# Loddon Highlands Water Supply Protection Area Groundwater Management Plan

## Annual Report

## For year ending 30 June 2020

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# Document History and Distribution

## Versions

| Version | Date | Author(s) | Notes |
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| Draft v1 | 5 August 2020 | Jock Richardson | Document creation and drafting |
| Draft v2 | 25 August 2020 | Scott Ridges | Document review and edits |
| Draft v3 | 31 August 2020 | Jock Richardson | Document edits post review |
| Draft v4 | 2 September 2020 | Jock Richardson | Review consistency of all 2020 reports and document edits |
| Draft v5 | 14 September 2020 | Matthew Pethybridge | Document review and edits |
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## Distribution

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| Draft v3 | Jock Richardson | 2 September 2020 | Consistency review |
| Draft v4 | Matthew Pethybridge | 4 September 2020 | Review and endorsement |
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| Draft v6 | Warren Blyth<br>General Manager Water Delivery Services | 17 September 2020 | Review and endorsement |
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| Final | The Hon. Lisa Neville MP<br>Minister for Water | 29 September 2020 | |
| Final | Mr Brad Drust<br>Chief Executive Officer, North Central Catchment Management Authority | 29 September 2020 | |

# 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 2019/20 water year.

GMW is responsible for the implementation, administration and enforcement of the Plan which was approved by the Minister administering the *Water Act 1989* on 21 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 administered under the Plan, during the 2019/20 water year.

A copy of this report is available for inspection at the Tatura office of GMW, or for download from the GMW website.

Charmaine Quick

MANAGING DIRECTOR

Date: 25/09/2020

# Executive summary

The *Loddon Highlands Water Supply Protection Area Groundwater Management Plan* (the Plan) was approved on 21 November 2012 by the Minister for Water.

The 2019/20 water year marks the eighth year of operation of the Plan.

In September 2019, Goulburn-Murray Water (GMW) announced that licence holders in 6 of the 7 management zones of the Loddon Highlands Water Supply Protection Area (the WSPA) would have access to 100 per cent of their licence entitlement volume for the 2019/20 water year. Licence holders in the Newlyn Zone would have restricted access with an allocation of 75 per cent in accordance with the requirements of the Plan.

Recorded use in the WSPA in 2019/20 was 6,115.9 ML, or 30 per cent of the total licence entitlement volume, which was the second lowest since the Plan was implemented.

There was moderate trade activity during the 2019/20 water year; 7 temporary licence transfers totalling 632.8 ML and 5 permanent transfers totalling 187 ML/yr.

Licence holders in the WSPA are entitled to carryover up to a maximum of 15 per cent of their unused licence entitlement volume for use in the subsequent water year. A total of 2,996.9 ML has been carried over for use in the 2020/21 water year.

A third consecutive year of below-average rainfall (i.e. 2019/20, following 2018/19 and 2017/18) was recorded at Clunes within the WSPA. Despite these drier conditions, less groundwater abstraction in 2019/20 resulted in smaller seasonal drawdowns and overall improved groundwater resource condition across much of the WSPA.

Groundwater monitoring and metering programmes continue to be successfully undertaken to support the objectives of the Plan.

GMW has commissioned a groundwater consultant to undertake an independent review of the monitoring arrangements in the Blampied and Newlyn management zones.

# Contents

# 1 Introduction

## 1.1 Purpose

This report has been prepared to meet the requirements of Prescription 7 of the *Loddon Highlands Water Supply Protection Area Groundwater Management Plan* (DSE, 2012) (the Plan) and section 32C of the *Water Act 1989* (the Act).

The report provides an overview of groundwater resource status and summarises the groundwater management activities undertaken in accordance with the Plan during the 2019/20 water year (1 July 2019 to 30 June 2020).

## 1.2 Water Supply Protection Area

The Loddon Highlands Water Supply Protection Area (the WSPA), declared in June 2010, extends from Newlyn and Learmonth in the south to Dunolly in the north and includes the townships of Creswick, Waubra, Clunes, Talbot and Maryborough.

The WSPA incorporates management of groundwater resources to all depths.

There are 7 management zones in the WSPA: Ullina Zone – 1100, Talbot Zone – 1101, Ascot Zone – 1102, Mollongghip Zone – 1103, Blampied Zone – 1104, Waubra Zone – 1106 and Newlyn Zone – 1107, as shown in Figure 1.

## 1.3 Groundwater Management Plan

The Plan, which applies to the management of groundwater resources within the area of the WSPA, was approved on 21 November 2012 by the Minister for Water (the Minister), in accordance with section 32A(6) of the Act.

The objective of the Plan is to make sure that groundwater resources within the WSPA are managed in an equitable and sustainable manner. More specifically, the Plan seeks to:

- Manage groundwater resources to protect groundwater users and the environment.
- Enable equitable access of groundwater resources to realise the potential for its use.
- 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. A summary of GMW's activities in accordance with Plan prescriptions is presented in Appendix A.

A copy of the Plan can be downloaded from GMW's website: www.gmwater.com.au.

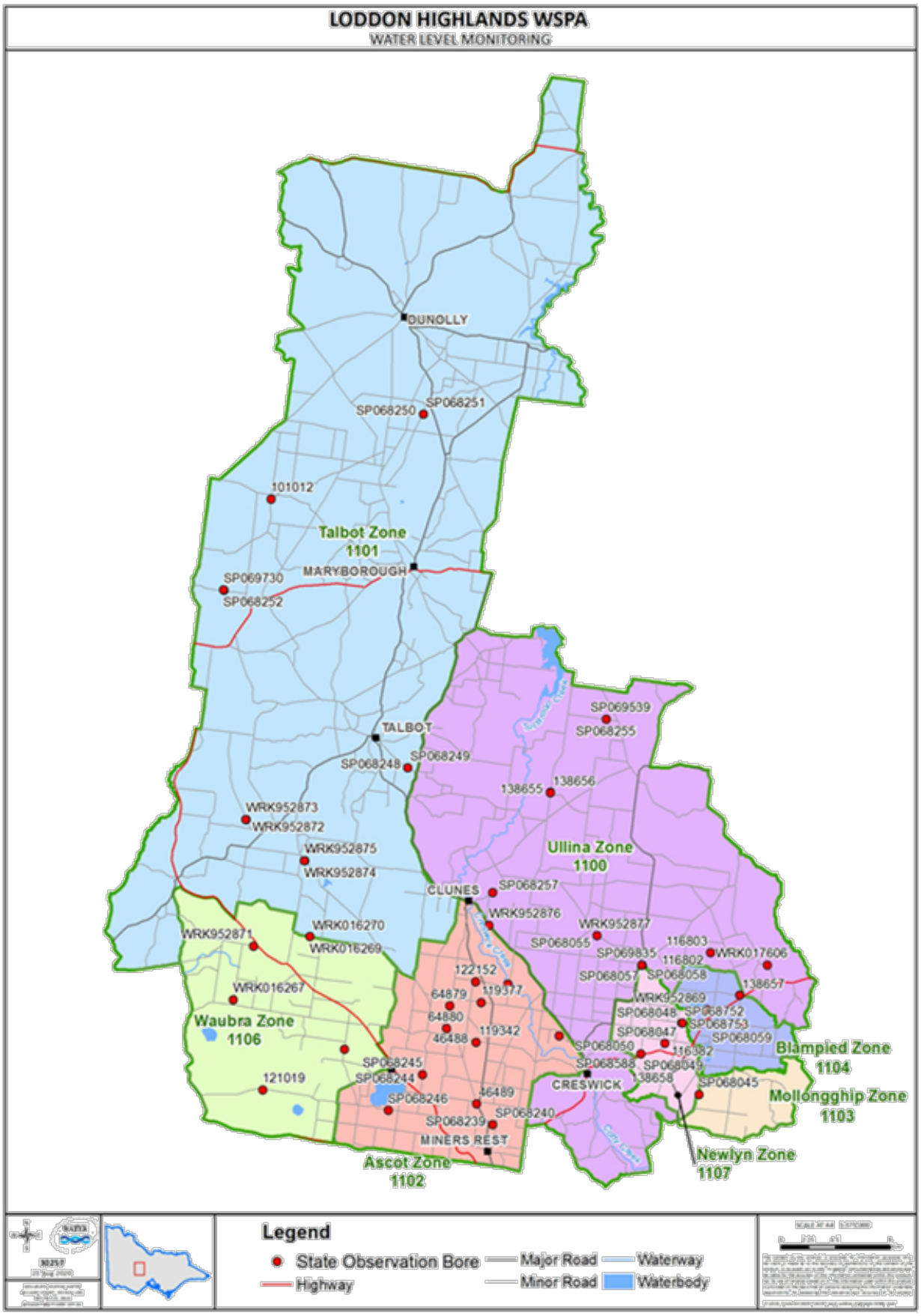


**Figure 1 Loddon Highlands Water Supply Protection Area**

# 2 Groundwater Management

## 2.1 Licence entitlement volume

The Minister declared a Permissible Consumptive Volume of 20,697 megalitres per year (ML/yr) for the WSPA in March 2013 (Victorian Government, 2013).

At 30 June 2020, the total of licence entitlement volume in the WSPA was 20,501.6 ML/yr. This has remained unchanged since 30 June 2019. The number of licences in each management zone is summarised in Table 1, as well as the total number of licensed bores and the total licence entitlement volume.

**Table 1 Groundwater licences in the Loddon Highlands WSPA in 2019/20**

| Management zone | Licences | Licensed bores | Licence entitlement volume (ML/yr) |
|---|---|---|---|
| Ullina Zone – 1100 | 21 | 28 | 2,982.2 |
| Talbot Zone – 1101 | 12 | 13 | 1,195.7 |
| Ascot Zone – 1102 | 69 | 104 | 7,067.2 |
| Mollongghip Zone – 1103 | 3 | 7 | 333.0 |
| Blampied Zone – 1104 | 19 | 27 | 1,252.5 |
| Waubra Zone – 1106 | 30 | 61 | 4,702.8 |
| Newlyn Zone – 1107 | 27 | 47 | 2,968.2 |
| **Total** | **181** | **287** | **20,501.6** |

Note: Data extracted from the Victorian Water Register on 1 July 2020.

## 2.2 Groundwater allocations

Annual groundwater allocations in the WSPA are determined by comparing average maximum groundwater recovery levels from key state observation bores against trigger levels outlined in Prescription 3 of the Plan.

Annual allocations are to be announced by 15 September of each year, based on groundwater level readings measured between 1 July and 30 August of the same year. Allocations may be reviewed based on groundwater levels to November and allocations may be increased if there is sufficient recovery.

The state observation bores used to determine seasonal allocations in each management zone are listed in Table 2 and shown in Table 2.

**Table 2 State observation bores used to determine annual allocations in the Loddon Highlands WSPA**

| Management zone | Bore number |
|---|---|
| Ascot Zone – 1102 | 64879, 64880, 122152, 119377, 119342 |
| Blampied Zone – 1104 | 138657 |
| Waubra Zone – 1106 | WRK016266, WRK016267, WRK016269 |
| Newlyn Zone – 1107 | 138658, 116382 |

Trigger levels have been established in the Ascot, Blampied, Newlyn and Waubra management zones under the Plan because of:

- high density of licences
- historical seasonal drawdown
- greater rates of groundwater level decline during dry periods.

GMW announced initial allocations for the 2019/20 water year on 13 September 2019. 6 of the 7 management zones started the water year with an allocation of 100 per cent of licence entitlement volume. Licence holders in Newlyn Zone were subject to restrictions on the take and use of groundwater, with an allocation of 75 per cent of licence entitlement volume (refer Figure 2, Figure 3, Figure 4 and Figure 5).

GMW continued to monitor groundwater recovery levels throughout spring. However, there was insufficient recovery in the Newlyn Zone trigger bores to enable a higher allocation (Figure 5).

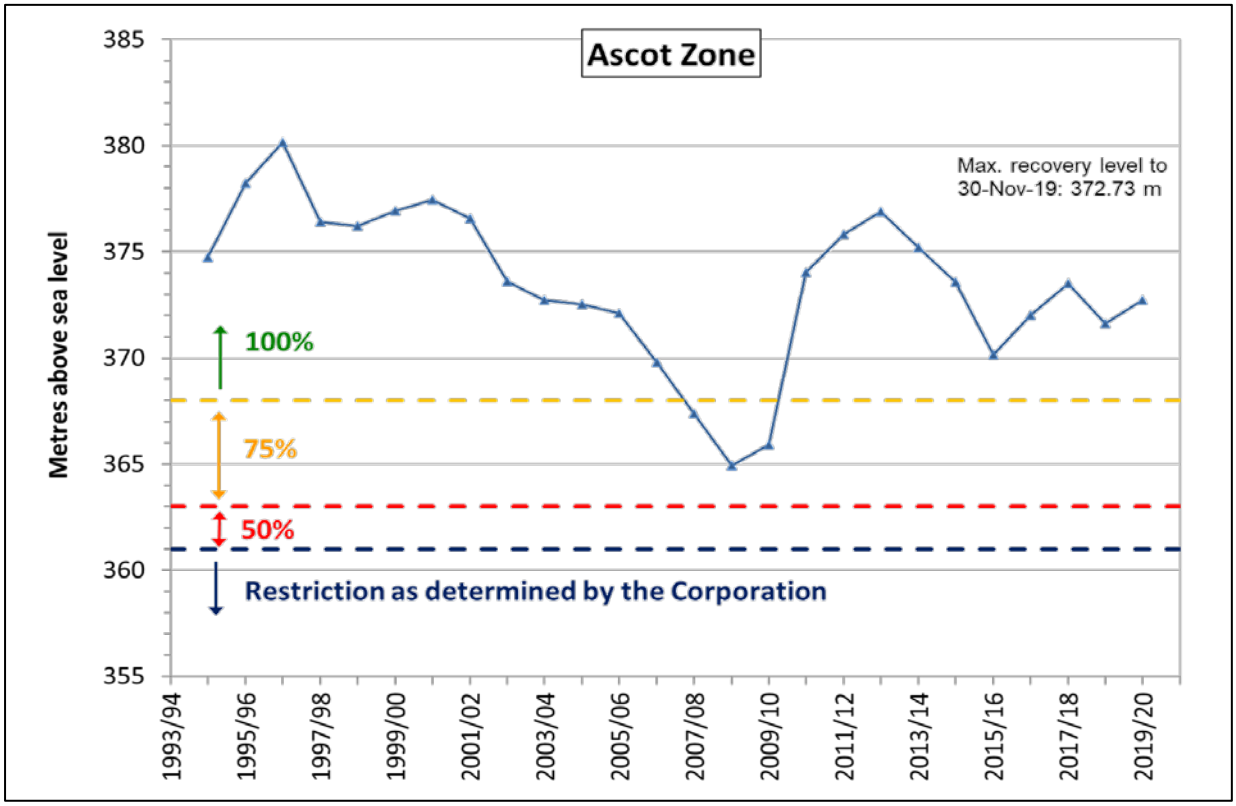


**Figure 2 Trigger levels to determine allocations in the Ascot Zone of the Loddon Highlands WSPA**

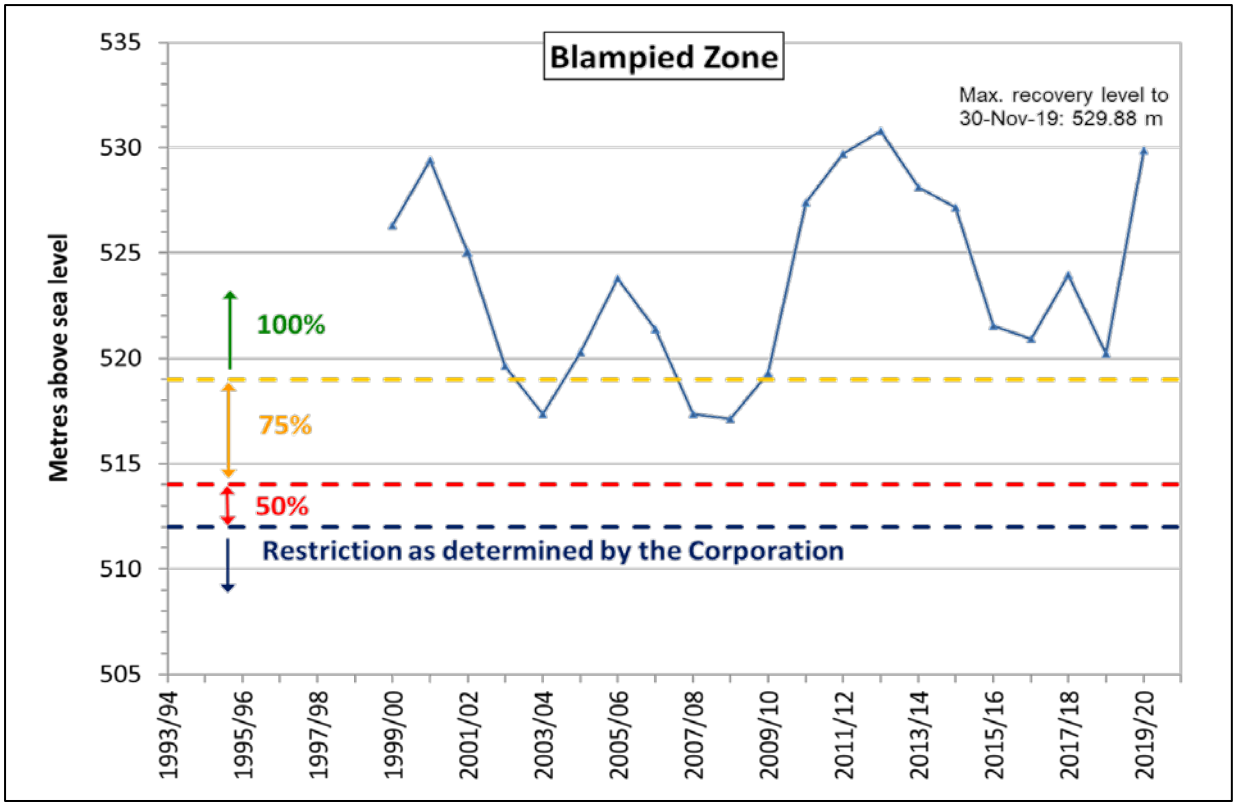


**Figure 3 Trigger levels to determine allocations in the Blampied Zone of the Loddon Highlands WSPA**

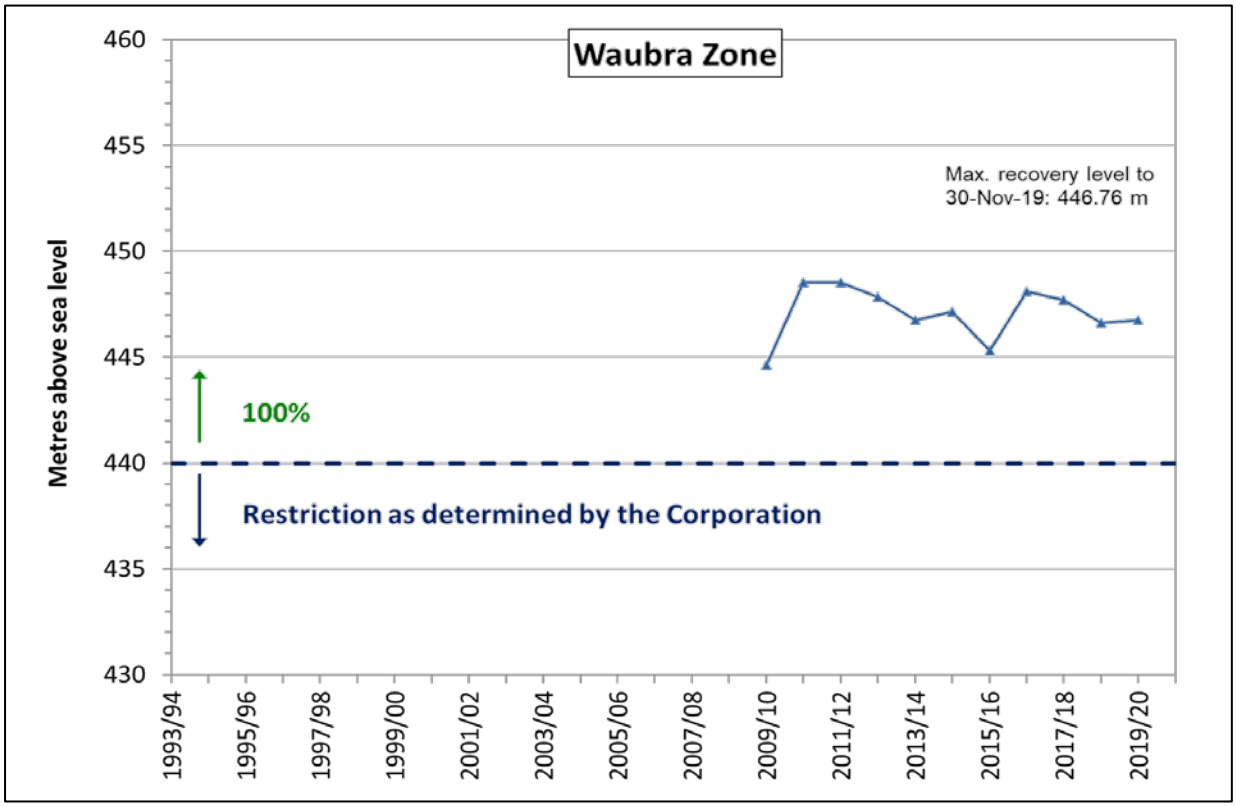


**Figure 4 Trigger levels to determine allocations in the Waubra Zone of the Loddon Highlands WSPA**

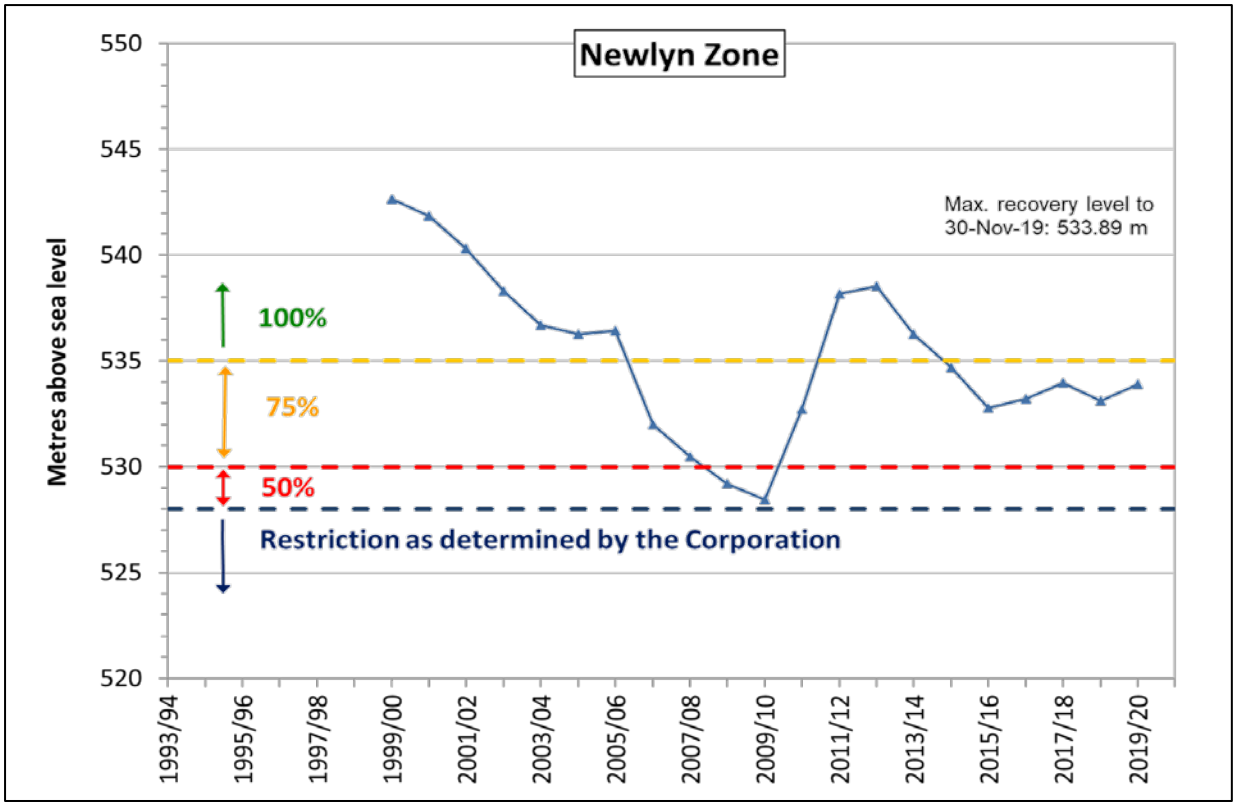


**Figure 5 Trigger levels to determine allocations in the Newlyn Zone of the Loddon Highlands WSPA**

## 2.3 Groundwater use

Total recorded use in the WSPA in 2019/20 was 6,115.9 ML, or 30 per cent of the total licence entitlement volume, which was the second lowest since the Plan was implemented in 2012/13 (Figure 6). Note: recorded use refers to metered and deemed use.

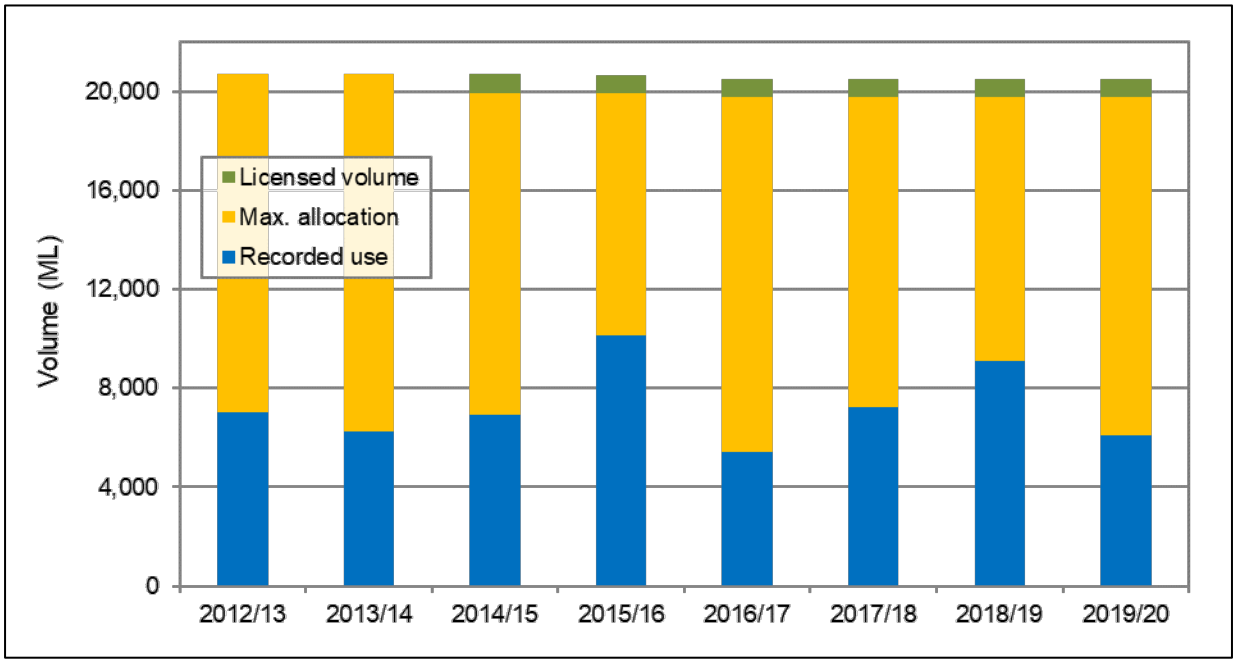


**Figure 6 Total licence entitlement volume, allocation and recorded use in the Loddon Highlands WSPA**

Recorded use was highest in the Ascot Zone, where the largest proportion of licence entitlement volume is held. Licence holders in the Blampied Zone used the greatest percentage of licence entitlement volume (Table 3).

**Table 3 Recorded use in the Loddon Highlands WSPA in 2019/20**

| Management zone | Licence entitlement volume (ML/yr) | Recorded use (ML) | Proportion of total licence entitlement volume used |
|---|---|---|---|
| Ullina Zone – 1000 | 2,982.2 | 618.4 | 21% |
| Talbot Zone – 1101 | 1,195.7 | 284.1 | 24% |
| Ascot Zone – 1102 | 7,067.2 | 2,831.4 | 40% |
| Mollongghip Zone – 1103 | 333.0 | 132.7 | 40% |
| Blampied Zone – 1104 | 1,252.5 | 671.8 | 54% |
| Waubra Zone – 1106 | 4,702.8 | 766.7 | 16% |
| Newlyn Zone – 1107 | 2,968.2 | 810.8 | 27% |
| **Total** | **20,501.6** | **6,115.9** | **30%** |

Note: Data extracted from Irrigation Planning Module on 30 July 2020.

## 2.4 Rainfall

Historic rainfall data, sourced from the Bureau of Meteorology weather station at Clunes (BOM, 2020), is presented in Figure 7 as an indicator of climate trends across the WSPA.

The data show that annual rainfall was generally above average in the early-1970s and remained relatively steady through the 1980s and 1990s. Between 1999/2000 and 2008/09, annual totals were below-average (Millennium Drought) until rainfall conditions improved in 2010.

With the exception of the 2016/17 water year, annual rainfall totals have been below average since the Plan was implemented, resulting in reduced recharge to groundwater systems within the WSPA.

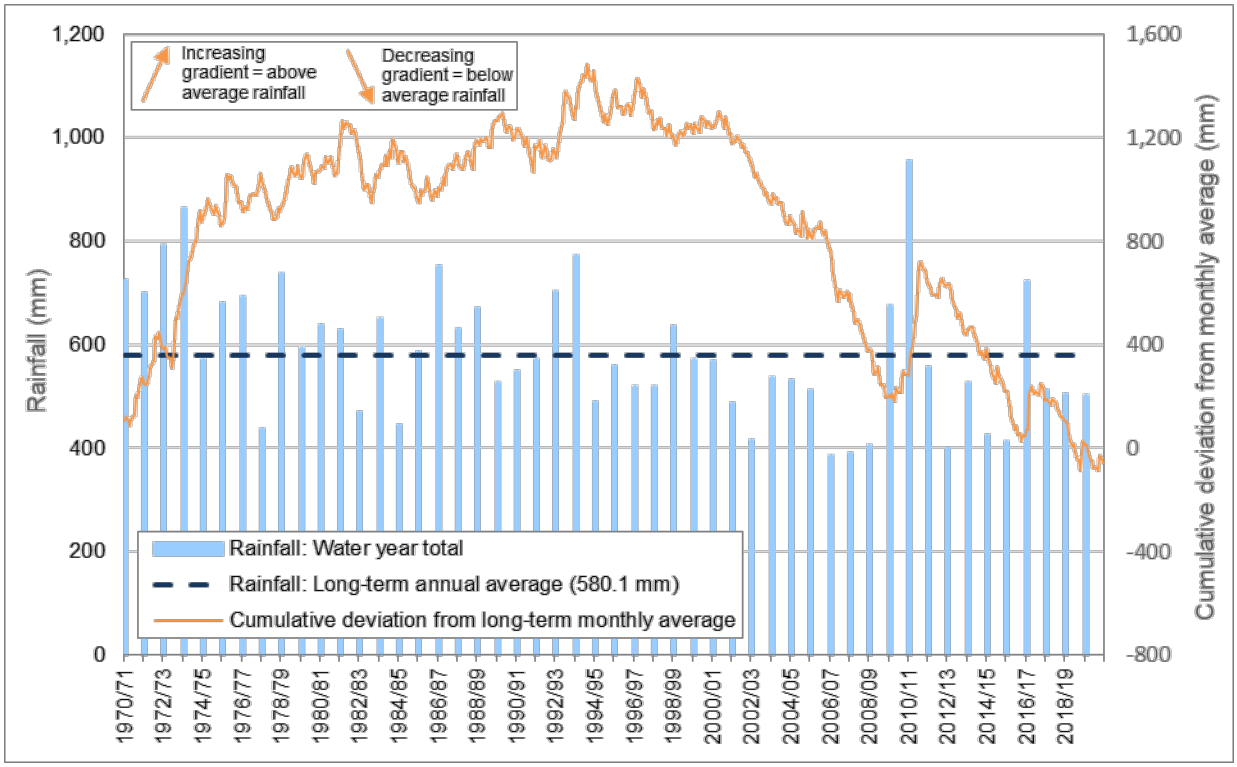


**Figure 7 Rainfall recorded at Clunes in the Loddon Highlands WSPA (BOM, 2020)**

## 2.5 Licence transfers

The Plan allows groundwater licence holders to temporarily or permanently transfer licence entitlement volume. During the 2019/20 water year, there were 7 temporary transfer transactions for a total of 632.8 ML and 5 permanent transfer transactions for a total of 187 ML/yr (Figure 8).

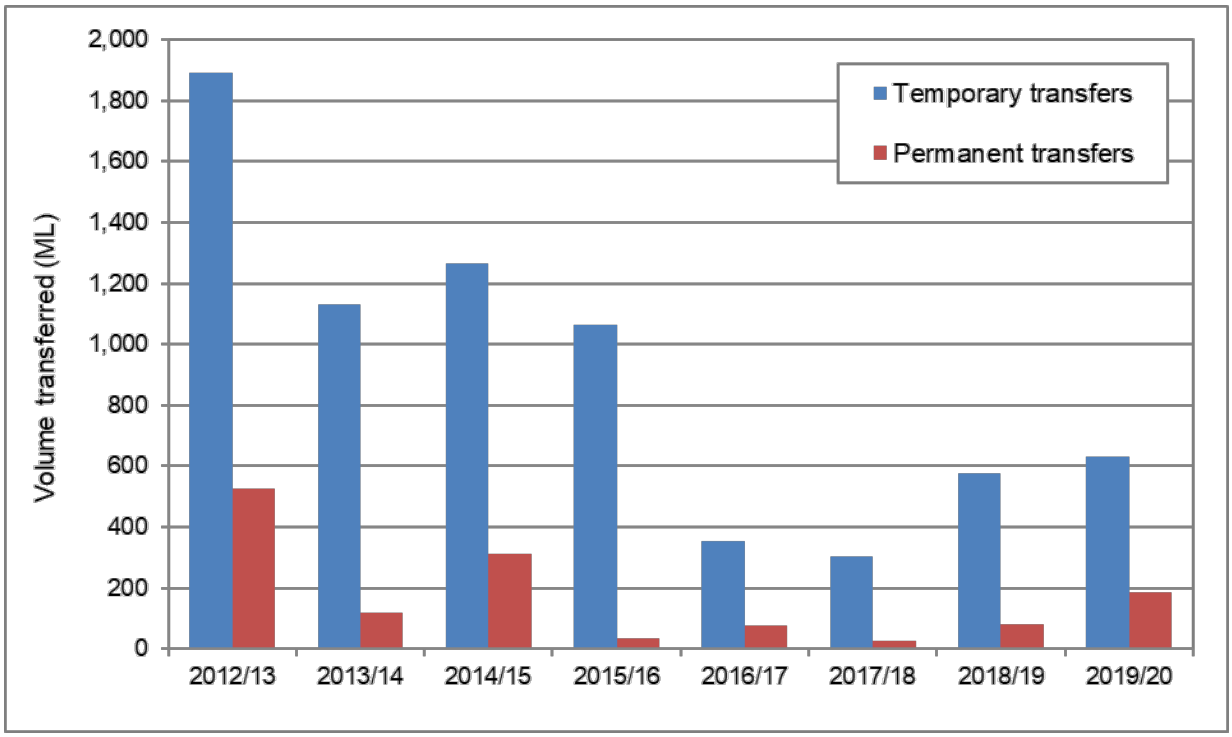


**Figure 8 Total licence entitlement volumes transferred in the Loddon Highlands WSPA**

The majority of transfers occurred between licence holders within the same management zones (Table 4).

Of the 7 temporary transfers completed, 1 was between management zones: 1 ML transferred from the Ullina Zone to the Talbot Zone. All 5 permanent transfers were between licence holders within the same management zones – Ullina Zone, Mollongghip Zone, Waubra Zone and Newlyn Zone.

**Table 4 Licence transfers in the Loddon Highlands WSPA in 2019/20**

| Management zone | Temporary transfers | | | | Permanent transfers | | | |
|---|---|---|---|---|---|---|---|---|
| | Transfer from | | Transfer to | | Transfer from | | Transfer to | |
| | No. of transfers | Volume (ML) | No. of transfers | Volume (ML) | No. of transfers | Volume (ML/yr) | No. of transfers | Volume (ML/yr) |
| Ullina Zone – 1000 | 2 | 506.8 | 1 | 505.8 | 1 | 2.0 | 1 | 2.0 |
| Talbot Zone – 1101 | - | - | 1 | 1.0 | - | - | - | - |
| Ascot Zone – 1102 | 5 | 126.0 | 5 | 126.0 | - | - | - | - |
| Mollongghip Zone – 1103 | - | - | - | - | 1 | 75.0 | 1 | 75.0 |
| Blampied Zone – 1104 | - | - | - | - | - | - | - | - |
| Waubra Zone – 1106 | - | - | - | - | 2 | 100.0 | 2 | 100.0 |
| Newlyn Zone – 1107 | - | - | - | - | 1 | 10.0 | 1 | 10.0 |
| **Total** | **7** | **632.8** | **7** | **632.8** | **5** | **187.0** | **5** | **187.0** |

## 2.6 Carryover

The Minister declared in November 2012 that groundwater licence holders in the WSPA were authorised to carryover up to a maximum of 15 per cent of licence entitlement volume for use in the subsequent water year (Victorian Government, 2012).

There was a total of 2,865.3 ML carried over by licence holders in the WSPA for use in the 2019/20 water year. At the conclusion of 2019/20, a total of 2,996.9 ML was carried over for use in the 2020/21 water year.

## 2.7 Metering

There were 235 metered service points and 54 deemed service points in the WSPA at 30 June 2020. There were 191 meter-related activities undertaken during the 2019/20 water year, including inspections, maintenance, battery replacements and 2 new meter installs (Table 5).

All meters were read at least twice during the 2019/20 water year.

**Table 5 Metering activities in the Loddon Highlands WSPA in 2019/20**

| Metering activity | Year ending 30 June 2020 |
|---|---|
| Total number of meters | 235 |
| Total number of meter reads | 470 |
| Meters installed or replaced | 2 |
| Meters inspection events | 181 |
| Meter maintenance events | 8 |

## 2.8 Licence compliance

There were no prosecutions or convictions relating to groundwater matters in the WSPA during the 2019/20 water year.

There were 6 instances of alleged overuse (i.e. licence entitlement volume exceedance) in 2019/20. These incidents are being investigated and GMW will take action in accordance with GMW's Risk-Based Compliance and Enforcement Framework.

## 2.9 Domestic and stock bore licences

Domestic and stock use is not required to be licensed as it is a private right under section 8 of the Act, provided that water is used in accordance with the constraints imposed by the Act.

The installation of a bore for domestic and stock use requires a bore construction licence, in accordance with section 67 of the Act. Upon completion of a bore, a bore completion report is required to be submitted to GMW and details are recorded in the Victorian state groundwater database, referred to as the Water Measurement Information System.

During the 2019/20 water year in the WSPA there were 48 domestic and stock bore construction licences issued by GMW and the Victorian Water Register (combined) and 8 domestic and stock bore completion reports received and processed by GMW.

# 3 Monitoring Program

## 3.1 Groundwater levels

During the 2019/20 water year a total of 59 state observation bores located within the WSPA were monitored by GMW and the Department of Environment, Land, Water and Planning (DELWP) – see Figure 1. This figure includes the 34 key bores listed in Schedule 1 of the Plan, where practicable. Of the 59 bores, 47 were monitored remotely using telemetry equipment, with measurements recorded hourly, and 12 were monitored manually, with measurements recorded on a monthly or quarterly basis.

Water level data for these bores are presented in Appendix B.

Groundwater recovery levels were relatively steady during the late-1980s and early-1990s; declined from the mid-1990s to 2009, largely in response to below-average rainfall during the Millennium Drought; and recovered strongly in response to above-average rainfall in 2010/11.

Groundwater levels have generally declined since approval of the Plan in 2012, which is interpreted by GMW to be largely in response to reduced rainfall recharge due to drier than average conditions across the period since Plan inception.

Groundwater levels recorded in bores at Cotswald Road, Glengower (Deep Lead aquifer in the Ullina Zone) and Forest Road, Glenbrae (Basalt aquifer in the Waubra Zone) were at their lowest on record during the 2019/20 water year (Figure 9 and Figure 10, respectively). All other groundwater levels remain within historical ranges.

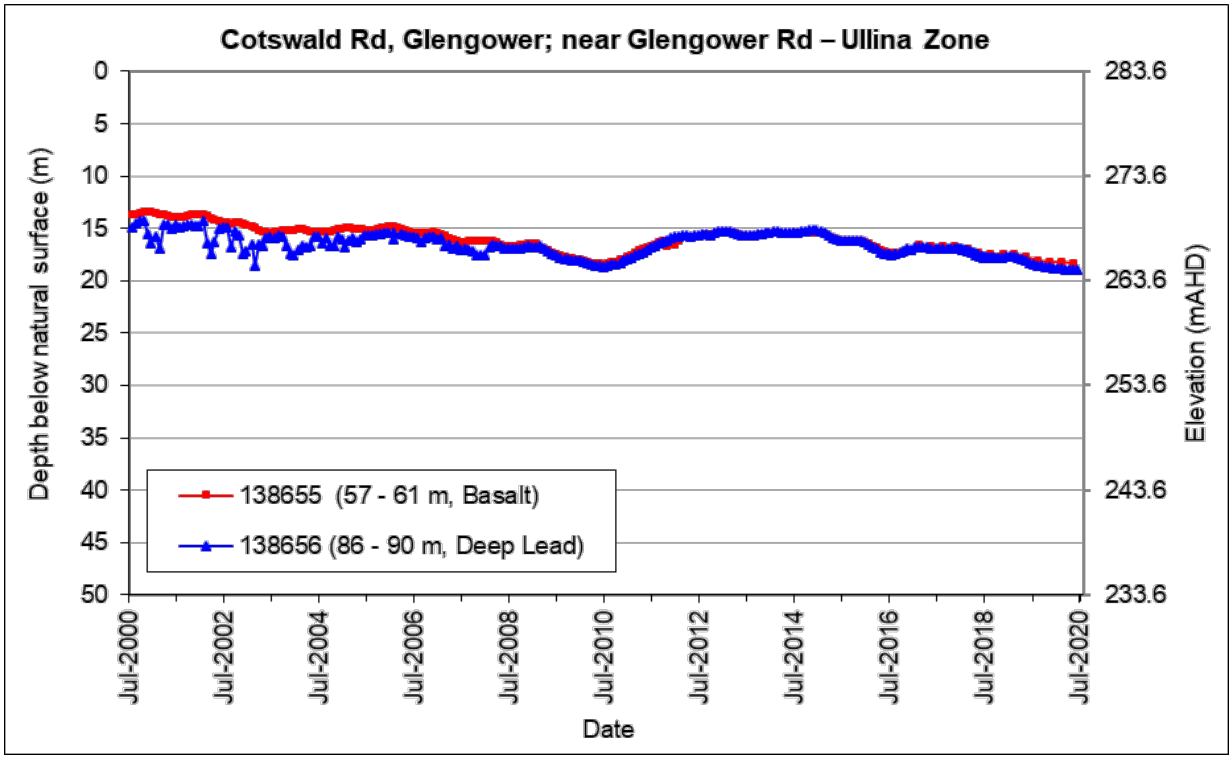


**Figure 9 Groundwater monitoring in the Ullina Zone at Glengower – July 2000 to June 2020 (DELWP, 2020)**

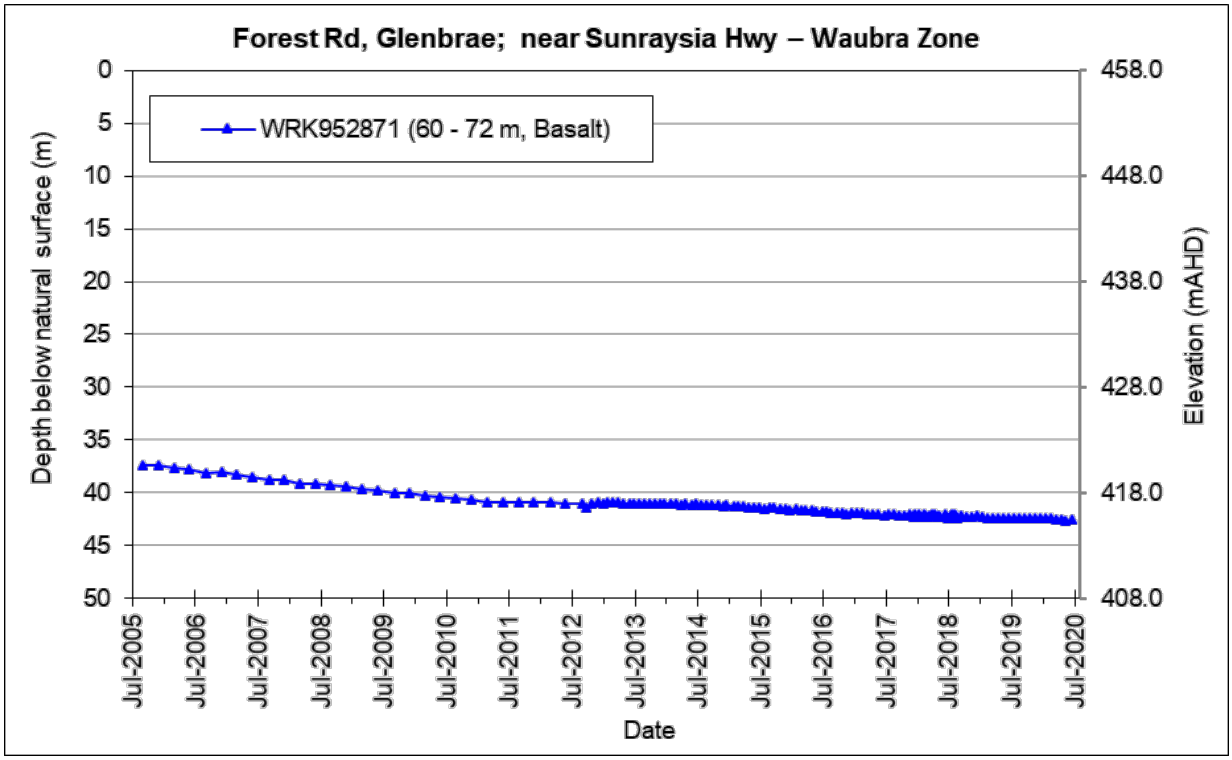


**Figure 10 Groundwater monitoring in the Waubra Zone at Glenbrae – July 2005 to June 2020 (DELWP, 2020)**

Seasonal drawdown during the 2019/20 water year was typically less than 8 m across the WSPA. In the Ascot Zone, where the greatest volume of groundwater was abstracted, drawdown up to 13 m was recorded in bore 64880 at Coghills Creek (Figure 11).

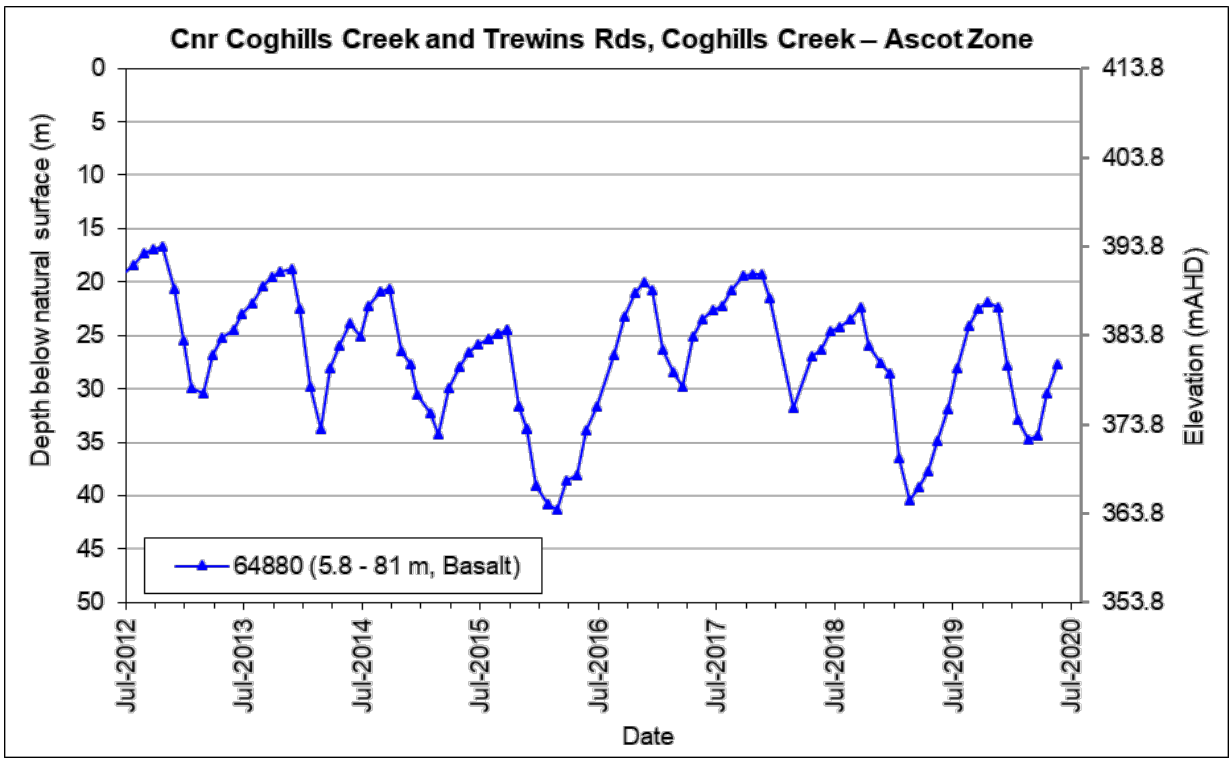


**Figure 11 Groundwater monitoring in the Ascot Zone at Coghills Creek – July 2012 to June 2020 (DELWP, 2020)**

## 3.2 Groundwater quality

During the 2019/20 water year, 4 state observation bores, located at 2 nested sites within the WSPA, were sampled by GMW and DELWP. Nested sites feature 2 or more bores in close proximity, each monitoring a different aquifer. The sites used for water quality testing, which are listed in Schedule 1 of the Plan, are located in the Talbot and Ullina zones and monitor groundwater in both the Deep Lead and basalt aquifers.

Groundwater samples collected from these bores were sent to a laboratory for analysis. The full suite of results are presented in Appendix C.

Time series groundwater salinity results, presented in Figure 12, indicate that groundwater salinity levels continue to be higher in the basalt aquifers than the underlying Deep Lead aquifers, at both sites. Ongoing annual monitoring of these bores will enable natural variance to be established and any trends in groundwater quality to be observed.

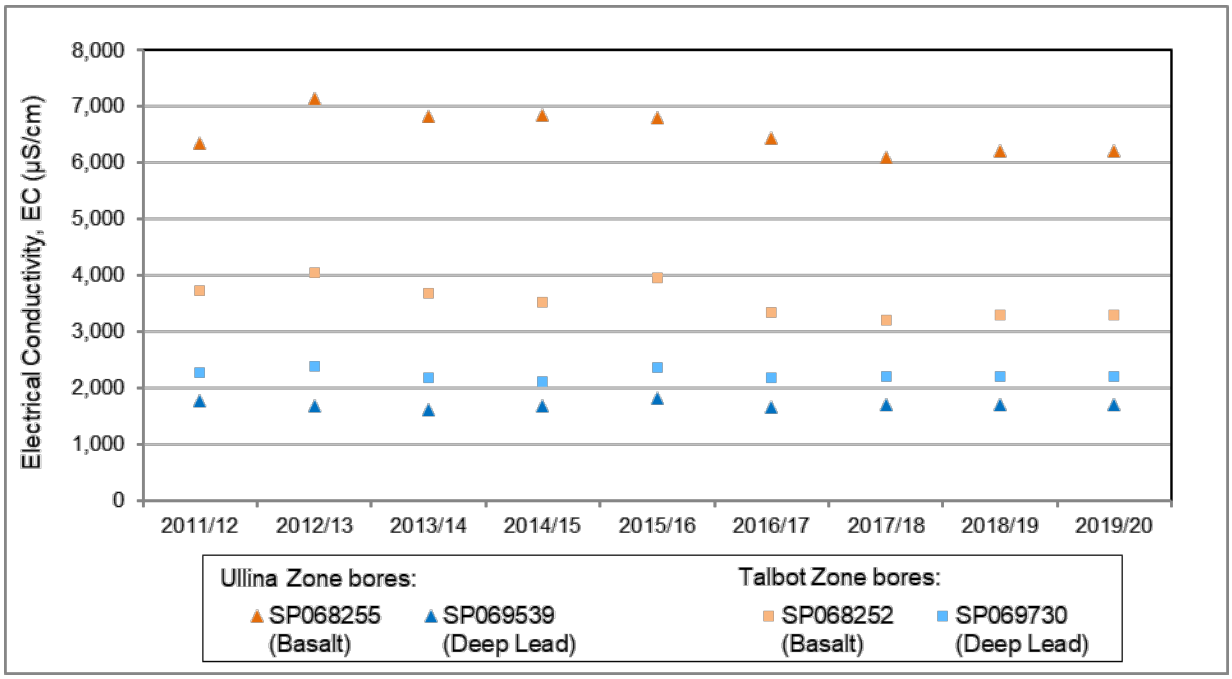


**Figure 12 Salinity of groundwater in key monitoring bores in the Loddon Highlands WSPA (DELWP, 2020)**

Groundwater salinity data from Central Highlands Water (CHW) licensed monitoring bores have also been used to assess changes in groundwater quality in the WSPA. Data were obtained from CHW bore fields at Forest Hill in the Newlyn Zone, Learmonth (Ascot Zone), Clunes (Ullina Zone), Waubra (Waubra Zone) and Bung Bong (Talbot Zone) (Figure 13). The data indicate that groundwater salinity levels are relatively stable and within historical ranges.

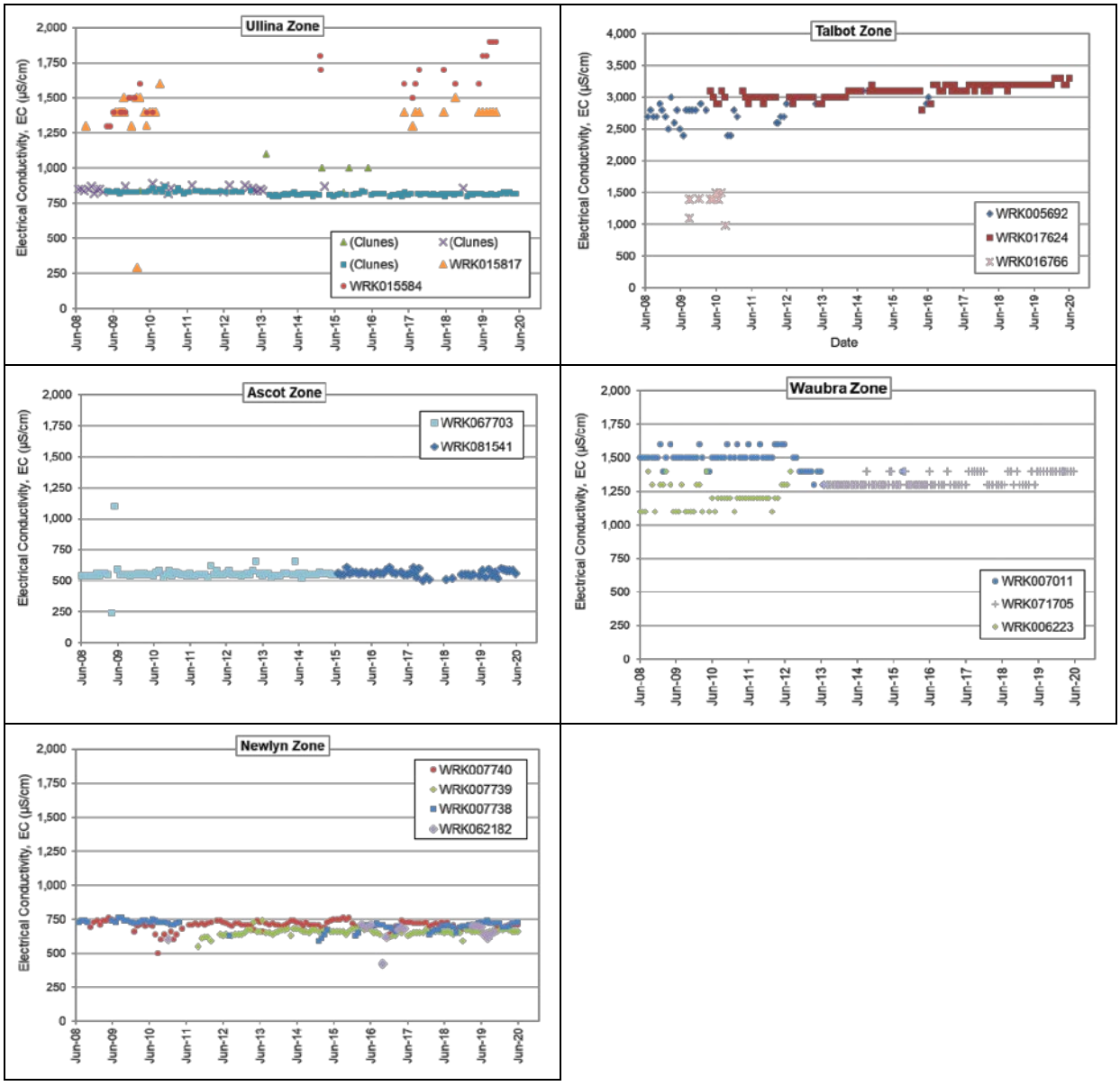


**Figure 13 Groundwater salinity monitoring results from Central Highlands Water bores located in the Loddon Highlands WSPA**

# 4 Administration and Engagement

## 4.1 Groundwater Reference Committee

The Groundwater Reference Committee (the Committee), appointed in accordance with Prescription 7(c) of the Plan, met on 12 September 2019.

Key points of discussion included:

- Changes to GMW team and committee membership
- Concerns about the impacts of increasing groundwater use on groundwater resources in the Ascot Zone
- Resource condition
- Plan implementation

Meeting actions comprised:

- GMW to hold an information session for groundwater licence holders in the Ascot Zone to discuss the resource position
- GMW to develop a project scope and commission an independent review of the operation of triggers bores in the Newlyn Zone
- GMW to send a letter to licence holders seeking their interest in representation on the committee; and provide additional information on the resource condition

GMW acknowledges the tragic passing of the late Norm Suckling in October 2019. Mr Suckling represented groundwater licence holders as an inaugural member of the Committee, and the former Spring Hill Groundwater Supply Protection Area Consultative Committee as well as the Loddon Campaspe Regional Water Services Committee.

## 4.2 Community engagement

### Groundwater information session

On 6 December 2019, GMW held a groundwater information session at Doug Lindsay Reserve in Creswick. Invitations to attend the session were sent to all groundwater licence holders in the WSPA, the Committee and key stakeholders, comprising McCain Foods, Agriculture Victoria, Hepburn Shire Council, Central Goldfields Shire Council and Ballarat City Council.

The session was held at the request of the Committee, whose members want groundwater licence holders and other relevant parties in the area to be more aware of the current resource position and potential management issues for the foreseeable future.

### Presentation to Hepburn Shire Council

On 3 March 2020, GMW presented to Hepburn Shire councillors at the Daylesford Town Hall. The presentation covered GMW's role in groundwater resource management under the Act and an overview of groundwater resources within the Hepburn Shire area (which encompasses parts of the WSPA), including aquifer systems, management arrangements, extraction and monitoring.

This presentation was given at the request of the Hepburn Shire Council after one of their executives attended the Creswick information session mentioned above.

## 4.3 Review of triggers bores

In April 2020, GMW engaged a groundwater consultant (Groundwater Consulting Australia) to undertake an independent review of groundwater monitoring arrangements in the Blampied and Newlyn management zones and provide advice on:

- the effectiveness of the existing bores for the monitoring of the resource; and
- the implementation of restrictions on the use of groundwater, in line with the objectives of the Plan

A draft report for comment was provided to GMW in July 2020. At the time of this annual report, the final report document had not been released. A summary of findings will be presented to the Groundwater Reference Committee at its next meeting.

# 5 References

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*Water Act 1989* (Vic), viewed 30 June 2020, http://classic.austlii.edu.au/au/legis/vic/consol_act/wa198983/

# Appendix A – Assessment of activities against Plan prescriptions

| Prescription | Activity | Compliant |
|---|---|---|
| **PRESCRIPTION 1 Carryover** | | |
| The Corporation shall:<br>a) Apply to the Minister for Water to declare the availability of carryover in the Loddon Highlands WSPA up to a maximum of 15% of licence entitlement that will not be subject to restriction in the form of allocations.<br>b) Consult with the Groundwater Reference Committee about the need to alter the percentage of carryover. | The Minister declared that licence holders in the WSPA may carryover up to 15 per cent licence entitlement volume from November 2012. | Yes |
| **PRESCRIPTION 2 Triggers and restrictions** | | |
| The Corporation shall:<br>a) By 15 September each year determine the maximum seasonal groundwater recovery level in the relevant bore/s, or its replacement, and corresponding seasonal allocation as detailed in the Plan.<br>b) Determine a seasonal allocation for the relevant zone based on the outcomes of a review of available data. The review will be undertaken when the 50% allocation is triggered in the Blampied, Newlyn or Ascot Zone. The Corporation shall consult with the Groundwater Reference Committee during the review.<br>c) Determine a seasonal allocation for the Waubra Zone and consult with Groundwater Reference Committee.<br>d) Announce seasonal allocations by listing them on its website; sending letters to all licence holders and placing public notices in local newspapers.<br>e) Review allocations based on groundwater level readings to November each year and announce an increase if triggered. | GMW announced allocations, based on groundwater recovery levels recorded in August 2019, for the 2019/20 water year on 13 September 2019.<br>Initial allocations were 75 per cent for the Newlyn Zone and 100 per cent for all other management zones.<br>The allocation remained unchanged for the Newlyn Zone as there was not sufficient recovery in the Newlyn Zone trigger bores to trigger a higher allocation.<br>GMW announced all allocations by listing them on its website, sending letters to all licence holders and placing public notices in local newspapers. | Yes |
| **PRESCRIPTION 3 Trading between zones** | | |
| The Corporation may approve a temporary or permanent transfer of groundwater licence entitlement under section 62 of the Water Act 1989 provided section 53 matters have been considered and the following conditions are satisfied:<br>a) The permanent transfer of licence entitlement is between zones as specified in the Plan.<br>b) The temporary transfer of licence entitlement is between zones as specified in the Plan.<br>c) Despite (b) above, a temporary transfer of licence entitlement may be considered where bores are located within 2.5 km of each other across an internal zone boundary.<br>d) Licence entitlement may be temporarily traded into, or out of, the Loddon Highlands WSPA provided that the PCV is not exceeded. | In 2019/20, GMW processed 7 transactions for temporary transfer of licence volume, totalling 632.8 ML and 5 transactions for permanent transfer of licence volume, totalling 187 ML/yr.<br>All transfers were compliant with Prescription 3. | Yes |

<table>
<tr><th>Prescription</th><th>Activity</th><th>Compliant</th></tr>
<tr><td colspan="3">PRESCRIPTION 4 Groundwater level interference</td></tr>
<tr><td>The Corporation may approve an application to take and use groundwater under section 51 or a transfer under section 62 of the Water Act 1989 provided that section 53 matters have been considered and the following conditions are satisfied:<br>a) Licence entitlement may be temporarily or permanently transferred up to 1,000 ML/yr within 2.5 km radius of a licensed bore.<br>b) Where the licence entitlement within a 2.5 km radius of a licensed bore exceeds 1,000 ML/yr then:<br><table><tr><td>(i). For temporary transfer of licence entitlement</td><td>1. Trade with usage in any one season limited to 115% of entitlement, whether it occurs through trade or carryover (this could include transferring from outside the 2.5 km radius); or<br>2. Trade from others within 2.5 km radius of the applicant’s bore for usage to exceed 115% of entitlement; or<br>3. Assess the application to consider other relevant information such as historical use and, if required undertake detailed investigations, when seeking to use more than 115% of your licence entitlement to demonstrate no unacceptable impacts are likely to occur. This could include transferring from outside the 2.5 km radius.</td></tr><tr><td>(ii). For permanent transfer of licence entitlement</td><td>1. Trade from others within 2.5 km radius of the applicant’s bore; or<br>2. Undertake detailed investigations to demonstrate no unacceptable impacts are likely to occur. This could include transferring from outside the 2.5 km radius.</td></tr></table></td><td>GMW processed all groundwater licence applications in accordance with Prescription 4.</td><td>Yes</td></tr>
<tr><td colspan="3">PRESCRIPTION 5 Groundwater monitoring</td></tr>
<tr><td>The Corporation shall:<br>(a) Obtain monthly groundwater level readings, where practicable, from State observation bores listed in Schedule 1 or their replacement (up to 288 readings per season).<br>(b) Establish a targeted groundwater salinity monitoring program to collect and analyse groundwater samples from selected licensed bores each year.<br>(c) Collect groundwater samples from selected State observation bores identified in Schedule 1 where practicable, or their replacement, and send them to a NATA accredited laboratory for analysis.</td><td>GMW obtained monthly groundwater level readings from bores listed in Schedule 1 of the Plan, where practicable.<br>GMW used groundwater salinity monitoring data provided by Central Highlands Water from their urban supply bores and monitoring bores to fulfil the requirements of a targeted salinity monitoring program.<br>GMW collected groundwater samples from nested State observation bores identified in Schedule 1 and sent them to a NATA accredited laboratory for analysis.</td><td>Yes</td></tr>
</table>

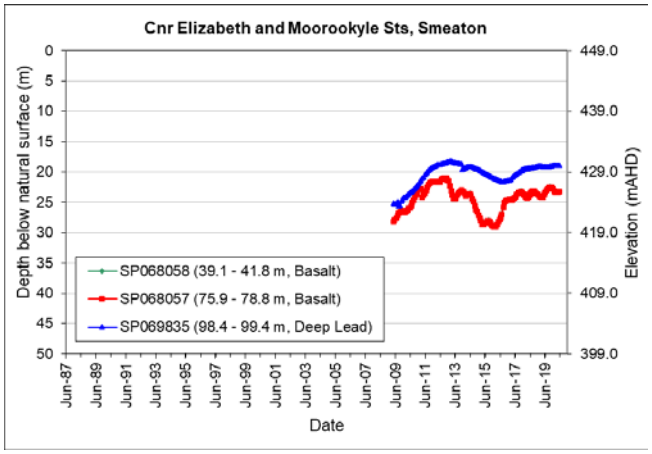
| Prescription | Activity | Compliant |
|---|---|---|
| **PRESCRIPTION 6 Metered licensed use** | | |
| The Corporation shall:<br>(a) Ensure that a meter is fitted to all operational licensed bores.<br>(b) Read each meter at least twice each season. | GMW ensured that use was accounted for each operational licensed bore and read each meter in January/February and May/June during the 2019/20 water year. | Yes |
| **PRESCRIPTION 7 Plan implementation** | | |
| The Corporation shall:<br>(a) By 30 September each year:<br>(i). prepare an annual report on the administration and enforcement of the Plan for the Minister for Water and relevant agencies.<br>(ii). mail a newsletter to groundwater licence holders, and domestic and stock users upon request, summarising the outcomes in the annual report.<br>(b) Post on its website the Plan; annual report, newsletters and groundwater level monitoring results.<br>(c) Meet with a Groundwater Reference Committee at least once each year to report on the implementation of the Plan and consider the need to review the Plan.<br>(d) Undertake a review of the Plan after 5 years from its approval, or sooner if warranted by any prescription contained within the Plan. | GMW prepared this annual report on the administration and enforcement of the Plan during the 2019/20 water year for the Minister and relevant agencies. GMW also sent a newsletter to licence holders summarising the information in this report.<br>GMW has posted on its website: the Plan, this annual report and a water year summary newsletter.<br>GMW updates a selection of hydrographs of groundwater levels on its website every month.<br>GMW met with the Groundwater Reference Committee on 12 September 2019 to discuss the implementation of the Plan.<br>GMW undertook a comprehensive review of the Plan in 2018. | Yes |

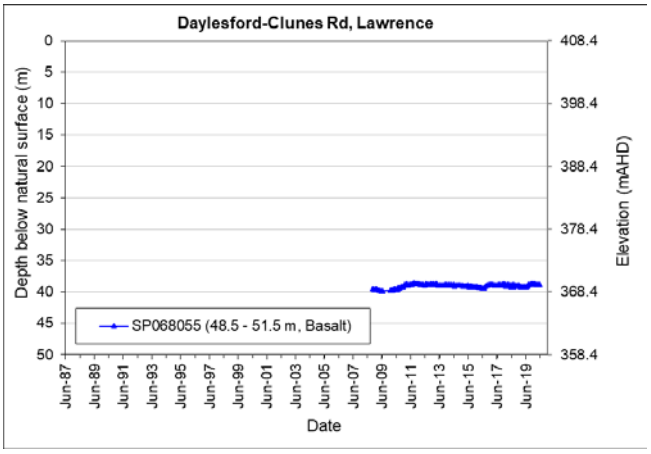
# Appendix B – Groundwater level data

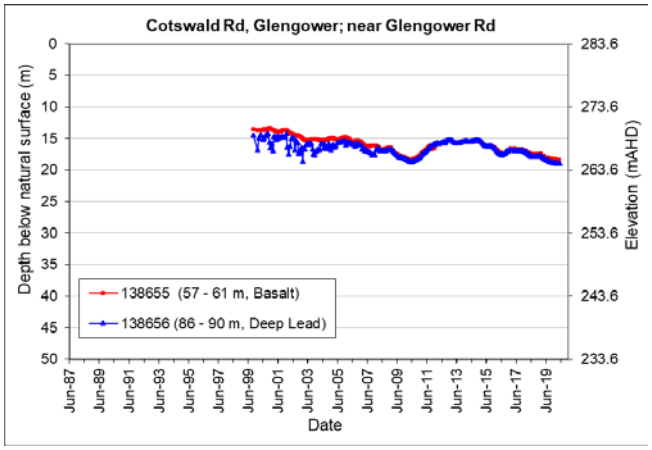
Hydrographs are provided for key monitoring bores listed in Schedule 1 of the Plan. All data is sourced from the Water Measurement Information System (DELWP, 2020).

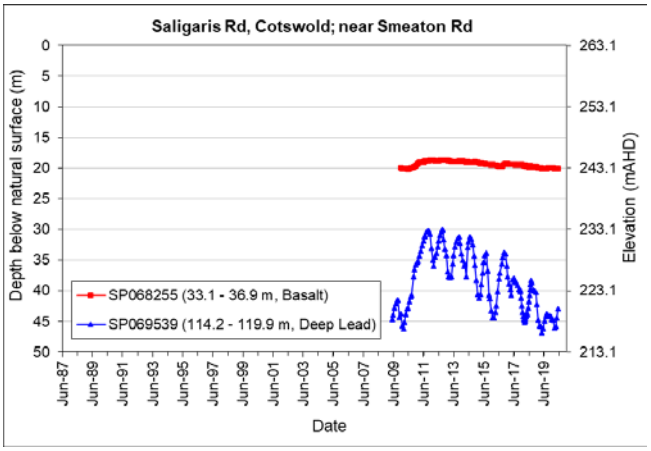
Further groundwater level information is available on the Water Measurement Information System at https://data.water.vic.gov.au

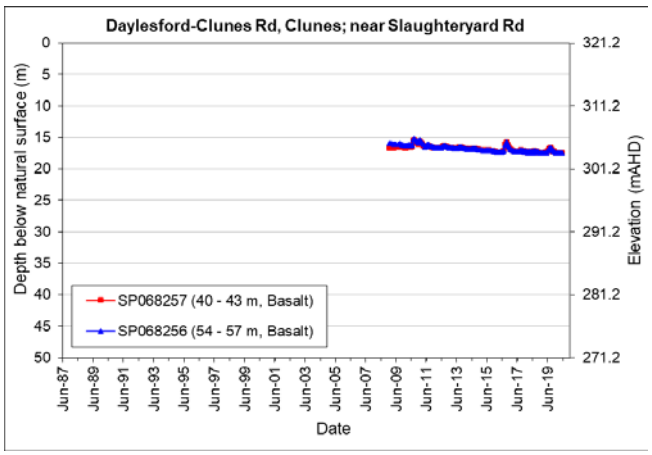
**Ullina Zone – 1100**



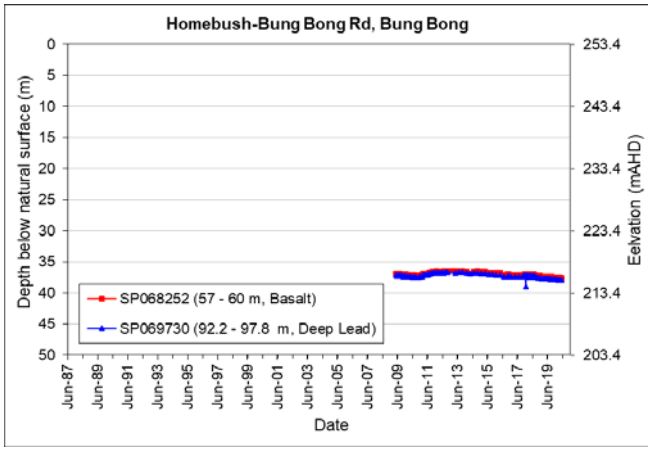



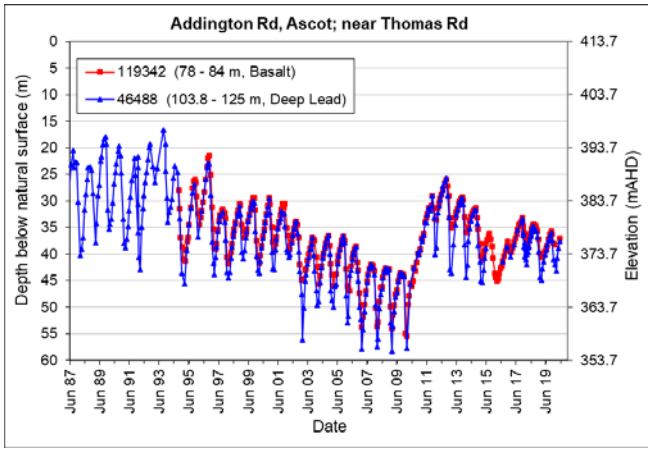



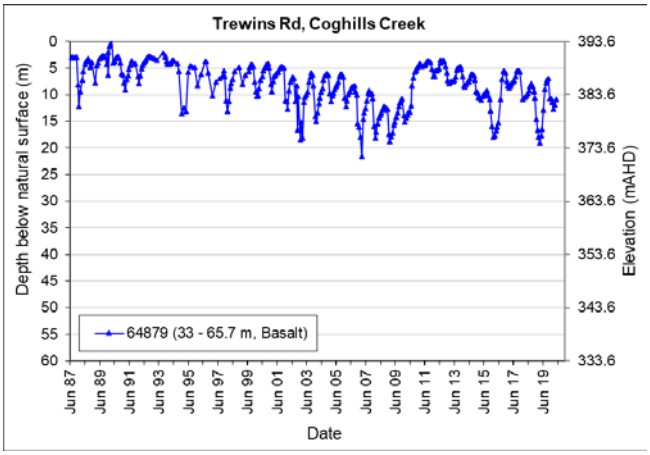



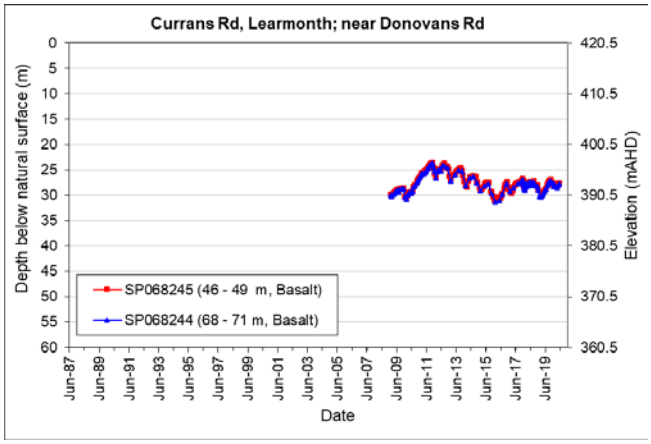
## Talbot Zone – 1101

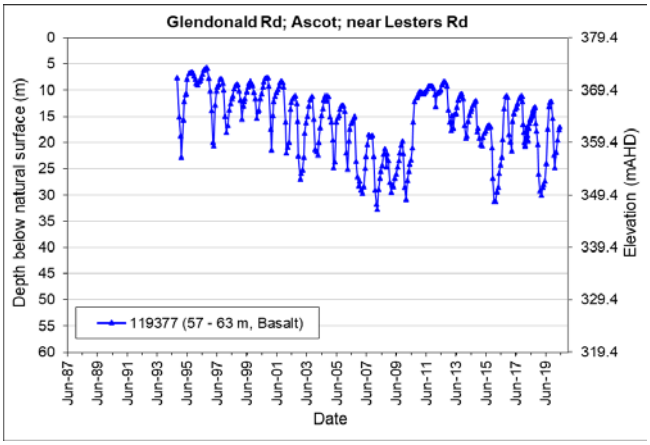


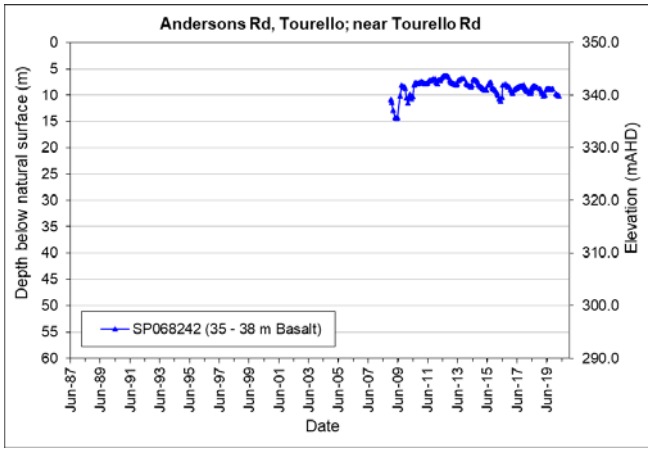

## Ascot Zone – 1102

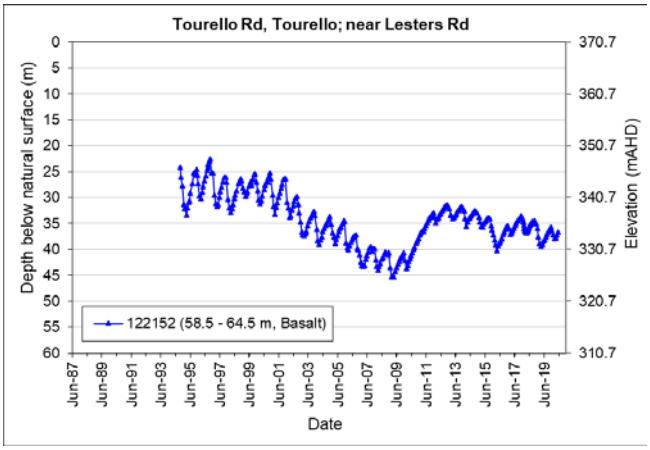


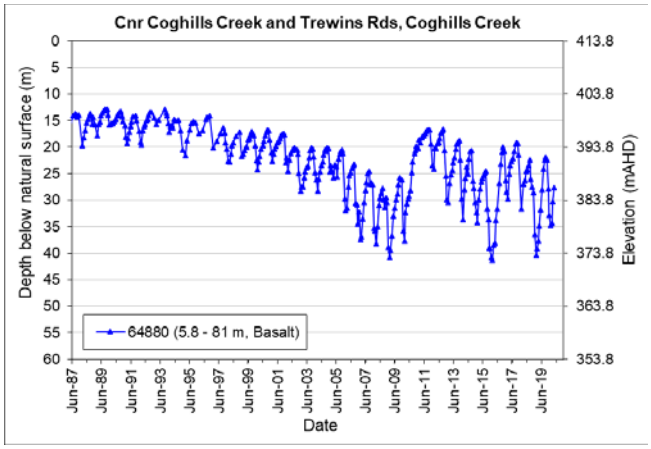



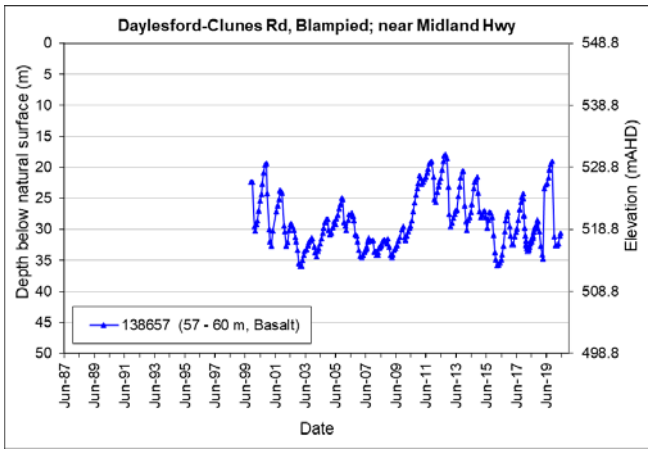



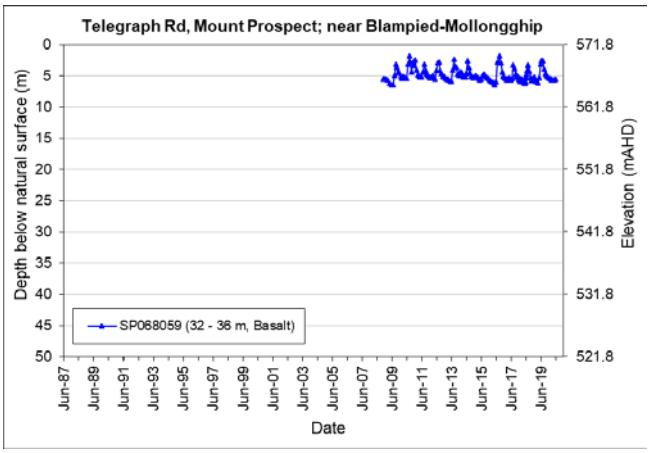


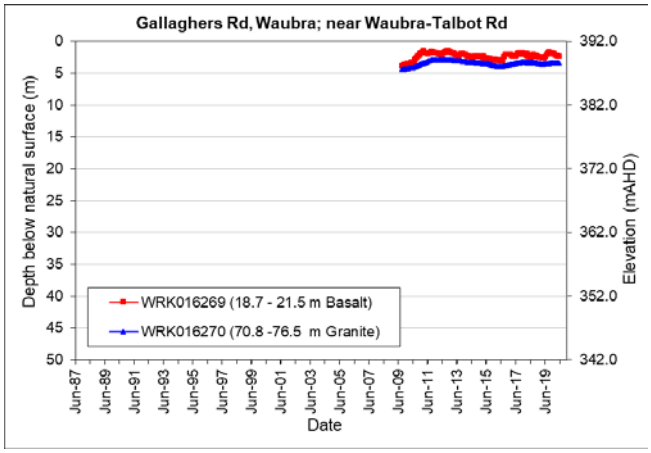



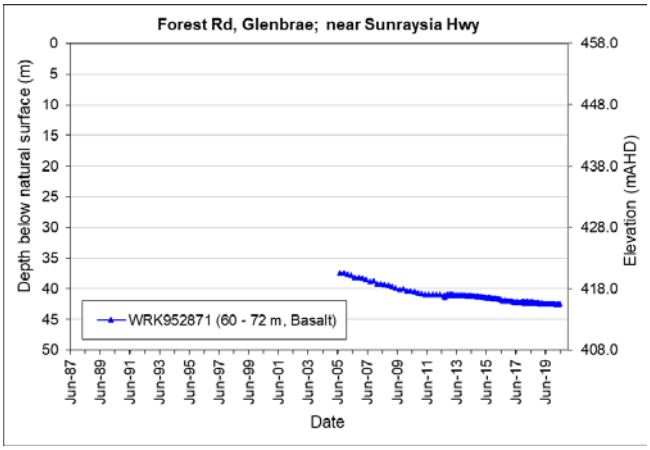

## Blampied Zone – 1104

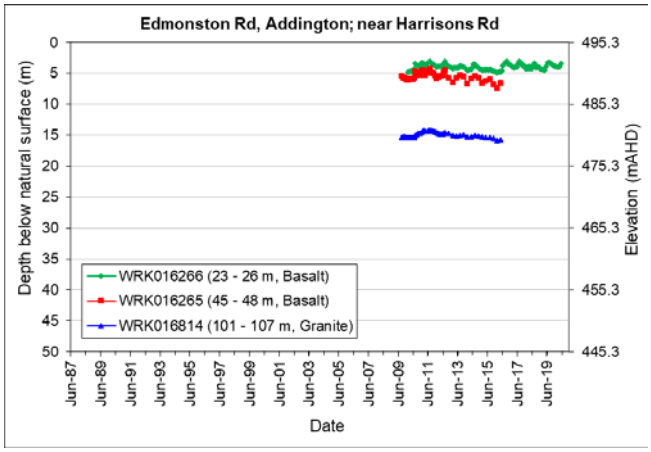


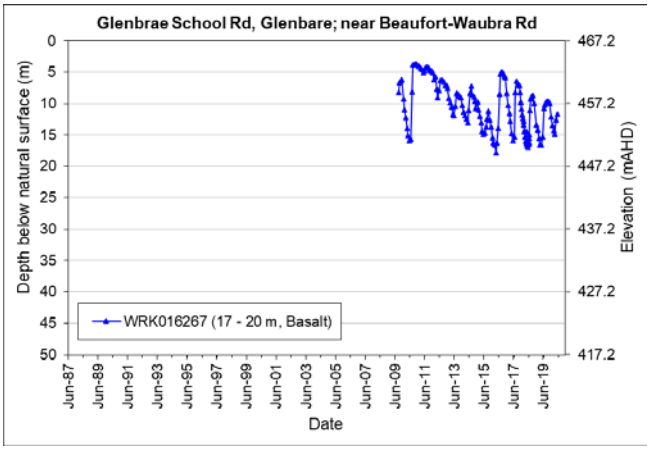



## Waubra Zone – 1106

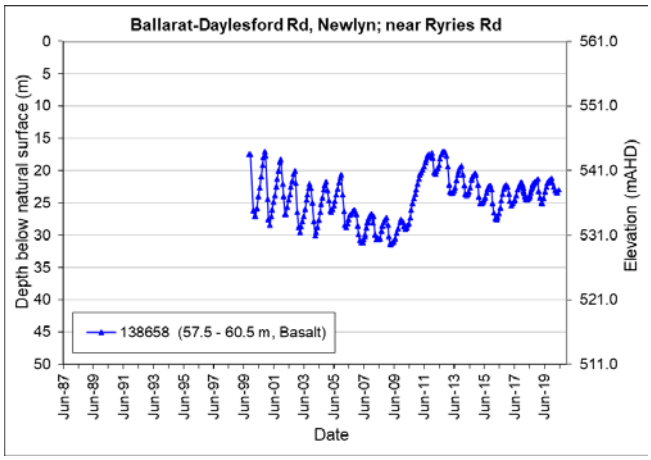


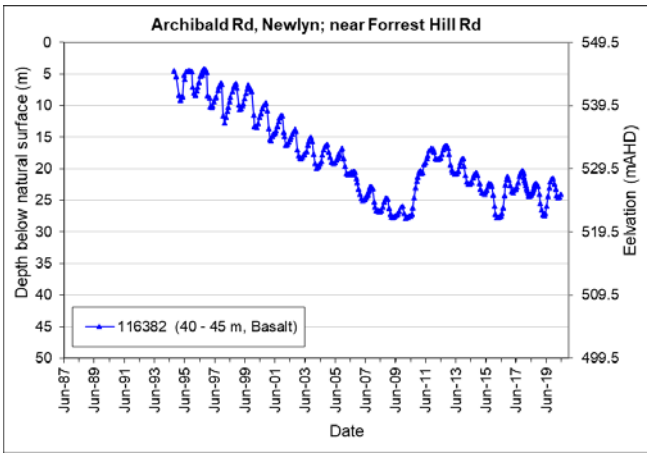



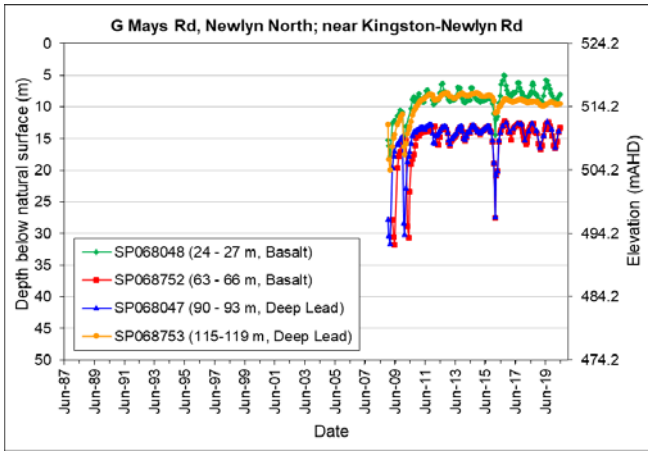



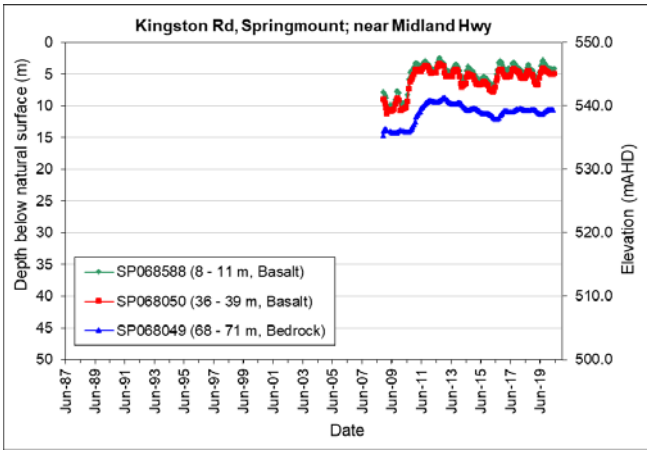




## Newlyn Zone – 1107




G Mays Rd, Newlyn North; near Kingston-Newlyn Rd
Depth below natural surface (m)
Elevation (mAHD)
Date
SP068048 (24 - 27 m, Basalt)
SP068752 (63 - 66 m, Basalt)
SP068047 (90 - 93 m, Deep Lead)
SP068753 (115-119 m, Deep Lead)


Kingston Rd, Springmount; near Midland Hwy
Depth below natural surface (m)
Elevation (mAHD)
Date
SP068588 (8 - 11 m, Basalt)
SP068050 (36 - 39 m, Basalt)
SP068049 (68 - 71 m, Bedrock)

# Appendix C – Groundwater quality results

Analytical chemistry results are provided for key monitoring bores listed in Schedule 1 of the Plan.

Further groundwater quality information is available on the Water Measurement Information System at https://data.water.vic.gov.au

| | Bore: | SP068255 | SP069539 | SP068252 | SP069730 |
|---|---|---|---|---|---|
| | Aquifer: | Basalt | Deep Lead | Basalt | Deep Lead |
| | Date: | 21/11/2019 | 21/11/2019 | 21/11/2019 | 21/11/2019 |
| Analyte | Unit | | | | |
| Conductivity @ 25°C | µS/cm | 6200 | 1700 | 3200 | 2200 |
| pH | pH units | 7.8 | 6.7 | 7.6 | 7.4 |
| Ionic balance | % | -2.29 | 1.79 | 1.93 | 2.58 |
| Total Anions | meq/L | 65 | 17 | 34 | 22 |
| Total Cations | meq/L | 69 | 16 | 33 | 21 |
| Ion Balance - TDS (EC) vs TDS | mg/L | 1.9 | 2.4 | 2.1 | 2 |
| Total Alkalinity, as CaCO3 | mg/L | 230 | 370 | 280 | 260 |
| Bicarbonate Alkalinity, CaCO3 | mg/L | 230 | 370 | 280 | 260 |
| Calcium, as Ca | mg/L | 120 | 41 | 80 | 55 |
| Carbonate Alkalinity, as CaCO3 | mg/L | 2 | 2 | 2 | 2 |
| Chloride, as Cl | mg/L | 1900 | 300 | 900 | 530 |
| Hydroxide Alkalinity, as CaCO3 | mg/L | 2 | 2 | 2 | 2 |
| Potassium, as K | mg/L | 13 | 8 | 7 | 5 |
| Sodium, as Na | mg/L | 730 | 190 | 370 | 230 |
| Ammonia, as N | mg/L | 0.3 | 0.3 | 0.2 | 0.1 |
| Nitrite, as N | mg/L | 0.01 | 0.01 | 0.01 | 0.01 |
| Nitrate, as N | mg/L | 4.7 | 0.06 | 4.6 | 1.9 |
| Nitrate + Nitrite, as N(0.003d | mg/L | 4.7 | 0.06 | 4.6 | 1.9 |
| Sulphate, as SO4 | mg/L | 350 | 37 | 140 | 75 |
| Total Kjeldahl Nitrogen, as N | mg/L | 0.3 | 0.3 | 0.4 | 0.1 |
| Total Nitrogen, as N | mg/L | 5 | 0.4 | 5 | 2 |
| Arsenic, as As | mg/L | 0.001 | 0.001 | 0.002 | 0.003 |
| Iron, dissolved as Fe | mg/L | 0.01 | 0.26 | 0.01 | 0.02 |
| Mercury, as Hg | mg/L | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Magnesium, as Mg | mg/L | 370 | 67 | 150 | 94 |
| Manganese, dissolved as Mn | mg/L | 0.001 | 0.085 | 0.001 | 0.003 |
| Total Dissolved Solids, 180C | mg/L | 3300 | 700 | 1500 | 1100 |
| Total Organic Carbon | mg/L | 1.2 | 2.4 | 1.3 | 1.2 |
| Turbidity, NTU | NTU | 0.1 | 0.9 | 0.2 | 1 |
| Phosphorus, total as P | mg/L | 0.08 | 0.29 | 0.11 | 0.12 |
| Lead, dissolved (ICP-MS) | mg/L | 0.001 | 0.001 | 0.001 | 0.001 |
| Nickel, dissolved (ICP-MS) | mg/L | 0.001 | 0.001 | 0.001 | 0.001 |
| Cadmium, dissolved (ICP-MS) | mg/L | 0.0002 | 0.0002 | 0.0002 | 0.0002 |
| Chromium, dissolved (ICP-MS) | mg/L | 0.004 | 0.001 | 0.004 | 0.001 |
| Copper, dissolved (ICP-MS) | mg/L | 0.002 | 0.001 | 0.002 | 0.004 |
| Zinc, dissolved (ICP-MS) | mg/L | 0.002 | 0.003 | 0.002 | 0.016 |

Note: Some results may be below detection limits, but these limits are not available from data source.