Katunga
Water Supply Protection Area
Groundwater Management Plan

Annual Report

For year ending 30 June 2021

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Document History and Distribution

Versions

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Draft v2	31 August 2021	Andrew Harbour	Document review and edits
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Final	Charmaine Quick Managing Director	23 September 2021	Review and approval
Final	The Hon. Lisa Neville MP Minister for Water	27 September 2021	
Final	Ms Chris Cumming Chief Executive Officer, Goulburn Broken Catchment Management Authority	27 September 2021	

Foreword

Goulburn-Murray Water (GMW) is pleased to present the annual report for the *Groundwater Management Plan for the Katunga Water Supply Protection Area* (the Plan) for the 2020/21 water year.

GMW is responsible for implementation and administration of the Plan, which was approved by the Minister administering the *Water Act 1989* on 24 July 2006.

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

The 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:

Executive summary

The *Groundwater Management Plan for the Katunga Water Supply Protection Area* (the Plan) was approved on 24 July 2006 by the Minister for Water (the Minister).

In 2017, a consultative committee appointed by the Minister in accordance with section 32G of the *Water Act 1989* (the Act) recommended amendments to the Plan. The Minister approved the amendments on 22 August 2017, including a new method for determining restrictions, simplification of trading rules, salinity monitoring requirements and the establishment of a groundwater reference group.

For the first time since the Plan was amended in 2017, licence holders had access restricted to 70 per cent of their licensed volume in the 2020/21 water year. This is a result of the new restriction method in the amended version of the Plan.

Recorded use in the 2020/21 water year was 26,093.2 ML, or 43 per cent of the total licence entitlement volume, which is 20 percent less than use during the 2019/20 water year.

There was substantially less permanent trade activity in the WSPA during 2020/21 than during 2019/20. There were 8 permanent transfers totalling 615.0 ML/yr, which is 3,308.8 ML/yr less than 2019/20.

Groundwater monitoring and metering programmes continue to support the implementation of the Plan.

Groundwater monitoring shows that aquifer recovery levels generally rose above the 2019/20 recovery level. However, a declining trend remains for the five year average recovery level.

The Katunga Groundwater Reference Group met for the third time since formation, via videoconference on 15 September 2020.

Contents

1 Introduction

1.1 Purpose

This report has been prepared to meet the requirements of Prescription 7 of the *Groundwater Management Plan for the Katunga Water Supply Protection Area* (DSE, 2006) (the Plan) and section 32C of the *Water Act 1989* (the Act).

This report provides an overview of groundwater resource status and summarises the groundwater management activities undertaken in accordance with the Plan during the 2020/21 water year (1 July 2020 to 30 June 2021).

1.2 Water Supply Protection Area

The Katunga Water Supply Protection Area (WSPA) is located in the Murray and Goulburn Valleys, extending from Yarrawonga in the east to Barmah in the west, and from the River Murray in the north down to Wunghnu in the south. The WSPA incorporates the townships of Numurkah, Cobram, Nathalia, Katunga and Katamatite.

The WSPA boundary has been set to manage groundwater resources at a depth of greater than 25 metres (m) below the ground surface. The overlying groundwater resources are managed in accordance with the *Shepparton Irrigation Region Groundwater Management Area Local Management Plan.*

There are thre management zones in the WSPA: North Western Dryland Zone (1061), Numurkah-Nathalia Zone (1062) and Cobram Zone (1063), 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 24 July 2006 by the Minister for Water (the Minister), in accordance with section 32A(6) of the Act.

In 2017, a consultative committee appointed by the Minister in accordance with section 32G of the Act recommended amendments to the Plan. The Minister approved the amendments on 22 August 2017, including a new method for determining restrictions, simplification of trading rules, salinity monitoring requirements and establishment of a groundwater reference group.

The objective of the Plan is to make sure the groundwater resources within the WSPA are managed in an equitable and sustainable manner. When allocations are made under the Plan, all groundwater licence holders in the WSPA are treated in the same manner.

The Plan enables annual allocations to be set to manage groundwater extraction. The intent of the annual allocation process is to maintain groundwater access for groundwater users.

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.

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

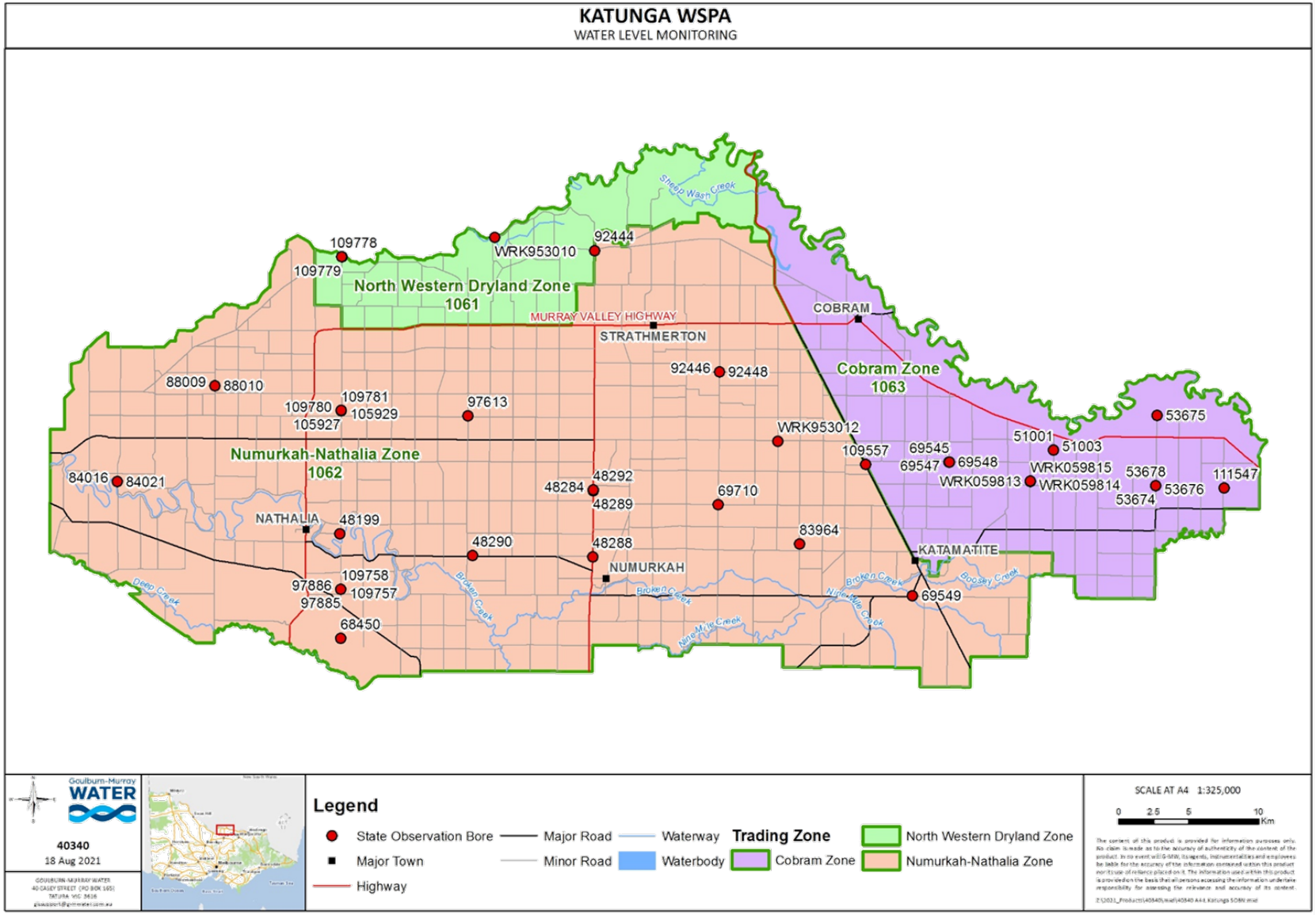


Figure 1 Katunga Water Supply Protection Area

2 Groundwater Management

2.1 Licence entitlement volume

The Minister declared a permissible consumptive volume of 60,577 megalitres per year (ML/yr) for the WSPA in March 2013 (Victorian Government, 2013).

At 30 June 2021 the total licence entitlement volume in the WSPA was 60,202.9 ML/yr. 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 Katunga WSPA in 2020/21

Management zone	Licences	Licensed bores	Licence entitlement volume (ML/yr)
North Western Dryland Zone (1061)	20	21	5,000.2
Numurkah-Nathalia Zone (1062)	178	201	34,360.7
Cobram Zone (1063)	67	80	20,842.0
Total	**265**	**302**	**60,202.9**

Note: Data extracted from the Victorian Water Register on 30 June 2021.

2.2 Groundwater allocations

Following amendments to the Plan in 2017, the method for determining annual groundwater allocations was revised – refer Prescription 2 of the Plan. Allocations are now assessed by calculating the average of annual maximum groundwater recovery levels for 7 key monitoring bores (listed in Schedule 1 of the Plan), from the previous 5 water years (i.e. a 5-year rolling average). The allocation is determined by comparing the 5-year rolling average of recovery levels to the trigger levels listed in Table 2, and illustrated on Figure 2.

Table 2 Trigger levels to determine annual allocations in the Katunga WSPA

Trigger level, depth below natural surface (m)	Annual allocation
21.0 and above	100%
21.1 to 24.0	70%
Below 24.1	70%, and review undertaken by GMW, in consultation with Katunga Groundwater Reference Group

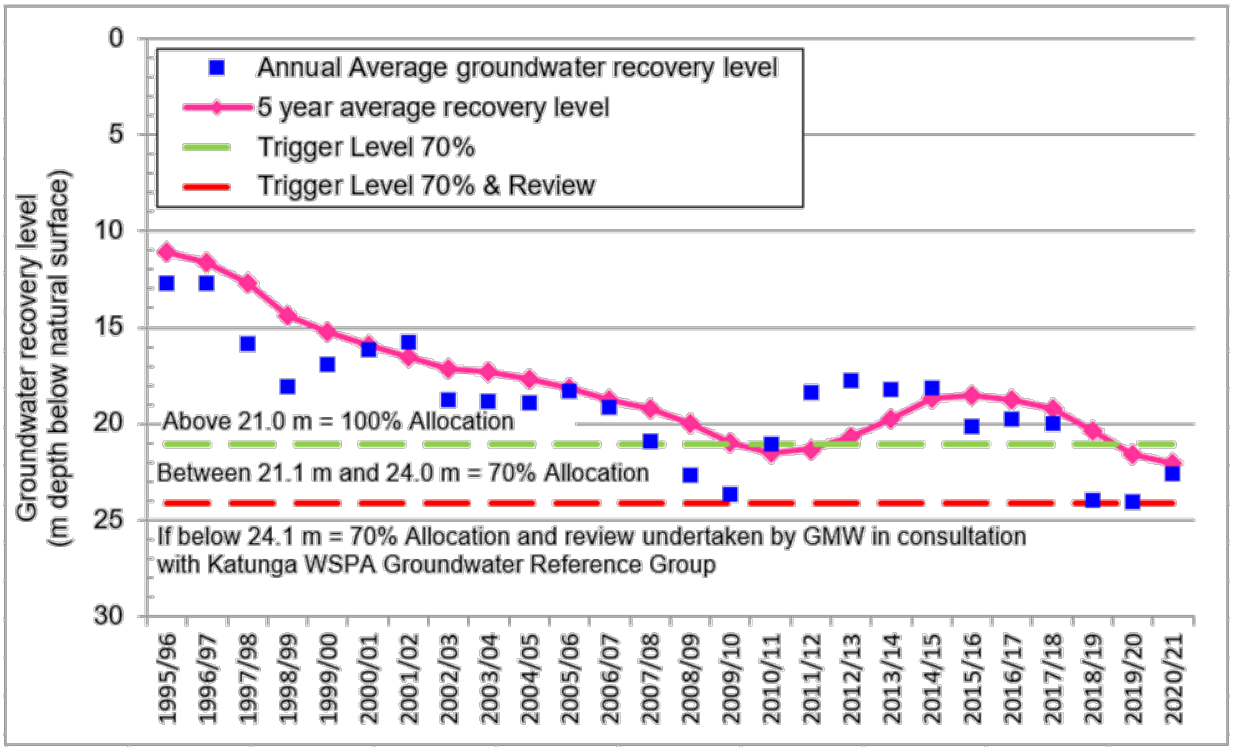


Figure 2 Trigger graph for determining allocations for the Katunga WSPA

Table 3 presents the maximum recovery levels of each of the seven key monitoring bores over the last seven water years, the average of those maximum levels for each water year, and the five-year average for 2018/19, 2019/20 and 2020/21 which were used to determine the allocations for 2019/20, 2020/21 and 2021/22 water years, respectively.

All monitoring records for these seven bores are provided in Appendix B.

Table 3 Calculation of five-year rolling averages from maximum recovery levels for key monitoring bores in the Katunga WSPA

Bore ID	Bore screen depth (m)		Max. recovery level by water year; depth below natural surface (m)					
		2014/15	*2015/16*	*2016/18*	*2017/18*	*2018/19*	*2019/20*	*2020/21*
48282	118-133	13.71	19.78	21.34	20.47	20.55	22.74	22.32
51001	100-118	20.00	21.41	20.17	20.41	28.53	27.18	22.62
69545	109-111	18.06	19.18	18.36	19.50	24.26	23.34	21.13
69710	122-124	18.63	19.89	19.43	19.64	23.96	24.05	22.77
83964	112-114	20.47	21.94	21.21	21.38	25.24	24.57	24.52
92446	134-135	18.68	20.15	19.50	19.92	23.83	24.09	22.91
97613	177-137	17.31	18.50	18.50	18.60	21.39	22.30	21.63
Average of max. recovery levels:		**18.12**	**20.12**	**19.79**	**19.99**	**23.97**	**24.04**	**22.56**
5-year rolling average of max. recovery levels:		***18.69***	***18.50***	***18.79***	***19.24***	***20.40***	***21.58***	***22.07***

2020/21 allocation

GMW determined an allocation of 70 per cent for the 2020/21 water year in the WSPA. The allocation was formally announced on 23 June 2020 by publication on GMW's website, advertisement in local newspapers (*Shepparton News* and *Country News*), and sending letters to licence holders in the WSPA.

The five-year rolling average of maximum recovery levels for the seven key monitoring bores was 21.58 m (depth below natural surface) in the 2019/20 water year ,which is above the 24.0 m trigger level but below the 21.0 m trigger level. This is a 1.18 m decrease since 2018/19.

2021/22 allocation

GMW determined an allocation of 70 per cent for the 2021/22 water year in the WSPA. The allocation was formally announced on 25 June 2021 by publication on GMW's website, advertisement in local newspapers (*Shepparton News*, Cobram Courier and Numurkah Leader), and sending letters to licence holders in the WSPA.

The five-year rolling average of maximum recovery levels for the seven key monitoring bores was 22.07 m (depth below natural surface) in the 2020/21 water year, which is above the 24.0 m trigger level but below the 21.0 m trigger level.

2.3 Groundwater use

Total recorded use in the WSPA in 2020/21 was 26,093.2 ML, or 43 per cent of the total licence entitlement volume (Figure 3). This is a 20 per cent decrease on the volume used in 2019/20. The decrease in use compared to 2019/20 is likely due to increased rainfall, a reduction in allocation from 100 per cent to 70 per cent, and increased surface water availability.

Note: recorded use refers to metered and deemed use.

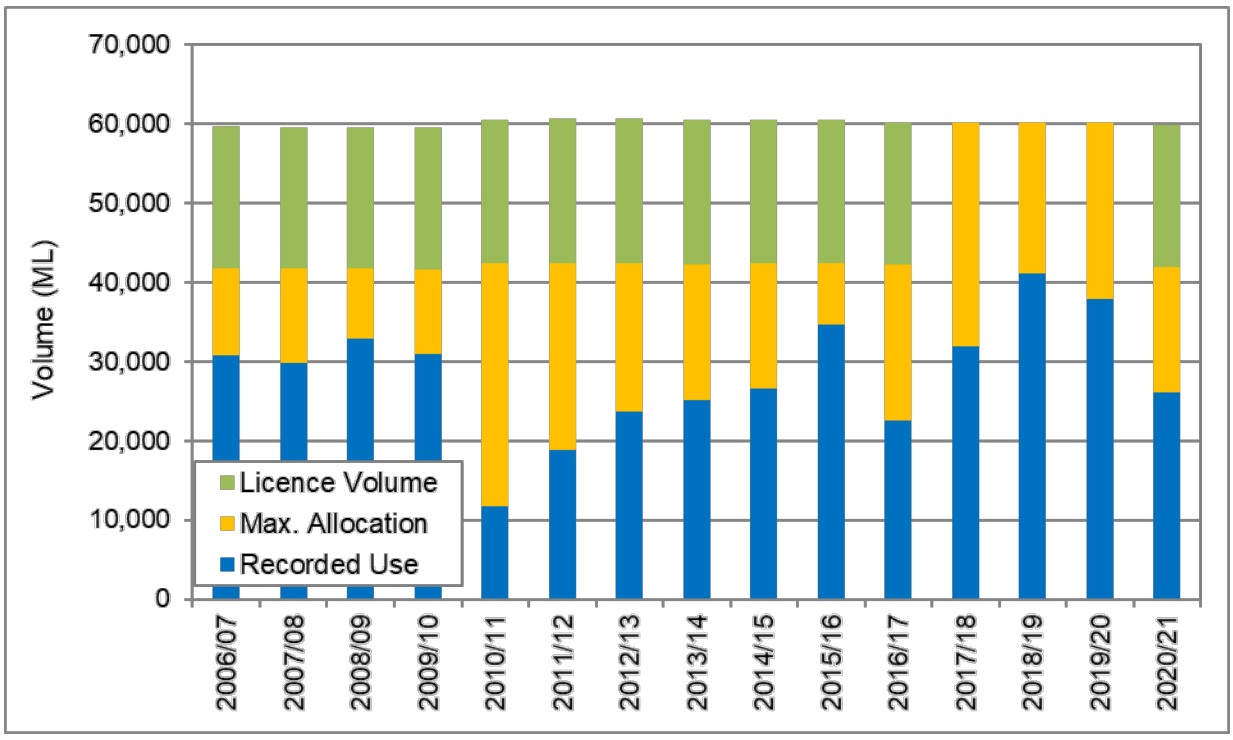


Figure 3 Entitlement, allocation and use in the Katunga WSPA, since 2006/07

Recorded use by management zone is provided in Table 4. Recorded use as a percentage of total licence entitlement volume was greatest in the Numurkah-Nathalia Zone (45 per cent) and lowest in the Cobram Zone (41 per cent).

Table 4 Recorded use in the Katunga WSPA in 2020/21

Management zone	Licence entitlement volume (ML/yr)	Recorded use (ML)	Proportion of total licence entitlement volume used
North Western Dryland Zone (1061)	5,000.2	2,212.9	44%
Numurkah-Nathalia Zone (1062)	34,360.7	15,420.7	45%
Cobram Zone (1063)	20,842.0	8,459.6	41%
Total	**60,202.9**	**26,093.2**	**43%**

Note: Data extracted from Irrigation Planning Module on 26 July 2021.

Groundwater use in the WSPA is heavily influenced by weather, as well as the availability and price of surface water, particularly in the Goulburn and Murray Declared Water Systems. Groundwater use increases during extended periods of dry weather and when surface water allocations are low.

2.4 Rainfall

Historical rainfall data, sourced from the Bureau of Meteorology weather station at Cobram (BOM, 2021), is presented in Figure 4 as an indicator of trends across the WSPA.

The data show that 2020/21 rainfall in the WSPA was above the long-term average of 468.8 mm.

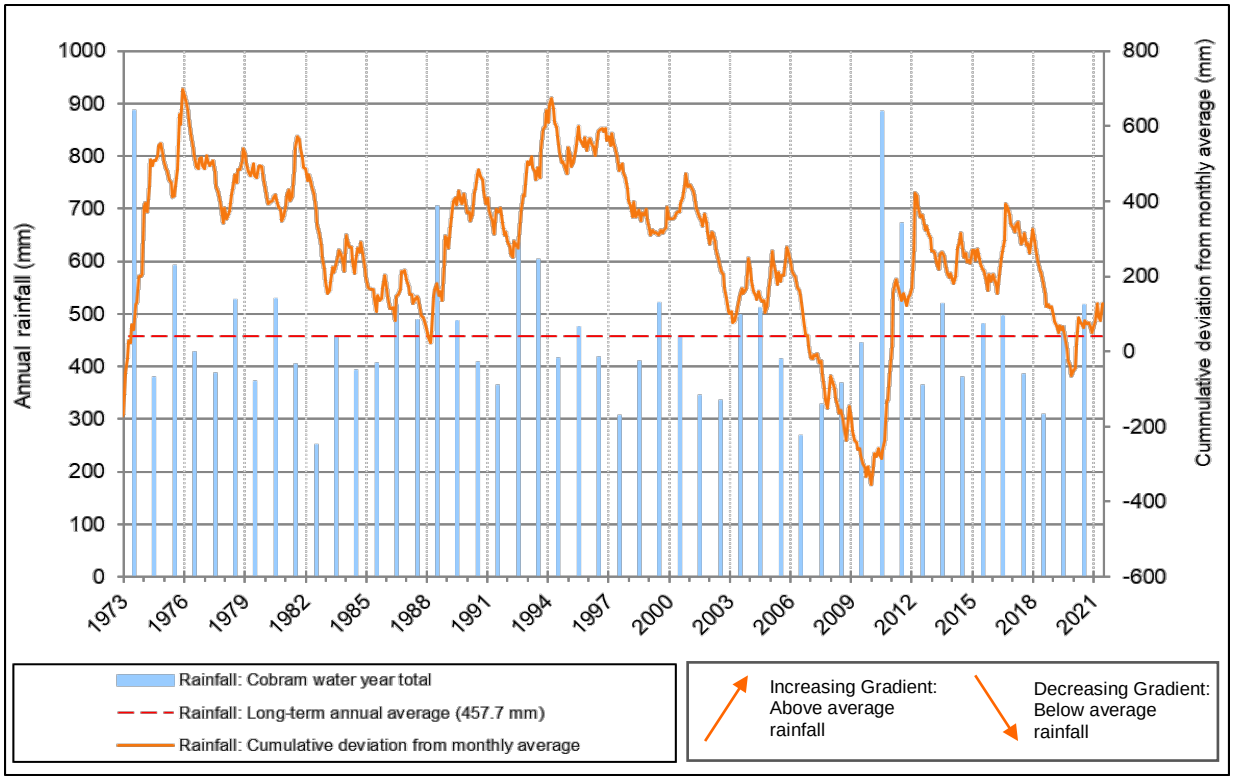


Figure 4 Rainfall recorded at Cobram (BOM, 2021)

2.5 Licence transfers

The Plan allows groundwater licence holders to temporarily or permanently transfer licence entitlement volume. Groundwater licence transfer activity for 2020/21 compared with previous water years is summarised in Figure 5. A detailed breakdown of licence transfer activity by management zone is provided in Table 5.

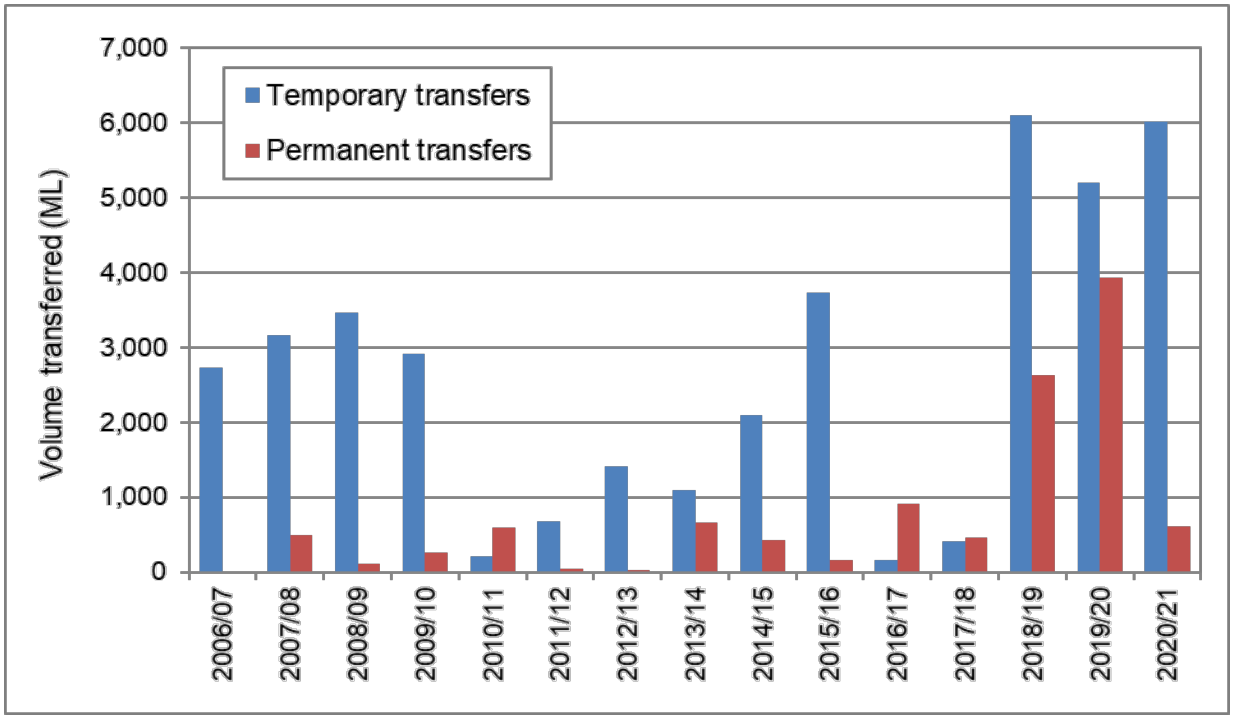


Figure 5 Licence entitlement volumes transferred in the Katunga WSPA. since 2006/07

Table 5 Licence transfers in the Katunga WSPA in 2020/21

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)
North Western Dryland Zone (1061)	1	95	3	205	2	24.0	-	-
Numurkah-Nathalia Zone (1062)	32	4,481.6	37	5,068.6	1	315.0	4	537.0
Cobram Zone (1063)	17	1,431.7	10	734.7	5	276.0	4	78.0
Total	**50**	**6,008.3**	**50**	**6,008.3**	**8**	**615.0**	**8**	**615.0**

During the 2020/21 water year there were eight permanent transfers, totalling 615 ML/yr. This is 3,308.8 ML/yr less than that permanently transferred in 2019/20.

Fifty temporary transfers totalling 6,008.3 ML occurred in 2020/21. This is 814.1 ML more than the total in 2019/20.

The 2017 amendments to the Plan relaxed trading rules by allowing new development through temporary transfers and removing the 20 per cent transfer to the environment that was applied to permanent transfers.

Rules were also introduced that allowed additional temporary transfer into areas which would previously have been refused under the original version of the Plan. These rules included the ability to temporarily

transfer up to 125 per cent of licence entitlement volume into areas where the intensity of entitlement would otherwise prevent such trade.

It is likely that the allocation of 70 per cent for the 2020/21 water year resulted in many licence holders needing to secure additional volume through temporary transfers, rather than in response to the drier (and higher use) water years of 2018/19 and 2019/20.

2.6 Metering

There were 194 metered service points and 104 deemed service points in the WSPA at 30 June 2021. All metered service points were read twice during 2020/21 and 78 meter-related activities were undertaken, including inspections, maintenance, battery replacements and new installations (Table 6).

Table 6 Metering activities in the Katunga WSPA in 2020/21

Metering activity	Year ending 30 June 2021
Total number of meters	194
Total number of meter reads	388
Meters installed or replaced	2
Meter inspection events	71
Meter maintenance events	3

2.7 Licence compliance

The Victorian Government and GMW have a zero-tolerance approach to unauthorised take of non-urban water. GMW is responsible for ensuring water users in northern Victoria comply with their licence conditions. Relevant actions, if required, are taken in accordance with GMW's Risk-Based Compliance and Enforcement Framework. Please visit www.gmwater.com.au/water-resources/water-use-compliance for more information.

There were no prosecutions or convictions relating to groundwater matters in the WSPA during the 2020/21 water year.

There were 25 instances of alleged unauthorised take of water (i.e. licence entitlement volume exceedance) in 2020/21. These incidents are being investigated and GMW will take action in accordance with GMW's Risk-Based Compliance and Enforcement Framework.

2.8 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 volume taken for 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 2020/21 water year, 40 licences to construct a bore for domestic and stock use were issued by GMW and the Victorian Water Register (combined) in the WSPA area. Thirty-two bore completion reports were received and processed by GMW.

3 Monitoring Program

3.1 Groundwater levels

The Plan requires that groundwater levels are monitored in seven State Observation Bores Network (SOBN) bores, specified in Schedule 1 of the Plan. The SOBN bores that were routinely monitored in the WSPA during the 2020/21 water year are shown in Figure 1 and hydrographs of the monitoring data are provided in Appendix B.

Monitoring data indicate that Deep Lead (comprising the Calivil Formation and the Lower Shepparton Formation) groundwater levels have steadily declined as groundwater development increased from 1990 onwards. This is represented by historical water levels in three nested bores on Langan Road in Katamatite (Figure 6). The drawdown level in the Langdon Road bores was not as significant during the 2020/21 season as has been seen in the three seasons prior.

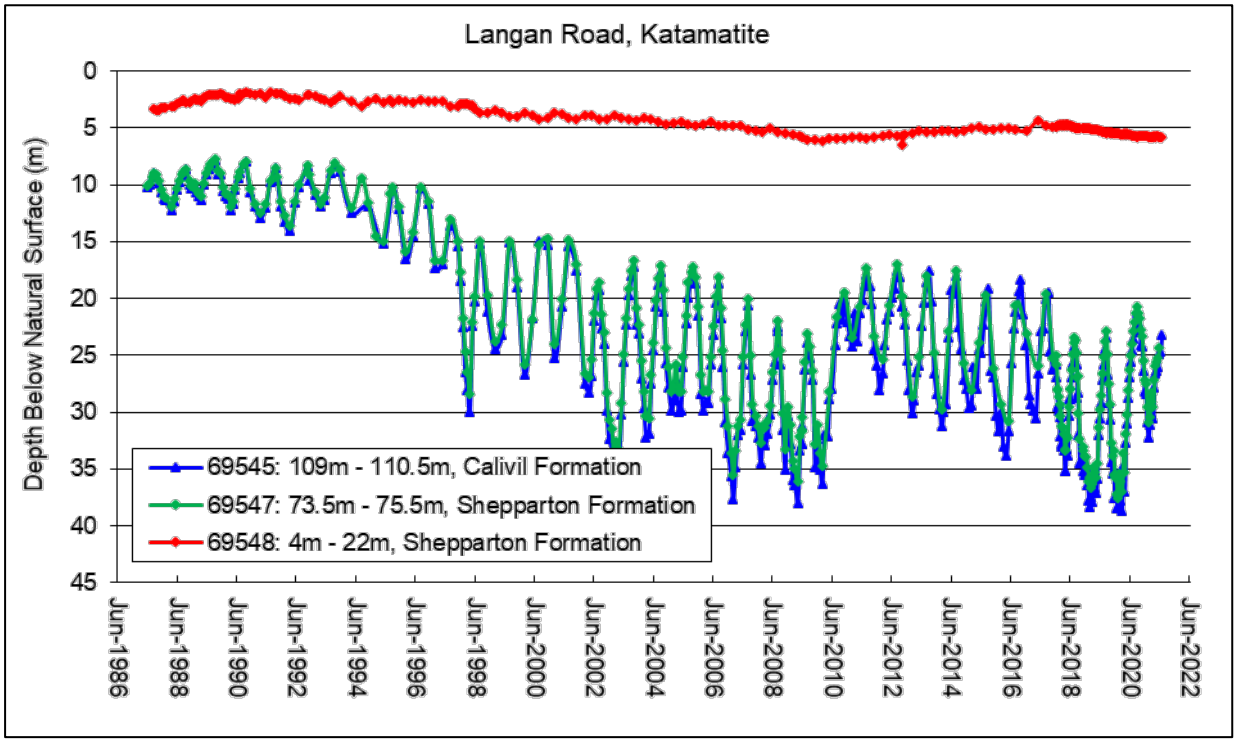


Figure 6 Groundwater monitoring in the Cobram Zone at Katamatite – June 1986 to June 2021 (DELWP, 2021)

3.2 Groundwater quality

The amended Plan requires GMW to sample bores specified in Schedule 1 of the Plan and have samples analysed for salinity once a year (Prescription 5). Locations of bores sampled are shown in Figure 1. Salinity measured in these bores is uploaded to the State groundwater database, the Water Management Information System. Sampling results from October 2020 are shown in Table 7 and the full suite of results are presented in Appendix C.

Table 7 Groundwater salinity results for bores sampled in 2020/21 in the Katunga WSPA

Management zone	Location	Bore ID	Depth of screened interval (m)	Aquifer screened	Salinity, as electrical conductivity (µS/cm)
North Western Dryland Zone (1061)	River Road, Barmah National Park	WRK953007	84 – 90	Calivil Formation	620
		WRK953008	36 – 39	Shepparton Formation	620
Numurkah-Nathalia Zone (1062)	Goulburn Valley Highway, Numurkah	48281	109 – 116	Calivil Formation	2,900
		48288	10 – 16	Shepparton Formation	2,900
	Goulburn Valley Highway, Yalca	*97613**	*137 - 139*	*Calivil Formation*	*1,900*
	James Bridge Road, Picola	84016	129 – 146	Calivil Formation	8,600
		84021	4.5 – 14.5	Shepparton Formation	34,000
Cobram Zone (1063)	Langan Road, Katamatite	69545	109 – 110.5	Calivil Formation	1,000
		69547	73.5 – 75.5	Lower Shepparton Formation	290
		69548	4 – 22	Shepparton Formation	440

Note: Additional salinity sampling occurred in 97613 to complement prescribed sites in Plan.

Time series groundwater salinity results in the Calivil Formation aquifer, presented in Figure 7, indicate that groundwater salinity levels have remained stable over the last six years, with the exception of 84021 which has had an increase in salinity over the last two readings (24,000 µS/cm in October 2019 to 34,000 µS/cm in October 2020). Ongoing comparisons of trends across a number of water years will be made in subsequent annual reports when more groundwater quality sampling is available.

Additionally, the Plan requires GMW to provide a sample bottle to any groundwater user in WSPA who requests one and to test the salinity level of returned samples. In 2020/21 no requests for sample bottles were received for the WSPA.

Domestic and stock groundwater users are also encouraged to submit a salinity sample from their groundwater bore. In accordance with the Plan, a user must contact GMW to register interest to be supplied with a sample bottle.

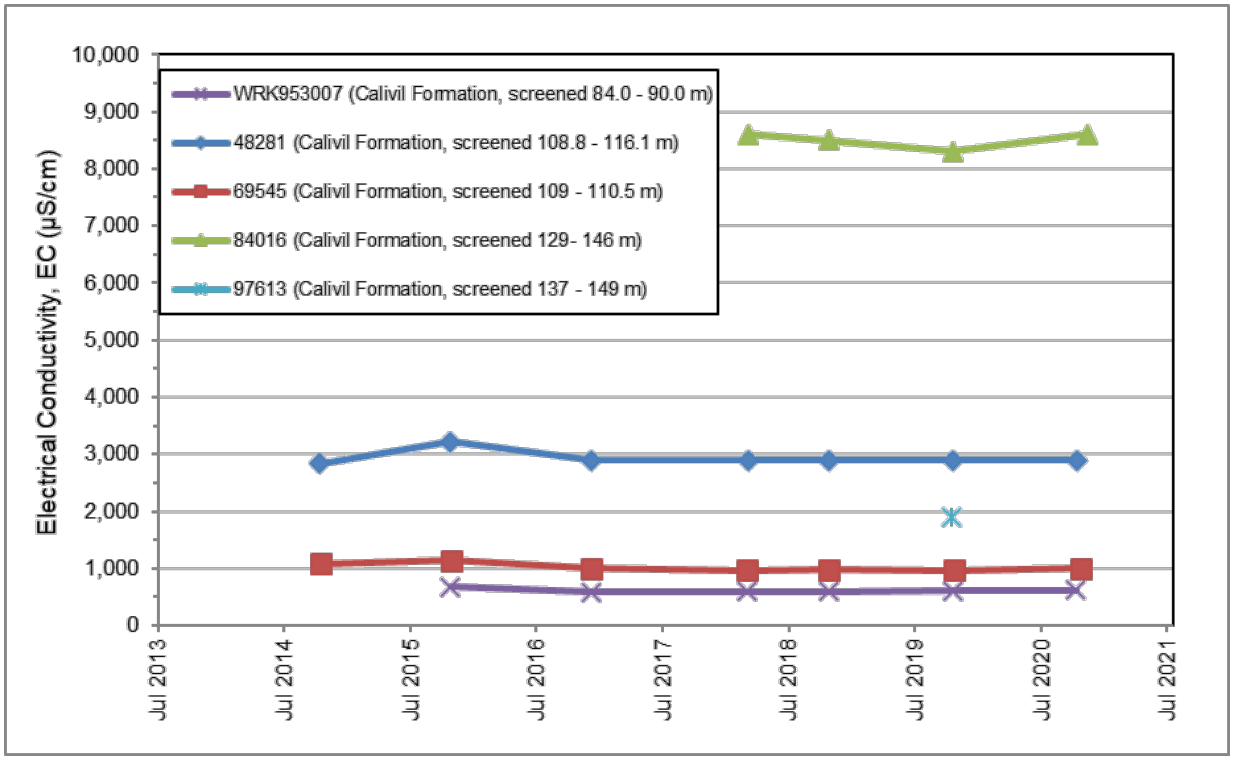


Figure 7 Salinity of groundwater in Calivil Formation monitoring bores in the Katunga WSPA (DELWP, 2021)

4 Administration and Engagement

4.1 Groundwater Reference Group

GMW appointed a Groundwater Reference Group comprising local landholders and representatives from Goulburn Valley Water, the Goulburn Broken Catchment Management Authority and GMW.

GMW met with the Groundwater Reference Group in Cobram on 15 September 2020.

Key points of discussion included:

- Actions from last meeting discussed
- Resource condition
- 2020/21 allocation and outlooks
- Plan implementation

4.2 Plan review

GMW will meet with the Groundwater Reference Group in November 2021 to present a summary of the 2020/21 water year and discuss any need to review the Plan.

5 References

Bureau of Meteorology (BOM), 2021. *Climate Data Online – Cobram station number 080109.* Retrieved on August 2021 from: http://www.bom.gov.au/jsp/ncc/cdio/wData/wdata?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=080109

Victorian Department of Environment, Land, Water and Planning (DELWP), 2021. *Water Measurement Information System*. Data retrieved in August 2021 from: https://data.water.vic.gov.au

Victorian Department of Sustainability and Environment (DSE), 2006. *Groundwater Management Plan for the Katunga Water Supply Protection Area.* Consolidated version incorporating amendment made in 2017. Department of Sustainability and Environment, Melbourne.

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

Water Act 1989 (Vic), viewed 30 June 2021, http://classic.austlii.edu.au/au/legis/vic/consol_act/wa198983/

Appendix A – Assessment of activities against Plan prescriptions

<table>
<tr><th>Prescription</th><th>Activity</th><th>Compliant</th></tr>
<tr><td colspan="3">PRESCRIPTION 1 Limit on groundwater licences</td></tr>
<tr><td>GMW must not approve an application for a groundwater licence if the approval of the application would cause:
a) the total licensed volume within a 2 km radius of the proposed extraction site exceeding 3,700 ML/year; or
b) the following zone limits to be exceeded.
<table>
<tr><th>Management zone</th><th>Zone limit (ML/year)</th></tr>
<tr><td>North Western Dryland Zone (1061)</td><td>6,500</td></tr>
<tr><td>Numurkah-Nathalia Zone (1062)</td><td>No limit</td></tr>
<tr><td>Cobram Zone (1063)</td><td>25,000</td></tr>
</table>
</td><td>No applications were approved that contravened Prescription 1.</td><td>Yes</td></tr>
<tr><td colspan="3">PRESCRIPTION 2: Restrictions on taking groundwater</td></tr>
<tr><td>By 15 September 2017, and by 1 July each year thereafter GMW will:
a) determine the rolling average of the maximum annual groundwater recovery levels from the preceding 5 irrigation years for bores listed in Schedule 1 and announce a corresponding allocation for the subsequent irrigation season as detailed below:
<table>
<tr><th>Trigger level depth below natural surface (m)</th><th>Allocation</th></tr>
<tr><td>21.0 and above</td><td>100%</td></tr>
<tr><td>21.1 to 24.0</td><td>70%</td></tr>
<tr><td>Below 24.1</td><td>70% and review undertaken by GMW in consultation with Katunga Groundwater Reference Group</td></tr>
</table>
b) Announce allocations by listing them on its website, sending letters to all licence holders and placing public notices in local newspapers</td><td>a) Allocations were determined in accordance with the Plan methodology and a 70 per cent allocation was announced on 23 June 2020.
b) All licence holders were informed by mail posted on 24 June 2020. Allocation information was also published on the GMW website and public notices announcing the revised 2020/21 allocation were printed in the Shepparton News and Country News.</td><td>Yes</td></tr>
</table>

Prescription	Activity	Compliant
PRESCRIPTION 3 Transfer of a groundwater licence		
3.1 GMW may approve a permanent transfer of a groundwater licence provided relevant matters have been considered and: a) zone limits in Prescription 1 will not be exceeded; and b) the total licensed volume within 2 km of an applicant's bore will be less than 3,700 ML/year; or c) where the total licensed volume within 2 km of an applicant's bore is equal to or greater than 3,700 ML/year, the permanent transfer is from other licence holders within a 2 km radius of the applicant's bore.	All applications were assessed with regard to this prescription.	Yes
3.2 GMW may approve a temporary transfer of a groundwater licence provided relevant matters have been considered and: a) zone limits in Prescription 1 will not be exceeded; and b) the total licensed volume within 2 km of an applicant's bore will be less than 3,700 ML/year; or c) where the total licensed volume within 2 km of an applicant's bore is equal to or greater than 3,700 ML/year – i. the applicant's licensed volume in one water season will not exceed 125% of their permanent licensed volume prior to any temporary trade occurring; or ii. the temporary transfer is from other licence holders within a 2 km radius of the applicant's bore	All applications were assessed with regard to this prescription.	Yes
PRESCRIPTION 4 Metering of licensed take		
4.1 GMW will: a) ensure that a meter is fitted to new licensed bores; b) read each meter at least once a year and record take in appropriate database(s); and c) if GMW is unable to measure the volume of water taken through a meter it may: i. make an estimate of take; or ii. request the licence holder to provide a meter reading	All new bores continue to be metered. Meter readings recorded at least once annually.	Yes

Prescription	Activity	Compliant
PRESCRIPTION 5 Groundwater level monitoring		
5.1 GMW will: a) obtain groundwater levels from bores used for allocation assessments (listed in Schedule 1) on a monthly basis. If a bore used for allocation assessments becomes defective an alternative bore may be monitored and the defective bore should be decommissioned. The alternative bore will be selected by consensus between DELWP and GMW. b) undertake water level monitoring at appropriate locations throughout the Katunga WSPA to: i. assess annual and long-term impact on water levels from groundwater pumping; ii. monitor regional and local seasonal drawdown; and iii. monitor the impacts of groundwater pumping generally across the Katunga WSPA and in areas of high intensity groundwater pumping.	a) Groundwater levels for allocation assessments are being obtained on a monthly basis. b) Water level monitoring is undertaken at appropriate locations in Katunga Water Supply Protection Area.	Yes
5.2 DELWP will manage the State observation bore network so that: a) continuous regional baseline monitoring is maintained to provide sufficient information to identify changes in groundwater resource availability and condition; b) State observation bores are properly maintained; and c) data collected from the bores is entered into the groundwater database, within 30 days after it has been collected.	a) Baseline monitoring is being supported by DELWP. b) State observation bores are maintained by DELWP. Data collected from the bores is entered into the groundwater database by DELWP.	Yes
PRESCRIPTION 6 Groundwater salinity monitoring		
6.1 GMW must: a) sample bores specified in Schedule 1 and have the samples analysed at an accredited laboratory for salinity once a year; b) enter salinity measured in bores referred to in Schedule 1 to the State groundwater database; and c) provide a sample bottle to any groundwater user in the Katunga WSPA who requests 1, test the salinity level of returned samples and provide the results to the groundwater user.	a) Bores specified in Schedule 1 were sampled and analysed for salinity in October 2019. b) Salinity results were entered into the State groundwater database. c) No groundwater users in the WSPA requested a sample bottle in 2020/21.	Yes
PRESCRIPTION 7 Annual reporting		
By 30 September each year GMW will prepare an annual report on the enforcement and administration of the Plan. The report will be provided to the Minister and the Goulburn Broken Catchment Management Authority and made publicly available on GMW's website.	An annual report was prepared by GMW and provided to the Minister and the Goulburn Broken Catchment Management Authority on 29 September 2020. The annual report was also published on GMW's website.	Yes

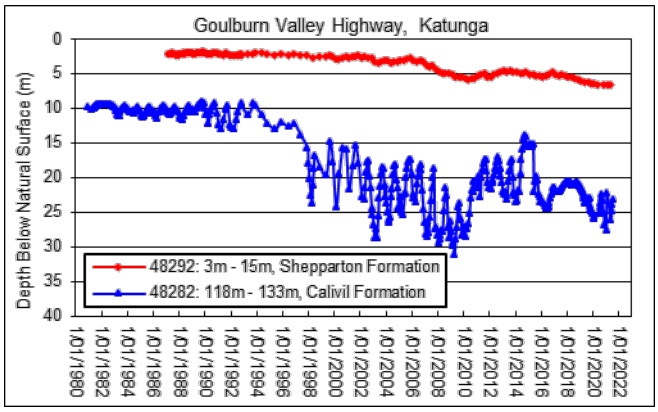
Appendix B – Groundwater level data

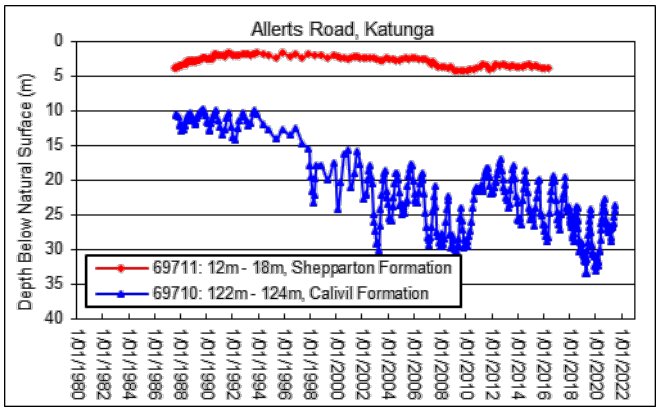
Schedule 1 bores

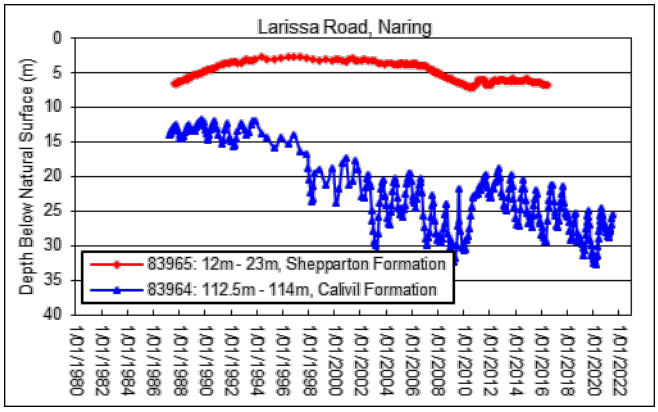
Hydrographs are provided for key monitoring bores listed in Schedule 1 of the Plan. All data is sourced from the Water Measurement Information System (DELWP, 2021). Note: monitoring of some bores has ceased.

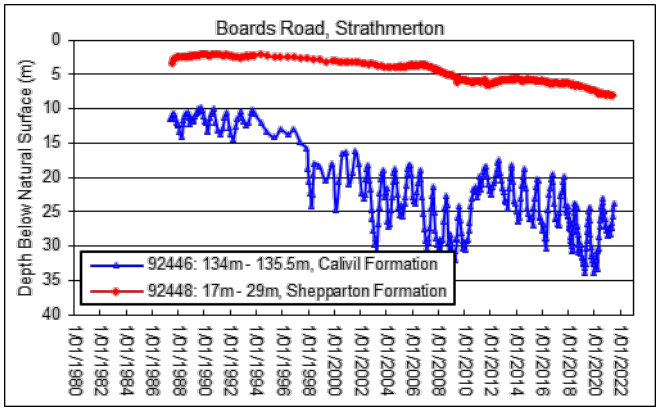
Further groundwater level information is available on the Water Measurement Information System at https://data.water.vic.gov.au

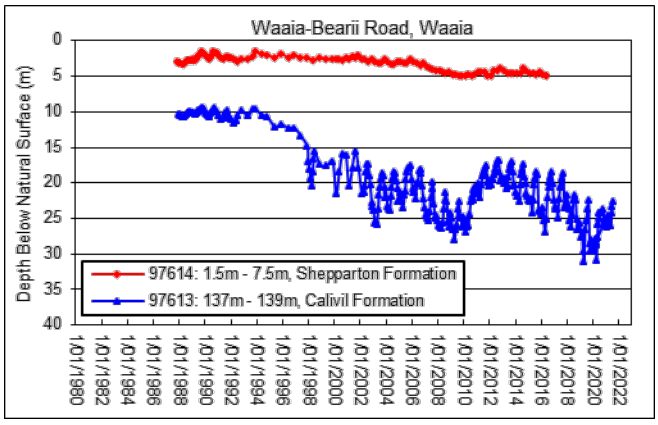
Numurkah-Nathalia Zone (1062)



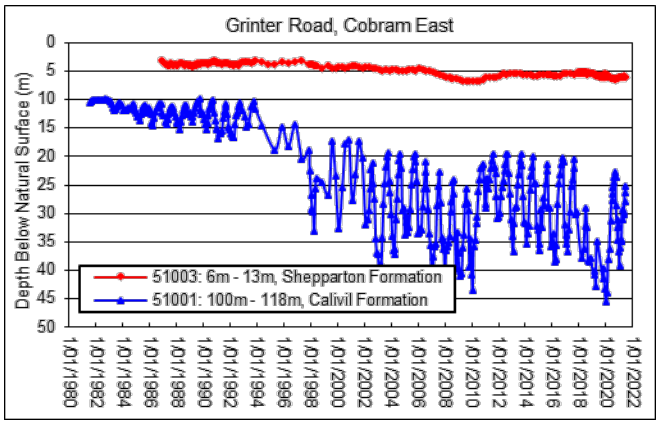


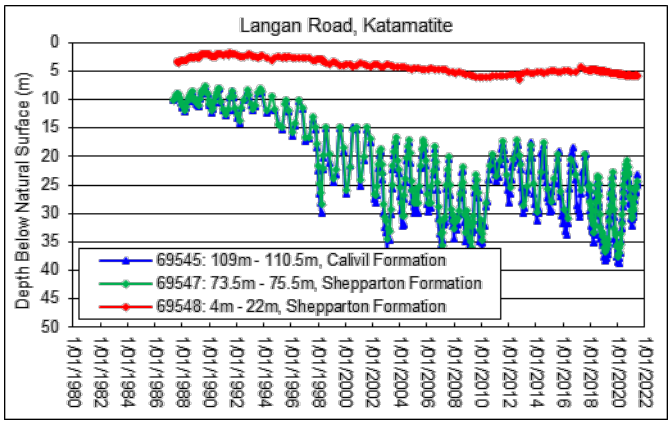






Cobram Zone (1063)

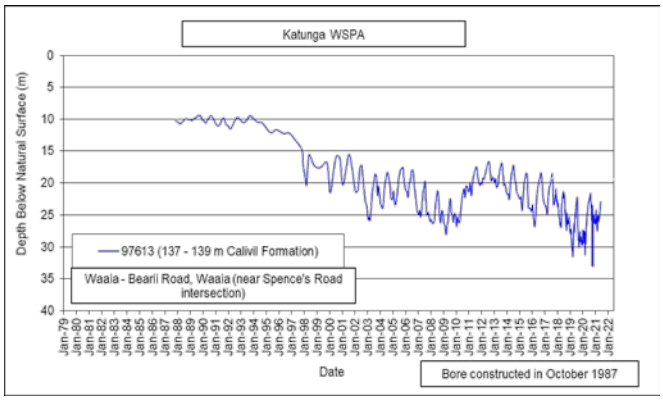


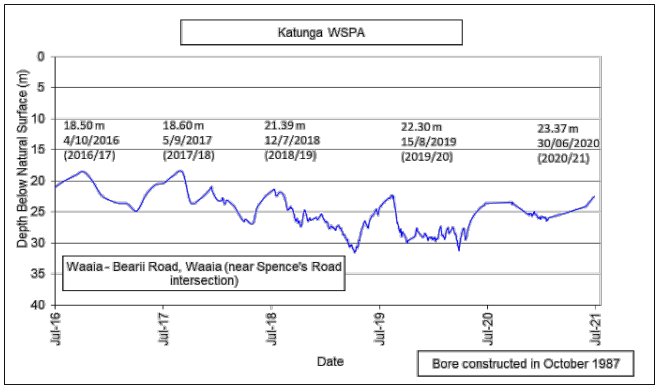


Allocation assessment bore levels

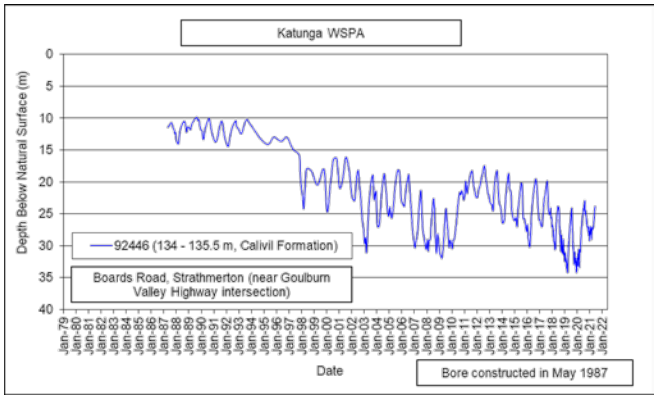
The 2021/22 allocations were determined using the 7 SOBN trigger bores listed Schedule 1 of the Plan. The available data used for this determination are shown in the hydrographs below. The hydrographs on the left side of each row show the full monitoring record for the allocation trigger bore and the hydrographs on the right show the last 5 years only.

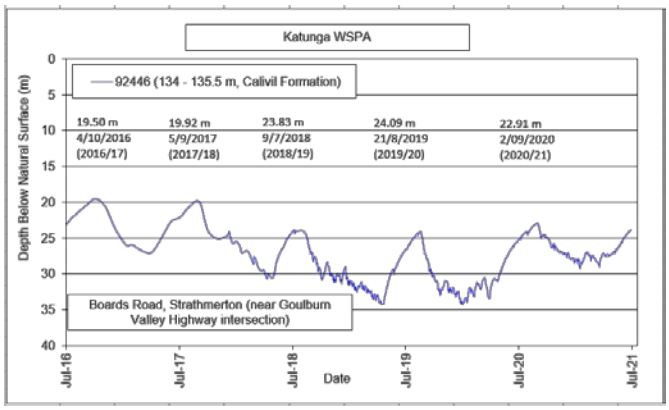
Bore 97613



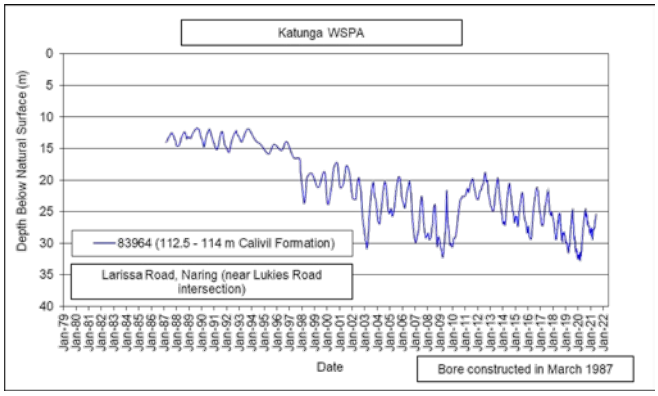


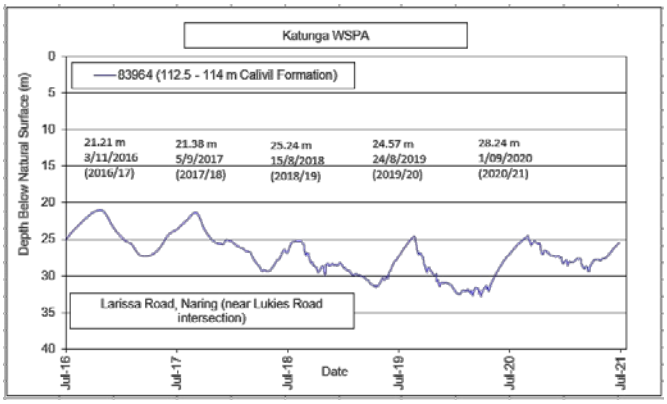
Bore 92446



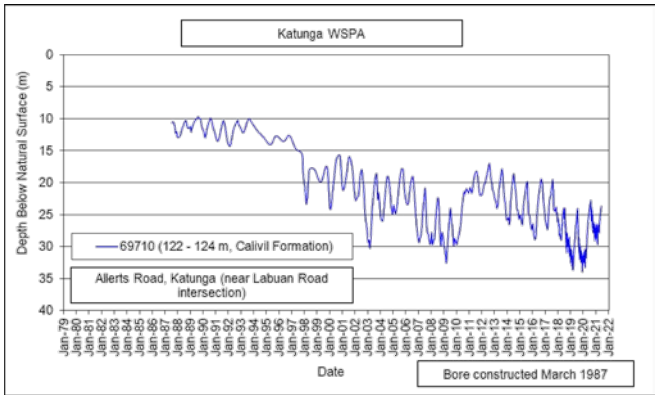


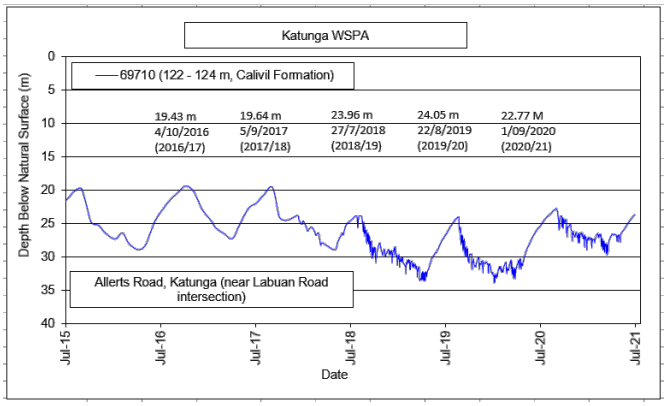
Bore 83964



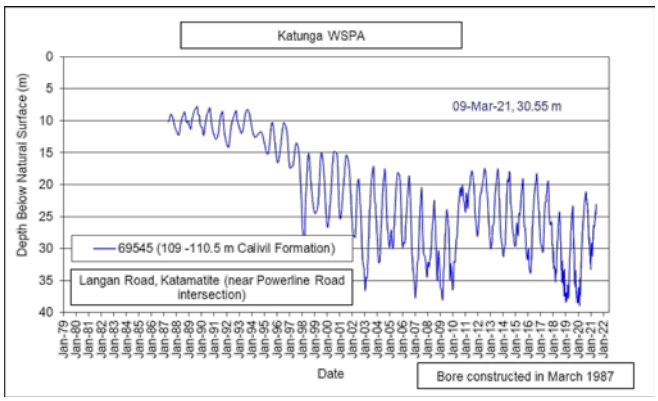


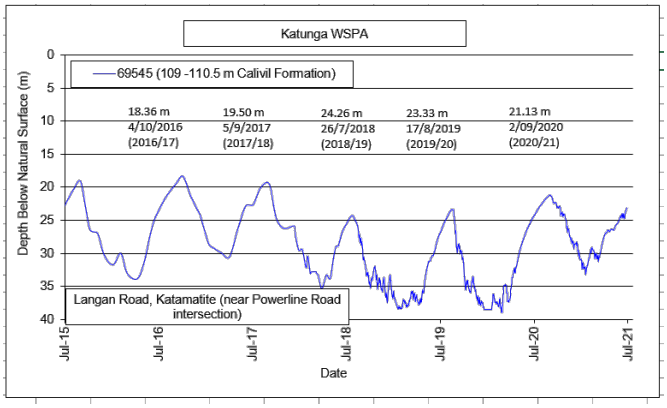
Bore 69710



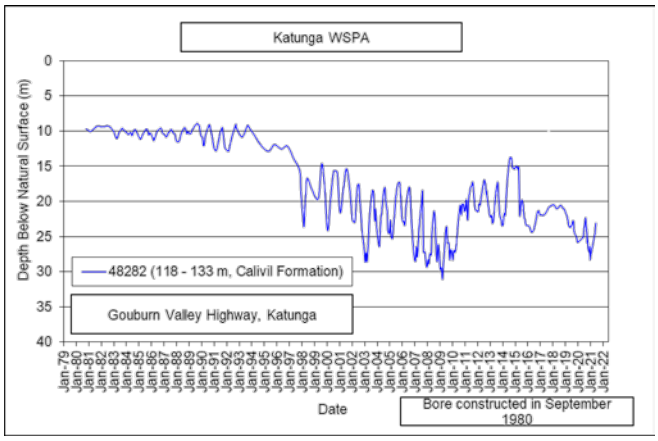


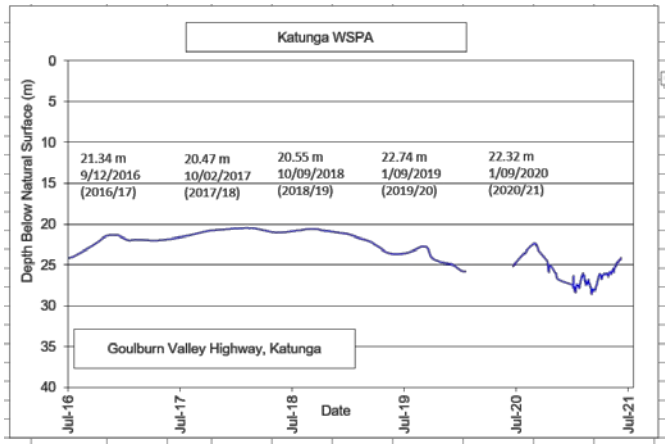
Bore 69545



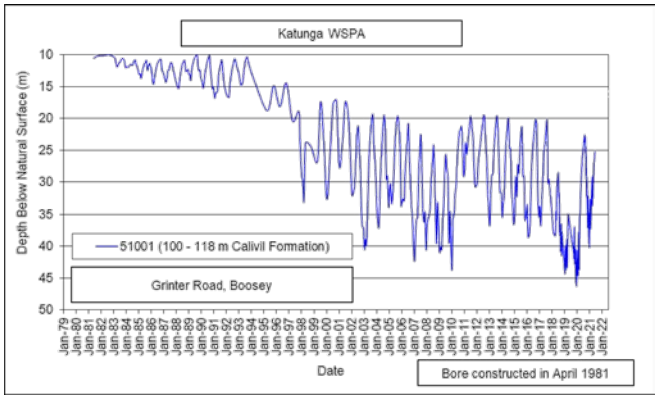


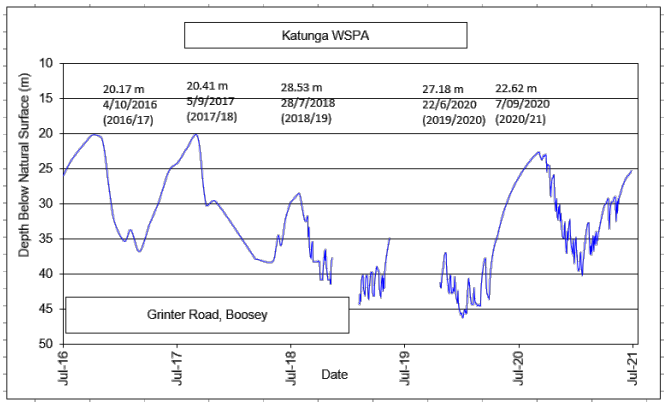
Bore 48282





Bore 51001





Appendix C – Groundwater quality results

Analytical chemistry results for 2020/21

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:	WRK953007	WRK953008	48281	48288	84016	84021	69545	69547	69548
	Aquifer:	Calivil Formation	Lower Shepparton Formation	Shepparton Formation	Upper Shepparton Formation	Calivil Formation	Upper Shepparton Formation	Calivil Formation	Lower Shepparton Formation	Upper Shepparton Formation
	Date:	15/10/2020	15/10/2020	1910/2020	15/10/2020	23/10/2019	20/10/2020	29/10/2020	29/10/2020	29/10/2020
Analyte	**Unit**									
Conductivity @ 25°C	µS/cm	620	620	2900	2900	8600	34000	1000	290	440
pH	pH units	7.1	7.2	7.2	6.8	8.7	7.3	7.4	7.4	7.2
Ionic balance	%	2.47	0.99	9.7	7.56	14.4	4.96	9.76	7.74	2.55
Total Anions	meq/L	6	7	30	32	86	440	10	3	4
Total Cations	meq/L	6	6	25	27	64	398	8	3	4
Ion Balance - TDS (EC) vs TDS	mg/l	1.7	1.7	1.9	1.9	1.8	1.7	1.8	1.5	1.6
Total Alkalinity, as CaCO3	mg/L	170	220	110	340	49	550	140	95	150
Bicarbonate Alkalinity, CaCO3	mg/L	170	220	110	340	40	550	140	95	150
Calcium, as Ca	mg/L	6.0	7	29	47	55	600	8.6	1.1	8.2
Carbonate Alkalinity, as CaCO3	mg/L	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chloride, as Cl	mg/L	66	42	830	770	3000	13000	200	24	31
Hydroxide Alkalinity, as CaCO3	mg/L	<2	<2	<2	<2	<2	<2	<2	<2	<2
Potassium, as K	mg/L	1	2	4	6	18	18	2.2	0.9	8.1
Sodium, as Na	mg/L	110	120	410	460	1,300	6,000	140	52	47

	Bore:	WRK953007	WRK953008	48281	48288	84016	84021	69545	69547	69548
	Aquifer:	Calivil Formation	Lower Shepparton Formation	Shepparton Formation	Upper Shepparton Formation	Calivil Formation	Upper Shepparton Formation	Calivil Formation	Lower Shepparton Formation	Upper Shepparton Formation
	Date:	15/10/2020	15/10/2020	1910/2020	15/10/2020	23/10/2019	20/10/2020	29/10/2020	29/10/2020	29/10/2020
Analyte	Unit									
Ammonia, as N	mg/L	<0.1	0.1	0.1	0.1	1.9	0.6	0.1	0.1	0.1
Nitrite, as N	mg/L	<0.01	<0.01	<0.01	0.2	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrate, as N	mg/L	0.06	0.02	0.03	1.5	0.01	0.01	0.08	0.01	2.9
Nitrate + Nitrite, as N(0.003d	mg/L	0.06	0.02	0.04	1.4	0.01	0.01	0.01	0.01	1.9
Sulphate, as SO4	mg/L	51	48	200	160	3	3000	51	17	15
Total Kjeldahl Nitrogen, as N	mg/L	<0.1	<0.1	0.5	0.4	2	1.8	<0.1	<0.1	1.2
Total Nitrogen, as N	mg/L	0.6	0.02	0.04	1.5	<0.01	<0.01	<0.01	<0.01	2.9
Arsenic, as As	mg/L	<0.001	0.002	<0.001	<0.001	<0.001	0.002	<0.001	0.002	<0.001
Iron, dissolved as Fe	mg/L	0.04	0.19	0.14	<0.01	<0.01	0.16	0.02	0.09	<0.01
Mercury, as Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Magnesium, as Mg	mg/L	11	10	62	59	51	1300	15	2	16
Manganese, dissolved as Mn	mg/L	0.003	0.02	0.17	0.049	0.085	12	0.096	0.032	0.003
Total Dissolved Solids, 180C	mg/L	350	370	1500	1500	4700	20000	550	190	270
Total Organic Carbon	mg/L	<0.5	<0.5	<0.5	2.3	1.8	5.1	0.7	<0.5	1.1
Turbidity, NTU	NTU	5.4	8.7	26	0.8	10	3.1	10	6	11
Phosphorus, total as P	mg/L	0.09	0.11	0.23	0.09	0.7	0.5	0.2	0.14	0.06
Lead, dissolved (ICP-MS)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel, dissolved (ICP-MS)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.034	0.035	0.044	0.003

Bore:		WRK953007	WRK953008	48281	48288	84016	84021	69545	69547	69548
Aquifer:		Calivil Formation	Lower Shepparton Formation	Shepparton Formation	Upper Shepparton Formation	Calivil Formation	Upper Shepparton Formation	Calivil Formation	Lower Shepparton Formation	Upper Shepparton Formation
Date:		15/10/2020	15/10/2020	1910/2020	15/10/2020	23/10/2019	20/10/2020	29/10/2020	29/10/2020	29/10/2020
Analyte	**Unit**									
Cadmium, dissolved (ICP-MS)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chromium, dissolved (ICP-MS)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001
Copper, dissolved (ICP-MS)	mg/L	<0.001	<0.001	<0.001	0.003	<0.001	0.002	<0.001	<0.001	0.002
Zinc, dissolved (ICP-MS)	mg/L	0.012	0.004	0.016	0.01	<0.001	0.014	0.013	0.007	0.009

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

Historic groundwater salinity data for key monitoring bores listed in Schedule 1 of the Plan