GeoTerra

WERRIS CREEK COAL PTY LTD

SURFACE WATER AND GROUNDWATER 2007 / 2008 MONITORING ANNUAL REVIEW

Werris Creek, NSW

WRC3-R1A

14 MAY, 2008

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WRC3-R1A (14 MAY, 2008)

GeoTerra

Werris Creek Coal Pty Ltd
1435 Quirindi Road
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Attention: Lynden Cini

Lynden,

RE: 2007/8 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 piezometer locations MW1 - MW14 as well as surface water locations within Quipolly Creek and Werris Creek.

This report covers the monitoring period between 10 January 2007 and 01 January 2008.

The review is prepared in accordance with the Ministers Consent (Section 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 for the appointment of Andrew Dawkins of Geoterra Pty Ltd 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.*

1.1 Mining Progress

The mine commenced operation on 11 April, 2005 and has been excavated to RL 295 AHD, which is slightly shallower than at the end of the last reporting period (RL 301.3m).

The original ground surface was approximately RL 370 AHD in the south and RL 390 AHD in the north, giving an excavation depth range of 69m to 89m as the ground slopes up to the north.

Based on groundwater modelling (RCA Australia, 2004) a 0.2m drawdown envelope was anticipated to extend approximately 0.5km north, 1km south, 2km west and 0.25km east of the mine void as shown in **Figure 1**.

The 0.2m cone of depression was not anticipated to extend into the alluvium of Quipolly or Werris Creeks within 1 year of mining, whilst the 0.1m cone of depression was anticipated to be approximately 1.25km north of Quipolly Creek after 7 years.

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 small within the coal measures aquifer with groundwater flow calculated to be approximately 1m/year flowing 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.

To the south of the Permian coal measures, groundwater occurs within the Werrie Basalt aquifer at between 8m (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 Valley to the south of the mine, groundwater occurs at approximately 4.4m (MW7) to 8.7m (MW12) 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.

3. MONITORING PROGRAM AND TRIGGER LEVELS

3.1 Groundwater Level

The approved Site Water Management Plan for the Werris Creek Coal Mine (RW Corkery & Co Pty Ltd, 2005) and the Groundwater Contingency Plan for the Werris Creek Coal Mine (WCC, 2005) identify nine groundwater monitoring bores shown on **Figure 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.

TABLE 1 Groundwater Monitoring Programme – Werris Creek Coal Mine *[1]

QUARTERLY (LIFE OF MINE)			
MONITORING BORE	PARAMETER	UNITS	METHOD
MW-1 *[2], MW-2 *[2], MW-3 *[2], MW-4 *[2], MW-5 *[2], MW-6 *[2], MW-7, MW-8, and MW-9	Standing water level	m	In-situ
QUARTERLY FOR INITIAL 12 MONTHS THEN 6-MONTHLY			
MW-1 *[2], MW-2 *[2], MW-3 *[2], MW-4 *[2], MW-5 *[2], MW-6 *[2], MW-7, MW-8, and MW-9	Total Nitrogen	mg/L	Representative Sample
	Nitrate Nitrogen	mg/L	Representative Sample
	Total Phosphorus	mg/L	Representative Sample
	Reactive Phosphorus	mg/L	Representative Sample
	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	In-situ
	pH		In-situ

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 DEC once the variability of the groundwater quality is established

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 MW-7 between September 2005 and April 2006.

Table 2 presents groundwater level and chemistry trigger levels as agreed with DWE 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 Trigger Levels and Benchmarks

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 DWE 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 DWE'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 (DECC).

The Plan is consistent with the initial Mining Operations Plan (MOP) for the mine which applies for a period of 3 years. An update to The Plan will be submitted to the Director-General in conjunction with the second MOP and prior to the expiry of the initial 3 year SWMP period. The second SWMP will include refinements based on operational experience and monitoring.

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.

The location of all surface water and groundwater monitoring points are presented on **Figure 1**, 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

EPA Identification No.	Type of Monitoring Point	Description of Location
WC-U, WC-D, QC-U, QC-D	Water Quality Monitoring	Upstream and downstream of the confluence of the northern catchment into Werris Creek and the southern catchment into Quipolly Creek

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

TABLE 5 Werris Creek and Quipolly Creek 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 DECC 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 (**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 Assessment Criteria

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

DECC 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 by WCC in Wells MW7 and MW13 and Bore MW12 indicates the following.

4.1.1 Groundwater Level

Groundwater levels shown in **Figure 3** indicate that the MW7 depth to standing water has risen marginally during the monitoring period (10/01/2007 to 01/01/2008) from 4.73m to 4.35m below surface. Water level monitoring with a pressure transducer between September 2005 and May 2006 indicates that short term reductions occurred after pumping of up to approximately 1.6m, with essentially full water level recovery after pumping ceased (Geoterra, 2006). The transducer is not still being used in MW7.

Groundwater levels in MW12 were steadily falling during the last year, then recovered following the rains which started around May, 2007. During the past 12 months, the standing water level in MW12 rose from 8.16m to 7.78m below surface.

In the past year, the depth to standing water in MW13 rose from 5.63m to 5.42m below surface in response to the rains that started in May 2007.

No sustained fall in groundwater levels of greater than 15% have occurred in the Quipolly Creek Alluvial aquifer in the 2005/2006 monitoring period.

4.1.2 Electrical Conductivity

The Quipolly Creek alluvium has a salinity range between approximately 400µS/cm and 1260µS/cm, with the bores wells increasing in salinity from MW7 to MW12 to MW13.

Over the monitoring period, salinity in MW7 and MW12 are essentially unchanged, whilst MW13 has become less saline (920 - 790µS/cm) within the monitoring period.

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

No sustained rise of greater than 15% change in salinity has been monitored

4.1.3 pH

Groundwater pH in the Quipolly Creek alluvium within MW7 and MW12 over the last year was essentially unchanged and lies within the 6.7 to 7.3 range, whilst MW13 became slightly more alkaline (from pH 6.6 to 7.0).

It should be noted that pH is measured in a logarithmic scale, and that adherence to the ANZECC 2000 criteria range is a more appropriate criteria than comparing 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 of greater than 15% change in pH has been monitored

4.1.4 Laboratory Analyses

Groundwater from MW7, 12 and 13 has generally exceeded the ANZECC Agricultural Irrigation Long Term Trigger Value for Total Phosphorous (0.05mg/L), and is occasionally within, but does not exceed the Short Term Trigger Value (0.8 – 1.2mg/L).

As pre mining phosphorous monitoring data is not available for the subject bore and wells, it is not possible with current data to comment on the pre mining status and variability of phosphorous within the Quipolly Creek aquifer.

No other ANZECC 2000 (Agricultural Irrigation or Livestock) criteria or trigger values have been exceeded in the monitoring period.

Total Phosphorous Agricultural Irrigation LTV is generally exceeded in all samples, however the STV is not exceeded.

4.1.5 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) have been attained or exceeded in the 2007 / 2008 monitoring period.

4.2 Groundwater Flow From the Coal Seam to Underlying Aquifers

All bores and piezometers 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.

Werris Creek Coal have initiated a plan to re-instate piezometers to monitor standing water levels in aquifers underneath the coal seam, and have selected three preferred locations, with the piezometers to be located and installed on site once the current mine plan extension is finalised.

4.3 Private Bores

The results of groundwater monitoring of private bores in the vicinity of the mine extracting from the Werrie Basalt (MW1, 2, 3, 8 and 10) and the Currabubula Formation (MW11) are presented in sections 4.3.1 to 4.3.5. The bores are on the following properties as shown in **Table 7**.

TABLE 7 Private Bores

BORE	PROPERTY	EXTRATION FORMATION	DISTANCE TO MINE (km)	COMMENT
MW1	Hillview	Werrie Basalt	2.2	
MW2	Railway View	Werrie Basalt	1.6	
MW3	Eurunderee[#]	Werrie Basalt	1.3	WCC owned bore
MW8	Roseneath	Werrie Basalt	4.5	
MW10	Turnbulls	Werrie Basalt	4.5	

MW11	Turnbulls Gap	Currabubula Fm	7.2	

4.3.1 Groundwater level

The groundwater level in bore MW2 gradually decreased from 27.56mbgl in the initial stages of the monitoring year, then reverted to end at over the last year at 27.20mbgl as shown in **Figure 4**.

Groundwater in MW3 has risen from 16.32mbgl to 14.94mbgl, MW8 has risen from 18.71 to 17.60, whilst MW10 has fallen from 18.20mbgl to 18.76mbgl during the last year.

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

No sustained fall in groundwater levels of greater than 15% have occurred in the private bores during the 2005/2006 monitoring period.

4.3.2 Electrical Conductivity

The Werrie Basalt Private water bores have a salinity range of 940µS/cm to 2940µS/cm, whilst MW11 in the Currabubula Formation has a salinity range between approximately 1210µS/cm and 2170µS/cm.

Over the monitoring period, salinity has reduced slightly in all bores by up to 380uS/cm, except for MW10 which has risen by 30uS/cm since the beginning of the monitoring year. Groundwater salinity is historically more variable than the other private bores, with the current salinities not exceeding its overall range.

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

No sustained rise of greater than 15% change in salinity has been monitored

4.3.3 pH

Groundwater pH in the Werrie Basalt and Currabubula Formation private bores ranges from approximately 6.5 to 7.8 and, as a group, show a gradual, indistinct, essentially flat to pH over the monitoring period.

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 has been monitored

4.3.4 Laboratory Analyses

Bore water in MW2 generally contains elevated Total Nitrogen and Total Phosphorous above the Long Term Trigger Value (LTV), but is within the Short Term Trigger Value (STV) for Agricultural Irrigation.

MW3 generally has Total Phosphorous above the LTV but within the STV Agricultural Irrigation range, as well as having chloride within or above the ANZECC 2000 (Agricultural Irrigation or Livestock) criteria or trigger values.

MW8 generally has only Total Phosphorous above the LTV but within the STV Agricultural Irrigation ANZECC 2000 criteria.

MW10 generally has elevated chloride of up to 440mg/L, which is within the ANZECC 2000 Agriculture and Irrigation criteria, as well as Total Nitrogen and Total Phosphorous above the LTV but within the STV Agriculture / Irrigation range. MW11 can have elevated

chloride of up to 404mg/L, which is within the ANZECC 2000 Agriculture and Irrigation

criteria, as well as Total Nitrogen and Total Phosphorous above the LTV but below the STV Agriculture / Irrigation range.

Total Phosphorous and, occasionally, Total Nitrogen Agriculture / Irrigation LTV is exceeded in most samples, however the STV is not exceeded.

4.3.5 Summary

No Private Bore groundwater quality ANZECC guideline values were exceeded during the monitoring period.

4.4 Werris Creek Coal Mine Piezometers

Groundwater monitoring of WCC piezometers in the Werrie Basalt (MW4, 5, 6, 9 and 14) indicates the following.

4.4.1 Groundwater Level

Groundwater levels shown in **Figure 5** during the monitoring period all initially decreased in the beginning of the year then rose in response to the rains after May, except for MW6.

- MW4 rose by 0.42m
- MW4B rose by 0.12m
- MW5 rose by 1.33m
- MW6 fell by 0.58m
- MW9 rose by 1.79m
- MW14 rose by 0.72

No sustained fall in groundwater levels of greater than 15% have occurred in the WCC piezometers during the 2005/2006 monitoring period.

4.4.2 Electrical Conductivity

The WCC piezometers have a salinity range of approximately 560µS/cm to 2740µS/cm.

Over the monitoring period, salinity has;

Fallen	in MW4B from 1040 to 810 µS/cm
Risen	in MW5 from 2630 to 2740 µS/cm, which equals a 4% rise
Fallen	in MW6 from 1970 to 1960 µS/cm
Fallen	in MW9 from 1120 to 940 µS/cm, and
Remained static	in MW14 at 1080 µS/cm

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

No sustained rise of greater than 15% change in salinity has been monitored in a continuous bore monitoring record.

4.4.3 pH

Groundwater pH in the Werrie Basalt piezometers ranges from approximately 6.6 to 8.0, and, as a group, show an initial lack of change before the rains with a slight increase in alkalinity after the rains in May.

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 has been monitored

4.4.4 Laboratory Analyses

Bore water in MW4 generally contains elevated Total Phosphorous above the Long Term Trigger Value (LTV), but within the Short Term Trigger Value (STV) for Agricultural Irrigation. Total Nitrogen also exceeded the LTV in November 2007.

A dead snake was pulled out of MW4 in the April 2006 sampling event, which would have affected the elevated Total Nitrogen and Total phosphorous levels observed in the February / March 2006 analyses, and along with reduced water levels, necessitated the redrilling of MW4B and the replacement of MW4B for MW4 in the monitoring suite.

MW4 can also occasionally have elevated manganese levels which exceed the ANZECC Agricultural Irrigation Guidelines. Prior to the last years monitoring, manganese peaked at 0.88mg/L, and in the last year, it ranged from peaks of 0.96 to 2.4mg/L

MW5 generally has Total Phosphorous above the LTV but within the STV Agricultural Irrigation range. It also generally has elevated chloride up to 638mg/L, which is within the ANZECC 2000 (Agricultural Irrigation or Livestock) criteria.

MW5 can also occasionally have elevated manganese levels which exceed the ANZECC Agricultural Irrigation Guidelines. Prior to last years monitoring, manganese peaked at 0.79mg/L, and in the last year, it peaked at 0.31mg/L

MW6 generally has Total Phosphorous above the LTV but within the STV Agricultural Irrigation range.

MW9 and MW14 both generally exceed the Total Phosphorous and Total Nitrogen LTV but are within the STV Agricultural Irrigation ANZECC 2000 criteria.

As pre mining phosphorous and nitrogen monitoring data is not available for the subject bores, it is not possible with current data to comment on the pre mining status and variability of phosphorous within the Werrie Basalt.

Total Phosphorous and, occasionally, Total Nitrogen Agriculture / Irrigation LTV is exceeded in most samples, however the STV is not exceeded.

Manganese can exceed ANZECC Agricultural Irrigation Guidelines in MW4, however the bore is used for monitoring piezometers rather than irrigation, and apart from one peak (2.4mg/L) the manganese levels are gradually rising.

Manganese can exceed ANZECC Agricultural Irrigation Guidelines in MW5, however the bore is used for monitoring piezometers rather than irrigation, and the values have

reduced below previous years peaks in the current monitoring period.

4.4.5 Summary

No WCC piezometer 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 2006 / 2007 monitoring period.

The manganese level in MW4 will require further monitoring to assess if the rising trend is continuing.

5. SURFACE WATER

Four monitored surface water discharges occurred into both Quipolly Creek and Werris Creek as shown in **Table 8**, however no discharge criteria were exceeded for any parameters except total suspended solids (TSS). It should be noted, however, that the upstream total suspended solids are higher than the downstream concentration in all cases.

TABLE 8 Surface Water Discharge into Local Creeks

	Electrical Conductivity (uS/cm)	Nitrites mg/L as N	Oil and Grease mg/L	pH	Reactive P (mg/L)	Total N mg/L	Total P mg/L	TSS mg/L
Discharge 27/6/07								
QC-UP	-	-	-	-	-	-	-	-
QC-DOWN	780	-	<2	7.2	0.14	0.55	0.5	13
Discharge 18/7/2007								
QC-UP	940	-	<5	8	-	-	-	4
QC-DOWN	990	-	<2	7.9	0.07	-	1.9	7
Discharge 21/8/7/2007								
WC-UP	190	0.84	<5	7.9	-	1.7	0.55	***165***
WC-DOWN	210	1.2	<5	7.9	-	2.3	0.96	***690***
QC-UP	100	0.037	<5	7.5	-	1.2	0.84	***92***
QC-DOWN	130	0.24	<5	7.4	-	0.8	0.71	***125***
Discharge 6/02/2008								
WC-UP	250	0.013	<5	7.8	0.54	1.2	0.61	***130***
WC-DOWN	260	0.16	<5	7.7	0.53	0.4	0.51	***80***
QC-UP	400	0.047	<5	8.1	0.13	0.5	0.14	***295***
QC-DOWN	390	0.064	<5	7.9	0.16	1	0.11	***145***

No surface water discharges to local creeks exceeded the Surface Water Assessment Criteria outlined in Table 6 apart from Total Suspended Solids in Werris Creek and Quipolly Creek on 21/8/07. Note that although the criteria are exceeded on 6/2/08, th edownstream TSS is actually lower than the upstream value.

6. CONCLUSIONS

Surface water and groundwater level and water quality monitoring between 10/01/07 and 01/01/2008 have shown no significant monitoring trigger values or ANZECC 2000 Agricultural or Irrigation criteria exceedances.

The sampling event time is now conducted quarterly in the last monitoring period (Geoterra, 2006).

Groundwater levels were generally falling up to the rains that started in May 2007, and since that time the majority of bores and wells have shown a rise in standing water levels.

No distinctive relationship of increased groundwater level reduction and proximity to the mine is observed, as the water levels in private bores are also affected by the degree of private extraction over the period.

In most instances Total Phosphorous exceeds the Long Term Trigger Value for Agricultural Irrigation, as does Total Nitrogen in some instances, however the Short Term Trigger Value (STV) is not exceeded in any cases.

Some exceedance of the manganese criteria (0.2mg/L) has been observed in the Werris Creek monitoring piezometers MW4 and MW5, however as they are not used for irrigation, the levels are not of concern. The levels in MW4 / MW4B are gradually rising, however in the last year the concentration in MW5 has fallen.

There is no observable differentiation with current data between the Quipolly Creek aquifer and Werrie Basalt or Currabubula Formation Total Phosphorous or Total Nitrogen values to indicate that agricultural use of fertilisers is more notably affecting the Quipolly Creek aquifer.

A sampled stream discharge occurred into both Quipolly Creek and Werris Creek on 6th February, 2008 indicated that no discharge criteria were exceeded. In absolute terms, the total suspended solids exceeded the criteria, however the results were less downstream of the discharge point compared to upstream in the sampling event, indicating that the streams were naturally turbid, and the mine discharge diluted the TSS.

No investigation of the cause of groundwater or surface water quantity or quality exceedances is required.

7. REFERENCES

Geoterra, 2006 Werris Creek Coal Pty Ltd Surface Water and Groundwater 2005/2006 Monitoring Annual Review

Geoterra, 2007 Werris Creek Coal Pty Ltd Surface Water and Groundwater 2005/2006 Monitoring Annual Review

RW Corkery & Co Pty Ltd, 2005 Site Water Management Plan for the werris Creek Coal Mine, April 2005

RCA Australia Pty Ltd, 2004 Groundwater Assessment, Werris Creek Coal Mine

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

Werris Creek Coal Pty Ltd, 2005 Groundwater Contingency Plan for the Werris Creek Coal Mine, August 2005

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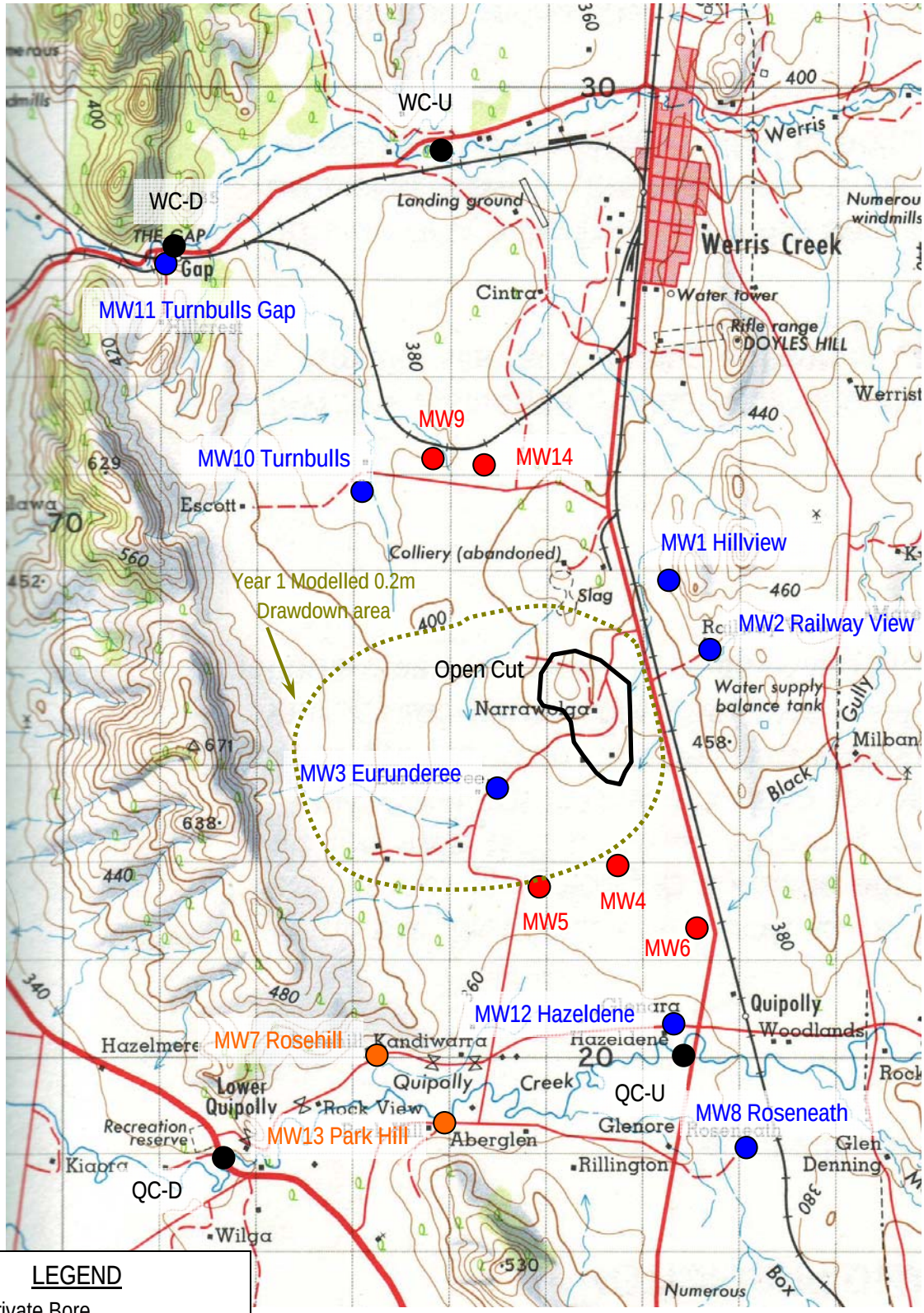
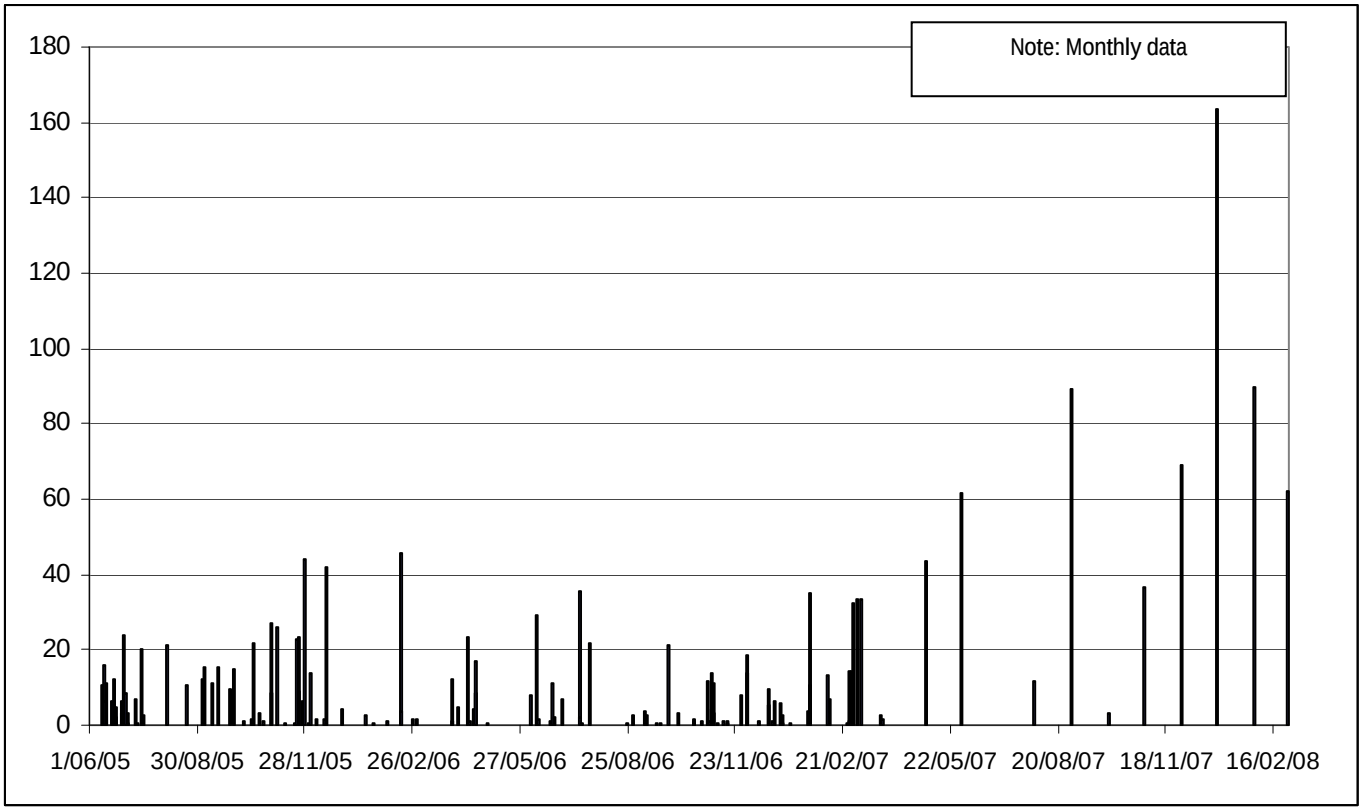
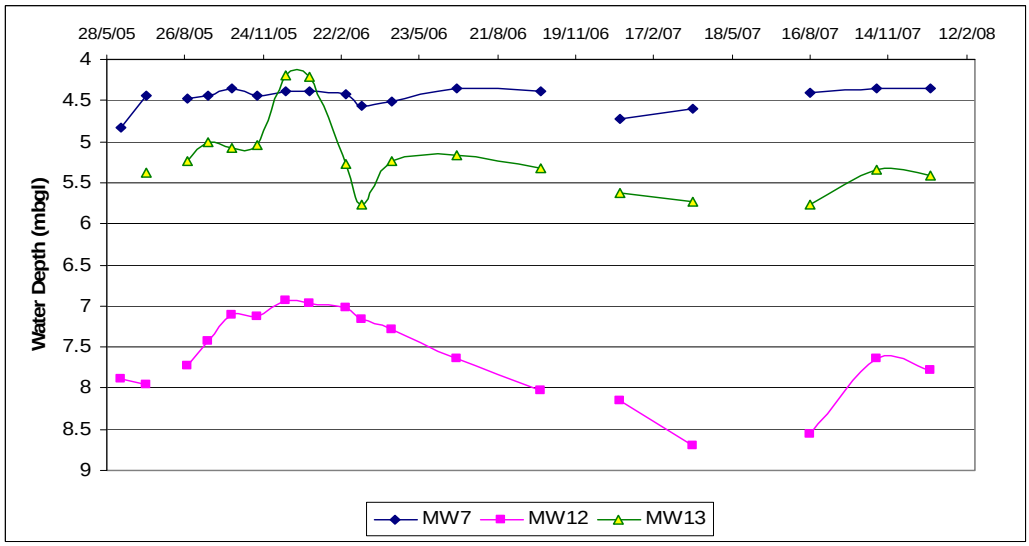
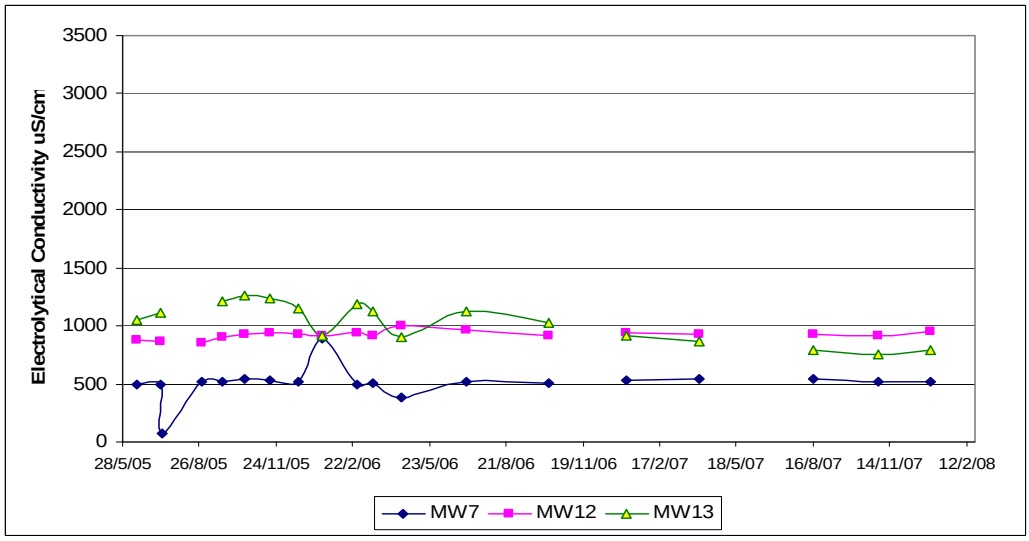


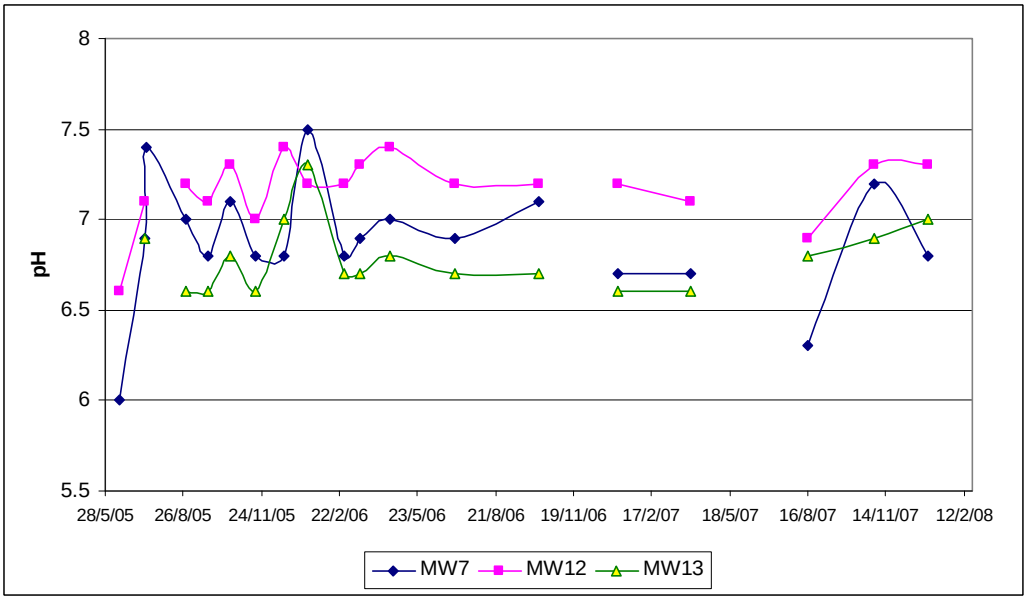
Project	WCC3-R1	**WERRIS CREEK COAL PTY LTD**	**GeoTerra**
Drawn	A Dawkins	**WERRIS CREEK COAL MINE**	
Date	16 April 2008	**Monitoring Locations**	**FIGURE 1**
Scale (approx)	As Shown		



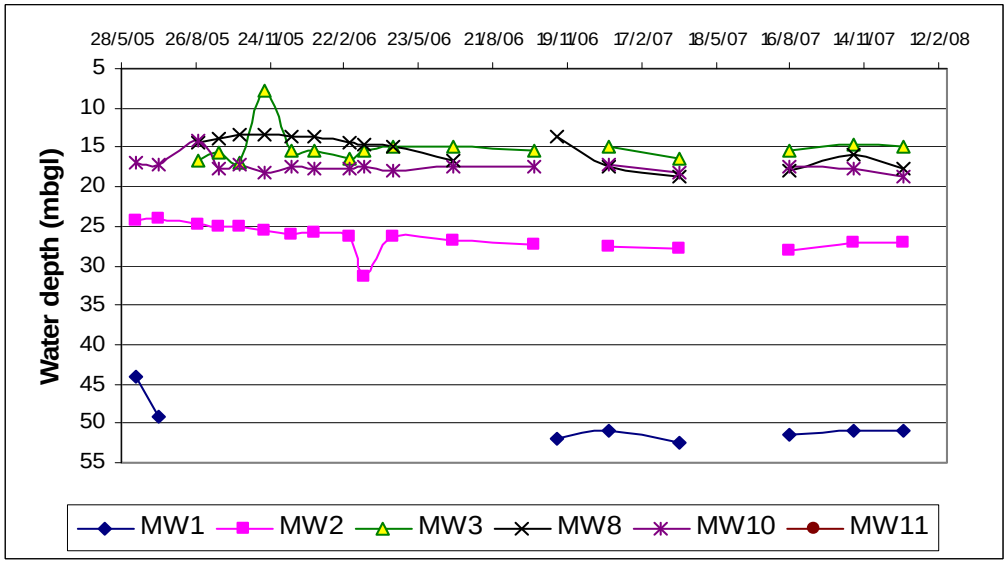
Project	WRC3-R1	**WERRIS CREEK COAL PTY LTD**	**GeoTerra**
Drawn	**A Dawkins**	**WERRIS CREEK COAL MINE**	
Date	**16 April 2008**		
Scale (approx)		**Rainfall**	**FIGURE 2**

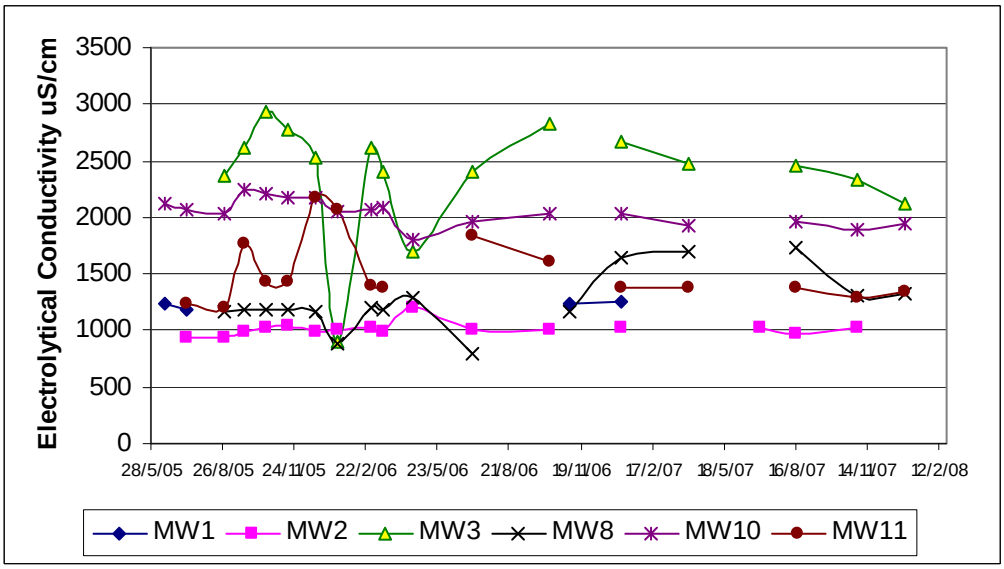


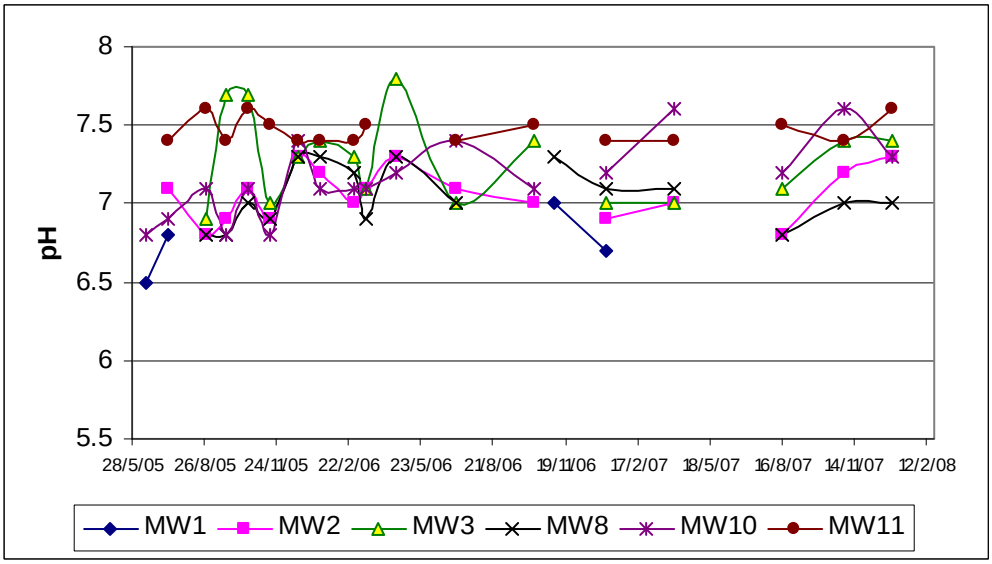




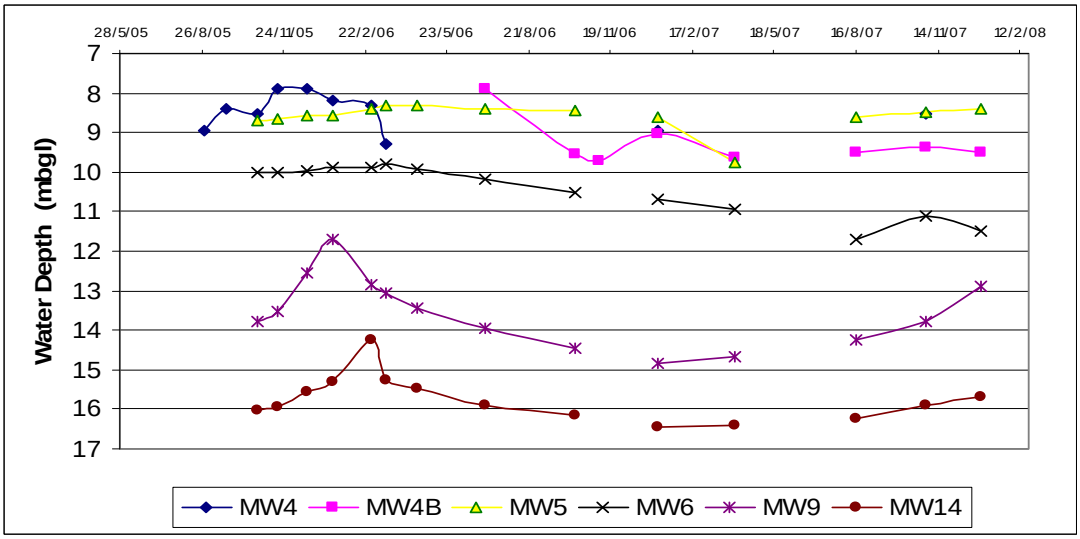
Project	**WRC3-R1**	**WERRIS CREEK COAL PTY LTD**	**GeoTerra**
Drawn	**A Dawkins**	**WERRIS CREEK COAL MINE**	
Date	**16 April 2008**		
Scale (approx)	**NTS**	**Quipolly Creek Alluvium (MW7, 12 &13)**	**FIGURE 3**

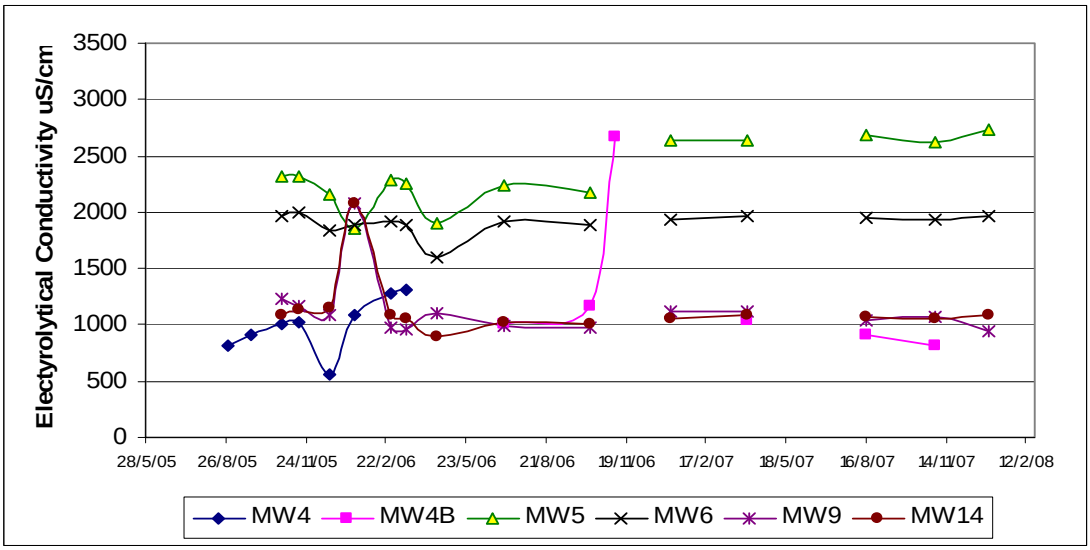


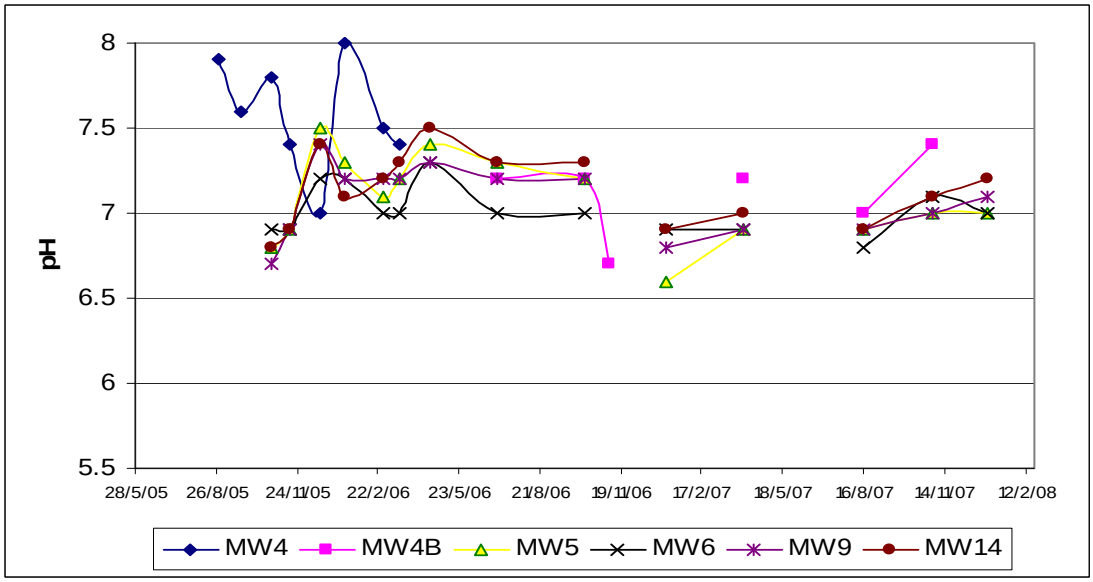




Project	WRC3-R1	WERRIS CREEK COAL PTY LTD	GeoTerra
Drawn	A Dawkins	WERRIS CREEK COAL MINE	
Date	16 April 2008		
Scale (approx)	NTS	Werris Creek Basalt / Currabubula Fm (Private Bores)	FIGURE 4







Project	WRC3-R1	WERRIS CREEK COAL PTY LTD	GeoTerra
Drawn	A Dawkins	WERRIS CREEK COAL MINE	
Date	16 April 2008		
Scale (approx)	NTS	Werris Creek Basalt (WCC Piezometers)	FIGURE 5

APPENDIX A
BORE AND PIEZOMETER DATA SUMMARY

Werris	Creek	Coal	Mine								
Bore	**Property**	**GW No.**	**Type**	**Purpose**	**GWMA**	**Total Depth**	**Install Date**	**Install SWL**	**Flow Depth mbgl**	**Yield L/sec**	**Slotted Depth**
Quipolly Ck	**Alluvium**										
MW7	Rosehill	966349	Well	Stk Dom	Misc Alluvium Barwon Region Quipolly Ck	N.A	N.A	4-May	N.A	N.A	N.A
MW12	Hazeldene	35072	Bore	Stock	Misc Alluvium Barwon Region Quipolly Ck	12.1	N.A	N.A	N.A	N.A	N.A
MW13	Parkhill	60408	Well	irrigaton	Misc Alluvium Barwon Region Quipolly Ck	5.5	1965	4-Jun	N.A	N.A	N.A
Werrie	**Basalt**										
MW1	Hillview	966036	Bore	Stk Dom	Misc Alluvium Barwon Region	63	2003	49	59.5 - 60	1.26	54-60
MW2	Railway View	966127	Bore	Stk Dom	Misc Alluvium Barwon Region	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	Low Nam GW Srce - Main Fan Area Prim. Rchg	39.6	2002	15.2	36.5 - 36.8	0.6	36-38.5
MW4	WCC Pty Ltd	N.A.	Bore	Monitoring	Misc Alluvium Barwon Region Quipolly Ck		2005				
MW5	WCC Pty Ltd	N.A.	Piezo	Monitoring	Misc Alluvium Barwon Region Quipolly Ck	28	2005	8.7	24-27	N.A	22-28
MW6	WCC Pty Ltd	N.A.	Piezo	Monitoring	Misc Alluvium Barwon Region Quipolly Ck	16	2005	10	12-13	N.A	Oct-16
MW8	Roseneath	902638	Bore	Stk Dom	Misc Alluvium Barwon Region Quipolly Ck	42.7	1995	16.4	22.9-23.2 / 35.1-35.4	0.31 / 0.31	22.5-36
MW9	WCC Pty Ltd	N.A.	Piezo	Monitoring	Misc Alluvium Barwon Region Quipolly Ck	28	2005	13.78	26-28	N.A	24-27
MW10	Turnbulls	965745	Bore	Domestic	Misc Alluvium Barwon Region Quipolly Ck	22	2002	14-18	15.3-15.6 / 19.8-20.2	1.26	15-21
MW14	WCC Pty Ltd	N.A.	Piezo	Monitoring	Misc Alluvium Barwon Region Quipolly Ck	26	2005	16.02	20-26	N.A	22-25
	Currabubula Fm										
MW11	Turnbulls Gap		Bore								

APPENDIX B
FIELD GROUNDWATER AND SURFACE WATER DATA

GeoTerra

QUIPOLLY CREEK

EC uS/cm (field)	MW7	MW12	MW13
14/6/05	490	880	1050
12/7/05	490	870	1110
14/7/05	80		
29/8/05	520	850	
23/9/05	520	900	1210
19/10/05	540	930	1260
17/11/05	530	940	1240
21/12/05	520	930	1150
17/1/06	890	910	920
28/2/06	500	940	1190
17/3/06	510	910	1120
21/4/06	380	1000	900
5/7/06	520	970	1120
10/10/06	510	920	1030
6/11/06			
9/1/07	530	940	920
4/4/07	550	930	860
3/7/07			
16/8/07	540	930	790
1/11/07	520	910	750
1/1/08	520	950	790

Deth to GW (m)	MW7	MW12	MW13
14/6/05	4.83	7.89	
12/7/05	4.44	7.96	5.38
14/7/05			
29/8/05	4.47	7.73	5.23
22/9/05	4.44	7.42	5.01
19/10/05	4.36	7.11	5.08
17/11/05	4.44	7.12	5.04
21/12/05	4.38	6.93	4.2
17/1/06	4.38	6.97	4.21
28/2/06	4.42	7.02	5.27
17/3/06	4.56	7.16	5.76
21/4/06	4.51	7.29	5.24
5/7/06	4.35	7.64	5.17
10/10/06	4.39	8.02	5.33
6/11/06			
9/1/07	4.73	8.16	5.63
4/4/07	4.6	8.7	5.74
3/7/07			
16/8/07	4.41	8.55	5.77
1/11/07	4.36	7.64	5.35
1/1/08	4.35	7.78	5.42

pH - Field	MW7	MW12	MW13
14/6/05	6	6.6	
12/7/05	6.9	7.1	6.9
14/7/05	7.4		
29/8/05	7	7.2	6.6
23/9/05	6.8	7.1	6.6
19/10/05	7.1	7.3	6.8
17/11/05	6.8	7	6.6
21/12/05	6.8	7.4	7
17/1/06	7.5	7.2	7.3
28/2/06	6.8	7.2	6.7
17/3/06	6.9	7.3	6.7
21/4/06	7	7.4	6.8
5/7/06	6.9	7.2	6.7
10/10/06	7.1	7.2	6.7
6/11/06			
9/1/07	6.7	7.2	6.6
4/4/07	6.7	7.1	6.6
3/7/07			
16/8/07	6.3	6.9	6.8
1/11/07	7.2	7.3	6.9
1/1/08	6.8	7.3	7

WERRIS	CREEK	BASALT	&	CURRUB.	FM	
Field EC uS/cm	MW1	MW2	MW3	MW8	MW10	MW11
14/6/05	1240				2120	
12/7/05	1190	940			2070	1230
29/8/05		940	2360	1160	2030	1210
23/9/05		990	2610	1190	2240	1770
19/10/05		1030	2940	1190	2210	1430
17/11/05		1050	2770	1190	2180	1430
21/12/05		990	2530	1170	2180	2170
17/1/06		1010	900	880	2050	2070
28/2/06		1020	2620	1210	2060	1390
17/3/06		990	2410	1180	2090	1370
21/4/06		1200	1700	1290	1800	
5/7/06		1000	2400	790	1970	1840
10/10/06		1010	2830		2040	1600
6/11/06	1230			1170		
9/1/07	1250	1020	2670	1650	2040	1380
4/4/07			2480	1700	1920	1380
3/7/07		1030				
16/8/07		970	2450	1730	1970	1370
1/11/07		1020	2330	1300	1890	1290
1/1/08			2130	1320	1950	1350

WERRIS	CREEK	BASALT	&	CURRUB.	FM	
pH - Field	MW1	MW2	MW3	MW8	MW10	MW11
14/6/05	6.5				6.8	
12/7/05	6.8	7.1			6.9	7.4
29/8/05		6.8	6.9	6.8	7.1	7.6
23/9/05		6.9	7.7	6.8	6.8	7.4
19/10/05		7.1	7.7	7	7.1	7.6
17/11/05		6.9	7	6.9	6.8	7.5
21/12/05		7.3	7.3	7.3	7.4	7.4
17/1/06		7.2	7.4	7.3	7.1	7.4
28/2/06		7	7.3	7.2	7.1	7.4
17/3/06		7.1	7.1	6.9	7.1	7.5
21/4/06		7.3	7.8	7.3	7.2	
5/7/06		7.1	7	7	7.4	7.4
10/10/06		7	7.4		7.1	7.5
6/11/06	7			7.3		
9/1/07	6.7	6.9	7.0	7.1	7.2	7.4
4/4/07		7	7	7.1	7.6	7.4
3/7/07						
16/8/07		6.8	7.1	6.8	7.2	7.5
1/11/07		7.2	7.4	7	7.6	7.4
1/1/08		7.3	7.4	7	7.3	7.6

WERRIS CREEK BASALT & CURRUB. FM						
Depth to GW	MW1	MW2	MW3	MW8	MW10	MW11
14/6/05	44.11	24.24			17	
12/7/05	49.1	24.02			17.29	
29/8/05		24.92	16.73	14.35	14.26	
23/9/05		25.04	15.66	13.78	17.75	
19/10/05		25.17	16.95	13.29	17.28	
17/11/05		25.5	7.76	13.42	18.31	
21/12/05		25.94	15.33	13.65	17.32	
17/1/06		25.91	15.35	13.63	17.61	
28/2/06		26.34	16.45	14.33	17.66	
17/3/06		31.32	15.53	14.55	17.5	
21/4/06		26.35	14.85	14.93	17.95	
5/7/06		26.72	14.95	16.6	17.46	
10/10/06		27.27	15.34		17.38	
6/11/06	52			13.65		
9/1/07	51.05	27.56	14.95	17.35	17.25	
4/4/07	52.4	27.9	16.32	18.71	18.2	
3/7/07						
16/8/07	51.48	28.1	15.33	17.87	17.38	
1/11/07	51	27.2	14.7	15.9	17.8	
1/1/08	50.91	27.2	14.94	17.6	18.76	

WERRIS CREEK BASALT (WCC) PIEZOS						
EC uS/cm (Field)	MW4	MW4B	MW5	MW6	MW9	MW14
29/8/05	820					
23/9/05	910					
27/10/05	1010		2310	1960	1230	1080
17/11/05	1020		2320	2000	1160	1130
21/12/05	560		2160	1840	1080	1150
17/1/06	1090		1850	1880	2080	2080
28/2/06	1280		2280	1920	980	1080
17/3/06	1310		2260	1880	960	1050
21/4/06			1900	1600	1100	900
5/7/06		1000	2230	1920	990	1030
10/10/06		1170	2180	1890	970	1010
6/11/06		2670				
9/1/07			2640	1930	1120	1060
4/4/07		1040	2630	1970	1120	1080
3/7/07						
16/8/07		910	2690	1950	1040	1070
1/11/07		810	2620	1930	1070	1050
1/1/08			2740	1960	940	1080

WERRIS CREEK BASALT (WCC) PIEZOS						
Depth to GW (m)	MW4	MW4B	MW5	MW6	MW9	MW14
29/8/05	8.94					
23/9/05	8.4					
27/10/05	8.52		8.7	10	13.78	16.02
17/11/05	7.9		8.64	9.99	13.53	15.93
21/12/05	7.89		8.55	9.95	12.55	15.57
17/1/06	8.19		8.56	9.88	11.72	15.32
28/2/06	8.33		8.38	9.89	12.86	14.23
17/3/06	9.27		8.3	9.81	13.06	15.28
21/4/06			8.33	9.91	13.42	15.47
5/7/06		7.88	8.4	10.18	13.95	15.88
10/10/06		9.56	8.43	10.53	14.46	16.17
6/11/06		9.71				
9/1/07	8.94	9.03	8.63	10.68	14.84	16.46
4/4/07		9.63	9.74	10.93	14.67	16.41
3/7/07						
16/8/07		9.49	8.62	11.7	14.25	16.23
1/11/07	8.52	9.39	8.47	11.1	13.8	15.9
1/1/08		9.51	8.41	11.51	12.88	15.69

WERRIS CREEK BASALT (WCC) PIEZOS						
pH - Field	MW4	MW4B	MW5	MW6	MW9	MW14
29/8/05	7.9					
23/9/05	7.6					
27/10/05	7.8		6.8	6.9	6.7	6.8
17/11/05	7.4		6.9	6.9	6.9	6.9
21/12/05	7		7.5	7.2	7.4	7.4
17/1/06	8		7.3	7.2	7.2	7.1
28/2/06	7.5		7.1	7	7.2	7.2
17/3/06	7.4		7.2	7	7.2	7.3
21/4/06			7.4	7.3	7.3	7.5
5/7/06		7.2	7.3	7	7.2	7.3
10/10/06		7.2	7.2	7	7.2	7.3
6/11/06		6.7				
9/1/07			6.6	6.9	6.8	6.9
4/4/07		7.2	6.9	6.9	6.9	7
3/7/07						
16/8/07		7	6.9	6.8	6.9	6.9
1/11/07		7.4	7	7.1	7	7.1
1/1/08			7	7	7.1	7.2