

Nullawarre Groundwater Management Plan Annual Report

2009-10

Introduction

This report summarises licence information, metered usage and monitoring data collected for the period between July 1st 2009 and June 30th 2010 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.

SRW and the Department of Sustainability and Environment recently completed a Dairy Wash Licensing Amnesty and are working through the applications received. This may result in future amendment of the PCV and associated licences, in accordance with government policy.

WSPA	PCV (ML)	Total No. Licences	Licensable (ML)	Domestic & Stock (ML)	Total (ML)
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Nullawarre	21,280	210	21,278.9	3,656 ¹	24,934.9
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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 210 licences to take and use water from the Nullawarre WSPA, 201 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 9,837.8ML*. This figure does not include all stock and domestic use or non-metered dairy use. It is estimated that total use could be approximately 12,500ML from registered bores (see footnote above).

Review of the meter readings indicated that several groundwater users may have exceeded their licensed entitlement. At the time of writing, SRW is 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 program is expected to be complete in Nullawarre by the end of 2010.

*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:

- Overall, groundwater levels are generally stable across the WSPA since the majority of monitoring commenced in 2001; and

- Minimum groundwater levels at the end of the most recent irrigation season (i.e. Autumn 2010) were higher than the previous two or three seasons with good recovery since.

Salinity is also regularly measured at four 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 increased to every three months rather than twice a year, as of June 2008 and some monitoring locations have been amended to better detect any changes.

Rainfall and stream flow data for Brucknell Creek are included as Appendix 3. The data for Brucknell Creek indicates that total stream flows increased by approximately 60% compared to the previous year. The highest stream flows were recorded during the months of August and September 2009. These flows correspond with significant rainfall events.

6. Transfers of Water Entitlement

During the period between July 2009 and June 2010 a number of transfers were approved within the Nullawarre WSPA.

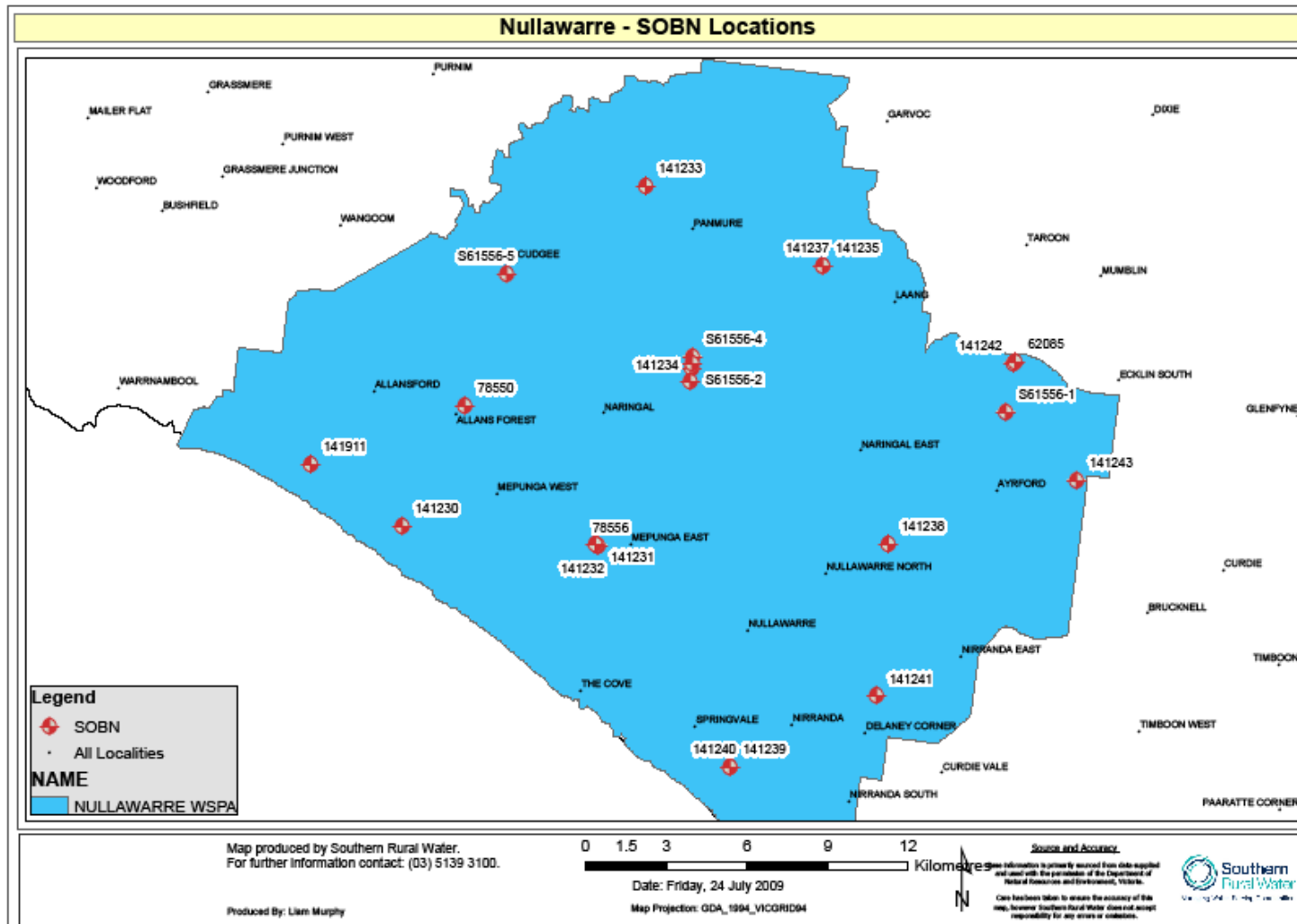
No permanent transfers occurred over the past year. There were 3 temporary transfers approved with a combined volume of 150ML.

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 has not altered the finding of the review.

Figure 1. The Nullawarre WSPA



Appendix 1. Monthly Monitoring Data (Groundwater Level)

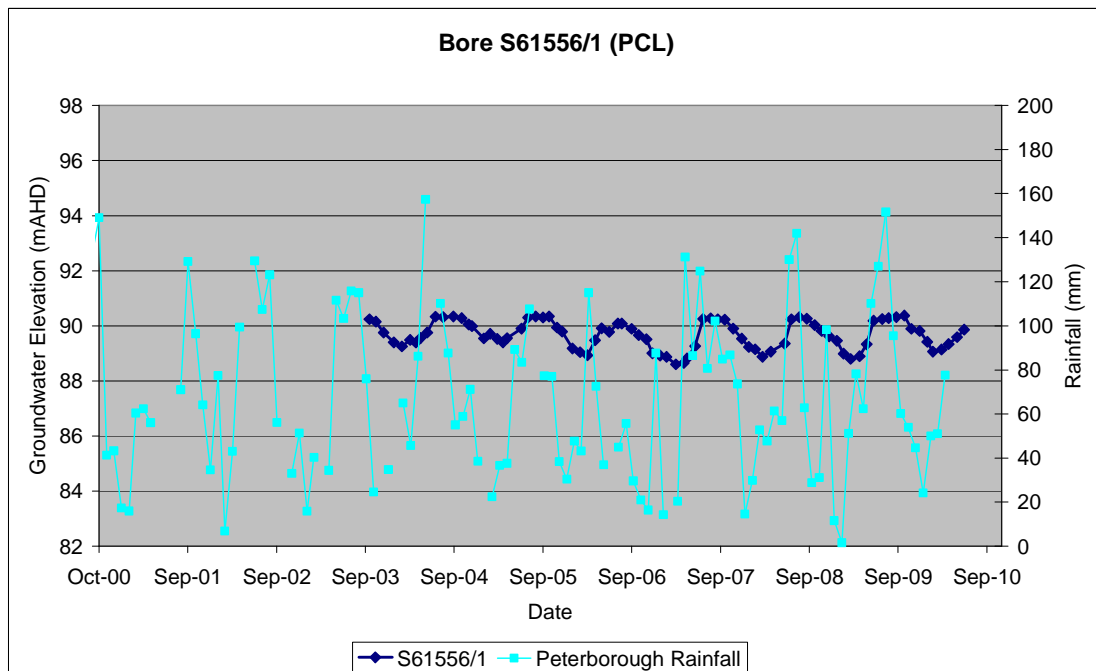
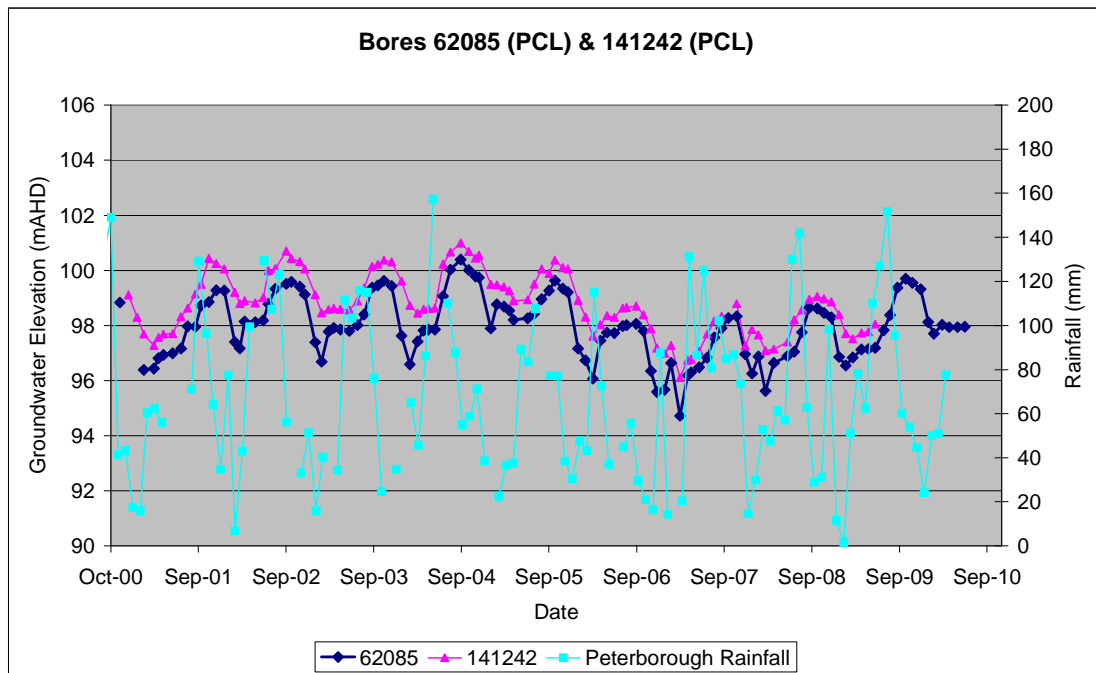
The tables below show the Reduced Water Level in metres above the Australian Height datum (AHD), which is equivalent to average sea level, at each monitoring bore within the Nullawarre WSPA. This data was used to generate the hydrographs in Appendix 1B.

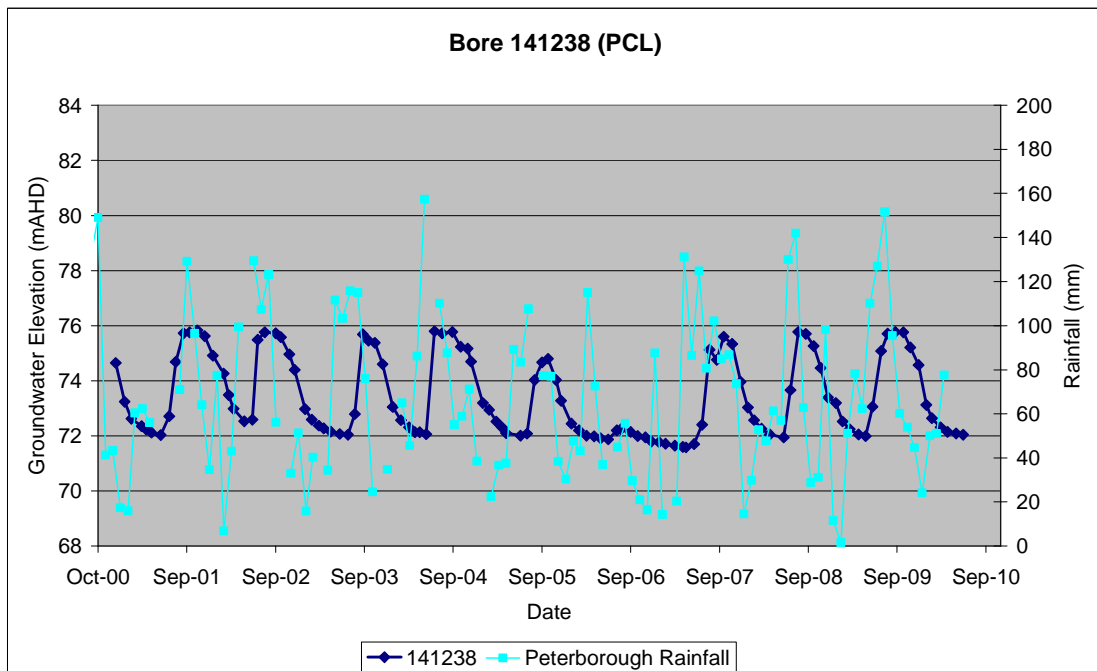
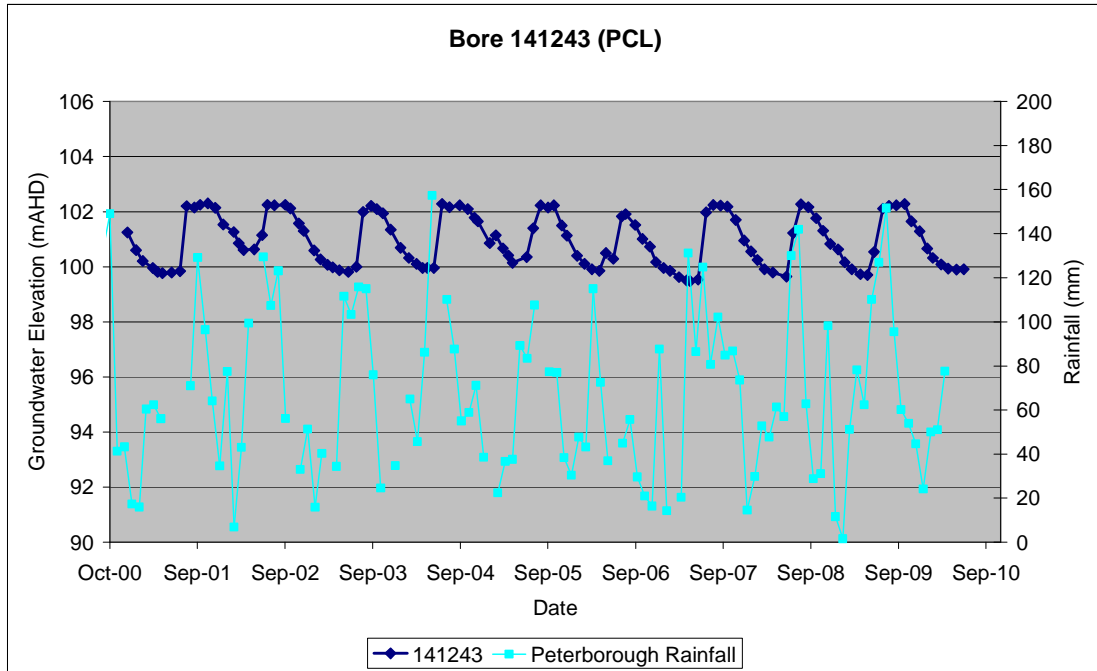
Date	62085	78550	141230	141231	141232	141233	141234	141235	141237	141238	141239
Jul-09	97.83	18.13	2.75	29.68	30.14	68.67	39.09	90.83	78.67	75.08	31.89
Aug-09	98.38	18.20	2.96	29.81	30.26	68.82	39.80	87.53	79.38	75.71	31.95
Sep-09	99.37	18.36	3.40	30.06	30.51	69.06	41.06	90.89	80.28	75.77	32.05
Oct-09	99.70	18.42	3.50	30.26	30.71	69.30	40.89	86.78	80.80	75.76	32.17
Nov-09	99.55	18.43	3.24	30.27	30.75	69.22	40.20	81.16	80.57	75.21	32.23
Dec-09	99.32	18.40	3.02	30.19	30.66	69.22	39.51	80.96	80.37	74.57	32.26
Jan-10	98.12	18.35	2.71	30.05	30.53	69.07	38.58	80.57	79.94	73.12	32.24
Feb-10	97.70	18.30	2.58	29.97	30.45	69.01	38.26	80.37	79.67	72.64	32.21
Mar-10	98.02	18.27	2.47	29.90	30.37	68.96	38.09	80.07	79.31	72.31	32.16
Apr-10	97.94	18.22	2.44	29.85	30.31	68.94	38.03	79.81	79.16	72.14	32.10
May-10	97.94	18.24	2.55	29.87	30.34	69.02	38.08	79.73	79.11	72.09	32.12
Jun-10	97.95	18.23	2.63	29.87	30.35	69.11	38.17	79.64	79.03	72.04	32.14
Jul-Jun	+0.12	+0.10	-0.12	+0.19	+0.21	+0.44	-0.92	-11.19	+0.36	-3.04	+0.25

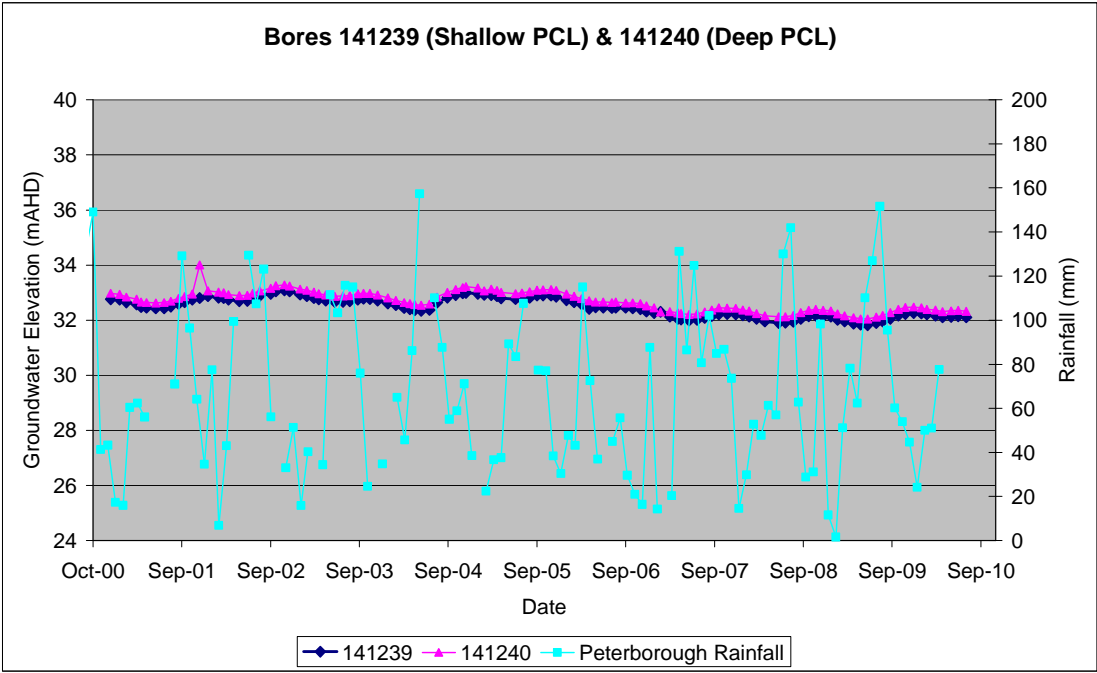
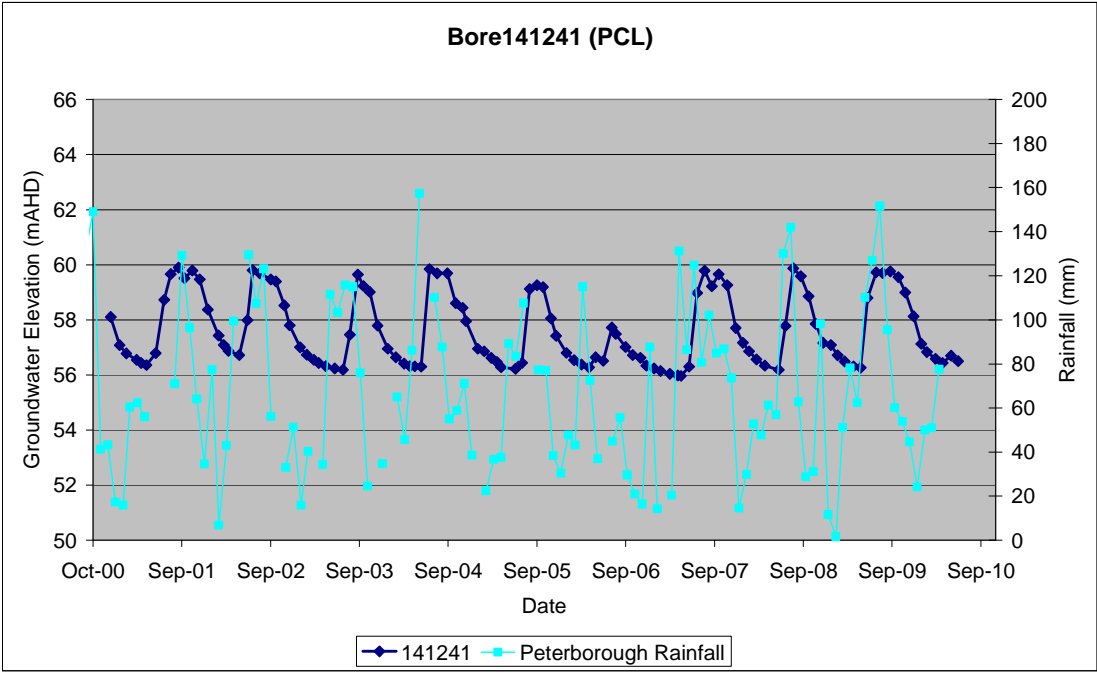
Date	141240	141241	141242	141243	141911	141912	S61556/1	S61556/2	S61556/3	S61556/4	S61556/5
Jul-09	32.11	59.73	98.38	102.11	1.12	1.12	90.25	35.13	37.27	37.11	15.37
Aug-09	32.17	59.70	98.91	102.21	1.18	1.18	90.28	35.14	37.43	37.18	15.43
Sep-09	32.27	59.76	99.87	102.23	1.28	1.28	90.32	35.42	37.98	37.30	15.75
Oct-09	32.39	59.55	100.46	102.28	1.38	1.39	90.37	35.28	37.66	37.35	15.58
Nov-09	32.46	58.99	100.12	101.65	1.38	1.44	89.89	35.02	37.26	37.35	15.39
Dec-09	32.48	58.13	99.98	101.29	1.37	1.39	89.81	34.98	37.03	37.29	15.32
Jan-10	32.45	57.13	99.11	100.66	1.26	1.27	89.42	34.90	36.67	37.20	15.23
Feb-10	32.39	56.83	98.77	100.32	1.15	1.23	89.06	34.84	36.52	37.15	15.11
Mar-10	32.37	56.59	98.70	100.08	1.14	1.14	89.14	34.87	36.52	37.11	15.20
Apr-10	32.31	56.44	98.57	99.93	1.09	1.10	89.34	34.95	36.57	37.09	15.23
May-10	32.34	56.70	98.60	99.90	1.19	1.19	89.59	35.02	36.67	37.14	15.30
Jun-10	32.36	56.50	98.71	99.91	1.21	1.22	89.86	35.09	36.74	37.16	15.32
Jul-Jun	+0.25	-3.23	+0.33	-2.20	+0.09	+0.10	-0.39	-0.04	-0.53	+0.05	-0.05

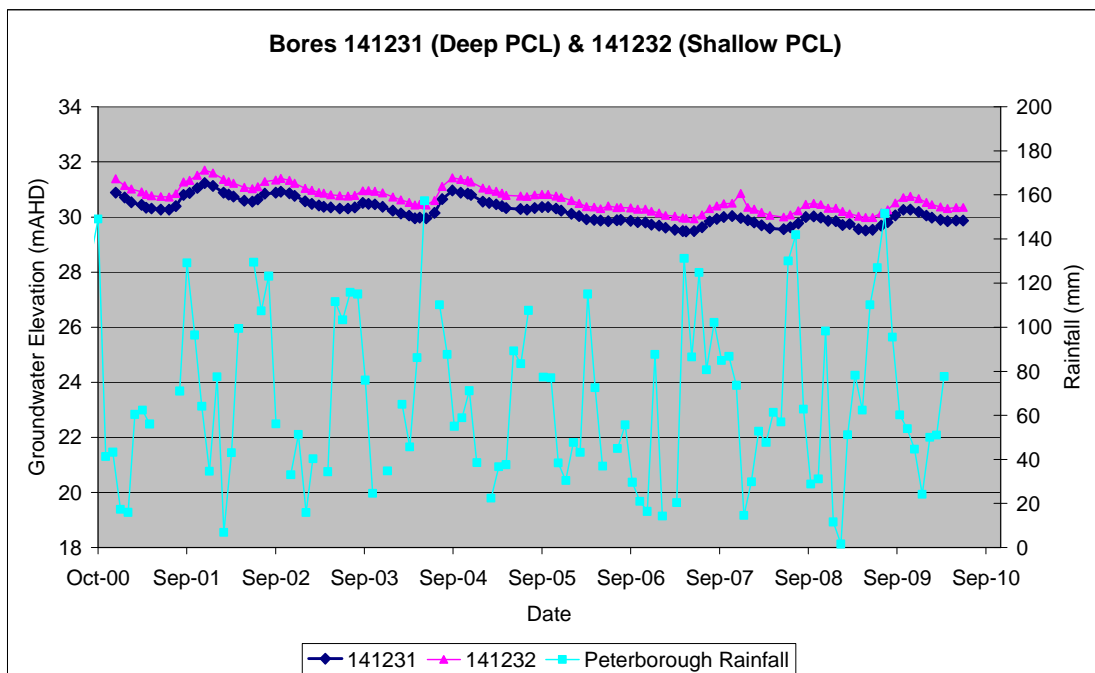
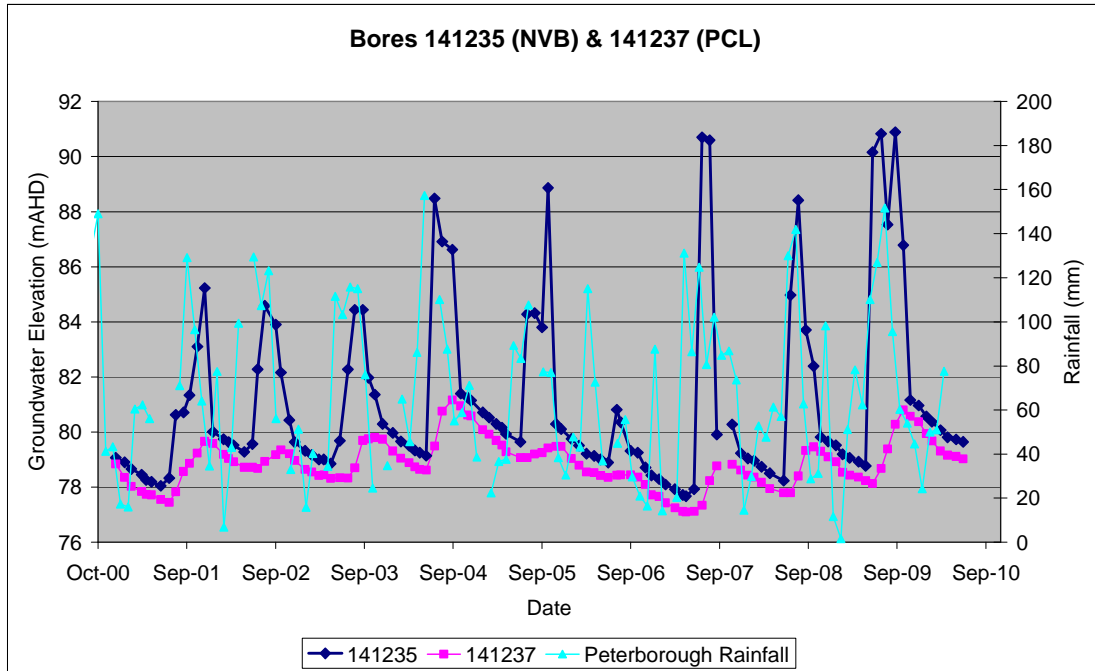
Appendix 1B. Hydrographs

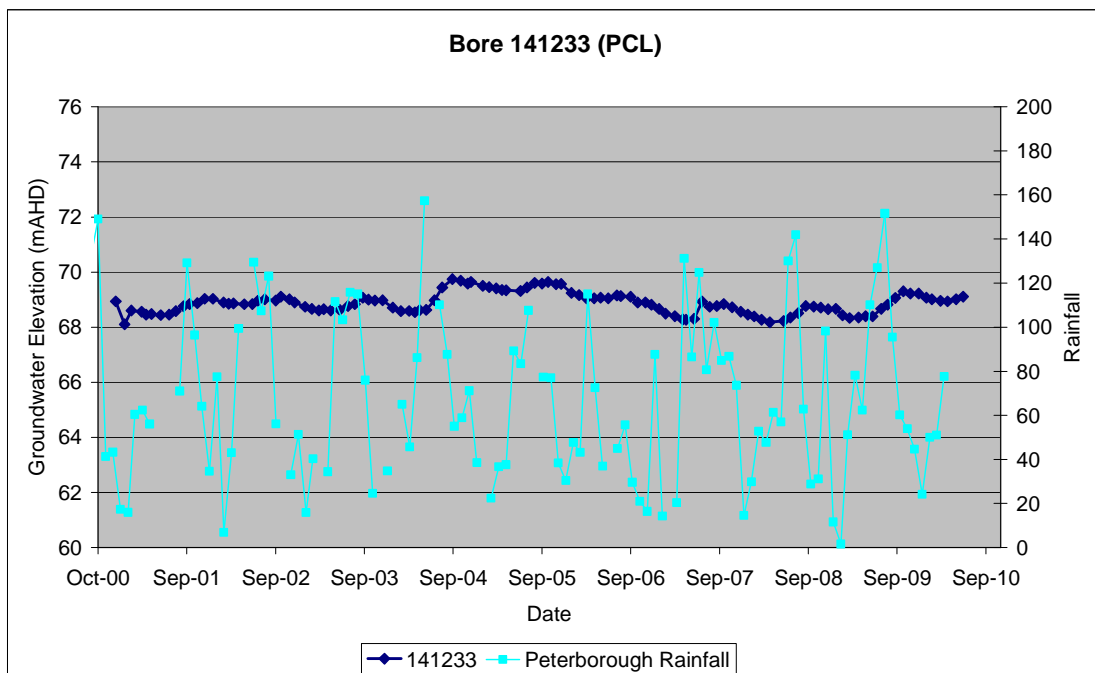
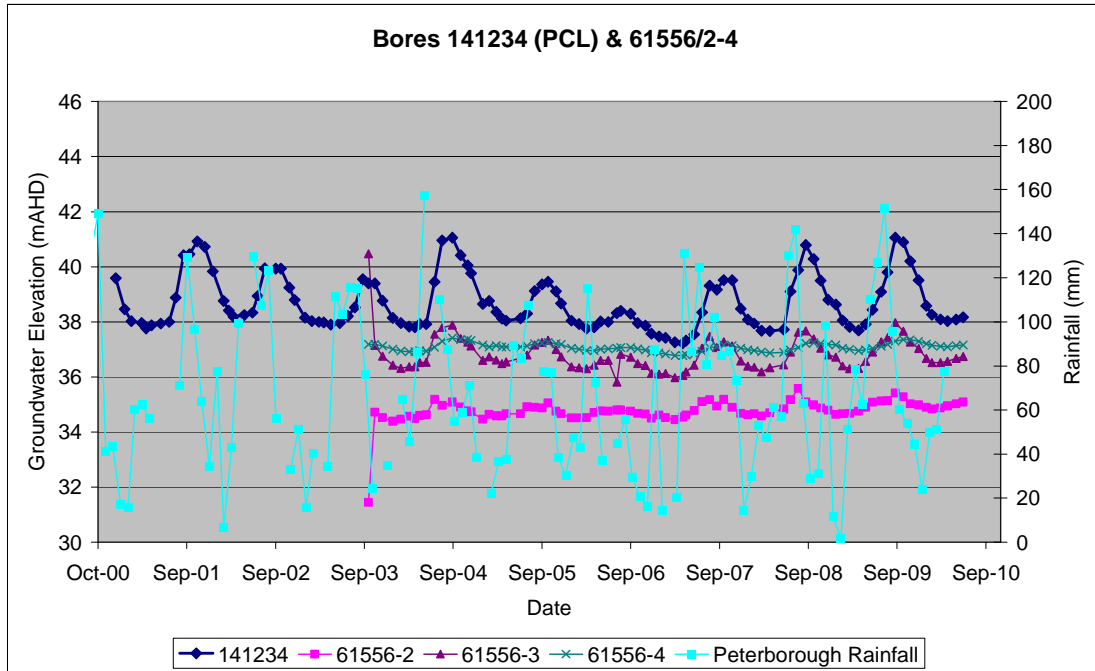
The following hydrographs show the trend in groundwater levels measured at monitoring bores throughout the Nullawarre Water Supply Protection Area. This is measured in metres above the Australian Height Datum (mAHD), or mean sea level. Monthly rainfall is also graphed.

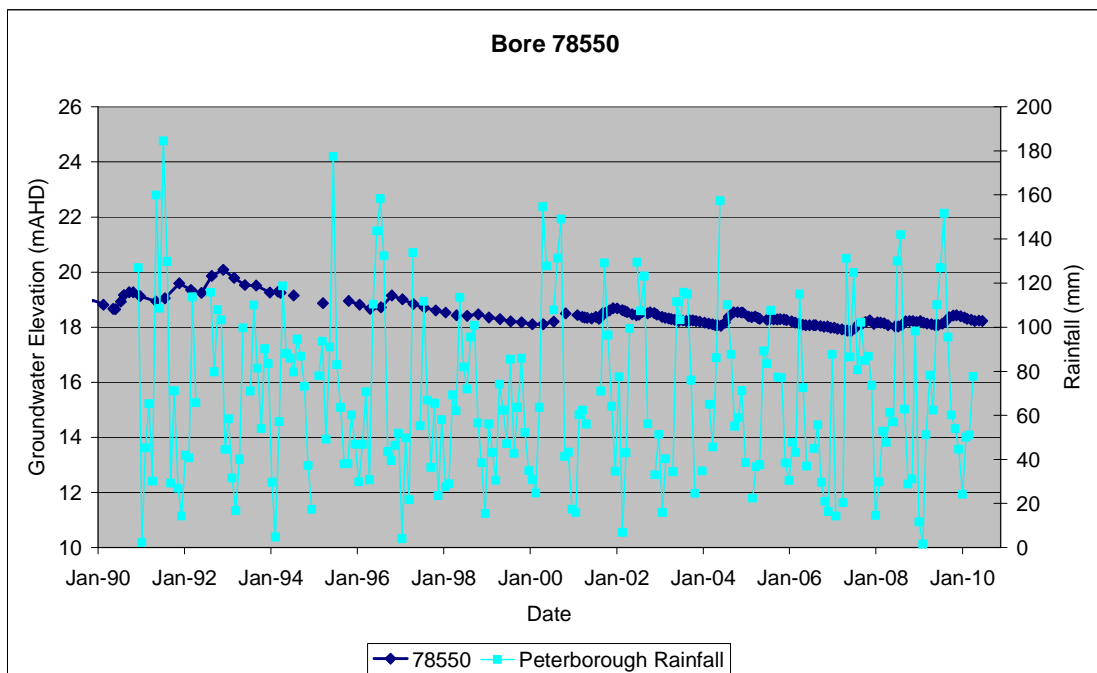
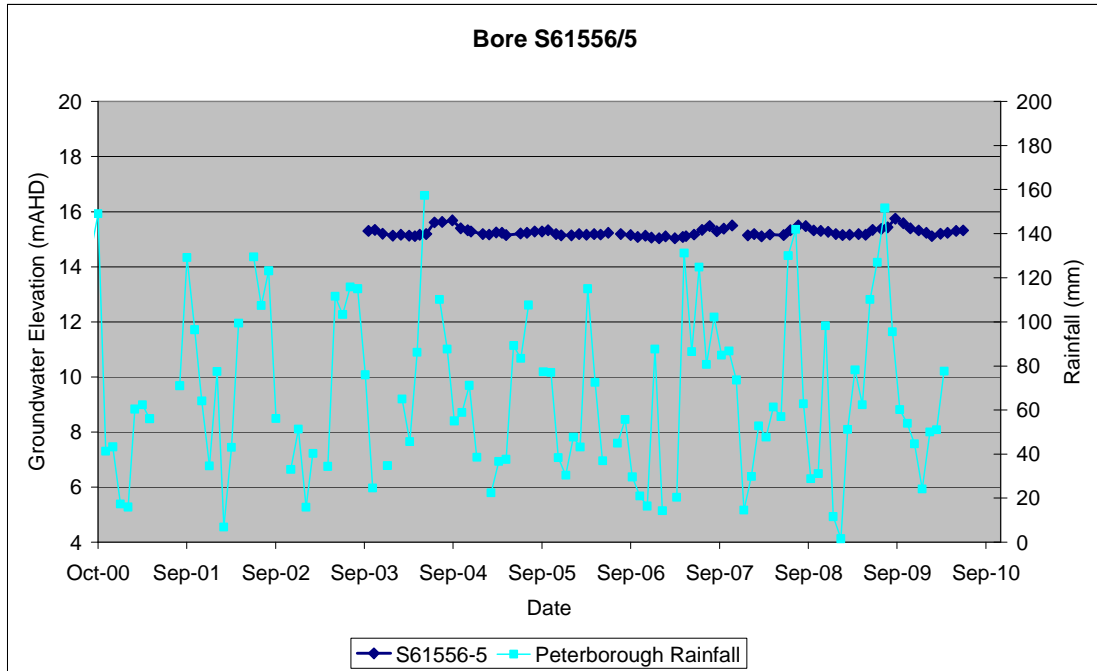


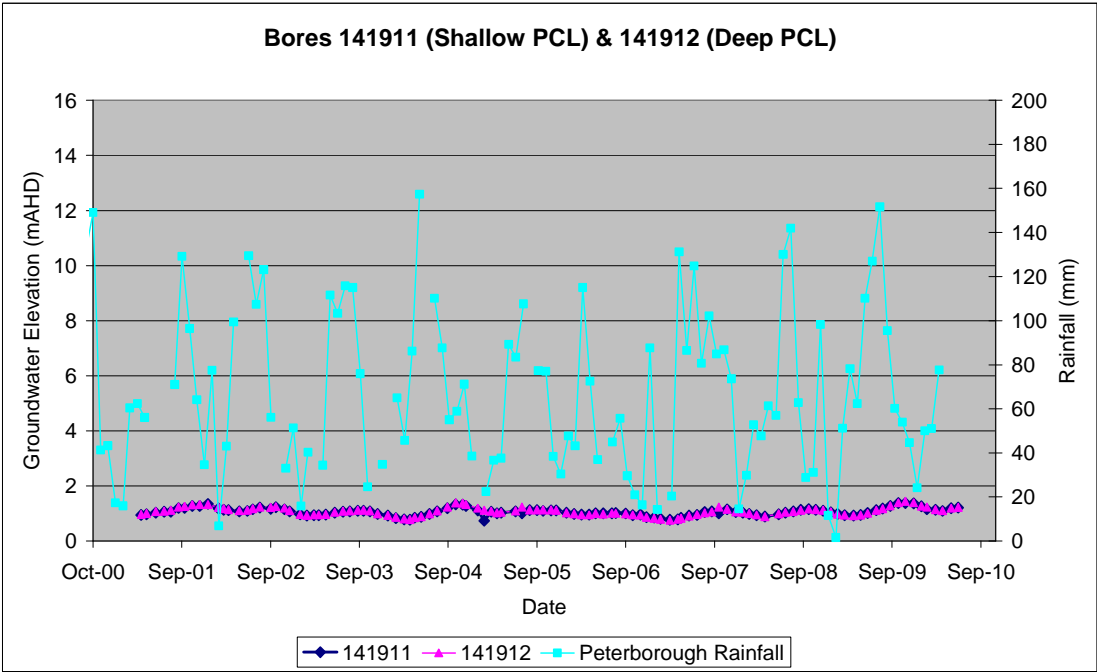
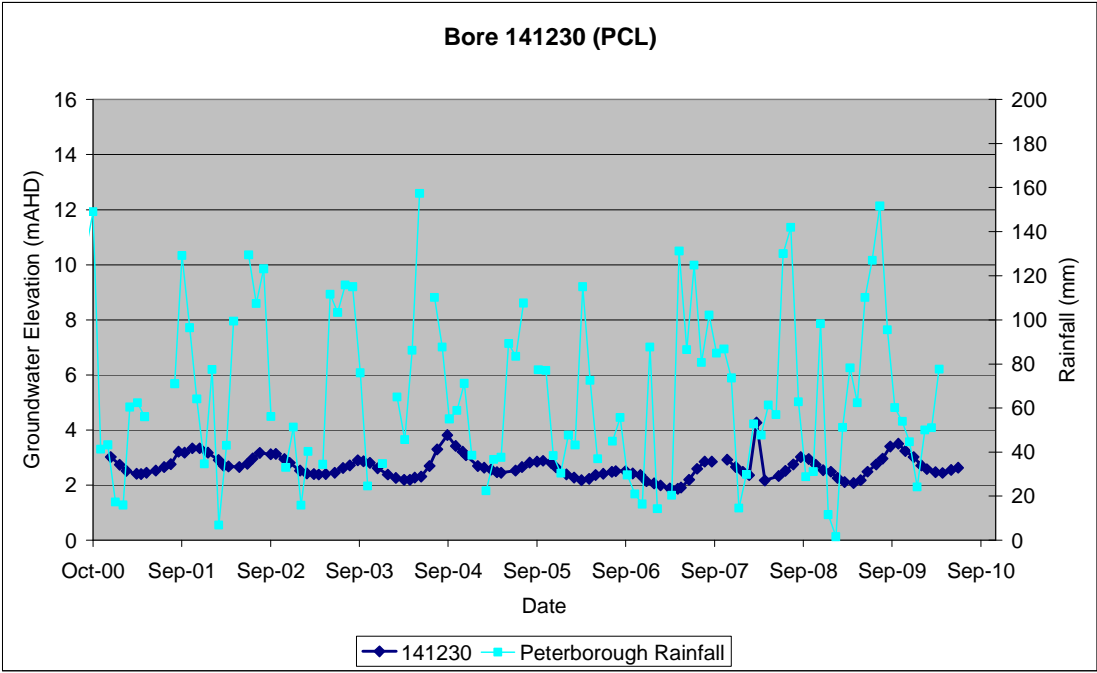






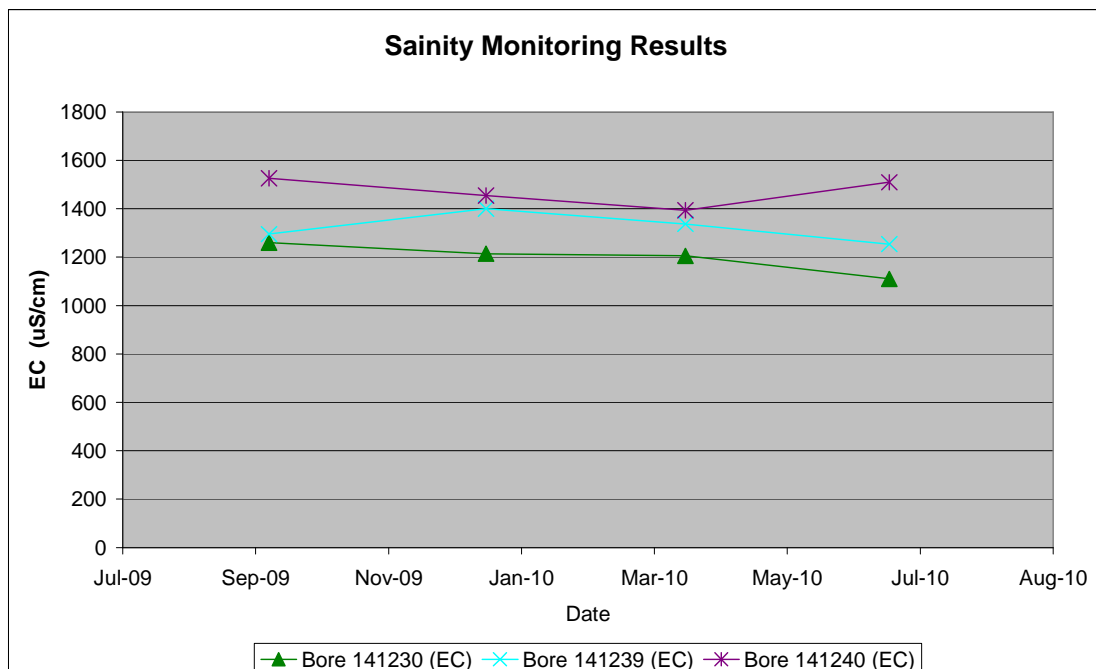
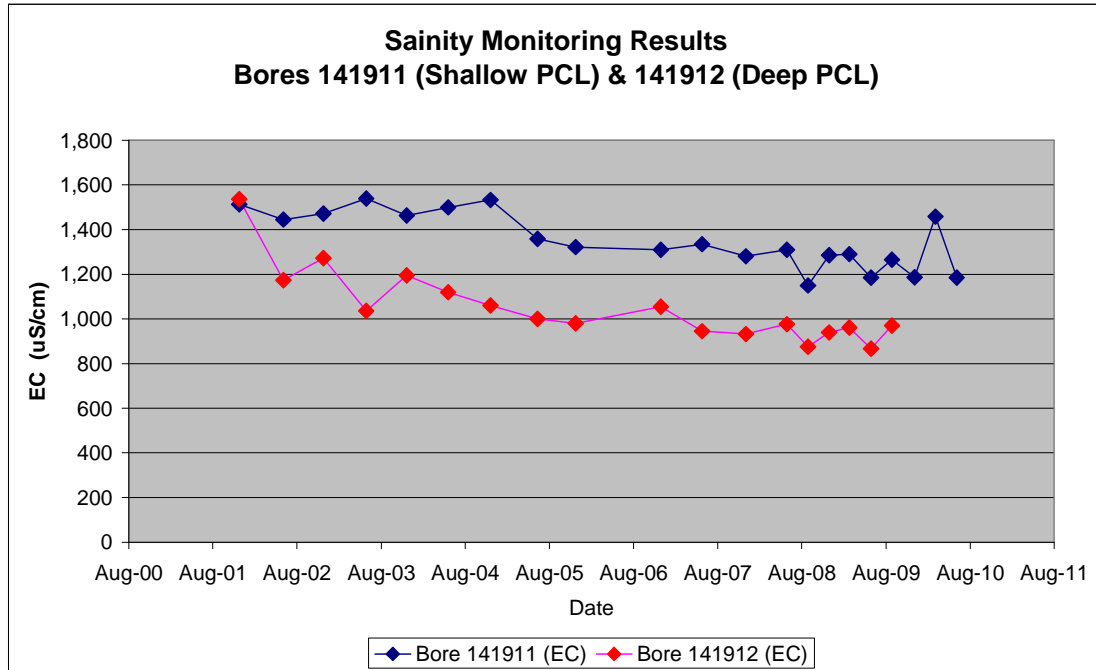






Appendix 2. Salinity Monitoring Data

The following graph plots salinity trends observed from monitored bores between December 2001 and June 2010. Data is also provided numerically in the table below. All results are in temperature-adjusted Specific Electrical Conductivity units of micro-Siemens per centimeter, also known as EC units.



	Bore 141911 (EC)	Bore 141912 (EC)	Bore 141230 (EC)	Bore 141239 (EC)	Bore 141240 (EC)
Dec-	1,513	1,537	-	-	-
Jun-	1,445	1,173	-	-	-
Dec-	1,472	1,272	-	-	-
Jun-	1,539	1,036	-	-	-
Dec-	1,463	1,195	-	-	-
Jun-	1,500	1,120	-	-	-
Dec-	1,533	1,060	-	-	-
Jun-	1,358	1,000	-	-	-
Dec-	1,322	980	-	-	-
Dec-	1,310	1,055	-	-	-
Jun-	1,335	945	-	-	-
Dec-	1,280	932	-	-	-
Jun-	1,310	977	-	-	-
Sep-	1,150	875	-	-	-
Dec-	1,285	939	-	-	-
Mar-	1,290	961	-	-	-
Jun-	1,185	867	-	-	-
Sep-	1,265	970	1,260	1,295	1,526
Dec-	1,186	*	1,214	1,400	1,455
Mar-	1,458	*	1,205	1,337	1,393
Jun-	1,185	*	1,110	1,254	1,509

NOTE: - indicates no reading taken – salinity monitoring program has been expanded
* Bore removed from salinity sampling as unable to get a suitable water sample.

Appendix 3. Climate Data

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

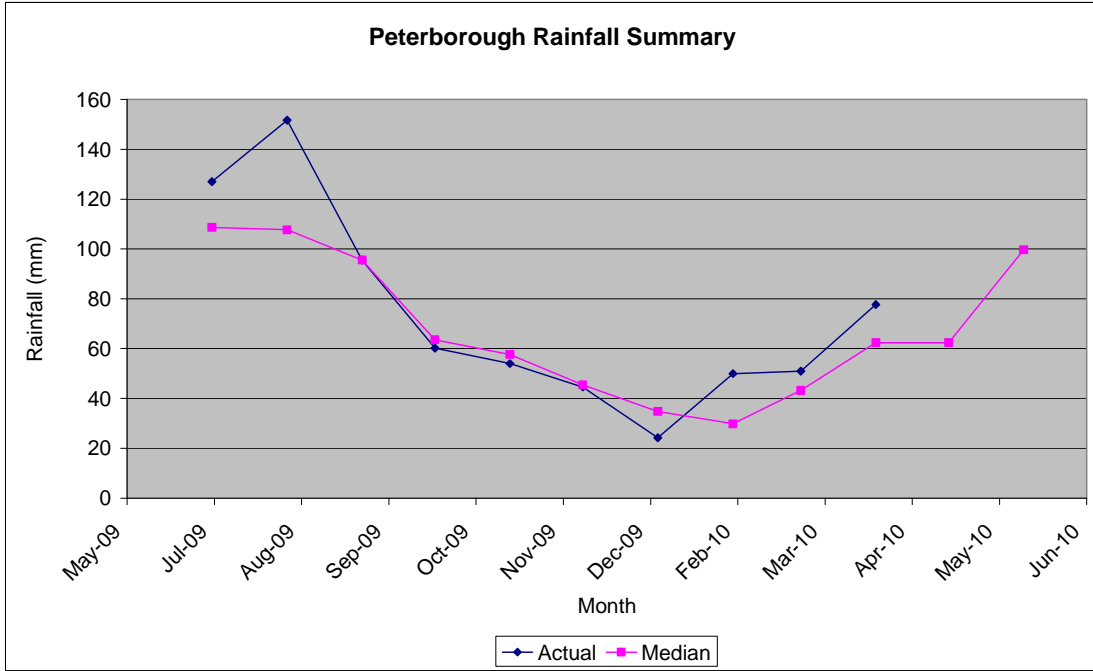
Month	Total Monthly Rainfall (mm)	Long-term Median Rainfall (mm)
Jul-09	127	108.6
Aug-09	151.6	107.7
Sep-09	95.5	95.5
Oct-09	60.2	63.6
Nov-09	54	57.65
Dec-09	44.6	45.5
Jan-10	24.2	34.8
Feb-10	50	29.8
Mar-10	51	43.2
Apr-10	77.6	62.4
May-10	No data	62.4
Jun-10	No data	95.7
Total	735.7**	810.85
Difference from Median (June '09–April '10)	+86.95***	

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

**Data for May and June 2010 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 to July 2009 to April 2010 actual annual rainfall was above*** 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 as the long-term trend for much of the year; however the months of July, August 2009 and February, March, April 2010, recorded rainfalls higher than usual. Data after April 2010 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.

