

Water Quality Annual Report



East Gippsland Water
September 2017

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1 Introduction

At East Gippsland Water (EGW) our vision is to be a leading and respected water corporation. This means supplying our customers with water that meets or exceeds all health requirements and ensuring it reaches our customers when they need it.

Last financial year we treated and delivered over 4.6 billion litres of drinking water. This water was distributed to around 23,458 customer connections across East Gippsland.

The quality of our drinking water consistently performs well against the Safe Drinking Water Regulations 2015 with all drinking water supplied to our customers fully compliant during 2016/2017. Once again this year 100 per cent of our samples were free of *Escherichia coli* (*E. coli*).

We continue to improve our supplies through strategic investment in new infrastructure and focus on maintenance systems for existing infrastructure. We continue to improve our operational activities to identify and manage risks.

1.1 Characterisation of the System

Our service region covers approximately 21,000 square kilometres and extends east from Lindenow and Bairnsdale, through Lakes Entrance to Mallacoota near the New South Wales border, and as far north as Dinner Plain in the High Country of the Victorian Alps (Figure 1).

Most of the water delivered to customers is sourced from local river systems. Underground aquifers are utilised in our Mallacoota and Mitchell systems to supplement supply. Dinner Plain is our only locality where all drinking water is sourced from local aquifers.

Nine separate water supply systems serve the communities of Bairnsdale, Bemm River, Bruthen, Buchan, Cann River, Dinner Plain, Eagle Point, Johnsonville, Lakes Entrance, Lake Tyers Aboriginal Trust, Lake Tyers Beach, Lindenow, Lindenow South, Mallacoota, Marlo, Metung, Newlands Arm, Newmerella, Nicholson, Nowa Nowa, Omeo, Orbost, Paynesville, Raymond Island, Sarsfield, Swan Reach and Swifts Creek.

A summary of our water supply and treatment systems is provided in Section 2.1.



Figure 1: East Gippsland Water's region of operation

2 Water Treatment and Quality Risk Management Systems

A detailed summary of the nine systems is provided in Table 1.

To manage water quality risk, a Drinking Water Quality Risk Management System (DWQRMS) supports and identifies key risks ensuring they are managed appropriately. The DWQRMS has been developed in accordance with the Australian Drinking Water Guidelines 2011. An overview of its structure is shown in Figure 2 below.

Internal audits of the DWQRMS are undertaken routinely to ensure we continually improve our systems. An external audit was undertaken at the request of the Department of Health & Human Services in April 2016, with a compliant result and no non-conforming issues identified. The next external audit is scheduled to be completed in the 2017-2018 financial year.

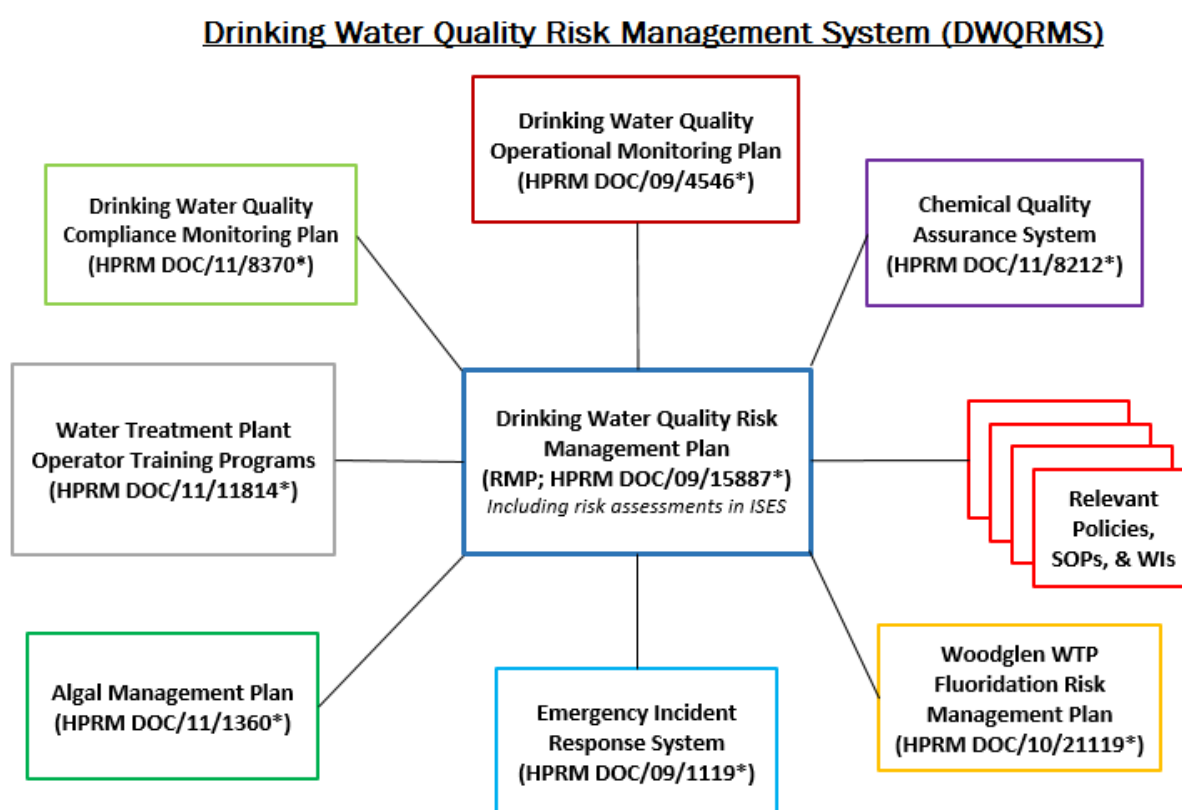


Figure 2: Structure of the Drinking Water Quality Risk Management System

2.1 Water Supply System Summary

Treatment processes vary slightly according to each locality. A description of each treatment process and chemical additives is included in the glossary of terms.

No significant changes were made to the water treatment processes in 2016/2017.

Table 1: Water Supply and Treatment Systems Summary

Water Sampling Locality	Population Supplied (Connections)	Source Water	Catchment Description	Raw Water Storage	Treatment Plant	Treatment process	Added substances	Comments
Bairnsdale	7,870	Mitchell River Aquifer (5 bores, seasonal supplemental supply)	Primarily forest (> 90%) with some human, forestry and agricultural impacts, some cattle and some septic tanks particularly around the town of Dargo. The non-forested area is around 5-10% of the catchment, but is mostly located near the river banks	Woodglen No. 1 (850ML) & 2 (713ML) storage basins	Woodglen	Coagulation, flocculation, clarification (dissolved air flotation), filtration (granular media filter), disinfection, fluoridation, mechanical dewatering	Caustic soda, poly (LT 25 ¹ & 27 ²), fluoride ³ , poly aluminium chlorohydrate ³ (PAC 23), chlorine (compressed chlorine gas and sodium hypochlorite); fluoride (fluorosilicic acid) ³ ; powder activated carbon ⁴	¹ LT 25 used for backwash water clarification ² LT 27 used for centrifuge ³ Fluoride dosing commenced in August 2010 ⁴ Capacity for powder activated carbon addition exists, but is not currently in use
Lindenow	220							
Lindenow South	170							
Sarsfield-Bruthen	590							
Merrangbaur	930							
Sunlakes-Toorloo	2,990							
Kalimna	660							
Eagle Point-Paynesville	3,760							
Nicholson-Swan Reach	750							
Metung	1,260							
Nowa Nowa	100							

Water Sampling Locality	Population Supplied (Connections)	Source Water	Catchment Description	Raw Water Storage	Treatment Plant	Treatment process	Added substances	Comments
Buchan	110	Buchan River	80% forest with some minor impacts (forestry, agriculture, cattle and camping)	n/a	Buchan	Coagulation, flocculation, clarification (dissolved air flotation), filtration (granular media filter), disinfection, Geobag dewatering	Caustic soda, poly aluminium chlorohydrate (PAC 23), poly (LT 25 ¹), chlorine (sodium hypochlorite)	¹ LT 25 used for backwash water clarification
Cann River	190	Cann River	Forest, some agricultural land (cattle), minimal septic tanks, roads and	n/a	Cann River			
Bemm River	100	Bemm River	90% forest, with some minor forestry, agricultural and human impacts	n/a	Bemm River			
Swifts Creek	130	Tambo River	Forest, agricultural land (cattle), some septic tanks, roads and logging	4.6ML basin (shade-cloth covered)	Swifts Creek			

Water Sampling Locality	Population Supplied (Connections)	Source Water	Catchment Description	Raw Water Storage	Treatment Plant	Treatment process	Added substances	Comments
Orbost	2,010	Brodribb River & Rocky River	90% forest, with some forestry, agricultural and human impacts	6ML basin	Orbost	Coagulation, flocculation, clarification (upflow clarifier), filtration (granular media filter), disinfection, Geobag dewatering (Mallacoota only)	Caustic Soda ¹ , poly aluminium chlorohydrate (PAC 23), poly (LT 20), chlorine (sodium hypochlorite)	
Omeo	260	Butchers Creek	State forest with minimal human impacts (some grazing)	5ML (shade-cloth covered) and 10ML covered basin	Omeo			
Mallacoota	970	Betka River & Aquifer (2 bores)	State forest with minimal human impacts (some forestry)	41ML basin (shade-cloth covered)	Mallacoota		Caustic soda, poly aluminium chlorohydrate (PAC 23), poly (LT 20 & 25 ¹), chlorine (sodium hypochlorite)	¹ LT 25 used for backwash water clarification
Dinner Plain	390	Aquifer (2 bores)	Supply is extracted from bores deeper than 70m, with an exclusion zone	700kL tank	Dinner Plain	Ultraviolet (UV) disinfection	Nil	Nil

2.2 Source Water Protection

The Drinking Water Quality Risk Management Plan (RMP), identifies risks to drinking water quality at all steps in the water supply chain, from catchment to consumer, and ensures that appropriate control measures and checks are in place to effectively manage those risks.

We work in collaboration with a number of external stakeholders, including the Department of Environment, Land, Water and Planning, the East Gippsland and North East Catchment Management Authorities to identify and manage water quality risks at the catchment level. Our catchments' health risks are addressed in comprehensive waterway strategies developed by the above authorities with the support of EGW with the primary goal of continual improvement to river and catchment health. The works conducted as part of the waterway strategies reduce source water quality risks, through initiatives such as livestock exclusion from rivers and riparian zone revegetation and river bank stabilisation for erosion control.

This integrated management approach to source water protection is ensured through the following legislation:

- Water Act 1989
- Planning and Environment Act 1987
- Catchment and Land Protection Act 1994
- Land Act 1958
- Environment Protection Act 1970 (including relevant State Environment Protection Policies (SEPPs))

2.3 System Issues

Our water supply and treatment systems operated as designed last financial year and no issues were identified with their capacity to routinely meet the required water quality standards.

Fluoridation at the Woodglen Water Treatment Plant was temporarily suspended between March and June 2017 due to a number of critical component maintenance issues on the dosing system. The Department of Health and Human Services (DHHS) was informed of this. Due to the criticality of this system these components were replaced and a recommissioning period ensued. The dosing system is programmed to be completely replaced in the 2017/2018 financial year.

In 2016/17, no Section 18 notifications were made to DHHS. All water quality standards were met in the 2016-2017 reporting period, as outlined in the sections below in this document.

There were two issues that required Section 22 notifications. Details on these issues are provided in Section 3 Emergency Incident and Event Management.

3 Emergency Incident and Event Management

3.1 Section 22 Notifications

Under Section 22 of the Safe Drinking Water Act 2003, DHHS must be notified of circumstances where drinking water supplied to the public does not comply, or is not likely to comply, with any relevant water quality standard, or where drinking water is supplied that may pose a risk to human health or cause widespread public complaint. In 2016/2017, two Section 22 notifications were made to DHHS.

The first Section 22 notification was reported in December 2016 in relation to taste and odour issues at Bemm River. EGW was experiencing an increase in taste and odour complaints from Bemm River customers due to elevated geosmin levels in the clear water storage (CWS) basin. Elevated geosmin levels were being caused by non-toxic algae in the CWS. A section 22 report was issued to DHHS as it was considered that the geosmin levels would potentially result in widespread complaint.

Despite having turned over the CWS basin several times, the algae persisted. We aim to resolve this issue in the short term by reducing algal biovolumes in the CWS basin through a number of control measures including installing a temporary filter to remove the algae and taste/odour compounds. Also the CWS basin is programmed to be replaced with a roofed tank by the end of calendar year 2017. This project is expected to control future risk of algal and taste and odour issues at Bemm River.

The second Section 22 notification occurred in January 2017. A dead rabbit was found in the Cann River CWS during routine inspection and water sampling. Due to the potential risk of contamination in Cann River's drinking water supply, a section 22 report was issued to DHHS. EGW managed the potential risk of drinking water contamination by collaborating closely with DHHS and the Cann River community. A boil water advisory was issued and actions were taken to rectify the issue, including isolating and treating the water in the CWS. DHHS was satisfied that EGW's management of this incident ensured the protection of public health.

Since this event EGW has inspected all shade cloth covered clear water storages across its network and repaired or modified a number of the shade cloths to reduce the risk of a repeat of this issue. EGW has also made provision for the replacement of a number of shade cloth covered storages with roofed tanks within its 2018 Price Submission.

3.2 Section 18 Notifications

A water supplier must notify DHHS under Section 18 of the Act when drinking water supplied to the public does not comply with any relevant water quality standard set out in Schedule 2 of the Safe Drinking Water Regulations 2015. In 2016/2017, no Section 18 notifications were made to DHHS.

4 Quality of Drinking Water for 2016/2017

The 2016/2017 Water Quality Annual Report includes Regulated Parameter data for the Safe Drinking Water Regulations 2015. All results irrespective of sample location type for drinking water supply have been included.

Table 2: Safe Drinking Water Regulations 2015 – Water Quality Schedule 2 Standards

Schedule 2 Parameter	Relevant sampling frequency per water sampling locality	Water quality standard for each water sampling locality	Presentation of results
<i>Escherichia coli</i>	One sample per week	No <i>Escherichia coli</i> per 100 millilitres of drinking water, with the exception of any false positive sample	Reported as 0 <i>Escherichia coli</i> detected in 100mL
Total Trihalomethanes	One sample per month	Less than or equal to 0.25 milligrams per litre of drinking water	Results to be expressed to two decimal places
Turbidity	One sample per week	The 95 th percentile of results for samples in any 12 month period must be less than or equal to 5.0 NTU	Results to be expressed to two decimal places

4.1 Regulated Parameters - *Escherichia coli* (*E. coli*)

E. coli is a microorganism that may cause illness in susceptible individuals. *E. coli* is associated with recent contamination of water supplies with faecal material and is therefore considered to be an important indicator of the safety of the water supply. Samples are taken at least weekly in each of the water sampling localities.

There must be 0 *E.coli*/100 ml within drinking water.

Table 3: *E.coli* sampling frequency and results 2016/2017

Water Sampling Locality	Sampling Frequency	Total No. Samples	Result (No. of samples containing <i>E.coli</i>)	Standard met (% samples with no <i>E.coli</i>)	Comments Complying (Yes / No)
Bairnsdale	Weekly	124	0	100%	Yes
Bemm River	Weekly	104	0	100%	Yes
Buchan	Weekly	104	0	100%	Yes
Cann River	Weekly	104	0	100%	Yes
Dinner Plain	Weekly	104	0	100%	Yes
Eagle Point-Paynesville	Weekly	106	0	100%	Yes
Kalimna	Weekly	104	0	100%	Yes
Lindenow	Weekly	104	0	100%	Yes
Lindenow South	Weekly	104	0	100%	Yes
Mallacoota	Weekly	104	0	100%	Yes
Merrangbaur	Weekly	104	0	100%	Yes
Metung	Weekly	104	0	100%	Yes
Nicholson-Swan Reach	Weekly	104	0	100%	Yes
Nowa Nowa	Weekly	104	0	100%	Yes
Omeo	Weekly	104	0	100%	Yes
Orbost	Weekly	104	0	100%	Yes
Sarsfield-Bruthen	Weekly	104	0	100%	Yes
Sunlakes-Toorloo	Weekly	109 ¹	0	100%	Yes
Swifts Creek	Weekly	104	0	100%	Yes

Note: Additional samples are recorded due to increases in population size (both fixed and seasonal) and the number of sampling days per calendar year.

¹This accounts for 57 samples taken from reticulation and 52 taken from entry water locations.

4.1.1 Comments on results

All water sampling localities were compliant for the *E. coli* water quality standard for the 2016/2017 reporting period (Table 3).

4.2 Regulated Parameters - Total Trihalomethanes

Trihalomethanes are compounds that may be produced when chlorine disinfectant reacts with organic material present in the water. These compounds may impact public health if they are present in drinking water in high concentrations over a long period of time. Samples are taken monthly in each of the water sampling localities.

There must be less than or equal to 0.25 mg/L of Total Trihalomethanes within drinking water.

Table 4: Total Trihalomethanes sampling program and results 2016/2017

Water Sampling Locality	Sampling Frequency	Total No. of Samples ¹	No. of Samples above the standard	Max. mg/L	Met the Standard (yes / no)
Bairnsdale	Monthly	12	0	0.05	Yes
Bemm River	Monthly	12	0	0.03	Yes
Buchan	Monthly	12	0	0.08	Yes
Cann River	Monthly	12	0	0.06	Yes
Dinner Plain ²	N/A ¹	N/A ¹	N/A ¹	N/A ¹	N/A ¹
Eagle Point- Paynesville	Monthly	14 ²	0	0.09	Yes
Kalimna	Monthly	12	0	0.06	Yes
Lindenow	Monthly	12	0	0.03	Yes
Lindenow South	Monthly	12	0	0.04	Yes
Mallacoota	Monthly	12	0	0.11	Yes
Merrangbaur	Monthly	12	0	0.06	Yes
Metung	Monthly	12	0	0.06	Yes
Nicholson-Swan Reach	Monthly	12	0	0.05	Yes
Nowa Nowa	Monthly	12	0	0.07	Yes
Omeo	Monthly	12	0	0.05	Yes
Orbost	Monthly	12	0	0.06	Yes
Sarsfield-Bruthen	Monthly	12	0	0.04	Yes
Sunlakes-Toorloo	Monthly	12	0	0.06	Yes

¹ N/A- Not Applicable; Dinner Plain water sampling locality is not sampled for chlorine-based disinfection by-products as ultra-violet disinfection is employed in place of chlorine

² More samples were taken at Eagle Point locality to account for Raymond Island.

4.2.1 Comments on results

All water sampling localities were compliant for the Total Trihalomethanes water quality standard for the 2016/2017 reporting period (Table 4).

4.3 Regulated Parameters - Turbidity

Turbidity measures the presence of fine suspended material present in the water and at elevated levels may result in a 'cloudy' appearance of water. Turbidity is an indirect indicator for the general quality of water and may represent fine particles such as clays, minerals or microscopic organisms. Samples are taken weekly in each of the water sampling localities (Table 5).

The 95th percentile of turbidity results for samples in any 12 month period must be less than or equal to 5.0 NTU within drinking water.

Table 5: Turbidity sampling program and results 2016/2017

Water Sampling Locality	Sampling Frequency ¹	No. of Samples	Max NTU	95 th Percentile	Met the standard (yes/no)
Bairnsdale	Weekly	124	0.6	0.4	Yes
Bemm River	Weekly	104	0.9	0.8	Yes
Buchan	Weekly	104	0.3	0.1	Yes
Cann River	Weekly	104	1.1	0.5	Yes
Dinner Plain	Weekly	104	0.3	0.1	Yes
Eagle Point-Paynesville	Weekly	106	0.4	0.1	Yes
Kalimna	Weekly	104	0.8	0.1	Yes
Lindenow	Weekly	104	3.1	0.3	Yes
Lindenow South	Weekly	104	1.1	0.1	Yes
Mallacoota	Weekly	104	2.7	0.7	Yes
Merrangbaur	Weekly	104	0.2	0.1	Yes
Metung	Weekly	104	0.3	0.1	Yes
Nicholson-Swan Reach	Weekly	104	1	0.2	Yes
Nowa Nowa	Weekly	104	0.2	0.1	Yes
Omeo	Weekly	104	0.5	0.1	Yes
Orbost	Weekly	104	0.7	0.2	Yes
Sarsfield-Bruthen	Weekly	104	0.3	0.1	Yes
Sunlakes-Toorloo	Weekly	109 ¹	1.1	0.1	Yes
Swifts Creek	Weekly	104	1.2	0.2	Yes

Note: Additional samples are recorded due to increases in population size (both fixed and seasonal) and the number of sampling days per calendar year.

¹This accounts for 57 samples taken from reticulation and 52 taken from water at the entry point to the locality.

4.3.1 Comments on results

All routine samples taken in water sampling localities were compliant for the turbidity water quality standard for the 2016/2017 reporting period (Table 5).

4.4 Fluoride

Fluoride is added to the water sampling localities of the Mitchell system to promote oral health under direction of DHHS. Fluoride samples are taken monthly in each of the fluoridated water sampling localities, effectively resulting in a weekly sample being taken at different locations in the fluoridated Mitchell system.

Compliance is measured as: annual average fluoride level must not exceed 1 milligram per litre and all individual samples must be less than 1.5 milligrams per litre.

Meeting Obligation is measured as: annual average fluoride level between 0.6 – 1.0 milligrams per litre in fluoridated systems.

Table 6: Fluoride sampling program 2016/2017

Water Sampling Locality	Sampling Frequency	Total No. of Samples ⁴	Operating Target (mg/L)	Max. (mg/L)	Average (mg/L)	Number of samples where standard (>1.5mg/L) was not met.
Bairnsdale ²	Monthly	16 ³	0.9	0.94	0.60	0
Bemm River	Biannually	2	N/A ¹	0.05	0.05	0
Buchan	Biannually	2	N/A ¹	0.05	0.05	0
Cann River	Biannually	2	N/A ¹	0.05	0.05	0
Dinner Plain	Biannually	2	N/A ¹	0.05	0.05	0
Eagle Point-Paynesville ²	Monthly	14	0.9	0.89	0.63	0
Kalimna ²	Monthly	14	0.9	0.9	0.67	0
Lindenow ²	Monthly	14	0.9	0.91	0.66	0
Lindenow South ²	Monthly	14	0.9	0.89	0.69	0
Mallacoota	Biannually	2	N/A ¹	0.05	0.05	0
Merrangbaur ²	Monthly	14	0.9	0.88	0.67	0
Metung ²	Monthly	14	0.9	0.9	0.63	0
Nicholson-Swan Reach ²	Monthly	14	0.9	0.9	0.66	0
Nowa Nowa ²	Monthly	14	0.9	0.87	0.69	0
Omeo	Biannually	2	N/A ¹	0.05	0.05	0
Orbost	Biannually	2	N/A ¹	0.05	0.05	0
Sarsfield-Bruthen ²	Monthly	14	0.9	0.9	0.63	0
Sunlakes-Toorloo ²	Monthly	14	0.9	0.9	0.67	0
Swifts Creek	Biannually	2	N/A ¹	0.11	0.09	0

¹ N/A – Not Applicable as these systems are not fluoridated.

² Indicates fluoridated water sampling localities.

³Water sampling locality has two entry point locations, each sampled biannually.

⁴Values over 12 reflect sampling of reticulation that took place monthly and samples of the entry water that took place biannually.

4.4.1 Comments on results

All water sampling localities were compliant for fluoride for the 2016/2017 reporting period (Table 6). East Gippsland Water has been 100% compliant for this standard at each fluoridated sampling locality since fluoridation began in 2010.

Lower than usual average annual fluoride levels in fluoridated localities are a result of the fluoridation system not operating between March and June 2017.

Low levels of fluoride detected in non-fluoridated water sampling localities is due to the natural occurrence of fluoride in source waters.

4.5 Other Substances - Arsenic

Arsenic is a naturally occurring element, which can be introduced into water in the catchment through the presence of naturally occurring minerals and ores. Short and long-term exposure to arsenic may result in potential health impacts. Samples are taken biannually in each applicable water sampling locality.

Compliance is measured as: less than or equal to 0.01 milligrams per litre (health-based guideline value under the Australian Drinking Water Guidelines 2011).

Table 7: Arsenic sampling program and results 2016/17

Water Sampling Locality	Sampling Frequency	No. of Samples	No. of Non-Complying Samples	Maximum (mg/L)	Complying (Yes / No)
Bairnsdale	Biannually	4 ¹	0	< 0.001	Yes
Bemm River	Biannually	2	0	< 0.001	Yes
Buchan	Biannually	2	0	< 0.001	Yes
Cann River	Biannually	2	0	< 0.001	Yes
Dinner Plain	Biannually	2	0	< 0.001	Yes
Eagle Point- Paynesville	Biannually	2	0	< 0.001	Yes
Kalimna	Biannually	2	0	< 0.001	Yes
Lindenow	Biannually	2	0	< 0.001	Yes
Lindenow South	Biannually	2	0	< 0.001	Yes
Mallacoota	Biannually	2	0	< 0.001	Yes
Merrangbaur	Biannually	2	0	< 0.001	Yes
Metung	Biannually	2	0	< 0.001	Yes
Nicholson-Swan Reach	Biannually	2	0	< 0.001	Yes
Nowa Nowa	Biannually	2	0	< 0.001	Yes
Omeo	Biannually	2	0	< 0.001	Yes
Orbost	Biannually	2	0	< 0.001	Yes
Sarsfield-Bruthen	Biannually	2	0	< 0.001	Yes
Sunlakes-Toorloo	Biannually	2	0	< 0.001	Yes
Swifts Creek	Biannually	2	0	< 0.001	Yes

¹ Water sampling locality has two entry point locations, each sampled biannually.

4.5.1 Comments on results

All water sampling localities were compliant for Arsenic for the 2016/2017 reporting period (Table 7).

4.6 Other Substances - Biocides

All surface raw water sources are analysed annually for biocides (i.e. herbicides and pesticides). A representative suite of these biocides is examined based on land management activities in the water supply catchments. Sampling occurs during the months of heaviest rainfall, namely July or September. The targeted biocides, alongside their associated limits of detection, are presented in the table below. Compliance is measured as recorded values being below the Australian Drinking Water Guidelines 2011 health-based guideline value, or if not specified in the Guidelines, the absence of the compound above the laboratory's limits of detection.

East Gippsland Water maintains close liaison with local stakeholders (e.g. catchment management authorities) regarding biocide application in water supply catchments, to ensure minimal risk to the drinking water supply. This informs the frequency of biocide sampling and testing.

In the 2016/2017 period, raw surface water samples were analysed from Bemm River, Buchan, Cann River, Orbost, Woodglen storages (1 and 2), Mallacoota, Omeo and Swifts Creek

Table 8: Biocide sampling program and results 2016/17

Water Sampling Locality	Class	Compound	Units	Max Result	Complying (Yes / No)
July 2016 Bemm River, Cann River, Buchan and Orbost	n/a	Glyphosate	mg/L	<.03	Yes
	Organo-chlorine Biocides	Aldrin	mg/L	<0.00001	Yes
		BHC (Alpha Isomer)	mg/L	<0.00005	Yes
		BHC (Beta Isomer)	mg/L	<0.00005	Yes
		BHC (Delta Isomer)	mg/L	<0.00005	Yes
		cis-Chlordane	mg/L	<0.00001	Yes
		trans-Chlordane	mg/L	<0.00001	Yes
		4,4'-DDD	mg/L	<0.00006	Yes
		4,4'-DDE	mg/L	<0.00006	Yes
		4,4'-DDT	mg/L	<0.00006	Yes
		Dieldrin	mg/L	<0.00001	Yes
		Endosulfan I	mg/L	<0.00005	Yes
		Endosulfan II	mg/L	<0.00005	Yes
		Endosulphan Sulphate	mg/L	<0.00005	Yes
Endrin	mg/L	<0.00010	Yes		
September 2016 Bairnsdale (Woodglen Storage 1+2), Mallacoota and Swifts Creek	Endrin Aldehyde	mg/L	<0.00010	Yes	
	Heptachlor	mg/L	<0.00005	Yes	
March 2017 Buchan and Cann River	Heptachlor Epoxide	mg/L	<0.00005	Yes	
	Lindane (BHC Gamma Isomer)	mg/L	<0.00005	Yes	
April 2017 Buchan	Methoxychlor	mg/L	<0.00005	Yes	
	Dichlorvos	mg/L	<0.001	Yes	
June 2017 Swifts Creek					

Water Sampling Locality	Class	Compound	Units	Max Result	Complying (Yes / No)
	Organo-phosphorus Biocides	Monocrotophos	mg/L	<0.001	Yes
		Prophos	mg/L	<0.001	Yes
		Tetraethylthiopyrphos	mg/L	<0.001	Yes
		Phorate	mg/L	<0.001	Yes
		Demeton-S	mg/L	<0.001	Yes
		Diazinon	mg/L	<0.001	Yes
		Methyl Parathion	mg/L	<0.001	Yes
		Ronnel	mg/L	<0.001	Yes
		Malathion	mg/L	<0.001	Yes
		Fenthion	mg/L	<0.001	Yes
		Chloropyrifos	mg/L	<0.001	Yes
		Trichlorinate	mg/L	<0.001	Yes
		Tetrachlovinphos	mg/L	<0.001	Yes
		Tukuthion	mg/L	<0.001	Yes
		Fensulfothion	mg/L	<0.001	Yes
		EPN	mg/L	<0.001	Yes
		Coumaphos	mg/L	<0.001	Yes
	Phenoxy acid biocides	2,4,5-T	µg/L	<0.01	Yes
		2,4,5-TP	µg/L	<0.01	Yes
		2,4,6-T	µg/L	< 0.1	Yes
		2,4-D	µg/L	<0.01	Yes
		2,4-DB	µg/L	<0.01	Yes
		2,4-DP	µg/L	<0.01	Yes
		2,6-D	µg/L	0.1	Yes
		4 Chlorophenoxy Acetic Acid	µg/L	<0.01	Yes
		Clopyralid	µg/L	<0.05	Yes
		Dicamba	µg/L	<0.01	Yes
		Fluroxypyr	µg/L	<0.05	Yes
		MCPA	µg/L	<0.01	Yes
		MCPB	µg/L	<0.01	Yes
Mecoprop	µg/L	<0.01	Yes		
Picloram	µg/L	<0.05	Yes		
Triclopyr	µg/L	<0.09	Yes		

4.6.1 *Comments on results*

All of the above results were below the health-based guideline values in the Australian Drinking Water Guidelines, or if not specified in the Guidelines, were below the lower limits of detection, and were deemed to be compliant in 2016/2017 (Table 8).

4.7 Other Substances- Blue green algae

Blue green algae (or 'cyanobacteria') are microscopic organisms that may thrive in warm, nutrient rich waters. They may impact water quality by releasing taste and odour compounds. In some extreme circumstances, these organisms may release concentrations of toxins. Samples are taken seasonally in each of the relevant water sampling localities. In addition to routine monitoring samples, additional samples may be taken to monitor the progression of algal growth during the summer/autumn seasons.

DHHS must be notified under Section 22 of the *Safe Drinking Water Act 2003* when samples representing the quality of drinking water supplied to customers indicate any of the following:

- total microcystins are detected at greater than or equal to 1.3 micrograms per litre
- *Microcystis aeruginosa* is present at greater than or equal to 6,500 cells per millilitre
- total combined biovolume of known toxic cyanobacterial species is greater than or equal to 0.6 millimetres cubed per litre
- total combined biovolume of all cyanobacterial species is greater than or equal to 10 millimetres cubed per litre.

Table 9 below summarises our monitoring program for blue green algae in 2016/17 in both raw water and clear water supplies.

Table 9: Blue green algae sampling program and results

Water Sampling Locality	No. of Samples (Raw Water)	No. of Samples (Clear Water)
Bairnsdale	54 ¹	N/A
Eagle Point- Paynesville		N/A
Kalimna		N/A
Lindenow		4
Lindenow South		N/A
Merrangbaur		4
Metung		N/A
Nicholson-Swan Reach		N/A
Nowa Nowa		N/A
Sarsfield-Bruthen		N/A
Sunlakes-Toorloo		N/A
Bemm River		N/A ²
Buchan	N/A ²	N/A
Cann River	N/A ²	5
Dinner Plain	N/A ²	N/A
Mallacoota	4	4
Omeo	20 ⁴	N/A
Orbost	28 ⁵	12
Swifts Creek	4	N/A

¹ The same raw water storages (Woodglen 1 & 2) service all 11 localities

² N/A – Not Applicable; this may be due to the absence of the specified storage within this locality, or due to the low risk from algal growth due to the presence of a fully sealed storage tank

³ Bemm River clear water storage was sampled at an increased interval for blue green algae in response to elevated levels of non-toxic algae being present throughout 2016/2017 and an increase in taste and odour complaints from the community

⁴ Omeo 10ML raw water storage was sampled at an increased interval for blue green algae in response to elevated levels of non-toxic algae being present throughout 2016/2017. This basin has since been covered.

⁵ Orbost raw water storage was sampled at an increased interval for blue green algae in response to elevated levels of non-toxic algae being present throughout 2016/2017

4.7.1 *Comments on results*

No samples exceeded the reporting thresholds for Section 22 of the *Safe Drinking Water Act (2003)* in 2016/2017. Due to the significant upgrades undertaken by EGW in the past 10 years, there are no uncovered clear water storages supplying customers (uncovered clear water storages are prone to algae blooms).

Any blue green algae biovolumes greater than 0.200 millimetres cubed per litre were reported in accordance with the Department of Environment, Land, Water and Planning *Blue Green Algae Circular 2016-17*.

4.8 Other Substances - Cadmium

Cadmium may be introduced into drinking water supplies through corrosion of pipes and fittings. Exposure to high concentrations of cadmium may result in potential health implications. Samples are taken quarterly in each of the water sampling localities.

Compliance is measured as: less than or equal to 0.002 milligrams per litre (health-based guideline value under the Australian Drinking Water Guidelines 2011).

Table 10: Cadmium sampling program and results

Water Sampling Locality	Frequency	No. of Samples	No. of Non-Complying Samples	Maximum (mg/L)	Complying (Yes / No)
Bairnsdale	Quarterly	4	0	< 0.0002	Yes
Bemm River	Quarterly	4	0	< 0.0002	Yes
Buchan	Quarterly	4	0	< 0.0002	Yes
Cann River	Quarterly	4	0	< 0.0002	Yes
Dinner Plain	Quarterly	4	0	< 0.0002	Yes
Eagle Point- Paynesville	Quarterly	6 ¹	0	< 0.0002	Yes
Kalimna	Quarterly	4	0	< 0.0002	Yes
Lindenow	Quarterly	4	0	< 0.0002	Yes
Lindenow South	Quarterly	4	0	< 0.0002	Yes
Mallacoota	Quarterly	4	0	< 0.0002	Yes
Merranqbaur	Quarterly	4	0	< 0.0002	Yes
Metung	Quarterly	4	0	< 0.0002	Yes
Nicholson-Swan Reach	Quarterly	4	0	< 0.0002	Yes
Nowa Nowa	Quarterly	4	0	< 0.0002	Yes
Omeo	Quarterly	4	0	< 0.0002	Yes
Orbost	Quarterly	4	0	< 0.0002	Yes
Sarsfield-Bruthen	Quarterly	4	0	< 0.0002	Yes
Sunlakes-Toorloo	Quarterly	4	0	< 0.0002	Yes
Swifts Creek	Quarterly	4	0	< 0.0002	Yes

¹ The six samples in Eagle Point – Paynesville include two samples taken on Raymond Island.

4.8.1 Comments on results

All water sampling localities were compliant for Cadmium for the 2016/2017 reporting period (Table 10).

4.9 Other Substances - Chromium

Chromium may occur naturally in the environment or be introduced through human activity. Samples are taken quarterly in each of the water sampling localities.

Compliance is measured as: less than or equal to 0.05 milligrams per litre of Cr (VI) (health-based guideline value under the Australian Drinking Water Guidelines 2011).

Table 11: Chromium sampling program and results 2016/17

Water Sampling Locality	Sampling Frequency	No. of Samples	No. of Non-Complying Samples	Maximum (mg/L)	Complying (Yes / No)
Bairnsdale	Quarterly	4	0	< 0.001	Yes
Bemm River	Quarterly	4	0	< 0.001	Yes
Buchan	Quarterly	4	0	< 0.001	Yes
Cann River	Quarterly	4	0	< 0.001	Yes
Dinner Plain	Quarterly	4	0	< 0.001	Yes
Eagle Point- Paynesville	Quarterly	6 ¹	0	< 0.001	Yes
Kalimna	Quarterly	4	0	< 0.001	Yes
Lindenow	Quarterly	4	0	< 0.001	Yes
Lindenow South	Quarterly	4	0	< 0.001	Yes
Mallacoota	Quarterly	4	0	< 0.001	Yes
Merranbaur	Quarterly	4	0	< 0.001	Yes
Metung	Quarterly	4	0	< 0.001	Yes
Nicholson-Swan Reach	Quarterly	4	0	< 0.001	Yes
Nowa Nowa	Quarterly	4	0	< 0.001	Yes
Omeo	Quarterly	4	0	< 0.001	Yes
Orbost	Quarterly	4	0	< 0.001	Yes
Sarsfield-Bruthen	Quarterly	4	0	< 0.001	Yes
Sunlakes-Toorloo	Quarterly	4	0	< 0.001	Yes
Swifts Creek	Quarterly	4	0	< 0.001	Yes

¹ The six samples in Eagle Point – Paynesville include two samples taken on Raymond Island

4.9.1 Comments on results

All water sampling localities were compliant for Chromium for the 2016/2017 reporting period (Table 11).

4.10 Other Substances - Copper

Copper may occur naturally in the environment or be introduced into water through contact with corroding copper pipes and fittings. Samples are taken quarterly in each applicable water sampling locality.

Compliance is measured as: less than 2 milligrams per litre (health-based guideline value under the Australian Drinking Water Guidelines 2011) and less than or equal to 1 milligram per litre (aesthetic guideline value under the Australian Drinking Water Guidelines 2011).

Table 12: Copper sampling program and results 2016/17

Water Sampling Locality	Sampling Frequency	No. of Samples	No. of Non-Complying Samples	Maximum (mg/L)	Complying (Yes / No)
Bairnsdale	Quarterly	4	0	0.010	Yes
Bemm River	Quarterly	4	0	0.011	Yes
Buchan	Quarterly	4	0	<0.001	Yes
Cann River	Quarterly	4	0	<0.001	Yes
Dinner Plain	Quarterly	4	0	0.096	Yes
Eagle Point- Paynesville	Quarterly	6 ¹	0	0.006	Yes
Kalimna	Quarterly	4	0	0.013	Yes
Lindenow	Quarterly	4	0	0.019	Yes
Lindenow South	Quarterly	4	0	0.009	Yes
Mallacoota	Quarterly	4	0	0.003	Yes
Merrangbaur	Quarterly	4	0	0.008	Yes
Metung	Quarterly	4	0	0.010	Yes
Nicholson-Swan Reach	Quarterly	4	0	0.039	Yes
Nowa Nowa	Quarterly	4	0	0.006	Yes
Omeo	Quarterly	4	0	0.003	Yes
Orbost	Quarterly	4	0	<0.001	Yes
Sarsfield-Bruthen	Quarterly	4	0	0.057	Yes
Sunlakes-Toorloo	Quarterly	4	0	0.010	Yes
Swifts Creek	Quarterly	4	0	0.015	Yes

¹ The six samples in Eagle Point – Paynesville include two samples taken on Raymond Island

4.10.1 Comments on results

All water sampling localities were compliant for Copper for the 2016/2017 reporting period (Table 12).

4.11 Other Substances - Cyanide

Cyanide may occur naturally in the environment or be introduced through human activity. Testing for Cyanide is performed biannually in each applicable water sampling locality.

Compliance is measured as: less than or equal to 0.08 milligrams per litre (health-based guideline value under the Australian Drinking Water Guidelines 2011).

Table 13: Cyanide sampling program and results 2016/17

Water Sampling Locality	Sampling Frequency	No. of Samples	No. of Non-Complying Samples	Maximum (mg/L)	Complying (Yes / No)
Bairnsdale	Biannually	4 ¹	0	< 0.005	Yes
Bemm River	Biannually	2	0	< 0.005	Yes
Buchan	Biannually	2	0	< 0.005	Yes
Cann River	Biannually	2	0	< 0.005	Yes
Dinner Plain	Biannually	2	0	< 0.005	Yes
Eagle Point- Paynesville	Biannually	2	0	< 0.005	Yes
Kalimna	Biannually	2	0	< 0.005	Yes
Lindenow	Biannually	2	0	< 0.005	Yes
Lindenow South	Biannually	2	0	< 0.005	Yes
Mallacoota	Biannually	2	0	< 0.005	Yes
Merrangbaur	Biannually	2	0	< 0.005	Yes
Metung	Biannually	2	0	< 0.005	Yes
Nicholson-Swan Reach	Biannually	2	0	< 0.005	Yes
Nowa Nowa	Biannually	2	0	< 0.005	Yes
Omeo	Biannually	2	0	< 0.005	Yes
Orbost	Biannually	2	0	< 0.005	Yes
Sarsfield-Bruthen	Biannually	2	0	< 0.005	Yes
Sunlakes-Toorloo	Biannually	2	0	< 0.005	Yes
Swifts Creek	Biannually	2	0	< 0.005	Yes

¹ Water Sampling locality has two entry point locations, each sampled biannually

4.11.1 Comments on results

All water sampling localities were compliant for Cyanide for the 2016/2017 reporting period (Table 13).

4.12 Other Substances - Free Chlorine

Chlorine is a disinfection agent that is added to drinking water to kill harmful microorganisms and ensure the water is safe to drink. The Australian Drinking Water Guidelines 2011 state that Chlorine concentrations in the drinking water supply must be less than or equal to 5 milligrams per litre for health purposes.

Table 14: Free Chlorine sampling program and results 2016/17.

Water Sampling Locality	Minimum Sampling Frequency	No. of Samples ¹	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L)
Bairnsdale	Weekly	177	0.23	1.40	0.93
Bemm River	Weekly	104	0.29	2.10	0.78
Buchan	Weekly	104	0.32	1.10	0.74
Cann River	Weekly	104	0.14	2.20	0.94
Dinner Plain	N/A ²	N/A ²	N/A ²	N/A ²	N/A ²
Eagle Point- Paynesville	Weekly	106	0.20	0.74	0.55
Kalimna	Weekly	104	0.50	0.91	0.69
Lindenow	Weekly	104	0.52	1.10	0.86
Lindenow South	Weekly	104	0.37	0.90	0.67
Mallacoota	Weekly	104	0.09	1.50	0.82
Merrangbaur	Weekly	104	0.41	0.89	0.68
Metung	Weekly	104	0.45	1.00	0.70
Nicholson-Swan Reach	Weekly	104	0.49	1.00	0.76
Nowa Nowa	Weekly	104	0.30	0.86	0.58
Omeo	Weekly	104	0.05	0.93	0.64
Orbost	Weekly	106	0.28	1.20	0.85
Sarsfield-Bruthen	Weekly	104	0.31	1.00	0.77
Sunlakes-Toorloo	Weekly	109	0.44	1.10	0.75
Swifts Creek	Weekly	104	0.46	0.92	0.73

¹ Additional samples may be recorded due to population size (both fixed and seasonal) and the number of sampling days per calendar year

² Dinner Plain is not sampled for free chlorine as ultra-violet disinfection is employed in lieu of chlorine

4.12.1 Comments on results

All water sampling localities were compliant for Free Chlorine for the 2016/2017 reporting period (Table 14).

4.13 Other Substances - Lead

Lead may occur naturally in water or be introduced through contact with lead pipes and joint fittings. Human exposure to high levels of lead may result in toxic effects. Samples are taken quarterly in each applicable water sampling locality.

Compliance is measured as: less than or equal to 0.01 milligrams per litre (health-based guideline value under the Australian Drinking Water Guidelines 2011).

Table 15: Lead sampling program and results 2016/17.

Water Sampling Locality	Sampling Frequency	No. of Samples	No. of Non-Complying Samples	Maximum (mg/L)	Complying (Yes / No)
Bairnsdale	Quarterly	4	0	< 0.001	Yes
Bemm River	Quarterly	4	0	0.001	Yes
Buchan	Quarterly	4	0	< 0.001	Yes
Cann River	Quarterly	4	0	< 0.001	Yes
Dinner Plain	Quarterly	4	0	< 0.001	Yes
Eagle Point- Paynesville	Quarterly	6 ¹	0	< 0.001	Yes
Kalimna	Quarterly	4	0	< 0.001	Yes
Lindenow	Quarterly	4	0	< 0.001	Yes
Lindenow South	Quarterly	4	0	< 0.001	Yes
Mallacoota	Quarterly	4	0	< 0.001	Yes
Merrangbaur	Quarterly	4	0	< 0.001	Yes
Metung	Quarterly	4	0	< 0.001	Yes
Nicholson-Swan Reach	Quarterly	4	0	< 0.001	Yes
Nowa Nowa	Quarterly	4	0	< 0.001	Yes
Omeo	Quarterly	4	0	< 0.001	Yes
Orbost	Quarterly	4	0	< 0.001	Yes
Sarsfield-Bruthen	Quarterly	4	0	0.001	Yes
Sunlakes-Toorloo	Quarterly	4	0	< 0.001	Yes
Swifts Creek	Quarterly	4	0	0.001	Yes

¹ The six samples in Eagle Point – Paynesville include two samples taken on Raymond Island

4.13.1 Comments on results

All water sampling localities were compliant for Lead for the 2016/2017 reporting period (Table 15).

4.14 Other Substances - Manganese

Manganese may occur naturally in the environment, or may be introduced through industrial activity. Manganese may cause aesthetic issues (such as taste or staining of laundry and appliances) as well as health issues at high concentrations. Compliance is measured as: less than or equal to 0.1 milligrams per litre (aesthetic value) and less than or equal to 0.5 milligrams per litre (health-based guideline value under the Australian Drinking Water Guidelines 2011).

Table 16: Manganese sampling program and results 2016/2017.

Water Sampling Locality	Sampling Frequency	No. of Samples ¹	Minimum (mg/L)	Maximum (mg/L)	Complying (Yes / No)
Bairnsdale	Monthly	28	0.001	0.001	Yes
Bemm River	Quarterly	8	0.001	0.005	Yes
Buchan	Quarterly	8	0.001	0.001	Yes
Cann River	Quarterly	8	0.001	0.002	Yes
Dinner Plain	Quarterly	4	0.001	0.001	Yes
Eagle Point- Paynesville	Quarterly	6	0.001	0.001	Yes
Kalimna	Quarterly	4	0.001	0.001	Yes
Lindenow	Quarterly	4	0.001	0.001	Yes
Lindenow South	Quarterly	4	0.001	0.001	Yes
Mallacoota	Monthly	24	0.001	0.024	Yes
Merrangbaur	Quarterly	4	0.001	0.001	Yes
Metung	Quarterly	4	0.001	0.001	Yes
Nicholson-Swan Reach	Quarterly	4	0.001	0.001	Yes
Nowa Nowa	Quarterly	4	0.001	0.001	Yes
Omeo	Quarterly	8	0.001	0.003	Yes
Orbost	Quarterly	8	0.001	0.005	Yes
Sarsfield-Bruthen	Quarterly	4	0.001	0.001	Yes
Sunlakes-Toorloo	Quarterly	4	0.001	0.001	Yes
Swifts Creek	Quarterly	8	0.001	0.001	Yes

¹ Number of samples per locality are determined by risk assessment based upon historical data and source water (river or bore water) and the sampling programme is set according to the risk rating

4.14.1 Comments on results

All water sampling localities were compliant for Manganese for the 2016/2017 reporting period (both aesthetic and health values) (Table 16).

4.15 Other Substances - Radiological

Radiologically active compounds may impact public health. Radiological activity samples are taken from bore waters every two years and from surface waters every five years. While there are no specific guidelines for radiological activity, the Australian Drinking Water Guidelines 2011 advise that radionuclides should be identified and determined if gross alpha or beta activities exceed 0.5 Bq/L.

Table 17: Radiological compound results for bore water 2016/17.

Water Sampling Locality	Sampling Frequency	No. of Samples	No. of Non-Complying Samples	Maximum (Bq/L)	Complying (Yes / No)
Bairnsdale-Bore	Biannual	10	0	< 0.1	Yes
Dinner Plain-Bore	Biannual	2	0	< 0.1	Yes
Mallacoota-Bore	Biannual	4	0	< 0.1	Yes

No radiological tests were required to be conducted on raw surface waters in 2016/17. The next tests for both bore and surface water are due to be taken in 2018/19.

4.15.1 Comments on results from 2015/2016

All water sampling localities were compliant for radiological active compounds for the 2016/2017 reporting period (Table 17).

4.16 Aesthetic Characteristics - Colour

Colour generally occurs in water as a result of dissolved organic material. Although not a health consideration, elevated colour can be an aesthetic issue.

Compliance is measured as: less than or equal to 15 Hazen Units (HU); (Australian Drinking Water Guidelines 2011 aesthetic value).

Table 18: Colour sampling program and results

Water Sampling Locality	Sampling Frequency	No. of Samples ¹	Minimum (HU)	Maximum (HU)	Complying (Yes / No)
Bairnsdale	Monthly	36	2	4	Yes
Bemm River	Monthly	12	2	4	Yes
Buchan	Monthly	12	2	2	Yes
Cann River	Monthly	12	2	2	Yes
Dinner Plain	Monthly	24	2	2	Yes
Eagle Point-Paynesville	Monthly	14	2	2	Yes
Kalimna	Monthly	12	2	2	Yes
Lindenow	Monthly	12	2	2	Yes
Lindenow South	Monthly	N/A ²	N/A ²	N/A ²	N/A ²
Mallacoota	Monthly	12	2	2	Yes
Merrangbaur	Monthly	12	2	2	Yes
Metung	Monthly	12	2	2	Yes
Nicholson-Swan Reach	Monthly	N/A ²	N/A ²	N/A ²	N/A ²
Nowa Nowa	Monthly	12	2	4	Yes
Omeo	Monthly	24	2	2	Yes
Orbost	Monthly	24	2	2	Yes
Sarsfield-Bruthen	Monthly	12	2	2	Yes
Sunlakes-Toorloo	Monthly	12	2	2	Yes
Swifts Creek	Monthly	24	2	2	Yes

¹ Number of samples per locality are determined by risk assessment based upon historical data and source water (river or bore water) and the sampling programme is set according to the risk rating

² N/A - Not Applicable; Colour is not sampled in the some sampling localities within the Mitchell system based on risk assessment and results from network samples taken downstream of these localities i.e. Lindenow South, Nicholson-Swan Reach

4.16.1 Comments on results

All water sampling localities were compliant for colour for the 2016/2017 reporting period (Table 18).

4.17 Aesthetic Characteristics - Hardness

Hardness is caused by the presence of dissolved calcium compounds in water. Hard water may result in scaling issues.

Compliance is measured as: less than or equal to 200 milligrams per litre (Australian Drinking Water Guidelines 2011 aesthetic value) as total hardness (as calcium carbonate).

Table 19: Hardness sampling program and results 2016/2017

Water Sampling Locality	Sampling Frequency	No. of Samples ¹	Minimum (mg/L)	Maximum (mg/L)	Complying (Yes / No)
Bairnsdale	Quarterly	12	16	26	Yes
Bemm River	Quarterly	8	13	17	Yes
Buchan	Quarterly	8	20	47	Yes
Cann River	Quarterly	8	18	24	Yes
Dinner Plain	Quarterly	4	35	40	Yes
Eagle Point- Paynesville	Quarterly	8	17	34	Yes
Kalimna	Quarterly	8	19	31	Yes
Lindenow	Quarterly	8	18	26	Yes
Lindenow South	Quarterly	8	19	27	Yes
Mallacoota	Quarterly	8	47	72	Yes
Merrangbaur	Quarterly	8	21	31	Yes
Metung	Quarterly	8	21	36	Yes
Nicholson-Swan Reach	Quarterly	N/A ²	N/A ²	N/A ²	N/A ²
Nowa Nowa	Quarterly	8	20	36	Yes
Omeo	Quarterly	8	11	17	Yes
Orbost	Quarterly	8	17	23	Yes
Sarsfield-Bruthen	Quarterly	8	16	31	Yes
Sunlakes-Toorloo	Quarterly	8	18	30	Yes
Swifts Creek	Quarterly	11	53 ³	120 ³	Yes

¹ Number of samples per locality are determined by risk assessment based upon historical data and source water (river or bore water) and the sampling programme is set according to the risk rating

² N/A - Not Applicable; Hardness is not sampled in the some sampling localities within the Mitchell system based on risk assessment and results from network samples taken downstream of these localities i.e. Nicholson-Swan Reach

³ An increase in hardness was recorded in Swifts Creek samples. Although still within an acceptable range for drinking water supplies, increased sampling was conducted to monitor for any additional changes

4.17.1 Comments on results

All water sampling localities were compliant for hardness for the 2016/2017 reporting period (Table 19).

4.18 Aesthetic Characteristics - Iron

Iron may occur naturally in the environment, or may be introduced through industrial activity, as well as through customer service piping. High levels of iron in the water can impart taste and may stain laundry or fittings. There is no health-based guideline for Iron in drinking water. Compliance is measured as: less than or equal to 0.3 milligrams per litre (Australian Drinking Water Guidelines 2011 aesthetic value).

Table 20: Iron sampling program and results

Water Sampling Locality	Sampling Frequency	No. of Samples ¹	Minimum (mg/L)	Maximum (mg/L)	Complying (Yes / No)
Bairnsdale	Monthly	28	<0.01	0.01	100%
Bemm River	Monthly	8	0.02	0.06	100%
Buchan	Monthly	8	<0.01	0.01	100%
Cann River	Monthly	8	<0.01	0.03	100%
Dinner Plain	Monthly	4	<0.01	0.01	100%
Eagle Point-Paynesville	Monthly	6	<0.01	0.01	100%
Kalimna	Monthly	4	<0.01	0.01	100%
Lindenow	Monthly	4	<0.01	0.02	100%
Lindenow South	Monthly	4	<0.01	0.01	100%
Mallacoota	Monthly	24	<0.01	0.02	100%
Merrangbaur	Monthly	4	<0.01	0.01	100%
Metung	Monthly	4	<0.01	0.01	100%
Nicholson-Swan Reach	Monthly	4	<0.01	0.01	100%
Nowa Nowa	Monthly	4	<0.01	0.01	100%
Omeo	Monthly	8	<0.01	0.01	100%
Orbost	Monthly	8	<0.01	0.03	100%
Sarsfield-Bruthen	Monthly	4	<0.01	0.01	100%
Sunlakes-Toorloo	Monthly	4	<0.01	0.01	100%
Swifts Creek	Monthly	8	<0.01	0.01	100%

¹ Number of samples per locality are determined by risk assessment based upon historical data and source water (river or bore water) and the sampling programme is set according to the risk rating

4.18.1 Comments on results

All water sampling localities were compliant for Iron for the 2016/2017 reporting period (Table 20).

4.19 Aesthetic Characteristics - pH

pH is the measure of the acidity (pH <7.0) or alkalinity (pH >7.0) of the water. Extreme pH values may cause corrosion or scaling in certain circumstances. High pH may also reduce the effectiveness of chlorine disinfection. The Australian Drinking Water Guidelines 2011 state that the pH of drinking water should be between pH 6.5 and 8.5 (aesthetic guideline limit). However, as cement mortar-lined pipes and newly constructed concrete water storages may raise pH, values up to pH 9.2 may be tolerated, provided no deterioration in microbiological quality of the water supply is observed.

Table 21: pH Sampling program and results 2016/17

Water Sampling Locality	Minimum Sampling Frequency	No. of Samples ¹	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L)
Bairnsdale	Weekly	176	7.0	7.9	7.4
Bemm River	Weekly	104	7.3	7.8	7.6
Buchan	Weekly	104	7.4	9.3	8.3
Cann River	Weekly	104	7.2	9.4	8.2
Dinner Plain	Weekly	104	6.6	7.3	6.9
Eagle Point- Paynesville	Weekly	106	7.1	9.1	7.6
Kalimna	Weekly	104	7.2	7.8	7.5
Lindenow	Weekly	104	7.2	8.5	7.6
Lindenow South	Weekly	104	7.3	8.3	7.8
Mallacoota	Weekly	104	7.3	8.6	7.9
Merrangbaur	Weekly	104	7.1	8.0	7.6
Metung	Weekly	104	7.1	9.1	8.5
Nicholson-Swan Reach	Weekly	104	7.1	9.3	7.5
Nowa Nowa	Weekly	104	7.4	9.3	8.2
Omeo	Weekly	104	7.2	8.9	7.9
Orbost	Weekly	104	7.4	9.2	8.1
Sarsfield-Bruthen	Weekly	104	7.0	8.5	7.4
Sunlakes-Toorloo	Weekly	109	7.3	9.0	7.7
Swifts Creek	Weekly	104	7.5	8.1	7.7

¹ Number of samples per locality are determined by risk assessment based upon historical data and source water (river or bore water) and the sampling programme is set according to the risk rating

4.19.1 Comments on results

Based on the average values over the year, pH values for all water sampling localities are within the upper guideline range for pH (i.e. pH < 9.2). Elevated individual pH values have been observed in a number of water sampling localities. This is largely due to the presence of cement-lined distribution pipes. However, these higher pH values have not impacted water quality, as evidenced by compliant microbiological (Table 3.1) and aesthetic quality (Section 5) during 2016/2017.

4.20 Aesthetic Characteristics - Zinc

Zinc may occur naturally in the environment, or may be introduced through industrial activity, as well as through corrosion of customer service piping. High levels of zinc in the water can impart taste and appearance issues with drinking water.

Compliance is measured as: less than or equal to 3 milligrams per litre (Australian Drinking Water Guidelines 2011 aesthetic value).

Table 22: Zinc sampling program and results 2016/17

Water Sampling Locality	Sampling Frequency	No. of Samples	Minimum (mg/L)	Maximum (mg/L)	% Complying
Bairnsdale	Quarterly	4	0.001	0.003	100%
Bemm River	Quarterly	4	0.008	0.010	100%
Buchan	Quarterly	4	0.001	0.001	100%
Cann River	Quarterly	4	0.001	0.001	100%
Dinner Plain	Quarterly	4	0.005	0.011	100%
Eagle Point-Paynesville	Quarterly	4	0.001	0.003	100%
Kalimna	Quarterly	4	0.001	0.006	100%
Lindenow	Quarterly	4	0.001	0.004	100%
Lindenow South	Quarterly	4	0.001	0.004	100%
Mallacoota	Quarterly	4	0.001	0.002	100%
Merrangbaur	Quarterly	4	0.002	0.004	100%
Metung	Quarterly	4	0.002	0.003	100%
Nicholson-Swan Reach	Quarterly	4	0.001	0.006	100%
Nowa Nowa	Quarterly	4	0.001	0.059	100%
Omeo	Quarterly	4	0.001	0.007	100%
Orbost	Quarterly	4	0.001	0.001	100%
Sarsfield-Bruthen	Quarterly	4	0.002	0.015	100%
Sunlakes-Toorloo	Quarterly	4	0.002	0.002	100%
Swifts Creek	Quarterly	4	0.002	0.018	100%

4.20.1 Comments on results

All water sampling localities were compliant for Zinc for the 2016/2017 reporting period.

4.21 Analysis of Results

Comparing the performance in all water sampling localities demonstrates our high standard of compliance over the long term. All sampling localities were fully compliant with the parameters described in Schedule 2 of the Safe Drinking Water Regulations 2015. EGW has been 100% compliant against all regulated parameters over the past three years.

EGW samples for additional parameters in raw water, entry points and throughout the reticulation system. As outlined in Table 23, all entry point and reticulation samples have been 100% compliant with Australian Drinking Water Guidelines 2011. Parameters not listed in the ADWG are also analysed (Table 24).

Table 23: Reticulation and entry point monitoring and results 2014-2017.

Parameter	Unit	Health Guideline Value (ADWG 2011)	Aesthetic Guideline Value (ADWG 2011)	Performance against guideline values 2014-2015	Performance against guideline values 2015-2016	Performance against guideline values 2016-2017
Arsenic	(mg/L)	0.01	-	100%	N/A ²	100%
Barium	(mg/L)	2	-	100%	N/A ²	100%
Cadmium	(mg/L)	0.002	-	100%	100%	100%
Chlorine (as free chlorine)	(mg/L)	5	0.6	100%	100%	100%
Chlorite	(mg/L)	0.8	-	100%	100%	100%
Chromium	(mg/L)	0.05	-	100%	100%	100%
Colour (True)	HU	-	15	100%	100%	100%
Copper	(mg/L)	2	1	100%	100%	100%
Cyanide	(mg/L)	0.08	-	100%	N/A ²	100%
E.coli	(orgs/100mL)	0	-	100%	100%	100%
Fluoride	(mg/L)	1.5	-	100%	100%	100%
Dichloroacetic Acid	(mg/L)	0.1	-	100%	100%	100%
Trichloroacetic Acid	(mg/L)	0.1	-	100%	100%	100%
Hardness (as CaCO ₃)	(mg/L)	-	200	100%	100%	100%
Iodide	(mg/L)	0.5	-	100%	N/A ²	100%
Iron	(mg/L)	-	0.3	100%	100%	100%
Lead	(mg/L)	0.01	-	100%	100%	100%
Manganese	(mg/L)	0.5	0.1	100%	100%	100%
pH (Field)	-	-	6.5-9.2	>99% ³	>99% ³	>99% ³
Silver	(mg/L)	0.1	-	100%	N/A ¹	100%
Total Trihalomethanes	(mg/L)	0.25	-	100%	100%	100%
Turbidity	NTU	-	5	100%	100%	100%
Zinc (mg/L)	(mg/L)	3	-	100%	100%	100%

¹ N/A - Not Applicable; Sampling for these parameters is conducted on a biennial basis according to a risk based assessment of each sampling locality conducted in 2012

² N/A - Not Applicable; Sampling for these parameters is conducted on a biennial basis according to a risk based assessment of each sampling locality conducted in 2015

³ Based on the average values over the past three years, pH values for all water sampling localities are within the upper aesthetic guideline range for pH (i.e. pH < 9.2). Elevated individual pH values have been observed in a number of water sampling localities within the reticulation system. This is largely due to the presence of cement-lined distribution pipes. However, these higher pH values have not impacted water quality, as evidenced by compliant microbiological (Table 3.1) and aesthetic quality (Section 5) during 2016/2017

Table 24: Reticulation and entry point - other parameter monitoring results 2014-2017

Parameter	Unit	2014/2015 Maximum	2015/2016 Maximum	2016/2017 Maximum
Aluminium (Acid Soluble)	mg/L	0.12	0.13	0.28
Calcium as Ca	mg/L	10	8.4	30
Chlorate	mg/L	0.6	0.05	0.38
Coliforms	Colilert	200	1	200
Electrical Conductivity	($\mu\text{S}/\text{cm}$ @ 25C)	470	340	440
Monochloroacetic Acid	mg/L	0.005	0.005	0.005
Bromoacetic Acid	mg/L	0.005	0.005	0.005
Bromochloroacetic Acid	mg/L	0.011	0.011	0.005
Bromodichloroacetic Acid	mg/L	0.014	0.008	0.005
Dibromoacetic Acid	mg/L	0.006	0.010	0.011
Magnesium	mg/L	12	7.4	11
Total Aluminium	mg/L	0.13	0.13	0.28

4.22 Continuous Improvement Measures

Last financial year, the following water quality improvements were made to our systems:

- Installation of a floating cover on the Omeo 10ML raw water storage for algae management, reduced risk of contamination from bird activity and evaporation control.
- Upgrade to Lindenow disinfection plant control system resulting in improved management of chlorine residuals and a reduction in the required dosage.
- Shadecloth covered clear water storage upgrades. Shadecloth covers were upgraded to reduce the risk of animal access and other contaminants.
- Comprehensive underwater camera inspection of a number of lined and covered clear water storages for structural and water quality risk assessment.
- Continuation of high-pressure air scouring of water mains across our water sampling localities as part of our ongoing maintenance programs. This maintenance activity aims to improve water quality by reducing the risk of turbidity spikes created during routine and non-routine pipeline works.
- Continuation of the Aquifer Storage and Recovery research initiative at Woodglen, enhancing options for selective raw water harvesting during periods where river water quality conditions are poor.
- Design work for future clear water tank installations and conversion of existing clear water basins to raw water basins. These tanks will replace shade-cloth covered clear water storages and result in reduced risk of recontamination. Having raw water basins will also enhance selective water harvesting options, resulting in improvement water quality risk profiles.

5 Complaints Relating to Water Quality

Our Customer Charter outlines our commitments, responsibilities and standards of service to be provided to our customers.

This Charter also sets out the obligations to customers as outlined by the Essential Services Commission's Customer Service Code for metropolitan retail and regional water businesses. This includes specific standards and conditions of service that apply to all water businesses in Victoria. Further information relating to East Gippsland Water's Customer Charter can be found on our website www.egwater.vic.gov.au.

EGW defines a water quality complaint as "A customer contacts EGW and informs EGW they are unhappy with the water being supplied, or, informs EGW of an issue that has affected the quality of the water being supplied, or, expresses opposition to EGW's use of water treatment chemicals".

The number of customer complaints relating to water quality has increased in 2016/2017 when compared to the previous two years (Table 24). This is attributable in large part to a change in how complaints are defined, which was introduced by EGW during 2016/17 and resulted from an ESC audit of our processes.

Water quality complaint explanations can be found in sections 5.1 – 5.5.

Table 24: Summary of all customer water quality complaints 2014-2017.

Type of Complaints	Number of Complaints			Comparison between years
	2016-2017	2015-2016	2014-2015	
Alleged Illness	2	0	2	No significant change.
Discoloured Water	23	0	3	Increase of 23 complaints from previous reporting period.
Taste and Odour	29	5	0	Increase of 24 complaints from previous reporting period.
Air in Water	13	0	0	Increase of 13 complaints from previous reporting period.
Other	1	3	0	No significant change.
Total	68	8	5	Increase of a total of 60 complaints from the previous reporting period.

Table 25: Summary of all customer water quality complaints per locality 2016/17.

Water Sampling Locality	Type of Complaint					Total
	Alleged Illness	Discoloured Water	Taste and Odour	White Water	Other	
Bairnsdale	2	15	4	8	0	29
Bemm River	0	0	8	0	0	8
Buchan	0	0	0	0	0	0
Cann River	0	0	1	0	0	1
Dinner Plain	0	0	0	0	0	0
Eagle Point- Paynesville	0	0	5	0	0	5
Kalimna	0	0	0	0	0	0
Lindenow	0	1	0	0	0	1
Lindenow South	0	0	0	0	0	0
Mallacoota	0	0	1	0	0	1
Merrangbaur	0	0	1	0	0	1
Metung	0	0	1	2	0	3
Nicholson-Swan Reach	0	1	1	1	0	3
Nowa Nowa	0	0	1	0	0	1
Omeo	0	0	0	1	0	1
Orbost	0	0	3	1	0	4
Sunlakes-Toorloo	0	5	1	0	0	0
Sarsfield-Bruthen	0	1	1	0	0	2
Swifts Creek	0	0	1	0	1	2
Total	2	23	29	13	1	68

5.1 Alleged Health Complaints

Two complaints were recorded in the EGW customer database, alleging health issues had resulted from drinking water (Table 25). These were unconfirmed by a health practitioner. EGW was fully compliant in all localities for all health based guidelines (Australian Drinking Water Guidelines 2011).

5.2 Discoloured Water

Twenty three complaints of discoloured drinking water were recorded in 2016/2017 (Table 25). These were mostly due to works being undertaken on water mains. All were managed through flushing the reticulation system.

5.3 Taste and Odour

Twenty nine taste and odour complaints were recorded in 2016/2017 (Table 25). Some of the complaints came from Bemm River as a result of the high geosmin levels in the clear water storage, described in section 3.1 of this document. The majority of other complaints related to drinking water tasting and smelling of chlorine. EGW managed these complaints

by sampling for chlorine residual and flushing the system where required. Sampling confirmed 100% compliance with health based guidelines.

5.4 Air in Water

Air in water can cause drinking water to appear cloudy in colour as a result of the formation of tiny bubbles. Thirteen complaints related to air in water were recorded in 2016/2017 (Table 25). EGW managed this issue by flushing the reticulation system.

5.5 Other

One complaint at Swifts Creek was associated with hardness related issues in the water supply (Table 25). Sampling confirmed 100% compliance with health based and aesthetic guidelines.

6 Regulated Water

Regulated Water is “water that is not intended for drinking but could reasonably be mistaken for drinking water”. EGW has no declared Regulated Water supplies as defined in Section 6 (2) of the *Safe Drinking Water Act 2003*.

We have a number of customers who are supplied non-potable water by agreement. We remind those customers that their water is non-potable on their quarterly invoice.

7 Further Information

This Water Quality Annual Report is prepared in accordance with Section 26 of the *Safe Drinking Water Act 2003*.

For further information regarding water quality information, please refer to the East Gippsland Water website (www.egwater.vic.gov.au), or contact East Gippsland Water on 1300 720 700.

8 Glossary of terms

Coagulation/ Flocculation Treatment process where chemicals are added to raw water to bind suspended solids, generally expressed as turbidity. Once bound, the chemical and turbidity form “floc” which is either settled out in the clarification process or floated off during the dissolved air flotation process.

Chlorine Gas Chemical added for disinfection of water.

CWS Clear water storage

DWQRMS Drinking Water Quality Risk Management System

Dissolved Air Flotation Treatment process utilising air dissolved in water to float suspended particles to the surface of a treatment plant clarifier cell. The float is periodically removed and clear water is drained from the bottom of the cell.

Disinfection Treatment process where chlorine or ultraviolet light is introduced to the flow of clear water prior to customer consumption to kill any pathogenic organisms (make it safe to drink) that may be present in the clear water following the sedimentation/dissolved air flotation and granular media filtration processes.

Fluoridation The addition of Fluoride to the water supply system for the benefit of dental hygiene.

Fluorosilicic Acid Chemical used for fluoridation of water

Geobag Dewatering Treatment process utilising large material bags to separate water from solids. The solids are restricted from passing through the fine material while water is able to seep through.

Granular Media Filtration Treatment process which utilises anthracite, sands and gravels to filter out suspended particles following the sedimentation/dissolved air flotation processes. Suspended particles are trapped within the media and clear water passes through prior to being disinfected. The particles build up in the media and are periodically washed out in a reverse flow process.

HU Hazen units

ISES Integrated standards enforcement system

kL Kilolitres (1,000 litres)

L/s Litres per second

mg/L Milligrams per litre

Mechanical Dewatering Treatment process where solids and water are separated through a high speed centrifugal separation process. High speed revolutions force separation between the solid and liquid, solids are captured for processing and water is returned back to the treatment process.

ML Megalitre (1,000,000 litres)

N/A Not applicable

NTU Nephelometric turbidity units

Poly Aluminium Chlorohydrate (PAC 23) Coagulant chemical used during coagulation process to remove suspended solids from raw water

Polymer (LT20, 25, 27) Chemical used as a flocculation aid to increase settlement rate of suspended solids in the coagulation process.

Powder Activated Carbon Product used for reduction/removal of taste and odour compounds and algae toxins in water.

RMP Risk management plan

SOP Standard operating procedure

Soda Ash Chemical used for pH correction to aid the coagulation/flocculation process.

Sodium Hydroxide (Caustic Soda) Chemical used for pH correction to aid the coagulation/flocculation process.

Sodium Hypochlorite Chemical added for disinfection of water.

Sedimentation/Clarification Treatment process where flocculated particles in the raw water are settled into the bottom of a clarifier and periodically removed. Clear water is taken from the top of the clarifier prior to filtration and disinfection.

WTP Water treatment plant