



**Spring Hill Water Supply Protection Area
Management Plan (Groundwater)**

REPORT FOR THE YEAR ENDED
JUNE 2006

Foreword

This report is submitted to the Minister for Water, the Goulburn Broken Catchment Management Authority and the North Central Catchment Management Authority in accordance with Section 32C of the *Water Act* 1989. A copy of this report is available for inspection at the Tatura office of Goulburn-Murray Water (G-MW), or upon request. A notice of report availability will also be published as required by Section 32D of the *Water Act* 1989.

The purpose of this report is to detail Authority activities administering and enforcing the management plan, and provide information that is required to be reported under the Plan.

Area	Spring Hill Water Supply Protection Area
Segment	Groundwater
Area Declared	14 January 1999
Plan Approved	28 January 2002
Scheduled Plan Review	August 2007
Implementation Authority	Goulburn-Murray Water
Relevant CMA	North Central Catchment Management Authority
Report Period	1 July 2005 – 30 June 2006

Summary

Since approval of the Management Plan in 2002, Goulburn-Murray Water has achieved many of the plan requirements including implementation of a metering and monitoring program. Implementing elements of the management plan in some cases requires longer term planning, consultation and negotiations with landholders, G-MW is actively progressing towards completion of these elements.

During any year, new operational issues may also arise and impact on plan implementation. These issues, such as new bores requiring meter fitting, are dealt with as they arise. Table 1 outlines management plan compliance for the reporting period.

Identification and monitoring of potential high users throughout the season, temporary transfers of water entitlement and a communication strategy warning of the consequences of unauthorised use of groundwater have resulted in successful management of compliance. As a result of this pro-active management there were no licences where water was taken in excess of licensed entitlement.

Table 1 – 2005/2006 compliance with the Management Plan

Plan Requirement	Complies
Bore monitoring requirements	Yes
Salinity Monitoring	No (not considered a significant non-compliance)
Bore metering requirements	Yes
Average annual levels above minimum levels specified in the plan	Yes
Overuse	Yes

Resource Position

Monitoring indicates further decline in spring groundwater recovery levels in the more intensively developed Blampied and Forest Hill zones. Decline in groundwater levels in the Smeaton and Mollonghip zones, while not showing the seasonal fluctuations observed in the other zones, is consistent with broader regional decline due to continued drier than average climatic conditions and low groundwater recharge.

Operation of the Plan

The plan is due for review in the 2006/07 financial year. The continuing dry conditions in the Spring Hill WSPA have highlighted the complexity of hydrogeology in the area and management issues requiring consideration in any review.

An approach to the review has been developed in consultation with licence holders with an aim to implementation of a revised plan in the 2007/08 financial year.

During the reporting period only the following few issues were identified to require consideration by Goulburn-Murray Water (G-MW) and the Department of Sustainability and Environment (DSE) in relation to the implementation of the Groundwater Management Plan:

1. All bores with the requirement are metered. An existing unused bore undergoing refurbishment will be metered in 2006/2007 before any use occurs.
2. Water samples were submitted for 27% of bores, this is a slight decrease (9%) on the previous reporting period 2004-2005. G-MW is endeavouring to improve compliance with the salinity sampling program by providing feedback to licensees on the sample results. G-MW will also aim to improve understanding by providing information to licensees outlining the purpose and benefits of collecting groundwater data and highlighting the importance of contributing to this information.
3. No notification was received for Domestic and Stock use of groundwater - the registration of Domestic and Stock use and the return of groundwater sample bottles for salinity testing was discussed in a letter to the DSE Executive Director of Water Resources dated 13 April 2005. While the Consultative Committee charged with developing the Management Plan believed that notification of Domestic and Stock use was an appropriate step towards improving groundwater management, it is doubtful that they would consider that enforcing compliance is of a high priority relative to other requirements in the Groundwater Management Plan. G-MW will continue to raise this issue in communications with customers.
4. A high priority needs to be given to reviewing the Spring Hill Groundwater Management Plan in 2007 as noted in section 3.19 of the Groundwater Management Plan explanatory paper.

Signed

(signed 2 October 2006)

Russell Cooper
Chief Executive

1	Introduction.....	5
2	Key Observations	7
2.1	Water Levels/Flows	7
2.2	Salinity / Water Quality	8
2.3	Water Use	9
2.4	Non compliance.....	9
3	Plan Implementation.....	10
3.1	Monitoring Requirements	10
3.1.1	Water level monitoring requirements of the Plan.....	10
3.1.2	Compliance and Exceptions.....	10
3.1.3	Maintenance of Monitoring Bores.....	10
3.1.4	Water levels and Resource Assessment.....	11
3.2	Salinity Monitoring	11
3.2.1	Compliance and Exceptions.....	12
3.3	Metering	13
3.3.1	Requirements of the Plan.....	13
3.3.2	Metering Fitting activities.....	14
3.3.3	Compliance and Exceptions.....	14
3.3.4	Issues Affecting Implementation.....	14
4	Restrictions on Licensing and Licence Transfers	15
4.1.1	Requirements of the Plan.....	15
4.1.2	Licensing Management Summary	15
4.1.3	Compliance and Exceptions.....	16
4.2	Notification of Domestic and Stock Use.....	16
4.2.1	Requirements of the Plan.....	16
4.2.2	Compliance and Exceptions.....	16
4.2.3	Issues Affecting Implementation.....	17
	Appendix A Monitoring Bore Locations	18
	Appendix B Hydrographs for Monitoring Bores from Schedule 2.	19
	Hydrographs from monitoring bores in Schedule 3.	21
	Appendix C Extraction Points & Metered Site Locations.....	24

1 Introduction

The Spring Hill Water Supply Protection Area (WSPA) is located to the north-east of Creswick. For management purposes an area of approximately 253 km² is divided into 4 zones; Smeaton, Forest Hill, Blampied and Mollonghip. The WSPA includes all aquifers down to a depth of 70m and covers the full depth of any aquifers within the volcanic cone areas. **Figure 1** shows the location of the Spring Hill WSPA.

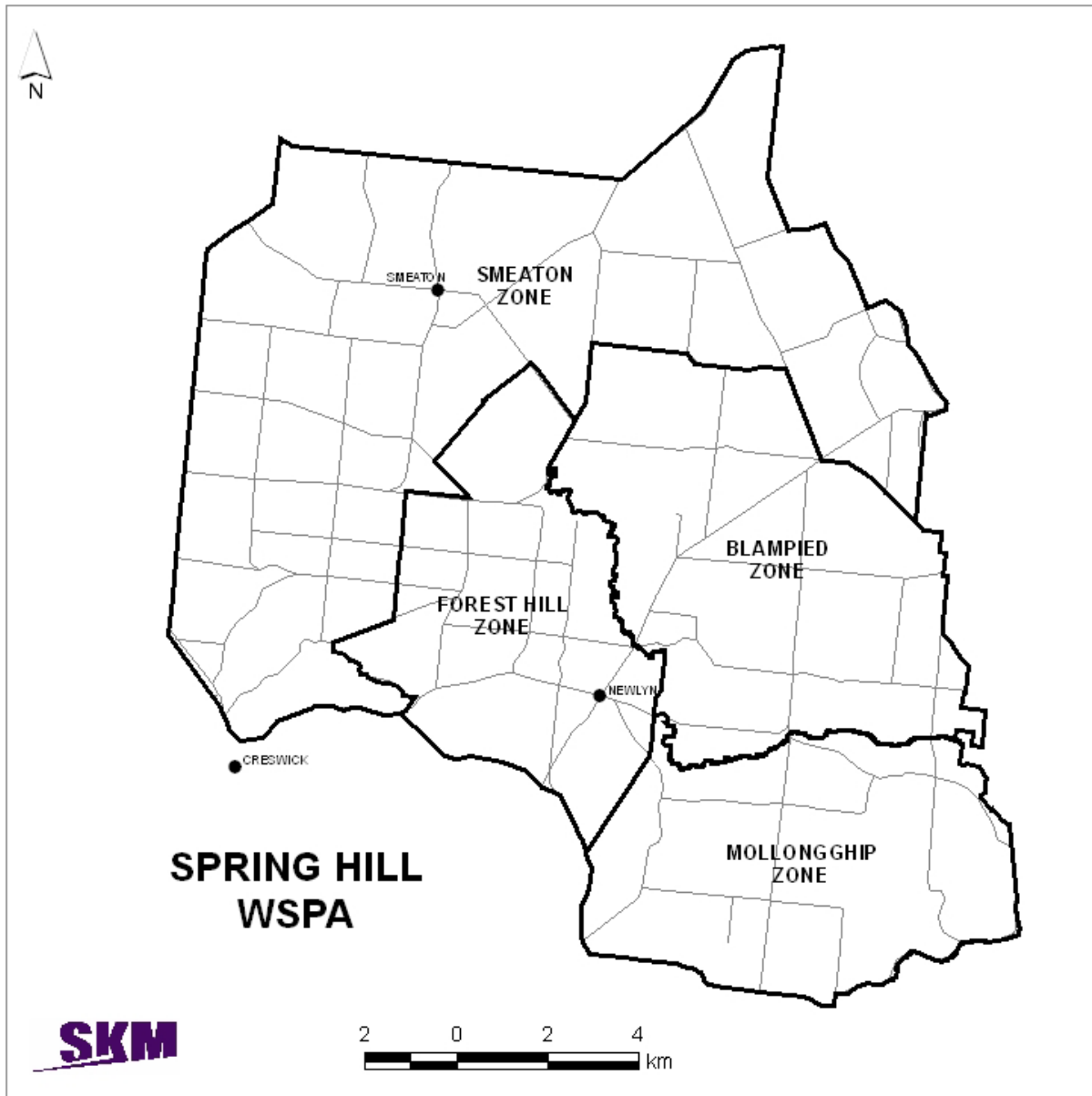
The Spring Hill Groundwater Management Plan (GMP) was approved by the Minister responsible for the Water Act on 28 January 2002. Under clause 7 of the GMP, Goulburn-Murray Water (G-MW) has the duty of administering the Plan.

The objective of the GMP is to make sure that the groundwater resources of the WSPA are managed in an equitable manner and to ensure the long-term sustainability of those resources.

In accordance with Section 32C of the *Water Act* 1989, G-MW must report annually on administration and enforcement of the GMP. The plan specifies several groundwater management activities including;

- Maintenance of monitoring bores
- Groundwater level monitoring
- Groundwater salinity monitoring
- Bore metering program

Figure 1 - Spring Hill WSPA



2 Key Observations

2.1 Water Levels/Flows

The Spring Hill WSPA GMP requires groundwater levels to be measured in 27 bores. The following is based on observations from these readings over the reporting period.

- The bore locations referred to below are shown in **Appendix A**.
- Hydrographs of bores in Schedule 2 and 3 are attached in **Appendix B**.
- Extraction Points & Metered Site Locations are shown in **Appendix C**.

The Spring Hill WSPA comprises a complex system of interconnected aquifer units that make up the groundwater resources for the area. Water levels typically respond to local groundwater abstraction and seasonal recharge. It is important that there is a broad monitoring network to fully assess groundwater level trends across the WSPA.

The continuation of below average rainfall has contributed to lower recharge rates across the Spring Hill WSPA – this has been exacerbated by a significantly drier than average autumn. Late season resource demand has increased due to these dry conditions. Groundwater usage data also confirms increased resource demand this year compared to 2004/05.

Evidence of a highly complex system is shown in the Forest Hill region where observation bore 116382 shows a steady decline in spring recovery of greater than 1 metre per year which is not reflected in bore 91937 (refer to appendix A)

Groundwater development is substantially greater in the Blampied and Forest Hill zones compared to the Smeaton and Mollongghip zones. The impact of this more intensive development is shown clearly in greater seasonal groundwater changes as seen in the Blampied and Forest Hill zones in bores 138657, 138658, and 116382 (refer to appendix A). In the Smeaton Zone groundwater pumping is of low intensity yet observation bores show a continued decline in water levels. While there is little available data for bores in Mollongghip, there are few licensed extraction bores in the zone, so trends would be expected to be similar to the Smeaton zone, which is also an area that is not intensively pumped (refer to Appendix A).

The water level decline observed in Spring Hill WSPA is consistent with a general decline in regional water levels as shown in the boundary bores to the north and west of the area (in the Upper Loddon WSPA). Water levels will be closely monitored for evidence of further decline and recommendations for future management of the area are likely to be made in the groundwater management plan review in 2007.

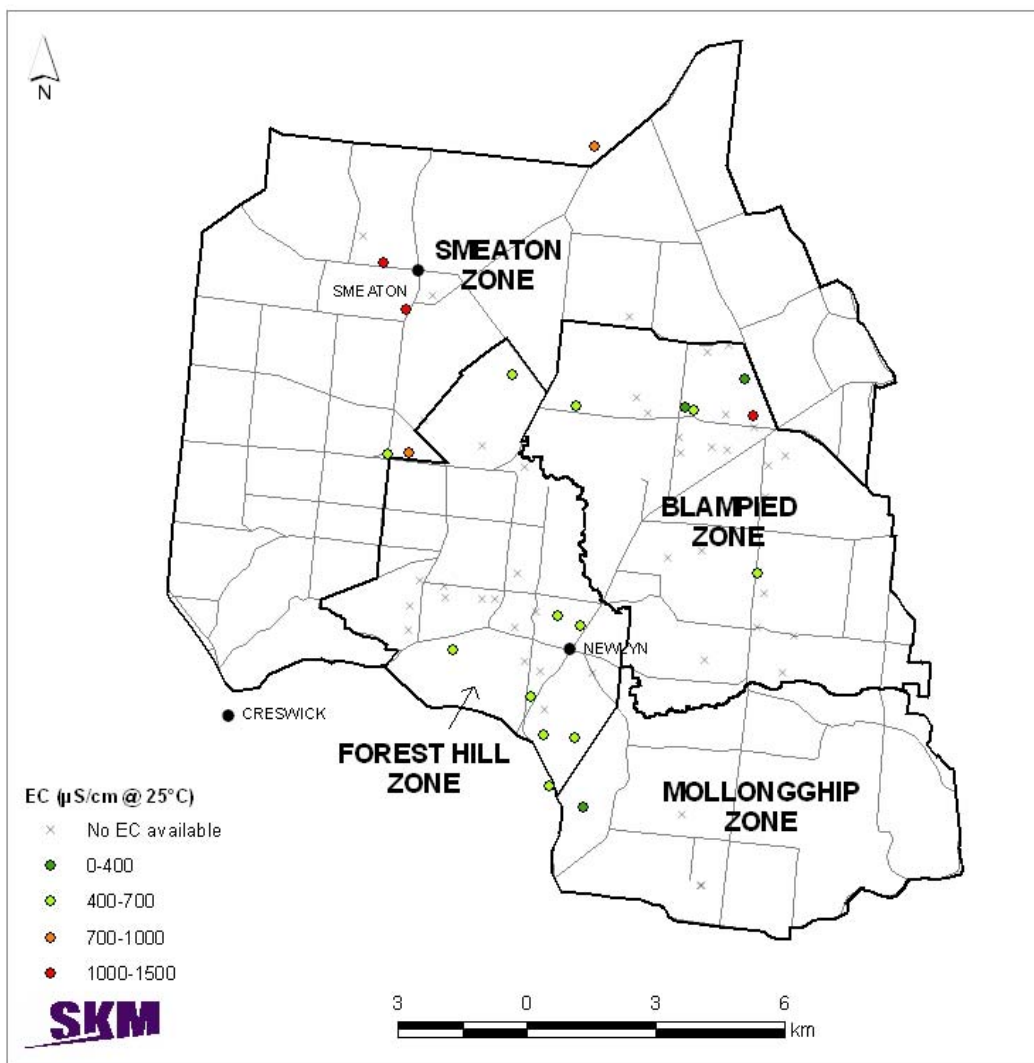
If during the 2006/07 year, G-MW considers that the groundwater resources in Spring Hill WSPA (in one or several areas) may be under stress (and therefore affecting access to the resource), it will consult relevant users and develop an action plan for implementing seasonal restrictions in accordance with Section 3.13 of the Spring Hill Groundwater Management Plan.

2.2 Salinity / Water Quality

Groundwater salinity sampling was conducted as outlined in Section 3.2. Groundwater salinities across the WSPA exhibit a general increase from south to north with salinities also being higher on the lateral boundaries (Figure 2).

No analysis was conducted on temporal trends in salinity up to 2005/2006 as there is insufficient data to justify such an analysis at this stage.

Figure 2 - Spring Hill Salinity Sampling Compliance 2005/2006



2.3 Water Use

Table 2 provides detail on water use in 2005/2006 compared to use in 2004/2005.

Table 2 Water Use Comparison Table

	At 30 June 2005	At 30 June 2006
No. of licences	56	56
Total entitlement volume	4947 ML/yr	4947 ML/yr
Total annual allocation	4947 ML/yr	4947 ML/yr
No. of metered bores*	47	51
Metered volume used	1298 ML	1848 ML
No of licences with estimated volumes	0	0
Total estimated volume used	0	0
Total use	1298 ML	1848 ML
Use % of total allocation	26%	37 %
No. of licences with use greater than licensed allocation **	3	0
Total volume used above licensed allocation***	49.5 ML	0
Use % of Allocation Limit	26%	37 %

*Note four additional meters have been installed.

** No. of licences with use greater than licence allocation is a result of approved temporary transfers.

*** Volume used over licence allocation is a result of approved temporary transfers.

2.4 Non Compliance

There were no licences where water was taken in excess of licensed entitlement. Identification and monitoring of potential high users throughout the season, temporary transfer of water entitlement and communication, outlining of the consequences of use over entitlement, has resulted in successful management of compliance.

Licence holders who recorded use over entitlement in 2004/2005 were the target of a G-MW communications strategy warning of the consequences of unauthorised use of groundwater. While this advice has brought about success in 2005/2006, licensed groundwater users will continue to be reminded of their obligation to use within licence entitlement. Metering of licensed use was completed during 2005/2006 and all future use in excess of entitlement will result in G-MW taking legal action.

No use in excess of entitlement or breaches of the *Water Act* 1989 was detected. This is expected to be a direct result of successful prosecutions from 2004/05 season and the increased proactive management of use within entitlement during 2005/06.

3 Plan Implementation

3.1 Monitoring Requirements

A map showing the monitoring sites listed in Schedule 2 and 3 of the Management Plan is included in **Appendix A**.

3.1.1 Water Level Monitoring Requirements of the Plan

The following table details the requirements of the management plan in relation to monitoring.

Table 3 - Bore Monitoring Program Requirements

Plan Requirement:	Activity / Reference	Complies
<p>8.1 Maintenance of monitoring bores</p> <p>The Secretary must, for each bore listed in Schedule 2:</p> <ul style="list-style-type: none"> i. periodically inspect the condition of the bore ii. maintain the bore in good condition iii. keep a record of all inspections and maintenance work undertaken under paragraphs a) and b) in relation to the bore 	<p>Inspected during monitoring.</p> <p>No action required.</p> <p>Records kept¹</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p>
<p>8.2 Water Levels</p> <ul style="list-style-type: none"> a) The Secretary must determine the potentiometric level in each bore specified in Schedule 2, during July, October, January and April in every year. b) G-MW must determine the potentiometric level in each bore specified in Schedule 3, during July, October, January and April in every year. c) The potentiometric levels determined in a) and b) must be recorded on the Groundwater Management System within 30 days 	<p>Monitored as required.</p> <p>Accessible bores monitored as required</p> <p>Data entered to GMS database.</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p>

3.1.2 Compliance and Exceptions

Monitoring activities undertaken during the reporting period comply with the requirements of the Plan. Exceptions are noted in section 3.1.4.

3.1.3 Maintenance of Monitoring Bores

Bores are visually inspected during monitoring and any maintenance required is noted on the monitoring run field sheets.

¹ Comments logged on monitoring run sheets on file WT01841 at Sinclair Knight Merz Tatura who monitor and maintain bores on behalf of DSE.

3.1.4 Water Levels and Resource Assessment

Under Clause 8.2 (a), DSE must determine the potentiometric levels for every bore specified in Schedule 2 (4 bores) during July, October, January and April. Monitoring complied with these requirements.

Under Clause 8.2 (b), G-MW must determine the potentiometric levels for every bore specified in Schedule 3 (23 bores) during July, October, January and April, if the bore is accessible. On four occasions individual bore readings were not obtained, due to access difficulties (Bores 132684 & 58830), lambing ewes (Bore 141410), and pumping (Bore 141414).

Under Clause 8.2 (c), potentiometric levels from bores listed in both Schedules 2 and 3 are to be entered into the Groundwater Management System (GMS) within 30 days after it is determined. Hydrographs of schedule 2 bores and representative hydrographs of schedule 3 bores are shown in **Appendix B**. From the 23 bores listed in Schedule 3, eight have been selected to give a broad representation of groundwater levels across the four Spring Hill zones.

3.2 Salinity Monitoring

G-MW conducted a mail out to Spring Hill WSPA licensees during the irrigation season. A sample bottle was included in the mail out along with a pre-paid return envelope and a letter requesting that a groundwater sample be collected during operation of the bore and returned to G-MW for salinity determination.

Under the plan, D&S users may also submit samples for testing.

The following table details the requirements of the management plan in relation to salinity monitoring.

Table 4 - Salinity Monitoring

Plan Requirement:	Activity / Reference	Complies
8.3 Salinity		
b) The licensee, or the owner or occupier of a domestic and stock bore, must take, store and give G-MW a sample of water from their bore when requested by G-MW	Sample bottles and letters sent to 56 licensees (78 bores) 21 (27 %) water samples were returned.	Partial compliance
d) G-MW must		
i. measure the electrical conductivity of each water sample	All water samples received were analysed.	Yes
ii. record the results of the analysis on the Groundwater Management System	Results of each analysis were entered into the GMS system.	Yes
iii. Inform the bore owner of the results of the analysis	Landholders provided with results from previous year by mail, and results from current year upon request.	Yes

3.2.1 Compliance and Exceptions

Samples were collected from 21 of the licensed bores (giving an approximate response rate of 27%) between December 2005 and May 2006. **Figure 2** shows the geographic spread of samples provided for analysis for 2005/2006. This is a slight decrease (9%) on the previous reporting period 2004-2005 and G-MW is endeavouring to improve compliance with the salinity sampling program by providing feedback to licensees on the sample results. G-MW will also aim to improve understanding by providing information to licensees outlining the purpose and benefits of collecting groundwater data and highlighting the importance of contributing to this information. A pro-active communication plan in 2006/2007 will help to improve the response rate and emphasise the important of the salinity sampling program.

The spread of returned samples is considered adequate to monitor general trends in groundwater salinities across the WSPA. The issue of non-compliance with the Plan is discussed further in Section 4.4.3.

3.3 Metering

The location of all extraction points and metered sites is shown in Appendix C.

3.3.1 Requirements of the Plan

The following table details the requirements of the management plan in relation to metering.

Table 5 - Bore Metering Program Requirements

Plan Requirement:	Activity / Reference	Complies
9.1 Installation and maintenance of meters		
a) G-MW must:		
i. ensure that a flow meter is fitted to every bore being used in association with a Licence unless the bore is used solely for dairy use or Domestic and Stock purposes;	1 meter is required to be installed, after a previously unused bore is planned to be operational in the 2006/2007 season.	Yes
ii. inspect the condition of the flow meter whenever it is read	Condition of meter noted when reading taken.	Yes
iii. maintain the flow meter in good condition	Condition of meter noted when reading taken.	Yes
iv. recalibrate the flow meter at any time when the authority has reason to believe that a reading from the meter may be inaccurate	No action required.	Yes
v. replace any damaged flow meter	No action required.	Yes
vi. keep a copy of all work done on the flow meter	No action required.	Yes
b) The licensee must::		
i. ensure reasonable care is taken of any meter fitted to the bore by G-MW; and	Four new meters fitted in 2005/2006.	Yes
ii. ensure G-MW is promptly advised whenever that meter appears to be defective, registering incorrectly or is damaged.	No licensees reported defective meters therefore no action has been required.	Yes
9.2 Meter Readings		
a) G-MW must:		
i. read each flow meter twice each year	Measurements taken February 23rd – 28 th and May 24 th -June 29 th 2006.	Yes
ii. determine the volume of water extracted	Total usage was calculated	Yes
iii. record the metered volume on a database	Data entered onto IPM database, MS Excel and MS Access databases at end of season.	Yes
iv. estimate the volume of water from defective meters	No defective meters reported.	Yes
v. record the estimated volume on a database	No estimated volumes	Yes

3.3.2 Metering Fitting activities

Table 6 – Summary of meter fitting activities

	Year to 30 June 2005	Total for WSPA at 30 June 2006
Number of meters installed	-	4
Meters requiring recalibration	-	-
Meters replaced	-	-

3.3.3 Compliance and Exceptions

Meters were fitted to four bores, outlined in last year's annual report. There is one bore that requires a meter to be fitted during the 2006/2007 season. This is a previously unused bore that is currently being equipped for groundwater extraction.

3.3.4 Issues Affecting Implementation

The increasing intensity of groundwater management within the Spring Hill WSPA and elsewhere requires improved systems for the storage, retrieval, analysis and reporting arrangements for large quantities of data. Goulburn-Murray Water is currently developing an asset management database to improve its maintenance schedule and records for metering. This will provide a powerful tool to analyse data. During the 2005/2006 season a Metering Database and Deep Lead Base were established. The implementation of a Geographic Information System is currently under consideration.

4 Restrictions on Licensing and Licence Transfers

4.1.1 Requirements of the Plan

The following table details the requirements of the management plan in relation to restrictions and prohibitions on the issue of groundwater licences.

Table 7 - Restrictions and Prohibitions on the Issue and Transfers of Groundwater Licences

Plan Requirement:	Activity/Reference	Complies
10 Restrictions and Prohibitions on the Issue of Licences		
10.1 A groundwater licence must not be issued under Section 51 of the act except : (a) To allow for amalgamation & division (b) To increase dairy use entitlement from 2ML to 5 ML (c) To resolve administrative anomalies.	No new entitlement allocated	Yes
11. Extent to which a groundwater licence may be transferred*		
11.1 Permanent transfers	Waternote sets out rules for permanent transfer	Yes
11.2 Temporary transfers	Waternote sets out rules for temporary transfer	Yes
11.3 Recording transfers	G-MW does not track individual buyers and sellers. However temporary transfers within and between zone in WSPAs are monitored. See Table 7	Yes

* Records are not kept of the cumulative number and volume of transfers associated with the conveyance of land.

4.1.2 Licensing Management Summary

The following table provides details of licensing activities.

Table 8 - Licensing Activities for 2005/06

Year to 30 June 2005	No.	Volume (ML)
New licences issued	0	0
Additional volumes on existing licences	0	0
Licences revoked	0	0
D&S Bores notifying use	0	-

Table 9 - Transfer Summary for 2005/2006

Zone Name	Transfer Zone	Within Zone		Into Zone		Out of Zone	
		No. of transfer	Amount transferred	No. Of transfers	Amount transferred	No. of transfers	Amount transferred
Mollongghip	1001	No trades completed					
Blampied	1002	4	147	-	-	-	-
Forest Hill	1003	2	66	-	-	1	5
Smeaton	1004	0	0	1	5	-	-

There were no permanent transfers in the Spring Hill WSPA.

4.1.3 Compliance and Exceptions

Activities undertaken during the reporting period comply with the requirements of the Plan, with the exception of recording transfers. G-MW has incorporated temporary transfer of water entitlement (TTWE) into Watermove, which does not match buyers and sellers at an individual licence level, and attempting to conduct these matches for other transfers would not be useful.

Licensees are able to apply for TTWE for planned use greater than licence entitlement. Such applications must be approved by G-MW before TTWE use can occur and matters to be considered under section 40 of the *Water Act 1989* must be considered. In the absence of approved TTWE, use in excess of entitlement is a breach of licence conditions and will be subject to legal action by G-MW.

4.2 Notification of Domestic and Stock Use

4.2.1 Requirements of the Plan

The following table details the requirements of the management plan in relation to notification of domestic and stock use.

Table 10 - Domestic and Stock Notification

Plan Requirement:	Activity/Reference	Complies
12 a) The occupier of any unlicensed D&S bore must notify G-MW whether or not the occupier has taken water from the bore for D&S purposes *	No additional notification received	No

*Only one D&S user has notified of their use since the plan commenced.

4.2.2 Compliance and Exceptions

Activities undertaken during the reporting period do not comply with the requirements of the Plan. G-MW will aim to improve by providing information to licensees outlining the purpose and benefits of notifying domestic and stock use and highlighting the importance of contributing to this information.

A Waternote describing the process for registration of D&S use is available at G-MW's Internet site at:

http://www.g-mwater.com.au/browse.asp?ContainerID=surface_and_groundwater

4.2.3 Issues Affecting Implementation

Compliance for use within entitlement

Achieving compliance for use within entitlement is considered a high priority relative to the potentially high cost of enforcement. Communication with licence holders outlining obligations to manage use within entitlement will continue along with reminders of potential legal action if this does not occur.

The success of G-MW's ongoing communication with licence holders regarding the need to manage use within entitlement is demonstrated by no use in excess of entitlement being recorded for 2005/2006.

Notification of Domestic and Stock Use

Significant difficulties remain with enforcing the GMP requirements for notification of domestic and stock use; these include:

- In many cases, the depth, location and current ownership of domestic and stock bores is unknown.
- There is no means of tracking changes in ownership and/or the status of the bore.
- The accuracy of corrected data drifts over time.
- Where current data is available, there are no institutional arrangements to ensure G-MW is made aware of changes to ownership.

Estimating groundwater use

While water use data estimates may assist in understanding total groundwater use, the implications for groundwater resource management are not considered to be significant, particularly given that the accuracy of the estimates would be highly questionable.

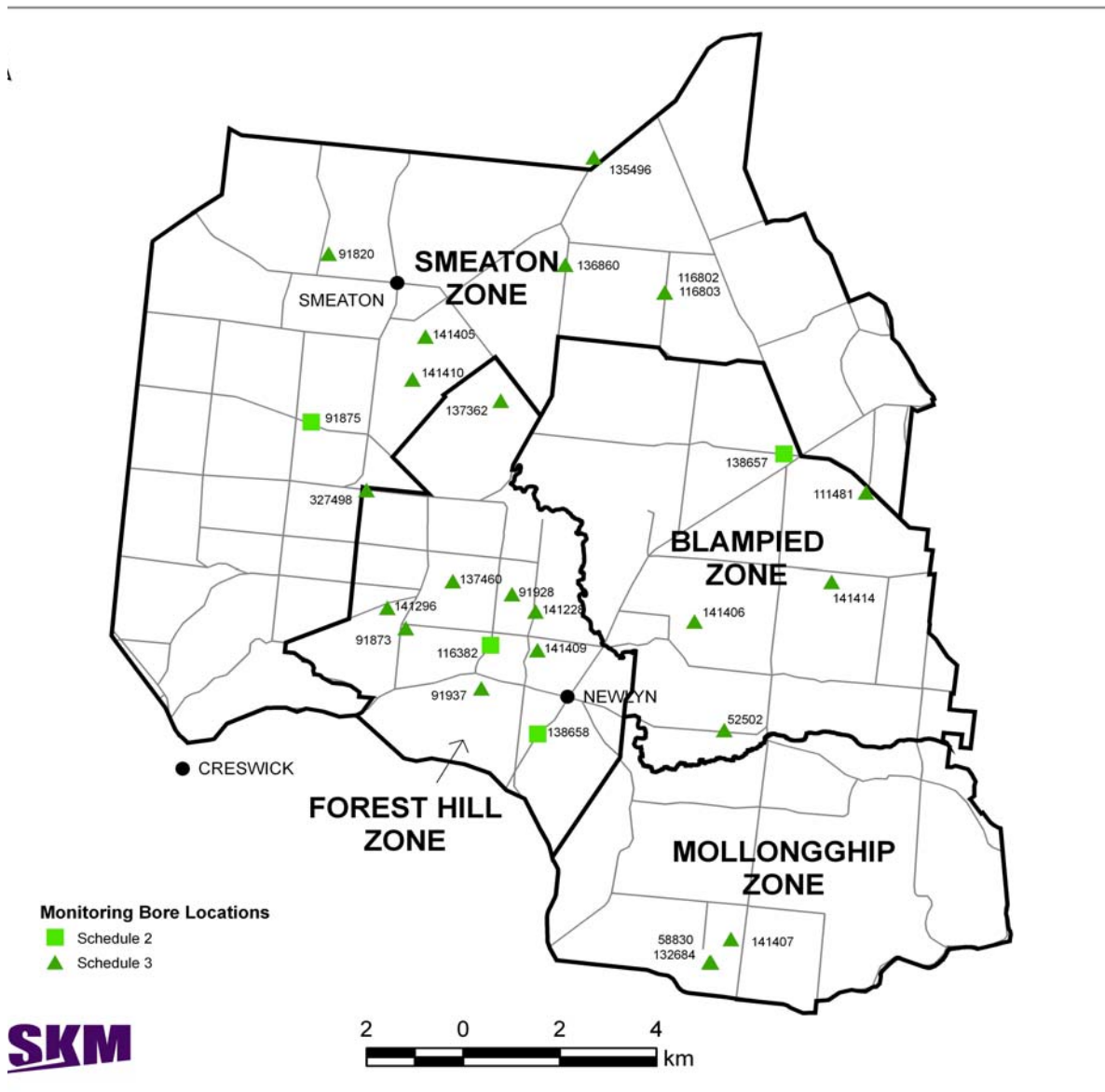
Review of the Groundwater Management Plan

G-MW will place a high priority on conducting a review of the Spring Hill Groundwater Management Plan during 2007. The requirement for a review is noted in section 3.19 of the Groundwater Management Plan explanatory paper.

Consideration of seasonal restrictions

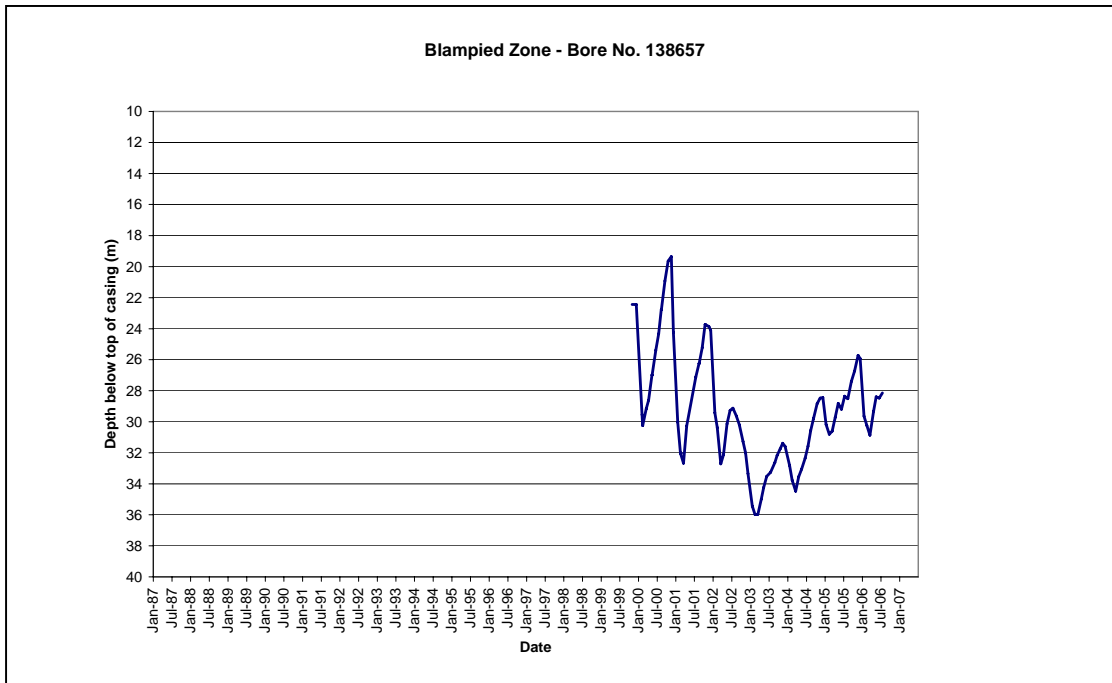
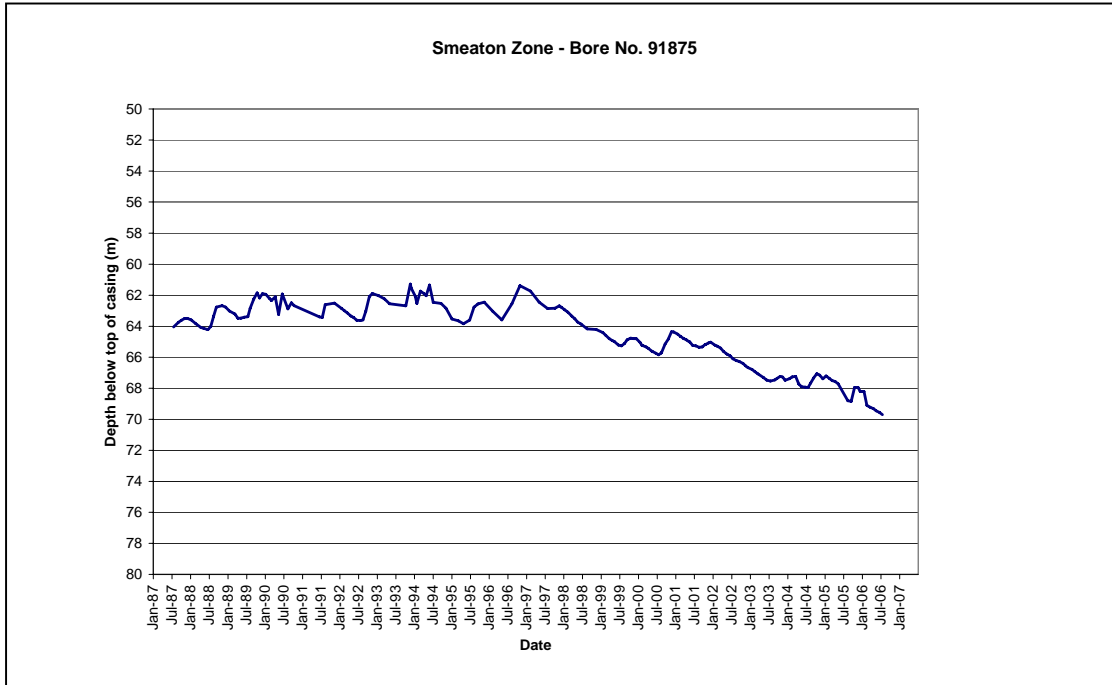
If dry conditions and low groundwater recharge persist into 2006/2007, there may be a need for G-MW to manage aquifer stress by introducing seasonal restrictions on licensed use according to the process outlined in section 3.13 of the Groundwater Management Plan explanatory paper. This would necessitate the declaration of a water shortage for the Spring Hill WSPA.

Appendix A - Monitoring Bore Locations

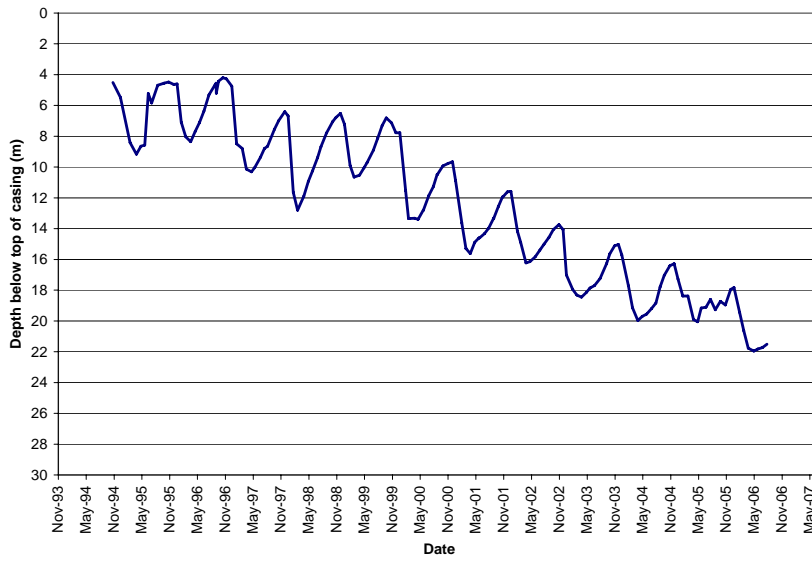


Appendix B - Hydrographs for Monitoring Bores from Schedule 2.

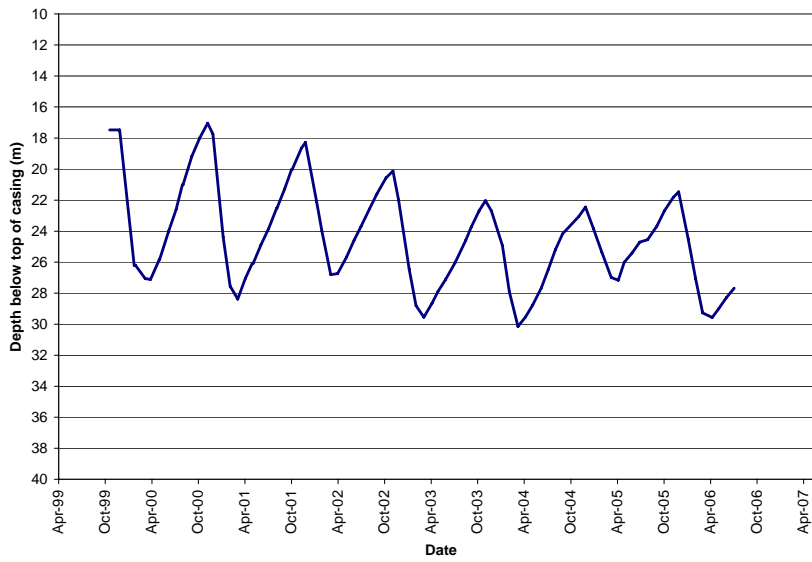
Graphs updated to last quarterly reading taken July 2006.



Forest Hill Zone - Bore No. 116382

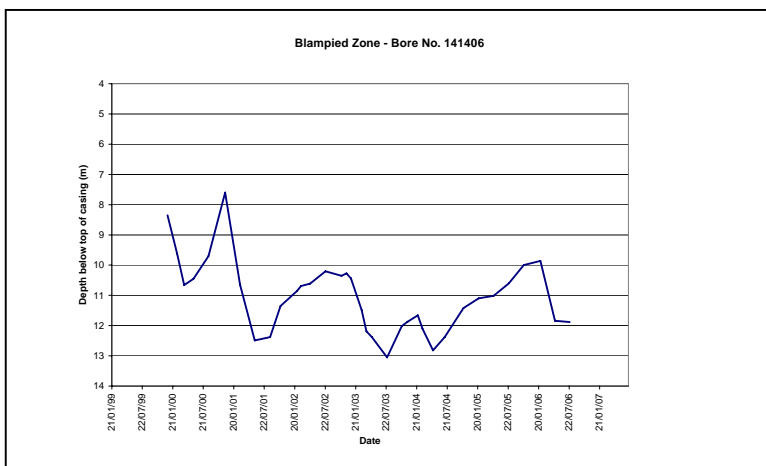
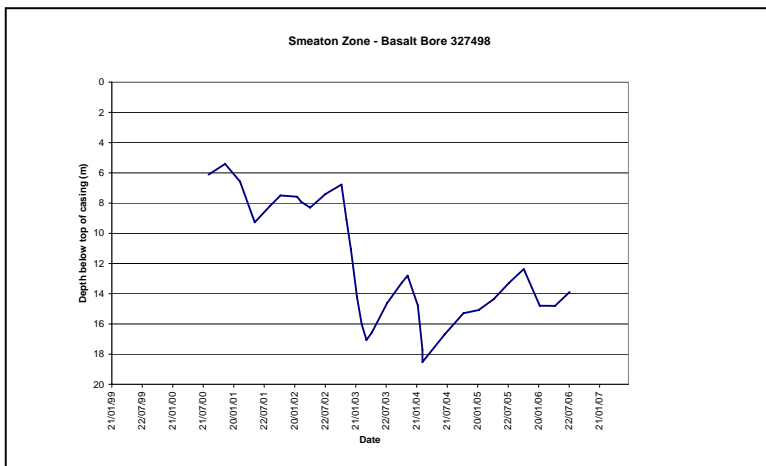
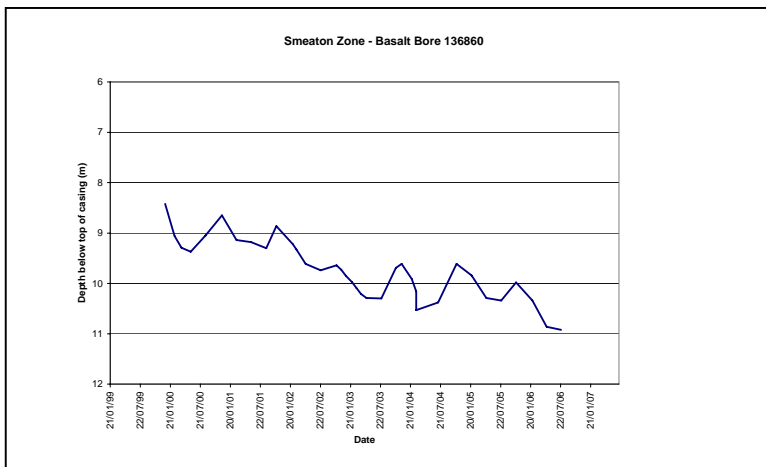


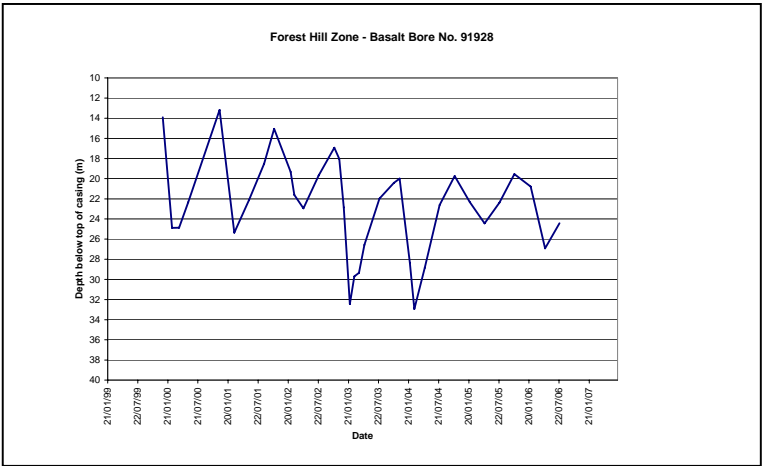
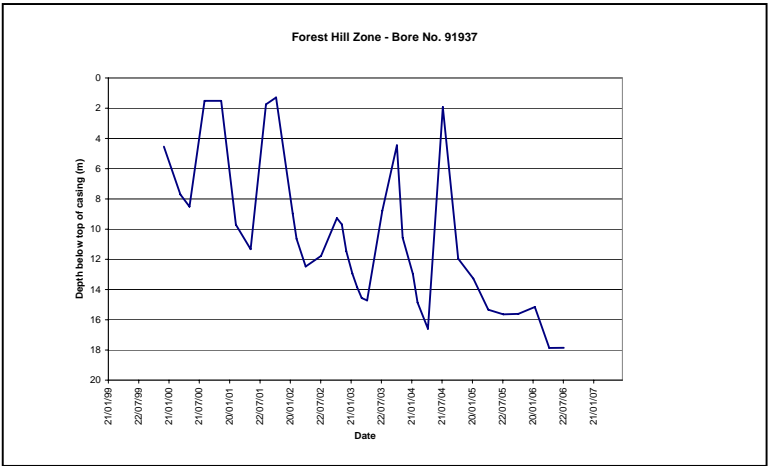
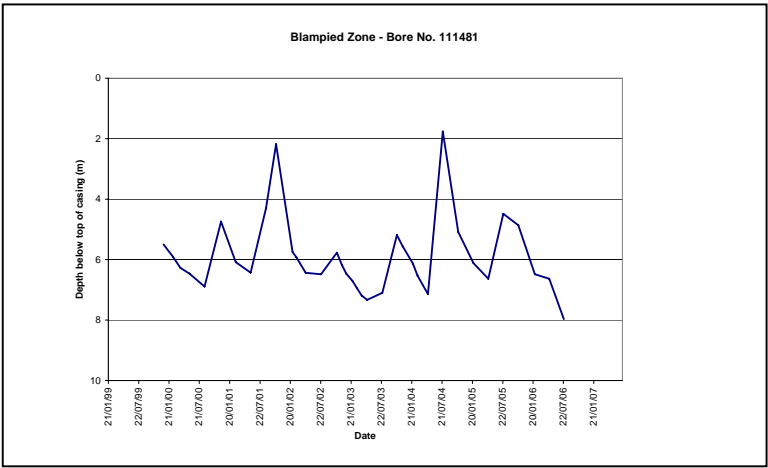
Forest Hill Zone - Bore No. 138658

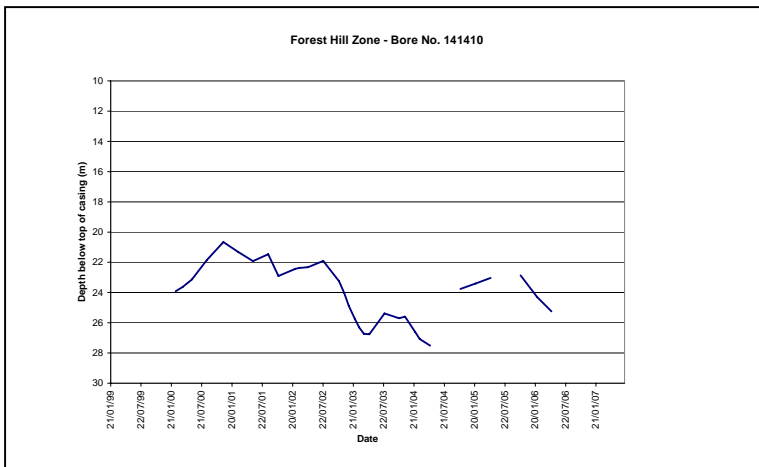
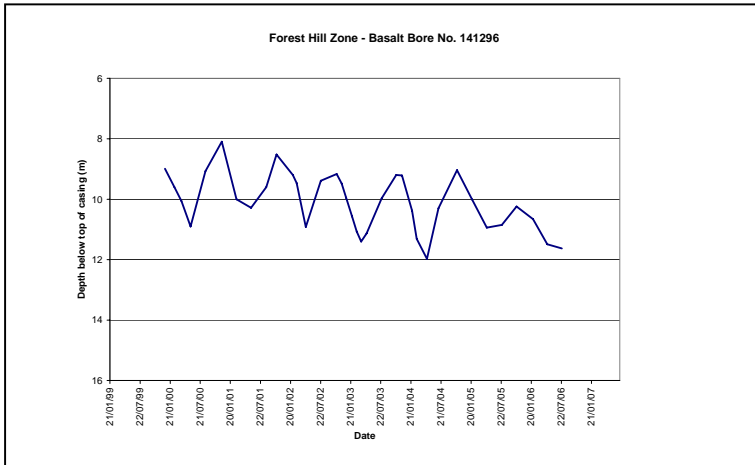


Hydrographs from monitoring bores in Schedule 3.

Graphs updated to last quarterly reading taken July 2006.







Appendix C - Extraction Points & Metered Site Locations.

