GOULBURN-MURRAY WATER

Loddon Highlands Water Supply Protection Area Groundwater Management Plan

Annual Report

June 2013

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Foreword

Goulburn-Murray Water (GMW) is pleased to present the annual report for the Loddon Highlands Water Supply Protection Area Groundwater Management Plan (the Plan) for the 2012/13 season.

GMW is responsible for implementation of the Plan, which was approved by the Minister for Water in November 2012.

This report has been prepared in accordance with section 32C of the *Water Act 1989*.

This report provides an overview of the groundwater management activities in the Loddon Highlands Water Supply Protection Area and documents the successful implementation of the Plan during the 2012/13 season.

A copy of this report is available for inspection at the GMW Tatura office, or it can be downloaded from the GMW website.

Gavin Hanlon
MANAGING DIRECTOR

Date 26/9/2013

Executive summary

The 2012/13 irrigation season saw the successful implementation of the Loddon Highlands Water Supply Protection Area (WSPA) Groundwater Management Plan (the Plan), which was approved by the Minister for Water in November 2012.

During 2012/13, the Minister for Water declared the Permissible Consumptive Volume at 20,697 ML/year, which sets a cap on licence entitlement in the WSPA.

Following historic low levels recorded in the last decade, groundwater levels have continued to rise, which may be largely attributed to increased rainfall recharge as well as lower usage in recent years.

Allocations in all zones of the Loddon Highlands WSPA were announced at 100% in 2012/13.

Metered usage in the Loddon Highlands WSPA was 34% (7,052 ML) of licensed entitlement and closer to historic seasonal use, and higher than the previous two seasons which were wetter.

There was significant trade activity during 2012/13. There were 24 temporary transfers of licence entitlement for a total of 1,891 ML, which is similar to the volumes traded during recent dry periods. There were also five permanent transfers for a total of 525 ML. These transfers were made by licence holders seeking to secure entitlement to meet business needs previously only possible via temporary transfers.

In November 2012, the Minister for Water declared that groundwater licence holders in the Loddon Highlands WSPA were authorised to take carryover to a maximum of 15% of licence entitlement. Licence holders have carried over 2,791.9 ML of entitlement into the 2013/14 season.

Groundwater monitoring and metering programmes are now in place to support the implementation of the Plan.

Table of Contents

1 Introduction

1.1 Purpose

This report has been prepared so that the requirements of prescription 7 of the Loddon Highlands Water Supply Protection Area (WSPA) Groundwater Management Plan (the Plan) and section 32C of the *Water Act* 1989 (the Act) are met.

It discusses the implementation of the Plan and provides an overview of groundwater management activities undertaken in accordance with the Plan during the 2012/13 water year.

1.2 Water Supply Protection Area

The Loddon Highlands WSPA was declared in June 2010. It extends from Newlyn and Learmonth in the south to Dunolly in the north, and incorporates the townships of Creswick, Waubra, Clunes, Talbot and Maryborough.

The Loddon Highlands WSPA incorporates groundwater resources to all depths.

There are seven management zones in the Loddon Highlands WSPA: the Talbot, Waubra, Ascot, Ullina, Newlyn, Blampied and Mollongghip Zones (Figure 1).

1.3 Groundwater Management Plan

The Plan was approved by the Minister for Water in accordance with section 32A(6) of the Act on 21 November 2012.

The objective of the Plan is to make sure that groundwater resources in the WSPA are managed in an equitable manner so as to ensure the long term sustainability of those resources. More specifically, the plan seeks to:

1. manage the resources to protect groundwater users and the environment;
2. enable equitable access of groundwater resources to realise the potential for its use; and
3. provide effective and transparent communication of Plan objectives, management rules and resource status.

Goulburn-Murray Water (GMW) is responsible for the implementation, administration and enforcement of the Plan. An assessment summary of GMW's activities in accordance with Plan prescriptions is presented in Appendix A.

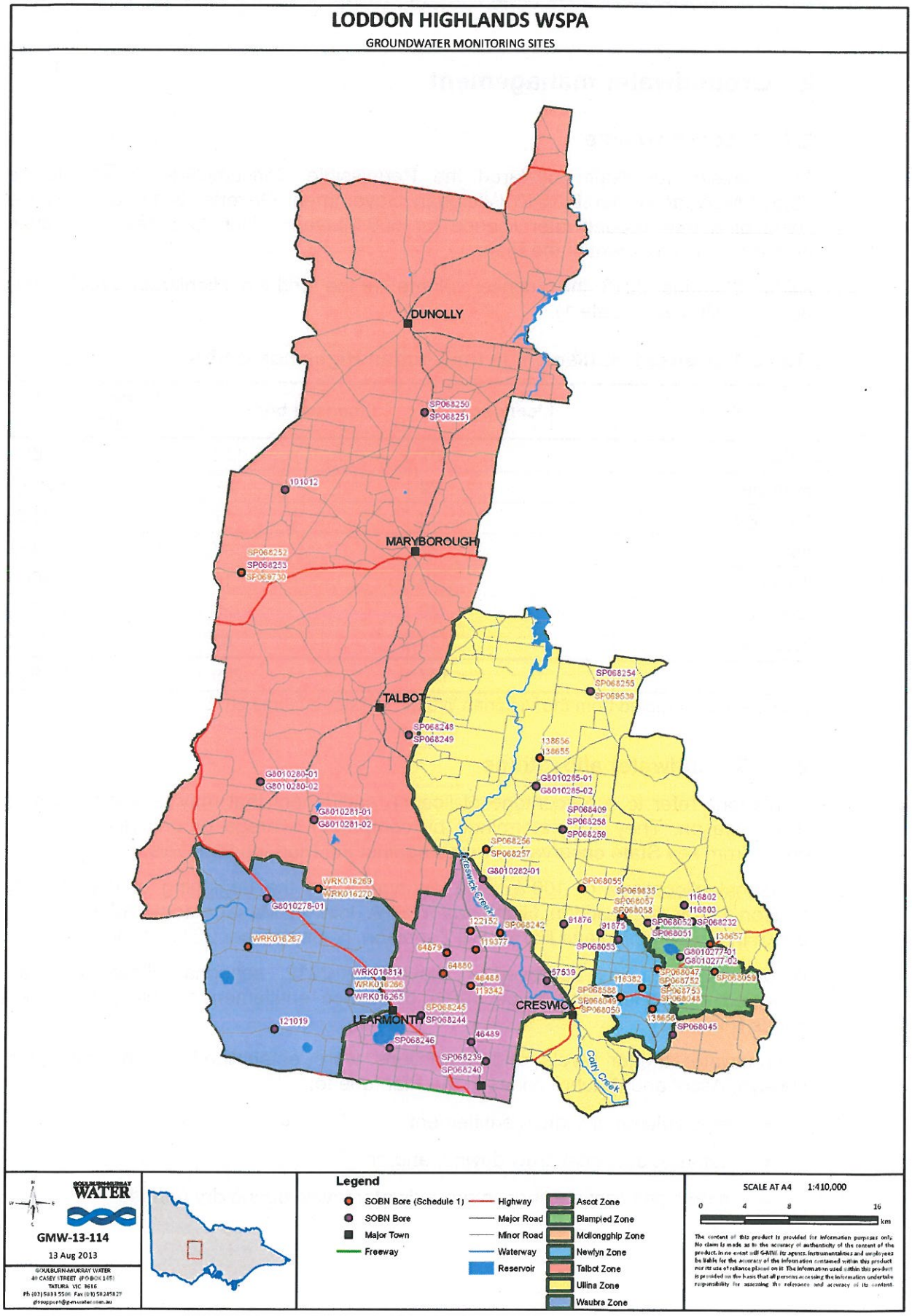


Figure 1 Loddon Highlands Water Supply Protection Area

2 Groundwater management

2.1 Licence volume

The Minister for Water declared the Permissible Consumptive Volume to be 20,697 ML/year in March 2013 (Victorian Government Gazette, 2013) to allow the issue of a new groundwater licence for 500 ML/year which had been submitted during the development of the Plan.

As at 30 June 2013 the licence volume in the Loddon Highlands WSPA was 20,693.5 ML/year (Table 1).

Table 1 Licensed entitlement in the Loddon Highlands WSPA

Zone	Licences	Licensed bores	Licence volume (ML)
Ascot	67	112	7,068.2
Blampied	22	29	1,252.5
Mollongghip	3	7	318.0
Newlyn	27	47	3,133.6
Talbot	14	16	1,268.7
Ullina	20	25	2,921.2
Waubra	34	63	4,731.3
Total	187	299	20,693.5

NOTE: Data extracted from the Victorian Water Register 30 June 2013

2.2 Groundwater allocations

Allocations refer to a percentage of licence entitlement that may be extracted in a given season. They are determined by comparing average groundwater recovery levels from key State observation bores against the Plan trigger levels.

Seasonal allocations of 100% were announced at the beginning of the 2012/13 season under the Loddon Highlands WSPA Interim Management Rules (G-MW, 2010) in the Blampied and Forest Hill Zones on 10 September 2012 (Appendix B).

When the Plan was approved in November 2012, seasonal allocations were reviewed and determined to be 100% of licence entitlement for all management zones (Figure 2).

Groundwater trigger levels and restrictions were established for the Blampied, Newlyn, Ascot and Waubra zones in the Plan due to:

- large volume of licence entitlement,
- historical seasonal draw downs, and/or
- more significant declines in groundwater levels during dry periods.

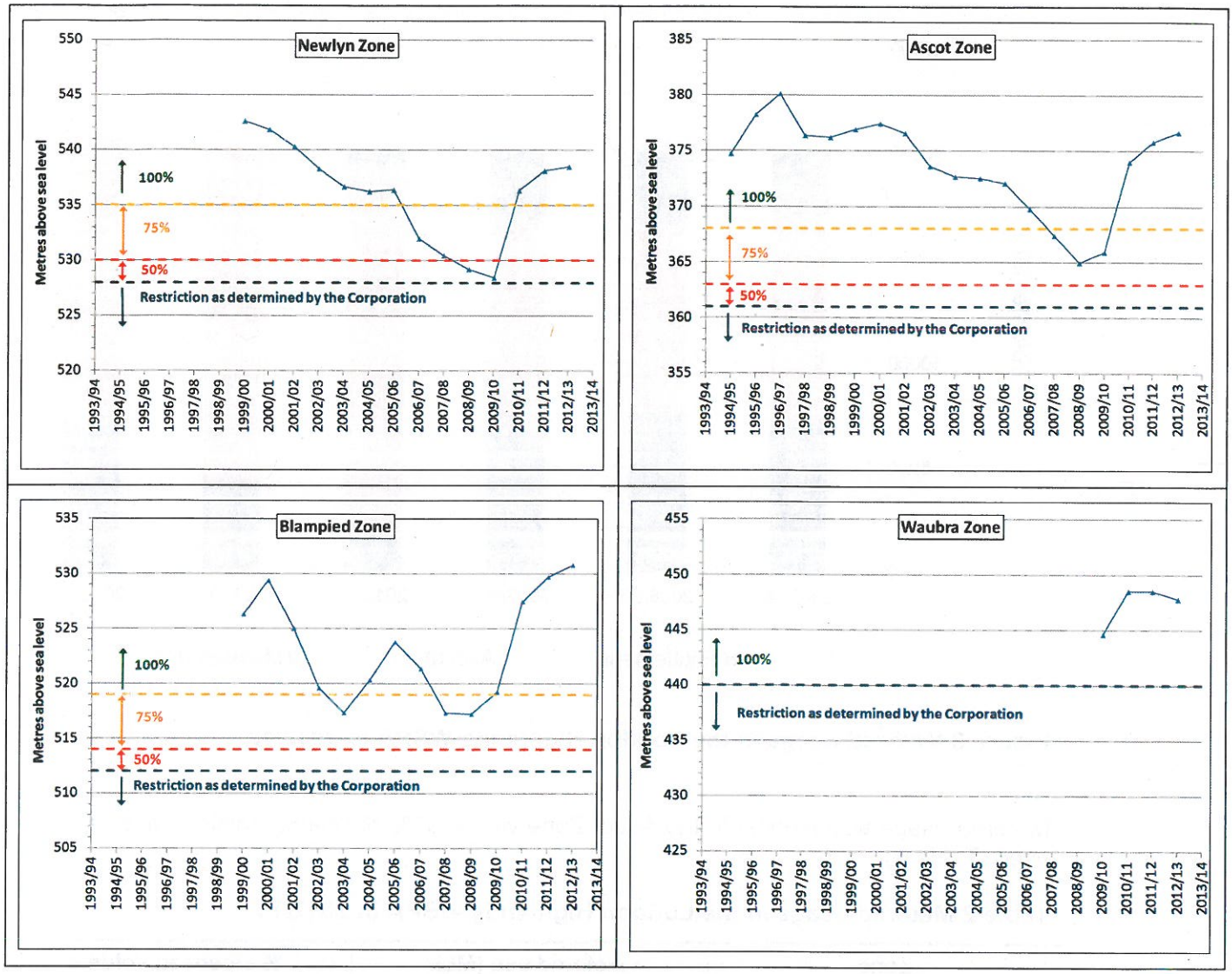


Figure 2 Loddon Highlands WSPA average groundwater recovery levels compared to trigger levels

2.3 Groundwater use

Metered use in the Loddon Highlands WSPA in 2012/13 was 7,052 ML, or equivalent to 34% of licence entitlement (Figure 3). This was closer to the historical average than the previous two seasons (which were notably wetter), and was likely due to a drier autumn.

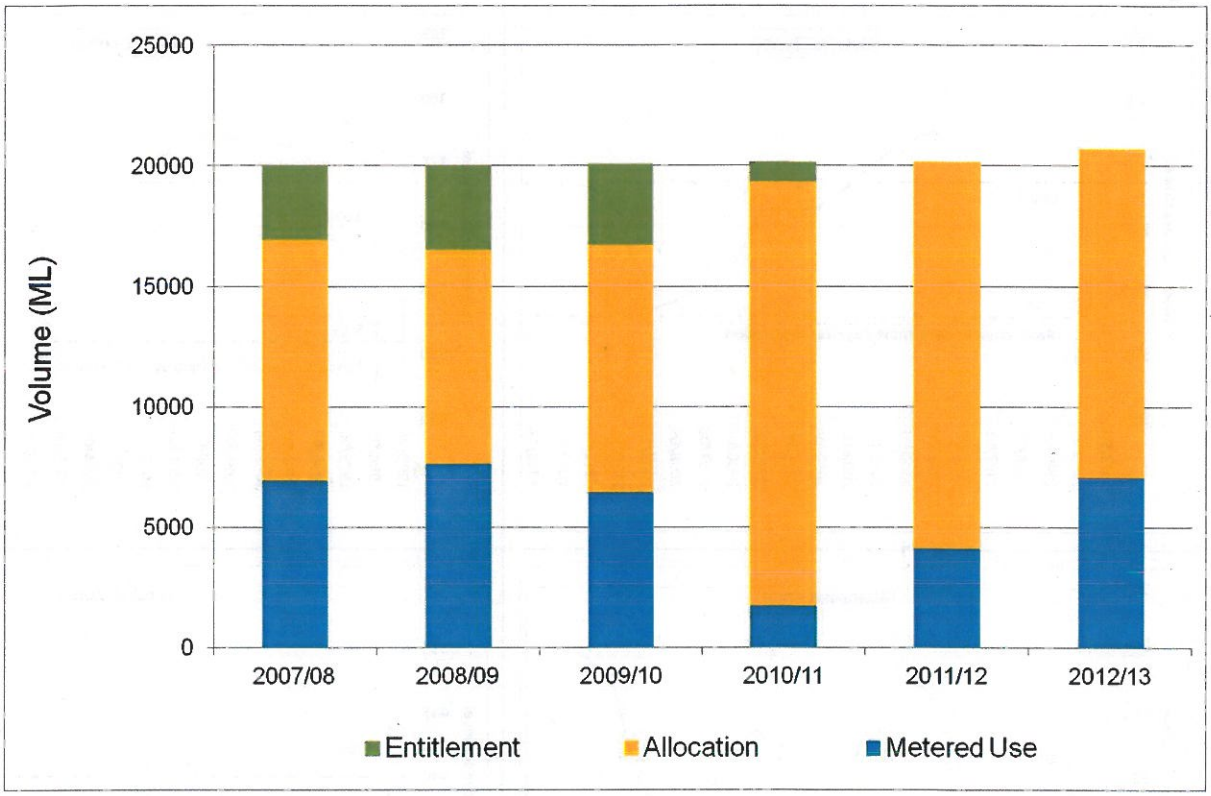


Figure 3 Metered usage in the Loddon Highlands WSPA in 2012/13

Metered usage was highest in the Ascot Zone where 55% of licence entitlement was used (Table 2).

Table 2 Metered usage in the Loddon Highlands WSPA in 2012/13

Zone	Metered use (ML)	% Licensed volume
Ascot	3,894.7	55%
Blampied	467.5	37%
Mollongghip	89.6	28%
Newlyn	959.3	31%
Talbot	271.2	21%
Ullina	120.8	4%
Waubra	1,248.8	26%
Total	**7,051.9**	**34%**

NOTE: Data extracted from GMW Irrigation Planning Module database 19 August 2013

2.4 Transfer of entitlement

The Plan allows groundwater licence holders to temporarily or permanently transfer licence entitlement. In 2012/13 there were 24 temporary transfer transactions for a total of 1,891 ML and five permanent transfer transactions for a total of 525 ML (Figure 4).

An increase in temporary transfers compared to last season correlates with the drier seasonal conditions.

The permanent transfers undertaken are representative of licence holders seeking to secure entitlement to meet existing business demands. Prior to approval of the Plan, the permanent transfer of entitlement was limited as it was only possible through the transfer of land ownership.

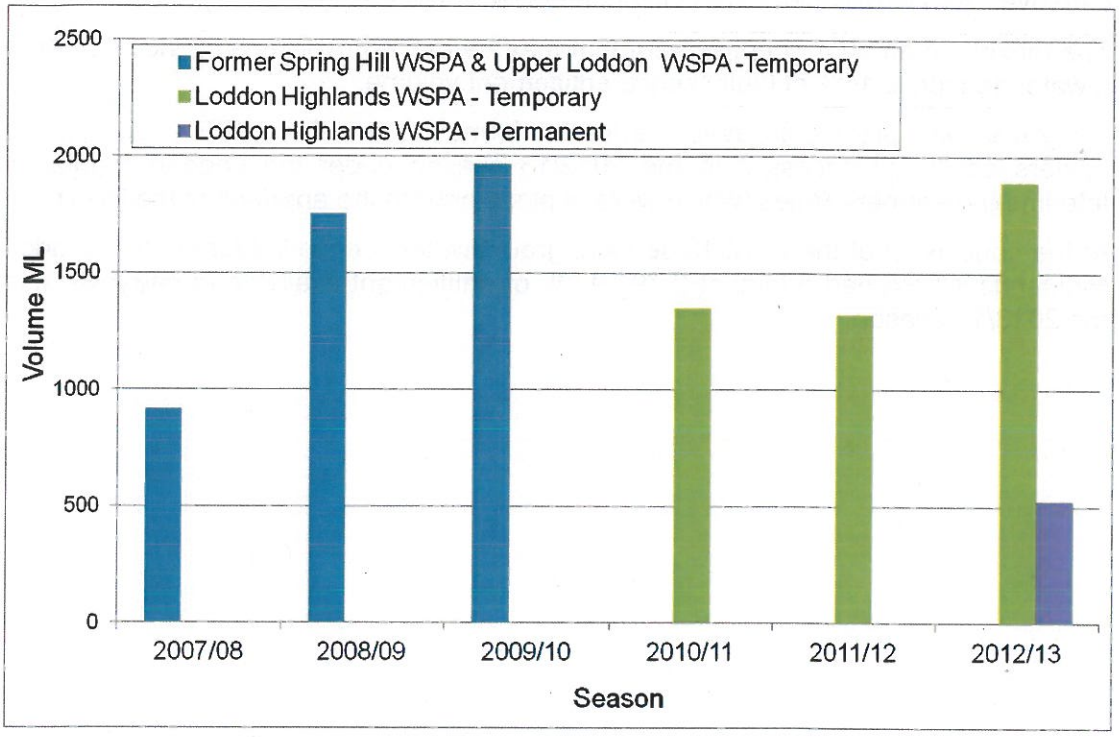


Figure 4 Transfer activity in the Loddon Highlands WSPA

The majority of temporary transfers occurred within the same management zone rather than between zones (Table 3). A total of 320 ML was transferred between zones: 200 ML from Waubra to Talbot, 110 ML from Newlyn to Mollongghip and 10 ML from Newlyn to Ullina.

The five permanent transfers occurred all within the same zones: 150 ML of entitlement was transferred within the Ascot Zone and 375 Ml within the Ullina Zone.

Table 3 Transfers in the Loddon Highlands WSPA in 2012/13

Zone	Temporary				Permanent			
	Transfer from		Transfer to		Transfer from		Transfer to	
	No. of transfer	Volume (ML)	No. of transfer	Volume (ML)	No. of transfer	Volume (ML)	No. of transfer	Volume (ML)
Ascot	14	832	14	832	2	150	2	150
Blampied	1	68	1	68				
Mollongghip			2	110				
Newlyn	5	170	2	50				
Talbot			1	200				
Ullina	1	505.8	2	515.8	3	375	3	375
Waubra	3	315	2	115				
Total	**24**	**1890.8**	**24**	**1890.8**	**5**	**525**	**5**	**525**

2.5 Carryover

Following an application from GMW, the Minister for Water declared that groundwater licence holders in the Loddon Highlands WSPA are authorised to take carryover from November 2012 (Victorian Government Gazette, 2012).

The maximum amount of entitlement that may be carried over by a licence holder in a water season is 15% of their licence entitlement volume.

Carryover was previously available in the former Spring Hill WSPA, but licence holders could not access it in the 2012/13 season under the Loddon Highlands Interim Management Rules (which were in place prior to the approval of the Plan).

At the conclusion of the 2012/13 season, groundwater licence holders in the Loddon Highlands WSPA had a total of 2,791.9 ML of entitlement available to carryover into the 2013/14 season.

3 Monitoring program

3.1 Groundwater levels

The Department of Environment and Primary Industries (DEPI) monitored over 70 bores from the State Observation Bore Network on a quarterly basis in the Loddon Highlands WSPA (Figure 1).

GMW conducted monthly infill monitoring of thirty six key State observation bores identified in Schedule 1 of the Plan (Appendix C). Groundwater recovery levels were generally higher in 2013/14 compared to 2012/13, continuing a rising trend seen since the low groundwater levels recorded during the extended drought of the last decade. These level rises may be largely attributed to increased rainfall recharge as well as lower usage in recent years.

Seasonal drawdown of up to 10 m was observed in the Blampied, Newlyn and Waubra Zones in 2012/13. In the Ascot Zone, where the greatest volume of groundwater was extracted, seasonal drawdown was up to 20 m. This is consistent with previous seasonal drawdown levels observed.

3.2 Groundwater quality

Groundwater quality testing was undertaken by taking samples from two nested State observation bore sites in the Loddon Highlands WSPA. Nested sites feature two or more bores in close proximity, each monitoring a different aquifer. The State observation bores used for water quality testing are located in the Talbot and Ullina Zones and monitor groundwater in both the deep lead and basalt aquifers.

Groundwater chemistry results are presented in Appendix D. The analysis indicates that groundwater salinity levels are higher in the basalt aquifers than the underlying deep lead aquifers at both sites (Table 4). Ongoing annual monitoring of these key bores will continue to enable trends in groundwater quality changes to be observed.

Table 4 Salinty of groundwater in key monitoring bores in the Loddon Highlands WSPA

Bore number	Zone	Screen depth below natural surface (m)	EC (µS/cm)
SP069539	Ullina	114.2-119.9 m (deep lead)	1,680
SP068255	Ullina	33.1-35.9 m (basalt)	7,130
SP069730	Talbot	92.2-97.8 m (deep lead)	2,390
SP068252	Talbot	57-60 m (basalt)	4,050

GMW has also collected groundwater salinity data from licensed bores owned by Central Highlands Water in the Newlyn, Ascot, Ullina, Waubra and Talbot Zones. The data indicates that groundwater salinity has been relatively stable across the WSPA since 2008.

GMW will assess if any further monitoring is required under a more broadly targeted groundwater salinity monitoring program in 2013/14.

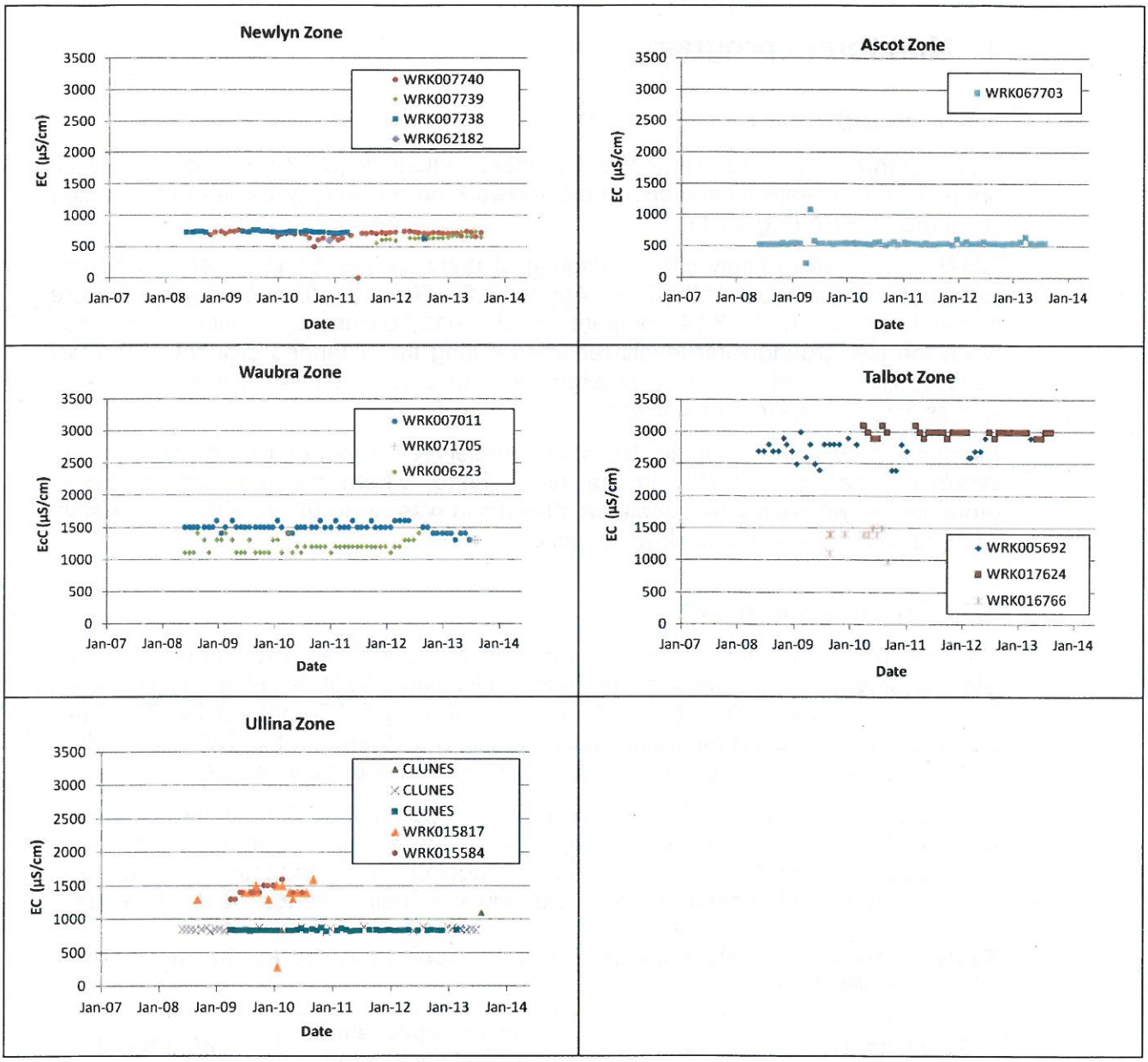


Figure 5 Salinity monitoring results from licensed bores

4 Future management considerations

4.1 Policy changes

DEPI provided policy advice during the 2012/13 season that GMW may consider approving temporary transfer of a licence for up to five years.

This policy changes means that temporary transfers up to five years can be considered in the Loddon Highlands WSPA providing that, when assessing groundwater resource conditions, GMW is confident there would be a low risk of any unacceptable impact on third parties or the environment for the duration of the transfer period.

4.2 Technical investigations

The North Central Catchment Management Authority has initiated investigations to better understand groundwater interactions with Birch Creek, with a proposal to install and monitor several shallow monitoring bores as well as analyse water samples.

5 References

Department of Sustainability and Environment. 2012. Loddon Highlands Water Supply Protection Area Groundwater Management Plan November 2013. Department of Sustainability and Environment, Melbourne

Goulburn-Murray Water, 2010. Loddon Highlands Water Supply protection Area interim Management Rules. Unpublished report held by Goulburn-Murray Water, Tatura, Victoria. Reference DM2842393

Victorian Government, 2012. Victorian Government Gazette No. S389 Wednesday 21 November 2012. Victoria Government, Melbourne

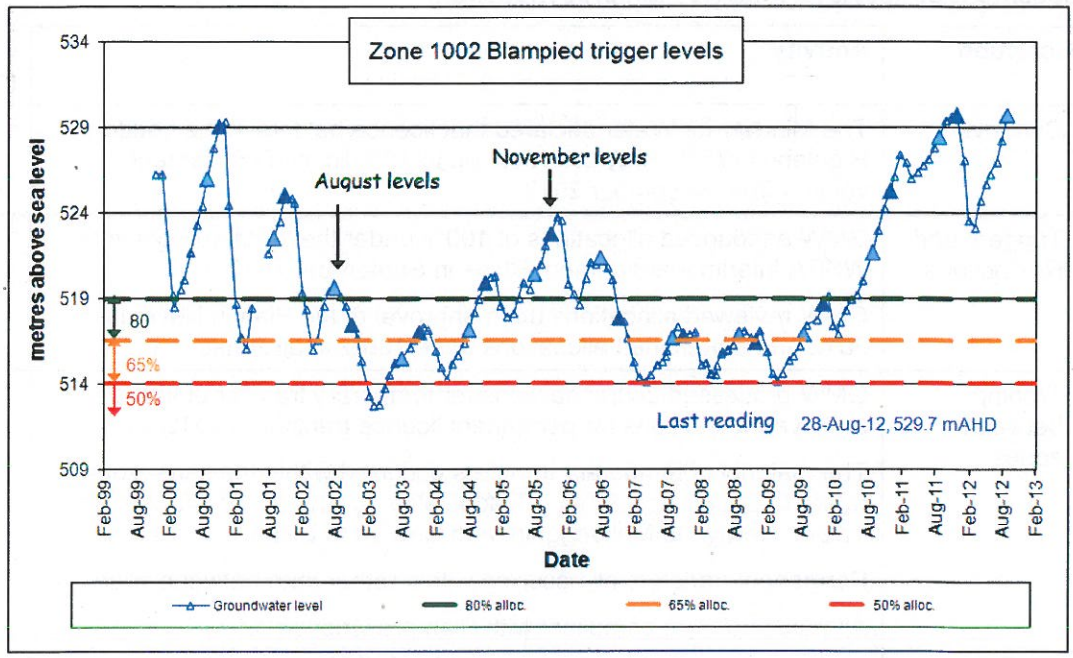
Victorian Government, 2013. Victorian Government Gazette No. G10 Thursday 7 March 2013. Victoria Government, Melbourne

Appendix A

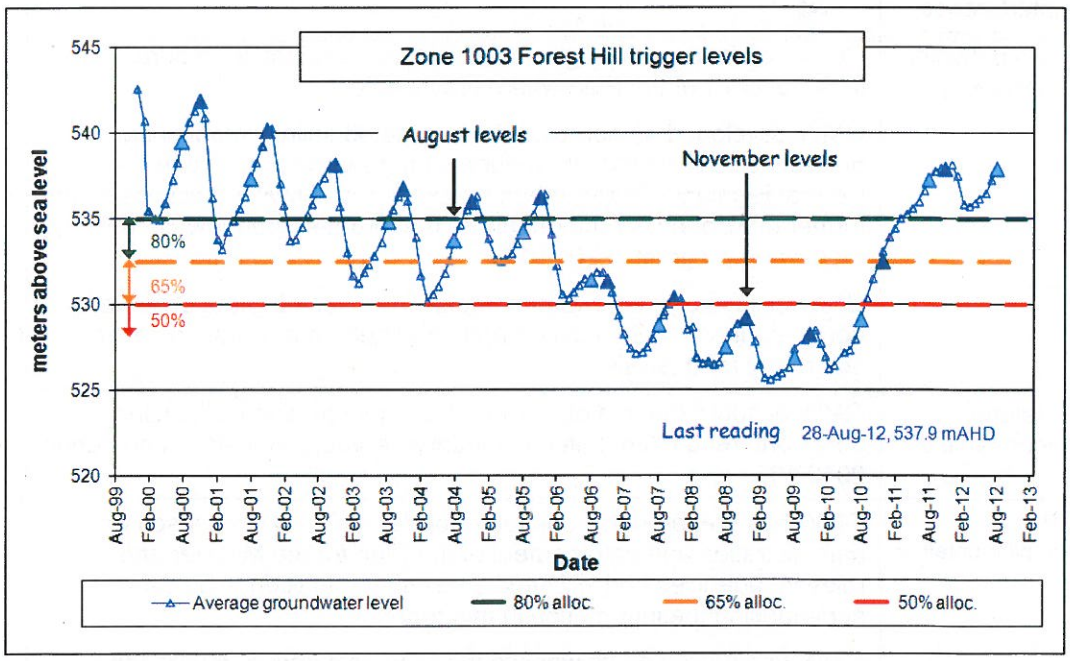
Assessment of activities against Plan prescriptions

Prescription	Activity	Compliant? (Yes/No)
1. Carryover	The Minister for Water declared that licence holders in the Loddon Highlands WSPA may carryover up to 15% licence entitlement volume from November 2012.	Yes
2. Triggers and Restrictions	GMW announced allocations of 100% under the Loddon Highlands WSPA Interim Management Rules in September 2012. GMW reviewed allocations upon approval of the Plan in November 2012 and determined allocations to be 100% in all zones.	Yes
3. Trading between zones	GMW processed 24 transactions for temporary transfer of licence and five transactions for permanent licence transfer in 2012/13. The majority of temporary transfers occurred within the same zone rather than between zones. Trades also occurred from Waubra to Talbot; Newlyn to Mollongghip; and Newlyn to Ullina. Permanent transfers all occurred within rather than between zones. All transfers were compliant with Plan prescription 3.	Yes
4. Groundwater level interference	GMW processed all groundwater licence applications in accordance with Plan prescription 4.	Yes
5. Groundwater monitoring	GMW obtained monthly groundwater level readings from bores listed in Schedule 1 of the Plan where practicable. GMW developed an approach for a targeted salinity monitoring program and collected information on groundwater salinity from Central Highlands Water urban supply bores. GMW will assess if any further monitoring is required under the targeted groundwater salinity monitoring program in 2013/14. GMW collected groundwater samples from nested State observation bores identified in Schedule 1 and sent them to a NATA accredited laboratory for analysis.	Yes
6. Metered licensed use	GMW ensured that a meter was fitted to all operational licensed bores and read each meter in January/February and May/June during 2012/13.	Yes
7. Plan implementation	GMW has prepared this annual report for the 2012/13 season on administration and enforcement of the Plan for the Minister and relevant agencies and will send a newsletter to licence holders summarising the information in this report. GMW has posted on its website the Plan, this annual report and a season summary newsletter. GMW updates hydrographs of groundwater levels every three months on their website in accordance with the Plan. GMW met with the Loddon and Campaspe Regional Water Services Committee on 28 June 2013 and the former Groundwater Consultative Committee on 10 September 2013 to report on the resource status and Plan implementation and, to discuss the establishment of a Groundwater Reference Committee.	Yes

Appendix B



Trigger levels used to determine 2012/13 allocations in the former Blampied Zone

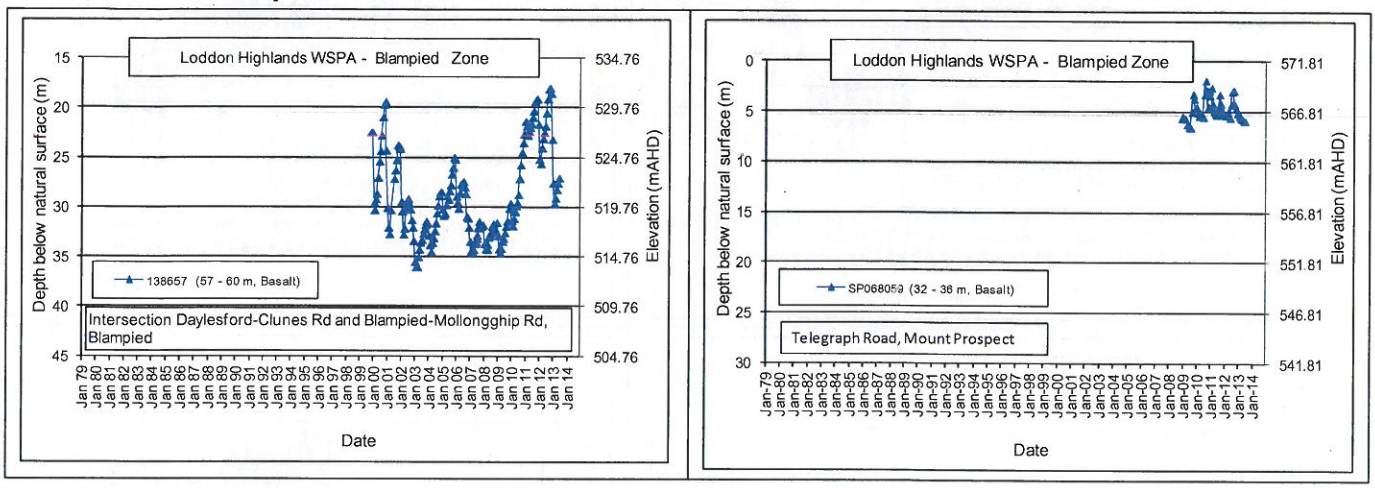


Trigger levels used to determine 2012/13 allocations in the former Forest Hill Zone

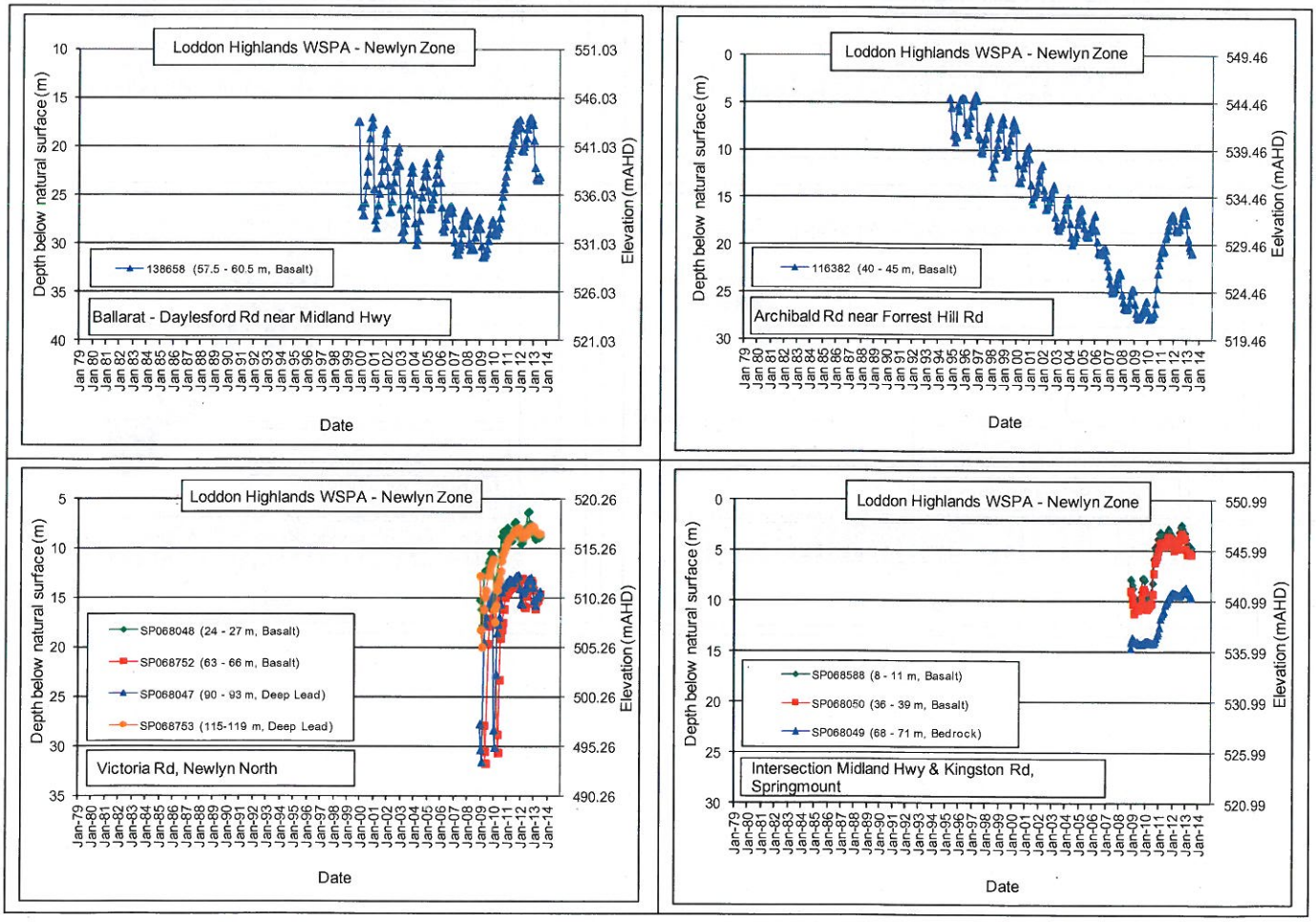
Appendix C

Hydrographs for key monitoring bores listed in the Plan. Further groundwater level information from other State observation bores is available on the Visualising Victoria's Groundwater website at http://www.vvg.org.au/.

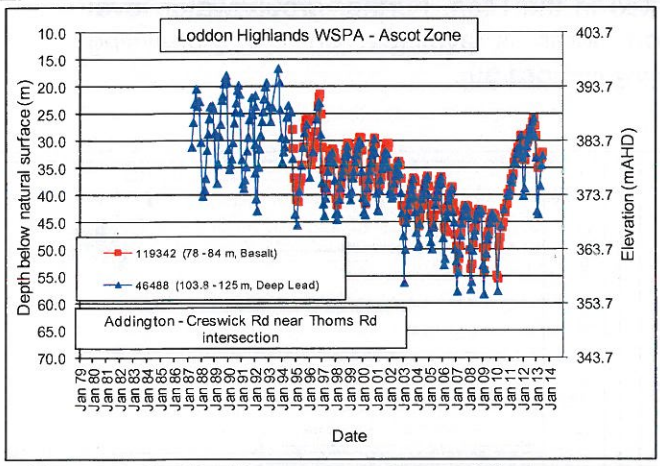
Zone 1104 – Blampied

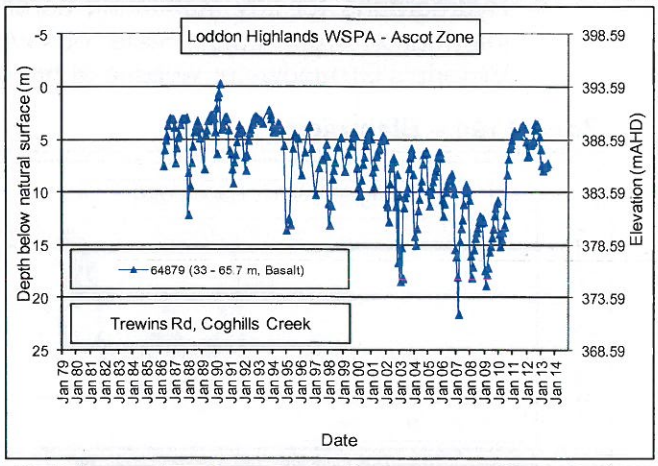


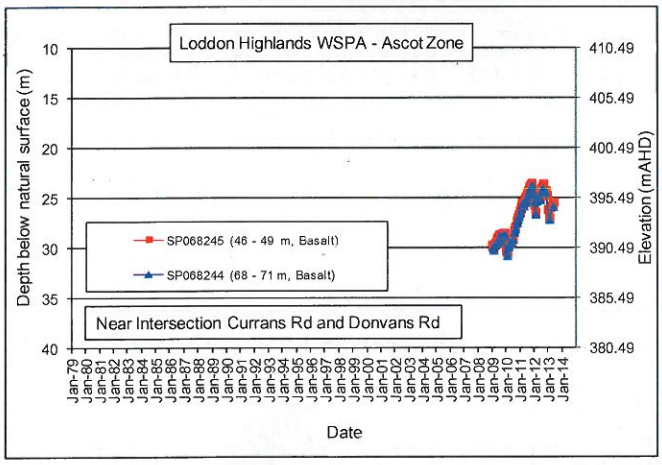
Zone 1107 - Newlyn

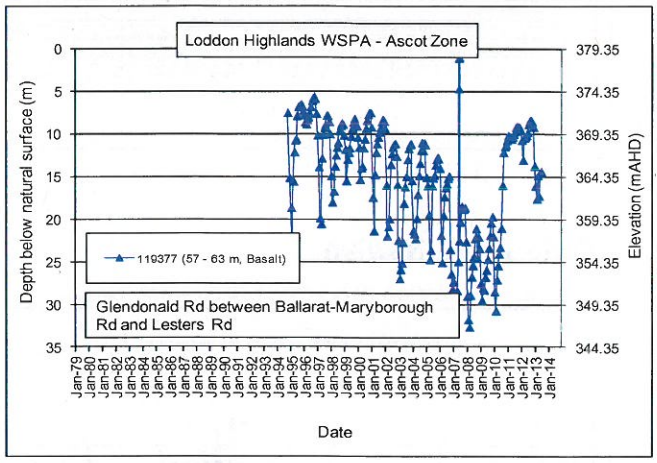


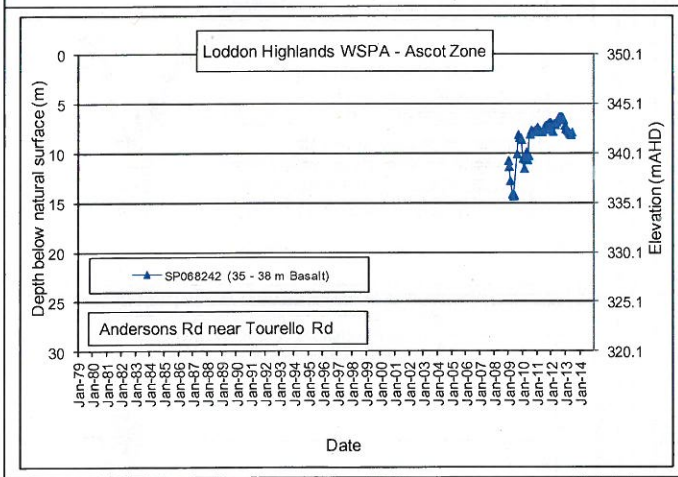
Zone 1102 – Ascot

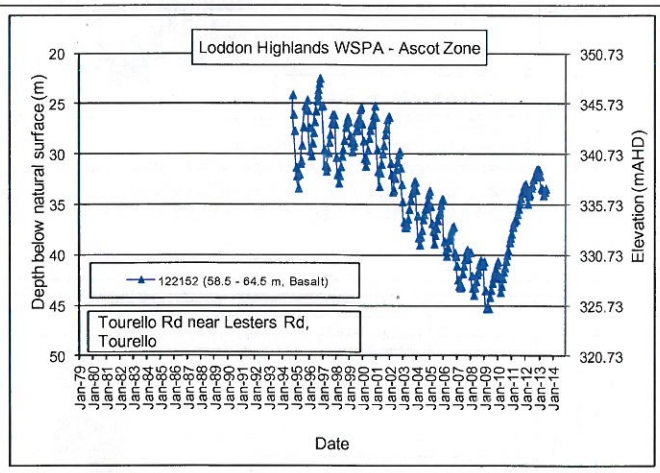


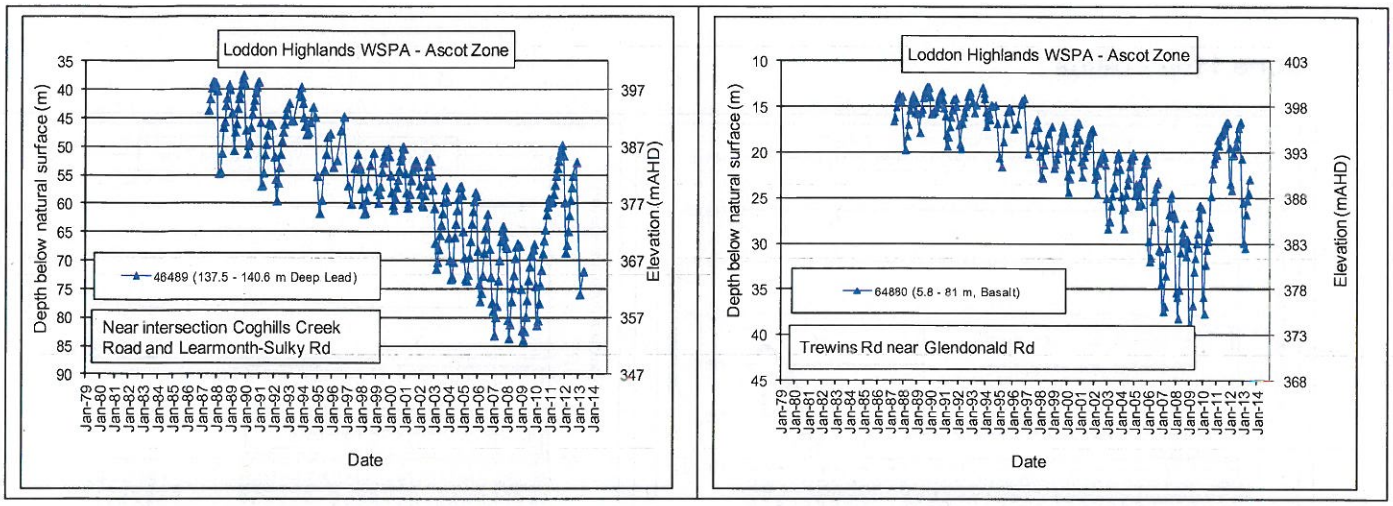




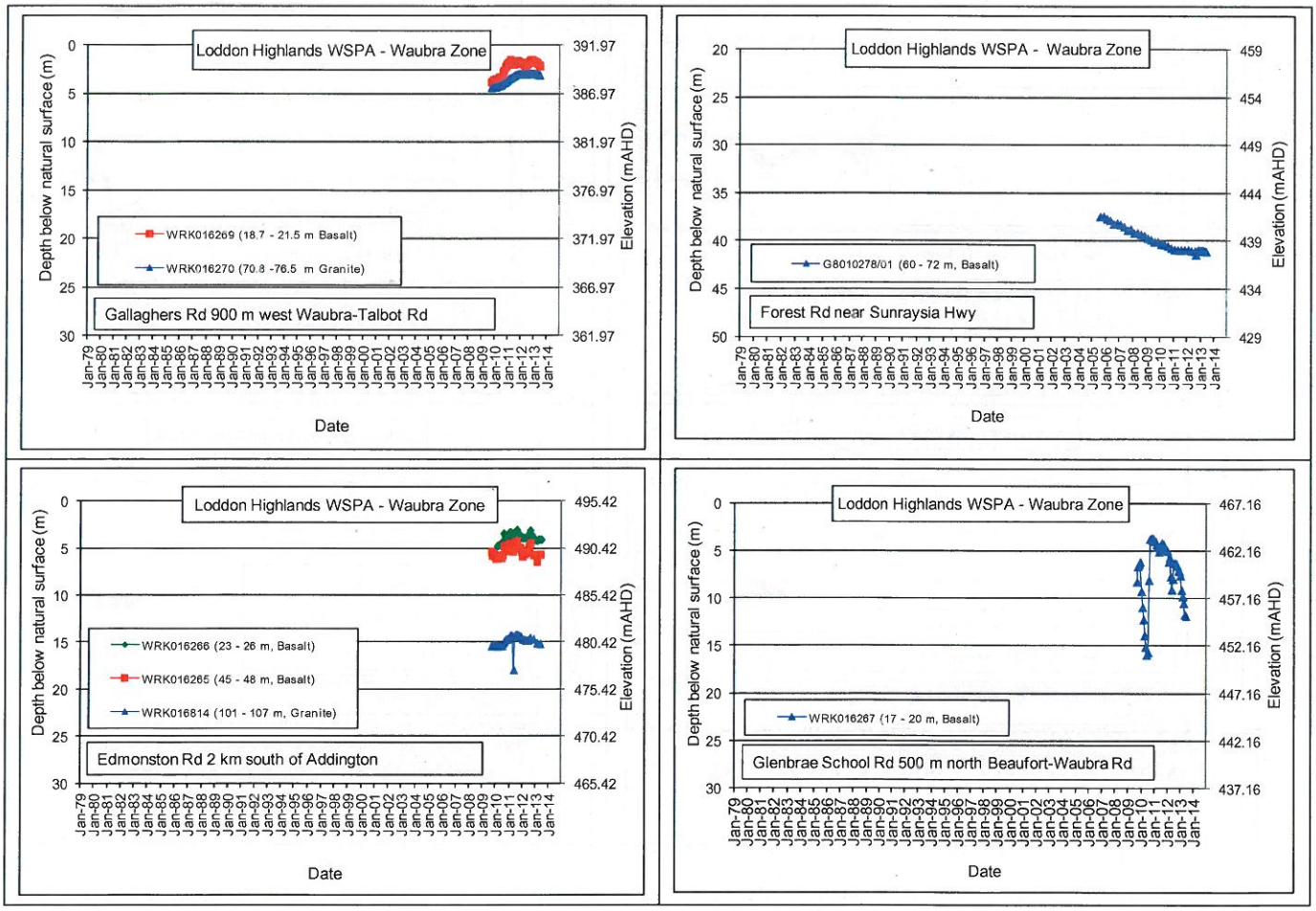




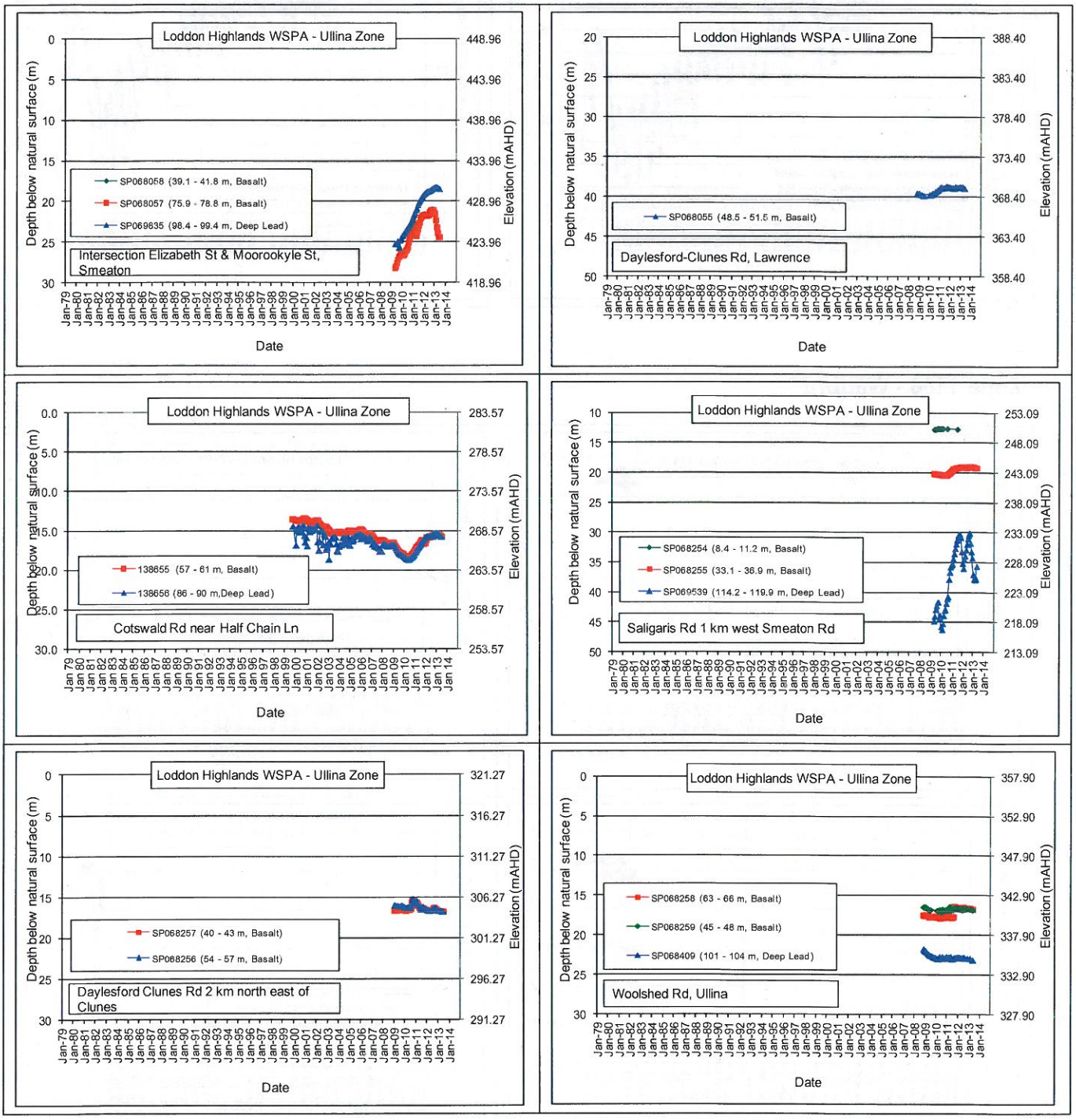


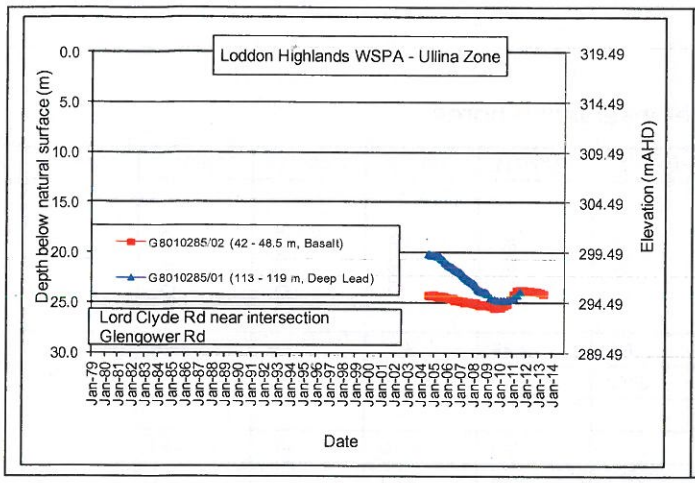


Zone 1106 - Waubra

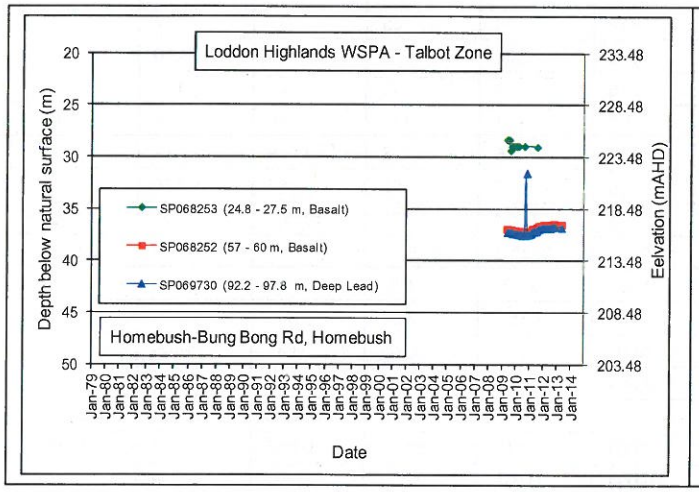


Zone 1100 - Ullina





Zone 1101 - Talbot



Appendix D

Groundwater chemistry from nested State observation bores

Analyte	Date	30/06/11	30/06/11	2/06/11	2/06/11	20/09/12	20/09/12	27/09/12	27/09/12
	Bore	SP069539	SP068255	SP069730	SP068252	SP069539	SP068255	SP069730	SP068252
pH Value	pH Unit	6.2	6.8	7.35	7.45	6.6	7.66	7.31	7.41
Electrical Conductivity @ 25°C	µS/cm	1760	6350	2260	3720	1680	7130	2390	4050
Electrical Conductivity @ 25°C	µS/cm	-	-	-	-				
Total Dissolved Solids @180°C	mg/L	978	3980	1340	2260	946	4460	1200	2260
Turbidity	NTU	<0.1	<0.1	249	2.1	<0.1	<0.1	538	4
Bicarbonate Alkalinity as CaCO3	mg/L	384	238	288	315	379	234	270	302
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	<1	<1	<1	<1	<1
Hydroxide Alkalinity as CaCO3	mg/L	<1	<1	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	mg/L	384	238	288	315	379	234	270	302
Sulfate as SO4 - Turbidimetric	mg/L	27	419	64	65	31	332	71	141
Chloride	mg/L	338	1690	500	969	380	2140	576	994
Calcium	mg/L	37	116	44	59	42	138	52	74
Magnesium	mg/L	57	350	71	136	66	384	86	162
Potassium	mg/L	7	14	5	8	9	15	6	9
Sodium	mg/L	231	709	255	406	187	726	235	391
Arsenic	mg/L	<0.001	<0.001	0.004	0.002	<0.001	0.001	0.002	0.003
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	<0.001	<0.001	0.002	0.003	<0.001	<0.001	0.001	<0.001
Copper	mg/L	<0.001	0.004	0.001	0.005	<0.001	0.001	<0.001	<0.001
Iron	mg/L	0.44	<0.05	<0.05	<0.05	0.35	<0.05	0.23	<0.05
Lead	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese						0.093	<0.001	0.027	<0.001
Nickel	mg/L	<0.001	0.001	<0.001	0.001	0.002	0.001	0.004	0.001
Zinc	mg/L	0.011	0.021	0.014	0.031	0.01	0.008	0.012	0.007
Mercury						<0.0001	<0.0001	<0.0001	<0.0001
Ammonia as N	mg/L	-	-	-	-				
Ammonia as N	mg/L	0.08	0.06	0.05	0.02	0.04	0.04	0.05	0.04
Nitrite as N	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrate as N						<0.01	4.53	1.41	4.16
Nitrite + Nitrate as N	mg/L	0.01	3.83	1.46	4.43	<0.01	4.53	1.41	4.16
Total Kjeldahl Nitrogen as N	mg/L	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.1	<0.1
Total Nitrogen as N	mg/L	<0.1	3.8	1.7	4.4	<0.1	4.5	1.5	4.2
Total Phosphorus as P	mg/L	0.06	<0.01	0.27	0.26	0.07	0.05	0.21	0.14
Nitrate as N	mg/L	0.01	3.83	1.46	4.43				
Ionic Balance	%	2.93	3.65	5.45	4.45	8.76	1.06	7.13	3.86
Total Anions	meq/L	17.8	61.2	21.2	35	18.9	72	23.1	37
Total Cations	meq/L	16.8	65.8	19.3	32	15.9	70.4	20	34.3
Total Organic Carbon	mg/L	<1	2	23	34	5	2	<1	<1