



NULLAWARRE GROUNDWATER MANAGEMENT PLAN

**Annual Report for Year Ended
June 2009**

Introduction

This report summarises licence information, metered usage and monitoring data collected for the period between July 1st 2008 and June 30th 2009 in accordance with the recommendations given in the Nullawarre Groundwater Management Plan (GMP).

1. The Nullawarre Groundwater Management Plan

The groundwater located in the Nullawarre Water Supply Protection Area (WSPA) encompasses all aquifers within 250 meters of the natural surface (Figure 1). The main aquifer is the Port Campbell Limestone formation (PCL). Groundwater within this WSPA is used for irrigation, dairy and stock and domestic purposes.

2. Southern Rural Water's duties under the Groundwater Management Plan

The Nullawarre Groundwater Management Plan identifies Southern Rural Water (SRW) as the authority responsible for managing and administering the plan.

The plan requires SRW to:

- Coordinate and cause to be carried out groundwater level monitoring and metering programs;
- Administer groundwater licensing within the prescriptions of the plan;
- Review and report annually to the Minister administering the Water Act 1989 on the implementation of the plan;
- Seek review of the plan and if, in its opinion, amendments are necessary or desirable, make recommendations to the Minister accordingly.

3. Allocations

The following table sets out the Permissible Consumptive Volume for the Nullawarre WSPA, and the total allocations for the period.

WSPA	PCV (ML)	Total No. Licences	Licensable (ML)	Domestic & Stock (ML)	Total (ML)
Nullawarre	21,280	211	21,279.9	3,656 ¹	24,935.9

¹ 946ML of D&S attached to existing licences, and 2,710ML registered as D&S (1,355 registered D&S bores at 2ML/bore estimated use) as at July 2009

4. Metering

Of the 211 licences to take and use water from the Nullawarre WSPA, 200 are currently metered in accordance with the State metering program; bores licensed for less than 10ML are not metered for compliance purposes. However, 20 meters are currently fitted to Dairy bores as part of a trial under the GMP.

Meters were read after the end of the irrigation season (between late May and early June) and the data stored in SRW's Water Management System. Metered use for the period was 13,536ML*. This figure does not include all stock and domestic use or non-metered dairy use. It is estimated that total use could be approximately 16,246ML from registered bores (see footnote on previous page).

Review of the meter readings indicated that several groundwater users may have exceeded their licensed entitlement. At the time of writing, SRW was investigating these cases.

SRW is currently conducting electromagnetic meter trials to assess their suitability for use in bores affected by iron-fouling. SRW is also engaged in a retrofitting program to conform with recent changes to the meter installation specifications.

*This figure is subject to some uncertainty for the following reasons:

- Water for Domestic & Stock use is extracted via metered bores in some cases, where the bore is also registered for irrigation, commercial or industrial use;
- Iron-related biofouling is common in the southeastern area of the WSPA and *may* be affecting the accuracy of some meters. SRW conducts regular meter inspections and maintenance.

5. Monitoring

There are 22 monitoring bores throughout the Nullawarre WSPA (see Figure 1). The monitoring bores are owned and managed by the Department of Sustainability & Environment and are used predominantly for monitoring static groundwater levels. Data collected from these bores are presented in Appendices 1A and 1B.

Review of the groundwater elevation data indicates that:

- Levels are the lowest on record in bores 141239 and 141240; and
- Levels were the lowest on record in bores 141231 and 141232 in mid-2007 and are close to the lowest on record at the time of writing.

Salinity is also regularly measured at two bores within the Nullawarre WSPA, and the results from these can be seen in Appendix 2. Salinity in these bores remains relatively stable over the period of record. Sampling has recently increased to every three months rather than twice a year.

SRW conducted a private bore salinity monitoring program during the 08/09 irrigation season, as required by the Groundwater Management Plan. 209 sample bottles were mailed out to groundwater license holders within the Nullawarre WSPA, and 56 samples were returned for analysis. This data has been added to SRW's records to help monitor the salinity levels in the Nullawarre WSPA and surrounding areas. Data collected from these private bores are presented in Appendix 2. There are no salinity trends evident at this time.

Rainfall and stream flow data for Brucknell Creek are included as Appendix 3. The data for Brucknell Creek indicates that stream flows increased from the previous year. The highest stream flows were recorded during the months of August and December. These flows corresponded with significant rainfall events.

6. Transfers of Water Entitlement

During the period between July 2008 and June 2009 a number of permanent and temporary transfers were approved within the Nullawarre WSPA.

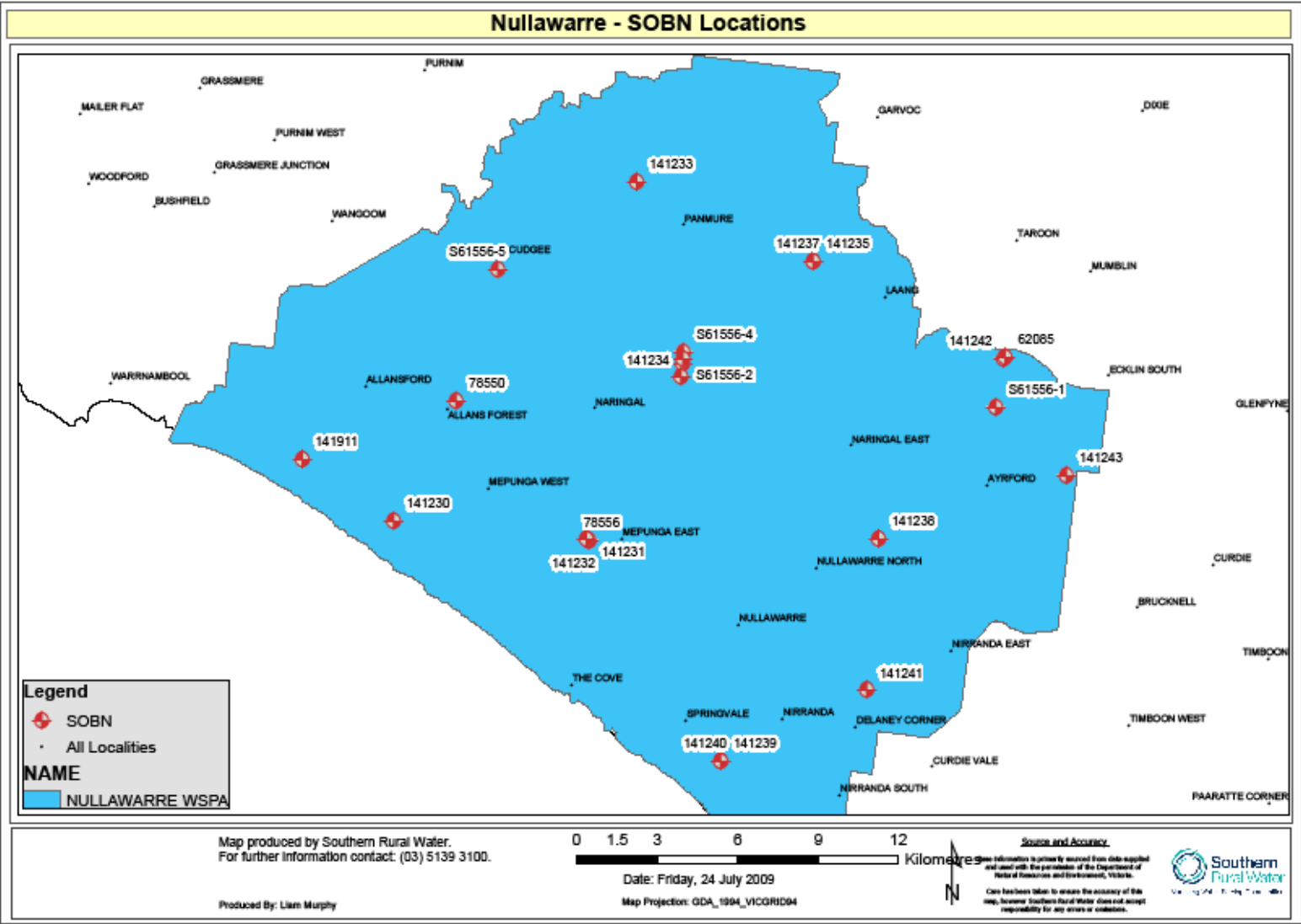
There were 4 permanent transfers over the past year, for a combined volume of 312.5ML. There were 7 temporary transfers approved with a combined volume of 433ML; the transfer terms were between one and five years.

7. Plan Review

A review of the Groundwater Management Plan was completed in 2007. SRW did not propose to amend the Plan.

Review of additional data collected to date (including the private bore salinity) has not altered the finding of the review.

Figure 1. The Nullawarre WSPA



Appendix 1. Monthly Monitoring Data (Groundwater Level)

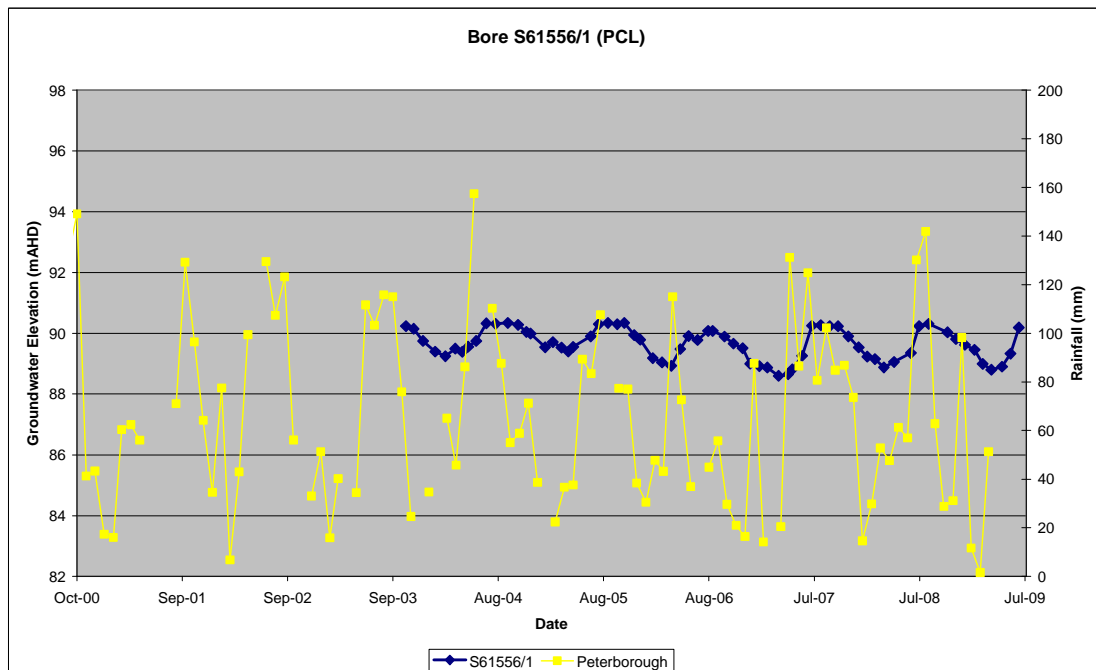
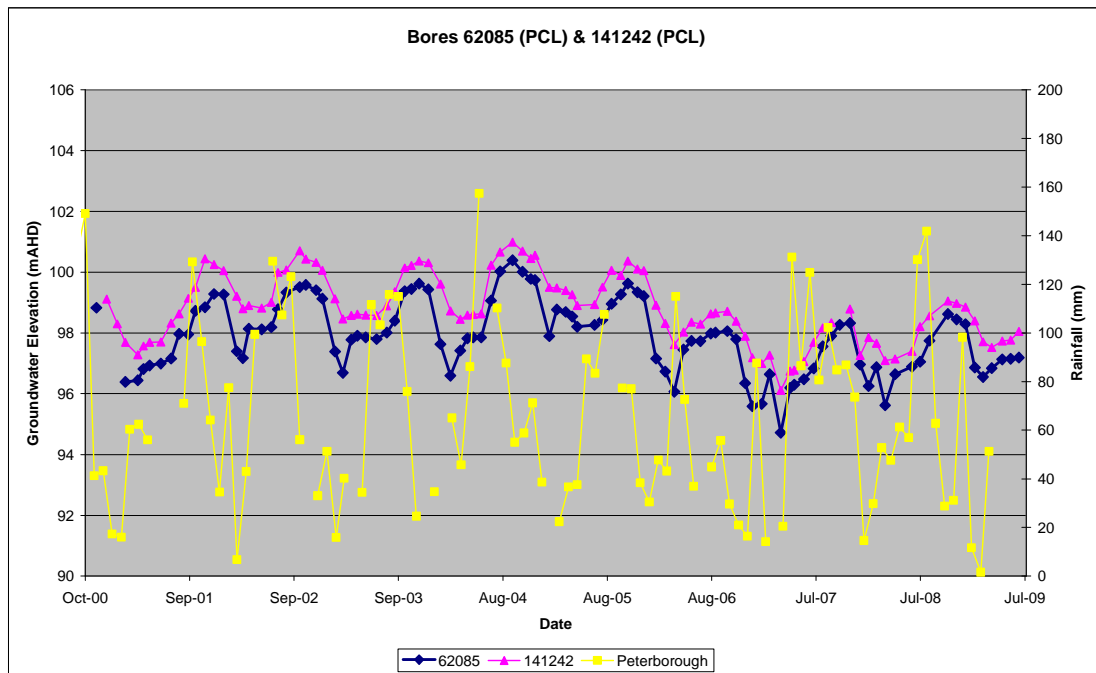
The tables below show the Reduced Water Level in metres above the Australian Height datum (AHD), which is equivalent to average sea level, at each monitoring bore within the Nullawarre WSPA. This data was used to generate the hydrographs in Appendix 1B.

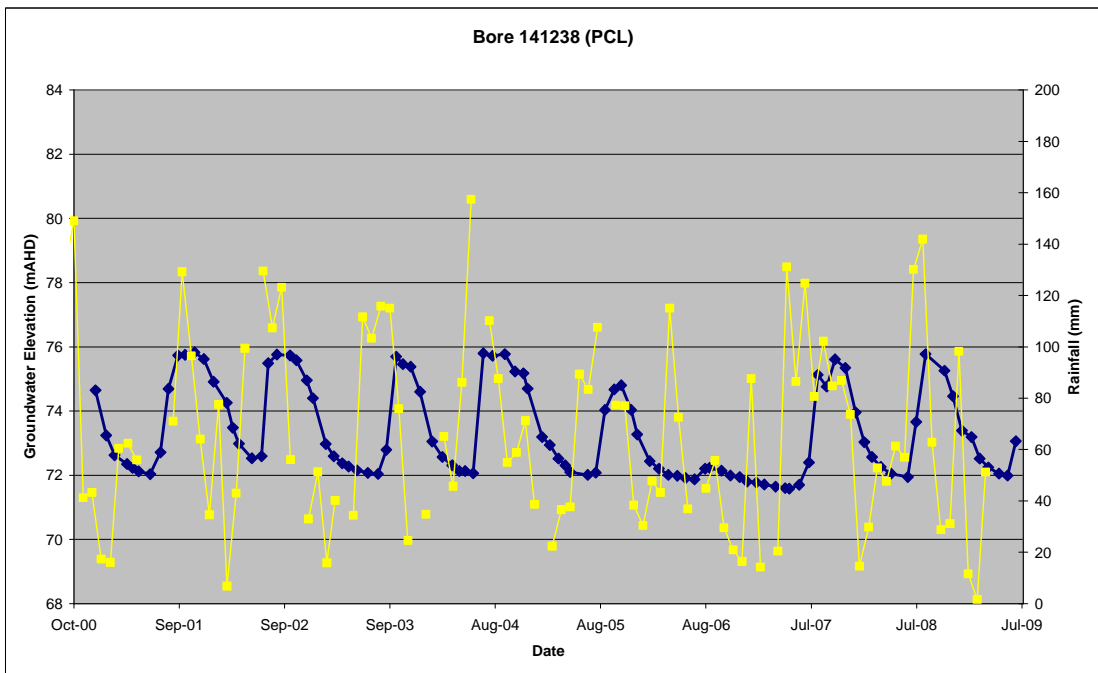
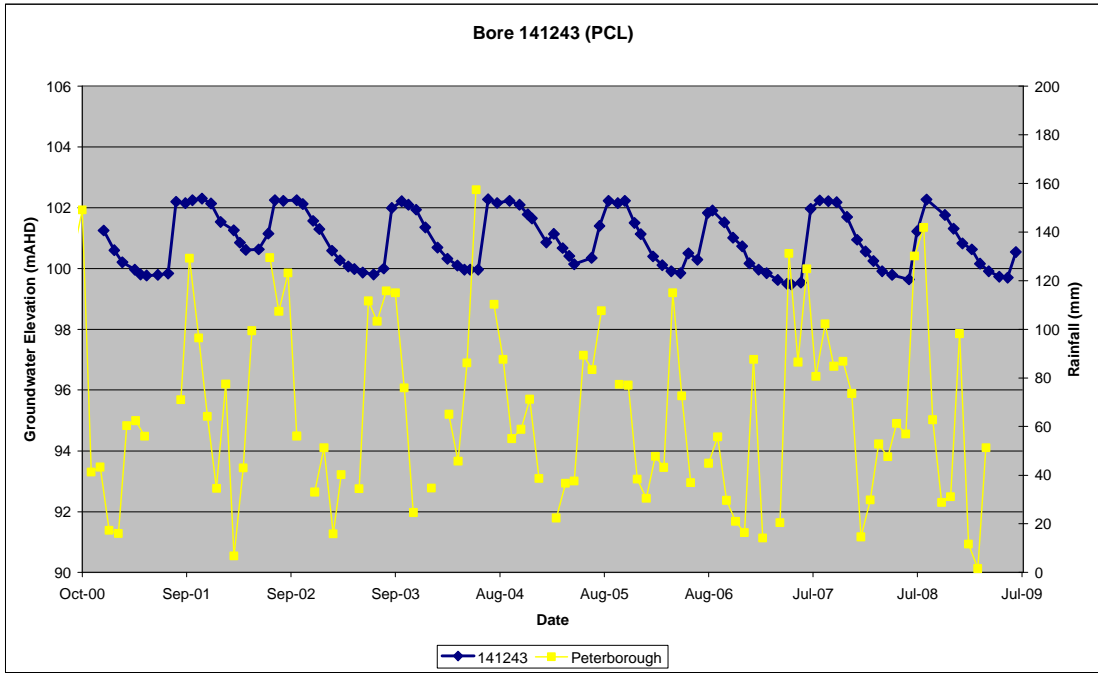
Date	62085	78550	141230	141231	141232	141233	141234	141235	141237	141238	141239
Jul-08	97.05	18.02	2.52	29.63	30.07	68.35	39.10	84.97	77.79	73.66	31.91
Aug-08	97.75	18.08	2.75	29.77	30.22	68.51	39.88	88.41	78.40	75.77	31.94
Sep-08	98.64	18.21	3.02	30.00	30.46	68.77	40.79	83.70	79.33	75.70	32.04
Oct-08	98.62	18.23	2.95	30.02	30.49	68.75	40.28	82.39	79.46	75.26	32.14
Nov-08	98.45	18.22	2.74	29.97	30.45	68.71	39.50	79.82	79.30	74.46	32.16
Dec-08	98.29	18.19	2.54	29.86	30.32	68.65	38.80	79.66	79.10	73.39	32.13
Jan-09	96.86	18.22	2.49	29.85	30.32	68.67	38.63	79.52	78.92	73.19	32.13
Feb-09	96.55	18.16	2.26	29.71	30.20	68.43	38.05	79.19	78.54	72.52	32.01
Mar-09	96.84	18.13	2.11	29.75	30.12	68.33	37.81	79.06	78.43	72.24	31.95
Apr-09	97.13	18.11	2.07	29.56	30.03	68.35	37.69	78.92	78.36	72.05	31.87
May-09	97.15	18.07	2.18	29.51	29.98	68.40	37.91	78.77	78.24	71.99	31.84
Jun-09	97.19	18.08	2.49	29.54	29.98	68.39	38.44	90.16	78.13	73.06	31.82
Jul-Jun	+0.14	+0.06	-0.03	-0.09	-0.09	+0.04	-0.66	+5.19	+0.34	-0.60	-0.09

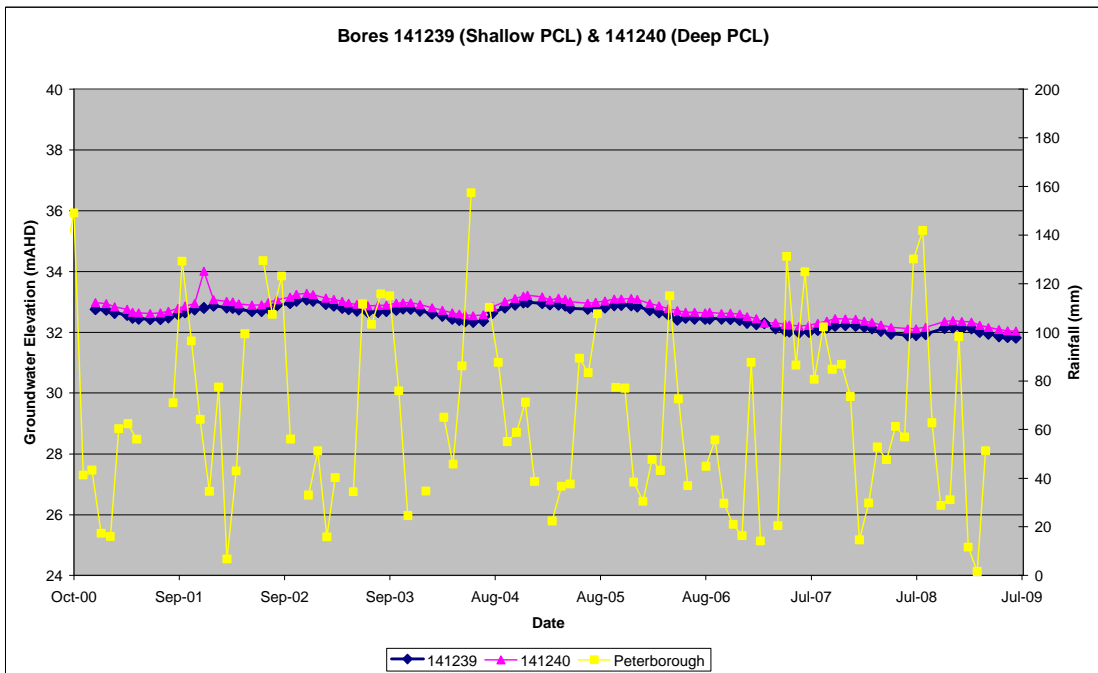
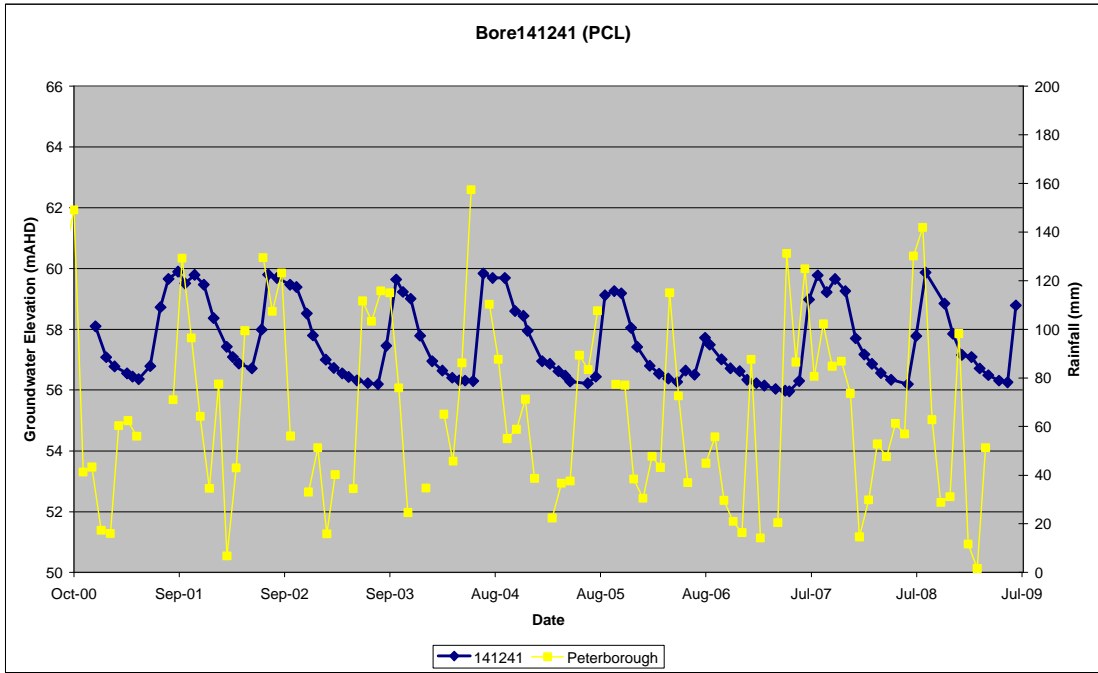
Date	141240	141241	141242	141243	141911	141912	61556/1	61556/2	61556/3	61556/4	61556/5
Jul-08	32.12	57.78	98.21	101.22	1.03	1.04	90.24	35.17	36.90	36.97	15.33
Aug-08	32.17	59.87	98.56	101.27	1.07	1.07	90.31	35.58	37.62	37.06	15.50
Sep-08	32.27	59.58	98.95	102.16	1.13	1.12	90.26	35.09	37.67	37.22	15.47
Oct-08	32.36	58.85	99.05	101.76	1.16	1.16	90.03	34.98	37.38	37.24	15.32
Nov-08	32.39	57.85	98.97	101.31	1.13	1.14	89.81	34.88	37.04	37.22	15.30
Dec-08	32.35	57.16	98.85	100.83	1.10	1.12	89.62	34.79	36.80	37.18	15.27
Jan-09	32.34	57.09	98.40	100.63	1.04	1.06	89.46	34.64	36.71	37.16	15.19
Feb-09	32.23	56.71	97.71	100.16	0.99	0.98	88.99	34.66	36.40	37.04	15.15
Mar-09	32.16	56.49	97.52	99.91	0.94	0.94	88.80	34.68	36.30	37.00	15.16
Apr-09	32.09	56.31	97.73	99.73	0.93	0.92	88.90	34.76	36.31	36.95	15.18
May-09	32.05	56.26	97.77	99.70	0.95	0.94	89.33	34.90	36.56	36.99	15.16
Jun-09	32.04	58.79	98.05	100.54	1.02	1.01	90.19	35.08	36.90	37.03	15.34
Jul-Jun	-0.08	+1.01	-0.16	-0.68	-0.01	-0.03	-0.05	-0.09	0.00	+0.06	+0.01

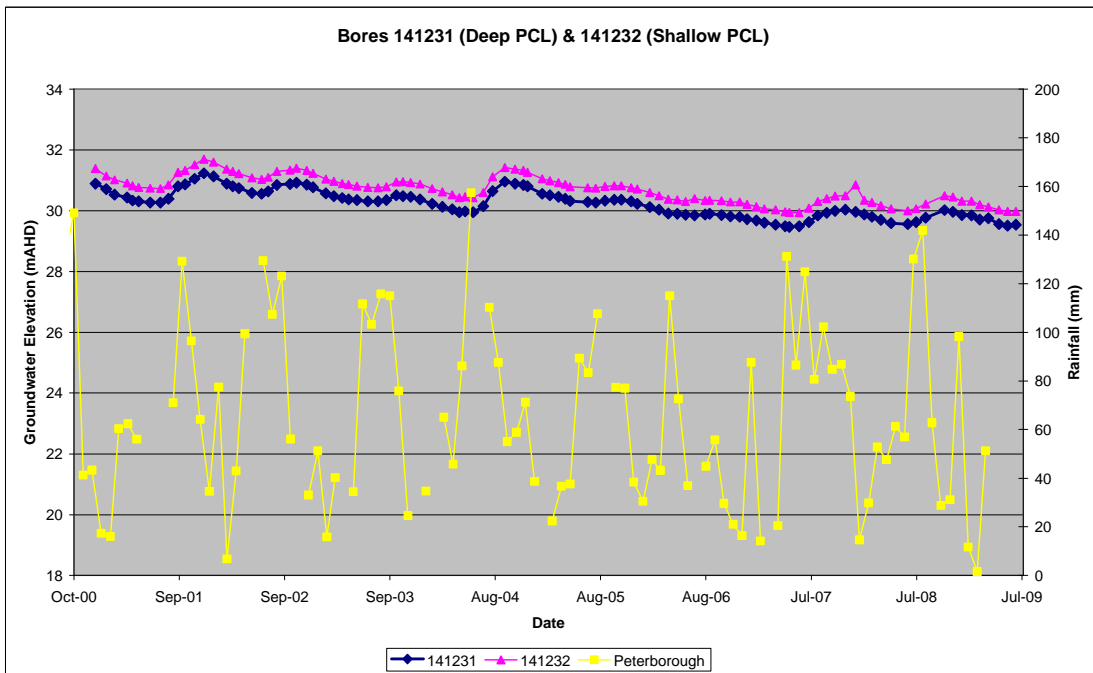
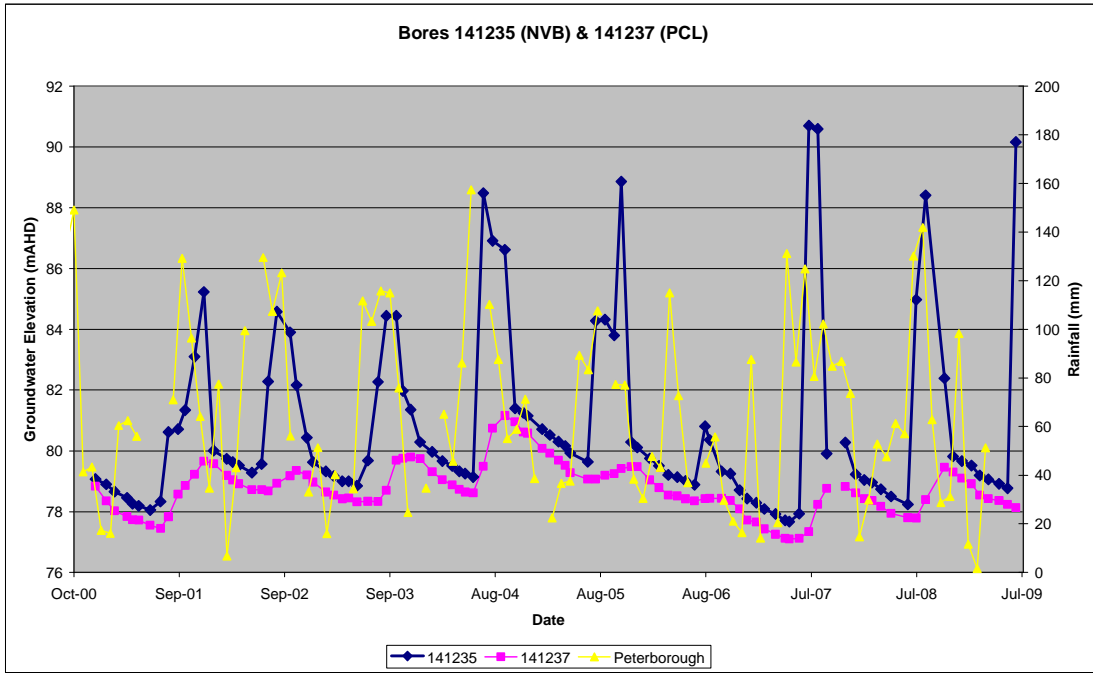
Appendix 1B. Hydrographs

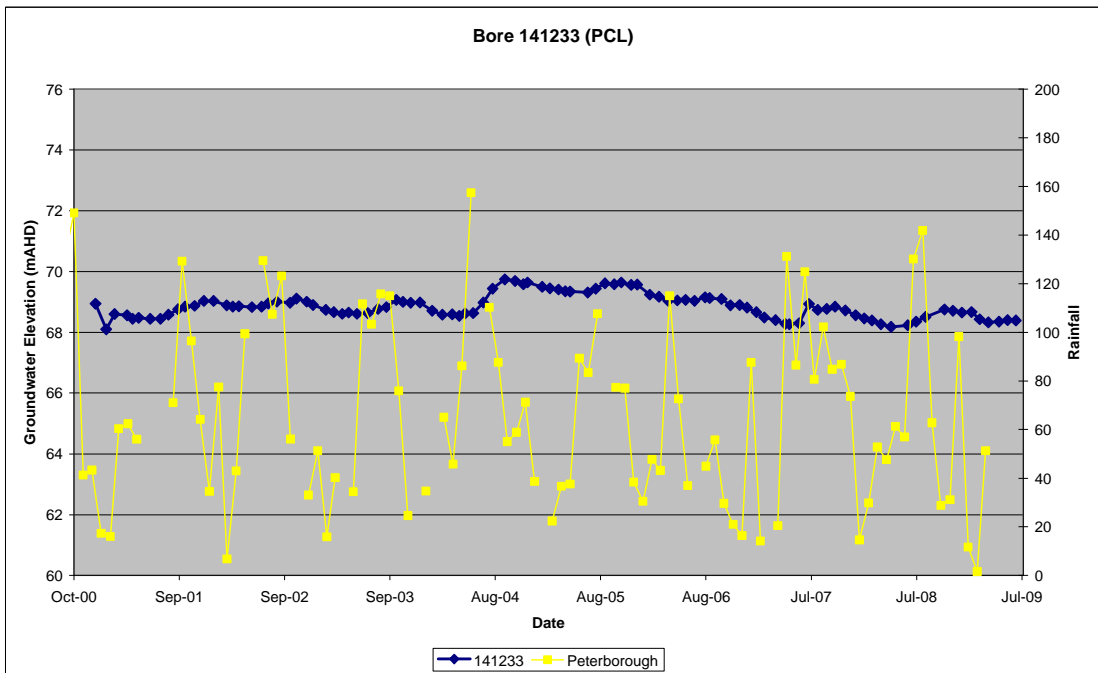
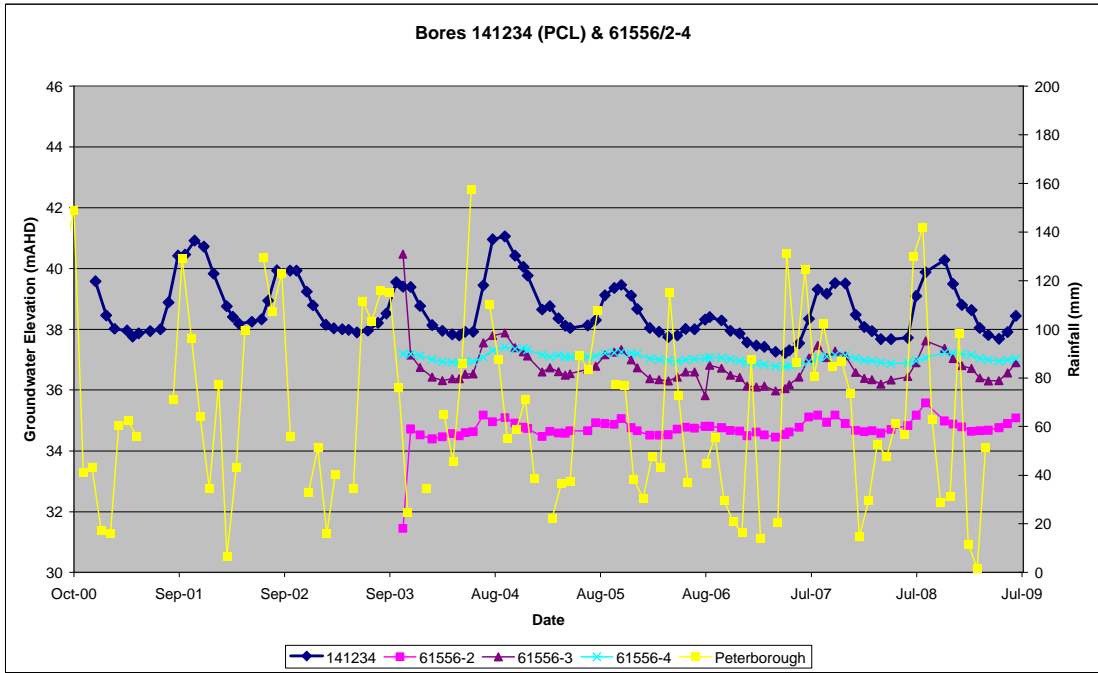
The following hydrographs show the trend in groundwater levels measured at monitoring bores throughout the Nullawarre Water Supply Protection Area. This is measured in metres above the Australian Height Datum (mAHD), or mean sea level. Monthly rainfall is also graphed.

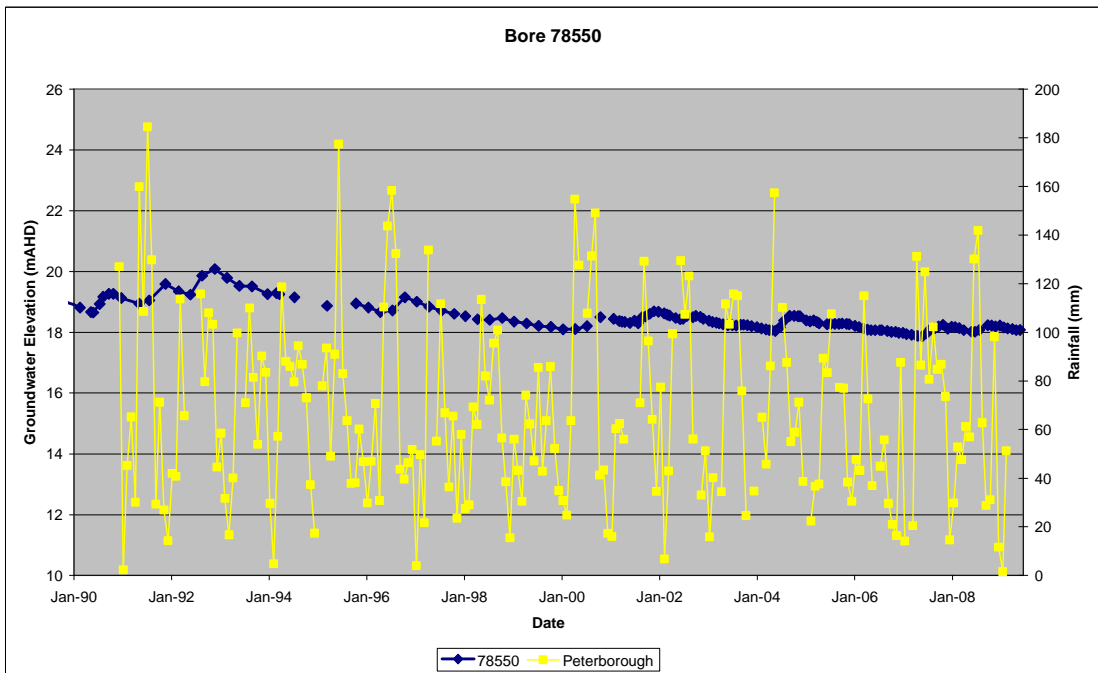
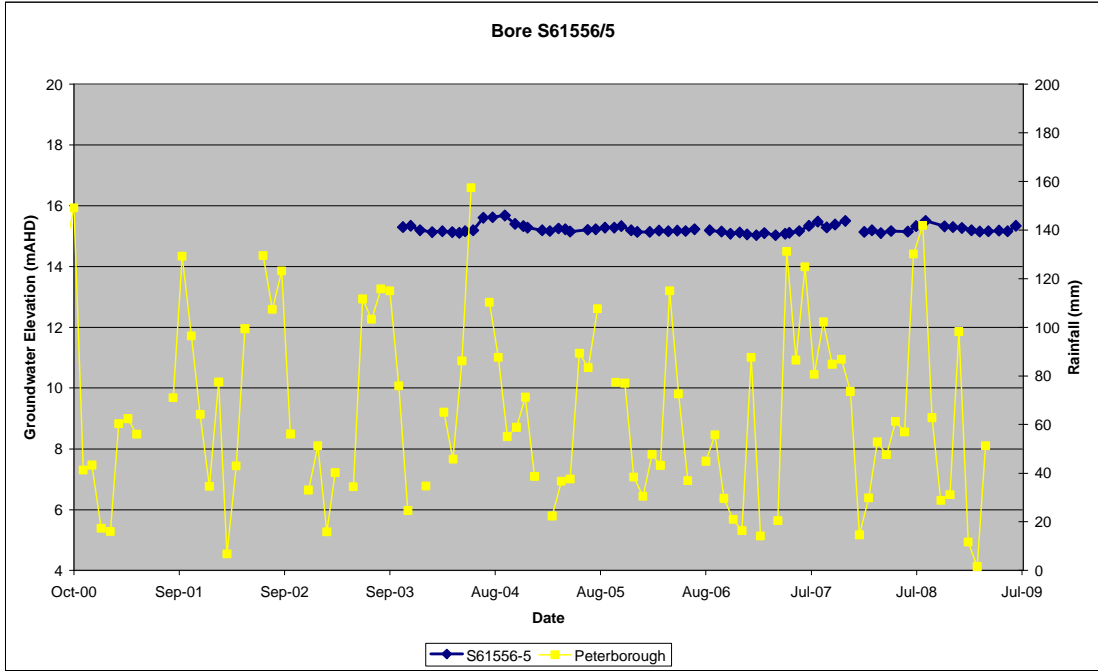


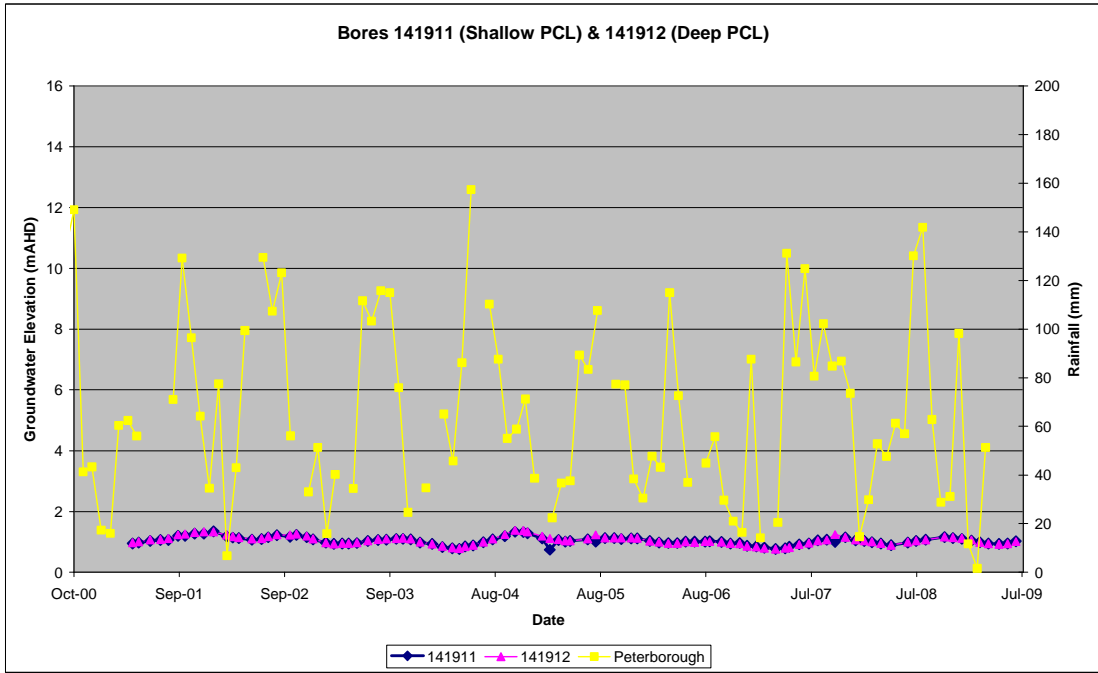
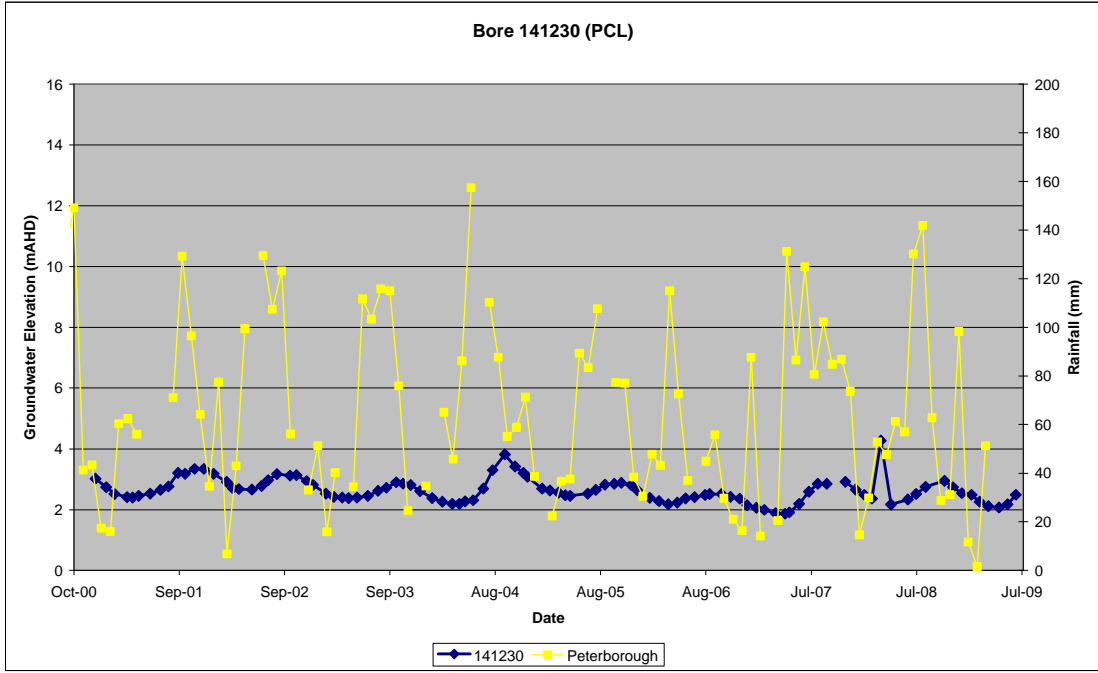






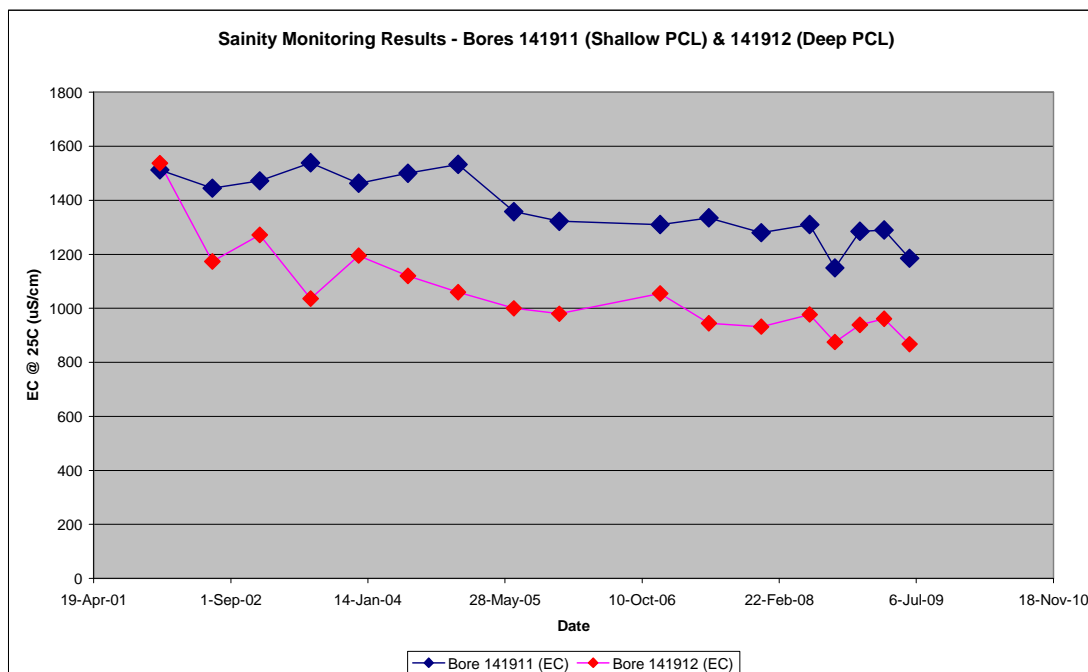




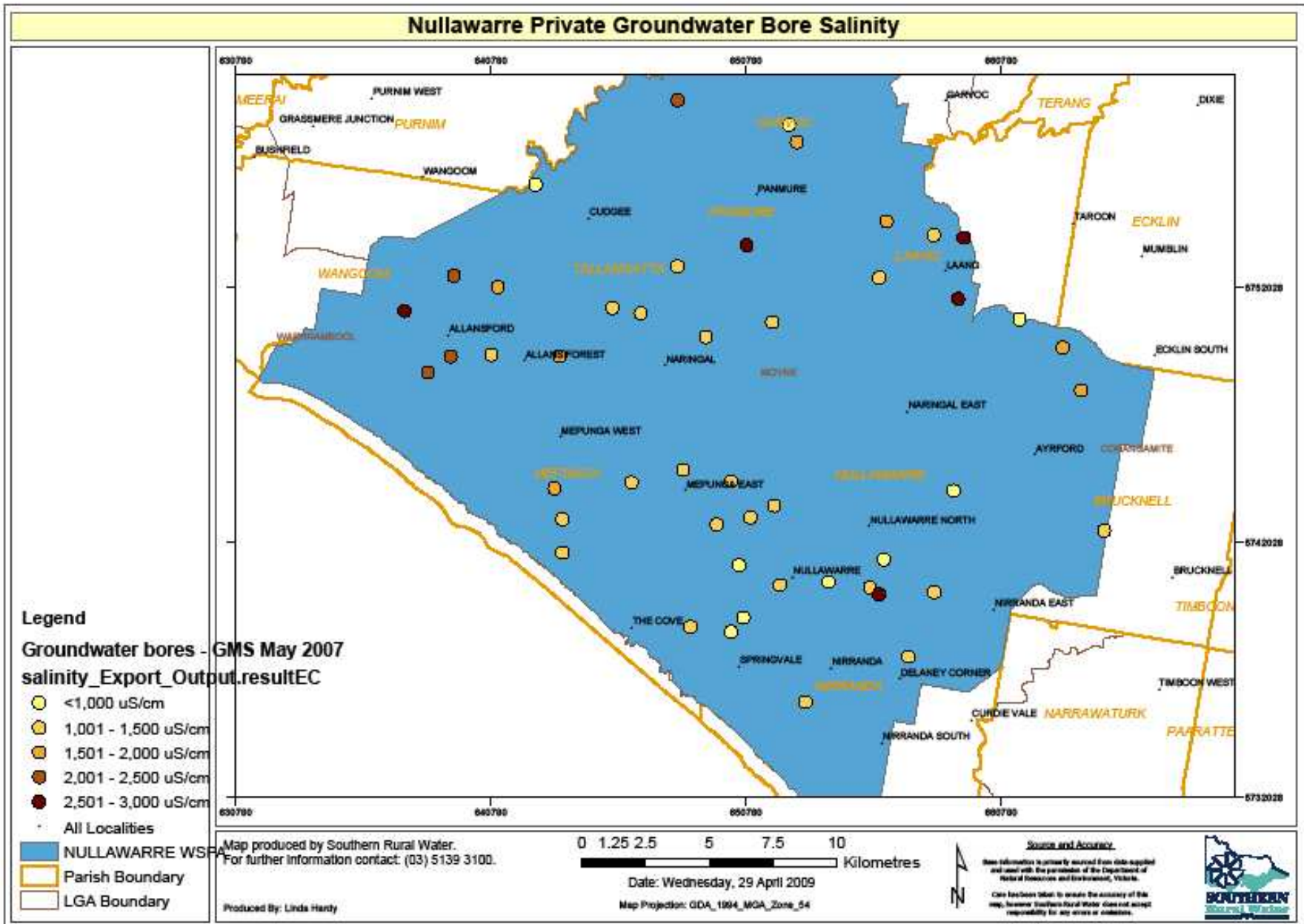


Appendix 2. Salinity Monitoring Data

The following graph plots salinity trends observed from monitored bores between December 2001 and June 2009. Data is also provided numerically in the table below.



	Bore 141911 (EC)	Bore 141912 (EC)
17-Dec-01	1,513	1,537
26-Jun-02	1,445	1,173
16-Dec-02	1,472	1,272
19-Jun-03	1,539	1,036
12-Dec-03	1,463	1,195
8-Jun-04	1,500	1,120
8-Dec-04	1,533	1,060
29-Jun-05	1,358	1,000
12-Dec-05	1,322	980
15-Dec-06	1,310	1,055
11-Jun-07	1,335	945
18-Dec-07	1,280	932
12-Jun-08	1,310	977
12-Sep-08	1,150	875
12-Dec-08	1,285	939
10-Mar-09	1,290	961
11-Jun-09	1,185	867



Appendix 3. Climate Data

The following table displays actual rainfall data collected by the Bureau of Meteorology from the gauge at Peterborough (090191).

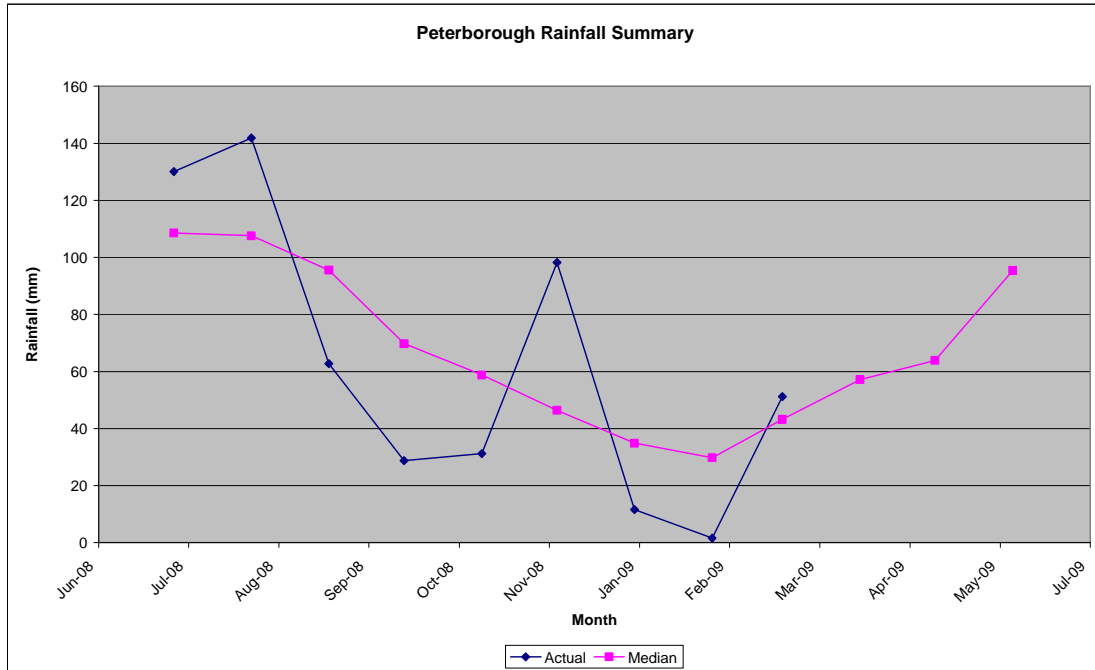
Month	Total Monthly Rainfall (mm)	Long-term Median Rainfall (mm)
Jul-08	130.1	108.5
Aug-08	141.9	107.6
Sep-08	62.8	95.5
Oct-08	28.8	69.7
Nov-08	31.2	58.8
Dec-08	98.2	46.4
Jan-09	11.6	34.9
Feb-09	1.6	29.8
Mar-09	51.2	43.2
Apr-09		57.2
May-09		63.9
Jun-09		95.3
Total	557.2**	810.9
Difference from Median	-253.7**	

**The median is used as it reduces any skew caused by abnormally high or low rainfall events depicting a 'truer' representation.*

***Data for April, May and June 2009 was not available from the Bureau of Meteorology*

The long-term median rainfall was used as a comparative tool, so it can easily be seen how recent conditions compare to the historical figures. For the period shown actual annual rainfall is below** the long-term annual median.

The graph over the page clearly exhibits the rainfall trend compared to the long-term median. Actual recorded rainfall had a similar distribution but lower monthly totals than the long-term trend for much of the year, however the months of July, August and December 2008 recorded rainfalls higher than that historically observed. Data since April 2009 was not available at the time of writing.



Brucknell Creek Flows

Brucknell Creek flows were recorded by SRW and are provided on the graph below. Rainfall measurement are also included which have been taken from Peterborough.

