

Annual Bulk Entitlement Report

**Anglesea groundwater
2024-2025**

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1. Introduction

The Anglesea Borefield is one of several water sources that can supplement the existing Greater Geelong water supply system when storages are low. Our diverse water supply mix is part of a balanced approach to managing the region's water resources and providing greater water security.

Our access to groundwater from the Anglesea borefield is governed by a Bulk Entitlement, issued by the Victorian Government. This was issued by the Victorian Government in 2009 and continues to be reviewed and updated in line with the conditions stipulated in the bulk entitlement. The most recent review was completed in December 2024.

When in use, groundwater from the Anglesea Borefield is pre-treated at the Anglesea Pre-Treatment Plant before it is transferred to Wurdee Boluc Reservoir, where it is mixed with surface water from the Otway Ranges. Water from Wurdee Boluc reservoir is then filtered, chlorinated and fluoridated, before piped to smaller storage basins and tanks, and then delivered to homes and businesses in Anglesea, Aireys Inlet, Torquay, the Bellarine Peninsula and suburbs in the greater Geelong region.

Despite only being used a handful of times since its operation commenced, the Anglesea borefield remains a critical source of water for the Greater Geelong region.

During 2024-25, which is the reporting period covered by this annual report the following key activities and insights were observed:

- No water was extracted from the Anglesea Borefield
- Following two years of below average rainfall and dry climatic conditions resulting in significant decline in water storages, the Anglesea Borefield was prepared for operation to begin pumping in July 2025
- Routine monitoring continued in accordance with the Monitoring and Assessment Program (MAP)
- Monitoring included looking for any changes in the environmental values and health of groundwater dependent ecosystems and continues to build our understanding of the long-term sustainability of the groundwater resources into the future
- Due to the dry conditions, surface water sampling was unable to be taken at a number of monitoring sites due to no water being present during the scheduled routine sampling runs
- On 28 June 2022, Barwon Water submitted a request to Parks Victoria under section 27 to replace observation bore 115868, which is scheduled for decommissioning due to integrity issues. Approval for this request is still pending with Parks Victoria.
- Significant progress was made on the current 5 yearly Bulk Entitlement review which is planned to be approved and gazetted in 2026
- Key monitoring observations included:
 - **Salinity:** groundwater observation bore results indicate stable salinity trends and no evidence of saline intrusion at coastal bore P14. Surface water results show salinity generally increases downstream through both Salt Creek and Anglesea River catchments, reflecting natural salt accumulation and flushing processes.
 - **pH (acidity):** groundwater results were slightly acidic to neutral with shallow observation bores showing more variability than deep observation bores. Surface water results confirm a continuing trend of lower pH values at the downstream end of the Salt Creek and Anglesea River catchments below the swamps, consistent with acid generation and release from acid sulfate soils during wetting and drying cycles.
 - **Groundwater levels:** the trigger was not exceeded in 2024–25, with only a temporary decline in the P8 bore (Alluvial Swamp Aquifer) in February 2025 which can be attributed to the dry climatic conditions

2. Report Scope

In accordance with the Bulk Entitlement Order, Barwon Water must prepare an annual report, to be called an Annual Bulk Entitlement Report (Anglesea Groundwater) which must include the following information in respect of the 12-month period, 1 July 2024 to 30 June 2025:

- a) the daily amount of groundwater taken under the Order;
- b) the monthly amount of groundwater taken under the Order;
- c) the annual amount of groundwater taken under the Order and from each bore;
- d) the results of the water quality sampling carried out under the monitoring and assessment program;
- e) any period or periods of greater than 30 days during which the average of the daily groundwater levels in an observation bore was below a trigger level as provided for in clause 9 of the Order;
- f) any issues or difficulties experienced or anticipated by Barwon Water in implementing an approved program or restoring groundwater levels as provided for in clause 9 of the Order;
- g) any arrangements entered into with an existing groundwater user under clause 7 of the Order;
- h) the results of any independent arbitration under clause 18 of the Order to which Barwon Water is a party; and
- i) any difficulties experienced or anticipated by Barwon Water in complying with the Order and any remedial action taken or proposed by it.

3. Groundwater extraction (Clauses 16.1 A, 16.2 A, 16.2 B and 16.2 C)

The bulk entitlement stipulates the **maximum amount** of groundwater we're able to extract from the Anglesea borefield. Under the bulk entitlement Barwon Water is entitled to extract:

- 40 ML per day
- 10,000 ML in any year
- 35,000 ML in any 5-year period

During the 2024-25 reporting period no water was extracted from the Anglesea Borefield. Table 1 shows the daily extraction rates and Table 2 shows the total extraction per bore of the Anglesea Borefield during 2024-25.

Community engagement

Keeping the community and key stakeholders updated on Anglesea borefield operations and environmental monitoring is important. Barwon Water provides regular updates via the Surf Coast Shire's Anglesea River Advisory Group, that consists of representatives from:

- Surf Coast Shire Council
- Corangamite Catchment Management Authority (CCMA),
- Great Ocean Road Coasts and Parks Authority (GORCAPA)
- Department of Energy, Environment and Climate Action (DEECA)
- Alcoa
- Friends of the Anglesea River
- ANGAIR
- Wadawurrung Traditional Owners Corporation

In addition to this, Barwon Water continue to engage with the broader community via print and digital media, and our dedicated Your Say webpage.

In August 2024 we also held a community information drop-in session about the Anglesea borefield and our Bulk Entitlement review process.

Table 1: Total daily/monthly groundwater extraction 2024-25

Date	Groundwater extraction rates (ML)											
	Jul 2024	Aug 2024	Sept 2024	Oct 2024	Nov 2024	Dec 2024	Jan 2025	Feb 2025	Mar 2025	April 2025	May 2025	June 2025
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
31	0.0	0.0		0.0		0.0	0.0		0.0		0.0	
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prog. Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Flow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Min. Flow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ave. Flow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 2: Annual groundwater extraction by bore 2024-25

Production bores		Groundwater Extraction (ML)
MAP. ID	BE. ID	
GW1	(SPB1)	0
GW2	N/A	0
GW3	(SPB3)	0
GW4	(SPB4)	0
GW5	N/A	0
GW6	(NPB6)	0
GW7	(NPB7)	0
Annual total		0

4. Water quality sampling (Clause 16.2 D)

4.1 Groundwater quality

The 2014 MAP stipulates that groundwater salinity is to be measured twice a year at five deep observation bores (between 165 – 490m deep) as well as 11 shallow observation bores (less than 80m deep). The deep observation bores monitor the Upper Eastern View Formation (UEVF) and the Lower Eastern View Formation (LEVF), while the shallow observation bores monitor the alluvial swamp aquifer (ASA, previously referred to as the perched water table) as well as the UEVF and LEVF. The monitoring under the MAP utilises observation bores managed by Barwon Water, the State Government, and Alcoa. The results from this sampling are summarized below.

There are two bores identified in the MAP that monitor for saline intrusion, bore P14 in the LEVF and Coastal Bore 119349 in the UEVF. In 2020, DEECA advised that Coastal Bore 119349 was in poor condition and scheduled for decommissioning. Bore 119349 has since been replaced with Bore P21 which is now monitored for saline intrusion noting this bore is only required to be monitored if Alcoa are extracting water which did not occur during 2024-25.

Production bores

The MAP requires weekly monitoring of field salinity and temperature in each production bore (GW1-GW7) that is in operation when taking groundwater. The Anglesea Borefield was not operated during 2024-25. Given this, no field salinity readings were taken from the production bores.

Deep observation bores

The 2024-25 groundwater salinity results from the deep observation bores are provided in Table 3, while the results over the whole monitoring period (from April 2010 onwards) have been provided graphically in Figure 1. This figure depicts the salinity measurements against the groundwater extraction and recovery periods. A linear regression line has been developed for each site in order to compare the results over the monitoring period.

Laboratory testing of major cations and anions, salinity (TDS and EC), pH, and bromide (for bores P14) was also completed at these groundwater bores and has been provided in Appendix E.

Table 3: Groundwater Quality Results – Deep Observation bores

Bore ID	Aquifer	Depth (m)	Date	Field Parameters			Lab Result	
				Temp °C	pH	EC (µS/cm)	EC (µS/cm)	TDS (mg/L)
119348	LEVF	N/A	Jul-24	23.0	6.88	1296	1410	722
			Jan-25	22.3	7.49	1345	1330	675
SB2	UEVF	229	Jul-24	18.8	5.59	2039	1710	1100
			Jan-25	19.8	5.56	2032	2020	890
NB2	UEVF	165	Jul-24	14.9	5.78	2392	2030	1390
			Jan-25	17.8	5.78	2400	2290	1240
P14	LEVF	504	Jul-24	16.1	6.07	807	875	458
			Jan-25	17.4	6.00	797	838	498
P15	LEVF	466	Jul-24	14.4	5.10	884	801	636
			Jan-25	23.1	4.96	900	918	517

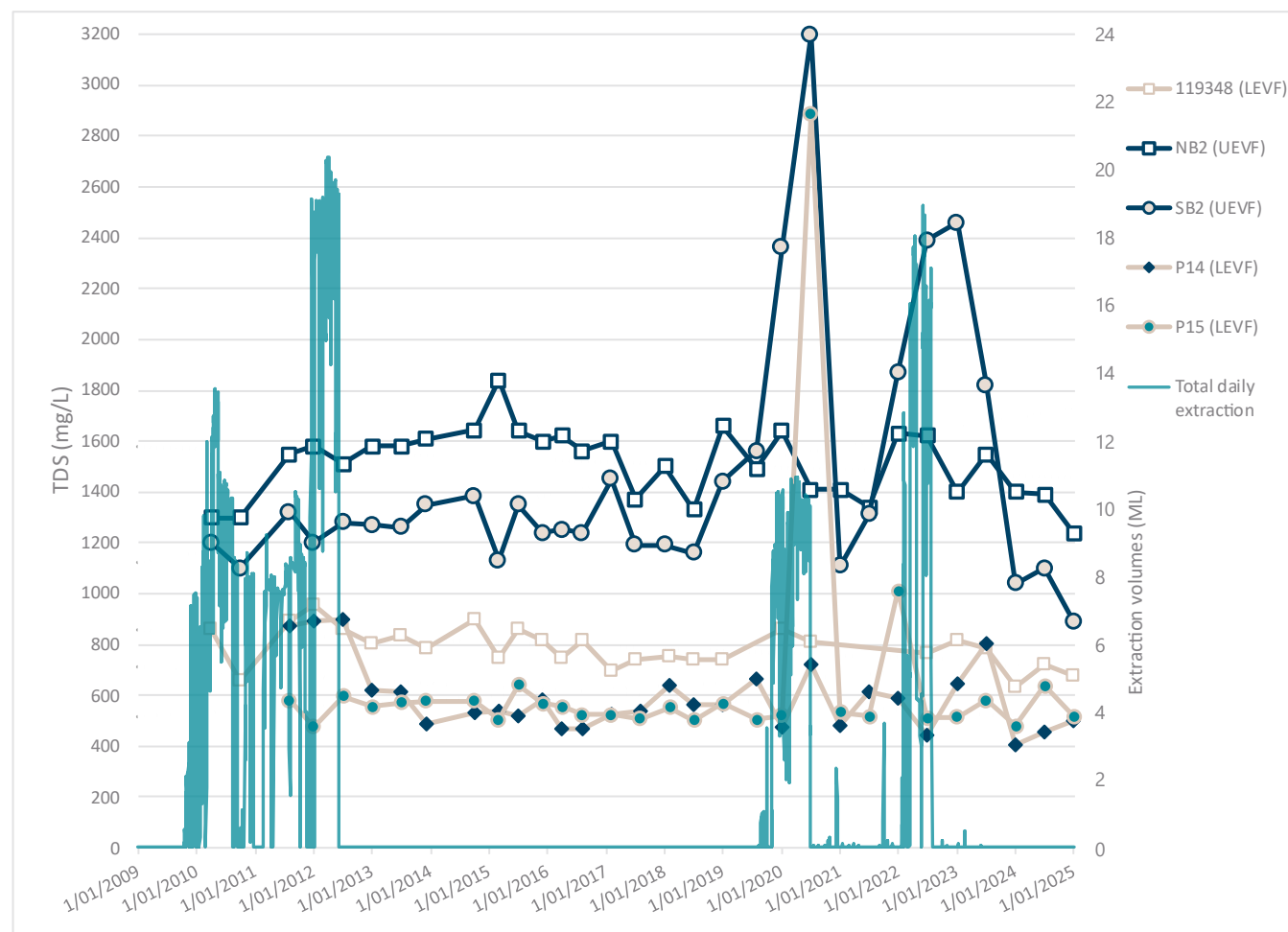


Figure 1: Groundwater quality results – deep observation bores

The field readings taken for the Electrical Conductivity (EC) are conducted during the bore purging process. Both the Total Dissolved Solids (TDS) and EC are taken to measure the salinity in groundwater samples. The TDS readings are measured in controlled laboratory conditions by weighing the residual solids that remain after the water from the sample is evaporated. This method is proven to be much more accurate than the EC readings, where an electrical current is passed through the sample and measured. Since the TDS yields more accurate results, these results have been used to analyse the trends in the groundwater salinity.

Given its proximity to the coastline, P14 is also tested for chloride and bromide to monitor for potential seawater intrusion. Testing began in December 2013 and has continued bi-annually since then. Seawater in an open ocean has a constant chloride/bromide ratio of approximately 285g/1g (285:1). Therefore, a decreasing chloride/bromide ratio, in conjunction with rising salinity can be indicative of saline intrusion. Results in Figure 2 show that there is no indication of saline intrusion at observation bore P14.

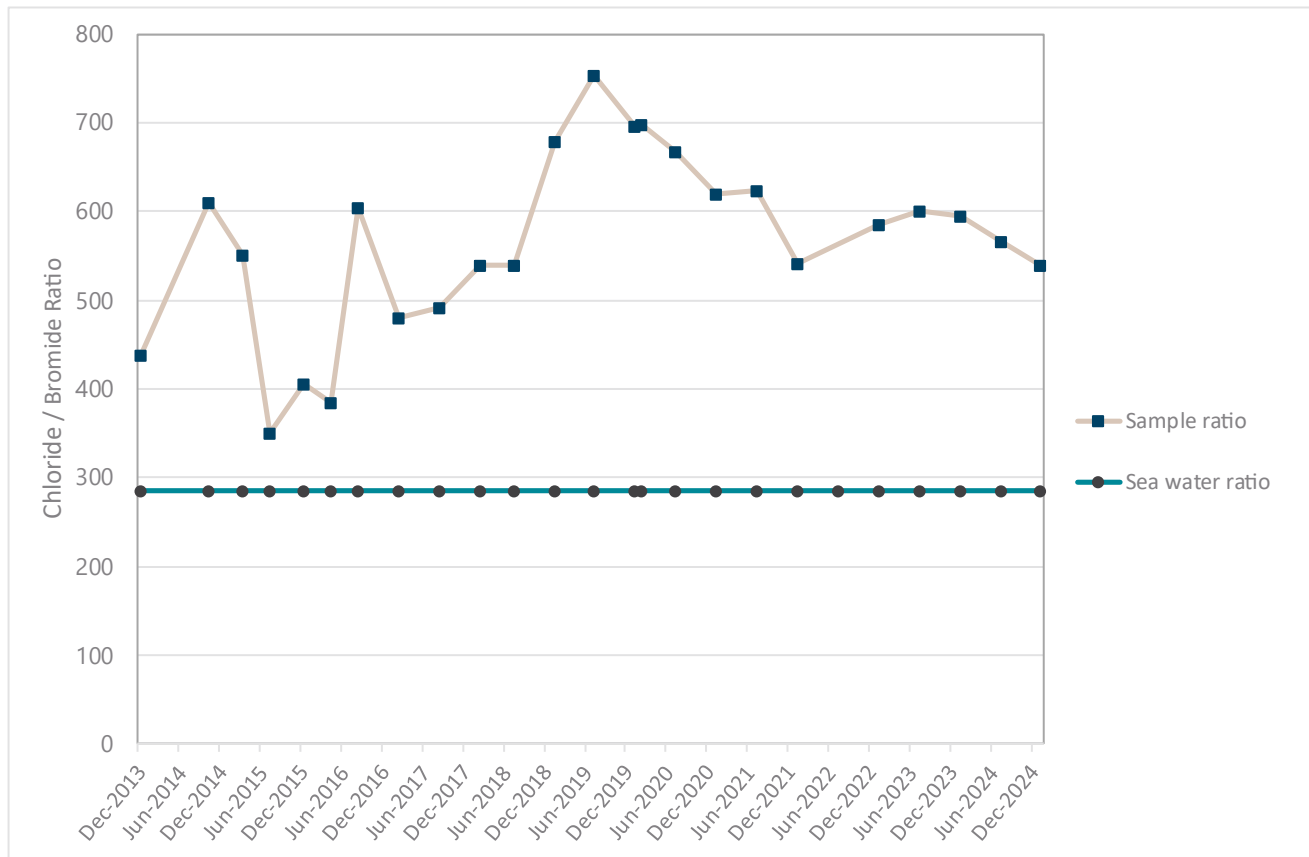


Figure 2: Chloride/bromide ratios over time. The trend remains above the 285:1 ratio associated with seawater. Hence there continues to be no indication of saline intrusion at P14 to date.

Shallow observation bores

The 2024-25 groundwater salinity results from the shallow observation bores are provided in Table 4. Groundwater salinity monitoring at the shallow observation bores commenced in April 2015, which provides the opportunity to look at longer-term trends. Figure 3 below shows the trend of each shallow observation bore over time using the data available.

The assessment of groundwater quality is primarily focused on salinity as the main indicator of changes in the aquifer system. Salinity levels in the ASA generally fluctuate more than in the upper or lower eastern view formations. This is potentially due to the variable nature of the water level in the ASA as a result of climatic conditions as well as ongoing flushing of acidity and metals from naturally occurring acid sulfate soils with the ASA. Results for shallow observation bore water level versus salinity level is provided in Appendix G.

Table 4: Groundwater Quality Results – Shallow Observation bores

			Field Parameters			Lab Result	
Bore ID	Aquifer	Date	Temp °C	pH	EC (µS/cm)	EC (µS/cm)	TDS (mg/L)
Anglesea River Catchment							
WTOB3	ASA	Jul-24	14.7	5.59	1461	1420	873
		Jan-25	15.5	5.38	1458	1510	985
P7B	ASA	Jul-24	11.8	4.66	1331	1520	778
		Jan-25	16.2	3.84	1481	1530	947
P8	ASA	Jul-24	11.2	5.12	2096	2180	1500
		Jan-25	16.7	5.15	2177	2220	1440
P19	UEVF	Jul-24	13.9	5.97	1204	1260	605
		Jan-25	17.8	5.77	1247	1220	682
P12	LEVF	Jul-24	13.5	5.85	1105	1180	587
		Jan-25	15.8	5.85	1166	1120	654
WTOB2	ASA	Jul-24	12.4	4.12	3028	2760	1730
		Jan-25	14.7	4.17	3232	3290	2220
Salt Creek Catchment							
P16	LEVF	Jul-24	11.6	4.45	347	347	496
		Jan-25	16.4	6.01	410	408	403
P17	ASA	Jul-24	10.3	6.74	708	1370	1030
		Jan-25	18.8	6.48	1398	1350	864
P1	ASA	Jul-24	11.0	6.06	382	377	496
		Jan-25	16.7	6.38	685	632	568
WTOB1	ASA	Jul-24	14.7	5.18	1221	1180	1670
		Jan-25	15.7	4.98	1262	1260	814

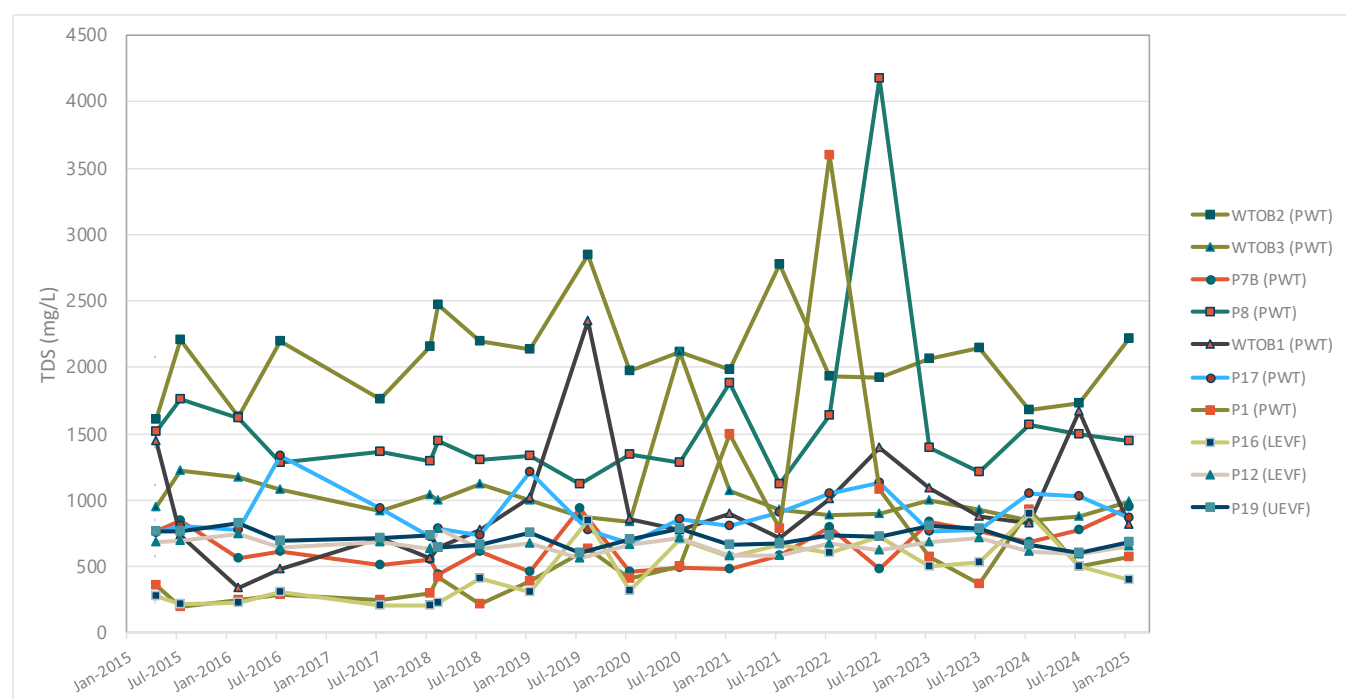


Figure 3: Groundwater quality results – shallow observation bores

4.2 Surface water quality – field testing

As outlined in the MAP 2014, Barwon Water monitors surface water quality at the sites listed in Table 5. The objective of this sampling is to;

- monitor baseline surface water quality, and monitor for any potential quality changes over time,
- assist in the assessment of groundwater and surface water interactions in many areas, by reviewing the water quality data collected over time, in conjunction with groundwater and surface water level monitoring,
- assist in the assessment of the process of acid generation in the catchments.

The water quality parameters tested are Electrical Conductivity (EC), Total Dissolved Solids (TDS), pH, Dissolved Oxygen (DO) and temperature. The location of the surface water sites has been provided in Appendix B and the results of the water quality testing is provided in Appendix C.

Table 5: Surface water quality sites – field testing

Catchment	BW ID	Site ID	SINo.	Site description	Monitoring frequency
Salt Creek	SV3	GS7	235274A	Breakfast Creek Tributary @ V notch	Monthly
	SV1	GS1	235273A	Breakfast Creek @ Road Bridge	Monthly
	SV4	GS2	235276A	Salt Creek @ Denhams Track	Monthly
	SV2	GS3	235222A	Salt Creek (Encoder) @ Alcoa	Monthly
	SGP2-B (pool)	N/A	235275A	Salt Creek (Pool) above swamp @ Denham Track	Monthly
Anglesea River	AGP1-B (pool)	N/A	235271A	Upper Anglesea River @ AARC	Monthly
	AV1	GS4	235270A	Upper Anglesea River @ AARC (V Notch)	Monthly
	AV3	GS6	235277A	Anglesea River @ Gumflats Road	Monthly
	ASP7 (pool)	N/A	235280A	Anglesea Swamp @ Vegetation Site P7	Monthly
	AGP2 (pool)	N/A	235272A	Anglesea Wetlands @ Allardyne Track	Monthly
	AV2	GS5	235260A	Anglesea River (Marshy Creek) @ Alcoa	Monthly

4.3 Surface water quality – laboratory testing

Barwon Water conducts laboratory sampling at all sites listed in Table 6 as outlined in the MAP 2014. This sampling is conducted biannually and the tested parameters include major cations and anions, salinity and pH. Water samples are taken by Australian Laboratory Services (ALS) to be independently tested. The full results from the laboratory testing of surface water sites are provided in Appendix D, with result for pH and EC provided below in Table 7 and Table 8.

Table 6: Surface water quality sites – laboratory testing

Catchment	BW ID	Site ID	SINo.	Site description
Salt Creek	SV3	GS7	235274A	Breakfast Creek Tributary @ V notch
	SV1	GS1	235273A	Breakfast Creek @ Road Bridge
	SV4	GS2	235276A	Salt Creek @ Denhams Track
	SV2	GS3	235222A	Salt Creek (Encoder) @ Alcoa
	AV1	GS4	235270A	Upper Anglesea River @ AARC (V Notch)

Anglesea River	AV3	GS6	235277A	Anglesea River @ Gumflats Road
	AV2	GS5	235260A	Anglesea River (Marshy Creek) @ Alcoa

Observations

The following trends have been identified from the surface water quality results taken from the field and laboratory testing:

- **Salinity:** As the water flows downstream through the swamp the salinity levels generally increase, although this can vary depending on catchment and climate conditions. The higher surface water salinities recorded at the downstream ends of both catchments reflects the storage and concentration of salts in the main swamps. These salts can remain stored in the swamps until sufficient rainfall is generated to flush them downstream into the Anglesea Estuary. This is demonstrated by the results in Table 7 which show field reading results from upstream to downstream in both the Salt Creek and Anglesea River catchment.

Table 7: Surface water results (2024-25), indicating increasing salinity (EC) from upstream to downstream through the Salt Creek and Anglesea River catchments

Date	Salt Creek				Anglesea River		
	235274A	235273A	235276A	235222A	235270A	235277A	235260A
	SV3	SV1	SV4	SV2	AV1	AV3	AV2
	Upstream -> Downstream				Upstream -> Downstream		
Jul-24	282	291	346	Dry	Dry	Dry	Dry
Aug-24	319	286	372	469	Dry	Dry	3830
Sep-24	360	308	317	450	Dry	Dry	5130
Oct-24	310	319	294	519	Dry	Dry	5600
Nov-24	291	Dry	298	810	Dry	Dry	6060
Dec-24	388	Dry	236	873	Dry	Dry	5630
Jan-25	365	Dry	Dry	Dry	Dry	Dry	6390
Feb-25	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Mar-25	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Apr-25	Dry	Dry	Dry	Dry	Dry	Dry	Dry
May-25	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Jun-25	470	Dry	326	120	602	Dry	Dry

Note: 'Dry' indicates that no water was present at the site at the time of sampling.

- **Acidity:** Table 8 shows field readings with a continuing trend of lower pH values generally being recorded at the downstream end of the Salt Creek and Anglesea catchments below the swamps. These results are consistent with the current understanding that the source of acidity in the catchments is due to the presence of actual and potential acid sulfate soils. When the catchments are subjected to wetting and drying cycles the pyritic sediments are oxidised, which causes acid generation in the swamps. The acid is released from the swamps as rainfall flushes the stored acid from the downstream end of the swamps to the estuary.

Table 8: Surface water results (2023-24 & 2024-25), indicating decreasing pH from upstream to downstream in the Anglesea catchment

Date	Salt Creek				Anglesea River		
	235274A	235273A	235276A	235222A	235270A	235277A	235260A
	SV3	SV1	SV4	SV2	AV1	AV3	AV2
Jul-23	6	6.6	6.6	4.6	6.1	Dry	3.16
Aug-23	6.8	6.2	6.7	4.8	5.6	Dry	3.06
Sep-23	5.1	5	6.3	4.3	5.3	Dry	3.25
Oct-23	5.4	5.4	6.1	4.4	5.8	Dry	3.29
Nov-23	5.2	6.3	6.1	Dry	Dry	Dry	2.97
Dec-23	6.9	6.2	6.7	3.8	5.5	Dry	2.97
Jan-24	5.1	5.7	6	4	5.2	Dry	2.95
Feb-24	4.9	5.9	5.9	Dry	Dry	Dry	2.6
Mar-24	4.8	Dry	6	Dry	Dry	Dry	Dry
Apr-24	5.3	Dry	No Access due to DEECA planned burn program	Dry	Dry	Dry	Dry
May-24	5.7	5.8	6.3	Dry	Dry	Dry	Dry
Jun-24	4.9	4.7	5.8	Dry	Dry	Dry	Dry
Jul-24	5.2	5.8	6.2	Dry	Dry	Dry	Dry
Aug-24	5.4	5.5	6.2	4.8	Dry	Dry	3.6
Sep-24	5.5	5.4	6.2	4.8	Dry	Dry	3
Oct-24	4.5	4.9	6.2	4.2	Dry	Dry	2.8
Nov-24	5.7	Dry	6.2	4.4	Dry	Dry	3.1
Dec-24	5.5	Dry	6.5	4.5	Dry	Dry	3.4
Jan-25	6	Dry	Dry	Dry	Dry	Dry	3.9
Feb-25	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Mar-25	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Apr-25	Dry	Dry	Dry	Dry	Dry	Dry	Dry
May-25	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Jun-25	5.4	Dry	6	6	5.7	Dry	Dry

Note: 'Dry' indicates that no water was present at the site at the time of sampling

5. Groundwater trigger levels (Clause 16.2 E)

The groundwater trigger levels were revised in 2014 following the Bulk Entitlement review. The revised trigger levels were established to prevent pumping induced changes in the hydraulic gradients between the different aquifer systems and thus, protect the environmental values and health of groundwater dependent ecosystems.

As outlined in the Bulk Entitlement, groundwater trigger levels are set for two bores in the Anglesea Swampland:

- Bore P19: Monitoring the Upper Eastern View Formation
- Bore P8: Monitoring the Alluvial Swamp Aquifer

The trigger mechanism accounts for the seasonal variation in the groundwater levels using groundwater levels measured at the reference bore P17. These trigger levels use daily recorded values, which are converted to a monthly average and are calculated based on the following formulae:

$$P8 = 0.3131 * P17 + 9.4666 - 2 \text{ Standard Deviations of Error}$$
$$P19 = 0.2391 * P1 + 16.82 - 2 \text{ Standard Deviations of Error}$$

The outputs from the trigger level monitoring are shown in Figure 4. At all times during 2024-25, the groundwater trigger was not exceeded. For the trigger to be exceeded, groundwater levels at both bores need to fall below a certain threshold level (also known as a 'trigger') for the month. For the month of February 2025, the P19 component of the trigger was not exceeded (groundwater levels remained above the threshold set for the month) whereas P8 was exceeded (groundwater levels fell below the threshold). While the groundwater levels in the ASA (P8) declined, our investigations showed there was no correlation to the groundwater levels in the UEVF (P19) and it is also important to note that there was no groundwater extraction during this time. This means the reduced water level in the ASA is most likely due to the dry conditions experienced in the previous months

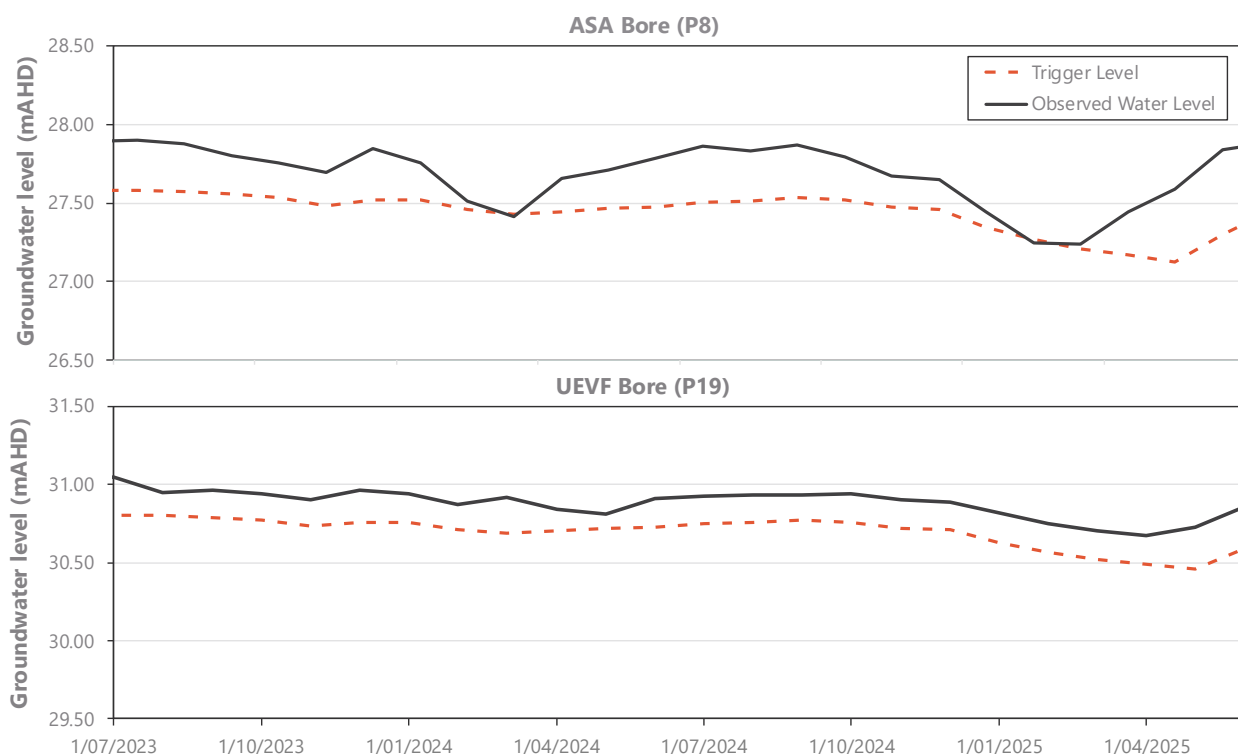


Figure 4: Past two years groundwater and trigger levels for P8 and P19 bores

6. Issues in implementing the program or restoring groundwater levels (Clause 16.2 D, 16.2 F)

6.1 Water quality sampling

Monthly water quality sampling is conducted at eleven surface water sites to observe pH, temperature, DO and EC. Some of the sampling sites were dry for a period of time during the past year. Water quality sampling could not be completed when a sampling site was dry.

6.2 Bulk Entitlement Minor Amendment

There is an error in the formula described in the Order that is used to calculate the trigger level in observation bore P19. This is a typographical error and it does not impact on the trigger levels; however, Barwon Water are currently working to adopt any improvements identified as part of the recent Bulk Entitlement review and incorporate them into the ongoing management of the Anglesea borefield through an application to amend our bulk entitlement. As part of this process, we have developed a new predictive trigger level approach.

6.3 Amendment to the Monitoring and Assessment Program (MAP)

There have been no amendments to the MAP in 2024-25 however, as outlined above Barwon Water are currently working to adopt any improvements identified as part of the recent Bulk Entitlement review and incorporate them into the ongoing management of the Anglesea borefield through an application to amend our bulk entitlement. This will include some changes to the MAP.

There are currently a number of observation bores that Alcoa own that are included in Barwon Water's monitoring and assessment program.

Bores that are no longer required for a specific purpose for Alcoa, are being decommissioned by Alcoa as a result. Decommissioned bores listed below are not all listed in the MAP but are listed to provide context for what has changed over the reporting period in the Anglesea catchment.

Decommissioned:

- WB9 Sept 2020
- WB10 Aug 2020
- WB13 Jun 2021
- WB17 May 2021
- Old MB1 June 2021

The current review of our bulk entitlement and environmental monitoring program will assess the most appropriate observation bores to be monitored through the monitoring program. Although a number of bores have been decommissioned, there has also been a number of new bores constructed by Alcoa that are also currently being monitored by Barwon Water and could be incorporated into an updated MAP.

7. Arrangements with existing groundwater users (Clause 16.2 G)

There have been no arrangements entered into that would trigger this clause.

8. Independent Arbitration (Clause 16.2 H)

Independent arbitration has not been necessary.

9. Difficulties in compliance with the order (Clause 16.2 I)

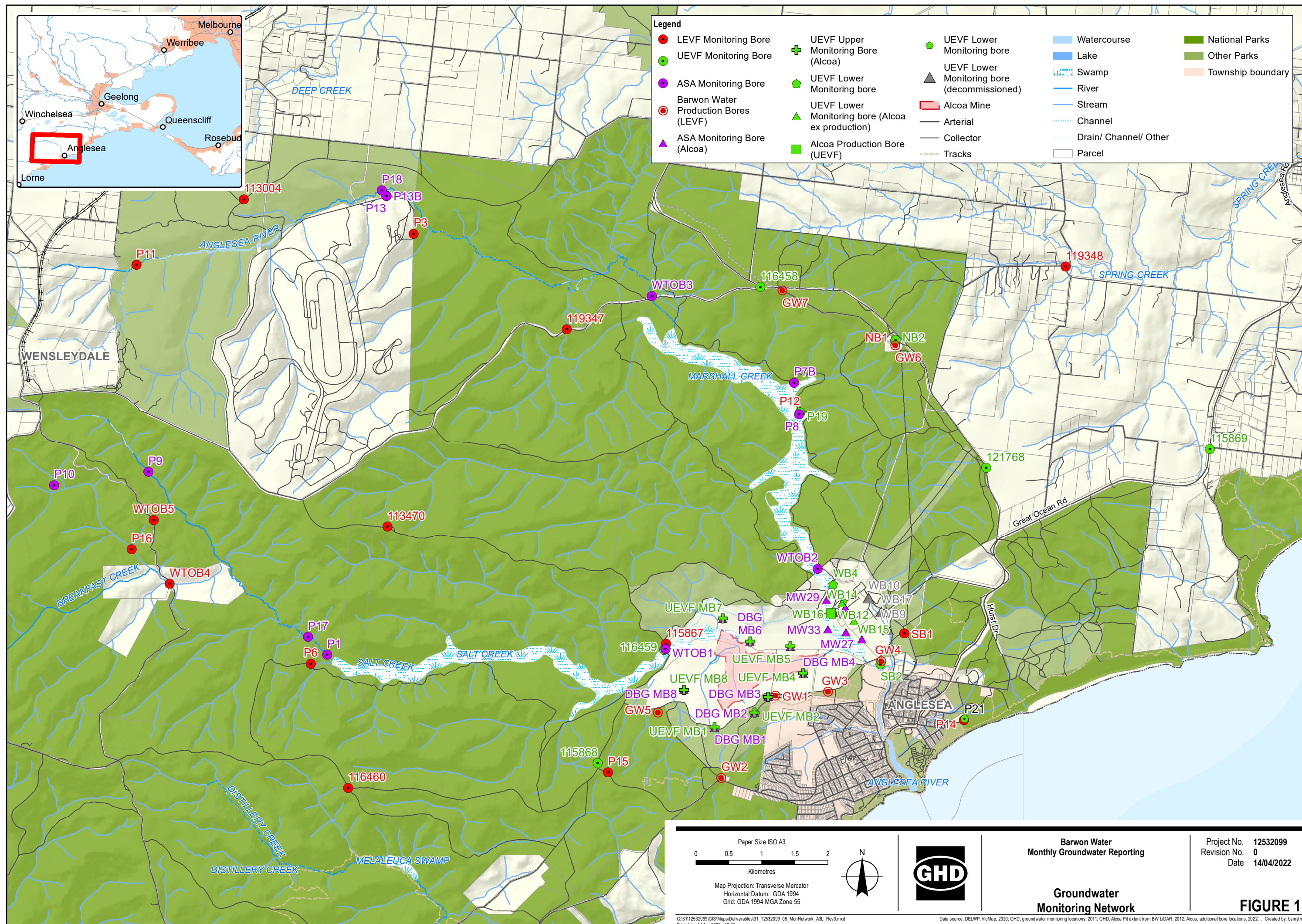
9.1 Bore 115868 (UEVF) and 119349 (UEVF) replacements

Bore 119349 was decommissioned by DELWP, now DEECA, in 2019, and a replacement (P21) was constructed in 2021. Bore P21 will be incorporated into the MAP as part of the Bulk Entitlement amendment process.

Bore integrity issues have been identified in state monitoring bore 115868, with DELWP, now DEECA condition assessments undertaken in 2019 indicating that this bore is beyond repair and should be decommissioned. On 28th June 2022, Barwon Water submitted a request for a section 27 consent with Parks Victoria for a replacement bore to be constructed at this site. If approved by Parks Victoria, Barwon Water will proceed with construction of the replacement bore.

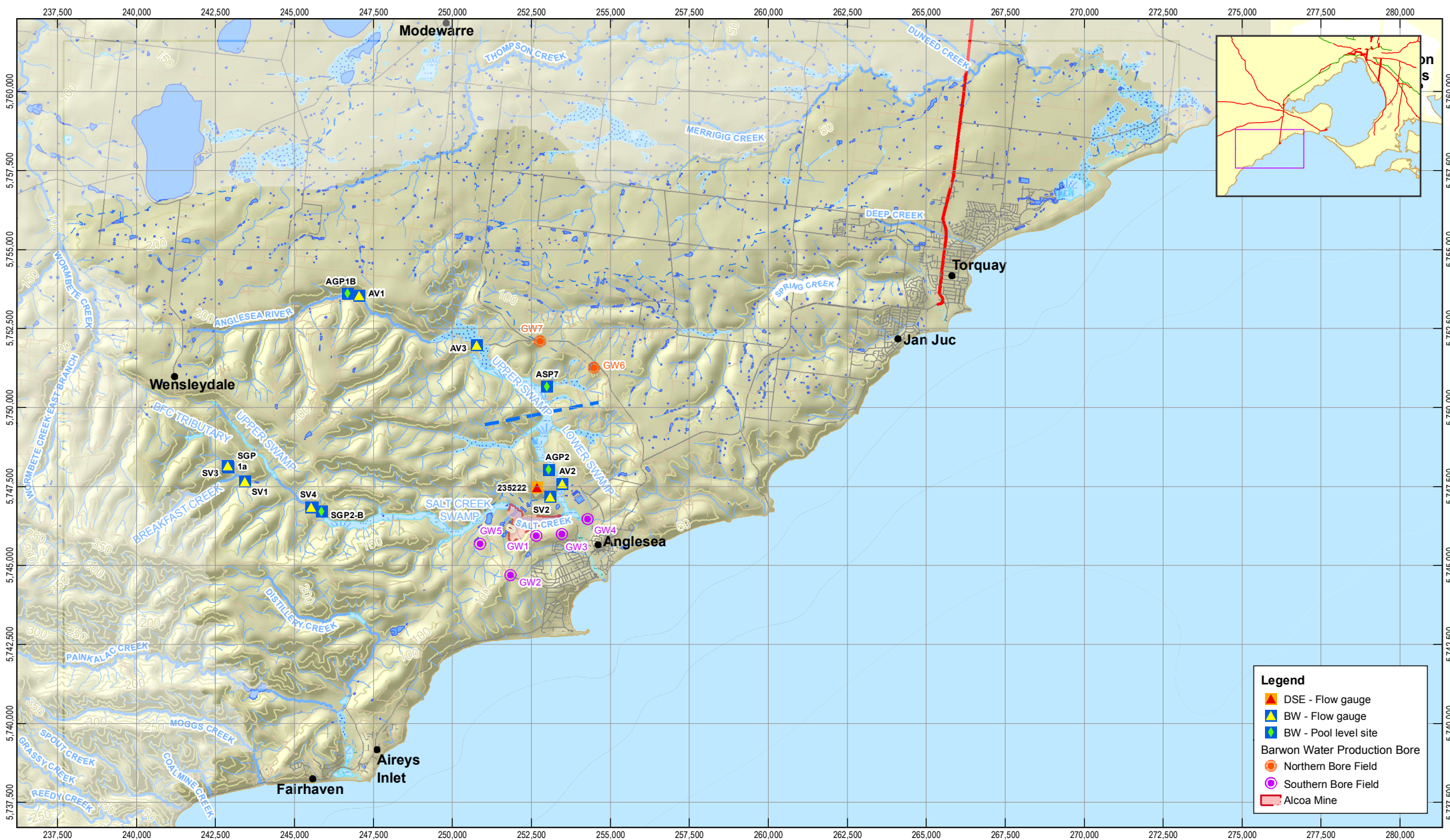
Appendix A

Observation bore locations



Appendix B

Surface water monitoring locations



1:160,000 Paper Size A4

0 0.5 1 2 3 4 5
Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



LEGEND

- Towns
- Highway
- Sealed Road (Arterial & Local)
- Unsealed Road
- Unsealed Track
- Estuary
- Lake
- Flat
- Swamp
- pondage
- River
- Stream
- Channel / Drain
- Connector
- Contours (50m)



Barwon Water
Anglesea Borefield
Numerical Modelling and Recalibration
Surface Water
Monitoring Locations

Job Number 31-32669
Revision A
Date 12 Jun 2015

Figure 2

G:\31\32669\GIS\Maps\Deliverables\0002_Anglesea_Monitoring_2014_SW_Locations.mxd

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Data source: VicMap, DSE, ABARES, Corangamite CMA, DPI, Barwon Water, BOM and SILO Created by:jeamonth

Appendix C

Surface water quality results - field testing

Name Breakfast Creek Tributary @ V notch
GHD/BW ID SV3
SINo. 235274A
BE Map ID GS7

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow at V notch	Weather conditions	Comments
3/07/2024	11:05	0.13	282	174.8	11.31	11.31	5.2	7.4		0.4	Cloudy	Air Temp 6.0, Water clear.
26/08/2024	9:45	0.24	319	197.8	10.24	10.24	5.4	11.4		3.63	Cloudy	Air Temp 12.6, Water clear.
10/09/2024	9:15	0.245	360	223.2	9.54	9.54	5.5	10.5		3.8	Cloudy	Air Temp 12.6, Water clear.
9/10/2024	8:50	0.18	310	192.2	10.58	10.58	4.5	9.6		0.4	Cloudy	Air Temp 8.0, Water clear.
19/11/2024	8:55	0.101	291	180.4	10.29	10.29	5.7	12.2		0.06	Cloudy	Air Temp 13.7, Water clear.
9/12/2024	8:45	0.109	388	240.6	9.46	9.46	5.5	12.4		0.3	Cloudy	Air Temp 13.7, Water clear.
8/01/2025	8:45	0.086	365	226.3	7.94	7.94	6	15.6		0	Sunny	Air Temp 18.5, Water clear. Pool only.
11/02/2025	6:50	DRY	DRY	DRY	DRY	DRY	DRY	DRY		DRY	Cloudy	Dry Creek, Air Temp 16.9
11/03/2025	8:30	DRY	DRY	DRY	DRY	DRY	DRY	DRY		DRY	Cloudy	Dry Creek, Air Temp 21.5
8/04/2025	7:55	DRY	DRY	DRY	DRY	DRY	DRY	DRY		DRY	Cloudy	Dry Creek, Air Temp 9.2
13/05/2025	8:00	DRY	DRY	DRY	DRY	DRY	DRY	DRY		DRY	Sunny	Dry Creek, Air Temp 6.1
11/06/2025	12:25	0.131	470	291.4	10.05	10.05	5.4	11.8		0.4	Cloudy	Air Temp 8.0, Water clear.

Name Breakfast Creek @ Road bridge
GHD/BW ID SV1 - Bridge
SINo. 235273A
BE Map ID GS1

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow State	Weather conditions	Comments
3/07/2024	11:45	0.194	291	180.4	10.11	10.11	5.8	7.5	6.2	Stagnant	Sunny	Water clear, Backed up DS after road bridge low flow @ site
26/08/2024	10:10	0.2	286	286	9.76	9.76	5.5	11.1	12.8	Stagnant	Cloudy	Water clear, Backed up DS after road bridge low flow @ site
10/09/2024	9:40	0.208	308	286	8.72	8.72	5.4	10.9	13.7	Stagnant	Cloudy	Water clear, Backed up DS after road bridge low flow @ site
8/10/2024	9:05	0.188	319	286	9.39	9.39	4.9	10.2	8.1	Stagnant	Cloudy	Water clear, Backed up DS after road bridge low flow @ site
19/11/2024	9:20	DRY	X	X	X	X	X	X	13.8	DRY	Cloudy	DRY CREEK
9/12/2024	9:05	DRY	X	X	X	X	X	X	14.1	DRY	Cloudy	DRY CREEK
8/01/2025	9:10	DRY	X	X	X	X	X	X	14.1	DRY	SUNNY	DRY CREEK
11/02/2025	7:15	DRY	X	X	X	X	X	X	17	DRY	Cloudy	DRY CREEK
11/03/2025	9:00	DRY	X	X	X	X	X	X	22.2	DRY	Cloudy	DRY CREEK
8/04/2025	8:15	DRY	X	X	X	X	X	X	9.4	DRY	Cloudy	DRY CREEK
13/05/2025	8:20	DRY	X	X	X	X	X	X	6	DRY	Sunny	DRY CREEK
11/06/2025	13:00	DRY	X	X	X	X	X	X	8.6	DRY	Sunny	DRY CREEK

Name Salt Creek @ Denham's Track
GHD/BW ID SV4
SINo. 235276A
BE Map ID GS2

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow State	Weather conditions	Comments
4/07/2024	12:10	0.2	346	215	10.42	10.42	6.2	6.4	11.5	Flowing	Cloudy	Flowing
29/08/2024	11:25	0.228	372	231	10.34	10.34	6.2	7.3	13.1	Flowing	Cloudy	Flowing
10/09/2024	11:15	0.217	317	197	10.5	10.5	6.2	10.4	17.5	Flowing	Cloudy	Flowing
8/10/2024	10:35	0.18	294	182	10.1	10.1	6.2	9.5	9.9	Flowing	Sunny	Flowing
19/11/2024	10:35	0.14	298	185	7.89	7.89	6.2	12.5	15.1	Flowing	Sunny	Flowing
9/12/2024	10:45	0.175	236	146	8.91	8.91	6.5	12.6	15.2	Flowing	Cloudy	Flowing
8/01/2025	10:15	0	X	X	X	X	X	X	18.8	Dry	Cloudy	Dry
11/02/2025	8:35	0	X	X	X	X	X	X	17.9	Dry	Cloudy	Dry
11/03/2025	10:30	0	X	X	X	X	X	X	23.1	Dry	Cloudy	Dry
8/04/2025	9:40	0	X	X	X	X	X	X	10	Dry	Cloudy	Dry
13/05/2025	10:20	0	X	X	X	X	X	X	10	Dry	Sunny	Dry
11/06/2025	14:20	0.241	326	202	10.35	10.35	6	8.2	11.5	Flowing	Sunny	Flowing

Name Salt Creek (Encoder) @ Alcoa
GHD/BW ID SV2
SINo. 235222A
BE Map ID GS3

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow State	Weather conditions	Comments
4/07/2024	10:30	DRY	X	X	X	X	X	X	10.9	DRY	Cloudy	DRY
27/08/2024	9:10	BELOW	469	290.8	10.85	10.85	4.8	11.9	8.9	Stagnant	Cloudy	Water clear
11/09/2024	8:55	BELOW	450	279	9.22	9.22	4.8	13.8	15.7	Stagnant	Cloudy	Water clear
9/10/2024	9:10	BELOW	519	321.8	9.9	9.9	4.2	14.5	9.4	Stagnant	Sunny	Water clear
22/11/2024	8:20	BELOW	810	502.2	9.73	9.73	4.4	20.2	22	Stagnant	Sunny	Water clear
10/12/2024	7:50	BELOW	873	541.3	9.63	9.63	4.5	18.2	17	Stagnant	Sunny	Water clear
9/01/2025	8:45	DRY	X	X	X	X	X	X	19.8	DRY	Sunny	DRY
10/02/2025	8:15	DRY	X	X	X	X	X	X	18	DRY	Cloudy	DRY
12/03/2025	8:45	DRY	X	X	X	X	X	X	18.5	DRY	Cloudy	DRY
7/04/2025	9:50	DRY	X	X	X	X	X	X	16.2	DRY	Cloudy	DRY
12/05/2025	9:15	DRY	X	X	X	X	X	X	6	DRY	Sunny	DRY
10/06/2025	11:30	0.033	120	74.6	10.42	10.42	6	9.2	10.5	Steady	Cloudy	Muddy Milky colour after high rainfall in area

Name Salt Creek (Pool)above swamp @ Denham Track (new downstream site)
GHD/BW ID SGP2-B
SINo. 235275A
BE Map ID

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow State	Weather conditions	Comments
4/07/2024	11:55	1.98	n/a	332	205.8	10.51	3.27	6.6	7	Flowing	Cloudy	
26/08/2024	11:10	2.008	n/a	271	168	10.1	10.1	6.2	10.1	Flowing	Cloudy	
10/09/2024	11:00	2.002	n/a	347	215.1	9.87	9.87	6.1	10.4	Flowing	Cloudy	
8/10/2024	10:10	1.95	n/a	451	279.6	10.88	10.88	5.1	13	Flowing	Cloudy	
19/11/2024	10:15	1.852	n/a	275	170.5	8.46	2.11	6.2	13.5	Flowing	Cloudy	
9/12/2024	10:20	1.911	n/a	278	172.4	8.62	2.75	6.5	13.8	Flowing	Cloudy	
8/01/2025	10:00	1.486	n/a	560	347.2	2	2	7.2	20	Stagnant	Sunny	
11/02/2025	8:15	1.07	n/a	546	338.5	2.31	2.31	7.1	17.8	Stagnant	Cloudy	
11/03/2025	10:10	0.87	n/a	537	332.9	6.59	6.59	6.8	18	Stagnant	Cloudy	
8/04/2025	9:20	0.733	n/a	646	400.5	8.13	8.13	6.9	13.2	Stagnant	Cloudy	
13/05/2025	9:50	0.638	n/a	854	529.5	5.26	5.26	6.8	9.5	Stagnant	Sunny	
11/06/2025	13:00	1.98	n/a	337	208.9	9.34	9.34	5.8	10.4	Stagnant	Sunny	

Name

GHD/BW ID

SINo.

BE Map ID

Upper Anglesea River (Pool) @ Australian Automotive Research Centre - (New downstream pool site)

AGP1-B

235271A

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow State	Weather conditions	Comments
3/07/2024	9:20	GH 1.440		1101	682.6	10.1	3.2	4.8	5.1	Stagnant	Sunny	
26/08/2024	9:00	GH 1.392		953	590.9	9.94	3.5	5.9	12	Stagnant	Sunny	
10/09/2024	8:40	GH 1.375		908	563	7.71	3.82	6.5	9.6	Stagnant	CLOUDY	
8/10/2024	7:45	GH 1.310		1063	659.1	6.37	6.37	5.8	10.3	Stagnant	CLOUDY	
19/11/2024	8:00	GH 1.127		1012	627.4	8.3	3.42	6.1	11.8	Stagnant	CLOUDY	
9/12/2024	7:55	GH 1.085		1008	625	6.52	2.11	6.1	12.3	Stagnant	CLOUDY	
8/01/2025	7:50	GH 0.874		1150	713	2	2	6.9	13.9	Stagnant	Sunny	
10/02/2025	11:50	GH 0.573		1244	771.3	5.46	5.46	6.7	18.6	Stagnant	CLOUDY	
11/03/2025	7:35	GH 0.331		1314	814.7	6.09	6.09	6.8	19.3	Stagnant	CLOUDY	
7/04/2025	12:55	GH 0.190		1389	861.2	6.52	6.52	6.5	16.3	Stagnant	CLOUDY	
12/05/2025	12:45	DRY		x	x	x	x	x	x	DRY	Sunny	
11/06/2025	11:30	GH 0.338		1635	1013.7	9.48	9.48	5	9.8	Stagnant	CLOUDY	

Name

GHD/BW ID

SINo.

BE Map ID

Upper Anglesea River @ AARC (V notch site)

AV1

235270A

GS4

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow State	Weather conditions	Comments
3/07/2024	8:55	DRY	X	X	X	X	X	X	2.5	DRY	Cloudy	Dry River
26/08/2024	8:40	DRY	X	X	X	X	X	X	11.8	DRY	Cloudy	Dry River
10/09/2024	8:25	DRY	X	X	X	X	X	X	7.5	DRY	Cloudy	Dry River
8/10/2024	7:45	DRY	X	X	X	X	X	X	7.1	DRY	Cloudy	Dry River
19/11/2024	7:40	DRY	X	X	X	X	X	X	12.1	DRY	Cloudy	Dry River
9/12/2024	7:40	DRY	X	X	X	X	X	X	12.2	DRY	Cloudy	Dry River
8/01/2025	7:30	DRY	X	X	X	X	X	X	18.1	DRY	Sunny	Dry River
10/02/2025	11:25	DRY	X	X	X	X	X	X	18.6	DRY	Cloudy	Dry River
11/03/2025	7:20	DRY	X	X	X	X	X	X	20.2	DRY	Cloudy	Dry River
7/04/2025	12:40	DRY	X	X	X	X	X	X	17	DRY	Cloudy	Dry River
12/05/2025	12:20	DRY	X	X	X	X	X	X	18.2	DRY	Sunny	Dry River
11/06/2025	10:50	BELOW	602	373.24	8.2	8.2	5.7	9.8	6	Stagnant	Sunny	Water Milky clear.

Name Anglesea River @ Gumflats Road
GHD/BW ID AV3
SINo. 235277A
BE Map ID GS6

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow State	Weather conditions	Comments
3/07/2024	7:50	DRY	X	X	X	X	X	X	2	dry	Cloudy	No Sampling as pool dry.
26/08/2024	7:50	DRY	X	X	X	X	X	X	11.9	dry	Cloudy	No Sampling as pool dry.
10/09/2024	7:45	DRY	X	X	X	X	X	X	7	dry	Cloudy	No Sampling as pool dry.
8/10/2024	7:00	DRY	X	X	X	X	X	X	6	dry	Cloudy	No Sampling as pool dry.
19/11/2024	6:45	DRY	X	X	X	X	X	X	12.1	dry	Cloudy	No Sampling as pool dry.
9/12/2024	9:05	DRY	X	X	X	X	X	X	14.1	dry	Cloudy	No Sampling as pool dry.
8/01/2025	6:45	DRY	X	X	X	X	X	X	16.2	dry	Sunny	No Sampling as pool dry.
10/02/2025	10:30	DRY	X	X	X	X	X	X	18.5	dry	Cloudy	No Sampling as pool dry.
11/03/2025	6:30	DRY	X	X	X	X	X	X	20.1	dry	Cloudy	No Sampling as pool dry.
7/04/2025	11:50	DRY	X	X	X	X	X	X	16	dry	Cloudy	No Sampling as pool dry.
12/05/2025	11:20	DRY	X	X	X	X	X	X	16.8	dry	Sunny	No Sampling as pool dry.
10/06/2025	13:15	DRY	X	X	X	X	X	X	10.4	dry	Sunny	No Sampling as pool dry.

Name

GHD/BW ID

SINo.

BE Map ID

Anglesea Swamp @ Vegetation Site P7

ASP7

235280A

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow State	Weather conditions	Comments
4/07/2024	12:10	BELOW	3580	2220	10.45	10.45	3.3	10.2	11.6	STAGNANT	CLOUDY	Water clear
28/08/2024	9:45	0.028	2410	1494	9.2	9.2	3.2	13.5	13.7	STAGNANT	CLOUDY	Water clear
10/09/2024	12:55	0.035	2340	1451	9.64	9.64	3	16.6	17.8	STAGNANT	CLOUDY	Water clear
9/10/2024	11:20	0.01	2610	1618	9.31	9.31	3.1	17.9	15.3	STAGNANT	SUNNY	Water clear
22/11/2024	10:00	BELOW	4510	2796	6.7	6.7	3	24.7	24.8	STAGNANT	SUNNY	Water clear
10/12/2024	9:30	BELOW	3920	2430	6.92	6.92	3.4	22.2	22.4	STAGNANT	SUNNY	Water clear
9/01/2025	10:00	DRY	X	X	X	X	X	X	17	DRY	SUNNY	DRY
10/02/2025	9:55	DRY	X	X	X	X	X	X	18.3	DRY	CLOUDY	DRY
12/03/2025	9:55	DRY	X	X	X	X	X	X	18.6	DRY	CLOUDY	DRY
7/04/2025	11:15	DRY	X	X	X	X	X	X	16.3	DRY	CLOUDY	DRY
12/05/2025	10:45	DRY	X	X	X	X	X	X	17	DRY	Sunny	DRY
11/06/2025	9:50	BELOW	4160	2579	9.13	9.13	3.6	5.1	5.1	STAGNANT	SUNNY	Water clear

Name

GHD/BW ID

SINo.

BE Map ID

Anglesea Wetlands @ Allardyle Track

AGP2

235272A

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow State	Weather conditions	Comments
3/07/2024	12:50	DRY	X	X	X	X	X	X	6.5	DRY	Sunny	DRY
26/08/2024	12:25	0.22	3990	2473.8	10.2	10.2	3	13.5	17.8	Stagnant	Cloudy	Water clear
10/09/2024	12:05	0.232	3710	2300.2	9.47	9.47	3	14.1	17.8	Stagnant	Cloudy	Water clear
8/10/2024	12:20	0.148	3768	2336.2	10.16	10.16	3.6	18.8	10.1	Stagnant	Cloudy	Water clear
22/11/2024	9:10	DRY	X	X	X	X	X	X	6.5	DRY	Sunny	DRY
9/12/2024	12:35	DRY	X	X	X	X	X	X	6.5	DRY	Cloudy	DRY
8/01/2025	11:25	DRY	X	X	X	X	X	X	19.1	DRY	Sunny	DRY
10/02/2025	8:40	DRY	X	X	X	X	X	X	18.2	DRY	Cloudy	DRY
11/03/2025	11:45	DRY	X	X	X	X	X	X	24	DRY	Cloudy	DRY
7/04/2025	11:15	DRY	X	X	X	X	X	X	16.3	DRY	Cloudy	DRY
12/05/2025	9:40	DRY	X	X	X	X	X	X	14.1	DRY	Sunny	DRY
10/06/2025	12:15	DRY	X	X	X	X	X	X	10.6	DRY	Raining	DRY

Name

GHD/BW ID

SINo.

BE Map ID

Anglesea River (Marshy Creek) @ Alcoa

AV2

235260A

GS5

Date	Time (EST)	Gauge Height (m)	EC (µS/cm)	TDS (mg/L)	DO (mg/L) (Top)	DO (mg/L) (Bottom)	pH	Water Temperature (°C)	Air Temperature (°C)	Flow State	Weather conditions	Comments
4/07/2024	9:20	DRY	X	X	X	X	X	X	10.9	DRY	Cloudy	DRY
27/08/2024	8:20	BELOW	3830	2374.6	11.1	11.1	3.6	14.7	9	Stagnant	Cloudy	Water very clear
11/09/2024	8:30	0.048	5130	3180.6	8.62	8.62	3	15.3	8.5	Stagnant	Cloudy	Water very clear
9/10/2024	7:50	0.028	5600	3472	10	10	2.8	12.2	5.4	Stagnant	Cloudy	Water very clear
22/11/2024	7:45	BELOW	6060	3757.2	9.75	9.75	3.1	14.7	20	Stagnant	Sunny	Water very clear
10/12/2024	7:30	BELOW	5630	3490.6	5.98	5.98	3.4	11.9	15	Stagnant	Sunny	Water very clear
9/01/2025	8:00	BELOW	6390	3961.8	5.64	5.64	3.9	13.3	19.5	Stagnant	Sunny	Water very clear
10/02/2025	7:30	DRY	X	X	X	X	X	X	18.1	DRY	Cloudy	DRY
12/03/2025	7:25	DRY	X	X	X	X	X	X	17.2	DRY	Cloudy	DRY
7/04/2025	8:35	DRY	X	X	X	X	X	X	16.1	DRY	Cloudy	DRY
12/05/2025	8:20	DRY	X	X	X	X	X	X	5.1	DRY	Cloudy	DRY
10/06/2025	8:35	DRY	X	X	X	X	X	X	6.5	DRY	Cloudy	DRY

Appendix D

Surface water quality results - laboratory testing

OFFICIAL

						Alkalinity			Anions by IC		Total Metals by ICP				pH
Catchment	Site	Date	Time (EST)	TDS (mg/L)	EC (µS/cm)	Total Alkalinity (mg CaCO ₃ / L)	Bicarbonate Alkalinity (mg CaCO ₃ / L)	Carbonate Alkalinity (mg CaCO ₃ / L)	Chloride (mg/L)	Sulphate (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	pH (Lab)
Salt Creek	SV3	11/02/2025	6:50:00 AM	Dry											
		2/07/2025	8:00:00 AM	310	550	<2	<2	<2	96	96	0.8	20	0.8	63	4.7
	SV1	11/02/2025	7:15:00 AM	Dry											
		2/07/2025	8:40:00 AM	400	750	<2	<2	<2	190	100	8.4	25	3.1	98	5.1
	SV4	11/02/2025	8:35:00 AM	Dry											
		2/07/2025	11:15:00 AM	160	300	2	2	2	87	26	1.9	6.5	1.3	33	5.2
	SV2	10/02/2025	8:15:00 AM	Dry											
		1/07/2025	9:45:00 AM	220	220	5	5	<2	54	30	6	4	2	25	6.6
Anglesea River	AV1	10/02/2025	11:25:00 AM	Dry											
		1/07/2025	12:35:00 PM	340	410	3	3	<2	110	47	1	6	1	56	5.6
	AV3	10/02/2025	10:30:00 AM	Dry											
		1/07/2025	12:00:00 PM	Dry											
	AV2	10/02/2025	7:30:00 AM	Dry											
		1/07/2025	8:35:00 AM	Dry											
	AGP1-B	Not required													

Appendix E

Groundwater quality results - laboratory testing

						Alkalinity				Major Ions					Ionic Balance		
Bore	Date	pH	TDS (mg/L)	EC (µS/cm)	Sulphate as SO4 (mg/L)	Carbonate as CaCO3	Bicarbonate as CaCO3 (mg/ L)	Hydroxide as CaCO3	Alkalinity (total) as CaCO3	Calcium (mg/L)	Chloride (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Total Cations (meq/l)	Total Anions (meq/L)	Ionic Balance
Inter-aquifer Flow Monitoring																	
119348	25/07/2024	7.08	722	1410	<1,000	<1	134.0	<1	134.0	17.0	394.0	11.0	25.0	197.0	11.0	13.8	11.4
	29/01/2025	7.63	675	1330	<1,000	<1	124.0	<1	124.0	20.0	359.0	11.0	24.0	210.0	11.6	12.6	3.9
NB2	16/07/2024	5.8	1390	2392	114,000	<1	38.0	<1	38.0	74.0	741.0	52.0	22.0	283.0	20.8	24.0	7.1
	23/01/2025	6.2	1240	2320	108,000	<1	49.0	<1	49.0	87.0	697.0	52.0	19.0	305.0	22.4	22.9	1.1
SB2	16/07/2024	5.6	1100	1710	115,000	<1	4.0	<1	4.0	18.0	618.0	48.0	37.0	224.0	15.5	19.9	12.3
	23/01/2025	5.8	890	2020	110,000	<1	40.0	<1	40.0	22.0	581.0	51.0	37.0	246.0	16.9	19.5	7.0
P15	17/07/2024	6.3	636	801	56,000	<1	12.0	<1	12.0	5.0	259.0	19.0	13.0	259.0	7.5	8.7	7.8
	21/01/2025	5.8	517	918	54,000	<1	15.0	<1	15.0	6.0	242.0	18.0	12.0	242.0	7.4	8.3	5.5
Saline Intrusion Monitoring																	
P14	22/07/2024	6.68	458	875	4,000	<1	96	<1	96	11	215	10	44	95	6.63	8.07	9.78
	22/01/2025	6.35	498	838	4,000	<1	95	<1	95	10	201	11	46	97	6.8	7.65	5.89
Swamp GDE																	
WTOB2	11/07/2024	4.12	1730	3028	340,000	<1	<1	<1	<1	48	856	61	27	361	23.8	31.2	13.5
	16/01/2025	4.17	2220	3232	345,000	<1	<1	<1	<1	52	819	65	27	375	24.9	30.3	9.67
P7B	15/07/2024	4.13	778	1520	82,000	<1	<1	<1	<1	19	425	29	7	172	11	13.7	10.9
	15/01/2025	3.49	947	1530	99,000	<1	<1	<1	<1	20	429	31	7	197	12.3	14.2	7.05
P8	15/07/2024	5.12	1500	2096	114,000	<1	2	<1	2	40	653	48	15	258	17.6	20.8	8.55
	15/01/2025	5.15	1440	2177	148,000	<1	<1	<1	<1	43	619	48	13	291	19.1	20.5	3.67
WTOB3	11/07/2024	5.59	873	1420	65,000	<1	11	<1	11	4	459	23	3	210	11.3	14.5	12.4
	16/01/2025	5.38	985	1510	82,000	<1	13	<1	13	4	447	22	2	202	10.8	14.6	14.7
P17	15/07/2024	6.75	1030	1370	<1000	<1	181	<1	181	36	340	24	5	164	11	13.2	8.97
	15/01/2025	6.48	864	1350	1,000	<1	168	<1	168	28	368	20	5	178	10.9	13.8	11.5
P1	15/07/2024	6.6	496	377	7,000	<1	19	<1	19	2	89	5	2	59	3.13	3.04	1.51
	15/01/2025	5.75	568	632	3,000	<1	60	<1	60	4	196	8	3	107	5.59	6.79	9.7
WTOB1	11/07/2024	5.18	1670	1180	62,000	<1	2	<1	2	7	376	19	3	168	9.3	11.9	12.4
	16/01/2025	4.98	814	1260	71,000	<1	6	<1	6	7	391	21	2	169	9.48	12.6	14.2
Upper Anglesea Swamp and Trigger Level Site																	
P19	15/07/2024	5.97	605	1260	17,000	<1	48	<1	48	12	363	17	24	162	9.66	11.6	8.93
	15/01/2025	5.77	682	1220	19,000	<1	39	<1	39	12	381	18	21	184	10.6	11.9	5.77
P12	15/07/2024	6.21	587	1180	8,000	<1	56	<1	56	12	339	14	25	152	9	10.8	9.3
	15/01/2025	6.53	654	1120	8,000	<1	56	<1	56	10	360	13	22	169	9.48	11.4	9.36
P16	11/07/2024	4.69	496	347	11,000	<1	2	<1	2	<1	95	8	1.0	50	2.86	2.95	-
	16/01/2025	6.19	403	408	22,000	<1	7	<1	7	<1	124	8	2	54	3.06	4.1	14.5

Appendix F

Monitoring and Assessment Activities Completed in 2024- 25

1. Purpose

Under the bulk entitlement for the Anglesea borefield, Barwon Water has established a comprehensive Monitoring and Assessment Program (MAP) that has been independently reviewed by independent experts and approved by the Minister for Water.

The objective of the MAP is to protect environmental values and the health of groundwater dependent ecosystems, whilst also continuing to collect data to build our understanding of the long-term sustainability of groundwater resources in the Anglesea area.

The following section provides an update on the MAP for the reporting period of the annual report.

2. Groundwater level monitoring

Groundwater level monitoring was conducted at a daily frequency at 42 observation bores during the 2024-25 reporting period. For the two trigger bores (P8 and P19) and reference bore (P17) Barwon Water has maintained daily monitoring and installed telemetry for constant oversight.

3. Groundwater quality monitoring

As the Anglesea Borefield was not operated during 2024-25, weekly field salinity and temperature monitoring for production bores (GW1-GW7) was not required.

Field and laboratory water quality parameters required for both deep and shallow observation bores under the MAP were recorded in 2024-25.

4. Surface water flow & level monitoring

Seven surface water sites, with four located in the Salt Creek catchment and three located in the Anglesea River catchment were monitored during 2024-25. All sites have permanent data loggers recording on a minimum daily frequency.

Surface water level was also monitored at one location in Salt Creek and three locations in the Anglesea river during 2024-25. Three of these locations were collected using data loggers and one measured during monthly field sampling.

5. Surface water quality monitoring

11 sites were monitored for water quality across the Salt Creek and Anglesea River catchments. Monitoring consisted of laboratory testing twice yearly along with monthly field sampling.

6. Aquatic ecology monitoring

Macroinvertebrate sampling was completed during Spring at 9 of the 11 sites (two sites were dry and unable to be sampled) across the catchment during 2024-25.

Southern Pygmy Perch and Otway Bush Yabbie were sampled 2 (BCT1 and SC1) during 2024-25.

7. Terrestrial ecology monitoring

Vegetation monitoring was conducted at six sites within the Anglesea River Swamp and four sites within the Anglesea River estuary during 2024-25.

Frog monitoring was conducted at eight sites within the Anglesea River Swamp and four sites within the Anglesea River estuary during 2024-25.

8. Acid sulfate soil investigations

No additional acid sulfate soil investigations were completed during 2024-25. A copy of the [2020 acid sulfate soil report and summary report](#) can be found on the Barwon Water website.

9. Land level surveying

The regional subsidence network consisting of 30 existing survey points were monitored during 2024-25. No subsidence outside the permitted range was recorded during 2024-25.

10. Rainfall gauging

Rainfall is recorded via rain gauges at three sites across the catchment. This data is downloaded on a monthly basis and maintained in accordance with approved Bureau of Meteorology standards.

Rainfall was recorded at three gauges across the catchment during 2024-25. This data has been maintained in accordance with approved Bureau of Meteorology standards and uploaded to the [Water Measurement Information System \(WMIS\)](#)

11. Failure of monitoring infrastructure

During the 2024-25 period, six data loggers failed and were replaced with new loggers.

Appendix G

Shallow observation bore water
level versus salinity level

