	0
Medicago sp.	Medic	Herb	Exotic		A or P	Fabaceae - Faboideae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	50	1	20	0	0	1	50
Medicago sp. (2)	Medic	Herb	Exotic		A or P	Fabaceae - Faboideae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	20

Scientific Name	Common name	Growth Form	Native/ Exotic	Important species	Annual/ Perennial	Family	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10 Td)		4 (11)		3 (12)	
Mentha satureioides	Creeping Mint	Herb	Native		Perennial	Lamiaceae	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	0	0	0	0
Microlaena stipoides	Weeping Grass	Grass	Native		Perennial	Poaceae	0	0	0	0	20	1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1000	0	0
Oxalis perennans		Herb	Native		Perennial	Oxalidaceae	0	0	1	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Oxalis sp.		Herb	Exotic		Perennial	Oxalidaceae	0	0	0	0	0	0	0	0	0	0	0	0	1	500	0	0	0	0	1	20	0	0	0	0
Paspalum dilatatum		Grass	Exotic		Perennial	Poaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	500	0	0	0	0	0	0
Petrorhagia nanteuilii	Proliferous Pink	Herb	Exotic		Annual	Caryophyllaceae	1	100	0	0	4	1000	1	100	1	50	0	0	1	50	1	50	0	0	1	20	1	50	1	50
Phalaris aquatica	Phalaris	Grass	Exotic		Perennial	Poaceae	0	0	0	0	0	0	0	0	0	0	1	50	0	0	0	0	1	1	0	0	0	0	0	0
Piptatherum miliacea	Rice Millet	Grass	Exotic		Perennial	Poaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1000	0	0	0	0	0	0
Plantago coronopus	Bucks Horn Plantain	Herb	Exotic		A or P	Plantaginaceae	0	0	0	0	0	0	1	10	1	20	0	0	0	0	1	50	0	0	0	0	0	0	0	0
Plantago lanceolata	Lambs Tongue	Herb	Exotic		Annual	Plantaginaceae	0	0	0	0	4	1	1	10	0	0	0	0	0	0	0	0	1	1000	0	0	0	0	0	0
Pratia concolor	Poison Pratia	Herb	Native		Perennial	Lobeliaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	50	0	0
Ranuculus sp.	Buttercup	Herb	Native		Perennial	Ranunculaceae	0	0	0	0	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rostraria cristata	Annual Cats Tail	Grass	Exotic		Annual	Poaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	0	0
Rumex brownii	Swamp Dock, Slender Dock	Herb	Native		Perennial	Polygonaceae	1	20	0	0	1	5	1	5	0	0	1	50	1	10	0	0	1	100	1	10	1	50	0	0
Rumex sp.	Dock	Herb	Native		A or P	Polygonaceae	0	0	0	0	0	0	1	5	0	0	0	0	1	10	0	0	0	0	0	0	0	0	1	50
Salvia verbenaca	Wild Sage, Vervain	Herb	Exotic		Perennial	Lamiaceae	0	0	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100

Scientific Name	Common name	Growth Form	Native/ Exotic	Important species	Annual/ Perennial	Family	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10 Td)		4 (11)		3 (12)	
Sclerolaena birchii	Galvanised Burr	Herb	Native		Perennial	Chenopodiacae	0	0	0	0	0	0	0	0	0	0	0	0	1	20	0	0	0	0	0	0	0	0	0	0
Sida corrugata	Corrugated Sida	Herb	Native	Important	Perennial	Malvaceae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	20	0	0
Silybum marianum	Variegated Thistle	Herb	Exotic		Biennial	Asteraceae	0	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0	0	0	1	20	2	500	1	20
Sonchus oleraceus	Common Sowthistle	Herb	Exotic		Annual	Asteraceae	0	0	0	0	1	1	1	20	1	100	1	100	0	0	0	0	0	0	0	0	1	100	1	20
Sonchus sp.	Sow thistle	Herb	Exotic		Annual	Asteraceae	1	50	0	0	0	0	0	0	0	0	0	0	1	20	0	0	0	0	0	0	0	0	0	0
Sporobolus creber	Western Rat-tail Grass	Grass	Native		Perennial	Poaceae	10	1000	0	0	1	100	25	100	0	0	0	0	0	0	0	0	0	0	1	20	0	0	0	0
Stachys arvensis	Stagger Weed	Herb	Exotic		Annual	Lamiaceae	0	0	0	0	0	0	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taraxacum officinale	Dandelion	Herb	Exotic		Annual	Asteraceae	1	50	1	100	1	10	1	100	1	50	1	10	1	20	0	0	1	50	0	0	1	50	0	0
Tragopogon dubius	Goats Beard	Herb	Exotic		Biennial	Asteraceae	0	0	0	0	0	0	0	0	0	0	1	100	0	0	0	0	1	500	0	0	1	2	1	100
Tragopogon porrifolius	Oyster Plant	Herb	Exotic		Biennial	Asteraceae	0	0	0	0	0	0	0	0	1	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tribulus terrestris	Calstrop	Herb	Exotic		Annual	Zygophyllaceae	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium angustifolium	Narrow-leaved Clover	Herb	Exotic		Annual	Fabaceae - Faboideae	0	0	1	1000	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trifolium arvense	Hare's-foot Clover	Herb	Exotic		Annual	Fabaceae - Faboideae	0	0	0	0	5	1000	1	50	0	0	1	1000	0	0	2	1000	0	0	5	1000	1	1000	1	50
Trifolium campestre	Hop Clover	Herb	Exotic		Annual	Fabaceae - Faboideae	1	100	1	1000	5	1000	10	1000	1	500	10	1000	0	0	1	500	0	0	5	1000	1	1000	5	500
Trifolium repens	White Clover	Herb	Exotic		Perennial	Fabaceae - Faboideae	0	0	0	0	0	0	0	0	0	0	5	1000	0	0	0	0	2	1000	0	0	0	0	0	0

Scientific Name	Common name	Growth Form	Native/ Exotic	Important species	Annual/ Perennial	Family	3 (1)		3 (2)		3 (4)		4 (3)		4 (5)		1 (6)		2 (7)		3 (8)		1 (9)		4 (10 Td)		4 (11)		3 (12)	
Trifolium sp.	Clover	Herb	Exotic		Annual	Fabaceae - Faboideae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	50	0	0	0	0
Urtica urens	Small Nettle	Herb	Exotic		Annual	Urticaceae	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica sp.	Speedwell	Herb	Exotic		Annual	Scrophulariaceae	0	0	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vicia sativa	Common Vetch	Herb	Exotic		Annual	Fabaceae - Faboideae	0	0	0	0	0	0	1	10	1	1000	0	0	1	20	0	0	1	100	0	0	0	0	0	0
Vicia villosa	Russian Vetch	Herb	Exotic		A or B	Fabaceae - Faboideae	0	0	0	0	0	0	0	0	0	0	10	1000	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia muelleri		Herb	Native		Perennial	Asteraceae	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0	0
Vulpia sp.	Silvergrass	Grass	Exotic		Annual	Poaceae	0	0	1	1000	4	50	1	1000	0	0	0	0	0	0	0	0	0	0	25	1000	1	100	0	0
Wahlenbergia communis	Tufted Bluebell	Herb	Native		Perennial	Campanulaceae	1	50	0	0	1	1	1	100	1	20	0	0	0	0	1	50	0	0	0	0	1	100	0	0

Appendix C: Fauna inventories

Fauna of the Werris Creek coal mine

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
Amphibia	Hylidae	*Litoria caerulea*	Green Tree Frog	x				x										
		Litoria peronii	Peron's Tree Frog	x					x					x				x
		Litoria rubella	Desert Tree Frog	x										x				
	Myobatrachidae	*Crinia signifera*	Common Eastern Froglet													x		x
		Limnodynastes dumerilii	Eastern Banjo Frog	x														
		Limnodynastes salmini	Salmon-striped Frog	x														
		Limnodynastes tasmaniensis	Spotted Marsh Frog	x														
		Neobatrachus sudelli	Painted Burrowing Frog	x														x
		Uperoleia laevigata	Smooth Toadlet	x										x				x
Aves	Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill														x	
	Accipitridae	*Elanus axillaris*	Black-shouldered Kite							x		x				x	x	
		Hieraaetus morphnoides	**Little Eagle**									**x**				**x**		**x**
	Anatidae	*Anas gracilis*	Grey Teal													x		
		Anas superciliosa	Pacific Black Duck			x	x			x						x	x	x
		Chenonetta jubata	Australian Wood Duck		x	x	x			x		x				x	x	
		Dendrocygna eytoni	Plumed Whistling-Duck													x		
	Ardeidae	*Egretta novaehollandiae*	White-faced Heron			x	x			x		x				x	x	x
	Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		x	x	x			x	x	x				x		
		Cracticus nigrogularis	Pied Butcherbird		x	x	x				x	x				x	x	x
		Cracticus torquatus	Grey Butcherbird							x	x					x		x
		Gymnorhina tibicen	Australian Magpie		x	x	x			x	x	x				x	x	x
		Strepera graculina	Pied Currawong				x									x		
	Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo			x	x			x	x	x				x		x
		Eolophus roseicapillus	Galah		x	x	x			x	x	x				x	x	x
		Nymphicus hollandicus	Cockatiel								x					x		x
	Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		x	x	x			x						x		x
		Coracina papuensis	White-bellied Cuckoo-shrike													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
Aves	Charadriidae	*Vanellus miles*	Masked Lapwing			x	x			x								
	Climacteridae	***Climacteris picumnus***	**Brown Treecreeper**													**x**		
	Columbidae	*Columba livia*	Rock Dove *									x				x		
		Geopelia striata	Peaceful Dove *			x	x											
		Ocyphaps lophotes	Crested Pigeon *								x	x				x		x
	Coraciidae	*Eurystomus orientalis*	Dollarbird			x	x											
	Corvidae	*Corvus bennetti*	Little Crow			x	x			x								
		Corvus coronoides	Australian Raven		x	x	x					x				x	x	
		Corvus mellori	Little Raven															x
	Cuculidae	*Scythrops novaehollandiae*	Channel-billed Cuckoo															x
	Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird													x		
	Dicruridae	*Grallina cyanoleuca*	Magpie-lark									x				x	x	x
	Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		x	x	x					x				x	x	x
	Falconidae	*Falco berigoga*	Brown Falcon									x					x	x
		Falco cenchroides	Nankeen Kestrel		x	x	x			x		x				x	x	x
		Falco peregrinus	Peregrine Falcon			x	x					x						
	Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra			x	x			x		x				x	x	x
	Hirundinidae	*Cheramoeca leucosternus*	White-backed Swallow									x				x		
		Hirundo ariel	Fairy Martin															x
		Hirundo neoxena	Welcome Swallow													x	x	
		Petrochelidon nigricans	Tree Martin			x	x									x	x	x
	Maluridae	*Malurus cyaneus*	Superb Fairy-wren													x		
		Malurus lamberti	Variegated Wren									x						
	Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater															x
		Lichenostomus chrysops	Yellow-faced Honeyeater													x		
		Lichenostomus penicillatus	White-plumed Honeyeater													x		x
		Manorina melanocephala	Noisy Miner		x	x	x			x	x	x				x	x	x
		Philemon corniculatus	Noisy Friarbird		x	x	x									x		
	Motacillidae	*Anthus australis*	Australian (Richard's) Pitpit									x						
	Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush															x
		Pachycephala rufiventris	Rufous Whistler															x
	Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote		x	x	x										x	x

Class	Family	Species	Common name	Apr 04	May 04	Jul 04	Oct 04	Mar 06	Feb 07	Mar 08	Dec 08	Mar 09	Oct 09	Nov 09	Jan 10	Apr 10	Jul 10	Nov 10
Aves		*Pardalotus striatus*	Striated Pardalote		x	x	x									x		x
	Passeridae	*Passer domesticus*	House Sparrow													x		
	Petroicidae	***Melanodryas cucullata***	**Hooded Robin**				**x**											
		Microeca fascinans	Jacky Winter													x		
	Phasianidae	*Coturnix pectoralis*	Stubble Quail		x	x	x			x		x						
		Coturnix ypsilophora	Brown Quail													x	x	
	Podargidae	*Podargus strigoides*	Tawny Frogmouth		x	x	x					x						
	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe													x	x	x
	Psittacidae	*Alisterus scapularis*	Australian King-Parrot															x
		Glossopsitta concinna	Musk Lorikeet							x						x	x	x
		Glossopsitta pusilla	Little Lorikeet			x	x											
		Platycercus adscitus eximius	Eastern Rosella		x	x	x			x	x	x				x	x	x
		Psephotus haematonotus	Red-rumped Parrot			x	x			x	x	x				x	x	x
		Psephotus varius	Mulga Parrot			x	x											
	Strigidae	*Ninox novaeseelandiae*	Southern Boobook			x	x			x		x						
	Sturnidae	*Sturnus vulgaris* *	European Starling			x						x				x	x	x
		Turdus merula *	Common Myna									x						x
	Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		x	x	x											
	Tytonidae	*Tyto alba*	Barn Owl									x				x		
Mammalia	Bovidae	*Bos taurus**	Cow			x				x						x		
	Canidae	*Canis (lupis) familiaris* *	Dog			x				x						x		
		Vulpes vulpes *	European Red Fox			x				x						x	x	x
	Felidae	*Felis catus**	Feral Cat			x				x								
	Leporidae	*Oryctolagus cuniculus* *	European Rabbit			x				x						x	x	
	Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo			x				x	x					x		
		Macropus robustus	Wallaroo			x										x	x	
		Macropus rufogriseus	Red-necked Wallaby			x												
	Muridae	*Mus musculus**	House Mouse			x				x						x		x
	Muridae	*Rattus rattus**	Black Rat			x										x		
	Phalangeridae	*Trichosurus velpecula*	Common Brushtail Possum			x				x						x	x	
	Tachyglossidae	*Tachyglossus aculeatus*	Short-beak Echidna			x										x		
Chiroptera (Bats)	**Emballonuridae**	***Saccolaimus flaviventrus***	**Yellow-bellied Sheath-tail 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
Chiroptera (Bats)	Molossidae	*Mormopterus species 3*	Undescribed Little Mastiff-bat @ 25KHz			*x*				x		x	x			x		x
		Mormopterus species 4	Undescribed Little Mastiff-bat @ 30KHz							x		x	x			x		x
		Austronomus australis	White-striped Free-tail (or Mastiff-bat) Bat			x				x		x				x		x
	Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat			x				x		x	x			x		x
		Chalinolobus morio	Chocolate Wattled Bat							x			x			x		x
		Falsistrellus tasmaniensis	**Eastern False Pipistrelle**										**x**			**x**		**x**
		Miniopterus schreibersii oceanensis	**Eastern Bent-wing Bat**			**x**							**x**			**x**		**x**
		Nyctophilus geoffroyi	Lesser Long-eared Bat			x												
		Nyctophilus sp.										x				x		x
		Scoteanax rueppellii	**Greater Broad-nosed Bat**			**x**							**x**			**x**		
		Scotorepens balstoni	Inland Broad-nosed Bat									x	x			x		x
		Scotorepens greyii	Little Broad-nosed Bat										x					
		Vespadelus darlingtoni	Large Forest Bat			x				x		x						
		Vespadelus vulturnus	Little Forest Bat							x			x	x	x	x	x	x
Reptilia	Agamidae	*Pogona barbata*	Eastern Bearded Dragon											x	x			
	Cheluidae	*Chelodina longicolli*	Eastern Snake-necked Turtle	x											x	x		x
	Elapidae	*Demansia psammophis*	Yellow-faced Whipsnake	x								x		x	x	x		
		Pseudechis guttatus	Blue-bellied Black Snake													x		
		Pseudonaja textilis	Eastern Brown Snake									x						x
	Gekkonidae	*Gehyra dubia*	Dubious Dtella													x		
		Gehyra variegata	Common Dtella	x					x			x				x		
		Gehyra variegata (egg shells)	Common Dtella															
		Oedura robusta	Robust Velvet Gecko													x		
		Strophurus williamsi	Eastern Spiny-tailed Gecko	x						x				x				
		Underwoodisaurus milii	Barking Gecko	x				x										
	Pygopodidae	*Delma inornata*	Plain Snake-lizard											x				
		Delma plebeia	Basalt Snake-lizard	x														
		Lialis burtonis	Burton's Snake-lizard	x				x										
	Scincidae	*Anomalopus leuckartii*	Two-clawed Worm-skink	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
Reptilia	Scincidae	*Carlia tetradactyla*	Southern Rainbow Skink											x				
		Cryptoblepharus pannosus	Ragged Snakeeyed Skink															
		Cryptoblepharus pulcher	Elegant Snake-eyed Skink	x						x		x		x	x	x		x
		Ctenotus robustus	Eastern Striped Skink	x								x		x		x		
		Egernia striolata	Tree skink						x							x		x
		Eulamprus tenuis	Greater Bar-sided Skink	x						x				x	x	x		
		Lampropholis guichenoti	Pale-flecked Garden Sunskink															x
		Menetia greyii	Dwarf Skink	x				x	x							x		x
		Morethia boulengeri	Boulenger's Morethia	x						x		x		x	x	x		
		Unknown Reptile eggshells	(Possibly *M. boulengeri*)					x	x							x		
	Typhlopidae	*Ramphotyphlops wiedii*	Blind Snake	x														

Bold text denotes a threatened species

* Denotes an exotic species

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WERRIS CREEK COAL
AEMR 2010-2011

APPENDIX 6

BLAST MONITORING RESULTS

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results											
					Glenala		Marengo		Tonsley Park		Cintra		Werris Creek		**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)
275	1/04/2010	13:11			<0.37	<111.9	0.67	100.8	0.35	93.3	0.83	98.6	NM	NM	10	120
276	9/04/2010	13.07			<0.37	<111.9	1.32	108.8	0.55	100.6	0.85	106.9	NM	NM	10	120
277	13/04/2010	13.18			<0.37	<111.9	1.37	101.7	0.9	97.7	1.15	98.6	NM	NM	10	120
278	15/04/2010	13.51			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
279	19/04/2010	13.26			<0.37	<111.9	0.82	104.3	0.65	100.6	0.93	105.4	NM	NM	10	120
280	21/04/2010	13.18			<0.37	<111.9	0.45	99.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
281	22/04/2010	13.13			<0.37	<111.9	<0.37	<111.9	0.53	106.6	0.75	110.4	NM	NM	10	120
282	27/04/2010	14.50			<0.37	<111.9	1.45	109.5	0.7	101.2	1.25	106.5	NM	NM	10	120
TOTALS	**APRIL**	**# BLAST**	**8**	**AVERAGE**	**-**	**-**	**1.01**	**104.2**	**0.61**	**100.0**	**0.96**	**104.4**	**-**	**-**	**5**	**115**
TOTALS	**APRIL**	**# BLAST**	**8**	**HIGHEST**	**-**	**-**	**1.45**	**109.5**	**0.90**	**106.6**	**1.25**	**110.4**	**-**	**-**	**10**	**120**
TOTALS	**ANNUAL**	**# BLAST**	**8**	**AVERAGE**	**-**	**-**	**1.01**	**104.2**	**0.61**	**100.0**	**0.96**	**104.4**	**-**	**-**	**5**	**115**

KEY
NT - Not Triggered
NM - Not Monitored
* - Project Related Property

Shot number	Date fired	Time Fired			Werris Creek Coal Blasting Results											
					Glenala		Marengo		Tonsley Park		Cintra		Werris Creek		**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)
283	4/05/2010	13.04			<0.37	<111.9	0.67	103.7	1.08	98.5	0.93	103.7	NM	NM	10	120
284	5/05/2010	13.12			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
285	6/05/2010	13.05			<0.37	<111.9	0.57	97.7	0.95	102.8	<0.37	<111.9	NM	NM	10	120
286	7/05/2010	13.08			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
287	11/05/2010	13.12			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
288	13/05/2010	13.31			<0.37	<111.9	0.6	109	1.03	104.5	1.49	110.2	NM	NM	10	120
289	13/05/2010	13.31			<0.37	<111.9	0.6	109	1.03	104.5	1.49	110.2	NM	NM	10	120
290	17/05/2010	13.08			<0.37	<111.9	0.45	102	0.38	101.8	0.77	107.8	NM	NM	10	120
291	19/05/2010	13.11			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
293	21/05/2010	13.04			<0.37	<111.9	<0.37	<111.9	0.45	89.7	0.56	97.7	NM	NM	10	120
294	24/05/2010	13.12			<0.37	<111.9	<0.37	<111.9	0.4	94.6	0.88	100.2	NM	NM	10	120
295	26/05/2010	13.15			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	0.83	106.5	NM	NM	10	120
296	31/05/2010	13.13			<0.37	<111.9	0.7	107.1	0.7	107.1	0.56	104.6	NM	NM	10	120
TOTALS	**MAY**	**# BLAST**	**13**	**AVERAGE**	**-**	**-**	**0.60**	**104.8**	**0.75**	**100.4**	**0.94**	**105.1**	**-**	**-**	**5**	**115**
TOTALS	**MAY**	**# BLAST**	**13**	**HIGHEST**	**-**	**-**	**0.70**	**109.0**	**1.08**	**107.1**	**1.49**	**110.2**	**-**	**-**	**10**	**120**
TOTALS	**ANNUAL**	**# BLAST**	**21**	**AVERAGE**	**-**	**-**	**0.81**	**104.5**	**0.68**	**100.2**	**0.95**	**104.8**	**-**	**-**	**5**	**115**

KEY
NT - Not Triggered
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* - Project Related Property

Shot number	Date fired	Time Fired			Werris Creek Coal Blasting Results											
					Glenala		Marengo		Tonsley Park		Cintra		Werris Creek		**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)
297	2/06/2010	13.17			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	0.48	108.4	NM	NM	10	120
292	7/06/2010	13.17			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
298	8/06/2010	13.15			<0.37	<111.9	0.4	107.5	<0.37	<111.9	0.64	108.4	NM	NM	10	120
299	11/06/2010	14.19			<0.37	<111.9	<0.37	<111.9	0.75	97.7	1.09	103.7	NM	NM	10	120
300	15/06/2010	13.34			<0.37	<111.9	0.45	110.1	0.68	110	0.77	118	NM	NM	10	120
301	22/06/2010	13.10.			<0.37	<111.9	0.52	99.4	1.03	103.7	1.52	112	NM	NM	10	120
302	17/06/2010	13.15			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
303	18/06/2010	13.02			<0.37	<111.9	<0.37	<111.9	0.6	100	1.07	99.4	NM	NM	10	120
304	24/06/2010	13.13			<0.37	<111.9	<0.37	<111.9	0.53	103.7	0.85	112	NM	NM	10	120
305	25/06/2010	13.17			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
306	29/06/2010	13.18			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	0.56	104.6	NM	NM	10	120
307	30/06/2010	13.28			<0.37	<111.9	0.54	107	0.88	102.8	1.6	109.9	NM	NM	10	120
TOTALS	**JUNE**	**# BLAST**	**12**	**AVERAGE**	**-**	**-**	**0.48**	**106.0**	**0.75**	**103.0**	**0.95**	**108.5**	**-**	**-**	**5**	**115**
TOTALS	**JUNE**	**# BLAST**	**12**	**HIGHEST**	**-**	**-**	**0.54**	**110.1**	**1.03**	**110.0**	**1.60**	**118.0**	**-**	**-**	**10**	**120**
TOTALS	**ANNUAL**	**# BLAST**	**33**	**AVERAGE**	**-**	**-**	**0.70**	**105.0**	**0.70**	**101.1**	**0.95**	**106.0**	**-**	**-**	**5**	**115**

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Shot number	Date fired	Time Fired			Werris Creek Coal Blasting Results											
					Glenala		Marengo		Tonsley Park		Cintra		Werris Creek		**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)
308	1/07/2010	13.15			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
309	2/07/2010	13.1			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	NM	NM	10	120
310	7/07/2010	13.24			<0.37	<111.9	<0.37	<111.9	0.77	105.4	1.5	114.8	NM	NM	10	120
311	7/07/2010	13.24			<0.37	<111.9	<0.37	<111.9	0.77	105.4	1.5	114.8	NM	NM	10	120
312	13/07/2010	13.17			<0.37	<111.9	<0.37	<111.9	0.48	106.6	0.85	113.8	<0.37	<111.9	10	120
313	19/07/2010	13.13			<0.37	<111.9	<0.37	<111.9	0.6	111.1	1.04	117.7	<0.37	<111.9	10	120
314	16/07/2010	13.1			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	10	120
315	20/07/2010	13.11			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	10	120
316	26/07/2010	13.41			<0.37	<111.9	0.07	112.9	0.5	109.1	1.2	114.6	<0.37	<111.9	10	120
317	21/07/2010	13.13			<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	10	120
319	29/07/2010	13.17			<0.37	<111.9	<0.37	<111.9	0.98	94.6	1.01	100.8	<0.37	<111.9	10	120
TOTALS	**JULY**	**# BLAST**	**11**	**AVERAGE**	**-**	**-**	**0.07**	**112.9**	**0.68**	**105.4**	**1.18**	**112.8**	**-**	**-**	**5**	**115**
TOTALS	**JULY**	**# BLAST**	**11**	**HIGHEST**	**-**	**-**	**0.07**	**112.9**	**0.98**	**111.1**	**1.50**	**117.7**	**-**	**-**	**10**	**120**
TOTALS	**ANNUAL**	**# BLAST**	**44**	**AVERAGE**	**-**	**-**	**0.54**	**107.0**	**0.70**	**102.2**	**1.01**	**107.7**	**-**	**-**	**5**	**115**

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Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results											
					Glenala		Marengo		Tonsley Park		Cintra		Werris Creek		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)
318	2/08/2010	13:18	Strip 13	OB	<0.37	<111.9	0.42	104.9	0.83	109.7	1.49	114.3	<0.37	<111.9	10	120
320	4/08/2010	13:21	Strip 13	OB	<0.37	<111.9	0.07	112.2	<0.37	<111.9	0.08	113.2	<0.37	<111.9	10	120
321	6/08/2010	14:02	Strip 10	OB	<0.37	<111.9	<0.37	<111.9	0.4	101.8	0.62	108.4	<0.37	<111.9	10	120
322	12/08/2010	13:12	Strip 9	IB	<0.37	<111.9	<0.37	<111.9	0.4	100.6	0.52	104.6	<0.37	<111.9	10	120
323	17/08/2010	13:22	Strip 10	OB	<0.37	<111.9	<0.37	<111.9	0.6	100.6	0.67	106.4	NM	NM	10	120
324	23/08/2010	13:14	Strip 9	IB	<0.37	<111.9	<0.37	<111.9	0.57	103.1	0.35	96.8	<0.37	<111.9	10	120
325	25/08/2010	13:23	Strip 9	IB	0.1	114.7	<0.37	<111.9	<0.37	<111.9	0.07	113.7	<0.37	<111.9	10	120
326	25/08/2010	13:23	Strip 10	WE	0.1	114.7	<0.37	<111.9	<0.37	<111.9	0.07	113.7	<0.37	<111.9	10	120
TOTALS	**AUGUST**	**# BLAST**	**8**	**AVERAGE**	**0.10**	**114.7**	**0.25**	**108.6**	**0.56**	**103.2**	**0.48**	**108.9**	**-**	**-**	**5**	**115**
TOTALS	**AUGUST**	**# BLAST**	**8**	**HIGHEST**	**0.10**	**114.7**	**0.42**	**112.2**	**0.83**	**109.7**	**1.49**	**114.3**	**-**	**-**	**10**	**120**
TOTALS	**ANNUAL**	**# BLAST**	**52**	**AVERAGE**	**0.10**	**114.7**	**0.48**	**107.3**	**0.67**	**102.4**	**0.90**	**107.9**	**-**	**-**	**5**	**115**

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Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results											
					Glenala		Marengo		Tonsley Park		Cintra		Werris Creek		**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)
327	3/09/2010	13:12	Strip 9	IB	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	0.42	111.3	<0.37	<111.9	10	120
328	8/09/2010	13:12	Strip 10	IB	<0.37	<111.9	<0.37	<111.9	1.05	105.7	1.17	111.7	<0.37	<111.9	10	120
329	7/09/2010	13:43	Strip 9	IB	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	10	120
330	15/09/2010	13:10	Strip 9	IB	<0.37	<111.9	<0.37	<111.9	0.53	105.7	0.92	110.2	<0.37	<111.9	10	120
331	21/09/2010	12:36	Strip 10	IB	<0.37	<111.9	<0.37	<111.9	0.55	103.7	0.9	108.4	<0.37	<111.9	10	120
332	24/09/2010	13:12	Strip 9	IB	<0.37	<111.9	<0.37	<111.9	0.68	107.2	1	110.9	<0.37	<111.9	10	120
333	24/09/2010	13:12	Strip 9	IB	<0.37	<111.9	<0.37	<111.9	0.68	107.2	1	110.9	<0.37	<111.9	10	120
334	30/09/2010	13:13	Strip 10	THRU	<0.37	<111.9	<0.37	<111.9	0.5	105.3	1.15	112	<0.37	<111.9	10	120
TOTALS	**SEPTEMBER**	**# BLAST**	**8**	**AVERAGE**	**-**	**-**	**-**	**-**	**0.67**	**105.8**	**0.94**	**110.8**	**-**	**-**	**5**	**115**
TOTALS	**SEPTEMBER**	**# BLAST**	**8**	**HIGHEST**	**-**	**-**	**-**	**-**	**1.05**	**107.2**	**1.17**	**112.0**	**-**	**-**	**10**	**120**
TOTALS	**ANNUAL**	**# BLAST**	**60**	**AVERAGE**	**0.10**	**114.7**	**0.48**	**107.3**	**0.67**	**103.0**	**0.91**	**108.4**	**-**	**-**	**5**	**115**

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Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results											
					Glenala		Marengo		Tonsley Park		Cintra		Werris Creek		**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)
335	7/10/2010	14:35	Strip 10	IB	<0.37	<111.9	NM	NM	0.63	106	1	112	<0.37	<111.9	10	120
336	12/10/2010	13:12	Strip 10	IB	<0.37	<111.9	NM	NM	0.6	93.3	1.12	99.6	<0.37	<111.9	10	120
337	11/10/2010	13:16	Strip 9	WE	<0.37	<111.9	NM	NM	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	10	120
338	13/10/2010	13:12	Strip 10	IB	<0.37	<111.9	NM	NM	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	10	120
339	22/10/2010	13:19	Strip 11	OB	<0.37	<111.9	NM	NM	0.6	113.3	0.9	107.5	<0.37	<111.9	10	120
340	25/10/2010	13:16	Strip 9	IB	<0.37	<111.9	NM	NM	0.5	106.8	0.7	113.7	<0.37	<111.9	10	120
341	27/10/2010	13:15	Strip 10	OB	<0.37	<111.9	NM	NM	0.97	105.8	0.62	112.1	<0.37	<111.9	10	120
342	26/10/2010		Strip 10	IB	<0.37	<111.9	NM	NM	0.4	87.2	0.9	113.3	<0.37	<111.9	10	120
343	29/10/2010	13:44	Strip 9	IB	<0.37	<111.9	NM	NM	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	10	120
TOTALS	**OCTOBER**	**# BLAST**	**9**	**AVERAGE**	**-**	**-**	**-**	**-**	**0.62**	**102.1**	**0.87**	**109.7**	**-**	**-**	**5**	**115**
TOTALS	**OCTOBER**	**# BLAST**	**9**	**HIGHEST**	**-**	**-**	**-**	**-**	**0.97**	**113.3**	**1.12**	**113.7**	**-**	**-**	**10**	**120**
TOTALS	**ANNUAL**	**# BLAST**	**69**	**AVERAGE**	**0.10**	**114.7**	**0.48**	**107.3**	**0.66**	**102.8**	**0.90**	**108.6**	**-**	**-**	**5**	**115**

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Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results											
					Glenala		Marengo		Tonsley Park		Cintra		Werris Creek		**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)
344	5/11/2010	14:24	Strip 11	OB	<0.37	<111.9	NM	NM	0.58	95.8	0.92	112.2	<0.37	<111.9	10	120
345	3/11/2010	13:13	Strip 10	IB	<0.37	<111.9	NM	NM	0.42	101.7	0.6	93.3	<0.37	<111.9	10	120
346	5/11/2010	12:32	Strip 9	IB	<0.37	<111.9	NM	NM	0.8	100.6	0.47	112.2	<0.37	<111.9	10	120
347	5/11/2010	12:32	Strip 10	TR	<0.37	<111.9	NM	NM	0.8	100.6	0.47	112.2	<0.37	<111.9	10	120
348	10/11/2010	13:18	Strip 10	IB	<0.37	<111.9	NM	NM	1	99	2.39	104.9	<0.37	<111.9	10	120
349	15/11/2010	13:25	Strip 9	IB	<0.37	<111.9	NM	NM	0.53	102.8	0.52	108.6	<0.37	<111.9	10	120
350	18/11/2010	13:14	Strip 10	IB	<0.37	<111.9	NM	NM	0.8	104.6	0.4	99.3	<0.37	<111.9	10	120
351	23/11/2010	13:48	Strip 10	IB	<0.37	<111.9	NM	NM	0.78	105.6	1.37	114.8	<0.37	<111.9	10	120
352	24/11/2010	13:13	Strip 9		<0.37	<111.9	NM	NM	<0.37	<111.9	0.47	115.5	<0.37	<111.9	10	120
353	26/11/2010	13:13	Strip 10	IB	<0.37	<111.9	NM	NM	<0.37	<111.9	0.42	111.6	<0.37	<111.9	10	120
TOTALS	**NOVEMBER**	**# BLAST**	**10**	**AVERAGE**	**-**	**-**	**-**	**-**	**0.71**	**101.3**	**0.80**	**108.5**	**<0.37**	**<111.9**	**5**	**115**
TOTALS	**NOVEMBER**	**# BLAST**	**10**	**HIGHEST**	**-**	**-**	**-**	**-**	**1.00**	**105.6**	**2.39**	**115.5**	**<0.37**	**<111.9**	**10**	**120**
TOTALS	**ANNUAL**	**# BLAST**	**79**	**AVERAGE**	**0.10**	**114.7**	**0.48**	**107.3**	**0.67**	**102.6**	**0.89**	**108.6**	**<0.37**	**<111.9**	**5**	**115**

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Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results											
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		**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)
354	1/12/2010	13:14	Strip 10	TS	<0.37	<111.9	NM	NM	0.77	109.0	0.53	107.2	<0.37	<111.9	10.00	120.0
355	2/12/2010	13:03	Strip 10	PS	<0.37	<111.9	NM	NM	1.32	95.6	0.75	91.7	<0.37	<111.9	10.00	120.0
356	3/12/2010	13:18	Strip 10	WE	<0.37	<111.9	NM	NM	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	10.00	120.0
357	8/12/2010	13:12	Strip 10	IB	<0.37	<111.9	NM	NM	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	10.00	120.0
358	10/12/2010	9:30	Strip 10	TS	<0.37	<111.9	NM	NM	0.38	98.5	0.62	101.7	<0.37	<111.9	10.00	120.0
359	20/12/2010	14:30	Strip 10	IB	<0.37	<111.9	NM	NM	<0.37	<111.9	0.12	113.8	<0.37	<111.9	10.00	120.0
TOTALS	**DECEMBER**	**# BLAST**	**6**	**AVERAGE**	**<0.37**	**<111.9**	**-**	**-**	**0.82**	**101.0**	**0.51**	**103.6**	**<0.37**	**<111.9**	**5.00**	**115.0**
TOTALS	**DECEMBER**	**# BLAST**	**6**	**HIGHEST**	**<0.37**	**<111.9**	**-**	**-**	**1.32**	**109.0**	**0.75**	**113.8**	**<0.37**	**<111.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**85**	**AVERAGE**	**0.10**	**114.7**	**0.48**	**107.3**	**0.69**	**102.5**	**0.85**	**108.0**	**<0.37**	**<111.9**	**5.00**	**115.0**

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Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results											
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		**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)
11-01	6/01/2011	13:13	Strip 11	OB	<0.37	<111.9	NM	NM	0.42	109.1	0.78	113.7	<0.37	<111.9	10.00	120.0
11-02	11/01/2011	13:34	Strip 9	IB	<0.37	<111.9	NM	NM	<0.37	<111.9	<0.37	<111.9	<0.23	<109.9	10.00	120.0
11-03	19/01/2011	15:15	Strip 10	THRU	<0.37	<111.9	NM	NM	0.55	104.5	1.47	109.3	<0.23	<109.9	10.00	120.0
11-04	25/01/2011	13:54	Strip 9	IB	<0.37	<111.9	NM	NM	0.38	108.4	0.42	114.2	<0.23	<109.9	10.00	120.0
11-05	21/01/2011	13:42	Strip 10	IB	<0.37	<111.9	NM	NM	<0.37	<111.9	<0.37	<111.9	<0.23	<109.9	10.00	120.0
TOTALS	**JANUARY**	**# BLAST**	**5**	**AVERAGE**	**<0.37**	**<111.9**	**-**	**-**	**0.45**	**107.3**	**0.89**	**112.4**	**<0.37**	**<111.9**	**5.00**	**115.0**
TOTALS	**JANUARY**	**# BLAST**	**5**	**HIGHEST**	**<0.37**	**<111.9**	**-**	**-**	**0.55**	**109.1**	**1.47**	**114.2**	**<0.37**	**<111.9**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**90**	**AVERAGE**	**0.10**	**114.7**	**0.48**	**107.3**	**0.66**	**103.0**	**0.85**	**108.5**	**<0.37**	**<111.9**	**5.00**	**115.0**

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Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results											
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		**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)
11-06	1/02/2011	11:16	S9_10-15_300	IB	NM	NM	<0.37	<111.9	0.4	89.7	0.47	102	<0.37	<111.9	10.00	120.0
11-07	9/02/2011	13.51	S10_18_330TSB5	THRU S	NM	NM	<0.37	<111.9	1.1	108.8	1.82	113	0.51	94.1	10.00	120.0
11-08	14/02/2011	15.18	S9_6-7_Gseam	IB	NM	NM	0.7	110.1	0.65	109.5	0.75	111.5	<0.23	<109.9	10.00	120.0
11-09	17/02/2011	13.51	S10_8-9R_Ccoal	IB	NM	NM	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.23	<109.9	10.00	120.0
11-10	23/02/2011	16.15	S9_8-12_Gcoal	IB	NM	NM	<0.37	<111.9	0.73	100.6	1.25	104.5	<0.23	<109.9	10.00	120.0
11-11	25/02/2011	15.34	S10_11-12R_Ccoal	IB	NM	NM	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.23	<109.9	10.00	120.0
TOTALS	**FEBRUARY**	**# BLAST**	**6**	**AVERAGE**	**<0.37**	**<111.9**	**0.70**	**110.1**	**0.72**	**102.2**	**1.07**	**107.8**	**0.51**	**94.1**	**5.00**	**115.0**
TOTALS	**FEBRUARY**	**# BLAST**	**6**	**HIGHEST**	**<0.37**	**<111.9**	**0.70**	**110.1**	**1.10**	**109.5**	**1.82**	**113.0**	**0.51**	**94.1**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**96**	**AVERAGE**	**0.10**	**114.7**	**0.70**	**110.1**	**0.67**	**102.9**	**0.87**	**108.4**	**0.51**	**94.1**	**5.00**	**115.0**

KEY
NT - Not Triggered
NM - Not Monitored
* - Project Related Property

Shot number	Date fired	Time Fired	Location	Type	Werris Creek Coal Blasting Results											
					Glenala		Greenslopes		Tonsley Park		Cintra*		Werris Creek		**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)
11-12	4/03/2011	14.51	S10_11-12_Fcoal Pt1	IB	NM	NM	<0.37	<111.9	<0.37	<111.9	0.45	100.3	<0.23	<109.9	10.00	120.0
11-13	10/03/2011	13.22	S9_8-12_Gcoal Pt2	IB	NM	NM	1.01	101.5	0.73	99.3	0.8	102.2	0.42	94.2	10.00	120.0
11-14	17/03/2011	13.53	S10_11-12_Fcoal Pt2	IB	NM	NM	<0.37	<111.9	0.48	87.2	0.47	105.7	<0.23	<109.9	10.00	120.0
11-15	22/03/2011	13.12	S9_8-12_Gcoal Pt3	IB	NM	NM	1.07	99.7	1.01	94.2	1.44	101.5	0.48	99.8	10.00	120.0
11-16	24/03/2011	13.27	S10_11-13_DE coal	IB	NM	NM	<0.37	<111.9	<0.37	<111.9	<0.37	<111.9	<0.23	<109.9	10.00	120.0
11-17	29/03/2011	15.3	S9_13-15_Gcoal	IB	NM	NM	<0.37	<111.9	0.81	100.2	1.15	110.3	<0.23	<109.9	10.00	120.0
TOTALS	**MARCH**	**# BLAST**	**6**	**AVERAGE**	**<0.37**	**<111.9**	**1.04**	**100.6**	**0.76**	**95.2**	**0.86**	**104.0**	**0.45**	**97.0**	**5.00**	**115.0**
TOTALS	**MARCH**	**# BLAST**	**6**	**HIGHEST**	**<0.37**	**<111.9**	**1.07**	**101.5**	**1.01**	**100.2**	**1.44**	**110.3**	**0.48**	**99.8**	**10.00**	**120.0**
TOTALS	**ANNUAL**	**# BLAST**	**102**	**AVERAGE**	**0.10**	**114.7**	**0.59**	**106.7**	**0.68**	**102.2**	**0.87**	**108.0**	**0.48**	**95.6**	**5.00**	**115.0**

KEY
NT - Not Triggered
NM - Not Monitored
* - Project Related Property

WERRIS CREEK COAL
AEMR 2010-2011

APPENDIX 7

MONTHLY OPERATIONAL NOISE MONITORING

29 April 2010

Ref: 04035/3523

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

RE: APRIL 2010 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 22nd April 2010.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Pty Ltd *"Noise Management Protocol"*. The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Marengo"
"Tonsley Park"
"Cintra"
"Fletcher"

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). WCC activities were audible at some monitoring locations throughout the survey.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speeds and direction have been determined as the arithmetic average of the measurements over the monitoring period. The weather station showed that winds were calm during the afternoon and gentle to moderate from the west to south west during the evening and night.

Temperature data from the mine operated weather station indicated that temperature lapse conditions occurred throughout the all of the evening and night monitoring periods. The temperature inversion or lapse data is extrapolated from the 2m and 10m temperature gauges on the weather station tower.

Noise emission levels were measured with a Brüel & Kjær Type 2260 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 "Sound Level Meters". Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator Prior to and at the completion of measurements.

The total measured Leq 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 minimum level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 22 April 2010 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	2:40 pm	35	n/a	Calm	Birds & insects (35), WCC (17)
Glenara	3:01 pm	39	n/a	Calm	Birds & insects (39), WCC inaudible
Cintra	4:30 pm	35	n/a	Calm	Birds & insects (35), WCC (20)
Marengo	3:40 pm	34	n/a	Calm	Birds & insects (34), WCC (<15)
Tonsley Park	4:10 pm	35	n/a	Calm	Birds & insects (35), WCC inaudible
Fletcher	3:19 pm	46	n/a	Calm	Traffic (46), insects (30), WCC (<15)

Table 2
WCC Noise Monitoring Results – 22 April 2010 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	7:40 pm	40	Lapse	1.5/WSW	Birds & insects (37), pump (36) WCC (30)
Glenara	7:57 pm	42	Lapse	2.2/NW	Insects (39), traffic (36) WCC (34)
Cintra	9:23 pm	36	Lapse	2.2/W	WCC (35), traffic (30), insects (22)
Marengo	8:38 pm	29	Lapse	2.6/W	Birds & insects (27), train (25), WCC barely audible
Tonsley Park	9:03 pm	42	Lapse	1.3/WSW	Insects (39), traffic (37), WCC (35)
Fletcher	8:16 pm	46	Lapse	2.2/WSW	Train (45), traffic (40), WCC (31), insects (28)

Table 3
WCC Noise Monitoring Results – 22 April 2010 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	10:02 pm	37	Lapse	0.9/NW	Pump (36), insects (27), WCC (20)
Glenara	10:19 pm	36	Lapse	2.2/W	Traffic (33), insects (32), WCC (26)
Cintra	11:40 pm	42	Lapse	0.9/SW	WCC (42), insects (30)
Marengo	10:59 pm	26	Lapse	1.8/SW	Frogs & insects (26), WCC inaudible
Tonsley Park	11:22 pm	36	Lapse	2.0/SW	Insects (34), traffic (30), WCC (29)
Fletcher	10:37 pm	38	Lapse	2.0/W	Dogs (36), traffic (33), WCC (25)

The results shown in Tables 1-3 indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC where higher than the criterion of 35 dB(A) at the Cintra monitoring location during the night monitoring period.

The elevated noise at Cintra during was a result of emissions from dozers working on the coal stockpile and a train being loaded at the rail loading facility. Cintra is a project related residence.

Data from those times where WCC operations were audible was 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 was 49 dB(A) at the Cintra monitoring location. The sleep disturbance criterion is applicable at a point 1m from the bedroom window of a residence. The monitoring location at Cintra is on the road near the house and not at the bedroom window. It is noted above that Cintra is project related.

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

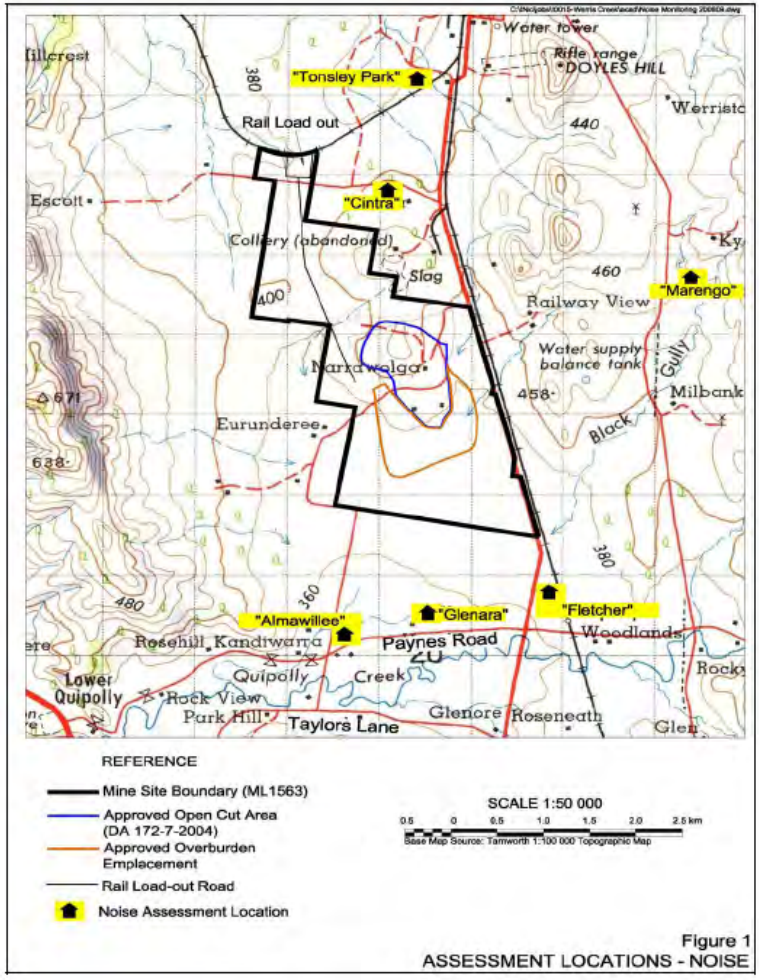

Figure 1
ASSESSMENT LOCATIONS - NOISE

21 June 2010

Ref: 04035/3586

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

RE: MAY 2010 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Tuesday 15 June 2010.

The survey was due to be conducted in May 2010 but high winds in the last week or so of May made the conditions unsuitable for monitoring. A noise monitoring survey was commenced on Monday 31 May but rain during the day forced mining to stop for the evening and night. Periods of high winds and, other logistical reasons, meant that the noise monitoring could not be scheduled again prior to 15 June. This survey, therefore, represents the May 2010 compliance monitor.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Pty Ltd *"Noise Management Protocol"*. The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Marengo"
"Tonsley Park"
"Cintra"
"Fletcher"

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). WCC activities were audible at some monitoring locations throughout the survey.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speeds and direction have been determined as the arithmetic average of the measurements over the monitoring period. The weather station showed that winds were calm for most of the survey periods picking up slightly from the north to north west towards the end of the night monitoring.

Temperature data from the mine operated weather station indicated that there was a strong temperature inversion throughout the all of the evening and night monitoring periods. The temperature inversion data is extrapolated from the 2m and 10m temperature gauges on the weather station tower.

Noise emission levels were measured with a Brüel & Kjær Type 2260 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 "Sound Level Meters". Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator Prior to and at the completion of measurements.

The total measured Leq 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 minimum level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 15 June 2010 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	4:07 pm	44	n/a	Calm	Traffic (41), birds & insects (39), train (36), WCC inaudible
Glenara	3:50 pm	40	n/a	Calm	Birds & insects (37), traffic (37), WCC inaudible
Cintra	2:20 pm	38	n/a	1.3/SSW	WCC (38), birds & insects (30)
Marengo	4:40 pm	22	n/a	Calm	Birds & insects (22), WCC inaudible
Tonsley Park	5:30 pm	42	n/a	Calm	Traffic (41), train (34), insects (25), WCC inaudible
Fletcher	5:10 pm	45	n/a	Calm	Traffic (45), insects (35), WCC inaudible

Table 2
WCC Noise Monitoring Results – 15 June 2010 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	7:45 pm	37	>3	Calm	WCC (36), traffic (30)
Glenara	8:02 pm	35	>3	Calm	WCC (34), traffic (29)
Cintra	8:24 pm	41	>3	0.2/NE	WCC (40), traffic (33)
Marengo	9:09 pm	24	>3	Calm	WCC (24)
Tonsley Park	8:44 pm	42	>3	Calm	Train (40), traffic (38), WCC inaudible
Fletcher	9:30 pm	46	>3	Calm	Train (46), WCC inaudible

Table 3
WCC Noise Monitoring Results – 15 June 2010 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	11:02 pm	37	>3	0.4/N	WCC (37), traffic (30)
Glenara	11:19 pm	35	>3	0.4/N	Traffic (32), WCC (32)
Cintra	10:40 pm	39	>3	Calm	WCC (39), insects (22)
Marengo	10:00 pm	33	>3	0.4/NNE	WCC (30), plane (30)
Tonsley Park	10:21 pm	41	>3	Calm	Train on loop(40), traffic (35), WCC inaudible
Fletcher	11:37 pm	42	>3	2.2/NNW	Traffic (42), WCC (31)

The results shown in Tables 1-3 indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC where higher than the criterion of 35 dB(A) at the Cintra monitoring location during the day, evening and night monitoring periods and at Almawillee during the evening and night.

The elevated noise at Cintra during was a result of emissions from dozers working on the coal stockpile coal trucks transporting coal to the loading facility and trains being loaded. Cintra is a project related residence.

The elevated noise at Almawillee was a result of noise emissions mainly from haul trucks.

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.

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 was 53 dB(A) at the Cintra monitoring location. The sleep disturbance criterion is applicable at a point 1m from the bedroom window of a residence. The monitoring location at Cintra is on the road near the house and not at the bedroom window. It is noted above that Cintra is project related. The Lmax noise did not exceed the criterion at any other 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

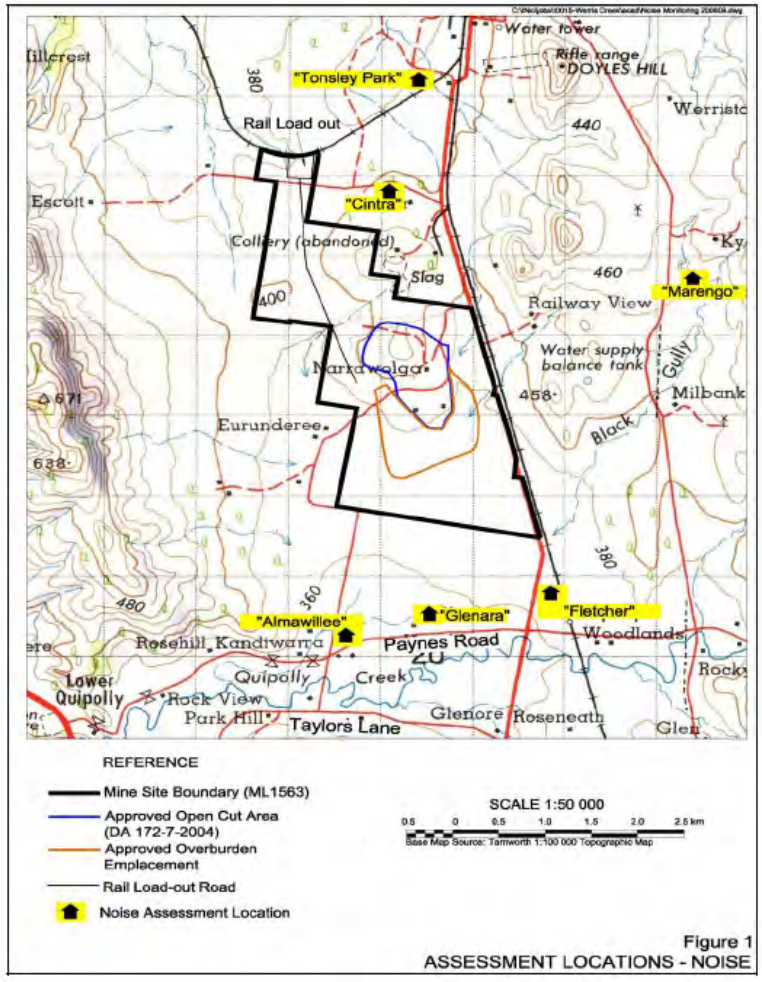

Figure 1
ASSESSMENT LOCATIONS - NOISE

21 June 2010

Ref: 04035/3601

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

RE: JUNE 2010 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 24 June 2010.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Pty Ltd *"Noise Management Protocol"*. The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Marengo"
"Tonsley Park"
"Cintra"
"Fletcher"

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). WCC activities were audible at some monitoring locations throughout the survey.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speeds and direction have been determined as the arithmetic average of the measurements over the monitoring period. The weather station showed that winds were light from the from the south west or calm for most of the day and evening survey periods picking up slightly from the north to north east during the night monitoring.

Temperature data from the mine operated weather station indicated that there was a strong temperature inversion throughout the all of the evening and night monitoring periods. The temperature inversion or lapse data is extrapolated from the 2m and 10m temperature gauges on the weather station tower.

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ABN: 40 106 435 554
Suite 1, 1 Roath Street, Cardiff NSW 2285
PO Box 374 Wallsend NSW 2287
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Noise emission levels were measured with Brüel & Kjær Type 2260 and Type 2250 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 "Sound Level Meters". Calibration of the instruments was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator Prior to and at the completion of measurements.

The total measured Leq 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 minimum level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 24 June 2010 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	12:30 pm	40	n/a	0.2/SW	Birds & insects (39), traffic (32), WCC inaudible
Glenara	12:47 pm	41	n/a	0.2/SW	Tractor (38), birds & insects (36), traffic (32), WCC inaudible
Cintra	1:07 pm	35	n/a	0.3/SW	WCC (35), birds & insects (24)
Marengo	1:55 pm	35	n/a	0.4/SSW	Planes (35), birds & insects (25), WCC inaudible
Tonsley Park	1:30 pm	34	n/a	0.3/SSW	Plane (31), track works (31), WCC inaudible
Fletcher	2:20 pm	48	n/a	0.4/SSW	Traffic (48), WCC inaudible

Table 2
WCC Noise Monitoring Results – 24 June 2010 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	8:50 pm	36	>3	Calm	WCC (35), dog (30)
Glenara	9:07 pm	45	>3	Calm	Traffic (44), WCC (39)
Cintra	8:40 pm	43	>3	Calm	WCC (43)
Marengo	9:25 pm	29	>3	0.4/SSE	Birds & insects (29), WCC inaudible
Tonsley Park	9:00 pm	50	>3	Calm	Train (50), traffic (37), WCC (37)
Fletcher	9:30 pm	44	>3	0.4/SSE	Traffic (43), WCC (36), dog (32)

Table 3
WCC Noise Monitoring Results – 24 June 2010 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	10:15 pm	41	>3	0.4/NE	Train (40), traffic (32), WCC (30)
Glenara	10:33 pm	35	>3	1.8/NE	Traffic (32), WCC (32)
Cintra	10:03 pm	46	>3	0.2/NE	Train (46), traffic (35), WCC (32)
Marengo	10:53 pm	25	>3	2.7/NE	WCC (25)
Tonsley Park	10:28 pm	37	>3	1.8/NE	Traffic (36), WCC (30)
Fletcher	10:50 pm	34	>3	2.27/NE	WCC (33), traffic (27)

The results shown in Tables 1-3 indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC where higher than the criterion of 35 dB(A) at the Cintra, Glenara, Tonsley Park and Fletcher monitoring locations during the evening monitoring period.

The elevated noise at Cintra and Tonsley Park during was a result of emissions from dozers working on the coal stockpile at the loading facility. Cintra is a project related residence.

The elevated noise at Glenara and Fletcher was a result of noise emissions mainly from haul trucks.

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.

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

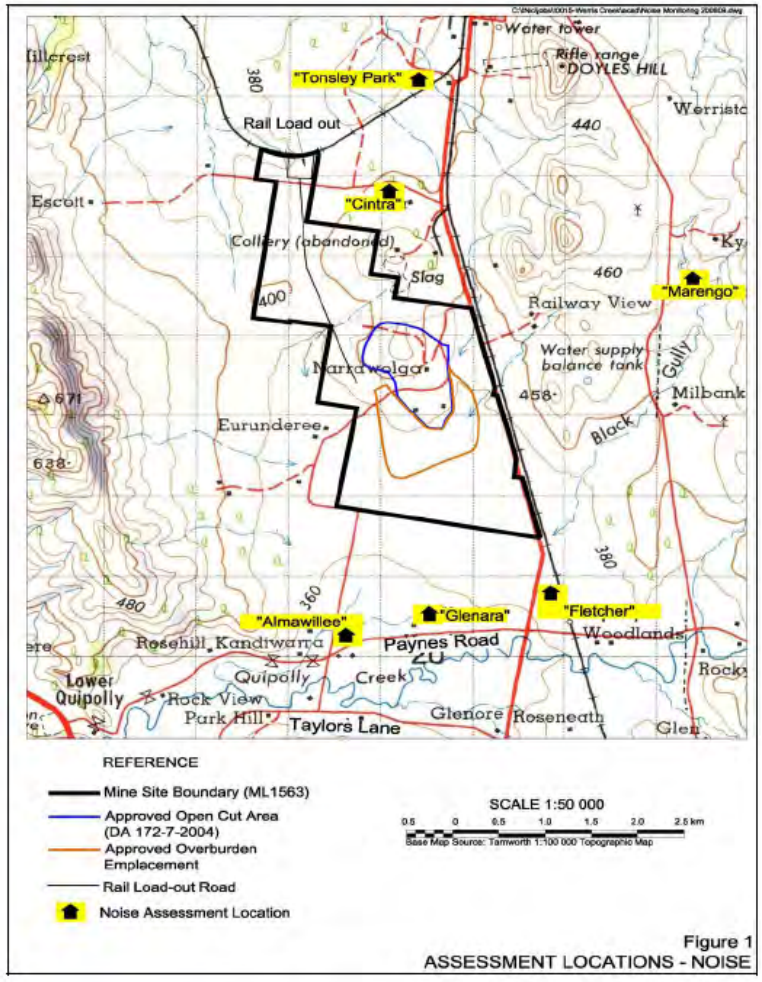

Figure 1
ASSESSMENT LOCATIONS - NOISE

29 July 2010

Ref: 04035/3626

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

RE: JULY 2010 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Monday 26 July 2010.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Pty Ltd *"Noise Management Protocol"*. The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Marengo"
"Tonsley Park"
"Cintra"
"Fletcher"

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). WCC activities were audible at some monitoring locations throughout the survey.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speeds and direction have been determined as the arithmetic average of the measurements over the monitoring period. The weather station showed that winds were light to gentle from the south east during the day time monitoring period. During the evening and night the wind stayed from the south east but decreased in speed to be calm by the end of the survey.

Temperature data from the mine operated weather station indicated that there was a strong temperature inversion throughout the all of the evening and night monitoring periods. The temperature inversion or lapse data is extrapolated from the 2m and 10m temperature gauges on the weather station tower.

Spectrum Acoustics Pty Limited
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The total measured Leq 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 minimum level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 26 July 2010 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	3:55 pm	44	n/a	5.4/SE	Traffic (42), wind (40), WCC inaudible
Glenara	4:13 pm	39	n/a	4.5/SSE	Traffic (38), birds (32), WCC inaudible
Cintra	4:50 pm	43	n/a	3.8/SE	Traffic (41), WCC (36), birds & insects (34)
Marengo	5:35 pm	32	n/a	3.5/SE	Birds & insects (32), WCC inaudible
Tonsley Park	5:09 pm	43	n/a	3.3/SE	Traffic (42), WCC (33), wind (30)
Fletcher	4:30 pm	46	n/a	4.5/SSE	Insects (42), track works (42), traffic (40), WCC inaudible

Table 2
WCC Noise Monitoring Results – 26 July 2010 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	8:23 pm	32	>3	1.3/ESE	Traffic (30), WCC (28)
Glenara	8:40 pm	34	>3	2.2/ESE	Traffic (33), train (30), WCC (25)
Cintra	9:10 pm	37	>3	3.1/ESE	WCC (34), traffic (34)
Marengo	9:43 pm	26	>3	0.9/SE	Birds & cattle (26), WCC inaudible
Tonsley Park	9:18 pm	38	>3	1.5/SE	Traffic (36), trains (33), WCC (30)
Fletcher	8:05 pm	48	>3	1.5/SE	Trains & track work (48), traffic (35), WCC inaudible

Table 3
WCC Noise Monitoring Results – 26 July 2010 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	11:20 pm	26	>3	1.3/SE	Frogs & insects (26), WCC inaudible
Glenara	11:02 pm	31	>3	0.9/SE	Traffic (29), plane (25), WCC barely audible
Cintra	10:25 pm	37	>3	1.8/SE	WCC (36), traffic (30)
Marengo	12:30 am	26	>3	Calm	Frogs (26), WCC inaudible
Tonsley Park	10:05 pm	29	>3	2.0/SE	Trains (27), traffic (25), WCC (25)
Fletcher	10:45 pm	39	>3	0.4/SE	Trains (38), WCC (30)

The results shown in Tables 1-3 indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC where higher than the criterion of 35 dB(A) at the Cintra, monitoring location during the day and night monitoring periods. Cintra is a project related residence.

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

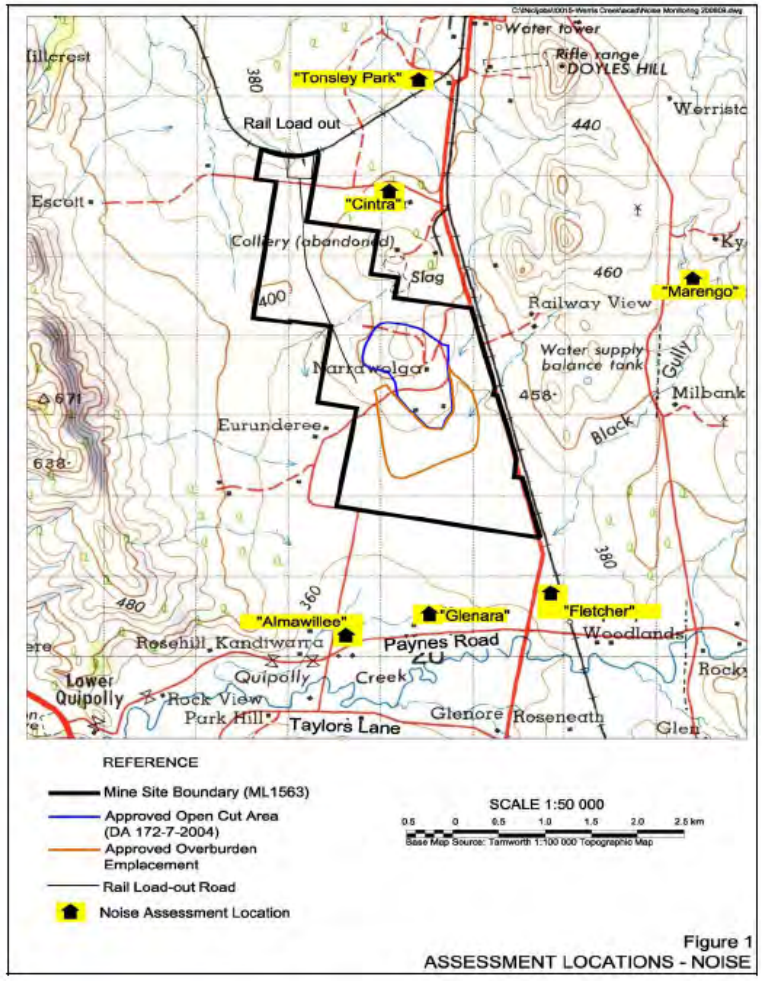

Figure 1
ASSESSMENT LOCATIONS - NOISE

27 August 2010

Ref: 04035/3657

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

RE: AUGUST 2010 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Friday 20 August 2010.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Pty Ltd *"Noise Management Protocol"*. The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Marengo"
"Tonsley Park"
"Cintra"
"Fletcher"

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). WCC activities were audible at some monitoring locations throughout the survey.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speeds and direction have been determined as the arithmetic average of the measurements over the monitoring period. The weather station showed that winds were light to gentle from the west south west during the day and evening monitoring periods. During the night the wind stayed from the west south west but decreased in speed to be calm by the end of the survey.

Temperature data from the mine operated weather station indicated that there was a temperature inversion throughout the all of the evening and night monitoring periods. The temperature inversion or lapse data is extrapolated from the 2m and 10m temperature gauges on the weather station tower.

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The total measured Leq 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 minimum level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 20 August 2010 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	5:43 pm	39	n/a	4.5/WSW	Traffic (37), birds (36), WCC barely audible
Glenara	5:25 pm	35	n/a	3.1/WSW	Traffic (34), birds & insects (25), WCC inaudible
Cintra	4:00 pm	37	n/a	4.9/WSW	Wind (33), traffic (32), birds & insects (30), WCC (30)
Marengo	4:42 pm	39	n/a	3.6/WSW	WCC (35), wind (34), cattle (31), traffic (30)
Tonsley Park	4:20 pm	43	n/a	3.6/WSW	Wind (33), traffic (38), train (37), WCC inaudible
Fletcher	5:07 pm	55	n/a	4.0/WSW	Traffic (54), track works (47), WCC inaudible

Table 2
WCC Noise Monitoring Results – 20 August 2010 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	9:30 pm	35	>3	4.5/WSW	Frogs (34), WCC (29)
Glenara	9:22 pm	39	>3	4.9/WSW	Traffic (35), planes (33), insects (32), WCC (30)
Cintra	7:55 pm	44	>3	6.3/WSW	Wind (41), plane (36), traffic (35), WCC (30)
Marengo	8:40 pm	41	>3	4.9/WSW	WCC (40), wind (35), train (30)
Tonsley Park	8:17 pm	48	>3	5.8/WSW	Train (46), wind (43), traffic (40), WCC inaudible
Fletcher	9:01 pm	46	>3	5.8/WSW	Traffic (46), insects (34), WCC (33)

Table 3
WCC Noise Monitoring Results – 20 August 2010 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	11:27 pm	32	>3	2.7/WSW	Frogs (32), WCC inaudible
Glenara	12:48 am	33	>3	Calm	Traffic (31), frogs (29), WCC barely audible
Cintra	10:04 pm	35	>3	3.1/WSW	WCC (33), wind (29), frogs (28)
Marengo	10:40 am	39	>3	3.1/WSW	WCC (38), wind (32)
Tonsley Park	10:18 pm	35	>3	4.0/WSW	Traffic (32), WCC (32)
Fletcher	10:58 pm	58	>3	2.7/WSW	Trains (58), traffic (47), WCC inaudible

The results shown in Tables 1-3 indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC where higher than the criterion of 35 dB(A) at the Marengo monitoring location during the evening and night monitoring periods. Marengo is a project related residence.

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

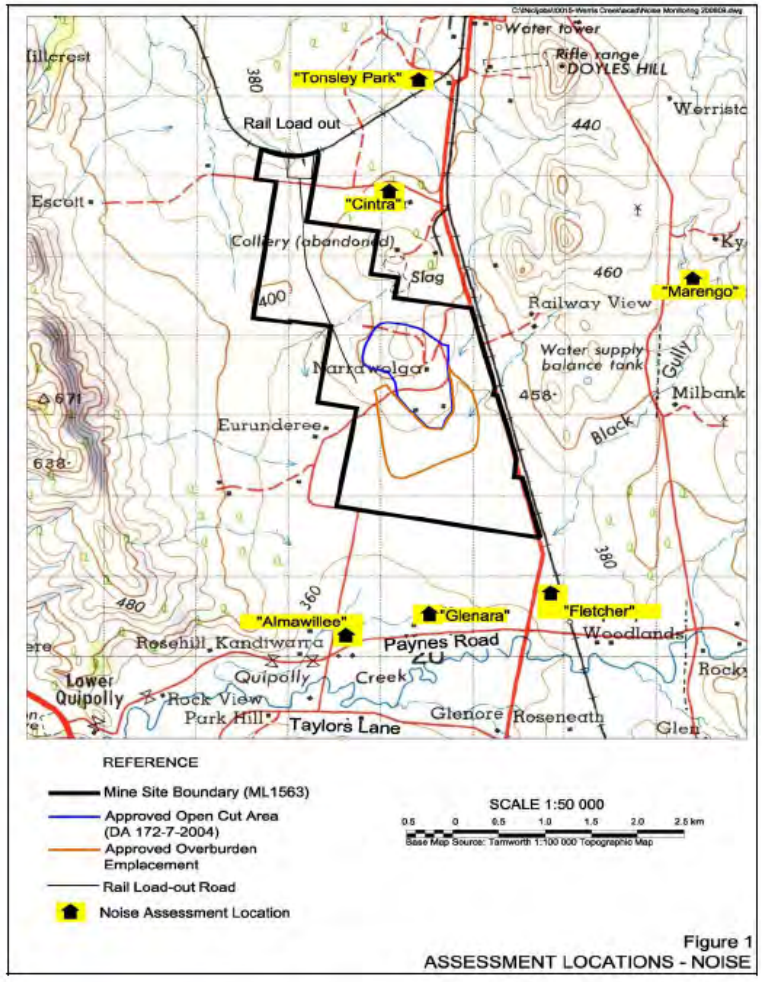

Figure 1
ASSESSMENT LOCATIONS - NOISE

"

28 September 2010

Ref: 04035/3696

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

RE: SEPTEMBER 2010 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Friday 17 September 2010.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Pty Ltd *"Noise Management Protocol"*. The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Marengo"
"Tonsley Park"
"Cintra"
"Fletcher"

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). WCC activities were audible at some monitoring locations throughout the survey.

The mine operated automatic weather station was not functioning during the period of the survey. Meteorological data used in this report was, therefore, obtained from a hand held weather station with measurements made at approximately 2m above ground level.

The total measured Leq 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 minimum level during the measurement and not measurable.

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Table 1 WCC Noise Monitoring Results – 17 September 2010 (Day)					
Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	4:45 pm	36	n/a	1/N	Traffic (33), WCC (30), birds (29)
Glenara	4:27 pm	39	n/a	1/N	Traffic (35), WCC (34), birds (33)
Cintra	3:05 pm	35	n/a	0.5/NW	WCC (34), birds & insects (28)
Marengo	3:47 pm	32	n/a	0.5/NW	Birds & insects (29), WCC (27), cattle (25)
Tonsley Park	3:25 pm	34	n/a	0.5/NW	Train noise (34), birds & insects (25), WCC inaudible
Fletcher	4:09 pm	46	n/a	1/N	Traffic (46), WCC inaudible

Table 2 WCC Noise Monitoring Results – 17 September 2010 (Evening)					
Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	8:47 pm	30		<0.5/NW	Frogs (26), WCC (25), insects (23)
Glenara	8:31 pm	34		<0.5/NW	Traffic (32), WCC (28), insects (24)
Cintra	9:10 pm	30		<0.5/NW	Traffic (28), WCC (25), insects (20)
Marengo	7:53 pm	38		<0.5/NW	WCC (37), insects (30)
Tonsley Park	7:20 pm	39		Calm	Traffic (37), WCC (32), domestic noise (31)
Fletcher	8:14 pm	45		<0.5/NW	Traffic (45), WCC (27)

Table 3 WCC Noise Monitoring Results – 17 September 2010 (Night)					
Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	11:32 pm	33		Calm	Birds (33), WCC (20)
Glenara	11:15 am	36		Calm	Traffic (35), WCC (30), insects (20)
Cintra	10:00 pm	31		<0.5/NW	WCC (27), traffic (27), insects (24)
Marengo	10:37 am	38		Calm	WCC (38), insects (23)
Tonsley Park	10:17 pm	38		Calm	Traffic (36), WCC (32)
Fletcher	10:58 pm	48		Calm	Traffic (48), birds (35), WCC (31)

The results shown in Tables 1-3 indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC where higher than the criterion of 35 dB(A) at the Marengo monitoring location during the evening and night monitoring periods. Marengo is a project related residence.

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

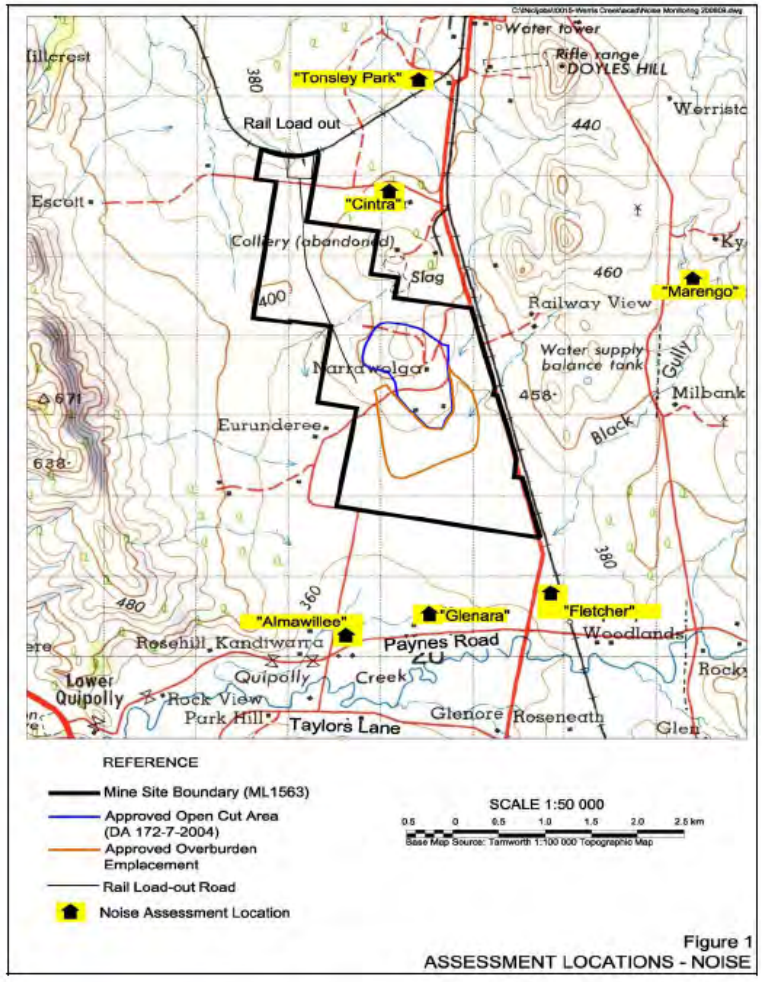

Figure 1
ASSESSMENT LOCATIONS - NOISE

2 November 2010

Ref: 04035/3756

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

RE: OCTOBER 2010 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Wednesday 27 October 2010.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Pty Ltd *"Noise Management Protocol"*. The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Marengo"
"Tonsley Park"
"Cintra"
"Fletcher"

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). WCC activities were audible at some monitoring locations throughout the survey.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speeds and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that winds were light to moderate from the north to north west during the day, dropping to calm in the evening before a southerly change came through at the start of the night time monitoring period. The data showed a mild temperature inversion for most of the evening and night.

The total measured Leq 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 minimum level during the measurement and not measurable.

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Table 1 WCC Noise Monitoring Results – 27 October 2010 (Day)					
Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	3:30 pm	41	n/a	3.6/N	Birds & insects (40), WCC (32), plane (30)
Glenara	3:48 pm	30	n/a	3.6/NW	Traffic (27), WCC (25), birds & insects (22)
Cintra	5:18 pm	41	n/a	4.0/NW	WCC (40), birds & insects (34), traffic (30)
Marengo	4:35 pm	39	n/a	4.0/WNW	Birds & insects (38), WCC (30), traffic (28)
Tonsley Park	4:58 pm	38	n/a	4.5/NNW	Frogs & insects (37), traffic (28), WCC (28)
Fletcher	4:05 pm	48	n/a	3.1/NNW	Traffic (46), train (42), birds & insects (38), WCC inaudible

Table 2 WCC Noise Monitoring Results – 27 October 2010 (Evening)					
Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	7:50 pm	37	>3	Calm	Traffic (34), birds & insects (32), frogs (31), WCC barely audible
Glenara	8:08 pm	40	<3	Calm	Traffic (36), WCC (36), insects (32)
Cintra	9:44 pm	38	>3	0.4/NW	WCC (38), insects (28)
Marengo	8:58 pm	40	>3	Calm	Frogs & insects (39), WCC (32)
Tonsley Park	9:25 pm	44	>3	Calm	Frogs & insects (41), WCC (40), traffic (35)
Fletcher	9:44 pm	49	>3	Calm	Traffic (49), WCC (33)

Table 3 WCC Noise Monitoring Results – 27 October 2010 (Night)					
Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	11:30 pm	32	>3	6.3/SSW	Traffic (31), insects (26), WCC inaudible
Glenara	12:38 am	30	>3	7.2/S	Traffic (30), WCC inaudible
Cintra	11:03 pm	42	>3	4.0/SSW	WCC (41), traffic (36), insects (30)
Marengo	10:15 am	41	0	3.1/SW	WCC (40), frogs & insects (35)
Tonsley Park	10:43 pm	43	>3	2.7/S	Traffic (40), frogs & insects (39), WCC (36)
Fletcher	12:55 pm	34	<3	5.4/S	Traffic (34), insects (23), WCC barely audible

The results shown in Tables 1-3 indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC where higher than the criterion of 35 dB(A) at the Cintra monitoring locations during the day, evening and night monitoring periods and at Tonsley Park during the evening and night, at Glenara during the evening and Marengo at night.

Cintra and Marengo are project related residences.

The noise at Cintra and Tonsley Park was related to emissions from the train loading facility including train noise, dozer tracks and trucks hauling coal. At Marengo and Glenara the noise was attributed to general mining hum with occasional individual noise sources discernable from haul trucks and excavators.

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 at Tonsley Park were measured whilst there was a temperature inversion of greater than +3° C/100m in place.

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

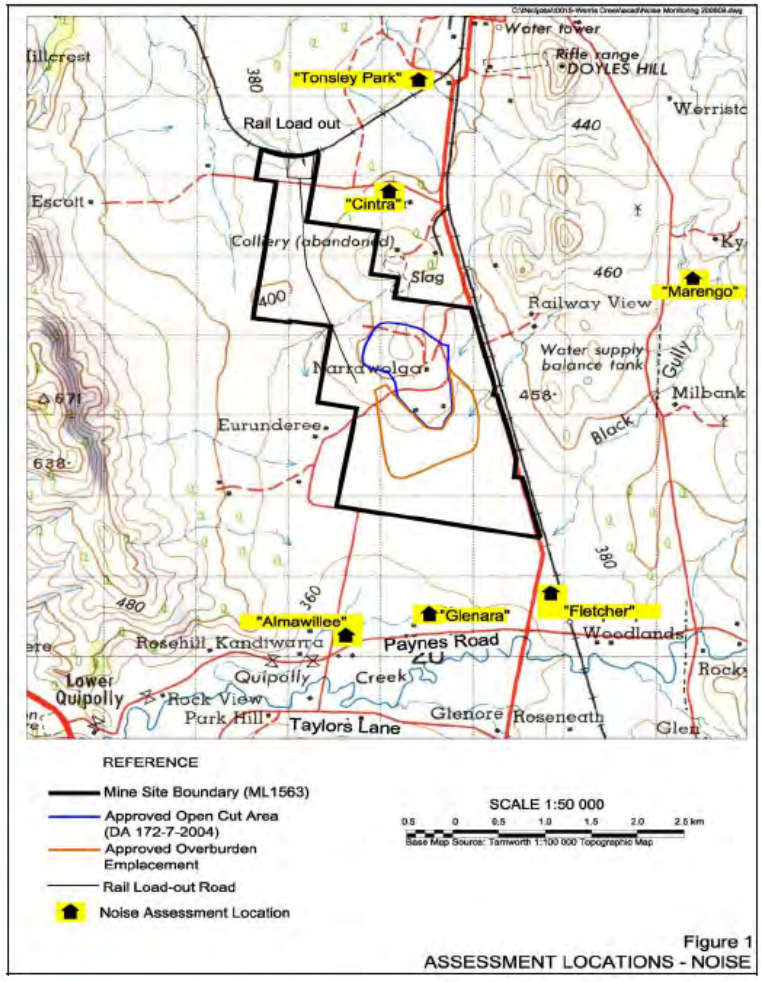

Figure 1
ASSESSMENT LOCATIONS - NOISE

16 December 2010

Ref: 04035/3808

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

RE: DECEMBER 2010 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 9 and Tuesday 14 December 2010. Rain during the night of 9 December caused the survey to be abandoned and recommenced, at the nearest opportunity, on 14 December.

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"

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). WCC activities were audible at some monitoring locations throughout the survey.

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 December 9 winds were moderate from the north to north west. The data from the met station shows wind speeds were generally higher than 5m/s. Observations at ground level were that winds at this height were at lower speeds than this (range 2 to 4m/s).

On December 14 the wind was light from the north east to north west. The data showed a mild to strong temperature inversion for the duration of 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 minimum level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 9 December 2010 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	4:31 pm	44	n/a	7.6/NW	Birds & insects (43), wind (36), WCC (30)
Glenara	4:51 pm	46	n/a	7.0/NW	Birds & insects (45), tractor (35), WCC (33)
Railway Cottage	4:37 pm	46	n/a	7.6/NW	Traffic (44), insects (43), WCC inaudible
Tonsley Park	3:25 pm	41	n/a	7.2/NNW	Insects (38), train on loop (36), traffic (32), WCC inaudible
Greenslopes	3:54 pm	44	n/a	5.8/NW	Wind (41) traffic (40), train (30), WCC inaudible
Kyooma	4:15 pm	38	n/a	7.6/NW	Birds & insects (35), wind in trees (35), WCC inaudible

Table 2
WCC Noise Monitoring Results – 9 December 2010 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	7:34 pm	43	Lapse	5.4/N	Birds & insects (39), horse (39), WCC (38)
Glenara	7:52 pm	50	Lapse	5.4/N	Birds & insects (50), WCC (38)
Railway Cottage	8:10 pm	47	Lapse	4.9/N	Birds & insects (44), traffic (43), WCC (39)
Tonsley Park	8:58 pm	41	Lapse	5.8/N	Birds & insects (39), railway works (37), WCC inaudible
Greenslopes	9:20 pm	42	Lapse	7.1/N	Insects (39), traffic (37), railway works (35), WCC inaudible
Kyooma	8:35 pm	36	Lapse	5.6/N	Insects (36), WCC inaudible

Table 3
WCC Noise Monitoring Results – 9 14 December 2010 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee*	10:36 pm	38	>3	2.2/NE	Insects (38), WCC (34)
Glenara*	10:19 pm	38	<3	0.9/NW	Insects (37), WCC (33), traffic (30)
Railway Cottage*	10:01 pm	40	>3	0.4/NW	Insects & dogs (39), WCC (33)
Tonsley Park	10:25 pm	44	Lapse	7.6/N	Insects (42), railway works (40), traffic (30), WCC inaudible
Greenslopes	10:47 pm	40	Lapse	8.0/N	Insects (39), traffic (35), WCC inaudible
Kyooma	10:02 pm	37	Lapse	7.2/N	Insects (37), WCC inaudible

*14 December

The results shown in Tables 1-3 indicate that, under the operational and atmospheric conditions at the time, noise emission from WCC where higher than the criterion of 35 dB(A) at the Almawillee, Glenara and Railway Cottage monitoring locations during the evening monitoring period on 9 December.

The noise at each of these monitoring locations was mainly related to engine noise from haul trucks.

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 during the evening on December 9 were measured whilst there was a wind speed of greater than 3m/s and, therefore, under non-compliant atmospheric conditions.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) 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

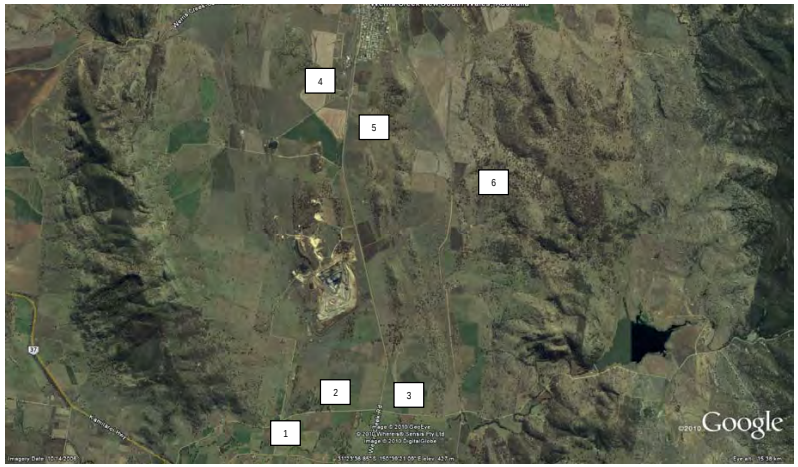

Figure 1 – Noise Monitoring Locations

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

23 November 2010

Ref: 04035/3770

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

RE: NO EMBER 2010 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 18 November 2010.

Noise measurement locations for the attended noise survey are as defined in the Werris Creek Coal Pty Ltd *"Noise Management Protocol"*. The locations are listed below and attached in **Figure 1**:

"Almawillee"
"Glenara"
"Marengo"
"Tonsley Park"
"Cintra"
"Railway Cottage" (previously denoted as "Fletcher")

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). WCC activities were audible at some monitoring locations throughout the survey.

Meteorological data used in this report were supplied by the mine from their automatic weather station. Wind speeds and direction have been determined as the arithmetic average of the measurements over the monitoring period. The data shows that winds were light to moderate generally from the south during the day, dropping to calm in the evening before turning to the north north west during the night. The data showed a mild to strong temperature inversion for most of the evening and night.

The total measured Leq 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 minimum level during the measurement and not measurable.

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Table 1
WCC Noise Monitoring Results – 18 November 2010 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	2:28 pm	36	n/a	1.8/S	Birds & insects (36), traffic (20), WCC inaudible
Glenara	2:45 pm	40	n/a	4.0/SSW	Birds & insects (38), traffic (36), WCC (25) inaudible
Cintra	2:05 pm	42	n/a	3.6/S	WCC (40), birds & insects (37)
Marengo	3:30 pm	33	n/a	4.9/S	Birds & insects (33), WCC barely audible
Tonsley Park	3:55 pm	41	n/a	5.8/S	Traffic (39), birds & insects (35), WCC (34)
Railway Cottage	3:03 pm	44	n/a	5.4/S	Traffic (44), birds & insects (25), WCC inaudible

Table 2
WCC Noise Monitoring Results – 18 November 2010 (Evening)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	8:02 pm	46	>3	0.4/S	Frogs & insects (46), WCC inaudible
Glenara	8:20 pm	40	>3	Calm	Frogs & insects (40), WCC inaudible
Cintra	9:42 pm	38	>3	1.3/S	WCC (38), insects (28)
Marengo	8:59 pm	40	>3	Calm	Frogs & insects (40), WCC (30)
Tonsley Park	9:25 pm	42	>3	Calm	Frogs & insects (41), traffic (33), WCC (31)
Railway Cottage	8:38 pm	50	>3	Calm	Frogs & insects (50), traffic (35), WCC inaudible

Table 3
WCC Noise Monitoring Results – 18 November 2010 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	10:43 pm	41	<3	2.7/NNW	Frogs & insects (41), WCC (30)
Glenara	11:00 am	38	<3	3.1/NNW	Frogs & insects (36), traffic (32), WCC (30)
Cintra	11:25 pm	42	<3	2.7/NNW	Frogs & insects (38), traffic (36), WCC (36)
Marengo	10:05 am	39	<3	0.9/S	Frogs & insects (39), WCC (25)
Tonsley Park	11:43 pm	41	<3	2.2/NNW	Frogs & insects (41), WCC (24)
Railway Cottage	10:25 pm	41	<3	2.2/NNW	Frogs & insects (40), traffic (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 where higher than the criterion of 35 dB(A) at the Cintra monitoring locations during the day, evening and night monitoring periods.

Cintra is a project related residence.

The noise at Cintra was related to emissions from the train loading facility including, dozer engine and track noise and trucks hauling coal.

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 at Cintra during the evening were measured whilst there was a temperature inversion of greater than +3° C/100m in place.

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

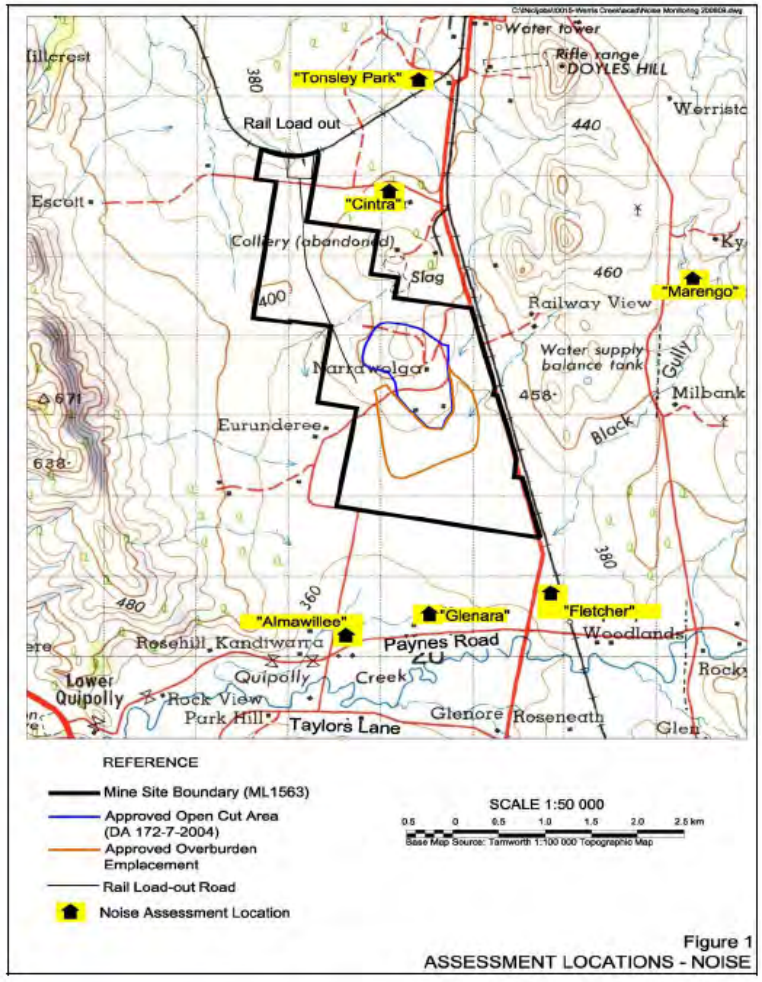

Figure 1
ASSESSMENT LOCATIONS - NOISE

25 January 2011

Ref: 04035/3851

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

RE: JANUARY 2011 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 20 and Wednesday 21 January 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"

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). WCC activities were only barely audible at the Kyooma monitoring location throughout the night survey.

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 January 20 winds were moderate from the east to south east. The data from the met station shows wind speeds were generally higher than 5m/s. Observations at ground level were that winds at this height were at lower speeds than this (range 1 to 3m/s).

On January 21 the wind was light from the south south west. The data showed that there was no temperature inversion during the night survey.

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.

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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 minimum level during the measurement and not measurable.

Table 1
WCC Noise Monitoring Results – 21 January 2011 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	9:40 am	39	n/a	1.3/203	Birds & insects (38), traffic (30), WCC inaudible
Glenara	9:22 am	42	n/a	2.2/196	Birds & insects (41), traffic (35), WCC inaudible
Railway Cottage	9:05 am	37	n/a	2.7/202	Traffic (36), insects (30), WCC inaudible
Tonsley Park	8:22 am	46	n/a	1.5/170	Birds & insects (44), traffic (41), WCC inaudible
Greenslopes	8:02 am	42	n/a	2.0/179	Birds & insects (41) traffic (35), wind (30), WCC inaudible
Kyooma	8:45 am	35	n/a	1.8/177	Birds & insects (35), WCC (20)

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

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	8:22 pm	41	Lapse	5.6/129	Birds & insects (38), wind (35), traffic (32), WCC inaudible
Glenara	8:05 pm	42	Lapse	6.8/137	Birds & insects (39), traffic (37), wind (35), WCC inaudible
Railway Cottage	8:40 pm	66	Lapse	5.0/122	Train (66), birds & insects (40), traffic (39), WCC inaudible
Tonsley Park	7:45 pm	46	Lapse	7.7/133	Wind (42), birds & insects (40), train (40) WCC inaudible
Greenslopes	7:25 pm	42	Lapse	7.1/144	Traffic (38), wind (36), insects (34), WCC inaudible
Kyooma	9:03 pm	43	Lapse	4.6/118	Birds & insects (43), WCC inaudible

Table 3
WCC Noise Monitoring Results – 20 January 2011 (Night)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	10:36 pm	36	Lapse	3.9/97	Insects (35), traffic (31), WCC inaudible
Glenara	10:53 pm	39	Lapse	2.4/74	Birds & insects (38), traffic (34) WCC inaudible
Railway Cottage	11:10 pm	39	Lapse	1.9/51	Traffic (38), insects (30), WCC inaudible
Tonsley Park	10:18 pm	42	Lapse	2.7/115	Insects (42), traffic (32), WCC inaudible
Greenslopes	10:00 pm	44	Lapse	2.6/147	Insects (44), traffic (30), WCC inaudible
Kyooma	11:29 pm	35	Lapse	1.5/10	Insects (35), 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 criterion of 35 dB(A) Leq at any monitoring location during any evening monitoring.

At Tonsley Park the noise from trains on the WCC rail loop was measured at 40 dB(A) Leq during the evening monitoring period. At this time a loaded train was initially at idle and then moved off from the

loop. 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

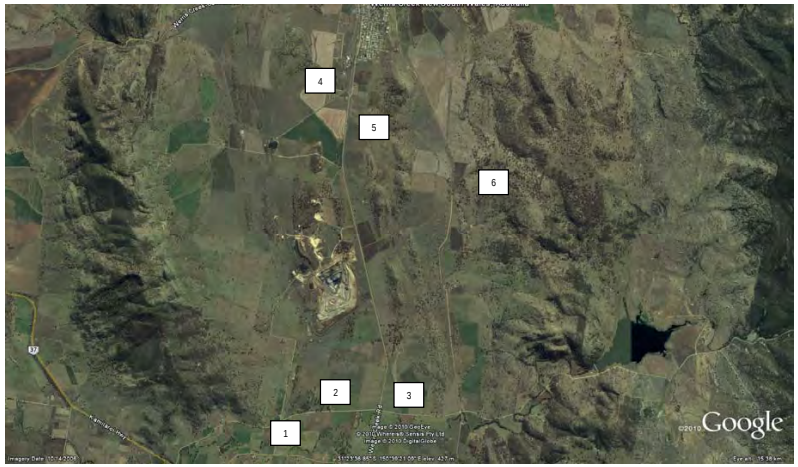

Figure 1 – Noise Monitoring Locations

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

2 March 2011

Ref: 04035/3886

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

RE: EBRUARY 2011 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Thursday 24 February 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"

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). WCC activities were audible at low levels on occasion at various monitoring locations throughout the survey.

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 February 24 winds were moderate from the south to south west during the day turning to the south east during the evening and early night. After midnight the wind decreased in strength and blew from the north east.

The data showed that there was a mild temperature inversion during the evening and early parts of the night survey.

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.

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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 minimum level during the measurement and not measurable.

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

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	3:50 pm	43	n/a	1.1/208	Birds & insects (40), traffic (39), horse (30), WCC inaudible
Glenara	4:07 pm	37	n/a	1.8/191	Birds & insects (37), WCC (20)
Railway Cottage	3:33 pm	55	n/a	2.4/225	Traffic (55), insects (40), WCC inaudible
Tonsley Park	4:33 pm	34	n/a	2.1/217	Traffic (32), birds & insects (28), train (21), WCC inaudible
Greenslopes	4:55 pm	40	n/a	0.8/200	Insects (39), traffic (33), WCC inaudible
Kyooma	3:10 pm	38	n/a	2.4/179	Birds & insects (38), WCC (27)

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

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	8:22 pm	42	<3	4.2/116	Insects (42), traffic (25), cattle (24), WCC inaudible
Glenara	8:40 pm	48	<3	3.4/125	Insects (48), traffic (32), WCC inaudible
Railway Cottage	9:00 pm	52	>3	3.1/145	Traffic (50), insects (48), WCC inaudible
Tonsley Park	8:00 pm	46	<3	4.7/114	Insects (46), traffic (35) WCC (25)
Greenslopes	7:38 pm	62	<3	4.0/129	Insects (62), WCC (26)
Kyooma	9:24 pm	41	>3	3.9/117	Birds & insects (41), WCC inaudible

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

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	10:01 pm	36	>3	3.9/125	Insects (35), traffic (28), WCC inaudible
Glenara	10:18 pm	47	<3	1.6/78	Insects (47), traffic (30) WCC (20)
Railway Cottage	10:37 pm	39	Lapse	2.1/81	Traffic (38), insects (30), WCC inaudible
Tonsley Park	12:29 am	43	Lapse	0.1/267	Insects (43), WCC inaudible
Greenslopes	12:10 am	44	Lapse	0.2/315	Insects (44), traffic (30), WCC inaudible
Kyooma	11:03 pm	50	Lapse	1.5/345	Insects (50), 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 criterion of 35 dB(A) Leq at any monitoring location during any monitoring period.

Data from those times where WCC operations were audible were analysed using the *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, the noise from WCC must not exceed **45 dB(A) 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

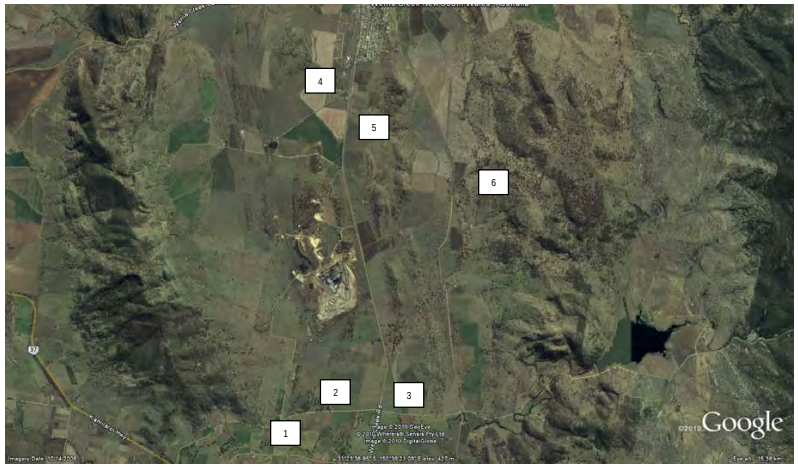

Figure 1 – Noise Monitoring Locations

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

31 March 2011

Ref: 04035/3930

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

RE: MARCH 2011 NOISE MONITORING RESULTS

This letter report presents the results of noise compliance monitoring conducted for the Werris Creek Coal Mine (WCC) on Friday 25 March 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"

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 stations. Wind speed and direction have been determined as the arithmetic average of the measurements, taken from the permanent weather station, over each monitoring period. The data show that on March 25 winds were light from the west during the day increasing in strength to come from the south during the evening before dropping in intensity from the south east at night.

Wind speed data is taken from the weather station at 10m above ground level as this relates to the noise propagation path.

The mine has a relocatable weather station which at the time of the survey was located at Tonsley Park (at r.l. 385.7m). The 2m temperature logger at the permanent weather station is at r.l. 445.5m. Temperature inversion information in this report has been calculated as an extrapolation as the difference between the temperature at these two stations.

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The data showed that there was a mild to strong temperature inversion during the evening and night surveys.

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 – 25 March 2011 (Day)

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	4:37 pm	41	n/a	3.7/216	Birds & insects (40), wind (35), WCC inaudible
Glenara	4:20 pm	38	n/a	4.1/219	Birds & insects (38), WCC (25)
Railway Cottage	4:02 pm	45	n/a	3.8/255	Wind in grass (43), traffic (39), insects (30), WCC inaudible
Tonsley Park	2:45 pm	42	n/a	3.7/251	Traffic (38), birds & insects (38), wind (33), WCC (25)
Greenslopes	3:06 pm	46	n/a	3.8/250	Traffic (45), WCC (36), birds & insects (30)
Kyooma	3:38 pm	39	n/a	5.4/268	WCC (37), birds & insects (35)

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

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	9:25 pm	34	+4.1	4.2/186	Insects (34), traffic (25), WCC inaudible
Glenara	9:06 pm	44	+2.9	4.6/189	Insects (44), WCC inaudible
Railway Cottage	8:45 pm	48	+3.9	4.6/194	Traffic (47), insects (40), WCC inaudible
Tonsley Park	7:30 pm	44	+4.2	7.4/188	Birds & insects (40), traffic (40) WCC (36)
Greenslopes	7:53 pm	47	+4.2	6.5/180	Insects (44), traffic (41), WCC (40)
Kyooma	8:18 pm	41	+3.4	4.8/179	Birds & insects (38), WCC (38)

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

Location	Time	dB(A),Leq	Inversion °C/ 100m	Wind speed/ direction	Identified Noise Sources
Almawillee	12:10 am	32	+5.6	3.0/148	Traffic (29), insects (29), dogs (25), WCC inaudible
Glenara	11:19 pm	34	+6.1	2.2/143	Traffic (33), insects (30), WCC inaudible
Railway Cottage	11:03 pm	24	+6.3	3.0/160	Insects (24), WCC inaudible
Tonsley Park	10:18 pm	58	+9.4	2.4/163	Train (58), traffic (39), WCC (34), insects (33)
Greenslopes	10:00 pm	45	+9.5	2.5/168	WCC (42), traffic (41), insects (38)
Kyooma	10:42 pm	40	+9.4	3.0/159	WCC (38), insects (36)

The results shown in Tables 1-3 indicate that, under the operational and atmospheric conditions at the time, noise emissions from WCC were higher than 35 dB(A) Leq at Kyooma and Greenslopes during each of the day, evening and night time monitoring periods and at Tonsley Park during the night.
The elevated noise at each location was due to general mine hum and plant noise (haul trucks and dozers). Noise from dozers on the stockpile at the rail load out facility was also a contributor to the received noise at the Tonsley Park and Greenslopes monitoring locations during the day and evening.

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 at each location during the evening and night were measured whilst there was a strong temperature inversion in place.

The elevated noise levels during the day at Kyooma and Greenslopes were measured whilst there was a westerly wind blowing at greater than 3m/s.

WCC has private agreements in place with the landowners at Kyooma, Tonsley Park and Almawillee which allow for received noise levels between 35 and 40 dB(A) Leq (15 min) to be considered a noise management zone.

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

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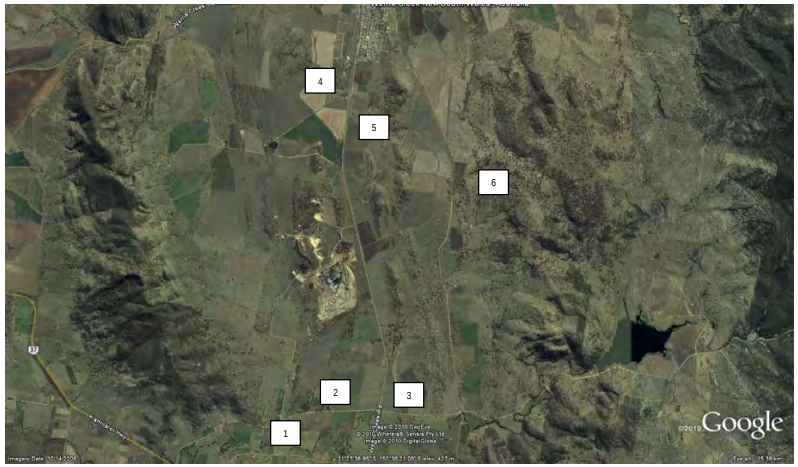

Figure 1 – Noise Monitoring Locations

Key

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

WERRIS CREEK COAL
AEMR 2010-2011

APPENDIX 8

MONTHLY METEOROLOGICAL DATA

Date	Average Temp	Max Temp	Min Temp	Average %RH	Max %RH	Min %RH	Rain mm	ET mm	Average WS	Max WS	Min WS	Minimum Wind Chill	Maximum Heat Index	Average Atm Pressure	Max Atm Pressure	Min Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/04/2010	18.3	24.5	12.6	65.7	90.0	42.0	0.0	4.9	1.9	5.8	0.0	12.7	24.3	1019.2	1020.8	1017.3	255.937	857	0
2/04/2010	17.5	25.1	9.7	63.6	87.0	39.0	0.0	4.9	1.8	4.9	0.0	9.8	24.3	1019.8	1021.9	1017.8	247.521	867	0
3/04/2010	18.4	25.9	11.1	59.5	87.0	34.0	0.0	5.2	2.2	6.7	0.0	11.3	25.1	1020.4	1022.6	1017.9	244.813	842	0
4/04/2010	17.8	24.3	10.9	61.5	87.0	39.0	0.0	5.3	2.9	6.3	0.0	10.3	23.7	1020.7	1023.0	1018.2	248.927	880	0
5/04/2010	17.6	25.4	10.1	63.4	86.0	39.0	0.0	3.4	0.9	3.1	0.0	10.3	24.8	1020.0	1022.4	1017.5	171.198	966	0
6/04/2010	18.8	23.8	15.8	71.5	92.0	52.0	4.2	2.2	1.6	4.0	0.0	15.9	23.9	1020.2	1022.2	1018.6	89.427	517	0
7/04/2010	19.2	21.2	16.9	76.3	87.0	67.0	0.8	1.8	2.5	5.8	0.0	16.5	21.1	1019.3	1021.2	1017.7	53.271	358	0
8/04/2010	20.4	26.6	15.7	71.1	88.0	42.0	0.4	3.3	1.9	5.4	0.0	15.7	26.3	1017.0	1019.0	1014.7	136.688	996	0
9/04/2010	18.5	25.9	11.3	62.7	88.0	36.0	0.0	4.1	0.7	2.2	0.0	11.3	24.8	1014.6	1017.9	1011.9	226.500	806	0
10/04/2010	20.4	27.3	13.1	62.2	85.0	40.0	0.0	3.7	1.7	4.5	0.0	13.6	26.7	1012.8	1014.7	1010.9	163.896	1135	0
11/04/2010	20.1	27.5	15.0	66.5	88.0	47.0	0.0	3.8	1.9	6.3	0.0	15	27.3	1013.0	1015.3	1010.6	158.823	888	0
12/04/2010	17.3	23.8	12.4	50.2	83.0	24.0	0.0	4.8	1.3	3.6	0.0	12.6	22.7	1017.2	1021.8	1014.5	274.674	807	0
13/04/2010	16.2	25.4	8.8	54.7	79.0	24.0	0.0	4.6	1.3	5.8	0.0	8.9	24.7	1022.3	1024.6	1018.9	222.208	769	0
14/04/2010	17.6	26.2	9.4	51.3	77.0	31.0	0.0	3.7	0.6	3.6	0.0	9.6	24.9	1022.2	1024.0	1020.8	190.313	877	0
15/04/2010	18.7	26.3	10.7	48.8	76.0	23.0	0.0	4.4	1.1	3.6	0.0	10.9	25.2	1024.2	1027.5	1020.5	210.708	744	0
16/04/2010	18.9	26.8	10.7	58.7	85.0	24.0	0.0	4.3	1.6	5.4	0.0	10.7	25.4	1026.4	1028.9	1023.6	199.208	819	0
17/04/2010	19.7	28.0	12.0	57.5	83.0	31.0	0.0	4.3	1.9	6.7	0.0	12.1	27.3	1026.1	1028.2	1023.7	177.938	849	0
18/04/2010	20.6	28.2	13.6	60.0	85.0	34.0	0.0	3.8	1.4	4.9	0.0	13.6	27.4	1024.9	1026.8	1022.6	177.458	814	0
19/04/2010	19.4	28.1	11.7	62.3	87.0	35.0	0.0	3.2	0.8	4.9	0.0	11.8	26.8	1024.4	1026.2	1021.5	157.344	826	0
20/04/2010	19.6	26.8	12.3	55.9	79.0	33.0	0.0	3.9	1.2	6.3	0.0	12.3	26	1022.7	1024.9	1020.4	177.531	684	0
21/04/2010	20.1	27.6	12.3	57.4	84.0	31.0	0.0	4.2	1.2	4.9	0.0	12.4	26.5	1023.2	1025.7	1020.5	186.281	684	0
22/04/2010	20.4	27.7	13.7	55.5	77.0	32.0	0.0	3.9	0.8	3.6	0.0	13.9	26.4	1022.7	1025.1	1019.8	185.854	665	0
23/04/2010	20.5	28.2	14.2	51.7	66.0	34.0	0.0	3.5	1.2	5.8	0.0	14.6	27.3	1019.7	1021.2	1016.0	128.792	590	0
24/04/2010	20.8	26.2	13.8	57.8	89.0	41.0	17.6	2.7	2.6	5.8	0.0	13	25.8	1015.4	1017.4	1013.0	41.635	210	0
25/04/2010	12.2	20.2	5.9	81.4	92.0	37.0	1.4	2.3	1.2	4.5	0.0	5.6	18.4	1023.2	1027.3	1016.4	172.052	743	0
26/04/2010	14.0	20.4	8.1	59.7	79.0	33.0	0.0	3.6	1.6	4.9	0.0	8.1	19.3	1024.2	1025.5	1021.6	163.438	615	0
27/04/2010	14.9	22.7	7.6	71.2	92.0	31.0	1.2	2.8	0.6	2.7	0.0	7.6	20.9	1023.1	1025.2	1021.2	179.208	728	0
28/04/2010	14.7	22.8	7.1	59.0	87.0	30.0	0.0	3.6	0.7	3.6	0.0	7.1	21.6	1023.8	1025.9	1021.4	198.219	716	0
29/04/2010	14.7	22.5	6.7	62.9	89.0	36.0	0.0	3.5	0.9	3.6	0.0	6.7	21.6	1024.8	1027.4	1022.2	194.865	711	0
30/04/2010	15.7	24.8	8.7	64.8	87.0	34.0	0.0	3.6	1.3	4.5	0.0	8.8	24.1	1026.6	1029.1	1023.6	189.656	688	0
Monthly	18.1	28.2	5.9	61.5	92.0	23.0	25.6	113.0	1.4	6.7	0.0	5.6	27.4	1021.1	1029.1	1010.6	180.813	1135	0

Date	Average Temp	Max Temp	Min Temp	Average %RH	Max %RH	Min %RH	Rain mm	ET mm	Average WS	Max WS	Min WS	Minimum Wind Chill	Maximum Heat Index	Average Atm Pressure	Max Atm Pressure	Min Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/05/2010	17.4	25.0	11.2	61.3	85.0	36.0	0.0	3.1	0.6	3.6	0.0	11.3	24.3	1026.7	1028.7	1024.9	173.621	703	0
2/05/2010	18.2	25.4	11.9	57.3	78.0	37.0	0.0	2.9	0.5	2.2	0.0	11.9	24.6	1026.5	1028.2	1024.3	134.760	917	0
3/05/2010	18.4	24.7	11.3	60.5	81.0	40.0	0.0	2.8	1.5	4.5	0.0	11.8	24.1	1023.7	1025.4	1019.8	117.479	586	0
4/05/2010	16.3	23.4	11.3	66.3	86.0	40.0	0.0	3.7	2.3	6.7	0.0	11.4	23.1	1018.0	1020.2	1014.4	154.021	719	0
5/05/2010	11.2	24.6	2.6	57.5	83.0	32.0	0.0	3.5	1.8	7.6	0.0	2.6	23.5	1021.3	1024.8	1014.2	171.990	697	0
6/05/2010	11.4	20.9	3.5	60.0	86.0	30.0	0.0	3.1	0.7	2.2	0.0	3.7	18.6	1023.8	1025.3	1021.4	180.646	666	0
7/05/2010	12.8	22.7	4.8	57.2	85.0	27.0	0.0	3.1	0.5	2.2	0.0	4.9	21.3	1022.7	1024.7	1021.1	178.427	658	0
8/05/2010	14.7	23.4	8.2	55.2	81.0	25.0	0.0	3.3	0.6	2.2	0.0	8.8	22.1	1022.7	1024.7	1020.8	174.313	645	0
9/05/2010	15.5	23.9	8.9	53.5	74.0	32.0	0.0	3.2	0.4	2.7	0.0	9.4	23.2	1021.5	1023.3	1018.9	172.188	657	0
10/05/2010	15.6	24.3	7.9	51.6	74.0	32.0	0.0	3.5	1.0	5.4	0.0	8.2	23.3	1018.0	1019.2	1014.7	160.271	632	0
11/05/2010	14.5	24.5	7.1	44.4	62.0	24.0	0.0	4.3	2.7	6.3	0.0	5.1	23.3	1018.1	1021.6	1014.3	170.365	647	0
12/05/2010	9.2	17.4	0.6	50.4	81.0	26.0	0.0	3.2	1.0	4.5	0.0	0.6	15.2	1022.4	1024.7	1019.1	167.604	628	0
13/05/2010	10.7	19.0	2.4	51.0	80.0	27.0	0.0	2.9	0.4	2.7	0.0	2.6	17.2	1020.9	1022.5	1018.1	162.948	614	0
14/05/2010	11.5	19.5	3.6	58.8	84.0	35.0	0.0	2.8	0.5	3.6	0.0	3.7	18	1019.0	1021.1	1017.6	159.375	604	0
15/05/2010	12.3	20.9	6.2	56.5	79.0	33.0	0.0	3.1	0.9	4.0	0.0	6.3	19.3	1020.9	1023.4	1017.8	157.083	611	0
16/05/2010	14.0	22.1	10.8	62.0	81.0	35.0	0.6	1.9	1.0	4.9	0.0	10.8	19.9	1020.5	1022.0	1018.8	66.698	466	0
17/05/2010	11.8	16.4	7.2	70.8	88.0	51.0	0.0	1.7	1.1	4.0	0.0	7.3	15.4	1019.6	1021.0	1018.4	82.573	556	0
18/05/2010	11.5	19.2	5.6	74.8	91.0	49.0	0.0	2.2	1.5	5.4	0.0	5.6	18.2	1021.9	1024.7	1019.2	128.281	591	0
19/05/2010	12.4	20.6	6.1	70.6	89.0	40.0	0.0	2.3	1.2	5.4	0.0	6.3	19.2	1023.0	1025.1	1020.4	113.000	510	0
20/05/2010	14.5	20.9	9.9	64.6	83.0	39.0	0.0	2.2	0.6	2.7	0.0	9.9	18.8	1021.1	1022.7	1017.8	105.646	531	0
21/05/2010	12.4	20.6	6.2	67.2	89.0	39.0	0.0	2.9	2.6	7.2	0.0	6.3	19.2	1020.7	1022.7	1017.5	131.896	630	0
22/05/2010	11.7	20.9	6.2	71.1	89.0	44.0	0.0	2.6	1.8	6.7	0.0	5.6	18.9	1022.5	1024.8	1020.2	130.542	608	0
23/05/2010	14.7	19.6	10.6	62.2	75.0	45.0	0.0	2.0	1.0	4.0	0.0	10.7	18.4	1020.8	1022.3	1017.4	79.438	349	0
24/05/2010	15.0	18.9	13.1	76.8	90.0	48.0	3.8	1.0	1.0	3.6	0.0	13.1	17.8	1014.6	1017.6	1009.4	33.583	178	0
25/05/2010	13.3	16.1	11.6	88.0	92.0	75.0	15.6	1.1	2.5	5.8	0.0	9.3	15.9	1007.8	1009.3	1005.9	56.573	555	0
26/05/2010	13.3	18.7	10.5	82.5	93.0	59.0	1.0	2.0	2.0	6.3	0.0	10.6	17.9	1013.6	1018.8	1007.8	109.271	636	0
27/05/2010	12.8	19.2	7.3	76.0	89.0	51.0	0.0	2.2	1.4	5.8	0.0	7.3	18.4	1020.6	1023.5	1017.5	116.458	642	0
28/05/2010	14.7	19.2	12.2	76.8	91.0	52.0	15.2	1.2	1.9	5.4	0.0	10.2	18.2	1015.2	1019.1	1009.2	33.104	279	0
29/05/2010	10.9	13.8	9.0	85.2	92.0	77.0	2.0	1.4	3.9	6.3	2.2	6.6	13.7	1010.2	1011.4	1008.9	58.948	374	0
30/05/2010	11.0	16.1	9.9	85.5	95.0	61.0	0.2	1.2	2.4	4.9	0.4	7.5	15.4	1012.8	1015.9	1009.8	70.177	513	0
31/05/2010	12.1	17.5	6.8	84.7	93.0	53.0	3.0	1.7	0.7	3.6	0.0	7	16.6	1018.6	1021.6	1013.8	129.479	656	0
Monthly	13.4	25.4	0.6	65.8	95.0	24.0	41.4	78.0	1.4	7.6	0.0	0.6	24.6	1019.7	1028.7	1005.9	125.186	917	0

Date	Average Temp	Max Temp	Min Temp	Average %RH	Max %RH	Min %RH	Rain mm	ET mm	Average WS	Max WS	Min WS	Minimum Wind Chill	Maximum Heat Index	Average Atm Pressure	Max Atm Pressure	Min Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/06/2010	12.1	17.8	9.6	80.6	91.0	52.0	1.2	1.2	1.0	3.1	0.0	9.1	16.7	1020.4	1022.0	1018.8	72.853	526	0
2/06/2010	12.6	16.9	11.5	88.1	92.0	65.0	13.2	1.0	2.0	5.4	0.0	9.8	16.5	1021.8	1023.5	1019.9	63.719	539	0
3/06/2010	13.9	17.5	11.0	79.5	90.0	63.0	0.0	2.3	3.3	8.0	0.0	10.5	17.2	1018.2	1021.1	1014.1	83.760	638	0
4/06/2010	13.5	17.4	10.1	79.6	87.0	56.0	0.0	2.1	4.0	6.3	0.0	9.6	16.6	1015.4	1017.1	1014.2	102.833	667	0
5/06/2010	10.7	17.7	4.6	69.3	88.0	52.0	0.0	2.2	1.0	4.0	0.0	4.1	16.7	1016.9	1019.7	1014.4	124.927	633	0
6/06/2010	9.5	15.9	3.8	70.7	89.0	48.0	0.0	2.2	0.9	3.6	0.0	3.5	14.6	1023.7	1027.3	1018.6	151.688	595	0
7/06/2010	9.9	17.3	4.5	71.9	92.0	46.0	0.0	2.3	1.1	3.6	0.0	4.6	16.1	1024.8	1026.1	1021.9	141.344	587	0
8/06/2010	10.0	17.5	3.9	66.1	83.0	44.0	0.0	2.5	2.1	8.0	0.0	2.8	16.1	1020.1	1022.3	1016.3	115.479	674	0
9/06/2010	9.6	15.0	5.9	62.1	80.0	42.0	0.0	3.4	4.2	7.6	1.8	3.2	13.3	1020.8	1024.4	1016.2	137.469	620	0
10/06/2010	6.2	13.7	0.2	69.5	80.0	39.0	0.0	2.1	0.9	3.6	0.0	0.1	12.1	1024.3	1026.2	1021.8	145.875	589	0
11/06/2010	7.2	13.3	0.8	69.7	80.0	50.0	0.0	2.3	1.2	3.6	0.0	0.9	12.4	1024.0	1026.2	1022.5	146.219	580	0
12/06/2010	7.7	16.9	1.3	69.7	80.0	47.0	0.0	2.3	0.9	3.6	0.0	1.4	15.6	1028.1	1032.0	1023.7	145.146	587	0
13/06/2010	10.2	17.2	4.6	72.7	80.0	46.0	0.0	2.0	1.1	3.1	0.0	3.4	16.1	1032.7	1035.8	1029.5	109.458	640	0
14/06/2010	10.5	18.4	5.0	69.8	80.0	43.0	0.0	2.1	1.0	4.5	0.0	5.1	17.2	1033.1	1034.4	1030.2	128.281	571	0
15/06/2010	11.4	19.4	4.5	67.1	80.0	39.0	0.2	2.4	0.5	3.6	0.0	4.8	17.8	1030.3	1032.0	1027.3	133.635	581	0
16/06/2010	11.4	18.4	6.9	68.0	80.0	39.0	7.6	1.4	1.3	4.9	0.0	7.2	17	1024.4	1027.0	1020.3	46.531	575	0
17/06/2010	11.9	15.5	8.8	86.4	80.0	55.0	4.0	1.5	2.2	5.8	0.0	8.8	14.3	1020.8	1022.4	1019.3	111.750	629	0
18/06/2010	8.4	15.6	0.8	73.9	80.0	52.0	0.2	2.1	0.8	4.0	0.0	1.3	14.4	1022.6	1025.8	1019.5	141.469	574	0
19/06/2010	9.7	16.2	5.4	74.3	80.0	52.0	0.0	2.1	0.6	2.2	0.0	5.6	14.8	1027.2	1030.2	1023.8	142.365	573	0
20/06/2010	10.4	19.2	4.2	76.4	80.0	49.0	0.2	2.0	0.4	3.6	0.0	4.3	18.3	1030.9	1034.0	1027.5	143.938	570	0
21/06/2010	11.7	19.7	6.5	77.0	80.0	45.0	0.2	2.1	1.8	4.9	0.0	6.7	18.2	1034.9	1037.4	1031.7	117.750	553	0
22/06/2010	11.9	18.4	7.2	72.3	80.0	47.0	0.0	2.3	2.1	5.8	0.0	7.1	17.6	1035.7	1037.1	1033.6	101.375	623	0
23/06/2010	11.7	17.9	5.9	66.4	80.0	49.0	0.0	2.2	1.2	5.4	0.0	5.9	16.5	1032.4	1034.0	1028.8	114.948	628	0
24/06/2010	13.3	18.7	10.2	69.0	80.0	51.0	0.0	2.1	1.0	3.6	0.0	10.3	17.7	1028.1	1029.1	1025.3	100.802	705	0
25/06/2010	13.5	18.5	10.7	76.6	80.0	52.0	9.4	1.5	1.4	4.5	0.0	10.2	17.6	1023.6	1025.2	1021.2	56.479	531	0
26/06/2010	9.6	15.0	2.9	80.4	80.0	54.0	0.4	1.6	1.0	3.6	0.0	3.3	14.8	1021.8	1023.5	1020.6	132.781	620	0
27/06/2010	5.7	12.8	-0.9	77.2	80.0	49.0	0.2	1.9	0.4	2.2	0.0	-0.9	11.7	1022.5	1024.4	1021.0	150.229	599	0
28/06/2010	5.3	12.7	-1.3	72.1	80.0	41.0	0.0	2.0	0.8	3.1	0.0	-1.3	11.1	1023.2	1025.7	1021.5	151.177	597	0
29/06/2010	4.2	11.4	-1.6	75.9	80.0	49.0	0.2	1.7	0.4	2.2	0.0	-1.6	10.6	1024.5	1027.4	1022.4	151.146	721	0
30/06/2010	5.1	12.3	-0.2	70.4	80.0	45.0	0.0	1.6	0.3	1.8	0.0	-0.6	11.1	1027.3	1030.4	1024.5	120.573	604	0
Monthly	10.0	19.7	-1.6	73.4	92.0	39.0	37.0	60.6	1.4	8.0	0.0	-1.6	18.3	1025.2	1037.4	1014.1	119.533	721	0

Date	Temp Avg	Temp Max	Temp Min	%RH Avg	%RH Max	%RH Min	Rain mm	ET mm	WS Avg	WS Max	WS Min	Wind Chill Minimum	Heat Index Maximum	Barometric Pressure Avg	Barometric Pressure Max	Barometric Pressure Min	Solar Rad. Avg	Solar Rad. Max	Solar Rad. Min
1/07/2010	7.4	12.3	5.0	75	86	49	1.0	0.73	0.2	1.8	0.0	5.0	11.3	1028.9	1030.3	1027.1	41	325	0
2/07/2010	7.4	12.6	5.6	83	92	47	0.4	1.14	1.8	4.9	0.0	2.7	11.6	1029.1	1031.7	1027.1	101	654	0
3/07/2010	6.0	14.3	-0.5	71	89	46	0.0	2.16	0.9	4.5	0.0	-0.5	13.4	1031.2	1033.0	1029.1	138	592	0
4/07/2010	9.0	17.1	3.3	73	89	41	0.2	1.96	0.8	3.1	0.0	3.3	15.7	1028.4	1029.5	1024.5	135	631	0
5/07/2010	12.4	17.9	9.9	72	92	38	6.6	1.47	1.2	3.6	0.0	9.3	16.3	1021.3	1024.3	1018.1	64	517	0
6/07/2010	10.1	14.4	6.3	66	84	51	0.2	0.95	2.4	5.8	0.0	4.3	13.4	1020.7	1023.0	1017.8	63	328	0
7/07/2010	8.6	12.8	4.8	82	90	70	0.0	1.29	1.6	6.3	0.0	3.3	12.4	1024.8	1026.4	1022.7	72	407	0
8/07/2010	10.7	15.8	6.8	77	90	58	0.0	2.75	2.7	7.2	0.0	5.2	15.1	1026.5	1028.2	1024.4	148	608	0
9/07/2010	10.3	17.1	5.4	76	90	45	0.2	2.69	2.4	6.7	0.0	4.1	15.9	1028.4	1030.2	1026.8	150	594	0
10/07/2010	11.1	18.8	3.3	72	92	43	0.2	2.41	1.1	5.4	0.0	2.6	17.5	1028.2	1030.6	1025.8	140	593	0
11/07/2010	12.9	13.8	11.7	79	89	65	2.0	0.86	1.2	2.7	0.0	11.3	13.6	1025.6	1027.1	1024.3	26	164	0
12/07/2010	12.4	13.8	11.1	91	93	86	10.4	0.44	0.4	1.8	0.0	11.1	13.8	1024.3	1026.2	1023.1	27	163	0
13/07/2010	14.9	18.6	9.5	79	94	65	0.4	1.56	2.1	5.4	0.0	9.5	18.5	1020.0	1023.2	1014.8	65	337	0
14/07/2010	12.4	15.0	7.9	72	91	49	32.6	2.86	5.1	9.4	2.7	4.7	14.7	1016.3	1020.7	1011.1	126	778	0
15/07/2010	9.5	13.3	5.3	67	81	47	0.0	3.09	3.7	6.7	0.0	4.1	12.2	1022.5	1026.0	1019.0	147	709	0
16/07/2010	6.8	13.9	0.4	70	90	41	0.0	2.42	1.2	3.6	0.0	0.4	12.7	1027.2	1029.1	1025.4	158	623	0
17/07/2010	8.9	16.4	2.7	68	88	41	0.0	2.34	0.4	2.2	0.0	2.7	15.1	1028.1	1030.6	1026.6	159	617	0
18/07/2010	11.1	18.1	4.8	67	83	44	0.0	2.82	1.4	4.5	0.0	4.2	17.0	1024.3	1027.5	1021.2	158	609	0
19/07/2010	10.3	14.6	6.6	80	92	65	0.6	1.16	1.0	3.1	0.0	5.7	14.0	1020.0	1021.4	1018.3	68	528	0
20/07/2010	7.3	12.7	3.3	81	93	48	0.2	0.69	0.6	4.0	0.0	2.3	11.7	1023.7	1026.1	1020.8	45	519	0
21/07/2010	7.7	14.1	2.1	75	92	50	0.4	2.72	2.5	7.2	0.0	2.1	13.0	1027.3	1029.1	1025.6	153	667	0
22/07/2010	8.5	13.9	3.9	67	87	36	0.0	2.59	1.4	5.4	0.0	3.9	12.7	1030.7	1032.8	1028.5	157	632	0
23/07/2010	9.7	16.7	3.3	71	88	49	0.0	2.73	1.4	5.4	0.0	3.3	15.6	1032.6	1035.0	1031.1	163	661	0
24/07/2010	9.9	16.3	3.3	69	90	41	0.0	2.07	0.6	2.7	0.0	2.8	15.1	1030.5	1033.1	1028.8	137	602	0
25/07/2010	11.2	16.9	7.2	74	87	52	0.0	2.23	1.1	3.6	0.0	7.1	16.1	1029.5	1031.0	1027.9	130	624	0
26/07/2010	10.6	16.6	5.9	72	90	46	0.2	2.91	2.6	5.8	0.0	4.9	15.4	1032.9	1034.8	1030.2	150	719	0
27/07/2010	11.9	19.2	5.5	65	84	40	0.0	2.94	1.3	4.9	0.0	5.5	17.8	1033.2	1035.8	1031.2	158	641	0
28/07/2010	12.0	13.9	9.8	86	92	73	15.4	0.68	1.2	4.5	0.0	8.9	13.9	1026.6	1031.6	1023.2	24	177	0
29/07/2010	13.7	16.6	10.8	88	93	76	13.6	0.94	1.9	6.7	0.0	10.8	16.6	1021.7	1024.3	1018.4	46	246	0
30/07/2010	14.1	17.7	9.2	86	93	73	10.8	1.45	1.7	4.5	0.0	9.2	17.7	1019.9	1022.2	1016.8	89	556	0
31/07/2010	13.8	17.0	9.3	82	92	65	14.8	1.97	3.2	5.8	0.4	9.0	16.7	1019.1	1024.2	1013.8	86	767	0
MONTHLY	10.4	19.2	-0.5	75.4	94.0	36.0	110.2	59.0	1.6	9.4	0.0	-0.5	18.5	1025.9	1035.8	1011.1	107	778	0

Date	Temp Avg	Temp Max	Temp Min	%RH Avg	%RH Max	%RH Min	Rain mm	ET mm	WS Avg	WS Max	WS Min	Wind Chill Minimum	Heat Index Maximum	Barometric Pressure Avg	Barometric Pressure Max	Barometric Pressure Min	Solar Rad. Avg	Solar Rad. Max	Solar Rad. Min
1/08/2010	10.1	15.0	5.5	75	90	56	0.6	3.01	3.2	7.6	0.0	3.9	14.2	1024.5	1027.5	1022.1	178	688	0
2/08/2010	7.0	10.5	4.6	75	87	57	0.4	2.34	4.7	7.6	1.8	0.8	9.9	1022.6	1025.2	1019.7	111	710	0
3/08/2010	10.3	15.1	5.8	72	87	53	0.2	2.67	2.4	7.6	0.0	4.1	14.3	1020.0	1022.3	1017.8	123	822	0
4/08/2010	9.7	15.8	3.6	73	91	52	0.0	2.85	1.5	4.0	0.0	2.5	14.9	1021.1	1023.5	1019.2	190	727	0
5/08/2010	9.4	14.7	4.6	67	88	45	0.0	2.52	1.5	4.5	0.0	4.6	13.6	1021.1	1022.8	1019.3	145	655	0
6/08/2010	7.1	13.0	1.7	67	87	46	0.0	2.76	1.1	4.5	0.0	1.1	11.8	1023.9	1026.4	1021.8	188	730	0
7/08/2010	6.7	14.3	-0.2	68	95	41	0.0	2.70	0.8	3.1	0.0	-0.2	13.0	1025.8	1028.4	1023.9	188	695	0
8/08/2010	8.2	15.5	1.8	63	80	37	0.0	2.91	0.6	4.5	0.0	1.8	14.0	1023.2	1024.9	1021.5	191	700	0
9/08/2010	11.7	19.0	3.6	60	81	38	0.0	3.48	2.3	6.7	0.0	3.6	17.5	1023.0	1026.1	1020.6	170	688	0
10/08/2010	13.9	15.4	11.5	82	91	61	22.0	1.11	3.1	6.7	0.0	9.9	15.4	1017.9	1021.4	1014.5	25	163	0
11/08/2010	10.5	13.1	8.2	75	86	61	2.4	2.57	4.3	8.5	0.9	4.3	12.5	1013.8	1016.4	1011.1	117	778	0
12/08/2010	8.4	9.5	7.5	82	86	73	3.0	1.55	5.8	8.0	3.1	3.3	9.4	1012.2	1015.6	1009.8	54	299	0
13/08/2010	9.2	14.6	5.0	75	90	48	6.6	2.50	2.0	4.5	0.0	2.4	13.5	1016.9	1019.2	1014.5	175	697	0
14/08/2010	10.2	16.8	3.2	72	92	53	5.4	3.16	1.7	4.5	0.0	2.2	15.9	1017.5	1021.1	1014.1	204	796	0
15/08/2010	13.2	16.8	9.6	56	73	38	1.0	4.43	4.8	10.7	0.9	9.1	15.3	1013.6	1018.1	1010.5	161	860	0
16/08/2010	11.2	16.2	7.3	62	80	43	0.0	3.45	3.4	7.2	0.4	6.2	14.8	1019.1	1022.7	1016.8	155	843	0
17/08/2010	9.4	15.5	4.6	63	85	44	0.0	2.98	1.0	3.6	0.0	4.6	14.3	1023.4	1026.0	1021.6	200	778	0
18/08/2010	14.2	20.9	5.4	56	80	42	0.0	4.62	3.3	6.3	0.0	5.3	19.7	1019.4	1023.9	1013.2	201	722	0
19/08/2010	14.0	18.4	13.3	85	90	54	14.4	1.44	4.9	7.2	2.2	10.2	17.7	1015.8	1017.3	1013.1	40	233	0
20/08/2010	12.4	16.6	7.8	62	90	39	0.0	4.02	3.8	7.6	0.0	5.6	15.2	1017.8	1021.1	1014.5	202	779	0
21/08/2010	8.6	14.0	3.2	57	80	38	0.0	3.76	1.8	5.4	0.0	2.8	12.7	1022.7	1025.1	1020.5	213	983	0
22/08/2010	8.4	15.1	0.5	65	88	40	0.0	2.66	0.4	2.7	0.0	0.0	13.9	1024.7	1027.6	1022.3	191	766	0
23/08/2010	9.6	11.2	7.5	88	93	65	15.2	0.58	1.9	5.4	0.0	5.8	11.3	1017.4	1022.2	1013.1	17	80	0
24/08/2010	10.0	12.9	8.2	80	89	61	0.0	2.08	3.4	5.4	1.8	5.4	12.2	1017.4	1019.6	1016.1	103	582	0
25/08/2010	10.7	14.1	8.5	73	89	54	0.2	3.08	4.8	8.0	2.7	5.2	13.3	1013.9	1016.4	1011.6	137	875	0
26/08/2010	9.4	13.6	5.9	72	84	55	0.6	2.78	5.2	8.0	2.7	3.2	12.7	1011.9	1013.7	1009.1	102	528	0
27/08/2010	10.1	13.2	7.0	71	86	54	0.0	2.74	4.3	7.6	0.9	3.9	12.3	1017.2	1021.7	1013.6	116	610	0
28/08/2010	8.9	13.5	4.3	71	91	51	0.0	2.19	0.8	3.1	0.0	3.5	12.5	1024.8	1028.1	1021.4	157	993	0
29/08/2010	10.2	17.8	3.1	64	88	38	0.2	3.28	0.7	4.5	0.0	3.1	16.2	1029.0	1031.5	1027.3	218	815	0
30/08/2010	11.8	19.2	5.0	62	86	37	0.0	3.49	0.6	3.6	0.0	5.0	17.8	1027.4	1029.6	1025.3	220	958	0
31/08/2010	13.2	19.8	6.2	64	86	37	0.0	4.12	1.5	4.9	0.0	6.2	18.6	1025.8	1028.1	1022.9	226	802	0
MONTHLY	10.2	20.9	-0.2	69.6	95.0	37.0	72.2	87.8	2.6	10.7	0.0	-0.2	19.7	1020.2	1031.5	1009.1	152	993	0

Date	Temp Avg	Temp Max	Temp Min	%RH Avg	%RH Max	%RH Min	Rain mm	ET mm	WS Avg	WS Max	WS Min	Wind Chill Minimum	Heat Index Maximum	Barometric Pressure Avg	Barometric Pressure Max	Barometric Pressure Min	Solar Rad. Avg	Solar Rad. Max	Solar Rad. Min
1/09/2010	15.7	21.8	7.8	61	83	45	0.0	3.83	2.5	6.3	0.0	6.8	20.8	1021.9	1025.0	1019.4	158	768	0
2/09/2010	18.7	22.9	14.9	65	84	56	0.0	4.03	2.6	5.8	0.0	14.9	23.2	1018.4	1020.2	1015.8	177	846	0
3/09/2010	17.5	23.7	13.5	74	89	52	4.2	2.91	2.7	6.3	0.0	12.1	23.7	1020.9	1023.1	1019.1	127	758	0
4/09/2010	17.8	21.4	14.4	76	88	62	10.2	2.40	4.4	8.0	0.0	12.0	21.2	1015.6	1020.8	1011.1	75	417	0
5/09/2010	14.3	17.7	11.3	69	86	47	0.0	3.64	3.9	7.2	0.4	10.7	16.8	1018.7	1021.7	1015.8	164	855	0
6/09/2010	12.4	16.4	8.4	61	81	43	0.0	3.40	1.5	4.5	0.0	8.4	15.1	1023.0	1025.2	1021.0	197	1057	0
7/09/2010	10.6	17.3	4.4	65	91	39	0.0	3.72	1.4	4.5	0.0	4.4	16.2	1025.8	1027.6	1024.2	226	925	0
8/09/2010	11.4	18.5	4.8	63	85	39	0.0	3.60	0.6	2.2	0.0	4.7	17.1	1026.0	1028.7	1023.4	234	855	0
9/09/2010	13.3	17.9	8.2	77	90	53	7.4	1.93	1.5	6.7	0.0	8.2	17.3	1018.3	1023.3	1012.8	102	717	0
10/09/2010	15.2	21.4	9.7	74	91	44	3.2	3.79	4.0	9.4	0.0	8.2	21.1	1011.4	1017.4	1007.3	160	960	0
11/09/2010	11.8	17.6	4.9	63	84	41	0.0	3.81	1.2	3.1	0.0	4.9	16.2	1020.8	1023.7	1017.3	255	861	0
12/09/2010	13.0	19.4	5.1	65	89	43	0.0	3.76	0.9	3.6	0.0	5.1	18.2	1022.8	1025.9	1020.8	243	916	0
13/09/2010	15.4	19.6	12.6	67	79	56	0.0	3.68	2.8	4.5	1.3	11.2	19.1	1019.4	1021.9	1017.1	191	914	0
14/09/2010	15.8	21.2	12.3	82	91	59	7.4	2.98	1.5	5.4	0.0	10.9	20.8	1014.3	1019.2	1009.4	189	984	0
15/09/2010	13.3	18.6	9.0	65	85	38	0.2	3.64	3.5	6.3	0.0	7.8	17.9	1015.8	1020.5	1011.6	170	938	0
16/09/2010	7.1	10.9	5.2	77	82	66	0.0	0.78	2.2	4.5	0.0	2.4	10.5	1021.4	1023.3	1019.9	102	534	0
17/09/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
18/09/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
19/09/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
20/09/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
21/09/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
22/09/2010	19.2	23.1	14.6	62	78	48	2.0	1.62	0.8	4.0	0.0	14.6	22.8	1020.3	1021.3	1019.4	164	846	0
23/09/2010	17.0	23.1	11.7	72	87	46	0.0	4.31	1.8	4.9	0.0	11.7	22.8	1019.8	1021.6	1017.2	241	1044	0
24/09/2010	17.6	23.4	12.2	67	88	38	0.0	4.39	2.1	5.4	0.0	12.2	23.1	1019.5	1022.2	1017.4	232	936	0
25/09/2010	17.6	23.7	10.9	54	80	32	0.0	5.56	2.6	6.7	0.0	9.8	23.0	1016.7	1018.9	1014.1	248	884	0
26/09/2010	17.4	24.4	9.9	49	76	27	0.0	4.74	0.9	3.6	0.0	9.7	23.6	1016.9	1018.7	1015.4	263	888	0
27/09/2010	17.9	24.3	13.2	67	87	48	5.8	4.48	3.0	8.9	0.0	13.2	24.3	1013.5	1016.7	1009.8	195	1066	0
28/09/2010	17.5	22.4	12.4	63	92	37	0.2	4.10	2.0	6.3	0.0	12.4	21.3	1012.0	1013.5	1010.1	196	936	0
29/09/2010	12.7	17.2	7.9	53	79	35	0.0	5.59	4.0	7.6	0.0	3.6	15.7	1014.8	1018.9	1011.8	271	984	0
30/09/2010	12.1	18.3	6.1	58	84	34	0.0	4.95	2.7	6.3	0.4	3.4	16.5	1021.4	1023.3	1018.8	285	935	0
MONTHLY	14.9	24.4	4.4	66.0	92.0	27.0	40.6	91.6	2.3	9.4	0.0	2.4	24.3	1018.8	1028.7	1007.3	195	1066	0

Date	Temp Avg	Temp Max	Temp Min	%RH Avg	%RH Max	%RH Min	Rain mm	ET mm	WS Avg	WS Max	WS Min	Wind Chill Minimum	Heat Index Maximum	Barometric Pressure Avg	Barometric Pressure Max	Barometric Pressure Min	Solar Rad. Avg	Solar Rad. Max	Solar Rad. Min
1/10/2010	15.8	20.7	10.1	56	73	40	0.0	4.01	2.1	8.0	0.0	9.4	19.4	1023.5	1025.7	1021.6	207	1133	0
2/10/2010	14.8	16.8	13.6	66	82	52	1.6	2.39	2.2	5.8	0.0	12.0	16.3	1024.5	1026.3	1022.8	106	561	0
3/10/2010	14.4	18.4	12.3	80	91	62	11.6	2.05	3.4	7.6	0.4	9.1	18.2	1022.9	1024.8	1021.3	87	475	0
4/10/2010	16.6	21.6	12.2	76	92	57	0.8	3.65	3.5	7.2	1.3	10.3	21.3	1019.1	1021.2	1016.8	169	998	0
5/10/2010	18.0	24.0	11.7	73	90	56	0.0	4.99	3.9	9.8	0.4	10.6	24.3	1017.6	1019.1	1015.1	289	1156	0
6/10/2010	18.7	25.1	11.9	68	86	47	0.0	5.28	2.2	4.0	0.0	11.0	24.8	1016.4	1018.8	1013.3	297	1049	0
7/10/2010	18.1	22.2	13.4	70	87	52	0.0	3.06	1.7	4.0	0.0	12.5	22.2	1015.1	1017.8	1012.5	147	642	0
8/10/2010	16.8	22.4	12.0	73	87	57	0.0	4.32	3.9	6.7	1.3	9.9	22.3	1018.0	1020.5	1016.3	217	910	0
9/10/2010	17.1	21.5	13.8	64	79	47	0.0	4.00	3.0	4.9	0.4	12.6	20.6	1021.0	1023.2	1019.3	182	861	0
10/10/2010	15.1	19.8	9.8	65	83	47	0.0	5.42	5.9	10.3	0.9	7.9	18.9	1025.0	1027.3	1022.6	201	1011	0
11/10/2010	17.4	22.3	13.8	59	74	43	0.0	5.40	4.6	8.0	0.0	10.7	21.5	1026.7	1027.8	1025.2	222	1029	0
12/10/2010	19.4	25.3	13.4	56	69	41	0.0	5.40	2.4	7.2	0.0	12.8	24.9	1024.1	1027.8	1020.6	269	1125	0
13/10/2010	18.6	20.9	15.8	60	69	51	0.0	3.42	2.1	7.2	0.0	14.7	20.2	1017.8	1021.4	1014.0	150	759	0
14/10/2010	18.2	20.8	15.7	73	80	67	0.0	2.48	3.2	5.8	0.0	14.9	20.9	1011.7	1014.4	1009.0	93	438	0
15/10/2010	17.5	19.1	12.4	82	91	74	16.2	14.19	10.9	18.3	1.8	7.5	19.4	998.7	1008.6	990.7	68	412	0
16/10/2010	8.6	12.2	5.2	63	83	44	1.4	23.02	9.3	14.3	4.5	-0.9	11.9	1006.9	1014.8	997.5	188	1130	0
17/10/2010	10.7	18.2	3.3	62	80	44	0.0	5.24	3.1	5.4	0.0	0.6	17.0	1015.7	1017.9	1013.9	322	1141	0
18/10/2010	14.1	21.4	6.3	62	87	39	0.0	5.37	1.7	5.8	0.0	6.1	20.1	1018.0	1020.0	1016.4	321	1004	0
19/10/2010	15.3	22.9	7.7	61	83	28	0.0	6.51	3.9	9.8	0.0	6.3	21.9	1021.3	1024.9	1019.2	325	1018	0
20/10/2010	17.1	24.3	10.2	62	82	38	0.0	5.26	2.4	5.4	0.0	8.5	23.7	1023.6	1025.9	1021.2	294	1155	0
21/10/2010	17.6	22.2	13.6	66	78	52	0.0	3.35	1.2	4.9	0.0	13.6	21.8	1021.3	1023.6	1018.3	176	1031	0
22/10/2010	17.5	23.4	12.9	67	81	46	0.0	4.37	2.0	5.4	0.0	12.9	23.2	1019.4	1021.6	1016.8	218	1220	0
23/10/2010	18.2	26.3	10.9	66	89	40	2.8	5.00	1.8	11.6	0.0	10.4	25.8	1016.7	1018.9	1013.8	265	1000	0
24/10/2010	14.4	15.9	12.2	89	92	80	24.6	1.33	3.3	6.7	0.0	10.1	15.9	1016.3	1018.1	1014.5	62	396	0
25/10/2010	15.0	20.4	11.7	80	89	60	0.6	4.30	4.4	7.6	1.3	9.4	20.3	1017.0	1019.0	1014.9	243	1091	0
26/10/2010	17.6	23.7	11.6	70	90	46	0.0	4.55	1.3	5.8	0.0	10.9	23.6	1016.2	1017.8	1014.4	266	1235	0
27/10/2010	19.7	26.8	12.6	57	83	28	0.0	6.28	1.9	6.3	0.0	12.6	25.7	1014.1	1016.1	1011.8	322	1092	0
28/10/2010	18.5	25.7	13.1	69	87	45	0.0	5.87	4.9	9.8	1.8	10.7	25.6	1014.4	1016.0	1012.3	276	1168	0
29/10/2010	20.1	26.4	12.9	62	81	44	0.0	5.38	2.1	5.8	0.0	12.3	26.3	1014.6	1016.8	1012.4	295	1119	0
30/10/2010	22.6	27.4	17.6	57	74	43	0.0	6.25	4.0	7.6	0.9	16.2	27.2	1012.5	1014.5	1010.7	252	1060	0
31/10/2010	22.5	26.8	18.4	58	79	46	1.0	5.69	4.8	8.5	0.0	17.9	26.6	1011.2	1012.9	1009.3	194	759	0
MONTHLY	17.0	27.4	3.3	66.8	92.0	28.0	60.6	167.8	3.5	18.3	0.0	-0.9	27.2	1017.5	1027.8	990.7	217	1235	0

Date	Average Temp	Max Temp	Min Temp	Average %RH	Max %RH	Min %RH	Rain mm	ET mm	Average WS	Max WS	Min WS	Minimum Wind Chill	Maximum Heat Index	Average Atm Pressure	Max Atm Pressure	Min Atm Pressure	Average Solar Rad	Max Solar Rad	Min Solar Rad
1/11/2010	16.3	20.3	12.9	86.6	92.0	78.0	12.2	1.9	3.3	11.6	0.0	9.2	20.8	1011.3	1013.0	1009.0	97.400	575	0
2/11/2010	13.0	18.5	7.9	66.6	90.0	40.0	0.0	5.6	4.4	7.2	0.0	5.2	16.8	1014.4	1017.6	1012.2	322.927	1254	0
3/11/2010	15.6	22.5	7.8	58.4	85.0	38.0	0.0	5.5	1.4	4.5	0.0	7.8	21.2	1017.2	1019.4	1015.1	337.927	1079	0
4/11/2010	16.7	22.9	11.7	63.6	80.0	38.0	0.0	5.3	4.3	9.4	0.0	10.8	22.1	1015.6	1017.9	1012.6	222.167	1032	0
5/11/2010	12.8	15.0	10.9	79.4	88.0	72.0	7.8	2.7	6.5	11.6	2.2	6.4	14.7	1017.0	1019.2	1015.2	120.167	728	0
6/11/2010	14.3	19.8	10.4	74.0	88.0	53.0	0.4	4.5	4.8	8.9	2.2	8.1	19.3	1017.9	1019.6	1015.5	232.177	1078	0
7/11/2010	18.3	25.9	11.1	59.7	79.0	38.0	5.0	5.4	2.1	13.4	0.0	10.7	25.3	1016.6	1018.8	1013.1	294.469	1181	0
8/11/2010	20.6	27.8	14.0	63.8	86.0	40.0	2.4	6.7	3.7	12.5	0.0	11.1	27.6	1016.7	1019.0	1013.8	315.885	1049	0
9/11/2010	21.3	27.2	16.3	65.2	83.0	48.0	0.0	4.3	2.3	7.2	0.0	14.9	26.8	1021.3	1023.6	1019.2	212.854	1186	0
10/11/2010	21.0	26.2	17.1	68.3	82.0	52.0	1.0	4.2	1.6	8.0	0.0	16.8	26.4	1019.1	1021.8	1015.4	209.500	1160	0
11/11/2010	19.0	22.9	16.5	78.5	92.0	60.0	31.8	3.4	1.7	5.4	0.0	15.3	22.9	1014.9	1018.1	1011.8	182.083	1116	0
12/11/2010	21.8	28.8	14.3	64.9	87.0	39.0	0.0	6.4	1.7	4.9	0.0	14.4	29.2	1012.4	1014.7	1010.0	347.615	1042	0
13/11/2010	24.3	28.9	21.2	63.1	72.0	48.0	0.0	5.9	4.0	8.0	0.4	19.1	29.7	1014.0	1016.0	1012.2	245.330	1156	0
14/11/2010	24.5	29.6	19.9	58.9	72.0	43.0	0.0	7.3	4.4	8.0	0.0	17.9	29.8	1014.3	1017.0	1011.7	317.135	1186	0
15/11/2010	21.2	24.1	18.7	76.2	92.0	62.0	9.6	3.6	5.8	9.8	0.0	16.2	24.8	1010.8	1012.5	1009.2	116.155	554	0
16/11/2010	20.0	25.2	16.3	79.0	93.0	51.0	17.0	4.1	2.2	7.2	0.0	15.4	25.4	1010.0	1012.2	1007.3	245.125	1285	0
17/11/2010	17.3	22.7	13.1	78.2	89.0	64.0	4.2	4.2	3.6	9.4	0.0	9.8	22.9	1011.7	1013.3	1010.1	226.469	1109	0
18/11/2010	19.1	23.3	14.6	73.1	87.0	58.0	0.0	3.8	2.1	6.3	0.0	14.3	23.7	1011.7	1013.4	1009.7	190.563	738	0
19/11/2010	18.4	23.3	13.4	73.7	92.0	56.0	0.0	5.2	6.0	12.5	0.0	11.7	23.6	1016.5	1021.8	1012.6	345.260	1146	0
20/11/2010	18.8	26.6	11.4	62.7	86.0	38.0	0.0	6.7	3.3	8.0	0.4	10.2	26	1021.1	1023.3	1018.7	351.802	1090	0
21/11/2010	20.2	26.7	13.2	50.7	76.0	24.0	0.0	6.6	1.9	5.8	0.0	13.2	25.4	1019.6	1021.6	1016.8	329.750	1108	0
22/11/2010	20.3	25.0	15.0	52.2	71.0	38.0	0.0	6.4	3.6	7.6	0.0	13.4	24.6	1020.0	1021.9	1018.4	272.979	1129	0
23/11/2010	21.2	25.9	17.0	48.5	60.0	35.0	0.0	7.1	3.8	10.3	0.4	14.8	25.2	1021.4	1023.5	1019.4	294.208	1283	0
24/11/2010	22.3	27.9	15.5	50.6	69.0	34.0	0.0	7.5	3.2	8.5	0.0	15.6	26.9	1020.5	1023.0	1017.5	336.594	1273	0
25/11/2010	22.6	28.7	16.1	45.8	66.0	28.0	0.0	7.3	2.7	4.9	0.0	16	27.2	1018.0	1020.3	1014.8	348.083	1053	0
26/11/2010	22.2	26.9	16.4	50.6	65.0	40.0	0.0	5.0	1.5	3.6	0.0	16.3	26.3	1015.2	1017.5	1012.6	239.135	993	0
27/11/2010	23.9	29.7	18.7	45.9	63.0	30.0	0.0	8.0	4.4	8.5	0.0	17.4	28.3	1011.8	1014.7	1008.0	287.344	1207	0
28/11/2010	21.9	26.2	18.9	52.2	73.0	40.0	0.0	6.7	6.5	11.2	0.4	16.7	25.6	1009.4	1011.3	1007.1	201.302	1275	0
29/11/2010	21.3	27.2	18.0	64.5	89.0	38.0	2.8	4.2	3.0	7.2	0.0	18	26.4	1008.7	1010.5	1006.4	158.260	749	0
30/11/2010	20.3	25.2	17.3	77.2	92.0	49.0	5.6	3.5	2.5	8.0	0.0	17.2	25.4	1009.7	1011.5	1007.5	159.906	1003	0
Monthly	19.7	29.7	7.8	64.4	93.0	24.0	99.8	158.8	3.4	13.4	0.0	5.2	29.8	1015.3	1023.6	1006.4	252.019	1285	0

Date	Temp Avg	Temp Max	Temp Min	%RH Avg	%RH Max	%RH Min	Rain mm	ET mm	WS Avg	WS Max	WS Min	Wind Chill Min	Heat Index Max	Baro. Pressure Avg	Baro. Pressure Max	Baro. Pressure Min	Solar Rad. Avg	Solar Rad. Max	Solar Rad. Min
1/12/2010	18.3	19.9	17.1	83	92	74	15.2	1.99	3.2	6.3	0.0	15.2	20.4	1011.8	1013.7	1010.0	87	700	0
2/12/2010	21.1	25.1	17.3	74	89	62	1.0	3.53	2.2	8.0	0.0	17.3	26.0	1013.4	1015.4	1011.5	173	764	0
3/12/2010	20.8	23.7	18.8	78	91	70	6.6	2.95	2.3	5.8	0.0	18.4	24.9	1012.4	1014.9	1009.7	147	761	0
4/12/2010	19.9	25.7	17.7	84	93	51	10.4	3.37	1.6	8.5	0.0	16.3	25.7	1009.1	1011.3	1006.1	202	1185	0
5/12/2010	21.5	27.5	17.3	75	94	53	0.4	4.95	1.6	9.4	0.0	17.3	28.1	1008.1	1010.0	1005.2	290	1247	0
6/12/2010	21.8	26.4	19.9	69	85	53	0.4	4.00	1.8	6.7	0.0	19.6	26.7	1009.1	1011.3	1007.3	198	872	0
7/12/2010	23.9	29.7	17.2	53	74	36	0.0	7.82	3.2	8.0	0.0	17.2	29.7	1011.0	1013.1	1008.7	365	1196	0
8/12/2010	25.2	30.8	19.8	56	66	45	0.0	7.48	4.3	8.9	0.0	18.8	31.9	1011.5	1014.7	1009.2	290	1164	0
9/12/2010	25.9	29.7	20.4	62	86	51	0.0	7.27	7.1	11.2	3.6	17.4	31.1	1010.0	1012.6	1006.4	221	1513	0
10/12/2010	20.8	22.7	18.9	88	92	79	0.0	1.83	2.6	6.3	0.0	17.8	23.6	1007.5	1009.9	1005.2	87	464	0
11/12/2010	21.4	25.8	18.9	76	92	54	0.0	4.65	2.6	6.7	0.0	17.9	26.1	1005.0	1006.9	1002.5	231	1044	0
12/12/2010	22.5	28.2	16.7	58	83	35	0.0	7.98	4.0	7.6	0.0	16.3	27.7	1004.8	1007.4	1003.3	356	1229	0
13/12/2010	23.2	29.9	14.7	50	79	28	0.0	7.25	1.8	4.9	0.0	14.5	28.7	1009.0	1010.5	1007.0	371	1124	0
14/12/2010	22.9	30.3	17.4	58	74	34	0.0	6.59	2.2	8.0	0.0	17.4	30.1	1009.5	1011.8	1006.8	333	1248	0
15/12/2010	23.6	30.1	16.9	60	78	40	0.0	6.26	1.7	9.4	0.0	16.9	30.3	1006.9	1009.3	1004.1	325	1143	0
16/12/2010	21.9	28.2	18.5	69	85	48	0.0	4.51	3.5	11.6	0.0	14.7	28.7	1003.2	1006.9	1000.1	185	1088	0
17/12/2010	19.8	23.7	16.3	70	87	40	0.0	3.54	3.4	9.8	0.0	14.6	24.4	1004.1	1006.0	1001.7	123	597	0
18/12/2010	16.9	18.4	15.2	75	83	63	0.0	3.64	5.4	10.3	1.8	12.8	18.4	1006.0	1007.6	1003.8	152	659	0
19/12/2010	17.4	19.3	15.7	79	87	66	0.0	22.04	6.9	12.5	0.9	12.8	19.4	1001.8	1006.5	996.4	102	395	0
20/12/2010	14.2	19.2	8.7	57	91	38	0.0	14.05	7.0	13.4	2.2	4.5	18.4	1004.1	1009.5	996.6	378	1208	0
21/12/2010	18.0	24.9	8.8	49	81	30	0.0	7.07	1.9	5.4	0.0	8.8	24.3	1010.3	1012.9	1008.7	383	1102	0
22/12/2010	21.7	28.8	12.8	48	69	25	0.0	6.59	2.0	5.8	0.0	12.3	28.0	1013.6	1015.1	1012.0	331	1146	0
23/12/2010	23.3	30.2	18.3	52	71	33	0.0	6.08	2.1	5.4	0.0	18.3	29.6	1015.1	1016.6	1013.7	272	1106	0
24/12/2010	22.3	27.1	17.8	61	75	48	0.0	7.95	5.8	9.8	2.2	15.1	27.2	1017.3	1018.7	1016.0	322	1193	0
25/12/2010	23.0	30.3	16.8	67	84	46	0.0	6.34	3.0	5.8	0.4	16.8	31.6	1012.2	1017.0	1007.7	307	1300	0
26/12/2010	21.7	27.8	19.0	79	91	56	0.0	3.91	2.4	8.5	0.0	18.7	28.9	1004.7	1009.7	1000.7	179	812	0
27/12/2010	21.2	28.1	16.9	77	92	42	0.0	5.72	3.8	11.2	0.0	13.9	28.8	1002.3	1008.0	999.8	276	1189	0
28/12/2010	19.9	27.3	12.6	66	90	46	0.0	6.59	4.7	8.0	0.0	9.9	27.3	1012.0	1015.2	1008.4	320	1538	0
29/12/2010	23.1	31.1	14.3	59	83	41	0.0	7.42	2.6	5.8	0.0	14.3	31.5	1013.6	1015.9	1010.9	367	1111	0
30/12/2010	26.6	33.7	18.6	53	78	32	0.0	7.76	1.8	6.3	0.0	18.6	34.2	1012.7	1015.2	1010.6	370	1111	0
31/12/2010	28.0	34.7	21.2	49	74	29	0.0	7.97	1.9	5.4	0.0	21.2	35.2	1011.7	1013.7	1009.7	366	1103	0
MONTHLY	21.7	34.7	8.7	65.67	94	25	34	199.1	3.2	13.4	0.0	4.5	35.2	1009.2	1018.7	996.4	262	1538	0

Date	Temp Avg	Temp Max	Temp Min	%RH Avg	%RH Max	%RH Min	Rain mm	ET mm	WS Avg	WS Max	WS Min	Wind Chill Minimum	Heat Index Maximum	Barometric Pressure Avg	Barometric Pressure Max	Barometric Pressure Min	Solar Rad. Avg	Solar Rad. Max	Solar Rad. Min
1/12/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data			no data	no data	no data	no data	no data	no data
2/12/2010	0.0	0.0	0.0	70	79	62	0.6		2.5	6.4	0.2			962.7	964.3	960.6	253	873	0
3/12/2010	0.0	0.0	0.0	76	88	68	7.2		2.4	5.3	0.2			962.0	964.5	959.3	152	881	0
4/12/2010	0.0	0.0	0.0	82	90	53	12.0		2.0	7.3	0.1			958.6	960.9	954.7	208	1410	0
5/12/2010	0.0	0.0	0.0	74	91	54	0.2		1.8	7.8	0.1			957.5	959.4	954.1	301	1363	0
6/12/2010	0.0	0.0	0.0	69	83	55	0.4		2.0	6.7	0.2			958.8	961.0	956.8	207	1334	0
7/12/2010	0.0	0.0	0.0	54	72	41	0.0		3.0	6.6	0.3			960.4	962.4	957.9	377	1383	0
8/12/2010	0.0	0.0	0.0	59	66	51	0.0		3.9	8.2	0.2			961.2	964.4	958.7	299	1380	0
9/12/2010	0.0	0.0	0.0	65	86	56	4.6		6.3	9.9	3.3			960.1	962.8	956.5	225	1452	0
10/12/2010	0.0	0.0	0.0	86	89	77	48.2		2.5	5.5	0.0			957.7	960.4	955.3	77	544	0
11/12/2010	0.0	0.0	0.0	74	90	53	0.0		2.7	6.3	0.0			954.7	956.7	952.4	218	1073	0
12/12/2010	0.0	0.0	0.0	60	80	40	0.0		4.1	6.8	0.3			954.2	955.4	953.0	365	1204	0
13/12/2010	0.0	0.0	0.0	36	46	34	0.0		1.9	3.8	0.5			958.1	959.7	957.1	600	1044	0
14/12/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data			no data	no data	no data	no data	no data	no data
15/12/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data			no data	no data	no data	no data	no data	no data
16/12/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data			no data	no data	no data	no data	no data	no data
17/12/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data			no data	no data	no data	no data	no data	no data
18/12/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data			no data	no data	no data	no data	no data	no data
19/12/2010	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data			no data	no data	no data	no data	no data	no data
20/12/2010	0.0	0.0	0.0	49	63	42	0.0		5.7	10.8	2.4			955.3	958.4	953.8	526	1314	0
21/12/2010	0.0	0.0	0.0	51	76	36	0.0		2.0	4.9	0.0			959.3	962.1	957.4	400	1161	0
22/12/2010	0.0	0.0	0.0	51	68	32	0.0		2.0	4.7	0.2			962.9	964.5	960.9	345	1213	0
23/12/2010	0.0	0.0	0.0	55	71	38	0.0		2.2	4.8	0.1			964.9	966.7	963.2	284	1294	0
24/12/2010	0.0	0.0	0.0	63	74	52	0.0		5.4	8.9	2.0			967.1	968.7	965.7	334	1325	0
25/12/2010	0.0	0.0	0.0	69	82	50	2.4		2.8	5.9	0.2			962.0	966.7	957.1	299	1413	0
26/12/2010	0.0	0.0	0.0	78	88	59	1.8		2.6	8.0	0.0			955.1	960.0	951.4	206	1444	0
27/12/2010	0.0	0.0	0.0	76	90	45	10.2		3.7	10.7	0.2			952.6	958.5	950.1	323	1207	0
28/12/2010	0.0	0.0	0.0	67	87	50	0.0		4.3	6.9	0.6			961.7	964.8	958.6	288	1235	0
29/12/2010	0.0	0.0	0.0	60	81	46	0.0		2.5	5.4	0.0			963.2	965.7	960.1	341	1102	0
30/12/2010	0.0	0.0	0.0	55	76	38	0.0		2.0	5.4	0.2			962.7	965.4	960.0	353	1130	0
31/12/2010	0.0	0.0	0.0	52	73	35	0.0		1.9	5.2	0.1			962.0	964.3	959.3	363	1119	0
MONTHLY	0.0	0.0	0.0	63.8	91.0	32.0	87.6	0.0	3.0	10.8	0.0	0.0	0.0	959.8	968.7	950.1	306	1452	0

Date	Temp Avg	Temp Max	Temp Min	%RH Avg	%RH Max	%RH Min	Rain mm	ET mm	WS Avg	WS Max	WS Min	Wind Chill Minimum	Heat Index Maximum	Barometric Pressure Avg	Barometric Pressure Max	Barometric Pressure Min	Solar Rad. Avg	Solar Rad. Max	Solar Rad. Min
1/01/2011	0.0	0.0	0.0	53	74	32	0.0		1.5	3.3	0.2			961.0	963.6	957.1	262	1056	0
2/01/2011	0.0	0.0	0.0	56	76	39	0.0		2.7	10.2	0.0			959.4	962.4	955.4	327	1197	0
3/01/2011	0.0	0.0	0.0	65	79	48	0.0		3.8	9.9	0.2			958.0	960.0	953.8	281	1049	0
4/01/2011	0.0	0.0	0.0	67	86	51	0.0		4.6	9.3	0.8			956.9	959.5	953.6	306	1197	0
5/01/2011	0.0	0.0	0.0	80	87	72	36.2		2.6	10.3	0.1			955.0	956.4	952.9	82	547	0
6/01/2011	0.0	0.0	0.0	72	87	58	0.0		5.1	11.5	1.0			956.4	959.2	954.7	238	1096	0
7/01/2011	0.0	0.0	0.0	66	82	52	1.4		4.1	7.1	1.8			958.1	960.1	954.9	242	1224	0
8/01/2011	0.0	0.0	0.0	62	79	42	0.0		3.8	7.9	1.4			957.9	959.9	954.7	326	981	0
9/01/2011	0.0	0.0	0.0	62	81	45	0.0		5.5	9.4	1.7			958.0	960.2	956.2	343	1126	0
10/01/2011	0.0	0.0	0.0	72	85	56	2.6		4.8	9.6	2.1			958.3	959.7	957.3	173	1574	0
11/01/2011	0.0	0.0	0.0	78	87	56	37.8		3.7	10.1	0.1			957.1	959.1	955.6	130	1140	0
12/01/2011	13.3	32.3	0.0	66	84	44	0.0		2.2	7.8	0.1			957.0	958.7	953.9	265	1350	0
13/01/2011	26.1	29.4	23.1	60	70	50	0.0		4.3	7.7	1.0			958.7	961.0	956.8	256	1337	0
14/01/2011	25.2	30.1	20.9	56	67	44	0.0		2.6	7.7	0.0			957.8	960.4	954.8	282	1414	0
15/01/2011	25.0	29.1	21.3	64	76	50	0.0		3.3	7.0	1.2			956.3	958.4	953.7	217	965	0
16/01/2011	25.9	30.2	23.0	65	78	51	0.0		4.2	8.1	1.3			954.4	956.7	951.7	233	1386	0
17/01/2011	27.6	34.6	20.3	54	75	34	0.0		2.2	5.6	0.0			969.9	1002.9	949.5	309	1116	0
18/01/2011	25.9	32.7	19.1	61	86	34	0.0		3.6	6.7	0.7			1004.1	1006.5	1002.0	364	1095	0
19/01/2011	25.2	31.4	18.9	61	83	34	0.0		2.9	7.7	0.2			1006.6	1009.1	1004.0	280	1424	0
20/01/2011	24.6	31.2	19.1	60	79	41	0.2		4.0	10.0	0.7			1009.8	1012.7	1007.5	321	1256	0
21/01/2011	24.9	31.3	17.9	53	76	33	0.0		2.6	5.8	0.1			1012.6	1014.8	1009.6	328	1014	0
22/01/2011	24.8	31.2	17.9	52	76	30	0.0		3.0	7.5	0.2			1013.4	1015.7	1010.6	341	1038	0
23/01/2011	24.6	30.6	17.6	50	73	33	0.0		2.2	5.3	0.2			1010.7	1013.7	1006.9	283	1241	0
24/01/2011	26.5	32.1	20.5	51	65	40	0.0		3.4	6.4	1.0			1007.4	1010.3	1004.2	246	1143	0
25/01/2011	30.9	37.3	24.7	44	58	31	0.0		2.5	6.3	0.0			1007.9	1010.4	1005.6	323	964	0
26/01/2011	33.0	40.1	25.6	43	59	29	0.0		2.0	4.2	0.1			1011.6	1014.2	1008.8	314	1045	0
27/01/2011	33.3	39.7	27.5	46	63	29	0.0		3.0	6.7	0.0			1012.2	1015.5	1008.4	307	940	0
28/01/2011	26.2	32.1	19.8	63	82	43	0.0		5.9	8.7	2.0			1014.7	1019.3	1012.6	326	1118	0
29/01/2011	23.1	29.8	16.7	55	73	37	0.0		3.2	6.2	0.6			1019.0	1020.9	1016.1	327	983	0
30/01/2011	25.7	33.1	17.8	45	68	27	0.0		1.3	3.1	0.0			1019.1	1022.1	1015.2	332	1005	0
31/01/2011	27.9	35.4	20.5	42	55	31	0.0		1.8	3.9	0.0			1015.9	1019.9	1011.5	316	965	0
MONTHLY	16.8	40.1	0.0	58.7	87.0	27.0	78.2	0.0	3.3	11.5	0.0	0.0	0.0	982.4	1022.1	949.5	280	1574	0

Date	Temp Avg	Temp Max	Temp Min	%RH Avg	%RH Max	%RH Min	Rain mm	ET mm	WS Avg	WS Max	WS Min	Wind Chill Minimum	Heat Index Maximum	Barometric Pressure Avg	Barometric Pressure Max	Barometric Pressure Min	Solar Rad. Avg	Solar Rad. Max	Solar Rad. Min
1/02/2011	28.5	36.1	24.0	46	55	33	0.0		3.1	7.3	0.1			1014.1	1017.2	1010.2	212	1020	0
2/02/2011	31.8	36.6	27.4	46	60	32	0.0		4.1	6.9	1.7			1014.7	1017.6	1011.4	270	1125	0
3/02/2011	31.5	36.0	27.6	49	63	36	0.0		5.5	9.5	0.0			1014.9	1018.2	1011.5	269	1056	0
4/02/2011	31.6	36.8	26.5	45	59	35	0.0		2.1	4.8	0.0			1014.2	1017.6	1010.5	251	1039	0
5/02/2011	31.7	35.4	27.4	45	57	36	0.0		5.8	8.5	1.7			1013.5	1016.3	1010.1	287	1099	0
6/02/2011	28.4	33.8	21.4	62	79	44	9.0		6.0	9.0	2.0			1016.4	1020.1	1013.8	171	1113	0
7/02/2011	22.7	28.1	18.0	66	79	52	0.0		4.2	8.5	0.4			1018.7	1021.5	1015.5	186	1053	0
8/02/2011	22.7	28.9	18.5	63	74	47	0.0		4.6	8.8	2.0			1016.8	1019.9	1013.6	158	1154	0
9/02/2011	22.5	30.1	14.8	54	74	35	0.0		3.4	7.8	0.6			1021.0	1023.6	1018.5	329	1010	0
10/02/2011	23.7	31.0	16.4	54	76	35	0.0		2.1	5.4	0.3			1020.9	1023.9	1016.8	324	1176	0
11/02/2011	26.4	32.6	19.6	51	71	36	0.0		2.3	5.1	0.4			1017.0	1021.1	1012.6	252	1158	0
12/02/2011	28.1	34.4	21.7	51	73	36	0.0		4.0	9.9	0.7			1014.7	1017.1	1011.1	278	1175	0
13/02/2011	24.3	30.6	20.5	68	79	48	1.2		3.8	10.1	0.0			1016.4	1020.1	1013.4	189	1115	0
14/02/2011	20.1	22.6	17.5	76	83	67	1.2		6.0	8.9	2.7			1020.5	1022.5	1017.7	78	266	0
15/02/2011	21.4	26.4	17.2	66	77	51	0.0		5.1	7.2	2.1			1020.6	1022.4	1018.7	149	746	0
16/02/2011	24.2	30.2	19.1	62	78	43	0.0		2.7	7.4	0.2			1016.9	1020.2	1013.4	173	1260	0
17/02/2011	26.1	31.5	21.1	59	72	43	0.0		2.5	6.9	0.3			1014.0	1016.9	1010.5	217	1174	0
18/02/2011	27.2	33.5	21.3	59	75	40	0.0		2.2	6.8	0.0			1013.3	1015.4	1010.6	237	1187	0
19/02/2011	28.8	34.3	22.2	52	71	39	0.0		3.9	13.6	0.9			1012.3	1014.9	1009.0	314	976	0
20/02/2011	28.7	34.8	21.7	56	86	39	73.6		4.5	10.9	0.1			1010.3	1012.5	1006.1	234	1187	0
21/02/2011	24.6	30.4	20.3	67	89	38	0.2		4.1	8.5	0.1			1011.1	1015.0	1008.7	303	1084	0
22/02/2011	20.2	25.0	16.1	62	78	46	0.0		7.1	10.1	4.5			1018.9	1022.8	1015.2	294	1077	0
23/02/2011	19.0	26.0	13.6	58	72	43	0.0		4.3	24.0	0.6			1020.9	1022.8	1017.6	330	1036	0
24/02/2011	21.4	29.5	12.2	53	82	30	0.0		2.2	5.0	0.2			1018.0	1021.7	1013.3	332	1045	0
25/02/2011	24.2	30.2	17.0	50	73	32	0.0		1.6	3.3	0.1			1014.0	1017.3	1010.9	246	1192	0
26/02/2011	24.9	30.0	20.6	52	66	39	0.0		2.4	5.8	0.2			1012.9	1015.0	1009.5	228	815	0
27/02/2011	26.8	31.6	22.0	49	65	37	0.0		2.6	7.4	0.3			1011.2	1013.5	1009.4	168	1119	0
28/02/2011	28.6	35.4	22.1	47	71	32	0.8		4.8	9.8	0.9			1009.9	1013.4	1005.6	281	1173	0
MONTHLY	25.7	36.8	12.2	56.1	89.0	30.0	86.0	0.0	3.8	24.0	0.0	0.0	0.0	1015.6	1023.9	1005.6	241	1260	0

Date	Temp Avg	Temp Max	Temp Min	%RH Avg	%RH Max	%RH Min	Rain mm	ET mm	WS Avg	WS Max	WS Min	Wind Chill Minimum	Heat Index Maximum	Barometric Pressure Avg	Barometric Pressure Max	Barometric Pressure Min	Solar Rad. Avg	Solar Rad. Max	Solar Rad. Min
1/03/2011	26.1	33.2	21.8	57	75	39	4.2		5.5	10.6	0.5			1009.4	1013.4	1005.9	137	1267	0
2/03/2011	21.2	24.5	18.2	77	86	64	0.8		2.6	7.1	0.3			1013.6	1015.4	1011.7	105	715	0
3/03/2011	23.1	28.5	18.4	70	89	47	21.8		2.5	5.0	0.5			1011.5	1013.6	1008.4	184	798	0
4/03/2011	23.6	29.7	18.3	58	76	35	0.0		1.6	4.8	0.1			1011.5	1013.4	1009.1	230	1078	0
5/03/2011	21.4	25.7	15.9	61	75	49	0.0		6.0	9.0	0.4			1018.3	1024.9	1013.2	245	1101	0
6/03/2011	18.9	25.3	13.3	56	71	39	0.0		3.9	6.4	1.9			1024.3	1025.9	1021.7	283	915	0
7/03/2011	19.0	25.6	13.1	61	77	41	0.0		3.3	6.2	0.4			1022.8	1025.3	1018.8	184	1047	0
8/03/2011	22.6	28.9	15.8	53	72	37	0.0		1.7	5.4	0.3			1018.8	1021.8	1014.8	272	1172	0
9/03/2011	23.0	25.6	20.3	58	66	49	0.0		2.5	6.4	0.0			1017.3	1019.7	1015.3	135	915	0
10/03/2011	22.1	25.9	19.4	64	75	49	0.2		2.2	4.9	0.1			1015.6	1017.0	1014.3	167	734	0
11/03/2011	22.3	27.2	18.3	69	85	51	1.8		2.0	6.9	0.7			1016.5	1018.9	1014.4	156	957	0
12/03/2011	23.8	30.5	18.0	64	86	41	0.0		2.0	9.6	0.0			1020.4	1022.8	1016.9	254	1083	0
13/03/2011	23.0	23.7	22.4	67	70	64	0.0		1.6	3.0	0.4			1021.7	1021.9	1021.5	0	0	0
14/03/2011	25.3	31.9	20.5	59	76	41	0.0		3.4	10.1	0.3			1020.2	1022.8	1015.9	275	1051	0
15/03/2011	23.0	30.0	17.2	68	86	44	0.8		4.0	8.0	0.4			1019.6	1022.8	1015.0	233	857	0
16/03/2011	24.2	30.1	18.7	66	87	45	0.2		1.7	4.4	0.1			1018.0	1020.5	1014.7	178	824	0
17/03/2011	23.1	28.8	20.3	71	82	51	3.0		2.2	6.5	0.3			1017.8	1020.2	1015.3	144	1003	0
18/03/2011	21.9	24.7	19.7	75	82	66	0.0		1.9	4.4	0.4			1015.1	1017.7	1012.5	95	506	0
19/03/2011	21.2	24.3	18.6	74	83	63	0.0		3.5	6.0	1.6			1012.6	1014.7	1009.5	103	549	0
20/03/2011	22.7	28.7	16.2	65	84	45	0.0		2.8	6.0	0.7			1008.7	1012.0	1005.5	149	1046	0
21/03/2011	23.2	27.9	19.1	69	87	53	2.2		2.0	5.6	0.1			1005.8	1008.6	1002.6	138	983	0
22/03/2011	23.4	28.0	20.5	72	89	43	4.4		3.1	8.1	0.0			1004.1	1006.6	1001.6	143	1014	0
23/03/2011	22.5	27.6	18.3	61	81	42	0.0		4.0	8.7	1.4			1006.6	1009.0	1004.2	151	907	0
24/03/2011	20.4	24.1	15.3	54	70	42	0.0		4.7	8.9	1.0			1009.7	1012.0	1008.4	210	1081	0
25/03/2011	19.4	23.0	15.7	53	65	41	0.0		4.2	7.4	2.2			1013.2	1017.1	1011.3	158	1128	0
26/03/2011	18.3	24.4	12.5	62	77	45	0.0		5.2	8.8	0.9			1018.3	1021.7	1016.7	239	868	0
27/03/2011	18.5	24.8	13.3	62	80	42	0.0		4.4	8.7	1.5			1022.8	1025.3	1020.6	213	925	0
28/03/2011	20.1	26.3	13.9	58	76	41	0.0		4.1	7.3	1.5			1024.5	1026.8	1022.0	207	1058	0
29/03/2011	20.1	26.4	13.7	64	83	43	5.4		2.3	7.0	0.5			1024.2	1026.6	1020.7	179	909	0
30/03/2011	21.5	27.2	16.8	62	79	37	1.4		1.7	7.9	0.1			1021.3	1024.1	1016.9	195	815	0
31/03/2011	20.9	27.1	15.1	64	81	45	0.0		2.7	8.8	0.3			1021.5	1024.4	1019.2	225	818	0
MONTHLY	21.9	33.2	12.5	63.7	89.0	35.0	46.2	0.0	3.1	10.6	0.0	0.0	0.0	1016.3	1026.8	1001.6	180	1267	0

WERRIS CREEK COAL
AEMR 2010-2011

APPENDIX 9

COMPLAINTS DATABASE

WHITEHAVEN COAL

2010-2011 Complaints Register

#	#	Issue	Complainant	Method	Complaint Date/Time	Nature of Complaint	Investigation	Action Taken / Follow-up
1	54	Clearing	DECCW (Anonymous)	Rang Environmental Officers Phone	8/4/2010 11am	DECCW forwarded through a complaint that they had received regarding illegal clearing at Werris Creek Coal.	Clearing was approved by DA172-7-2004 MOD5 and undertaken following a Pre-Clearing Inspection in late 2009.	Verbal response provided to DECCW. No follow up response possible to Anonymous Complainant.
2	55	Lighting (Mine)	A	Rang Environmental Officers Phone	16/4/2010 10am	Werris Creek resident complained of bright beaming lights at night shining directly into the lounge room from the Coal Mine.	The only activity on elevated location was a drill in the prestrip and unlikely to cause light nuisance	All OCEs were made aware of the complaint and that lights on top of the dump not to be directed towards Werris Creek. Verbal response provided to Complainant.
3	56	Blast (Overpressure and Vibration) Lighting	A	Rang Environmental Officers Mobile	23/4/2010 10am	Werris Creek resident complained of another light shining into the lounge room and that another blast had shaken the house badly.	A structural inspection of the house had been undertaken following an earlier complaint. The blast results were in compliance at nearest monitor. Lighting plant with drill had been removed following previous complaint.	Commenced notifying Complainant of blasts that might be felt at the house. Verbal response provided to Complainant.
4	57	Groundwater Level	H	Rang Environmental Officers Mobile	20/5/2010 3pm	Quipolly resident stated water level has dropped 3 foot in the bore allegedly as a result of the Coal Mine's operations.	A review of nearby monitoring bores did not show a significant drop in water level. Annual water review report stated that long term decreasing trend in groundwater levels due to reduced rainfall recharge.	Commenced monitoring of bore (MW15) for water quality and level as well as sampling Black Gully (BGD). Verbal response provided to Complainant.
5	58	Blast (Overpressure and Vibration)	A	Rang Environmental Officers Phone	15/6/2010 1:25pm	Werris Creek resident stated that the vibration from 2 blasts banged the windows badly at the rear of the house and must be doing damage to the house.	One blast fired with two shots with the oversized rocks fired causing a higher than expected overpressure result however still within compliance limits at all monitors.	A memo of blast results for all previous complaints with a verbal response provided to Complainant. Blast engineer to design additional precautions when firing oversized rocks.
6	59	Blast (Overpressure and Vibration)	A	Rang Environmental Officers Phone	7/7/2010 3:15pm	Werris Creek resident stated vibration from big blast banged the rear windows at 1:30pm on 7/7/10 and concerned that is causing damage to the home. Complainant wants to be notified of big blasts so can have media present.	The blast levels at the nearest monitor were within the compliance limits.	Offer of blast monitoring declined. Verbal response provided to Complainant.
7	60	Noise (Rail Load Out)	J	Email to Environmental Officer	7/7/2010 11:21am	Resident south of Werris Creek township stated on 4/7/11 the noise from the dozers on the Product Coal Stockpile was very loud in particular the tracks.	Product Coal Stockpile dozers only use 1st gear reverse to minimise noise levels.	All dozer operators had refresher training on 1st gear reverse procedure. Noise modelling being undertaken for Complainants property as part of LOM Project. Email response back to Complainant.

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8	61	Groundwater Level	K	Rang Environmental Officers Mobile	8/7/2011 8am	Quipolly resident stated that one bore has fallen 15 feet over time near the mine boundary and another bore fallen 5 feet.	A review of nearby monitoring bores did not show a significant drop in water level. Annual water review report stated that long term decreasing trend in groundwater levels due to reduced rainfall recharge.	Commenced monitoring of bores (MW17) for water quality and level. Verbal response provided to Complainant.
9	62	Blast (Overpressure and Vibration)	I	Rang Environmental Officers Phone	8/7/2010 11:15am	Werris Creek resident stated that the "vibration" from yesterday's blast shook their back sliding door and had only recently notice fresh cracks in the gyprock inside their house since the mine was blasting was closer to town.	The blast levels at the nearest monitor were within the compliance limits.	Verbal response provided to Complainant.
10	63	Lighting (Rail Load Out)	C	Rang Environmental Officers Phone	8/7/2010 12:15pm	Werris Creek resident complaining about flood lights on Product Coal Stockpile causing glare infrequently at their house.	Coal Processing Manager investigated the Product Coal Stockpile area and didn't believe the current configuration of lights would cause any issue to Werris Creek township.	Coal Processing Manager toolbox talked Train Load Out staff on issue and lighting plants to face west. Verbal response provided to Complainant.
11	64	Blast (Overpressure and Vibration)	A	Rang Environmental Officers Phone	26/7/10 1:55pm	Werris Creek resident stated that the vibration from the blast shook the windows badly at the rear of the house	Complainant was advised of the time of blast prior to the blast. A monitor was step up at rear of house, with all blast results in compliance. Consultation with other neighbours stated no problems with blasts.	Monitoring now being undertaken at rear of Complainants property. EO also in attendance for every major blast. Verbal response provided to Complainant.
12	65	Noise (Mine)	L	Rang Environmental Officers Mobile	29/7/2011 11:50pm	Quipolly resident complained about horrendous noise from mine.	Rain delayed start of night shift until 11pm. Continuous noise monitor alarm triggered at midnight and the OCE responded and pulled back dumping adjacent to SW dump edge. Strong temperature inversion present that night. Fog developed and operations suspended at 1am.	Verbal response provided to Complainant.
13	66	Noise (Mine), Groundwater Level, Dust (Mine)	L	Letter to CCC Chairman	30/7/2010 4:37pm	Quipolly residents state that impacts from Noise, Dust and Groundwater levels caused by the mine are affecting their quality of life.	Monitoring of bore has shown a long term decreasing trend in groundwater levels due to reduced rainfall recharge. Continuous noise monitoring shows elevated noise levels due to temperature inversions. Dust monitoring results within compliance.	CCC chairman to write letter back to Complainant. Group Environmental Manager and Community Liaison Officer to meet with residents to negotiate private agreement.
14	67	Noise (Mine)	D	Rang Environmental Officers Mobile	13/8/2010 11am	Quipolly property owner forwarding on a general noise complaint from their tenant.	Continuous noise monitoring shows elevated noise levels due to temperature inversions.	Verbal response provided to Complainant.

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15	68	Blast (Overpressure and Vibration)	M	Rang Environmental Officers Phone	25/8/2010 1:30pm	Quipolly residents complained about excessive blast noise that rattled the house.	Wedge shot resulted in unexpectedly high overpressure level measured to be in 114.7dBL and in compliance at complainant's property. There was a strong north westerly wind that could have enhanced noise impact.	Verbal response provided to Complainant. Blast engineers to review designs to remove need for wedge shots.
16	69	Lighting (Mine)	A	Rang Environmental Officers Phone	26/8/2010 1:30pm	Werris Creek resident complained about lighting shining towards the house.	Environmental Officer audited lighting plant locations resulting in one lighting plant on the dump being reoriented.	Verbal response provided to Complainant.
17	70	Dust (Mine)	Anonymous	Rang Open Cut Office	24/9/2010 8:45am	Dust complaint from "anonymous" resident of Werris Creek irate about the huge amounts of dust over the mine blowing towards Werris Creek.	Open Cut Examiner and Environmental Officer visually inspected the mine site from an adjacent property. Minor operational dust was observed in pit, however there was no evidence of excessive visual dust from the mine site. A foggy hazy was present earlier in the morning. Council Quarry in front of the mine was operational on the day.	No follow up response possible to Anonymous Complainant.
18	71	Dust (Mine)	L	Rang Environmental Officers Mobile	24/9/2010 1:45pm	Quipolly resident stated that dust had been blowing from the mine for the last 3 days resulting in the partner and step son having asthma attacks.	Open Cut Examiner and Environmental Officer visually inspected the mine site from an adjacent property. Minor operational dust was observed in pit, however there was no evidence of excessive visual dust from the mine site. A foggy hazy was present earlier in the morning. Weather conditions had been calm for the last couple of days. Two water carts in pit operating at time of complaint.	Verbal response provided to Complainant.
19	72	Lighting (Mine)	A	Rang Community Complaint Phone Line	5/10/2010 1:30pm	Lighting complaint from resident of Werris Creek regarding two mine lights shining into lounge room.	A review of lighting plant locations resulted in one light relocated from top level of overburden emplacement and another lighting plant being re-orientated.	Verbal response provided to Complainant, indicating that the next night was an improvement. Maintenance to investigate alternative light bulbs.
20	73	Lighting (Mine) Blast (Overpressure and Vibration)	A	Rang Environmental Officers Phone	13/10/2010 9am	Werris Creek resident stated that lights shining at the house meant that people could not sleep in the back room and that the blast shook the house on 7/10/2010.	The blast results were within compliance levels. A review of lighting impact towards the house identified that no lights were shining at the house but the lights were visible from upper levels of overburden emplacement. Environmental Officer had been inspecting lights at night from Werris Creek.	Verbal response provided to Complainant that as the lights are not shining directly at the house, there is not much more the mine can do in the short term to improve the amenity as the mine was operating in accordance with approvals.

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21	74	Blast (Overpressure and Vibration)	A	Rang Environmental Officers Phone	18/10/2010 10am	Werris Creek resident stated that a blast on Sunday shook the house.	No mining activities including blasting were undertaken on the weekend and neither Zeolitte Quarry or Council Quarry were also operating that day.	Verbal response provided to Complainant.
22	75	Lighting (Mine)	A	Rang Community Complaint Phone Line	26/10/2010 11am	Lighting complaint from Werris Creek resident regarding two mine lights shining at the house.	A review of lighting plants locations resulted in one light being relocated from the top of overburden dump.	Verbal response provided to Complainant.
23	76	Noise (Mine)	C	Rang Community Complaint Phone Line	4/11/2010 11am	Noise complaint from Werris Creek resident regarding mining noise last night that could be heard from within the house.	There was a mild temperature inversion and SSW wind blowing towards Werris Creek that was unusual and could have enhanced noise propagation.	Verbal response provided to Complainant.
24	77	Blast (Overpressure and Vibration)	A	Rang Community Complaint Phone Line	8/11/2010	Blasting complaint from Werris Creek resident regarding the second blast from the previous Friday that badly shook the house.	The blast results were in compliance. Two blasts were fired following permission from DECCW due to safety issues.	Verbal response provided to Complainant.
25	78	Blast (Overpressure and Vibration)	A	Rang Community Complaint Phone Line	10/11/2010 1:30pm	Werris Creek resident stated that blast shook house and windows and was the biggest blast they had ever felt.	The blast results were in compliance. Weather conditions unlikely to affect blast levels. Blasting engineer review identified that a change to the product type to minimise the fume and overpressure had resulted in a higher than normal vibration levels.	Verbal response provided to Complainant.
26	79	Blast (Overpressure and Vibration)	N	Rang Environmental Officers Phone	10/11/2010 1:30pm	Werris Creek resident stated that blast shook house and windows and was the biggest blast they had ever felt.	The blast results were in compliance. Weather conditions unlikely to affect blast levels. Blasting engineer review identified that a change to the product type to minimise the fume and overpressure had resulted in a higher than normal vibration levels.	Verbal response provided to Complainant.
27	80	Blast (Overpressure and Vibration)	O	Rang Environmental Officers Phone	10/11/2010 1:30pm	Werris Creek resident stated that blast shook house and windows and was the biggest blast they had ever felt.	The blast results were in compliance. Weather conditions unlikely to affect blast levels. Blasting engineer review identified that a change to the product type to minimise the fume and overpressure had resulted in a higher than normal vibration levels.	Verbal response provided to Complainant.
28	81	Blast (Overpressure and Vibration)	P	Rang Open Cut Office	10/11/2010 1:30pm	Werris Creek resident stated that blast shook house and windows and was the biggest blast they had ever felt.	The blast results were in compliance. Weather conditions unlikely to affect blast levels. Blasting engineer review identified that a change to the product type to minimise the fume and overpressure had resulted in a higher than normal vibration levels.	Verbal response provided to Complainant.

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29	82	Lighting (Mine)	A	Rang Community Complaint Phone Line	7/12/2010 8am	Lights shining brightly towards Werris Creek resident's house.	Project Manager reviewed lighting plant locations and found none that would cause nuisance to Werris Creek.	No follow up taken.
30	83	Blast (Overpressure and Vibration)	A	Rang Community Complaint Phone Line	21/12/2010 10am	Blasting complaint from Werris Creek resident stating that yesterday's blast shook the house and that it was late.	Blast results were within compliance limits.	Verbal response provided to Complainant.
31	84	Lighting (Rail Load Out)	C	Email to Environmental Officer	31/12/2010 11pm	Lights from coal stockpile beaming straight into town tonight from Werris Creek resident.	Coal Processing Manager confirmed two trains were loaded that night with dozers working on the stockpile.	Verbal response provided to Complainant.
32	85	Blast (Overpressure and Vibration)	O	Rang Environmental Officers Mobile	6/1/2011 1:30pm	Blasting complaint from Werris Creek Resident for Blast #1 6/1/11 at 1.30pm.	Blast results were in compliance however strong SSE wind could have reinforced the air blast impact.	Environmental Officer spoke with complainant over the phone advising them of the blast results.
33	86	Blast (Overpressure and Vibration)	A	Rang Community Complaint Phone Line	6/1/2011 1:30pm	Blasting complaint from Werris Creek Resident for Blast #1 6/1/11 at 1.30pm.	Blast results were in compliance however strong SSE wind could have reinforced the air blast impact.	Environmental Officer visited complainant and provided a copy of December and January blasting results.
34	87	Blast (Overpressure and Vibration) Dust (Mine)	DECCW (A)	Rang Environmental Officers Mobile	13/1/2011 5:30pm	General blast and dust complaint from a Werris Creek resident alleging that the mine is doing nothing to fix the damage that blasting has done to their home and the dust is affecting husband's asthma.	Structural Inspection report completed. Last couple of months blasting and dust results were reviewed.	Structural Inspection report, blasting and dust results were sent to DECCW. Environmental Officer visited complainant to discuss their complaint.
35	88	Lighting (Mine)	A	Rang Community Complaint Phone Line	20/1/2011 2:30pm	Lighting complaint from Werris Creek resident about a bright light from the coal mine directed at home the previous night between 12am and 1am.	OCE confirmed that RL445m dump was used the previous night and on review the following day the lighting plant was facing west. OCE's have received toolbox talks to be aware of Werris Creek direction to avoid when setting up lighting plants.	Phone call and letter to complainant advising of investigation outcome.
36	89	Blast (Overpressure and Vibration) Dust (Blast)	DECCW (A)	Rang Environmental Officers Mobile	28/1/2011 10:30am	Complaint from Werris Creek resident regarding a blast dust cloud on 21/1/11 that allegedly was able to be seen from 45km away and thought that it was a bush fire. Also the blast on 25/1/11 shook the house.	Both blasts were in compliance. Weather at time of blast 21/1/11 would have dissipated dust cloud over WCC land to NW and blast 25/1/11 would not have influenced overpressure impact.	Email response to DECCW. Phone call and letter to complainant advising of investigation outcome.

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37	90	Noise (Train Load Out) Noise (Train Shunting)	DoP (A)	Rang Environmental Officers Mobile	3/2/2011 10:40am	Werris Creek resident stated that dozer noise from Product Coal Stockpile on Monday 31st January and Tuesday 1st February night was very loud all night. Noise from a train shunting in Werris Creek station was very loud on Tuesday 1st morning just after midnight. Complainant later changed date to Wednesday 2nd February.	Weather conditions had an unusually strong summer time temperature inversion and SW to NW winds that could have enhanced noise experience by people in Werris Creek. Otherwise all other operational activities were as per normal practice. Werris Creek station train shunting is a Pacific National issue.	Phone call to complainant advising of a Pacific National contact for Werris Creek train yard and letter sent advising of investigation outcome. Coal Processing Manager refreshed operators on 1st Gear Reverse Policy.
38	91	Noise (Train Load Out) Lighting (Mine)	A	Rang Environmental Manager Mobile	8/2/2011 8:00am	Werris Creek resident complained that lighting from the mine on 7th February from 11:30pm was directly impacting the property until 5am. Excessive dozer noise from the Train Load Out area at 4:30am.	Night shift finished at 3:45am with the highest lighting plant on RL410m dump. A cross section was prepared by Surveyor that found a hill RL423m between the lighting plant and house would have prevented any lighting impact on the house. Train Load Out dozers operated in 1st Gear Reverse as per policy and meteorology was unlikely to have enhanced the noise toward Werris Creek.	Phone call and letter to complainant advising of investigation outcome. OCE's implementing a documented procedure for setting up and monitoring lighting plant locations. Complainant was offered to inspect operations onsite, undertake attended monitoring and have a second structural inspection undertaken which was all declined.
39	92	Noise (Mine)	D	Rang Environmental Officers Mobile	4/2/2011 4:00pm	Tenant complained to Quipolly property owner of general noise from the mine.	No specific dates given.	Phone call to complainant encouraging their tenant to contact Environmental Officer as soon as practicable with any noise issues they may have.
40	93	Blast (Overpressure and Vibration) Dust (Blast)	A	Rang Environmental Manager Mobile	9/2/2011 2:00pm	Werris Creek resident complained of blast on Wednesday 9th February 2011 fired at 13:51 (Blast #7 Strip 10 Through-seam) resulted in a dust plume described as a "black cloud".	Blast results were within compliance limits and the weather conditions were unlikely to have influenced any impacts. The through-seam blast could have produced blacker dust due to the coal seam blasted however the SE wind would have dissipated the plume over WCC owned land.	Phone call and letter to complainant advising of investigation outcome.
41	94	Blast (Overpressure and Vibration) Dust (Blast)	E	CCC member passed on to Environmental Officer	11/2/2011 4:00pm	Werris Creek resident complained of blast on Wednesday 9th February 2011 fired at 13:51 (Blast #7 Strip 10 Through-seam) resulted in a dust plume described as a "huge black cloud" and shook their home.	Blast results were within compliance limits and the weather conditions were unlikely to have influenced any impacts. The through-seam blast could have produced blacker dust due to the coal seam blasted however the SE wind would have dissipated the plume over WCC owned land.	Phone call and letter to complainant advising of investigation outcome.

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42	95	Noise (Train Load Out) Unauthorised Access	A	Rang Environmental Manager Mobile	23/2/2011 9:30am	Werris Creek resident complained about excessive noise from Train Load Out Area due to dozers at 9:15pm. Childern were observed riding bikes at the mine site entrance on the weekend.	Weather data indicated temperature inversion present however SE wind would limit noise enhancement. Dozers were operated in accordance with normal practice with one dozer operating in between trains. Staff onsite over weekend did not see any children.	Written response sent to Complainant. I&I NSW requested WCC to review security.
43	96	Blast (Overpressure and Vibration)	F	Rang Crushing Plant Office	24/2/2011 9:30am	Werris Creek resident stated yesterdays blast "shook whole house" frightening them and next door neighbour.	Blast results were in compliance. Shot was a larger blast but at bottom of pit.	Written response sent to Complainant.
44	97	Blast (Overpressure and Vibration)	G	Rang Crushing Plant Office	24/2/2011 4:20pm	Werris Creek resident stated yesterdays blast "shook whole house" frightening the wife and was the first blast they had ever experienced.	Blast results were in compliance. Shot was a larger blast but at bottom of pit.	Written response sent to Complainant.
45	98	Lighting (Mine)	A	Rang Environmental Manager Mobile	25/2/2011 2pm	Werris Creek resident claimed that lights directed at house last night from midnight	No change to lighting plants locations occurred. Highest lighting plant is at RL~410m behind ridge crest RL~423m preventing light towards Werris Creek.	Written response sent to Complainant.
46	99	Unauthorised Access	A	Rang Environmental Manager Mobile	28/2/2011 9am	Werris Creek resident observed Children seen at mine site entrance and risk of unauthorized access when driving past on the weekend.	Staff onsite over weekend did not see any children.	Review security patrols. Review options for camera. Close gate during periods of limited operations.
47	100	Lighting (Mine)	A	Rang Environmental Manager Mobile	7/3/2011 12:20pm	Werris Creek resident stated lights shining brightly at their house only after 12:15am on 3rd & 4th March 2011.	The highest lighting plant is located on RL410m dump which is below the ridgeline RL423m which is between the mine and the house and therefore unlikely that any of the stationary lighting plants are causing the issue. A review of lighting complaints indicates lights only impact between 11pm and 2am. A review of train arrivals into Werris Creek station from the south was inconclusive.	A response letter was sent to the complainant.
48	101	Noise (Rail Load Out) Lighting (Mine)	A	Rang Environmental Manager Mobile	10/3/2011 3pm	Werris Creek resident heard noise from the rail load out facility from 9pm to 1am and lights shining from the open cut area last night 9th March 2011.	There was one train arriving in that time period together with the weak inversion and south westerly winds it is possible that noise from the rail load out facility was audible at the residence. No change to the highest lighting plant which is below the ridgeline and unlikely to be the source of the lighting complaint.	Environmental Manager spoke to complainant at the time of the complaint.

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49	102	Dust (Mine)	B	Rang Environmental Officers Mobile	14/3/2011 6:30pm	Werris Creek resident stated that excessive dust coming from mining operations blowing towards Werris Creek on Monday 6pm 14th March 2011.	Very strong south easterly winds started suddenly at 5:30pm. Mining operations were as protected in pit as possible and the dump was also in pit. Scrappers ended shift at 5:30pm. ARTC contractors were known to be operating on the rail line around that time.	Complainant to get photos developed and EO to organize meeting.
50	103	Noise (Mine)	C	Email to Environmental Officer	25/3/2011 11pm	Werris Creek resident stated that excessive noise from mining operations on 22nd, 23rd and 25th March.	All three nights had strong temperature inversions and south westerly winds which would enhance and propagate noise levels towards Werris Creek township. No exceedance of noise levels due to adverse weather conditions.	A response letter was sent to the complainant.
51	104	Noise (Rail Load Out)	DECCW (A)	Email to Environmental Manager	28/3/2011 6pm	Werris Creek resident stated that loud and annoying noise from the rail load-out facility from 9pm to 2:30am.	Weak to moderate inversion however north east to south easterly winds unlikely to propagate noise towards Werris Creek township. No trains, but coal haulage and one dozer operated until 3:30am	Email response provided to DECCW. A response letter was sent to the complainant. Monthly attended noise monitoring to now include Kurrara St in Werris Creek.
52	105	Noise (Rail Load Out) Lighting (Mine)	DECCW (A)	Email to Environmental Manager	30/3/2011 2:30pm	Werris Creek resident stated that excessive noise from the rail load-out facility until 11:30pm and lights from the "pit area" were very bright on Wednesday night 30th March 2011.	Strong temperature inversion present but moderate south east winds until 10pm, after which light winds changing between south east and north west. Unlikely that there were ongoing noise impacts but after 10pm possible as there was a train being loaded at that time. The highest lighting plant is unchanged located below the ridgeline and unlikely to be the source of the complaint.	Email response provided to DECCW. A response letter was sent to the complainant.