

GeoTerra

**WERRIS CREEK COAL PTY LTD
SURFACE WATER AND GROUNDWATER
2009 / 2010 MONITORING
ANNUAL REVIEW
Werris Creek, NSW**

WRC3-R3B

31 May 2010

GeoTerra Pty Ltd ABN 82 117 674 941

77 Abergeldie Street Dulwich Hill NSW 2203

Phone: 02 9560 6583 Fax: 02 9560 6584 Mobile 0417 003 502 Email: geoterra@inet.net.au

WRC3-R3B (31 MAY, 2010)

GeoTerra

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

Attention: Andrew Wright

Andrew,

RE: 2009/10 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

GeoTerra Pty Ltd ABN 82 117 674 941

77 Abergeldie Street Dulwich Hill NSW 2203

Phone: 02 9560 6583 Fax: 02 9560 6584 Mobile: 0417 003 502 Email: geoterra@inet.net.au

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 Mining Progress	1
1.2 Rainfall	1
2. GENERAL GROUNDWATER DESCRIPTION	2
3. MONITORING PROGRAM AND TRIGGER LEVELS	3
3.1 Groundwater Level	3
3.1.1 Groundwater Quality	5
3.2 Groundwater Mitigation Measures	7
3.2.1 Groundwater Quantity	7
3.3 Surface Water Monitoring	7
3.3.1 Surface Water Assessment Criteria	8
4. GROUNDWATER MONITORING RESULTS	9
4.1 Quipolly Creek Alluvium	9
4.1.1 Groundwater Level	9
4.1.2 Electrical Conductivity	10
4.1.3 pH	10
4.1.4 Laboratory Analyses	11
4.1.5 Summary	12
4.2 Private Bores	12
4.2.1 Groundwater Level	12
4.2.2 Electrical Conductivity	13
4.2.3 pH	14
4.2.4 Laboratory Analyses	15
4.2.5 Summary	15
4.3 Werris Creek Coal Mine Piezometers	16
4.3.1 Regional Groundwater Levels	16
4.3.2 Groundwater Flow From the Coal Seam to Underlying Aquifers	17
4.3.3 Electrical Conductivity	18
4.3.4 pH	19
4.3.5 Laboratory Analyses	20
4.3.6 Summary	21

5. SURFACE WATER	21
6. CONCLUSIONS	22
7. REFERENCES	22

DRAWINGS

Drawing 1 Groundwater And Stream Monitoring Locations

FIGURES

Figure 1	Monthly Rainfall	2
Figure 2	MW7, MW12 and MW13 Standing Water Level	9
Figure 3	MW7, MW12 and MW13 Electrical Conductivity	10
Figure 4	MW7, MW12 and MW13 pH	11
Figure 5	MW7, MW12 and MW13 Total Phosphorous	11
Figure 6	MW8 Standing Water Level	13
Figure 7	MW8 and MW11 Electrical Conductivity	14
Figure 8	MW 8 and MW11 pH	14
Figure 9	MW 8 and MW11 Total Nitrogen	15
Figure 10	MW1, 2, 3, 4, 4B, 5, 6, 9, 10 and MW14 Standing Water Level	16
Figure 11	P1 to P3 Cross Section	17
Figure 12	P1, P2 and P3 Standing Water Level	18
Figure 13	MW1, 2, 3, 4, 5, 6, 9, 10 and MW14 Electrical Conductivity	19
Figure 14	MW4B, 5, 6, 9 and MW14 pH	20

TABLES

Table 1	Groundwater Monitoring Programme	4
Table 2	Trigger Levels and Benchmarks	5
Table 3	Groundwater Assessment Criteria	6
Table 4	Surface Water Monitoring Locations	7
Table 5	Werris Creek and Quipolly Creek Monitoring Parameters	8
Table 6	Assessment Criteria	8
Table 7	Private Bores	12
Table 8	Water Discharge into Local Creeks	21

APPENDICES

Appendix A Bore and Piezometer Data Summary

Appendix B Field Groundwater and Surface Water Data

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 - MW14, piezometers P1, P2 and P3, as well as surface water locations within Quipolly Creek and Werris Creek.

This report covers the annual monitoring period up to 31 March 2010.

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.*

1.1 Mining Progress

The mine commenced operation on 11 April, 2005 and has been excavated to approximately RL 280m, or 130m below surface as of March 2010, compared to 108m in April 2009.

1.2 Rainfall

Monthly total rainfall for the mine site is shown in **Figure 1**.

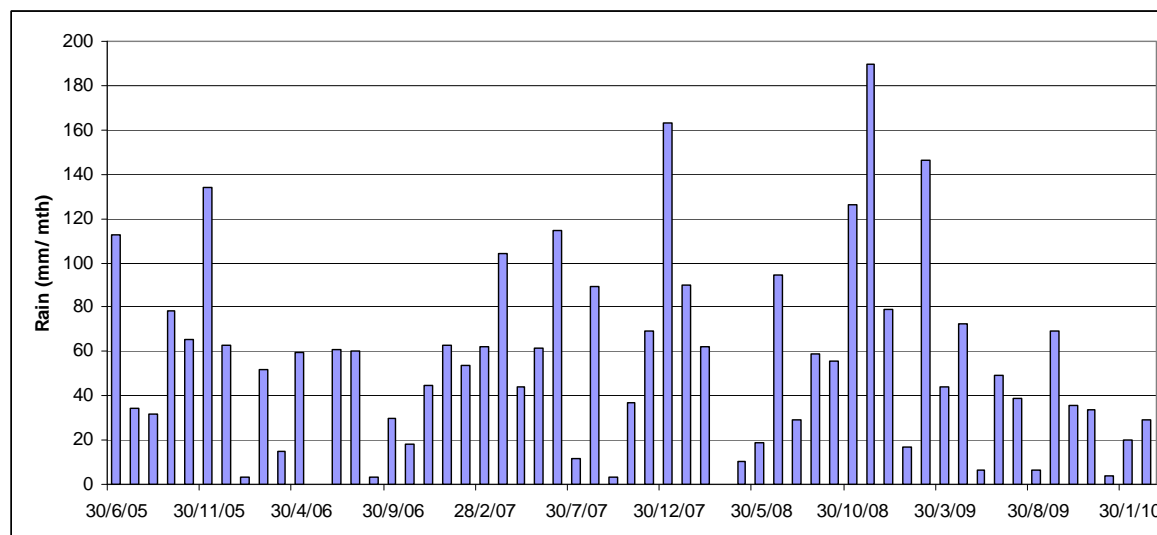


Figure 1 Monthly Rainfall

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.

Based on groundwater modelling (RCA Australia, 2009) 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. The 0.1m cone of depression extent was modelled to intersect along approximately 1.25km of Quipolly Creek at the maximum predicted drawdown.

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 nine 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 MW-7 between September 2005 and April 2006.

The MW7 logger was re-established in May 2010 and will be reported in the next year’s annual report.

Groundwater level monitoring also commenced via a bore drilled into the decommissioned underground workings to the north of the pit in December 2007.

Table 1 Groundwater Monitoring Programme

QUARTERLY			
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
	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-4 *2, MW-5 *2, MW-6 *2, MW-7, MW-8, and MW-9	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	
<p>Note:</p> <p>*1 As presented in the approved Site Water Management Plan</p> <p>*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</p>			

Table 2 presents groundwater level and chemistry trigger levels as agreed with DWE (currently called NSW Office of Water) 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 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 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 ($\mu\text{s}/\text{cm}$)	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 (DECCW).

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 **Drawing 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 DECCW 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

DECCW 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 1st April 2009 and 31st March 2010 (with reference to monitoring conducted since June 2005) in Wells MW7 and MW13 and Bore MW12 as shown in **Figures 2 to 4** indicate the following.

4.1.1 Groundwater Level

During the monitoring period the groundwater level at;

- MW7 has fallen from 4.0mbgl to 4.42 metres below ground level (mbgl), although it is still within the range observed since June 2005
- MW12 has not been monitored because access inside the well has been blocked
- MW13 has fallen from 4.63mbgl to 5.37mbgl, although it is still within the range observed since June 2005

Even though MW13 fell from 4.18mbgl to 5.63mbgl between April and August 2009, then recovered to 5.37mbgl in February 2010, no sustained fall in groundwater levels of greater than 15% compared to the baseline “natural” condition has occurred in the Quipolly Creek Alluvial aquifer in the 2009/2010 monitoring period.

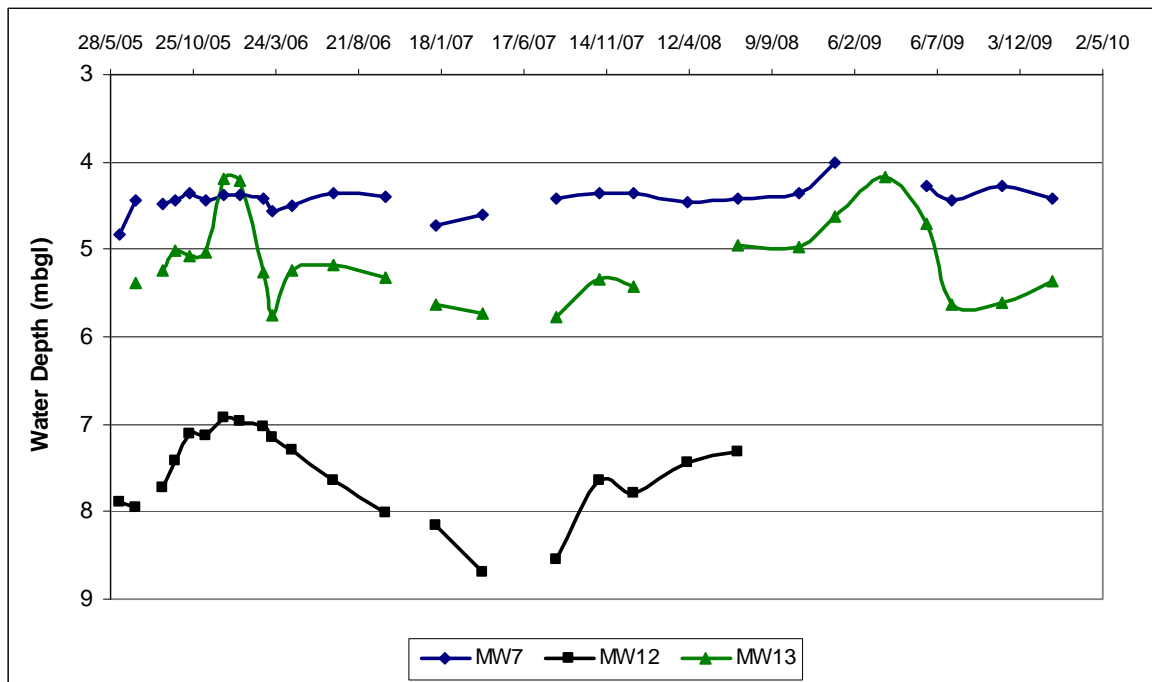


Figure 2 MW7, MW12 and MW13 Standing Water Level

4.1.2 Electrical Conductivity

The Quipolly Creek alluvium has a salinity range between 380 μ S/cm and 1260 μ S/cm.

During the monitoring period, salinity in;

- MW7 and MW12 has remained essentially unchanged to slightly reduced, and
- MW13 has become less saline (930 - 840 μ S/cm).

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

No sustained rise of greater than 15% change in salinity was monitored in 2009/2010

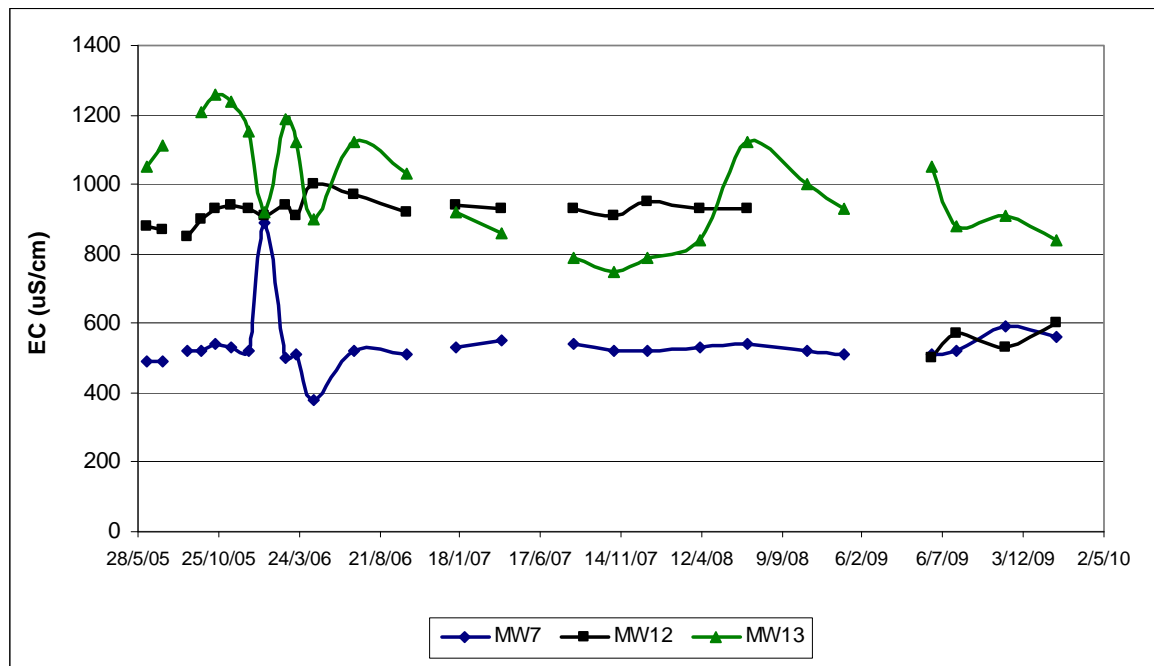


Figure 3 MW7, MW12 and MW13 Electrical Conductivity

4.1.3 pH

During the monitoring period, groundwater pH in the Quipolly Creek alluvium within

- MW7 became more acidic, and changed from pH 8.10 to 7.79
- MW12 became more alkaline, and changed from pH 7.3 to 7.78, and
- MW13 became more alkaline, and changed from pH 7.0 to 7.79.

It should be noted that pH is measured in a logarithmic scale, and therefore adherence to the ANZECC 2000 criteria range is a 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 2009/2010 monitoring period

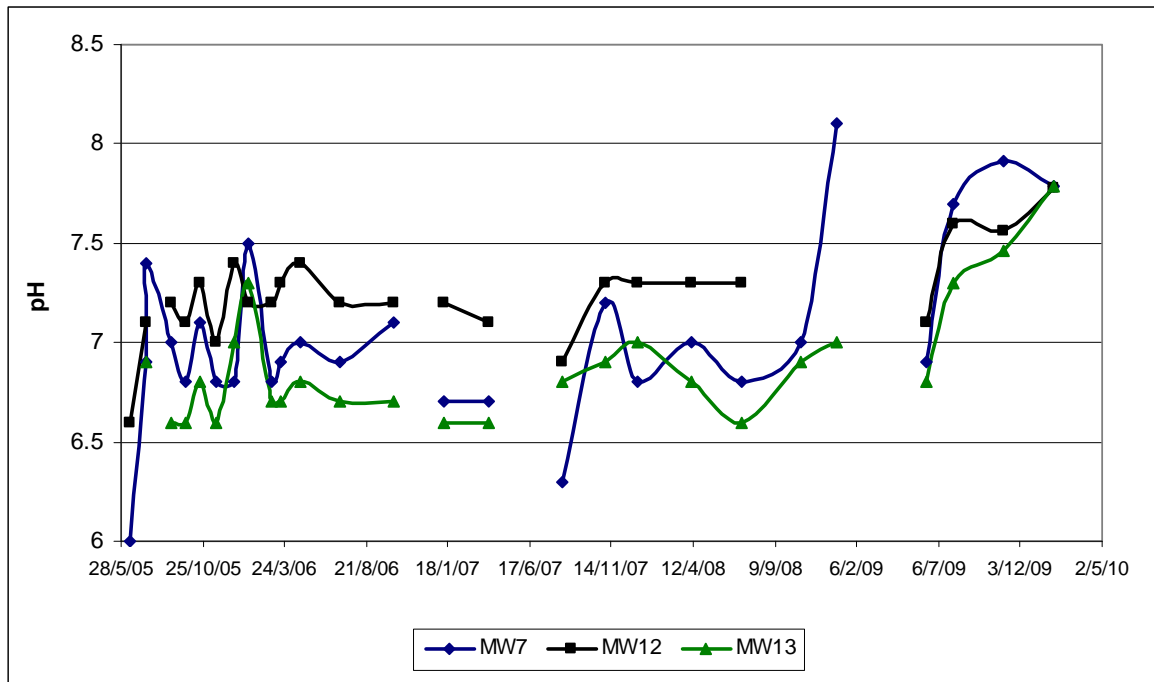


Figure 4 MW7, MW12 and MW13 pH

4.1.4 Laboratory Analyses

Groundwater from MW7 and MW13 generally exceeded the ANZECC Agricultural Irrigation Long Term Trigger Value for Total Phosphorous (0.05mg/L), but did not exceed the Short Term Trigger Value (0.8 – 1.2mg/L) in the last year, with no general significant rising or falling trend in Total Phosphorous as shown in **Figure 5**.

MW12 did not exceed either Total Phosphorous criteria.

MW7 and MW13 are located within paddocks with intensive agriculture whilst MW12 is located in a dryland horse grazing paddock (A. Wright, pers comm.).

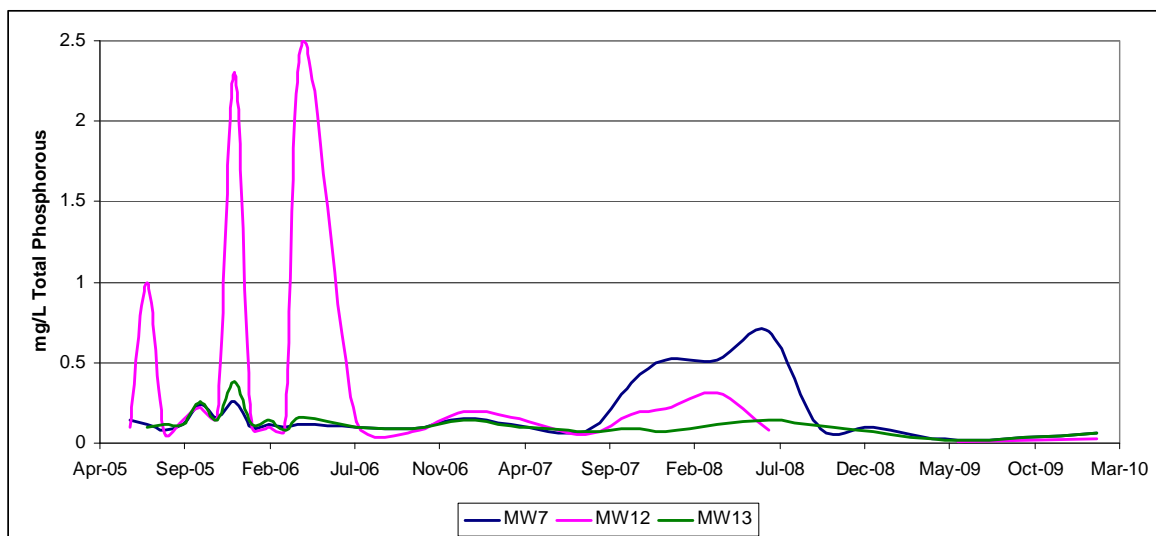


Figure 5 MW7, MW12 and MW13 Total Phosphorous

As pre mining Total 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 of Total Phosphorous within the Quipolly Creek aquifer.

The ANZECC Agricultural Irrigation Long Term Trigger Value for Total Nitrogen (5mg/L) and the Short Term Trigger Value (25 – 125mg/L) were not exceeded during the monitoring period.

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 MW7 and MW13, however the STV was not exceeded during the 2009/2010 monitoring period.

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 2009 / 2010 monitoring period.

4.2 Werrie Basalt and Currabubula Formation Private Bores

The results of groundwater monitoring of private bores in the vicinity of the mine extracting from the Werrie Basalt (MW8) and the Currabubula Formation (MW11) are presented in sections 4.3.1 to 4.3.5. Plots of the data are shown in **Figures 5 to 7**.

The bores are on the following properties as shown in **Table 7**.

Table 7 Private Bores

BORE	PROPERTY	EXTRATION FORMATION	DISTANCE TO MINE (km)
MW8	Roseneath	Werrie Basalt	4.5
MW11	Turnbulls Gap	Currabubula Fm	7.2

4.2.1 Groundwater Level

The measured groundwater level in MW8 has fallen over the monitoring period from 14.07mbgl to 17.05mbgl, although it is still within its historical range since June 2005.

Standing water levels in MW11 are not 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% compared to the “natural” baseline range have occurred in the private bores during the 2009/2010 monitoring period.

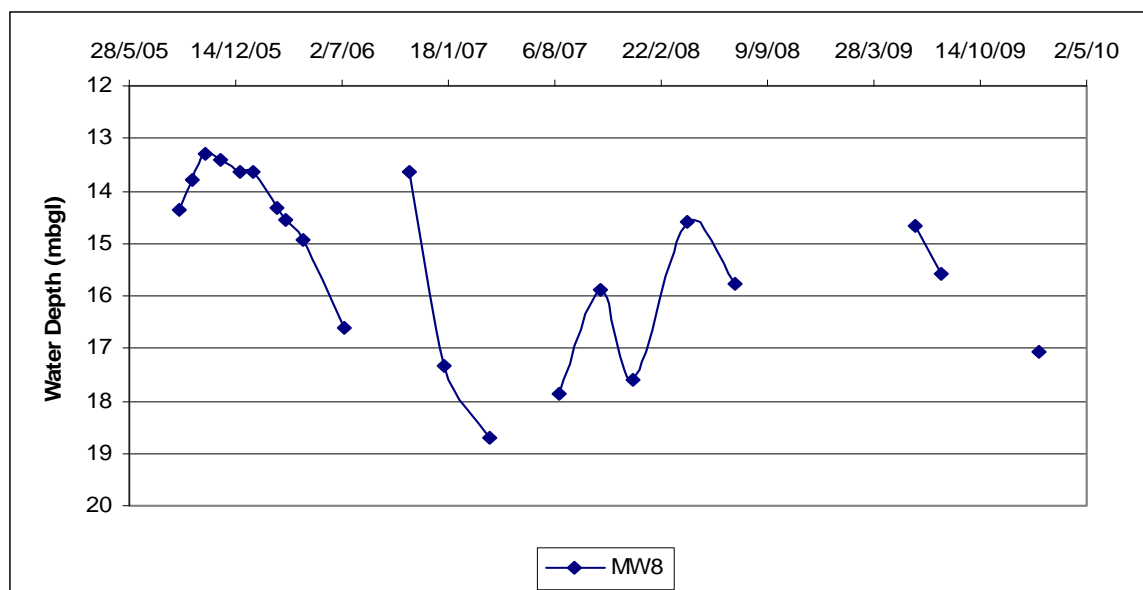


Figure 6 MW8 Standing Water Level

4.2.2 Electrical Conductivity

MW8 in the Werrie Basalt has a salinity range between 790 - 1730 μ S/cm, whilst MW11 in the Currabubula Formation ranges from 580 - 2170 μ S/cm.

During the monitoring period, salinity has risen in;

- MW8 from 1040 - 1467 μ S/cm, although it is still within the range observed since August 2005, and
- MW11 from 1190 - 1410 μ S/cm, although it is still within the range observed since August 2005.

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 since August 2005 was monitored during the 2009/2010 monitoring period.

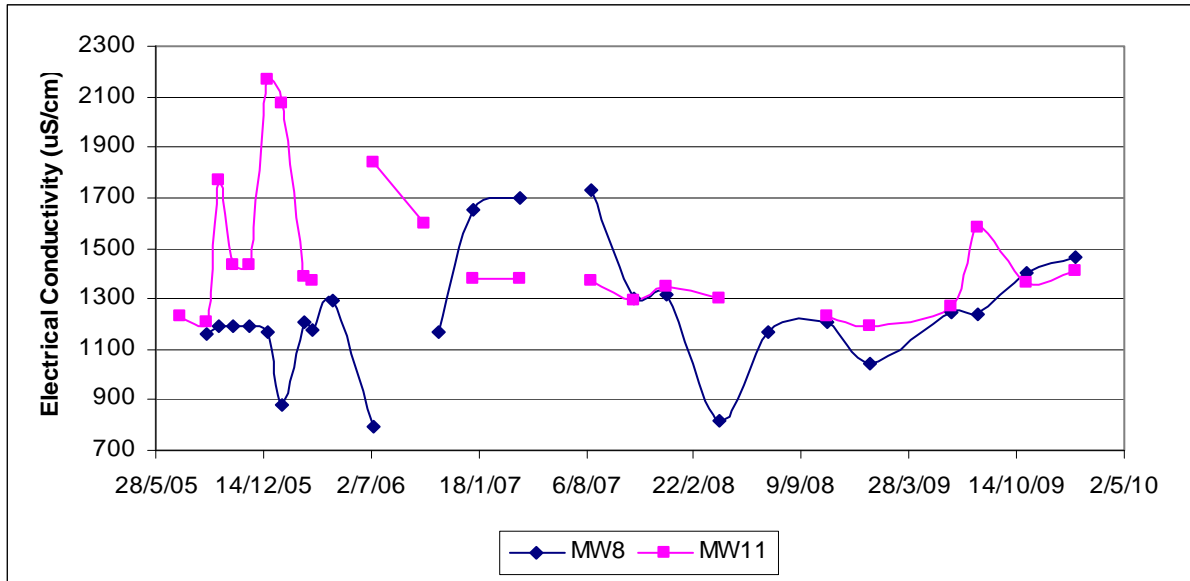


Figure 7 MW8 and MW11 Electrical Conductivity

4.2.3 pH

Groundwater pH in the Werrie Basalt and Currabubula Formation private bores during the monitoring period ranged from pH 6.8 to 7.7.

MW8 had an indistinct trend, whilst MW11 exhibited a very gradual rise in alkalinity 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 was monitored during the 2009/2010 monitoring period

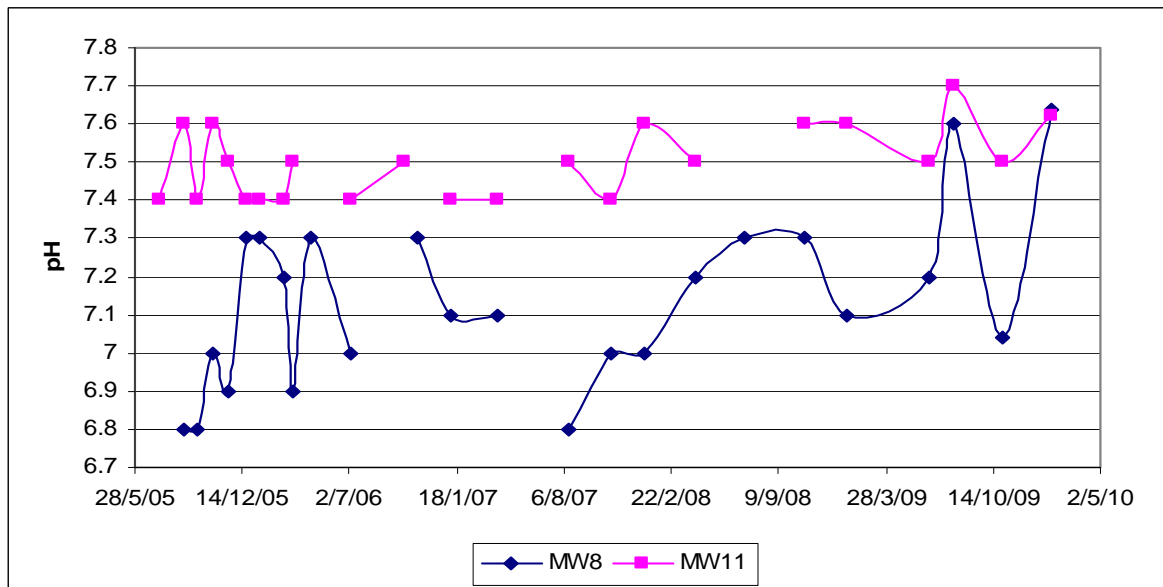


Figure 8 MW 8 and MW11 pH

4.2.4 Laboratory Analyses

During the monitoring period, MW8 exceeded the Total Nitrogen LTV, but not the short term trigger value (STV) with 5.6mg/L in June 2009 and 5.8 mg/L in February 2010.

MW11 generally had Total Nitrogen above the LTV (8.7 – 14.0mg/L).

As shown in **Figure 9**, Total Nitrogen since June 2005 has been relatively static, although variable in MW8, whilst Total Nitrogen in MW11 has been essentially falling since July 2006 and has been historically above the Total Nitrogen LTV since September 2005.

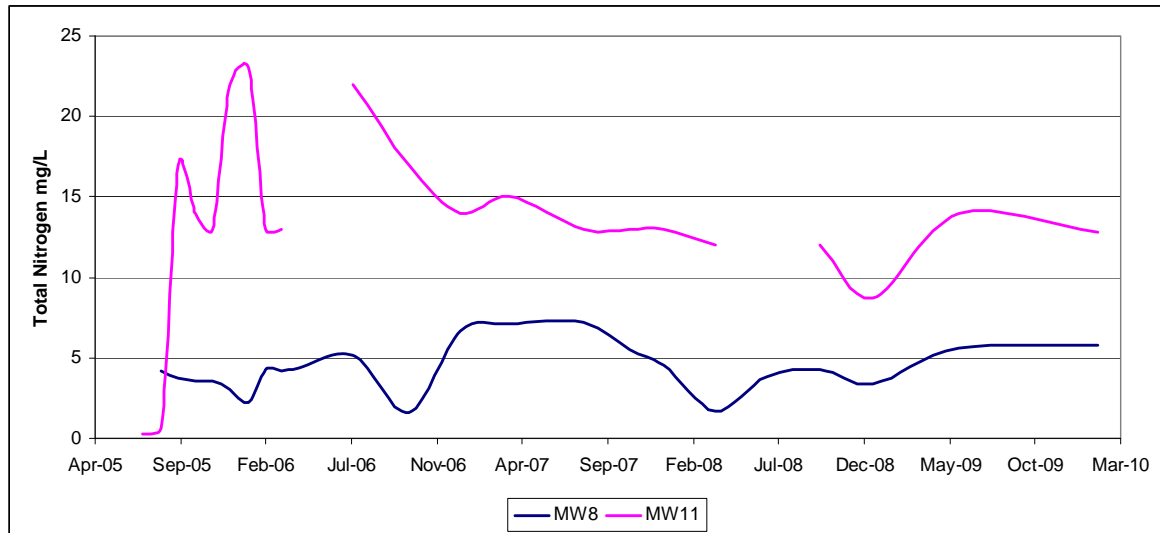


Figure 9 MW 8 and MW11 Total Nitrogen

During the monitoring period, MW8 has been below the Total Phosphorous Long Term Trigger Value Agriculture / Irrigation criteria (LTV), whilst Total Phosphorous in MW11 did not exceed the LTV.

Total Nitrogen levels can exceed the Agriculture / Irrigation LTV, however the STV was not exceeded in MW8 or MW11 during the 2009/2010 monitoring period.

4.2.5 Summary

No private bore 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.

4.3 Werris Creek Coal Mine Piezometers

Groundwater monitoring of WCC piezometers in the Werrie Basalt (MW1, 2, 3, 4, 5, 6, 9, 10 and 14) shown in **Figure 8** indicates the following results and trends.

4.3.1 Regional Groundwater Levels

During the monitoring period, groundwater levels in the mine piezometers and bores in the Werris Creek Basalt;

- fell in MW1 from 51.16 – 52.03
- rose in MW2 since the last reading in July 2008 (due to no available analyses between July 2008 and November 2009) from 27.48 to 26.55mbgl
- were not measured in MW3 after January 2009 due to sealing of the bore access following installation of a pump for use in washing mine vehicles
- were not measured in MW4 due to the blocking of the bore in April 2006 by a dead snake
- fell from 9.48 – 10.24mbgl in MW4B
- fell from 7.39 – 9.04mbgl in MW5
- fell from 10.87 – 12.32mbgl in MW6
- fell from 12.55 – 14.3mbgl in MW9
- fell since the last reading in July 2008 (due to no available analyses between July 2008 and November 2009) from 17.85 – 18.43mbgl in MW10, and
- fell from 14.78 – 16.54mbgl in MW14

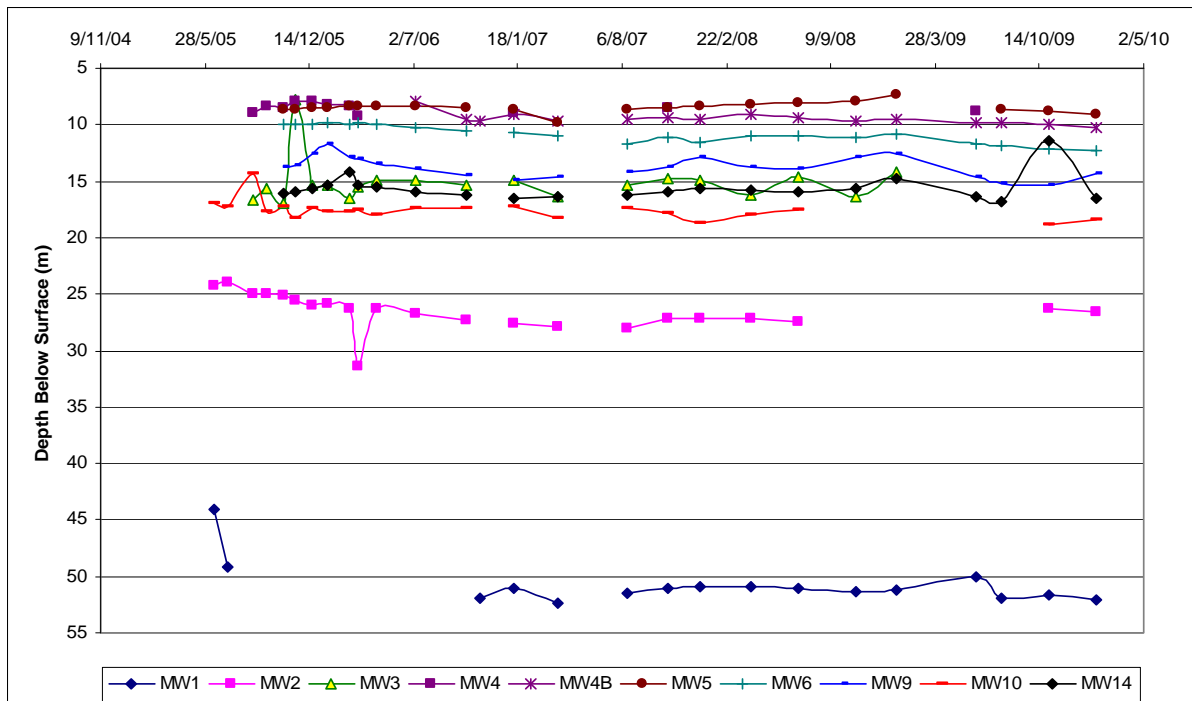


Figure 10 MW1, 2, 3, 4, 4B, 5, 6, 9, 10 and MW14 Standing Water Level

No sustained fall in groundwater levels of greater than 15% compared to the “natural” baseline range have occurred in the WCC piezometers during the 2009/2010 monitoring period, although MW6 may be showing a longer term water level reduction. However, MW4 and MW5, which are located between MW6 and the open cut, are not showing the same trend

4.3.2 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 were 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;

A bore into the underground workings to the north of the open cut has been monitoring groundwater levels in the underground since December 2007.

The mine installed three piezometers adjacent to the active mine area in August 2008 to monitor standing water levels in aquifers underneath the coal seam. Locations of the bores are shown in **Drawing 1**.

A cross section through Piezometers P1 and P3 is shown in **Figure 9**.

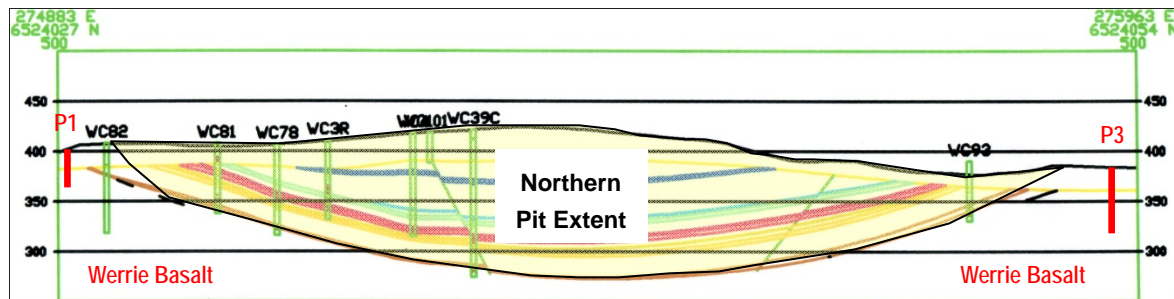


Figure 11 P1 to P3 Cross Section

As shown in **Figure 12**, monitoring of groundwater levels since December 2007 within the old underground workings initially showed dewatering of the workings from 45.2mbgl to 55.8mbgl up to October 2008, which has since recovered and is essentially flat lining at around 52.2 mbgl.

During the monitoring period, the water level in piezometer:

- P1 rose from 23.3 to 20.9mbgl, fell back to 24mbgl, then rose again to 20.75mbgl
- P2 has fallen from 18.7 to 20.75mbgl, and
- P3 fell from 28.1 to 29.53mbgl, before the logging equipment was removed from the piezometer as it was mined through in late November 2009

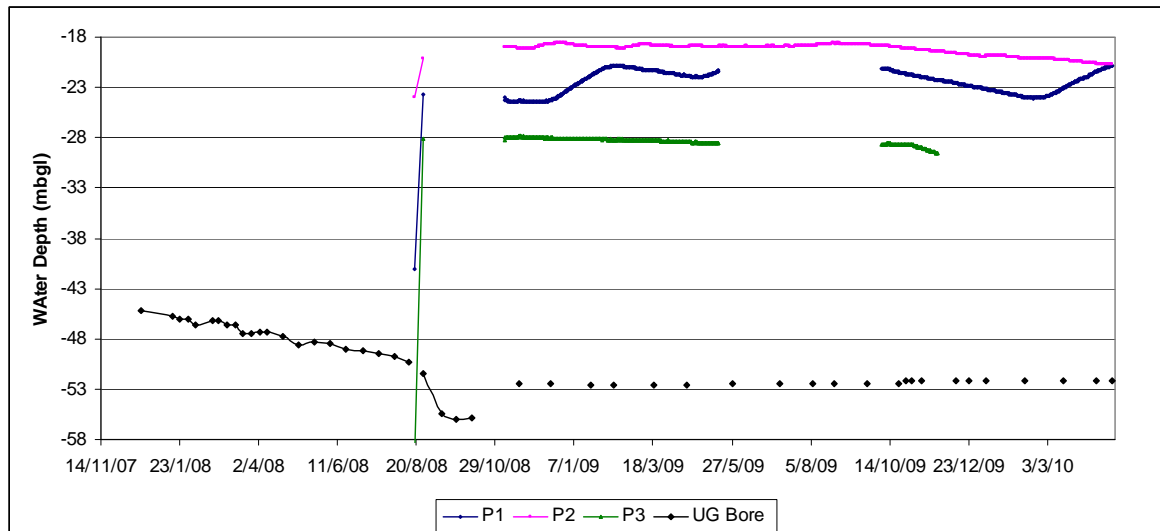


Figure 12 P1, P2 and P3 Standing Water Level

Rainfall data shown in **Figure 1** indicates there has been a reduction in rainfall recharge throughout 2009, which has been observed in the general water level reduction in the Werris Creek Coal and private bore monitoring bore suite.

As a result, with the current data, the proportional contribution from the open cut depressurisation and the lack of recharge can not be conclusively ascertained in the P1 to P3 water level reductions.

It should also be noted that the P1 has recovered to above its installation water level.

Ongoing monitoring is being used to assess water level changes as the pit progresses to the north.

4.3.3 Electrical Conductivity

As shown in **Figure 13**, the WCC piezometers have a salinity range of approximately 560 μ S/cm to 2940 μ S/cm, with one outlier reading in MW4 at 4110 μ S/cm.

During the monitoring period, salinity has;

- remained around 1280 μ S/cm in MW1
- risen from 970 – 1027 μ S/cm in MW2
- fallen from 2280 - 1742 μ S/cm in MW3
- peaked at 4110 μ S/cm in a one off sample at MW4 in June 2009
- risen from 930 μ S/cm in July 2008 to 1078 μ S/cm in MW4B
- fallen from 2630 – 2440 μ S/cm in MW5
- risen from 1940 – 1990 μ S/cm in MW6
- risen from 770 – 885 μ S/cm in MW9
- fallen from 1920 – 1875 μ S/cm in MW10, and
- risen from 1080 – 1310 μ S/cm in MW14

In general the salinities have slightly risen during the monitoring period due to the lack of fresh meteoric recharge to the aquifers as a result of the lower rainfall throughout 2009.

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 the 2009 / 2010 monitoring period apart from MW4, which was no longer regularly sampled after March 2006 due to a dead snake being found in the piezometer.

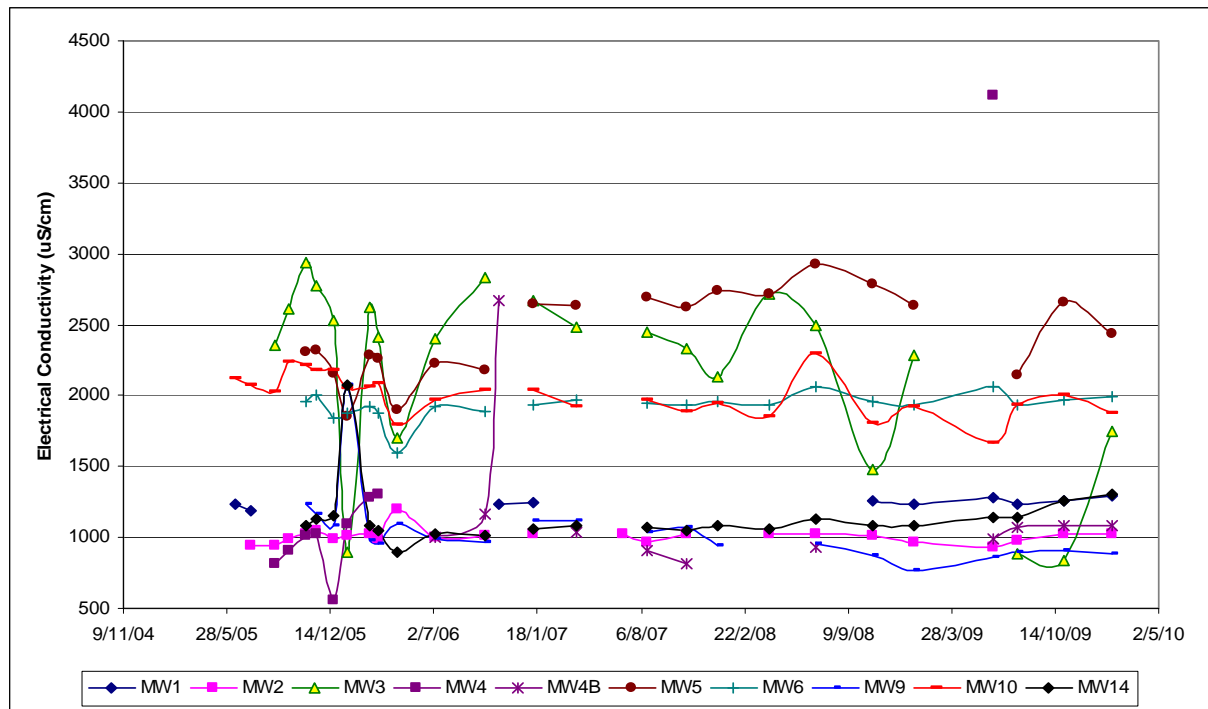


Figure 13 MW1, 2, 3, 4, 5, 6, 9, 10 and MW14 Electrical Conductivity

4.3.4 pH

Figure 14 indicates that groundwater pH in the Werrie Basalt ranges from approximately 6.45 to 8.4, and, as a group, has shown no distinctive changes in 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 in the 2009 / 2010 monitoring period.

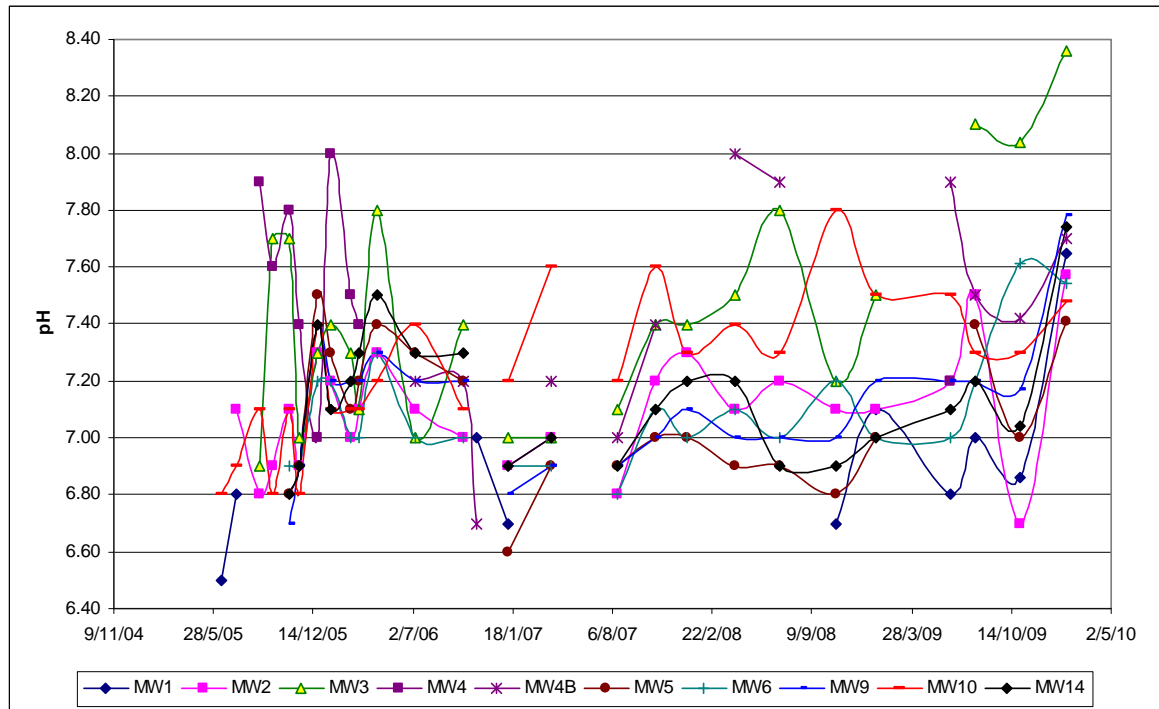


Figure 14 MW4B, 5, 6, 9 and MW14 pH

4.3.5 Laboratory Analyses

During the monitoring period;

- Total Nitrogen in MW1 has ranged from 7.1 – 10.2mg/L which exceeds the LTV but not the STV for Agricultural Irrigation
- MW4 had Total Nitrogen (546 mg/L) and Total Phosphorous (26.3mg/L) above both the LTV and STV criteria in a one off sample in June 2009. It should be noted that this bore was abandoned from regular monitoring after a dead snake was found in April 2006, with monitoring transferred to MW4B
- MW5 had Total Nitrogen (14.5mg/L) and Total Phosphorous (0.72mg/L) above the LTV but below the STV criteria in February 2010. The February reading has been the highest to date
- MW6 had Total Phosphorous above the LTV (0.08 – 0.46mg/L) but below the STV criteria
- MW7 Total Phosphorous above the LTV (0.06 – 0.1mg/L) but below the STV criteria
- MW9 had Total Nitrogen above the LTV but below the STV (3.2 – 8.8mg/L)
- MW10 had Total Nitrogen above the LTV but below the STV Agriculture / Irrigation criteria (18.8 – 23mg/L).
- MW14 had Total Nitrogen above the LTV criteria (8.7 – 14mg/L).

As pre mining Total Phosphorous and Total Nitrogen monitoring data is not available for the subject bores, it is not possible to comment on the pre mining status of Total Phosphorous within the Werrie Basalt.

All bores, except for MW4 were within their “natural” baseline historical range for Total Nitrogen and Total Phosphorous.

Total Phosphorous and Total Nitrogen Agriculture / Irrigation LTV can be exceeded in most samples, however the STV was not exceeded except for MW3, however it has reached the same level of 2.3mg/L Total Phosphorous in October 2005.

4.3.6 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 2009 / 2010 monitoring period.

5. SURFACE WATER

Two monitored surface water discharges occurred in the 2009 / 2010 monitoring period into Quipolly Creek as shown in **Table 8** from discharge point SB9, however no criteria were exceeded for any parameters between the upstream and downstream monitoring locations except for;

- Total Phosphorous at QCD (0.1mg/L) on 15/2/2010 compared to no sample at QCU as QCU was dry at that time,

Although monitoring was conducted in Werris Creek on 6/1/2010 and 15/2/2010 at the same time as the Quipolly Creek monitoring, no water was discharged from the mine into Werris Creek during either event. As a result, the water quality monitored in Werris Creek is not influenced by mine discharges on those dates.

Table 8 Water Discharge into Local Creeks

Discharge	pH	Electrical Conductivity (uS/cm)	Nitrate mg/L as N	Oil and Grease mg/L	Reactive P (mg/L)	Total N mg/L	Total P mg/L	TSS mg/L
CRITERIA	6.5 - 8.5	1900-4500^a 2000-5000^b	6.77	10	-	5.0^{ltv} 25 – 125^{stv}	0.05^{ltv} 0.8-12^{stv}	50
6/1/2010								
WCU	7.87	1270	-	<5	-	-	-	18
WCD	8.16	668	-	<5	-	-	-	54
QCU	-	-	-	-	-	-	-	-
QCD	7.71	687	-	<5	-	-	-	10
15/2/2010								
WCU	7.84	1110	<0.01	<5	0.22	0.6	0.25	18
WCD	7.82	118	3.87	<5	0.05	5.8	0.11	62
QCU	-	-	-	-	-	-	-	-
QCD	7.82	861	0.02	<5	0.1	5.0	0.1	10

NOTES:

a - agricultural irrigation criteria

b - livestock criteria

ltv – irrigation long term trigger value

stv – irrigation short term trigger value

underlined values exceed the relevant criteria

No downstream surface water discharges to Quipolly Creek exceeded the Surface Water Assessment Criteria compared to the upstream value as Quipolly Creek (upstream) was dry at both times, although the Total Phosphorous ANZECC 2000 Agriculture / Irrigation LTV was exceeded at QCD on 15/2/2010.

It should be noted that the compliance criteria only apply to the licensed dam discharge sites, and that the creek monitoring is not linked to the compliance limits and is undertaken as due diligence by the mine to demonstrate the potential impact, or lack of, from the discharges.

6. CONCLUSIONS

Surface water and groundwater level and water quality monitoring up to 31st March 2010 has shown no significant exceedance of trigger values or ANZECC 2000 Agricultural or Irrigation criteria except in MW4, where nutrient levels were exceeded in June 2009 due to a dead snake in the bore that was first identified in April 2006, and as a result, monitoring was transferred to MW4B.

Groundwater levels were generally falling due to the lack of rainfall recharge, and no distinctive regional groundwater depressurisation due to operation of the mine is observed.

There is no observable differentiation with existing 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 affecting the Quipolly Creek aquifer.

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

No discharge from the mine to Werris Creek occurred during the monitoring period.

Total Phosphorous marginally exceeded the Long Term Trigger Value for Agricultural Irrigation, but not the Short Term Trigger Value at the downstream Quipolly Creek sampling site during the 15/2/2010 discharge event. At the time the upstream sample site was dry.

It should be noted that the mine's compliance criteria only apply to the licensed dam discharge sites, and that the creek monitoring results are not linked to those criteria.

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
- RW Corkery & Co, 2005 Site Water Management Plan for the Werris Creek Coal Mine, April 2005
- RCA Australia, 2004 Groundwater Assessment, Werris Creek Coal Mine

RCA Australia, 2009 Proposed Modification to the Werris Creek Coal Mine Groundwater Impact Assessment

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

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

DISCLAIMER

This report was prepared in accordance with the scope of services set out in the contract between Geoterra Pty Ltd (Geoterra) and the client, or where no contract has been finalised, the proposal agreed to by the client. To the best of our knowledge the report presented herein accurately reflects the client's intentions when it was printed. However, the application of conditions of approval or impacts of unanticipated future events could modify the outcomes described in this document.

The findings contained in this report are the result of discrete / specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site / sites in question. Under no circumstances, however, can it be considered that these findings represent the actual state of the site / sites at all points. Should information become available regarding conditions at the site, Geoterra reserve the right to review the report in the context of the additional information.

In preparing this report, Geoterra has relied upon certain verbal information and documentation provided by the client and / or third parties. Geoterra did not attempt to independently verify the accuracy or completeness of that information. To the extent that the conclusions and recommendations in this report are based in whole or in part on such information, they are contingent on its validity. Geoterra assume no responsibility for any consequences arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to Geoterra.

Interpretations and recommendations provided in this report are opinions provided for our Client's sole use in accordance with the specified brief. As such they do not necessarily address all aspects of water, soil or rock conditions on the subject site. The responsibility of Geoterra is solely to its client and it is not intended that this report be relied upon by any third party, who should make their own enquiries.

The advice herein relates only to this project and all results, conclusions and recommendations made should be reviewed by a competent and experienced person with experience in environmental and / or hydrological investigations before being used for any other purpose. The client should rely on its own knowledge and experience of local conditions in applying the interpretations contained herein.

To the extent permitted by law, Geoterra, excludes all warranties and representations relating to the report. Nothing in these terms will exclude, restrict or modify any condition, warranty, right or remedy implied or imposed by any statute or regulation to the extent that it cannot be lawfully excluded, restricted or modified. If any condition or warranty is implied into this license under a statute or regulation and cannot be excluded, the liability of Geoterra for a breach of the condition or warranty will be limited to the supply of the service again.

This report shall not be reproduced either wholly or in part without the prior written consent of Geoterra.

APPENDIX A
BORE AND PIEZOMETER DATA SUMMARY

Werris	Creek	Coal	Mine							
Bore	Property	GW No.	Type	Purpose	Total	Install	Install	Flow Depth	Yield	Slotted
					Depth	Date	SWL	mbgl	L/sec	Depth
Quipolly Ck	Alluvium									
MW7	Rosehill	966349	Well	Stk Dom	N.A	N.A		N.A	N.A	N.A
MW12	Hazeldene	35072	Bore	Stock	12.1	N.A	N.A	N.A	N.A	N.A
MW13	Parkhill	60408	Well	irrigaton	5.5	1965		N.A	N.A	N.A
Werrie	Basalt									
P1	WCC Pty Ltd	N.A.	Piezoe	Monitoring	42	2008		35	N.A.	39-42
P2	WCC Pty Ltd	N.A.	Piezo	Monitoring	25	2008		25	N.A	22-25
P3	WCC Pty Ltd	N.A.	Piezo	Monitoring	61	2008		60	N.A	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	N.A.	Bore	Monitoring		2005				
MW5	WCC Pty Ltd	N.A.	Piezo	Monitoring	28	2005	8.7	24-27	N.A	22-28
MW6	WCC Pty Ltd	N.A.	Piezo	Monitoring	16	2005	10	12-13	N.A	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	N.A.	Piezo	Monitoring	28	2005	13.78	26-28	N.A	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	N.A.	Piezo	Monitoring	26	2005	16.02	20-26	N.A	22-25
	Currabubula Fm									
MW11	Turnbulls Gap		Bore							

APPENDIX B
FIELD GROUNDWATER AND
SURFACE WATER DATA

MW7

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	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	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
Aug-09	4.43	7.7	520	Testing for these analytes not undertaken			
Nov-09	4.27	7.91	590	Testing for these analytes not undertaken			
Feb-10	4.42	7.79	561	1.36	1.4	0.06	0.05
30/04/2010	4.48						
17/05/2010	4.67						

MW12

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	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
Aug-09	N/A	7.6	570	Testing for these analytes not undertaken			
Nov-09	N/A	7.56	529	Testing for these analytes not undertaken			
Feb-10	N/A	7.78	602	0.96	1.1	0.03	0.04

MW13

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	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			
Feb-10	5.37	7.79	840	2.03	2.1	0.06	0.06
17/05/2010	5.6						

		6/01/2010	6/01/2010	6/01/2010		15/02/2010	15/02/2010	15/02/2010
		WCD	WCU	QCD		WCD	WCU	QCD
		Discharge	Discharge	Discharge		Discharge	Discharge	Discharge
pH Value	pH Unit	8.16	7.87	7.71		7.82	7.84	7.82
Electrical Conductivity @ 25°C	µS/cm	668	1270	687		118	1110	861
Suspended Solids (SS)	mg/L	54	18	10		62	18	10
Nitrite as N	mg/L					0.04	<0.01	<0.01
Nitrate as N	mg/L					3.87	<0.01	0.02
Nitrite + Nitrate as N	mg/L					3.91	<0.01	0.02
Total Kjeldahl Nitrogen as N	mg/L					1.9	0.6	0.3
Total Nitrogen as N	mg/L					5.8	0.6	0.3
Total Phosphorus as P	mg/L					0.11	0.25	0.1
Reactive Phosphorus as P	mg/L					0.05	0.22	0.1
Oil & Grease	mg/L	<5	<5	<5		<5	<5	<5
Total Organic Carbon	mg/L	4	13	5				