

Mid-Loddon Groundwater Management Area Local Management Rules

Annual Report

For year ending 30 June 2020

Document Number: A3820308
Version: FINAL



Excellence



Honesty



Accountability



Courage



Caring

Document History and Distribution

Versions

| Version | Date | Author(s) | Notes |
|----------|-------------------|---------------------|--------------------------------|
| Draft v1 | 7 September 2020 | Jock Richardson | Document creation and drafting |
| Draft v2 | 16 September 2020 | Scott Ridges | Document review and edits |
| Draft v3 | 16 September 2020 | Jock Richardson | Document edits post review |
| Final | 7 October 2020 | Matthew Pethybridge | Document approval |

Distribution

| Version | Recipient(s) | Date | Notes |
|----------|---------------------|-------------------|---------------------|
| Draft v1 | Scott Ridges | 14 September 2020 | Peer review |
| Draft v3 | Matthew Pethybridge | 17 September 2020 | Review and approval |

Foreword

Goulburn-Murray Water (GMW) is pleased to present the annual report for the *Mid-Loddon Groundwater Management Area Local Management Rules* (the Rules) for the 2019/20 water year.

GMW is responsible for implementation and administration of the Rules which was endorsed by the Board of GMW in 2009.

This report provides an overview of the groundwater management activities administered under the Rules during the 2019/20 water year.

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



Matthew Pethybridge
GROUNDWATER AND STREAMS MANAGER

Date: 7 October 2020

Executive summary

The *Mid-Loddon Groundwater Management Area Local Management Rules* (the Rules) was endorsed by the Board of Goulburn-Murray Water in July 2009. The 2019/20 water year marks the eleventh year of operation under the Rules.

A groundwater allocation of 100% of licence entitlement volume was set for the Mid-Loddon Groundwater Management Area (the GMA) for the 2019/20 water year. Recorded use was 20,147 ML, or 59 per cent of the total licence entitlement volume. This is 20 per cent less than the volume used in 2018/19. A total of 9,763.9 ML has been carried over for use in the 2020/21 water year.

There was moderate trade activity during the 2019/20 water year; 13 temporary transfers, totalling 1,430 ML, and two permanent transfers (140 ML/yr), were completed.

A third consecutive year of below-average rainfall was recorded at Bridgewater within the GMA; although the annual total was slightly higher than the previous two years. The combination of record-high groundwater extraction in 2018/19 and slightly increased rainfall in 2019/20, resulted in groundwater systems recovering to similar or slightly improved levels in the spring of 2019/20, compared to 2018/19.

Groundwater monitoring and metering programs continue to support the objectives of the Rules.

Contents

| | |
|---|----|
| Document History and Distribution | 2 |
| Foreword | 3 |
| Executive summary | 4 |
| 1 Introduction..... | 6 |
| 1.1 Purpose | 6 |
| 1.2 Water Supply Protection Area..... | 6 |
| 1.3 Groundwater Management Plan | 6 |
| 2 Groundwater Management | 8 |
| 2.1 Licence entitlement volume..... | 8 |
| 2.2 Groundwater allocations | 8 |
| 2.3 Groundwater use..... | 9 |
| 2.4 Rainfall | 10 |
| 2.5 Licence transfers..... | 11 |
| 2.6 Carryover..... | 11 |
| 2.7 Metering | 12 |
| 2.8 Licence compliance..... | 12 |
| 2.9 Domestic and stock bore licences..... | 12 |
| 3 Monitoring Program..... | 13 |
| 3.1 Groundwater levels | 13 |
| 3.2 Groundwater quality | 15 |
| 4 Administration and Engagement..... | 17 |
| 4.1 Groundwater Reference Committee | 17 |
| 5 References..... | 18 |
| Appendix A – Assessment of activities against the Rules | 19 |
| Appendix B – Groundwater level data | 20 |
| Appendix C – Groundwater quality results..... | 24 |

1 Introduction

1.1 Purpose

This annual report has been prepared to meet requirements of the *Mid-Loddon Groundwater Management Area Local Management Rules* (GMW, 2009) (the Rules).

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

1.2 Water Supply Protection Area

The Mid-Loddon Groundwater Management Area (the GMA) extends from Tullaroop Reservoir in the south to Mitiamo in the north, and includes the townships of Carisbrook, Bridgewater and Serpentine.

The GMA incorporates groundwater resources to all depths and contains three management zones: Moolort Zone – 1011, Laanecoorie-Serpentine Zone – 1012 and Jarklin Zone – 1013 (Figure 1).

1.3 Groundwater Management Plan

The Rules was endorsed for implementation by the Board of Goulburn-Murray Water (GMW) on 1 July 2009.

The Rules aims to ensure groundwater resources in the GMA are managed in an equitable and sustainable manner. More specifically, the Rules seeks to:

1. Provide all groundwater users with access to the resource, including domestic and stock users;
2. Enable development of the groundwater resources to realise the potential for its use in the region;
3. Provide environmental benefits through management of groundwater resources and maintain the integrity of the aquifer system, including its structure and groundwater quality;
4. Manage groundwater interference and intensively pumped areas to protect existing authorised users and the environment from unacceptable drawdown levels;
5. Establish transparent trigger levels and restrictions;
6. Provide mechanisms such as transfer of licence entitlement and carryover to allow flexible and adaptive management in response to changing demands, such as climatic conditions; and
7. Establish an effective monitoring program and provide periodic communications that will inform groundwater users of the status of the resource.

An assessment of GMW's activities against the Rules is presented in Appendix A.

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

2 Groundwater Management

2.1 Licence entitlement volume

The Minister for Water declared a Permissible Consumptive Volume of 34,037 megalitres per year (ML/yr) for the GMA in March 2013 (Victorian Government, 2013).

At 30 June 2020 the total of licensed groundwater entitlement volume (licensed volume) in the GMA was 33,927.1 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 Licence entitlement in the Mid-Loddon GMA

| Management zone | Licences | Licensed bores | Licence volume (ML/year) |
|------------------------------------|------------|----------------|--------------------------|
| Moolort Zone – 1011 | 23 | 31 | 3,775.4 |
| Laanecoorie-Serpentine Zone – 1012 | 65 | 80 | 27,304.7 |
| Jarklin Zone – 1013 | 14 | 17 | 2,847.0 |
| Total | 102 | 128 | 33,927.1 |

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

2.2 Groundwater allocations

An allocation is a percentage of licensed volume that may be extracted in a given season.

Annual allocations in the GMA are determined by comparing the average of annual maximum groundwater recovery levels recorded for observation bore 88214 in three water years (i.e. the current and two preceding), against a trigger level outlined in the Rules and illustrated on **Error! Reference source not found.**

In September 2019 an allocation of 100 per cent was announced for all groundwater licence holders in the GMA for the 2019/20 water year.

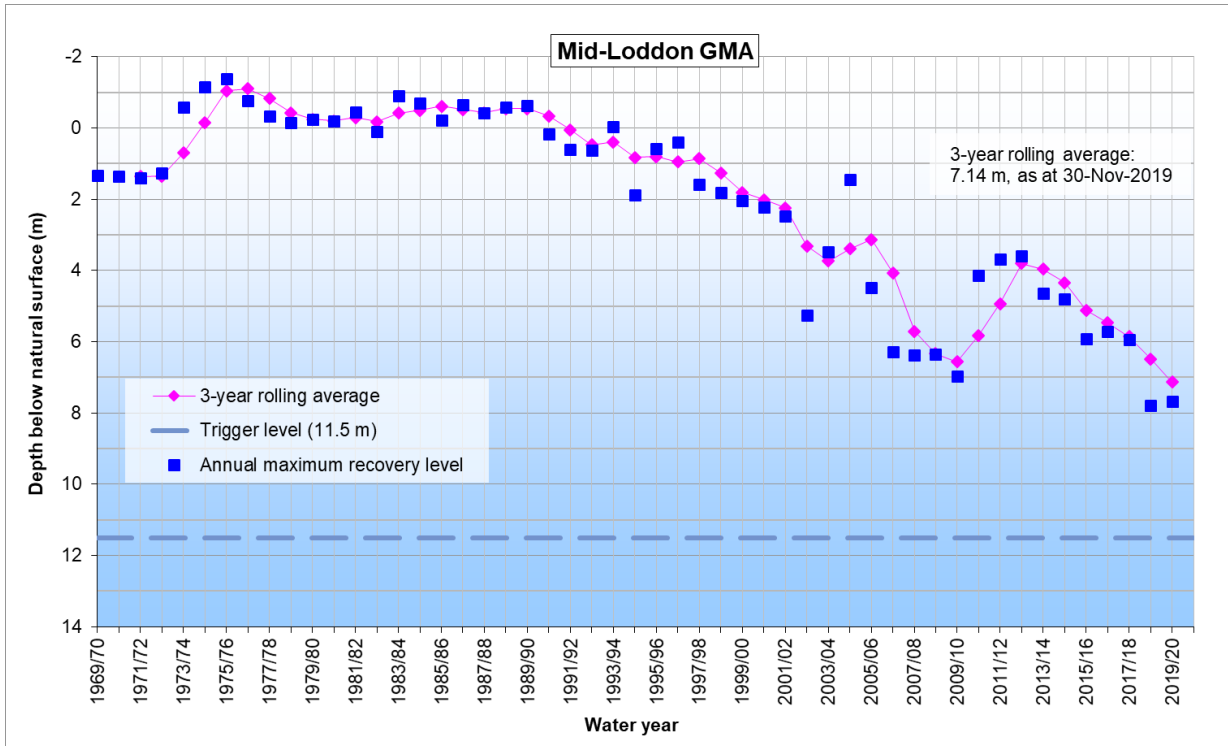


Figure 2 Groundwater levels in bore 88214, compared to the trigger level

2.3 Groundwater use

Total recorded use in the GMA in 2019/20 was 20,147.0 ML, or 59% of licensed volume (Figure 3). This is a 20 per cent decrease on the volume used in 2018/19. Note: recorded use refers to metered and deemed use.

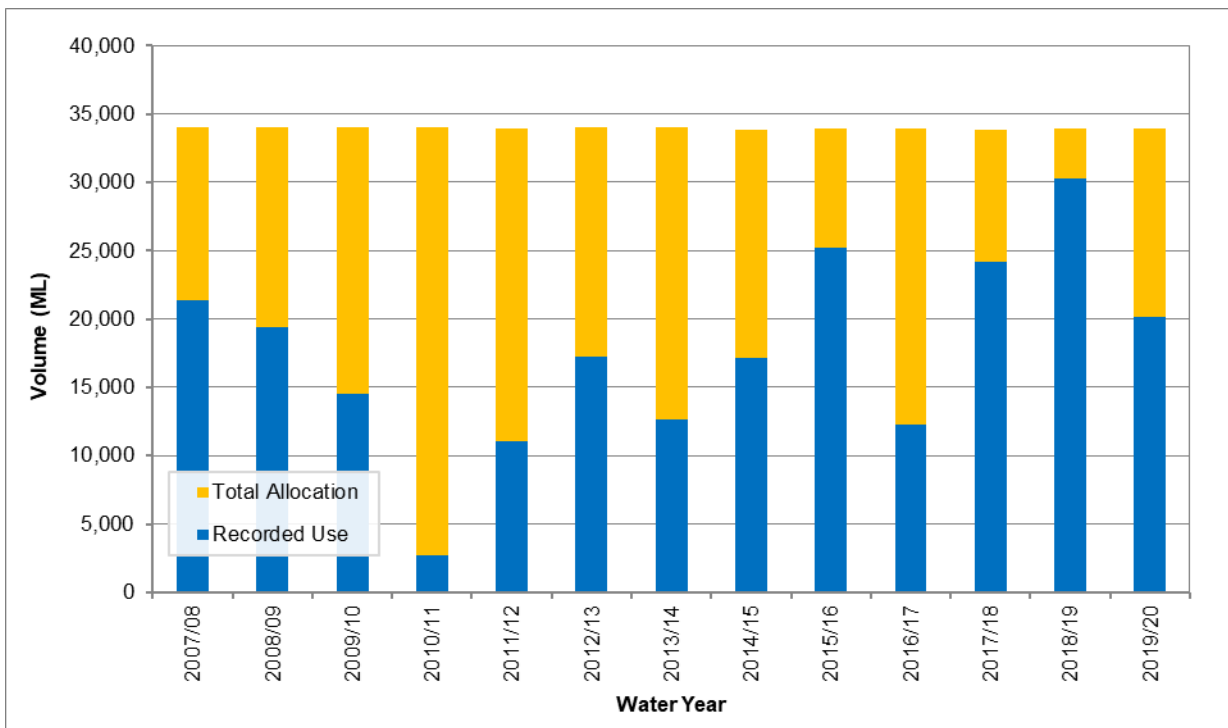


Figure 3 Total allocation and recorded use in the Mid-Loddon GMA

Recorded use by volume was greatest in the Laanecoorie-Serpentine Zone, where the majority of the licensed volume is held. Licence holders in the Jarklin Zone used the greatest percentage of licence entitlement volume (Table 2).

Table 2 Recorded use by management zone in the Mid-Loddon GMA in 2019/20

| Management zone | Licensed volume (ML/yr) | Recorded use (ML) | Proportion of licensed volume used |
|------------------------------------|-------------------------|-------------------|------------------------------------|
| Moolort Zone – 1011 | 3,775.4 | 2,686.8 | 71% |
| Laanecoorie-Serpentine Zone – 1012 | 27,304.7 | 15,196.1 | 56% |
| Jarklin Zone – 1013 | 2,847.0 | 2,264.1 | 80% |
| Total | 33,927.1 | 20,147.0 | 59% |

2.4 Rainfall

Historic rainfall data, sourced from the Bureau of Meteorology weather station at Bridgewater (BOM, 2020), is presented in Figure 4 as an indicator of climate trends across the GMA.

The data show that annual rainfall was generally above the long-term average in the 1970s and remained relatively steady through the 1980s and 1990s. Throughout the Millennium Drought (late-1990s to 2009), annual totals were mostly below-average; drought breaking rainfall totals were recorded in 2009/10 and 2010/11.

The data also indicate that rainfall total have mostly been below-average since the Rules was implemented. Notable exceptions include the 2010/11 year when widespread flooding occurred as a result of significant rain events, as well as 2016/17. The drier conditions have resulted in reduced recharge to the groundwater system.

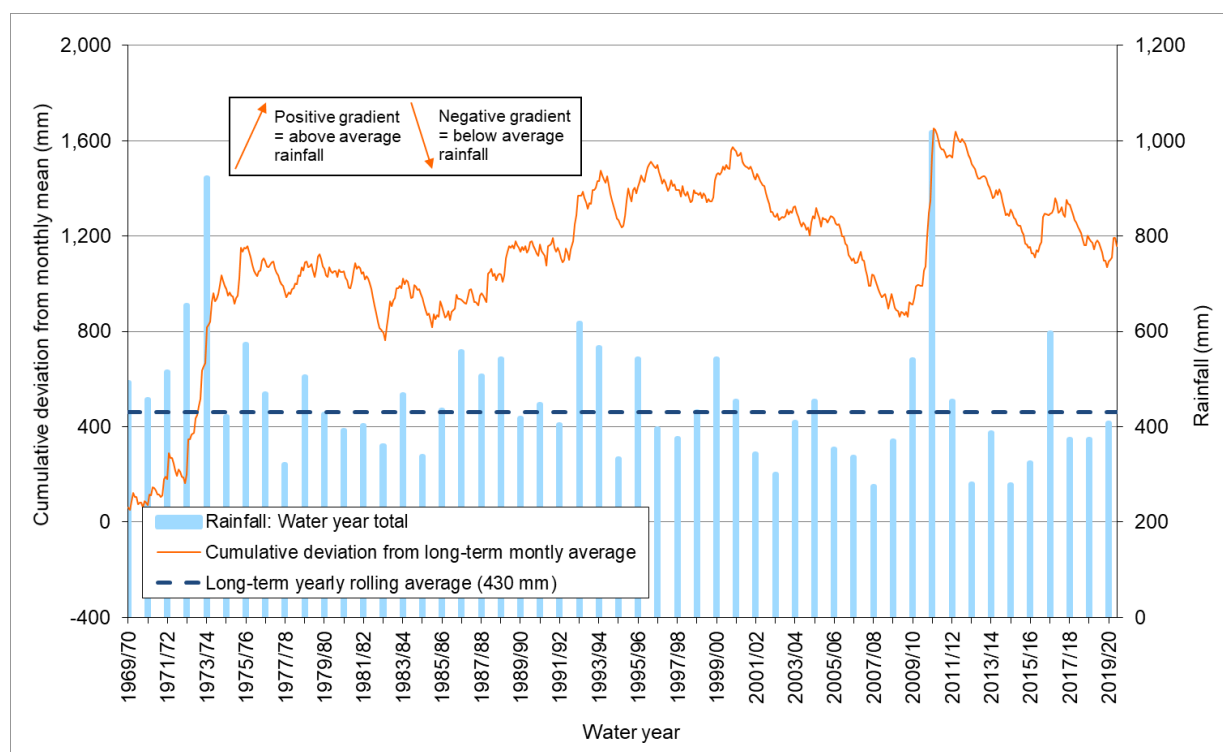


Figure 4 Rainfall recorded at Bridgewater in the Mid-Loddon GMA (BOM, 2020)

2.5 Licence transfers

The Rules allows groundwater licence holders to temporarily or permanently transfer licensed volume. During the 2019/20 water year there were 13 temporary transfer transactions for a total of 1,430 ML and two permanent transfer transactions for a total of 140 ML/yr (Figure 5).

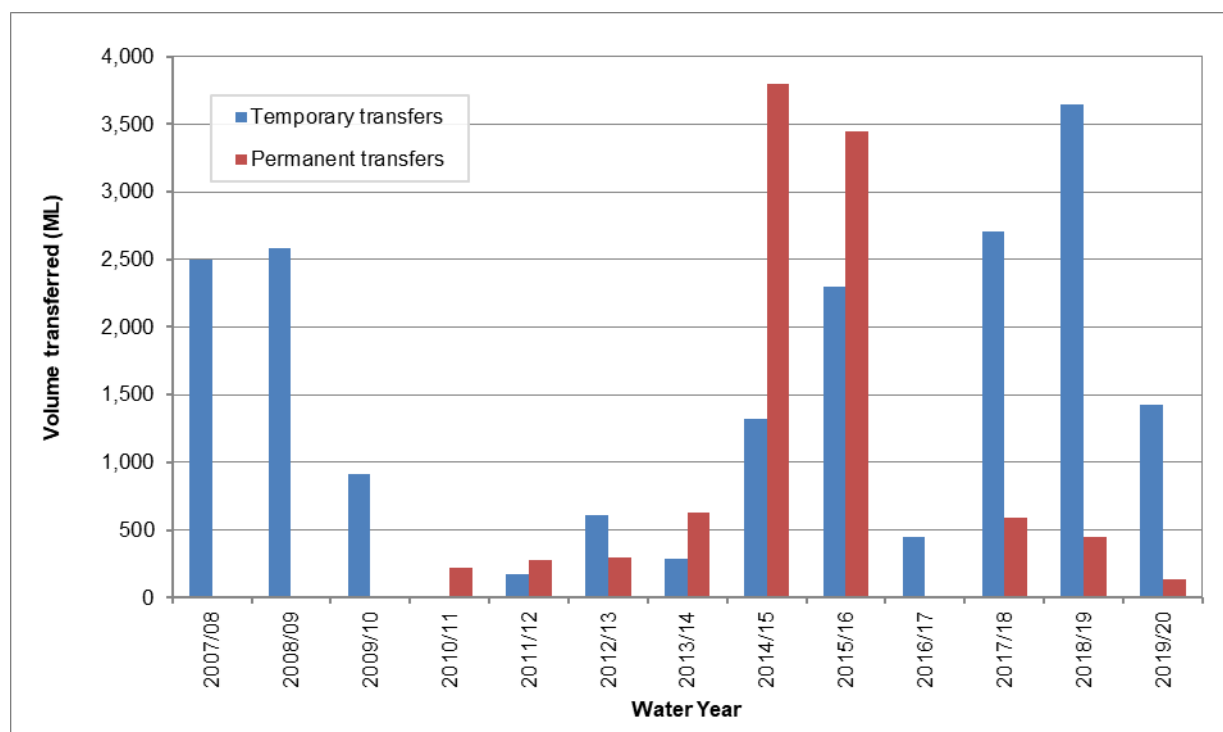


Figure 5 Total licensed volumes transferred in the Mid-Loddon GMA

Of the 13 temporary transfers completed, eight were from the Laanecoorie-Serpentine Zone to the other management zones: 388 ML to the Moolort Zone and 563 ML to the Jarklin Zone. The two permanent transfers were between licence holders within the same management zone – Laanecoorie-Serpentine Zone (Table 3).

Table 3 Licence transfers in the Mid-Loddon GMA the 2019/20

| Management 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/yr) | No. of transfer | Volume (ML/yr) |
| Moolort Zone – 1011 | 0 | - | 2 | 388 | 0 | - | 0 | - |
| Laanecoorie-Serpentine Zone – 1012 | 12 | 1,326 | 4 | 375 | 2 | 140 | 2 | 140 |
| Jarklin Zone – 1013 | 1 | 104 | 7 | 667 | 0 | - | 0 | - |
| Total | 13 | 1,430 | 13 | 1,430 | 2 | 140 | 2 | 140 |

2.6 Carryover

Under the Rules, licence holders in the GMA are permitted to carryover up to a maximum of 30 per cent of their unused licence entitlement from one water year to the next.

Licence holders in the GMA carried over a total of 7,714.9 ML for use in the 2019/20 water year; and, at the conclusion of 2019/20, were able to carryover 9,763.9 ML for use in the 2020/21 water year.

2.7 Metering

There were 130 active meters in the GMA, as at 30 June 2020. All meters were read at least twice during the 2019/20 water year; and 85 of them required preventative maintenance.

2.8 Licence compliance

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

There was one instance of alleged overuse (i.e., licensed volume exceedance) in 2019/20. This incident is being investigated and GMW will take action in accordance with GMW's Risk-Based Compliance and Enforcement Framework.

There were no instances of unlicensed take and use without consent or unauthorised take in 2019/20.

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 (WMIS).

During the 2019/20 water year in the GMA there were 24 domestic and stock bore construction licences issued by GMW and the Victorian Water Register (combined), comprising a total of 36 proposed bores; and nine domestic and stock bore completion reports were received and processed by GMW.

3 Monitoring Program

3.1 Groundwater levels

During the 2019/20 water year a total of 47 state observation bores, located within the GMA, were monitored by GMW and the Department of Environment, Land, Water and Planning (DELWP) – see Figure 1. Of these, 36 were monitored remotely using telemetry equipment, with measurements recorded hourly, and 11 were monitored manually, with measurements recorded on a monthly or quarterly basis.

This figure includes the 25 key bores listed in Schedule 1 of the Rules, where practicable. Water level data for these bores are presented in Appendix B.

In the GMA, groundwater levels were rising during the early-1970s and remained relatively elevated until the mid-1990s. The magnitude of seasonal fluctuations typically increased during the 1990s as a result of increased groundwater extraction. From the mid-1990s to 2009 groundwater recovery levels declined, largely in response to reduced rainfall recharge to the aquifer system.

Groundwater levels recovered strongly in response to above-average rainfall received in the 2010/11 water year (Figure 4). Since 2011, groundwater recovery levels have generally declined as a result of reduced rainfall recharge and increased extraction, particularly in 2015/16, 2017/18 and 2018/19. Some groundwater levels are now back to the lows of the Millennium Drought.

Monitoring data indicate that groundwater levels were within historic ranges during 2019/20, across the majority of the GMA. Seasonal recovery levels in most bores were at their lowest on record during in 2018/19. The combination of record-high groundwater extraction in 2018/19 (Figure 3) and slightly increased rainfall in 2019/20 (Figure 4), resulted in groundwater systems recovering to similar or slightly improved levels in the spring of 2019/20, compared to 2018/19.

Seasonal drawdown of up to 11.8 m was observed in areas of intensive groundwater extraction; and typically less than 3 m in areas with less intensive development (Figure 9). As a result of some welcome rainfall events in the autumn of 2019/20, some groundwater systems had exceeded the spring recovery levels by the end of June 2019 (e.g. bore 138653, Figure 6).

Moolort Zone

At Moolort, the groundwater level in deep lead observation bore 138653 recovered to 5.1 m lower in 2019/20, compared to 2018/19 (24.3 m down from 19.2 m depth). However, the magnitude of drawdown was 6 m, compared to 13.1 m in 2018/19 (Figure 6).

At Baringhup West, deep lead groundwater recovery levels declined by 0.7 m in 2019/20 (6.63 m down from 5.93 m depth); and the magnitude of drawdown was 2.1 m, compared to 5.3 m in 2018/19 (Figure 6).

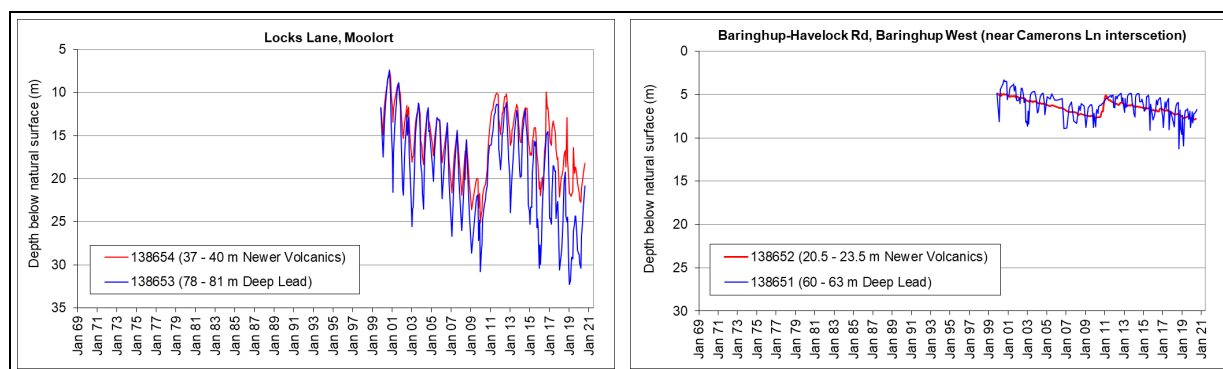


Figure 6 Groundwater level monitoring in the Moolort Zone

Laanecoorie-Serpentine Zone

The maximum groundwater recovery level in the trigger bore (ID 88214) located on Rothackers Road, near the Pompapiel Creek, changed by just 4 cm between 2018/19 and 2019/20 (7.8 m to 7.76 m depth); and the magnitude of drawdown was also comparative (10.6 m, compared to 10.9 m) (Figure 7).

At Yarraberb, groundwater recovery levels in the deep lead aquifer declined by 0.6 m in 2019/20; and with the magnitude of drawdown was around 1.9 m.

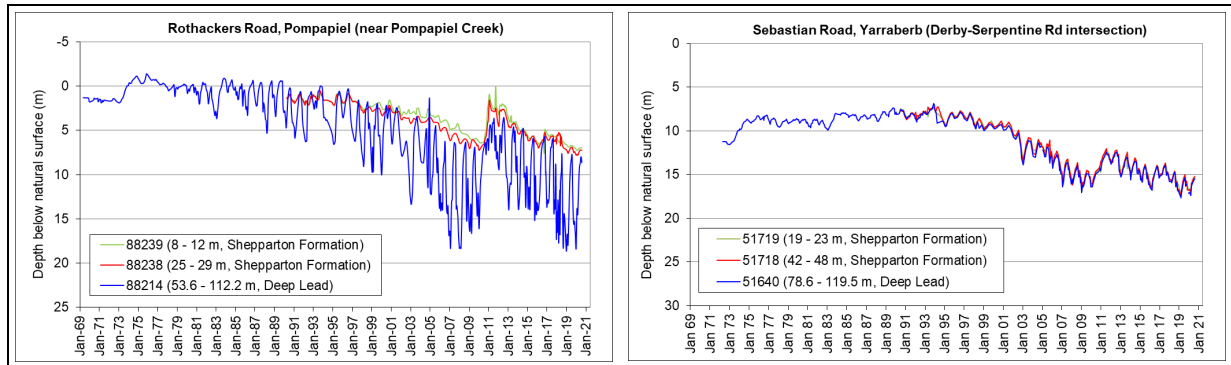


Figure 7 Groundwater level monitoring in the Laanecoorie-Serpentine Zone

Jarklin Zone

At Calivil, the highest groundwater level recorded in deep lead observation bore 54343 during 2019/20 was 5.14 m; 2 m lower than the highest level observed in 2018/19. The magnitude of drawdown was the 11.8 m which is the second largest since records began in the early-1970s. In March 2020, groundwater levels fell to 16.97 m below the surface which is the lowest level on record (Figure 8).

At Prarie, groundwater recovery levels in the deep lead aquifer declined by 1.1 m in 2019/20, compared to 2018/19; the magnitude of drawdown was 2.7 m; and the lowest level was 9.64 m which equals the lowest level on record also.

Lower groundwater levels can provide improved drainage, and reduced waterlogging and land salinity problems in this area.

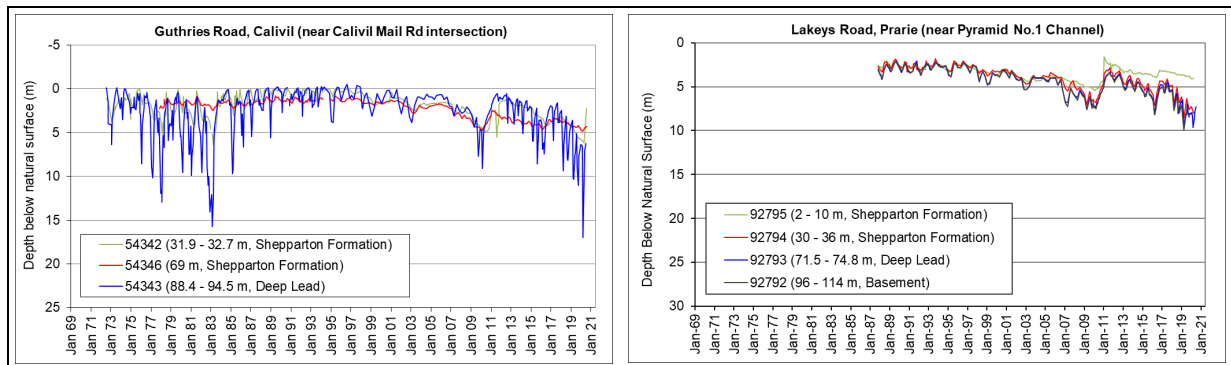


Figure 8 Groundwater level monitoring in the Jarklin Zone

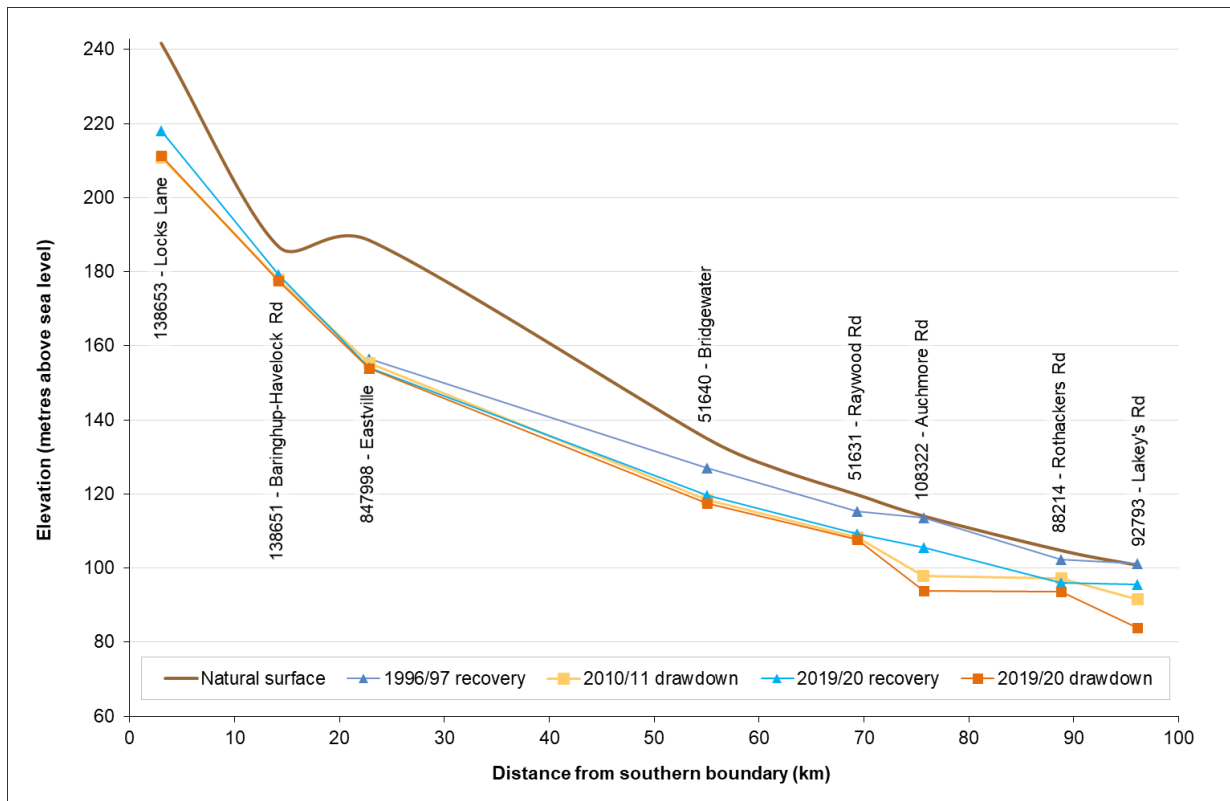


Figure 9 Groundwater levels along a north-south section of the Mid Loddon GMA

3.2 Groundwater quality

Sampling of state observation bores

During the 2019/20 water year two state observation bores, located within the GMA, were sampled by GMW and DELWP. These comprise bore number 88214 in the Laanecoorie-Serpentine Zone, and bore number WRK059856 (replacement for bore 53434) in the Jarklin Zone. Both bores are screened in the Deep Lead aquifer.

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 10 **Error! Reference source not found.**, indicate that groundwater salinity levels have been relatively stable since 2009; and were at similar levels in the 1970s.

Ongoing annual sampling of these key bores will enable any trends in groundwater quality to be observed.

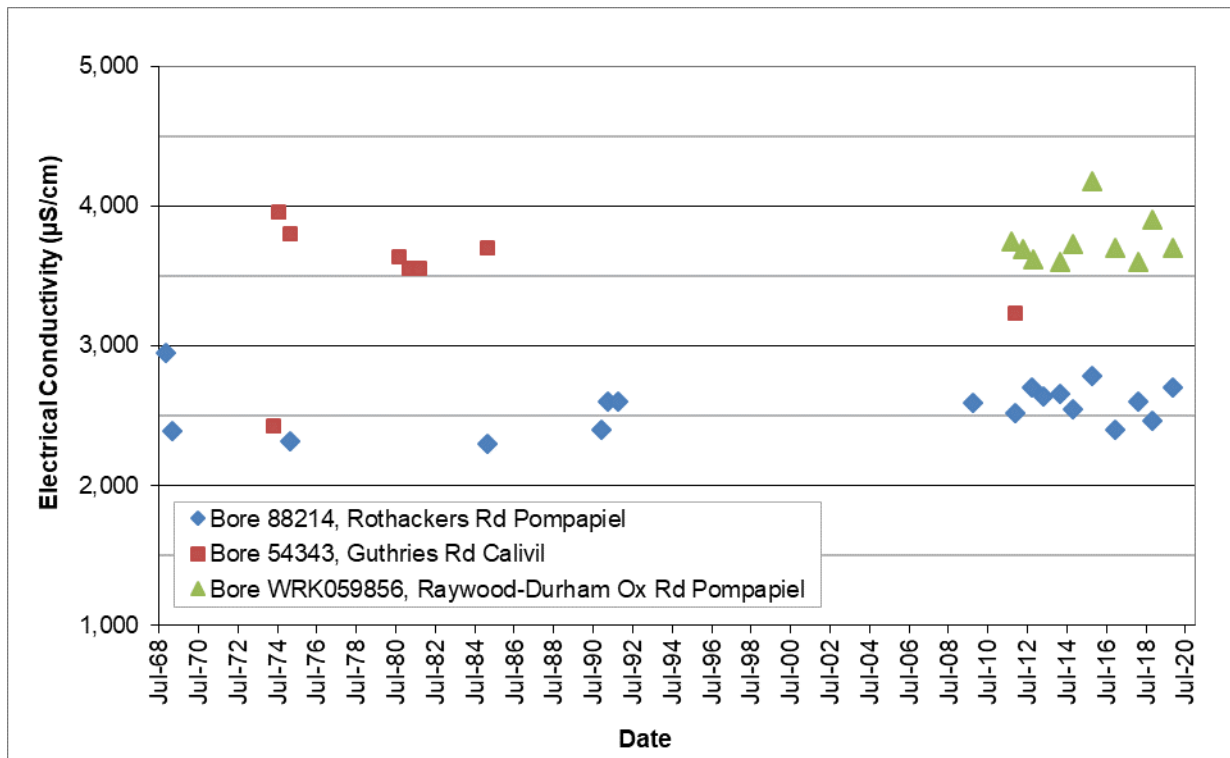


Figure 10 Salinity of groundwater in key monitoring bores in the Mid-Loddon GMA (DELWP, 2020)

Sampling of private bores

GMW provides all groundwater licence holders in the GMA with a sample bottle and a reply-paid envelope to submit a groundwater sample for salinity analysis. In the 2019/20 water year, 129 sample bottles were sent out and 29 samples, or 22 per cent, were returned for analysis.

Generally, the salinity of groundwater samples collected in 2019/20 were slightly lower than their 2018/19 equivalent (Table 4).

Continued sampling of private bores, particularly those that have been a sampling history, will assist with identifying any trends in groundwater salinity. A greater return rate would further improve the spatial and temporal understanding of groundwater salinity in the GMA.

Groundwater users are strongly encouraged to participate in this program so that they can identify any changes in groundwater salinity at their bore that might impact on their business.

Table 4 Salinity results of private bore samples returned in 2019/20

| Management zone | Samples returned | Salinity range, as electrical conductivity (µS/cm) | Average of differential from previous result |
|------------------------------------|------------------|--|--|
| Moolort Zone – 1011 | 5 | 1,175 – 2,090 | - 0.4% |
| Laanecoorie-Serpentine Zone – 1012 | 22 | 537 – 4,115 | - 2% |
| Jarklin Zone – 1013 | 2 | 3,470 – 3,770 | + 2% |

4 Administration and Engagement

4.1 Groundwater Reference Committee

GMW met with the Mid-Loddon Groundwater Reference Group on 12 September 2019. Key points of discussion included:

- Changes to GMW team and committee membership
- Resource condition
- The status of groundwater licence applications with potential to impact on the GMA
- Implementation of the Rules
- Investigation of groundwater resources west of the GMA

5 References

Bureau of Meteorology (BOM), 2020. *Climate Data Online – Bridgewater (Post Office) station number 81058*. Retrieved on 7 September 2020 from: http://www.bom.gov.au/jsp/ncc/cdio/wData/wdata?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=081058

Victorian Department of Environment, Land, Water and Planning (DELWP), 2020. *Water Measurement Information System*. Data retrieved in August 2020 from: <https://data.water.vic.gov.au>

Goulburn-Murray Water, 2009. *Mid-Loddon Groundwater Management Area Local Management Rules*. Goulburn-Murray Water, Tatura, Victoria.

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

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

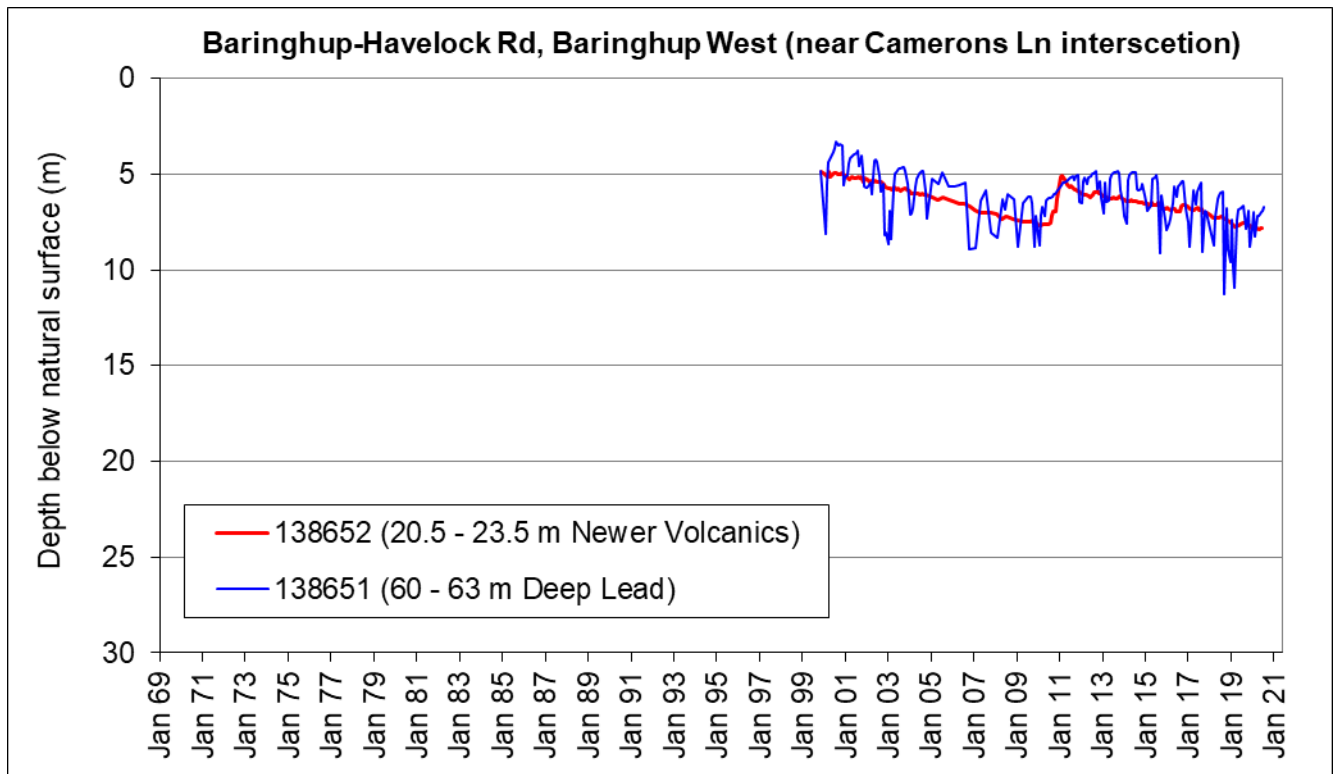
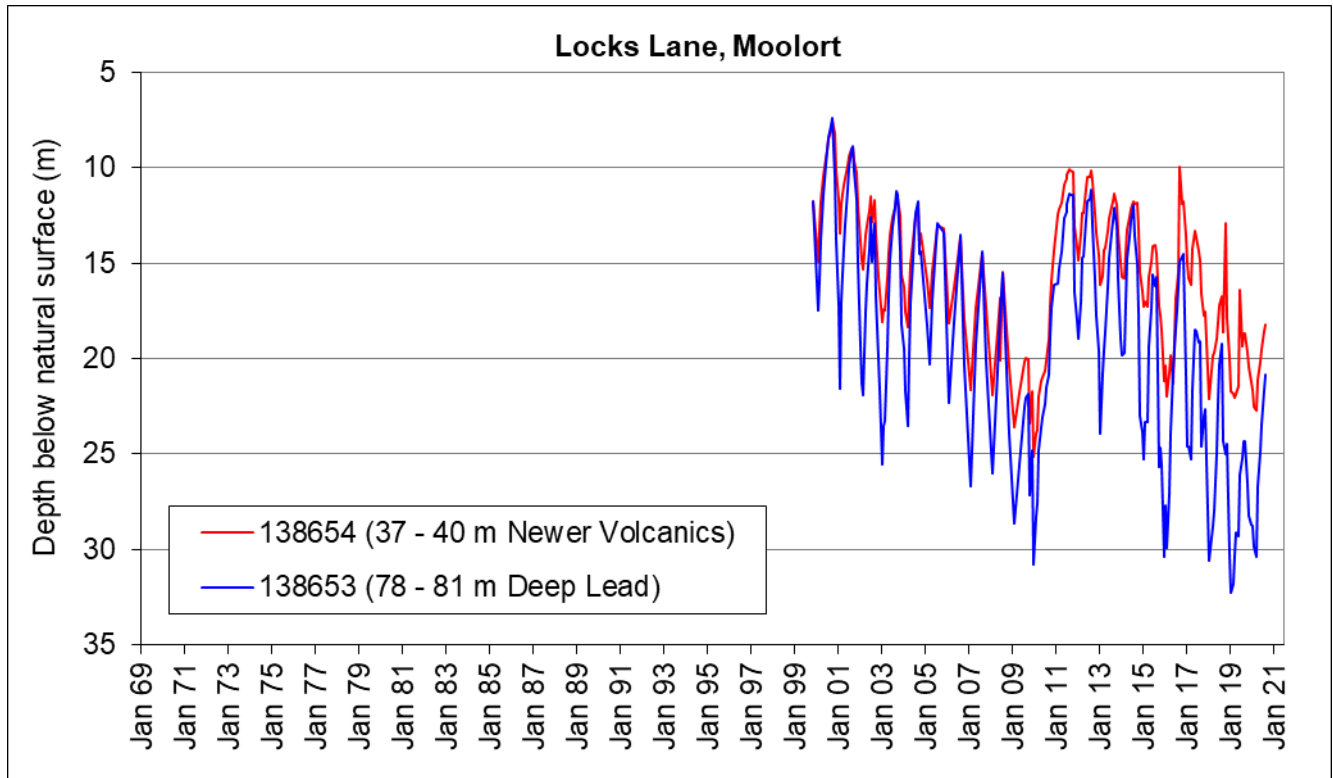
Appendix A – Assessment of activities against the Rules

| Rule | Activity | Compliant? |
|---|---|------------|
| 1. Cap on licence entitlement | The Minister for Water declared the Permissible Consumptive Volume for the Mid-Loddon GMA of 34,037 ML/year in March 2013. | Yes |
| 2. Managing groundwater interference | GMW processed all groundwater licence applications in accordance with Rule 2 and section 40 of the Act. | Yes |
| 3. Managing intensity of groundwater extraction | GMW processed all groundwater licence applications in accordance with Rule 3. | Yes |
| 4. Managing groundwater levels | In early-September 2019, GMW announced allocations of 100% of licence entitlement volume for all management zones for the 2019/20 water year. GMW announced the allocations by listing them on their website, sending letters to all licence holders and placing public notices in local newspapers. | Yes |
| 5. Transfer of groundwater licence entitlement | GMW processed 13 temporary- and 2 permanent transfer transactions in 2019/20. All transfers were carried out in accordance with conditions in Rule 5. | Yes |
| 6. Carryover | Carryover up to 30% of licence volume was available to licence holders. | Yes |
| 7. Monitoring groundwater levels | GMW obtained monthly readings from state observation bores listed in Schedule 1 of the Rules, where practicable. | Yes |
| 8. Monitor groundwater salinity | Groundwater salinity was analysed from state observation bores 88214 and WRK059856. Bottles were sent to all licensed groundwater users and salinity measured in returned samples. Licence holders were advised of the results. | Yes |
| 9. Record meter readings | Meters are fitted to all operational bores in the Mid-Loddon GMA. Meters were read in January/February and May/June during 2019/20. | Yes |
| 10. Annual reporting | In September 2019, GMW prepared an annual report summarising the groundwater management activities under the Rules for the 2018/19 season. The report was published on the GMW website before 1 October 2019. | Yes |
| 11. Provide effective communication | GMW's communication activities during 2019/20 included: <ul style="list-style-type: none"> meeting with the Mid-Loddon Groundwater Reference Group on 12 September 2019; prepared an annual newsletter, and mailed a copy to all licence holders in the GMA, in September 2019; published on its website: the 2018/19 annual report, the 2019 annual newsletter; updated hydrographs and trigger graphs on a monthly basis The Rules and other supporting documents have been available on the GMW website since approval. | Yes |
| 12. Review of local management rules | In 2018, GMW undertook a formal review of the Rules in consultation with DELWP and the Mid-Loddon Groundwater Reference Group. | Yes |

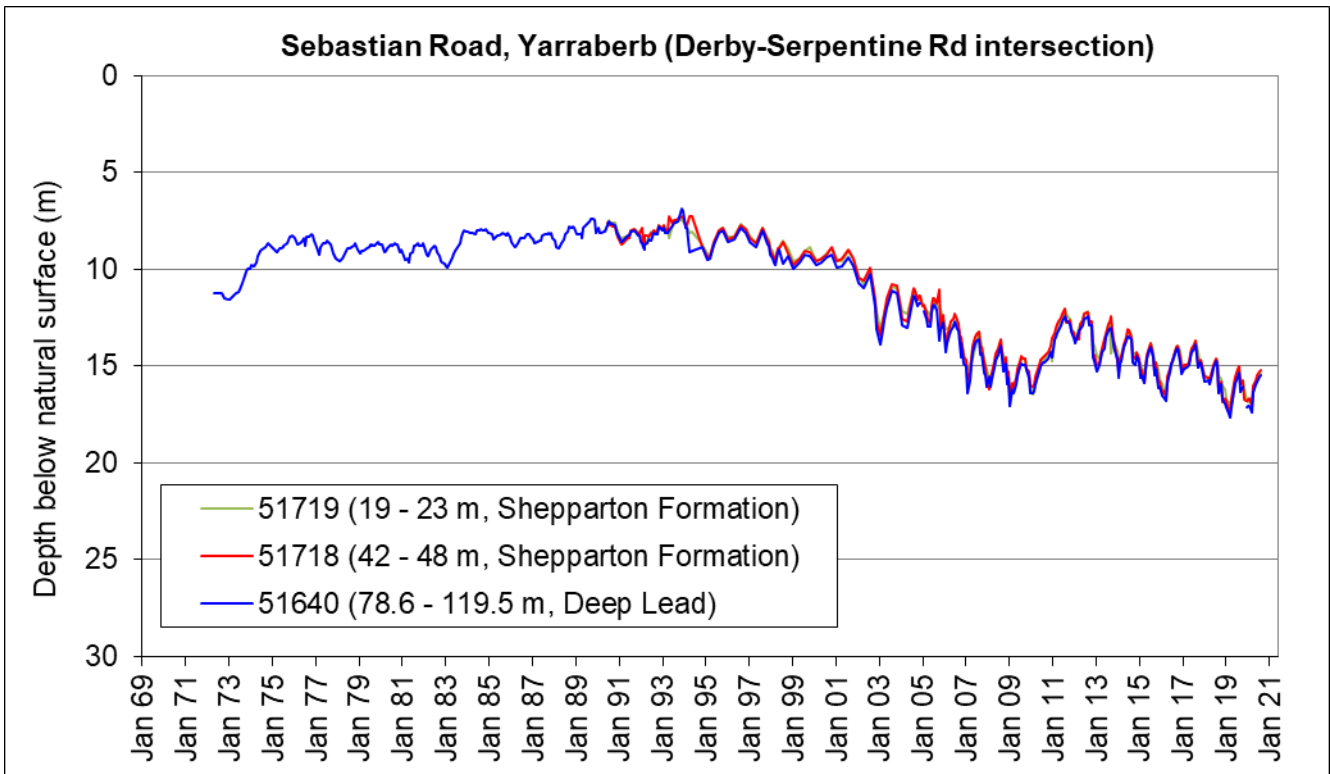
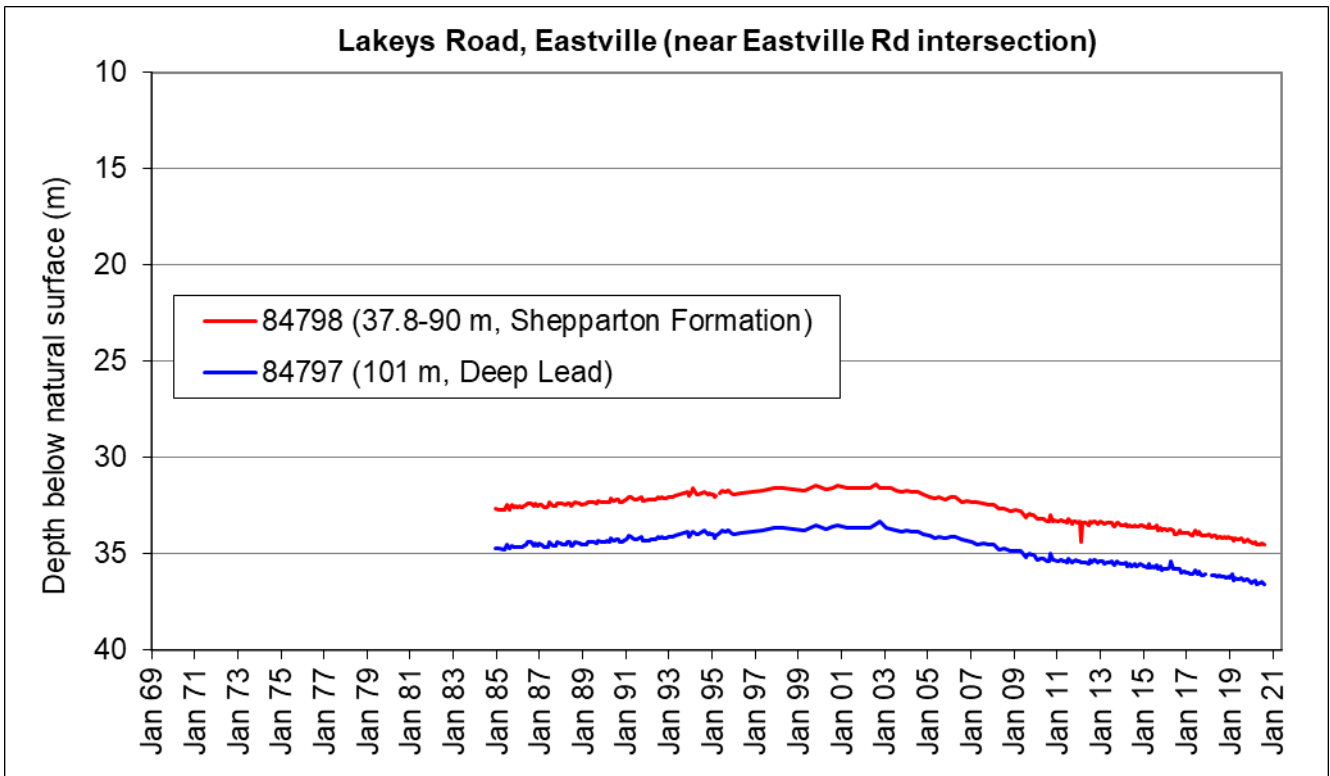
Appendix B – Groundwater level data

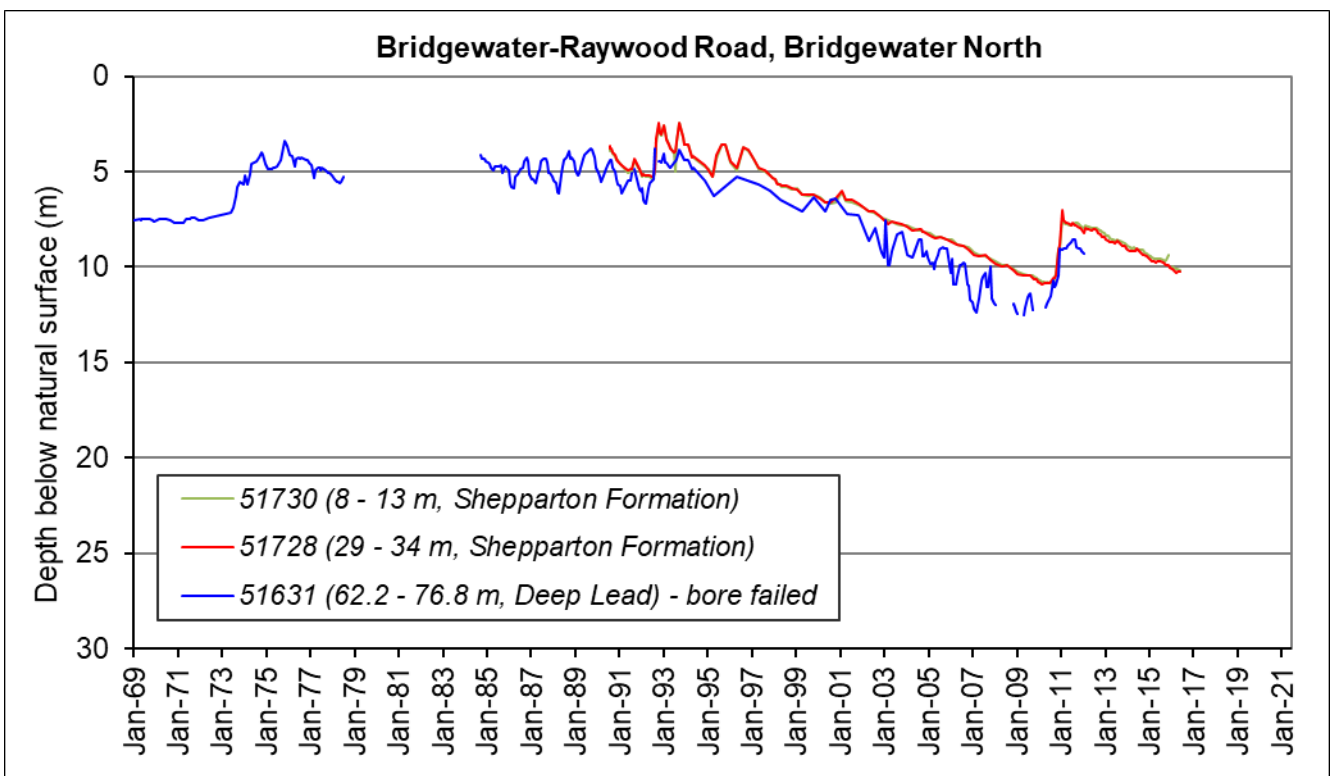
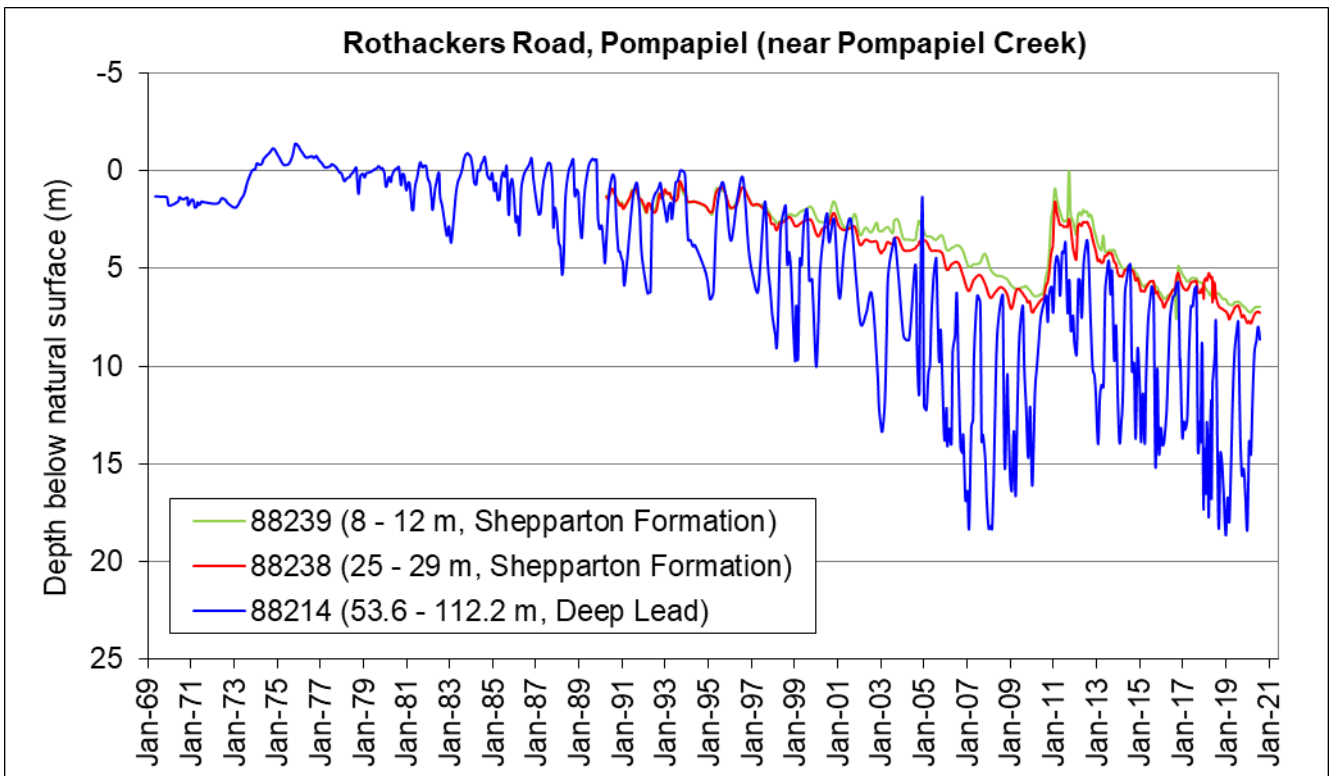
Hydrographs are provided for key monitoring bores. All data is sourced from the Water Measurement Information System (DELWP, 2020). Further groundwater level information is available on the Water Measurement Information System at <https://data.water.vic.gov.au>

Moolort Zone – 1011

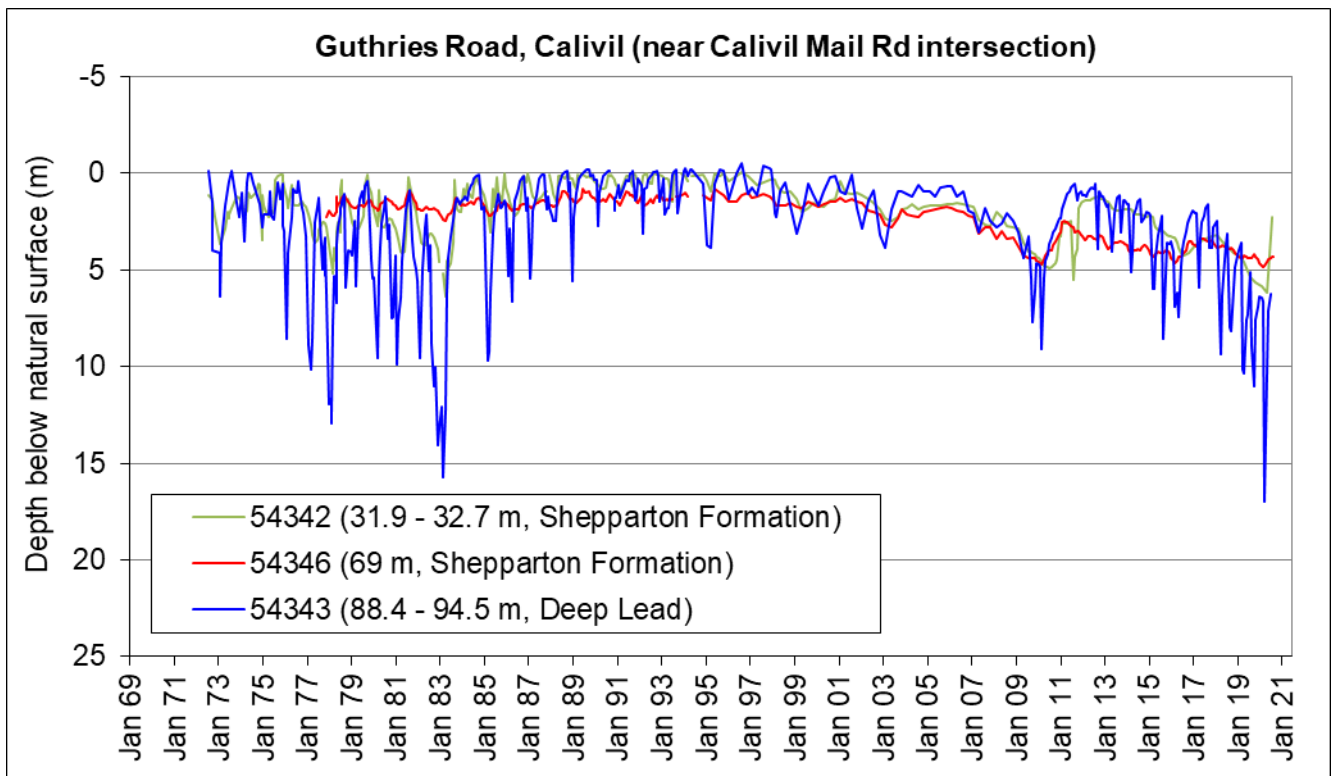
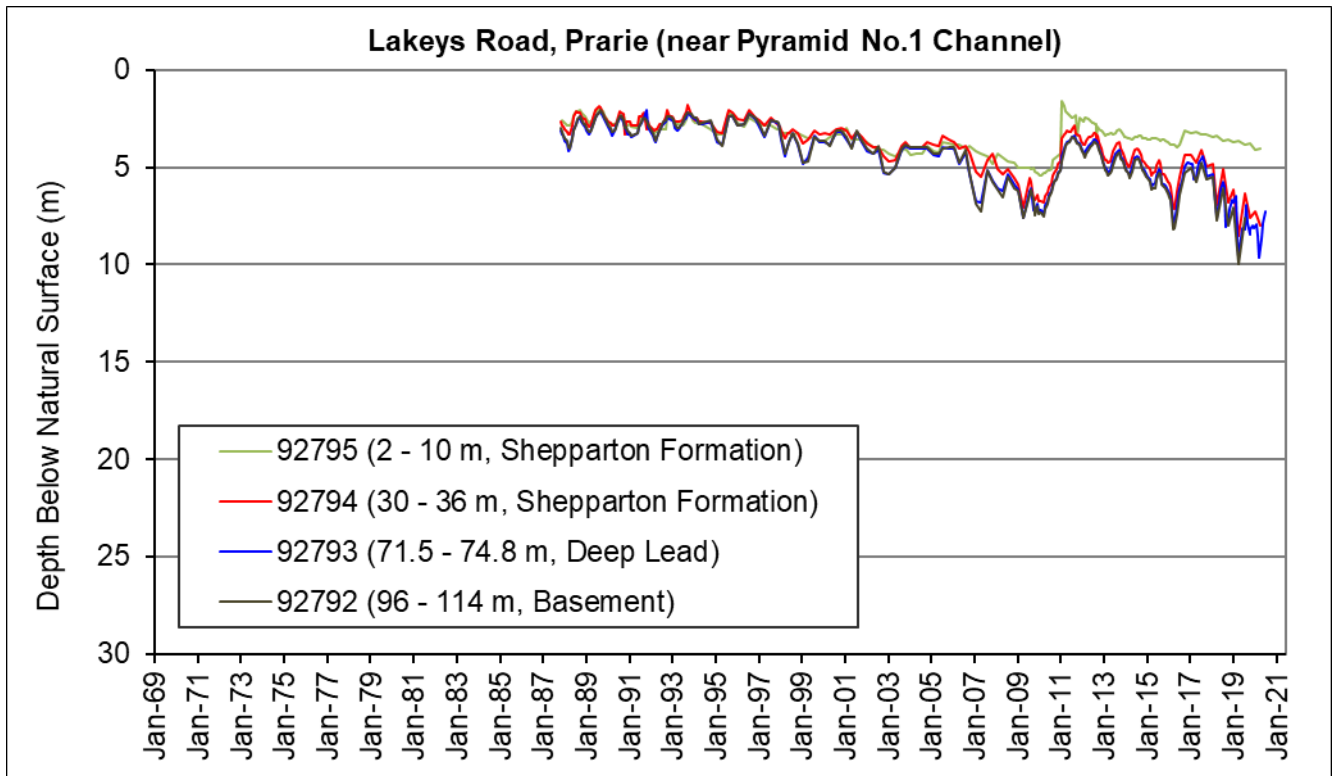


Laanecoorie-Serpentine Zone – 1012





Jarklin Zone – 1013



Appendix C – Groundwater quality results

Analytical chemistry results are provided for key monitoring bores. Further groundwater quality information is available on the Water Measurement Information System at <https://data.water.vic.gov.au>

| | | Bore: | 88214 | WRK059856 |
|--|----------|----------|------------|------------|
| | | Aquifer: | Deep Lead | Deep Lead |
| | | Date: | 31/10/2019 | 30/10/2019 |
| Analyte | Unit | | | |
| Conductivity @ 25°C | µS/cm | | 2700 | 3700 |
| pH | pH units | | 8.6 | 7.2 |
| Ionic balance | % | | 14.5 | 15.4 |
| Total Anions | meq/L | | 27 | 43 |
| Total Cations | meq/L | | 20 | 32 |
| Ion Balance - TDS (EC) vs TDS | mg/L | | 2.1 | 1.8 |
| Total Alkalinity, as CaCO ₃ | mg/L | | 190 | 210 |
| Bicarbonate Alkalinity, CaCO ₃ | mg/L | | 170 | 210 |
| Calcium, as Ca | mg/L | | 14 | 55 |
| Carbonate Alkalinity, as CaCO ₃ | mg/L | | 15 | 2 |
| Chloride, as Cl | mg/L | | 780 | 1200 |
| Hydroxide Alkalinity, as CaCO ₃ | mg/L | | 2 | 2 |
| Potassium, as K | mg/L | | 8 | 9 |
| Sodium, as Na | mg/L | | 330 | 640 |
| Ammonia, as N | mg/L | | 0.1 | 0.5 |
| Nitrite, as N | mg/L | | 0.01 | 0.01 |
| Nitrate, as N | mg/L | | 0.01 | 0.01 |
| Nitrate + Nitrite, as N(0.003d) | mg/L | | 0.01 | 0.01 |
| Sulphate, as SO ₄ | mg/L | | 71 | 240 |
| Total Kjeldahl Nitrogen, as N | mg/L | | 0.1 | 0.5 |
| Total Nitrogen, as N | mg/L | | 0.1 | 0.5 |
| Arsenic, as As | mg/L | | 0.001 | 0.006 |
| Iron, dissolved as Fe | mg/L | | 0.01 | 0.81 |
| Mercury, as Hg | mg/L | | 0.0001 | 0.0001 |
| Magnesium, as Mg | mg/L | | 62 | 87 |
| Manganese, dissolved as Mn | mg/L | | 0.06 | 0.19 |
| Total Dissolved Solids, 180C | mg/L | | 1300 | 2100 |
| Total Organic Carbon | mg/L | | 1.7 | 1.7 |
| Turbidity, NTU | NTU | | 0.6 | 11 |
| Phosphorus, total as P | mg/L | | 0.05 | 0.08 |
| Lead, dissolved (ICP-MS) | mg/L | | 0.001 | 0.001 |
| Nickel, dissolved (ICP-MS) | mg/L | | 0.001 | 0.001 |
| Cadmium, dissolved (ICP-MS) | mg/L | | 0.0002 | 0.0002 |
| Chromium, dissolved (ICP-MS) | mg/L | | 0.001 | 0.001 |
| Copper, dissolved (ICP-MS) | mg/L | | 0.001 | 0.01 |
| Zinc, dissolved (ICP-MS) | mg/L | | 0.001 | 0.016 |

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