South Gippsland Water

Annual Drinking Water Quality Report 2013-14

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1.1 INTRODUCTION

At South Gippsland Water we are committed to the management of our water supply systems for the provision of safe, high-quality drinking water to all customers.

Welcome to our annual water quality report for the period 1st July 2013 to 30th June 2014. Produced in accordance with requirements of the *Safe Drinking Water Act 2003* (the Act), this report summarises our performance against water quality standards, provides an overview of our management practices, and describes how we respond to water quality challenges as they arise.

As part of South Gippsland Water's commitment to quality, we maintain a drinking water management system based on Hazard Analysis and Critical Control Point (HACCP) principles and the *Australian Drinking Water Guidelines*[*]. The system incorporates a catchment-to-tap monitoring program to ensure drinking water consistently meets legislative requirements of the Act and associated Safe Drinking Water Regulations 2005 (the Regulations). More information on water treatment, quality management systems and operational improvements for 2013-14 can be found in part 2 of this report.

For the 2013-14 financial year, we are pleased to advise that drinking water supplied in all South Gippsland Water localities complied with the prescribed standards of the Regulations for *Escherichia coli* (*E. coli*), chlorine disinfection byproducts and turbidity. With the exception of one, all localities have complied with the water quality standard for aluminium. Part 3 of this report provides a summary of results from our comprehensive monitoring program, while part 4 outlines corrective actions taken to resolve water quality issues.

Customers are very important to us at South Gippsland Water, and we strive to meet expectations in terms of supplying water that is not only safe to drink but also aesthetically-pleasing. We also aim to provide prompt and helpful service in response to water quality concerns. For details on the number of water quality complaints and queries that were received in 2013-14 and how these were addressed, please refer to part 5.

Finally, we are also pleased to report that our risk management plan with respect to the supply of drinking water to the public has once again successfully passed a regulatory audit. Reviewed by a Department of Health-accredited auditor, the plan was found to be compliant in all auditable elements. This demonstrates that obligations imposed on South Gippsland Water by the Safe Drinking Water Act are being met. An account of the audit outcomes can be found in part 6.

We hope that you find this report informative and invite you to contact our customer service department by telephoning 03 5662 0444 or emailing sgwater@sgwater.com.au if you require additional information or clarification on anything presented within.

[*] National Health and Medical Research Council and National Resource Management Ministerial Council *Australian Drinking Water Guidelines 2011*

1.2 CHARACTERISATION OF THE SYSTEM

The service area of South Gippsland Water (SGW) covers approximately 4,000 square kilometres of the South Gippsland region, from Wonthaggi in the west to Yarram in the east. Drinking water is supplied to 22 rural centres via ten separate supply systems; refer to Figure 1 (map).

The total water supply operation for 2013-14 comprised:

- 1,234 square kilometres of total catchment area
- 13 reservoirs and 4 raw water storage basins or tanks
- 10 water treatment plants
- 25 treated water distribution storages
- 15 water pump stations
- 698 kilometres of water mains
- 4,720megalitres (million litres) of metered water supplied to customers

Separate water sampling localities in South Gippsland Water have been formally gazetted by the Department of Human Services in a notice in the Victoria Government Gazette Special Edition No. S193 on 3rd August 2006. Information on localities and water supply systems is provided in Table 1. There have been no major changes in arrangements with respect to water supply since the previous reporting period.

Table 1: SGW water sampling localities and supply sources

Water treatment plant	Localities supplied	Population serviced*	Principal raw water supply sources	Supplementary raw water supply sources	Raw water storage
Devon North	Alberton Yarram	510 2,240	Tarra River		Devon North Raw Water Basin
Dumbalk	Dumbalk	260	Tarwin River (east branch)		Dumbalk Raw Water Tank
Fish Creek	Fish Creek	510	Battery Creek		Battery Creek Reservoir
Foster	Foster	1,110	Deep Creek		Deep Creek Reservoir; Foster Dam; Foster Raw Water Basin.
Korumburra	Korumburra	3,400	Coalition Creek; Bellview Creek; Ness Creek.	Tarwin River (west branch)	Coalition Creek Reservoir; Bellview Reservoir; Ness Gully Reservoir.
Lance Creek	Cape Paterson Inverloch Lance Creek Wonthaggi	740 4,520 120 7,400	Lance Creek		Lance Creek Reservoir
Leongatha	Koonwarra Leongatha	190 4,970	Ruby Creek		No. 1 Reservoir; No. 2 Reservoir; Hyland Reservoir (No. 3); Western Reservoir (No. 4).
Meeniyan	Meeniyan	460	Tarwin River (west branch)		Meeniyan Raw Water Basin
Poowong	Loch Nyora Poowong	280 710 320	Little Bass River		Little Bass Reservoir
Toora	Port Franklin Port Welshpool Toora	450 630 450	Agnes River		Cooks Dam

* Permanent population served based on Australian Bureau of Statistics (ABS) 2011 Census updated with local government growth factors of 2.5% for Bass Coast Shire, 1.5% for South Gippsland Shire, and 0.09% for Wellington Shire. Where no specific ABS data available for serviced locality, population has been estimated from number of connected properties and ABS statistics for average number of people per household.

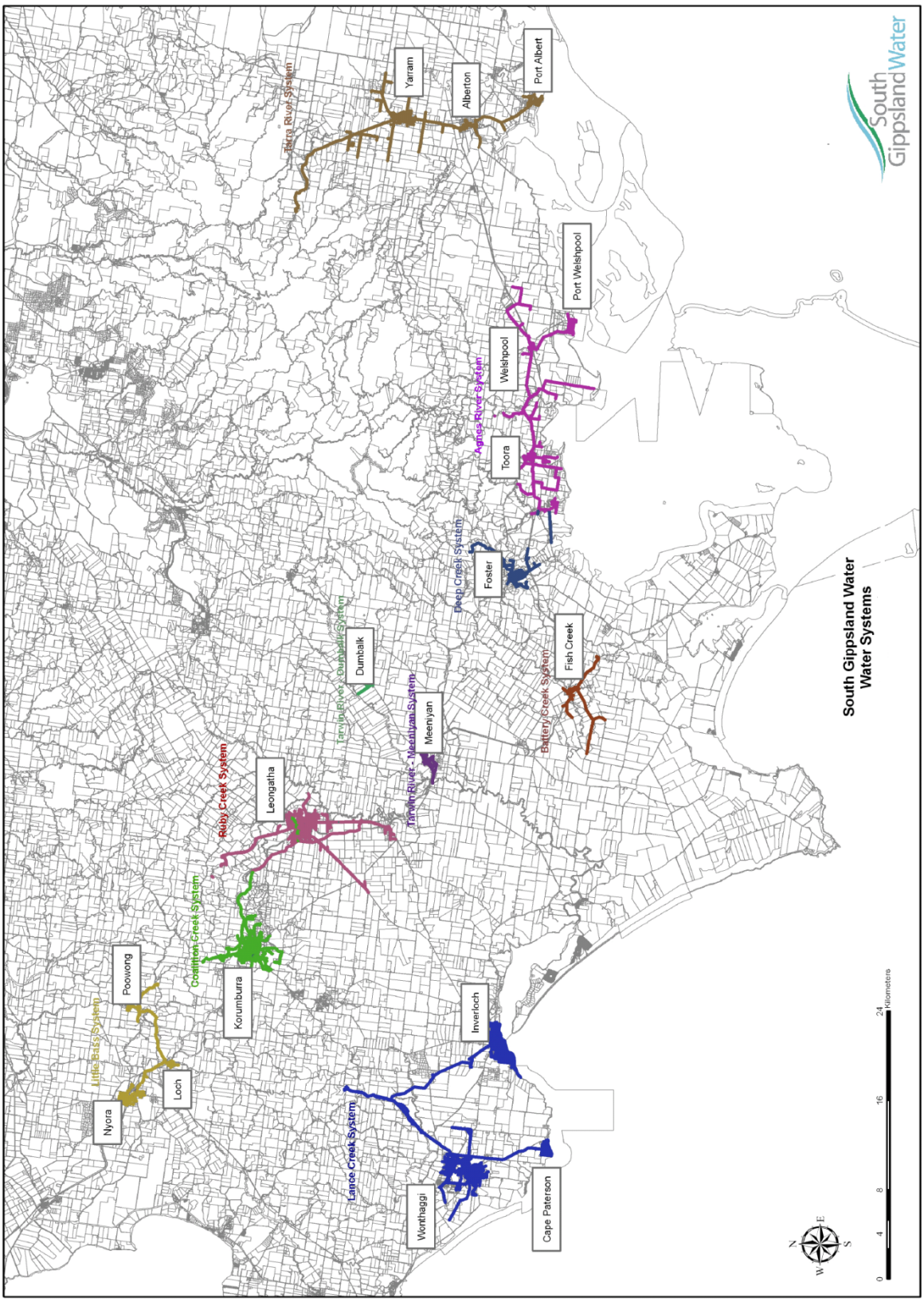


Figure 1: South Gippsland Water supply area and systems

2. WATER TREATMENT AND QUALITY MANAGEMENT SYSTEMS

2.1 WATER TREATMENT

Conventional water treatment is a process whereby water is purified to a level suitable for human consumption prior to being disinfected. In general, water is either collected in a reservoir or pumped from a river to a settling basin, where natural sedimentation of large particulate matter occurs. As smaller particles and dissolved substances will not settle out of the water within a practical timeframe, chemical agents must be added to precipitate and coagulate these materials into larger insoluble masses known as floc. The water can then be clarified by gravity settling or flotation of the floc, followed by filtration through a granular medium. Chemical disinfectants are added to the treated water product to destroy any microorganisms that may remain.

A summary of the processes by which the drinking water supplied by South Gippsland Water (SGW) is treated and disinfected is provided in Table 2. There have been no major changes in water treatment processes since the 2013-14 reporting period.

Table 2: List of processes and chemicals used to treat and disinfect water supplied by SGW

Water Treatment Plant	Localities supplied	Treatment process	Treatment frequency	Added substances
Devon North	Alberton Yarram	Pre-treatment pH correction Manganese oxidation Coagulation and flocculation Dissolved air flotation clarification Filtration by granular medium Chloramine disinfection Dewatering of waste water	As required As required Regular Regular Regular Regular Regular	Sodium carbonate Potassium permanganate Aluminium sulphate - - Sodium hypochlorite and ammonia -
Dumbalk	Dumbalk	Pre-treatment pH correction Manganese oxidation Coagulation and flocculation Sedimentation clarification Filtration by granular medium Ultraviolet (UV) disinfection Primary chlorination disinfection Secondary chlorination disinfection Removal of volatile organics by aeration Dewatering of waste water	Regular As required As required Regular Regular Regular Regular Regular Regular Regular	Sodium carbonate Potassium permanganate Polyaluminium chloride - - - Sodium hypochlorite Sodium hypochlorite - Anionic polyacrylamide
Fish Creek	Fish Creek	Pre-treatment pH correction Manganese oxidation Coagulation and flocculation Sedimentation clarification Filtration by granular medium Post-treatment pH correction Primary chlorination disinfection Removal of volatile organics by aeration Secondary chlorination disinfection Dewatering of waste water	Regular As required Regular Regular Regular Regular Regular Regular Regular Regular	Sodium carbonate Potassium permanganate Aluminium sulphate - Anionic polyacrylamide* Sodium carbonate Sodium hypochlorite - Sodium hypochlorite -

Water Treatment Plant	Localities supplied	Treatment process	Treatment frequency	Added substances
Foster	Foster	Taste and odour control Pre-treatment pH correction Manganese oxidation Coagulation and flocculation Sedimentation clarification Filtration by granular medium Post-treatment pH correction Primary chlorination disinfection Secondary chlorination disinfection Dewatering of waste water	As required Regular As required Regular Regular Regular Regular Regular Regular Regular	Powdered activated carbon Sodium carbonate Potassium permanganate Aluminium sulphate - - Sodium carbonate Chlorine (gas) Sodium hypochlorite -
Korumburra	Korumburra	Taste and odour control Pre-treatment pH correction Manganese oxidation Coagulation and flocculation Sedimentation clarification Filtration by granular medium Manganese sequestration Primary chlorination disinfection Secondary chlorination disinfection Dewatering of waste water	As required Regular As required Regular Regular Regular As required Regular Regular Regular	Powdered activated carbon Sodium carbonate Potassium permanganate Aluminium sulphate - - Sodium tripolyphosphate Chlorine (gas) Sodium hypochlorite -
Lance Creek	Cape Paterson Inverloch Lance Creek Wonthaggi	Taste and odour control Pre-treatment pH correction Manganese oxidation Coagulation and flocculation Dissolved air flotation clarification Filtration by granular medium Post-treatment pH correction Chloramination disinfection Fluoridation Dewatering of waste water	As required As required As required Regular Regular Regular Regular Regular Regular Regular	Powdered activated carbon Sodium carbonate Potassium permanganate Aluminium sulphate - - Sodium carbonate Chlorine (gas) and ammonia Hexafluorosilicic acid Anionic polyacrylamide
Leongatha	Koonwarra Leongatha	Taste and odour control Pre-treatment pH correction Manganese oxidation Coagulation and flocculation Sedimentation clarification Filtration by granular medium Post-treatment pH correction Primary chlorination disinfection Secondary chlorination disinfection Dewatering of waste water	As required Regular As required Regular Regular Regular Regular Regular Regular Regular	Powdered activated carbon Sodium carbonate Potassium permanganate Aluminium sulphate - - Sodium carbonate Chlorine (gas) Sodium hypochlorite Anionic polyacrylamide
Meeniyan	Meeniyan	Manganese oxidation Coagulation and flocculation Sedimentation clarification Filtration by granular medium Chlorination disinfection Ultraviolet (UV) disinfection Removal of volatile organics by aeration Dewatering of waste water	As required Regular Regular Regular Regular Regular Regular Regular	Sodium hypochlorite Polyaluminium chloride Anionic polyacrylamide* - Sodium hypochlorite - - Anionic polyacrylamide
Poowong	Loch Nyora Poowong	Taste and odour control Pre-treatment pH correction Manganese oxidation Coagulation and flocculation Sedimentation clarification Filtration by granular medium Post treatment pH correction Chloramination disinfection Dewatering of waste water	As required As required As required Regular Regular Regular Regular Regular Regular	Powdered activated carbon Sodium carbonate Potassium permanganate Aluminium sulphate Anionic polyacrylamide* - Sodium hypochlorite Sodium hypochlorite and ammonia -

Water Treatment Plant	Localities supplied	Treatment process	Treatment frequency	Added substances
Toora	Port Franklin Port Welshpool Toora	Taste and odour control Pre-treatment pH correction Manganese oxidation Coagulation and flocculation Sedimentation clarification Filtration by granular medium Post treatment pH correction Chlorination disinfection Dewatering of waste water	As required As required As required Regular Regular Regular Regular Regular Regular	Powdered activated carbon Sodium carbonate Potassium permanganate Aluminium sulphate - - Sodium hypochlorite Chlorine (gas) -

*Polyacrylamide used as a floc aid, filter aid or sludge-thickening agent when required.

2.2 WATER TREATMENT ISSUES

Occasionally issues arise out of the application of water treatment processes and corrective actions must be taken. The use of aluminium salts as coagulating agents may lead to aluminium being present in supplied drinking water at higher than acceptable levels. Process monitoring and 'jar-jests' that simulate plant conditions in the laboratory are used to ensure correct dosage of chemicals and enable optimisation of treatment processes in response to changes in raw water quality and other factors.

Elevated aluminium levels for the locality of Meeniyan in 2013-14 were reported to the Department of Health under section 18 of the Safe Drinking Water Act 2003; refer to part 4 of this report for details.

2.3 QUALITY MANAGEMENT SYSTEMS AND CONTINUAL IMPROVEMENT

The risk management approach adopted by South Gippsland Water for the provision of safe drinking water is based on the twelve elements of the 'Framework for Management of Drinking Water Quality', as described in the *Australian Drinking Water Guideline 2011.* Incorporated into the risk management system are a number of on-going programs and practices designed to ensure treatment plants are operating optimally at all times, and treated water within distribution systems is both protected from external contamination and remains aesthetically pleasing to customers; examples are as follows:

- Filter management program
- Backflow prevention program
- Regular site security checks of all water treatment facilities and distribution system water storages
- Procedures in relation to hygienic mains break repair and replacement
- Proactive mains flushing and air-scouring programs
- Hydrant replacement program

The risk management system also includes a commitment to continual improvement, with the aim of achieving best practice in the delivery of drinking water to customers. Training, attendance at seminars, and membership of peak industry bodies (including the Australian Water Association, the Water Industry Operators Association, and the Water Services Association of Australia) ensure staff are kept abreast of drinking water related research, and advances in technologies and practices.

All ideas for improvement are documented in the Drinking Water Management System (DWMS) improvement plan register. The register is reviewed at regular DWMS committee meetings with items being prioritised, actioned and included in capital works plans where appropriate. Major improvements achieved in 2013-14 are outlined below.

2.3.1 Installation of filter-to-waste systems

Filter to waste systems were installed at Dumbalk, Leongatha, Meeniyan and Toora water treatment plants in the 2013-14 financial year. As treatment plant filters require a short 'ripening' stage to reach maximum effectiveness following a backwash or plant shutdown, turbidity in filtered water may exceed target levels at the start of a filter run. While this volume of sub-standard quality water is relatively small, by diverting it to the waste system the overall quality of the treated water product is enhanced. This not only further minimises risk to consumers as part of the multi-barrier approach to drinking water safety but also allows for some reductions in the use of disinfecting agents and associated costs.

2.3.2 Installation of additional turbidity meters

Additional on-line turbidity meters were installed at Devon North, Fish Creek, Lance Creek, Leongatha, Meeniyan and Toora water treatment plants in 2013-14. The new turbidity meters have enabled closer monitoring and control of treatment and filtration processes at these plants. This in turn allows for fine-tuning of treatment plant operation and helps to ensure water produced is always of the highest quality.

2.3.3 PLC upgrade for Lance Creek Water Treatment Plant

A major upgrade to the programmable logic controller (PLC) at the Lance Creek water treatment plant was commenced in 2013-14. PLCs are computers that allow electromechanical processes, including operation of water treatment plants, to be automated. Due for completion in the 2014-15 financial year, the main objective of the works at Lance Creek is to minimise disturbances to treatment processes that can adversely affect water quality. By maximising the capability of the treatment plant, the PLC upgrade will enable more efficient use of treatment chemicals and staff resources, and better management of the Lance Creek supply system overall.

2.3.4 Implementation of a new data management system

The 2013-14 year has also seen the acquisition and gradual implementation of an advanced water information management system for South Gippsland Water. The new software package allows for efficient collection and secure storage of water quality and operational data. It includes a large array of features and tools to facilitate treatment plant control, analysis of information, and preparation of reports. Once fully implemented, improvements in terms of efficiencies and whole water system management will be the result.

3. QUALITY OF DRINKING WATER FOR 2013-14

During the 2013-14 reporting period, South Gippsland Water implemented water quality monitoring programs consistent with requirements of the *Safe Drinking Water Act 2003* (the Act). As specified in the Safe Drinking Water Regulations 2005, samples must be collected from the drinking water supply at relevant frequencies and analysed for performance against water quality standards as shown in Table 4.

Table 3: Drinking water quality standards and required sampling frequencies

Parameter	Relevant sampling frequency for each water sampling locality	Quality standard for each water sampling locality
Microbiological organisms:		
• *Escherichia coli*	One sample per week	At least 98% of all samples of drinking water collected in any 12-month period contain no *Escherichia coli* per 100 millilitres of drinking water
Chlorine-based chemicals:		
• Chloroacetic acid	One sample per month	0.15 milligrams per litre of drinking water
• Dichloroacetic acid	One sample per month	0.1 milligrams per litre of drinking water
• Trichloracetic acid	One sample per month	0.1 milligrams per litre of drinking water
• Trihalomethanes	One sample per month	0.25 milligrams per litre of drinking water
Chemicals derived from treatment with ozone:		
• Bromate	One sample per month	0.02 milligrams per litre of drinking water
• Formaldehyde	One sample per month	0.5 milligrams per litre of drinking water
Aluminium-based chemicals:		
• Aluminium (acid-soluble)	One sample per month	0.2 milligrams per litre of drinking water
Other parameters:		
• Turbidity	One sample per week	95% upper confidence limit of the mean of samples of drinking water collected in any 12 month period must be less than or equal to 5.0 Nephelometric Turbidity Units

As South Gippsland Water does not use ozone for treatment or disinfection, analysis for the ozone-derived chemicals of bromate and formaldehyde is not necessary and has not been conducted in the 2013-14 reporting period.

In addition to regulatory compliance monitoring, South Gippsland Water also conducted water quality monitoring for specific parameters based on the health and aesthetic considerations detailed in the *Australian Drinking Water Guidelines 2011*. All water samples collected as part of South Gippsland Water's monitoring programs were independently analysed by a National Association of Testing Authorities (NATA) certified laboratory. Results of analysis for 2013-14 are summarised in Tables 4 to 28.

Section 23 of the Act requires that a water supplier make available for inspection by the public the results of any water quality monitoring program that is conducted on any drinking water it supplies. Customers and members of the public may access drinking water quality data by telephoning South Gippsland Water Customer Service on **(03) 5662 0444**, or by emailing **sgwater@sgwater.com.au**

3.1 *ESCHERICHIA COLI*

Escherichia coli (*E. coli*) is used as a specific indicator of faecal contamination and hence the safety of water for drinking. The Safe Drinking Water Regulations 2005 specify that at least 98% of all samples of drinking water collected in a 12-month period contain no *E. coli* per 100 mL of drinking water.

3.1.1 Results: Escherichia coli

Monitoring for compliance with the water quality standard for *E. coli* was conducted in accordance with the Regulations*. Results are presented in Table 4.

Table 4: *Escherichia coli* results for 2013-14 financial year

Locality	Sampling frequency (No. of samples per time period)	Total No. of samples	No. of samples containing *E. coli*	Maximum result (Orgs/100mL)	Percentage of samples with no *E. coli*	Complying with regulation (Yes/No)
Alberton	One per week	53	0	0	100%	Yes
Cape Paterson	One per week	53	0	0	100%	Yes
Dumbalk	One per week	52	0	0	100%	Yes
Fish Creek	One per week	52	0	0	100%	Yes
Foster	One per week	52	0	0	100%	Yes
Inverloch	Two per week	106	0	0	100%	Yes
Koonwarra	One per week	53	0	0	100%	Yes
Korumburra	Two per week	106	0	0	100%	Yes
Lance Creek	One per week	53	0	0	100%	Yes
Leongatha	Three per week	159	0	0	100%	Yes
Loch	One per week	53	0	0	100%	Yes
Meeniyan	One per week	53	0	0	100%	Yes
Nyora	One per week	53	0	0	100%	Yes
Poowong	One per week	53	0	0	100%	Yes
Port Franklin	Two per week	104	0	0	100%	Yes
Port Welshpool	One per week	52	0	0	100%	Yes
Toora	Two per week	104	0	0	100%	Yes
Wonthaggi	Four per week	212	0	0	100%	Yes
Yarram	One per week	53	1	1	98%	Yes

3.1.2 Actions undertaken in relation to non-compliance for *E. coli*

Drinking water supplied in all localities complied with the water quality standard for *E. coli*. For specific details of *E. coli* detection in the Yarram sampling locality, refer to part 4 of this report.

* South Gippsland Water collects samples for *E. coli* monitoring in excess of the one per week per locality as specified in the Safe Drinking Water Regulations 2005. As part of a pro-active risk management strategy based on population size, South Gippsland Water requested (and was granted) permission from the Department of Health to increase the number of regulated samples taken in the localities of Inverloch, Korumburra, Leongatha, Port Franklin, Toora and Wonthaggi.

3.2 CHLORINE-BASED DISINFECTION BYPRODUCT CHEMICALS

Chlorine-based disinfection byproduct chemicals may be present in drinking water as a result of reactions between chlorine and naturally-occurring organic materials, such as humic and fulvic acids.

3.2.1 Results: Chlorine-based disinfection byproducts

Monitoring for compliance with the water quality standards for chlorine-based disinfection byproduct chemicals was conducted in accordance with the Safe Drinking Water Regulations 2005. A summary of results for the regulated chlorine disinfection byproducts of chloroacetic acid, dichloroacetic acid, trichloroacetic acid and trihalomethanes (total) are provided in table 5, 6, 7 and 8 respectively.

3.2.1.1 Chloroacetic acid

The Safe Drinking Water Regulations 2005 specify that chloroacetic acid in drinking water should not exceed 0.15 mg/L.

Table 5: Chloroacetic acid results for 2013-14 financial year

Locality	Sampling frequency (No. of samples per time period)	Total No. of samples	No. of non-complying samples	Minimum result mg/L	Maximum result mg/L	Complying with regulation (Yes/No)
Alberton	One per month	12	0	<0.005	<0.005	Yes
Cape Paterson	One per month	12	0	<0.005	<0.005	Yes
Dumbalk	One per month	12	0	<0.005	<0.005	Yes
Fish Creek	One per month	12	0	<0.005	<0.005	Yes
Foster	One per month	12	0	<0.005	<0.005	Yes
Inverloch	One per month	12	0	<0.005	<0.005	Yes
Koonwarra	One per month	12	0	<0.005	<0.005	Yes
Korumburra	One per month	12	0	<0.005	<0.005	Yes
Lance Creek	One per month	12	0	<0.005	<0.005	Yes
Leongatha	One per month	12	0	<0.005	<0.005	Yes
Loch	One per month	12	0	<0.005	<0.005	Yes
Meeniyan	One per month	12	0	<0.005	<0.005	Yes
Nyora	One per month	12	0	<0.005	<0.005	Yes
Poowong	One per month	12	0	<0.005	<0.005	Yes
Port Franklin	One per month	12	0	<0.005	<0.005	Yes
Port Welshpool	One per month	12	0	<0.005	<0.005	Yes
Toora	One per month	12	0	<0.005	<0.005	Yes
Wonthaggi	One per month	12	0	<0.005	<0.005	Yes
Yarram	One per month	12	0	<0.005	<0.005	Yes

3.2.1.2 Dichloroacetic acid

The Safe Drinking Water Regulations 2005 specify that dichloroacetic acid in drinking water should not exceed 0.1 mg/L.

Table 6: Dichloroacetic acid results for 2013-14 financial year

Locality	Sampling frequency (No. of samples per time period)	Total No. of samples	No. of non-complying samples	Minimum result mg/L	Maximum result mg/L	Complying with regulation (Yes/No)
Alberton	One per month	12	0	<0.005	0.007	Yes
Cape Paterson	One per month	12	0	<0.005	0.012	Yes
Dumbalk	One per month	12	0	<0.005	0.015	Yes
Fish Creek	One per month	12	0	<0.005	0.016	Yes
Foster	One per month	12	0	<0.005	0.008	Yes
Inverloch	One per month	12	0	<0.005	0.022	Yes
Koonwarra	One per month	12	0	<0.005	0.013	Yes
Korumburra	One per month	12	0	<0.005	0.047	Yes
Lance Creek	One per month	12	0	<0.005	0.012	Yes
Leongatha	One per month	12	0	0.009	0.025	Yes
Loch	One per month	12	0	0.015	0.026	Yes
Meeniyan	One per month	12	0	<0.005	0.029	Yes
Nyora	One per month	12	0	0.011	0.027	Yes
Poowong	One per month	12	0	0.007	0.026	Yes
Port Franklin	One per month	12	0	0.012	0.026	Yes
Port Welshpool	One per month	12	0	0.009	0.020	Yes
Toora	One per month	12	0	0.009	0.024	Yes
Wonthaggi	One per month	12	0	0.007	0.016	Yes
Yarram	One per month	12	0	<0.005	<0.005	Yes

3.2.1.3 Trichloroacetic acid

The Safe Drinking Water Regulations 2005 specify that trichloroacetic acid in drinking water should not exceed 0.1 mg/L.

Table 7: Trichloroacetic acid results for 2013-14 financial year

Locality	Sampling frequency (No. of samples per time period)	Total No. of samples	No. of non-complying samples	Minimum result mg/L	Maximum result mg/L	Complying with regulation (Yes/No)
Alberton	One per month	12	0	<0.005	0.012	Yes
Cape Paterson	One per month	12	0	<0.005	<0.005	Yes
Dumbalk	One per month	12	0	<0.005	0.009	Yes
Fish Creek	One per month	12	0	0.001	0.027	Yes
Foster	One per month	12	0	<0.005	<0.005	Yes
Inverloch	One per month	12	0	<0.005	0.016	Yes
Koonwarra	One per month	12	0	<0.005	0.021	Yes
Korumburra	One per month	12	0	<0.005	0.033	Yes
Lance Creek	One per month	12	0	<0.005	<0.005	Yes
Leongatha	One per month	12	0	0.007	0.023	Yes
Loch	One per month	12	0	<0.005	<0.005	Yes
Meeniyan	One per month	12	0	<0.005	0.021	Yes
Nyora	One per month	12	0	<0.005	<0.005	Yes
Poowong	One per month	12	0	<0.005	<0.005	Yes
Port Franklin	One per month	12	0	0.010	0.030	Yes
Port Welshpool	One per month	12	0	0.008	0.024	Yes
Toora	One per month	12	0	0.008	0.029	Yes
Wonthaggi	One per month	12	0	<0.005	<0.005	Yes
Yarram	One per month	12	0	<0.005	0.011	Yes

3.2.1.4 Trihalomethanes (total)

The Safe Drinking Water Regulations 2005 specify that trihalomethanes in drinking water should not exceed 0.25 mg/L.

Table 8: Trihalomethanes (total) results for 2013-14

Locality	Sampling frequency (No. of samples per time period)	Total No. of samples	No. of non-complying samples	Minimum result mg/L	Maximum result mg/L	Complying with regulation (Yes/No)
Alberton	One per month	12	0	<0.001	0.003	Yes
Cape Paterson	One per month	12	0	0.008	0.013	Yes
Dumbalk	One per month	12	0	0.045	0.130	Yes
Fish Creek	One per month	12	0	0.084	0.250	Yes
Foster	One per month	12	0	0.070	0.120	Yes
Inverloch	One per month	12	0	0.008	0.015	Yes
Koonwarra	One per month	12	0	0.091	0.210	Yes
Korumburra	One per month	12	0	0.077	0.200	Yes
Lance Creek	One per month	12	0	0.006	0.015	Yes
Leongatha	One per month	12	0	0.086	0.200	Yes
Loch	One per month	12	0	0.002	0.007	Yes
Meeniyan	One per month	12	0	0.072	0.120	Yes
Nyora	One per month	12	0	0.002	0.011	Yes
Poowong	One per month	12	0	0.002	0.011	Yes
Port Franklin	One per month	12	0	0.058	0.120	Yes
Port Welshpool	One per month	12	0	0.041	0.089	Yes
Toora	One per month	12	0	0.049	0.098	Yes
Wonthaggi	One per month	12	0	0.009	0.015	Yes
Yarram	One per month	12	0	<0.001	0.003	Yes

3.2.2 Actions undertaken in relation to non compliance for chlorine-based disinfection byproduct chemicals

There were no actions required in relation to non-compliance for chlorine-based disinfection byproduct chemicals. Drinking water supplied in all localities complied with the water quality standards for chloroacetic acid, dichloroacetic acid, trichloroacetic acid and trihalomethanes.

3.3 OZONE-BASED DISINFECTION BYPRODUCT CHEMICALS

Water supplied by South Gippsland Water is not treated with ozone and therefore byproducts derived from ozone are not a significant risk to drinking water supplied and are not measured.

3.4 ALUMINIUM

Aluminium may be present in drinking water where aluminium salts are used as coagulants in water treatment processes to destabilise particles in water. The Safe Drinking Water Regulations 2005 specify that acid-soluble aluminium in drinking water should not exceed 0.2 mg/L

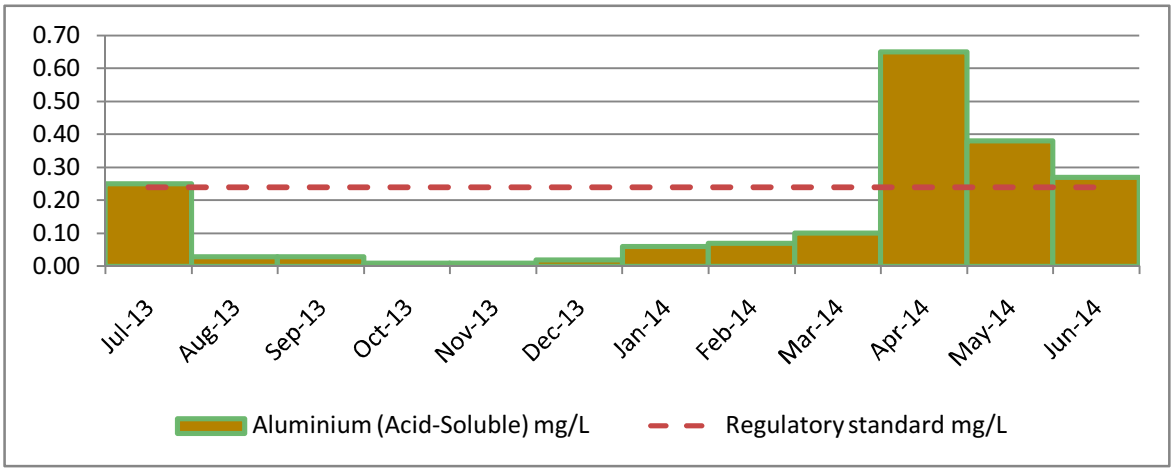
3.4.1 Results: Aluminium

Monitoring for compliance with the water quality standard for aluminium was conducted in accordance with the Regulations. A summary of aluminium results for all localities is provided in Table 9.

Table 9: Acid-soluble aluminium results for 2013-14 financial year

Locality	Sampling frequency (No. of samples per time period)	Total No. of samples	No. of non-complying samples	Minimum result mg/L	Maximum result mg/L	Complying with regulation (Yes/No)
Alberton	One per month	12	0	<0.01	0.03	Yes
Cape Paterson	One per month	12	0	<0.01	0.05	Yes
Dumbalk	One per month	12	0	<0.01	0.06	Yes
Fish Creek	One per month	12	0	<0.01	0.04	Yes
Foster	One per month	12	0	<0.01	0.02	Yes
Inverloch	One per month	12	0	<0.01	0.03	Yes
Koonwarra	One per month	12	0	<0.01	0.04	Yes
Korumburra	One per month	12	0	<0.01	0.03	Yes
Lance Creek	One per month	12	0	0.02	0.03	Yes
Leongatha	One per month	12	0	<0.01	0.04	Yes
Loch	One per month	12	0	0.02	0.04	Yes
Meeniyan	One per month	12	4	<0.01	0.65	No
Nyora	One per month	12	0	0.02	0.04	Yes
Poowong	One per month	12	0	<0.01	0.04	Yes
Port Franklin	One per month	12	0	<0.01	0.02	Yes
Port Welshpool	One per month	12	0	<0.01	0.04	Yes
Toora	One per month	12	0	<0.01	0.03	Yes
Wonthaggi	One per month	12	0	<0.01	0.03	Yes
Yarram	One per month	12	0	0.02	0.03	Yes

Figure 2: Acid-soluble aluminium results for non-complying locality (Meeniyan)



3.4.2 Actions undertaken in relation to non-compliance for aluminium

Four instances of non-compliance with the water quality standard for aluminium were recorded for Meeniyan in 2013-14. The exceedances were reported to the Department under section 18 of the Act, and corrective actions are discussed in part 4 of this report.

3.5 TURBIDITY

Turbidity is a measurement of the light-scattering property of water which is dependent on the amount, size and composition of fine suspended matter. The Safe Drinking Water Regulations 2005 specify that the calculated 95% upper confidence limit (UCL) of the mean of samples of drinking water collected in any 12-month period should be less than or equal to 5.0 Nephelometric Units (NTU).

3.5.1 Results: Turbidity

Monitoring for compliance with the water quality standard for turbidity was conducted in accordance with the Regulations*. A summary of turbidity monitoring results is presented in table 10.

Table 10: Turbidity Results for the 2013-14 financial year

Locality	Sampling frequency (No. of samples per time period)	Total No. of samples	Maximum result NTU	95% UCL of mean	Complying with regulation (Yes/No)
Alberton	One per week	53	4.3	0.3	Yes
Cape Paterson	One per week	53	0.4	0.3	Yes
Dumbalk	One per week	52	0.5	0.3	Yes
Fish Creek	One per week	52	2.5	0.4	Yes
Foster	One per week	52	0.6	0.3	Yes
Inverloch	Two per week	106	0.6	0.3	Yes
Koonwarra	One per week	53	0.9	0.2	Yes
Korumburra	Two per week	106	0.6	0.3	Yes
Lance Creek	One per week	53	0.4	0.3	Yes
Leongatha	Three per week	159	0.8	0.3	Yes
Loch	One per week	53	0.3	0.2	Yes
Meeniyan	One per week	53	0.8	0.3	Yes
Nyora	One per week	53	0.3	0.2	Yes
Poowong	One per week	53	0.6	0.3	Yes
Port Franklin	Two per week	104	1.2	0.3	Yes
Port Welshpool	One per week	52	0.7	0.3	Yes
Toora	Two per week	104	0.8	0.3	Yes
Wonthaggi	Four per week	212	0.5	0.2	Yes
Yarram	One per week	53	0.6	0.2	Yes

3.5.2 Actions undertaken in relation to non-compliance for turbidity

Based on the calculated UCL of the mean, drinking water supplied in all localities complied with the water quality standard for turbidity and no actions were required.

* South Gippsland Water collects samples for turbidity monitoring in excess of the one per week per locality as specified in the Safe Drinking Water Regulations 2005. As part of a pro-active risk management strategy based on population size, South Gippsland Water requested (and was granted) permission from the Department of Health to increase the number of regulated samples taken in the localities of Inverloch, Korumburra, Leongatha, Port Franklin, Toora and Wonthaggi.

3.6 FLUORIDE

Naturally-occurring fluoride concentrations in drinking water are largely dependent on the type of soil and rock through which source water drains. Fluoride may also be added to drinking water supplies as a public health measure for the prevention of dental carries. The *Australian Drinking Water Guidelines 2011* (ADWG) specify that the maximum concentration of fluoride in drinking water should not exceed 1.5 mg/L. The *Health (fluoridation) Act 1973* states that the annual average concentration for fluoride in drinking water must not exceed a level of 1 mg/L.

Under the *Health (fluoridation) Act*, an obligation is imposed on suppliers of fluoridated water to achieve a dose rate that confers a dental health benefit on consumers. Based on annual average maximum daily air temperature (which has been shown to correlate closely with water consumption), and as specified in the *Code of practice for fluoridation of drinking water supplies*, *Health (fluoridation) Act 1973*, the optimal fluoride concentration for drinking water supplied in the South Gippsland region is 0.9 mg/L. While fluoridated water suppliers must aim for this optimal concentration in operating a fluoride dosing facility, an annual average fluoride concentration of greater than or equal to 0.6 mg/L (which is the minimum concentration that confers a dental health benefit) is deemed as meeting the obligation.

3.6.1 Results: fluoride in non-fluoridated supplies

Monitoring of non-fluoridated drinking water is conducted annually to verify continued low levels of naturally-occurring fluoride, as have been recorded historically. Results of fluoride monitoring for non-fluoridated supplies are provided in Table 11.

Table 11: Fluoride results for non-fluoridated supplies in the 2013-14 financial year

Water Treatment Plant	Localities Supplied	Sampling Frequency (Samples per time period)	Total No. of Samples	Result mg/L	Complying with regulation Yes/No
Devon North	Alberton Yarram	One per year	1	<0.05	Yes
Dumbalk	Dumbalk	One per year	1	0.09	Yes
Fish Creek	Fish Creek	One per year	1	<0.05	Yes
Foster	Foster	One per year	1	<0.05	Yes
Korumburra	Korumburra	One per year	1	<0.05	Yes
Leongatha	Leongatha Koonwarra	One per year	1	<0.05	Yes
Meeniyan	Meeniyan	One per year	1	<0.05	Yes
Poowong	Loch Nyora Poowong	One per year	1	0.10	Yes
Toora	Port Franklin Port Welshpool Toora	One per year	1	<0.05	Yes

3.6.2 Actions undertaken in relation to non-compliance in non-fluoridated supplies

Drinking water monitored at distribution entry point sites at all water treatment plants complied with both the *Health (fluoridation) Act 1973* and the ADWG guideline value for fluoride and there were no actions required in relation to non-compliance.

3.6.3 Results: fluoride in fluoridated supply

For the fluoridated supply of Lance Creek, monitoring is conducted in accordance with the *Code of practice for fluoridation of drinking water supplies, Health (fluoridation) Act 1973*; refer to Table 12 for results.

Table 12: Fluoride results for fluoridated (Lance Creek) supply system in the 2013-14 financial year

Locality	Sampling frequency (Samples per time period)	Total No. of samples	Operating target range mg/L	Min. result mg/L	Max. result mg/L	Average result mg/L	Complying with regulation (Yes/No)	Meeting obligation (Yes/No)
Cape Paterson	One per week	53	0.9±0.1	0.60	0.90	0.80	Yes	Yes
Inverloch	One per week	53	0.9±0.1	0.56	0.92	0.79	Yes	Yes
Lance Creek	One per week	53	0.9±0.1	0.12	0.97	0.77	Yes	Yes
Wonthaggi	One per week	53	0.9±0.1	0.61	0.91	0.80	Yes	Yes

3.6.4 Actions undertaken in relation to non-compliance for fluoride in fluoridated supplies

No actions were required in relation to non-compliance; drinking water in all fluoridated localities complied with both the *Health (fluoridation) Act 1973* and the ADWG guideline for maximum allowable fluoride concentration. Based on the requirement that the annual average fluoride concentration be greater than or equal to 0.6 mg/L, the obligation imposed by the *Health (fluoridation) Act* with regard to conferring a dental health benefit was also fulfilled.

3.7 OTHER ALGAE, PATHOGEN, CHEMICAL OR SUBSTANCE THAT MAY POSE A RISK TO HUMAN HEALTH

As part of South Gippsland Water's drinking water quality management system, specific water quality parameters that have the potential to affect human health are monitored. These parameters are measured against standard values defined in the *Australian Drinking Water Guidelines 2011* (ADWG). As many of these parameters do not change significantly over time or through water supply systems, frequent monitoring is not required.

3.7.1 Arsenic

Arsenic is a naturally-occurring element which can be introduced to water through the dissolution of minerals and ores, or from industrial effluent, atmospheric deposition, drainage from old gold mines or the use of some types of sheep dip. The ADWG specify that, from a health perspective, the concentration of arsenic should not exceed 0.01 mg/L. Water supplied by South Gippsland Water complied with the ADWG guideline value for arsenic, with all results indicating levels were below detection limits; refer to Table 13.

Table 13: Arsenic results for 2013-14 financial year

Water Treatment Plant	Localities supplied	Sampling frequency (samples per time period)	Total No. of samples	Result mg/L	Complying with ADWG guideline value Yes/No
Devon North	Alberton Yarram	One per year	1	<0.001	Yes
Dumbalk	Dumbalk	One per year	1	<0.001	Yes
Fish Creek	Fish Creek	One per year	1	<0.001	Yes
Foster	Foster	One per year	1	<0.001	Yes
Korumburra	Korumburra	One per year	1	<0.001	Yes
Lance Creek	Cape Paterson Inverloch Lance Creek Wonthaggi	One per year	1	<0.001	Yes
Leongatha	Leongatha Koonwarra	One per year	1	<0.001	Yes
Meeniyan	Meeniyan	One per year	1	<0.001	Yes
Poowong	Loch Nyora Poowong	One per year	1	<0.001	Yes
Toora	Port Franklin Port Welshpool Toora	One per year	1	<0.001	Yes

3.7.2 Copper

Copper is naturally distributed in rocks and soils. It may also be present in drinking water where aggressive waters of low pH and hardness induce corrosion of copper pipes. The ADWG specify that the concentration of copper should not exceed 1 mg/L based on aesthetic considerations, and 2 mg/L based on health considerations. Water supplied by South Gippsland Water complied with both the aesthetic-based and health-based guideline values for copper; refer to Table 14.

Table 14: Copper results for 2013-14 financial year

Locality	Sampling Frequency (samples per time period)	Total No. of samples	Minimum result mg/L	Maximum result mg/L	Complying with ADWG guideline value (Yes/No)
Alberton	One per quarter	4	<0.001	<0.001	Yes
Cape Paterson	One per quarter	4	0.007	0.018	Yes
Dumbalk	One per quarter	4	0.011	0.013	Yes
Fish Creek	One per quarter	4	0.002	0.004	Yes
Foster	One per quarter	4	0.006	0.011	Yes
Inverloch	One per quarter	4	0.011	0.018	Yes
Koonwarra	One per quarter	4	0.005	0.010	Yes
Korumburra	One per quarter	4	0.006	0.008	Yes
Lance Creek	One per quarter	4	0.010	0.031	Yes
Leongatha	One per quarter	4	0.004	0.020	Yes
Loch	One per quarter	4	0.004	0.005	Yes
Meeniyan	One per quarter	4	0.002	0.530	Yes
Nyora	One per quarter	4	0.004	0.004	Yes
Poowong	One per quarter	4	0.003	0.009	Yes
Port Franklin	One per quarter	4	0.002	0.005	Yes
Port Welshpool	One per quarter	4	0.002	0.009	Yes
Toora	One per quarter	4	0.004	0.038	Yes
Wonthaggi	One per quarter	4	0.011	0.021	Yes
Yarram	One per quarter	4	<0.001	0.001	Yes

Note: Samples are taken for analysis from the reticulation system. Copper levels may be higher at customers' internal taps if copper plumbing is used in the domestic system. Customers experiencing blue copper staining of fixtures or discolouration of water are advised to call South Gippsland Water Customer Service on 03 5682 0444.

3.7.3 Cyanogen chloride

Cyanogen chloride is a byproduct of chloramination that can be formed through the reaction between organic precursors with hypochlorous acid in the presence of the ammonium ion. Based on health considerations, the ADWG specify that the concentration of total cyanogenic compounds in drinking water should not exceed 0.08 mg/L.

Monitoring of chloraminated water systems confirmed that water supplied by South Gippsland Water complied with the guideline value for cyanogen chloride, with all results indicating levels were below the detection limit; refer to Table 15.

Table 15: Cyanogen chloride for 2013-14 financial year: chloraminated systems only.

Water Treatment Plant	Localities supplied	Sampling frequency (samples per time period)	Total No. of samples	Maximum result mg/L	Complying with ADWG Guideline value Yes/No
Devon North	Alberton Yarram	Two per quarter	8	<0.05	Yes
Lance Creek	Cape Paterson Inverloch Lance Creek Wonthaggi	Two per quarter	8	<0.05	Yes
Poowong	Loch Nyora Poowong	Two per quarter	8	<0.05	Yes

3.7.4 Lead

Lead may be detected in drinking water as a result of dissolution from natural sources or from household plumbing systems containing lead. The ADWG specify that, from a health perspective, the concentration of lead should not exceed 0.01 mg/L. Water supplied by South Gippsland Water complied with the ADWG guideline value; refer to Table 16.

Table 16: Lead results for 2013-14 financial year

Locality	Sampling frequency (samples per time period)	Total No. of samples	Minimum result mg/L	Maximum result mg/L	Complying with ADWG guideline value (Yes/No)
Alberton	One per quarter	4	<0.001	<0.001	Yes
Cape Paterson	One per quarter	4	<0.001	<0.001	Yes
Dumbalk	One per quarter	4	<0.001	<0.001	Yes
Fish Creek	One per quarter	4	<0.001	<0.001	Yes
Foster	One per quarter	4	<0.001	<0.001	Yes
Inverloch	One per quarter	4	<0.001	<0.001	Yes
Koonwarra	One per quarter	4	<0.001	<0.001	Yes
Korumburra	One per quarter	4	<0.001	<0.001	Yes
Lance Creek	One per quarter	4	<0.001	<0.001	Yes
Leongatha	One per quarter	4	<0.001	<0.001	Yes
Loch	One per quarter	4	<0.001	<0.001	Yes
Meeniyan	One per quarter	4	<0.001	0.002	Yes
Nyora	One per quarter	4	<0.001	<0.001	Yes
Poowong	One per quarter	4	<0.001	<0.001	Yes
Port Franklin	One per quarter	4	<0.001	<0.001	Yes
Port Welshpool	One per quarter	4	<0.001	<0.001	Yes
Toora	One per quarter	4	<0.001	<0.001	Yes
Wonthaggi	One per quarter	4	<0.001	<0.001	Yes
Yarram	One per quarter	4	<0.001	<0.001	Yes

3.7.5 Manganese

Manganese may be present in source waters as a result of dissolution form natural sources. Concentrations may be reduced in drinking water by converting soluble forms of the element to insoluble precipitates followed by physical removal using filtration. The ADWG specify that the concentration of manganese should not exceed 0.1 mg/L based on aesthetic considerations, and 0.5 mg/L based on health considerations. Drinking water supplied by South Gippsland Water complied with both the aesthetic-based and health-based guideline values for manganese; refer to Table 17.

Table 17: Manganese result for 2013-14 financial year

Locality	Sampling frequency (samples per time period)	Total No. of samples	Minimum result mg/L	Maximum result mg/L	Complying with ADWG guideline value (Yes/No)
Alberton	One per quarter	4	<0.001	0.007	Yes
Cape Paterson	One per quarter	4	0.002	0.018	Yes
Dumbalk	One per quarter	4	<0.001	0.002	Yes
Fish Creek	One per quarter	4	0.002	0.042	Yes
Foster	One per quarter	4	0.006	0.039	Yes
Inverloch	Two per quarter	8	0.004	0.028	Yes
Koonwarra	One per quarter	4	0.004	0.047	Yes
Korumburra	Two per quarter	8	0.008	0.031	Yes
Lance Creek	One per quarter	4	0.004	0.050	Yes
Leongatha	Three per quarter	12	0.006	0.031	Yes
Loch	One per quarter	4	0.001	0.005	Yes
Meeniyan	One per quarter	4	<0.001	0.003	Yes
Nyora	One per quarter	4	0.002	0.004	Yes
Poowong	One per quarter	4	0.002	0.008	Yes
Port Franklin	One per quarter	4	0.002	0.015	Yes
Port Welshpool	One per quarter	4	<0.001	0.036	Yes
Toora	One per quarter	4	0.003	0.011	Yes
Wonthaggi	Four per quarter	16	0.004	0.055	Yes
Yarram	One per quarter	4	<0.001	0.005	Yes

3.7.6 Nitrate and Nitrite

Nitrates and nitrites are naturally occurring oxides of nitrogen. Nitrite is rapidly oxidised to nitrate and is seldom present in well-oxygenated or chlorinated supplies. Chloramination disinfection can lead to nitrate and nitrite formation in the distribution system due to the action of nitrifying bacteria. The ADWG specify that, from a health perspective, the concentrations of nitrate and nitrite should not exceed 50 mg/L and 3 mg/L respectively. Water supplied by South Gippsland Water complied with the guideline values for nitrate and nitrite; refer to Tables 18, 19 and 20.

Table 18: Nitrate results for 2013-14 financial year: chloraminated systems

Locality	Sampling frequency (samples per time period)	Total No. of samples	Minimum result mg/L	Maximum result mg/L	Complying with ADWG guideline value (Yes/No)
Alberton	Two per month	24	0.32	0.79	Yes
Cape Paterson	Two per month	24	0.30	1.80	Yes
Inverloch	Two per month	24	0.18	1.70	Yes
Lance Creek	Two per month	24	0.08	1.70	Yes
Loch	Two per month	24	0.17	2.80	Yes
Nyora	Two per month	24	0.15	2.90	Yes
Poowong	Two per month	24	0.13	2.20	Yes
Wonthaggi	Two per month	24	0.01	1.80	Yes
Yarram	Two per month	24	0.38	0.92	Yes

Table 19: Nitrite results for 2013-14 financial year: chloraminated systems

Locality	Sampling frequency (samples per time period)	Total No. of samples	Minimum result mg/L	Maximum result mg/L	Complying with ADWG guideline value (Yes/No)
Alberton	Two per month	24	0.011	0.740	Yes
Cape Paterson	Two per month	24	0.008	0.840	Yes
Inverloch	Two per month	24	0.020	0.760	Yes
Lance Creek	Two per month	24	0.002	0.034	Yes
Loch	Two per month	24	0.010	0.020	Yes
Nyora	Two per month	24	0.010	0.020	Yes
Poowong	Two per month	24	0.002	0.011	Yes
Wonthaggi	Two per month	24	0.002	0.044	Yes
Yarram	Two per month	24	0.009	0.900	Yes

Table 20: Nitrate results for 2013-14 financial year: chlorinated systems

Water Treatment Plant	Localities supplied	Sampling frequency (samples per time period)	Total No. of samples	Result mg/L	Complying with ADWG guideline value Yes/No
Dumbalk	Dumbalk	One per year	1	0.14	Yes
Fish Creek	Fish Creek	One per year	1	0.55	Yes
Foster	Foster	One per year	1	0.11	Yes
Korumburra	Korumburra	One per year	1	0.16	Yes
Leongatha	Leongatha Koonwarra	One per year	1	0.43	Yes
Meeniyan	Meeniyan	One per year	1	0.23	Yes
Toora	Port Franklin Port Welshpool Toora	One per year	1	0.07	Yes

3.7.7 N-Nitrosodimethylamine (NDMA)

N-Nitrosodimethylamine (NDMA) is produced as a byproduct of chloramination of drinking water due to the oxidation of natural organic matter by chlorine in the presence of ammonia. The ADWG specify that, based on health considerations, the concentration of NDMA in drinking water should not exceed 0.0001 mg/L (100 ng/L).

Monitoring of chloraminated systems for NDMA was conducted quarterly, with results indicating water supplied by South Gippsland Water complied with the guideline value for NDMA; refer to Table 21.

Table 21: NDMA for 2013-14 financial year: chloraminated systems

Water Treatment Plant	Localities Supplied	Sampling frequency (samples per time period)	Total No. of Samples	Maximum result mg/L	Complying with ADWG guideline value Yes/No
Devon North	Alberton Yarram	One per quarter	8	0.000037	Yes
Lance Creek	Cape Paterson Inverloch Lance Creek Wonthaggi	Two per quarter	8	0.000020	Yes
Poowong	Loch Nyora Poowong	Two per quarter	8	0.000016	Yes

3.7.8 Other inorganic chemicals

Inorganic chemicals may be present in water as a result of the natural dissolution of rocks, soils and some plants, or through contamination from industrial and agricultural sources. Materials used to coat pipes and plumbing fittings may also be sources of inorganic chemicals in drinking water. Monitoring of all water supply systems was conducted to verify compliance with ADWG health-related guidelines for chemical concentrations as specified in Table 22.

Table 22: Results of inorganic chemical monitoring in 2013-14 financial year

Parameter	Sampling frequency	No. of Samples per water supply system/locality*	Total No. of samples taken in 2013-14	Maximum result mg/L	ADWG guideline value mg/L	Compliance with ADWG guideline value Yes/no
Antimony	Annually	One per locality	19	<0.001	0.003	Yes
Barium	Annually	One per system	10	0.028	2	Yes
Beryllium	Annually	One per system	10	<0.001	0.06	Yes
Boron	Annually	One per system	10	0.03	4	Yes
Cadmium	Annually	One per locality	19	<0.0002	0.002	Yes
Chromium	Annually	One per locality	19	<0.001	0.05	Yes
Cyanide	Annually	One per system	10	<0.005	0.08	Yes
Mercury	Annually	One per system	10	<0.0001	0.001	Yes
Molybdenum	Annually	One per system	10	<0.001	0.05	Yes
Nickel	Annually	One per locality	19	<0.001	0.02	Yes
Selenium	Annually	One per system	10	<0.001	0.01	Yes
Silver	Annually	One per system	10	<0.001	0.1	Yes
Sulphate	Quarterly	One per system	40	84	500	Yes
Zinc	Annually	One per locality	19	0.008	3	Yes

*****Monitoring is conducted at the entry point to distribution systems or at customer tap sites in each locality dependent on likelihood of change in level of chemical as it passes through the water supply system.

3.7.9 Other organic chemicals

Potential sources of contamination of the drinking water supply with organic chemicals are industrial effluent, run-off from agricultural land, and the use of pesticides and herbicides. Consistent with historical data, annual monitoring of distribution entry point water at all South Gippsland Water treatment plants found that levels of industrial and agricultural chemicals were compliant with the ADWG health-related guidelines for the 2013-14 period; refer to Table 23.

Table 23: Results of organic chemical monitoring in 2013-14 financial year

Parameter	Sampling Frequency	No. of Samples per water supply system*	Total No. of samples taken in 2013-14	Maximum result mg/L	ADWG guideline value mg/L	Compliance with ADWG guideline value Yes/no
2,4-D	Annually	One per system	10	<0.00001	0.03	Yes
2,4-DB	Annually	One per system	10	<0.00001	b	-
2,4-DP	Annually	One per system	10	<0.00001	b	-
2,6-D	Annually	One per system	10	<0.0001	b	-
1,1-dichloroethane	Annually	One per system	10	<0.001	a	-
1,2-dichloroethane	Annually	One per system	10	<0.001	0.003	Yes
2,4,5-T	Annually	One per system	10	<0.00001	0.1	Yes
2,4,5-TP	Annually	One per system	10	<0.00001	b	-
2,4,6-T	Annually	One per system	10	<0.0001	b	-
2,4,6-trichlorphenol	Annually	One per system	10	<0.001	0.02	Yes
4 Chlorophenoxy Acetic Acid	Annually	One per system	10	<0.00001	b	-
Amitrole	Annually	One per system	10	<0.0001	0.0009	Yes
Atrazine	Annually	One per system	10	<0.002	0.02	Yes
Benzene	Annually	One per system	10	<0.001	0.001	Yes
Benzo(a)pyrene	Annually	One per system	3	<0.000002	0.00001	Yes
Carbon tetrachloride	Annually	One per system	10	<0.001	0.003	Yes
Clopyralid	Annually	One per system	10	<0.00005	2	Yes
Dicamba	Annually	One per system	10	<0.00001	0.1	Yes
Fluoroxypyr	Annually	One per system	10	<0.00005	b	-
Glyphosate	Annually	One per system	10	<0.03	1	Yes
MCPA	Annually	One per system	10	<0.00001	0.04	Yes
MCPB	Annually	One per system	10	<0.00001	b	-
Methoxychlor	Annually	One per system	10	<0.0002	0.3	Yes
Pentachlorphenol	Annually	One per system	10	<0.001	0.01	Yes
Picloram	Annually	One per system	10	<0.00005	0.3	Yes
Prometryn	Annually	One per system	10	<0.002	b	-
Simazine	Annually	One per system	10	<0.002	0.02	Yes
Tetrachloroethene	Annually	One per system	10	<0.001	0.05	Yes
Trichloroethyline	Annually	One per system	10	<0.001	a	-
Triclopyr	Annually	One per system	10	0.00007	0.02	Yes

a Insufficient data to set a ADWG guideline value based on health considerations

b No ADWG information available

* Distribution system entry point monitoring is conducted at the clear water storage outlets of all SGW water treatment plants.

3.7.10 Raw water monitoring

For the purposes of risk management, the parameters listed in Table 24 were monitored at the specified (minimum) frequencies by external laboratory analysis in raw water at all South Gippsland Water treatment plants for the 2013-14 reporting period. As an added risk management practice, and to facilitate the optimisation of treatment processes, more frequent (daily to weekly) monitoring of certain parameters was carried out by treatment plant operators.

Table 24: Raw water monitoring

Parameter	Sampling frequency
Escherichia coli	Weekly
Total Coliforms	Weekly
Cryptosporidium	Annually/Event-based
Giardia	Annually/Event-based
Cyanobacteria (Blue-green algae)	Weekly (external/internal)
Algae byproducts (MIB/Geosmin/Saxitoxin)	Event-based
Alkalinity	Monthly
Aluminium	Quarterly
Calcium	Quarterly
Copper	Quarterly
Dissolved Organic Carbon	Quarterly
Manganese	Quarterly
Nitrogen	Quarterly
Orthophosphorous	Quarterly
Phosphorous	Quarterly
Total Organic Carbon	Quarterly
Turbidity	Weekly
Pesticides	Annually/Event-based
Radionuclides	Every 7 years: Sampling conducted in 2009

Data obtained from all water quality monitoring programs conducted by South Gippsland Water is available on request by telephoning Customer Service on 03 5662 0444 or emailing sgwater@sgwater.com.au

3.8 AESTHETICS

South Gippsland water aims to provide aesthetically-pleasing drinking water for all customers. Actions taken to manage aesthetic characteristics include:

- Monitoring and management of algae blooms in raw water reservoirs;
- Optimisation of treatment processes to minimise levels of iron, manganese and organic compounds in supplied water;
- pH adjustment of treated water;
- Regular flushing and air-scouring to remove sediment accumulation in mains;
- Frequent sampling and analysis for aesthetic parameters; and,
- Monitoring when required for compounds that may impart unpleasant tastes and odours to drinking water.

Results of monitoring for aesthetic characteristics are provided in Tables 25, 26, 27 and 28. For manganese results, refer to Table 17.

3.8.1 Alkalinity

Alkalinity is defined as the quantitative capacity of an aqueous solution to neutralise an acid. In simpler terms, it is a measure of how easily the pH of water can be changed. Alkalinity is mainly determined by the levels of carbonate, bicarbonate and hydroxyl anions (negatively-charged ions) present, and it has a strong influence on water stability; that is, the tendency of water to be either corrosive, stable, or scale-forming with regard to the surfaces it comes in to contact with.

While water stability is complex and influenced by a number of factors, soft water of low pH and low alkalinity will generally tend to corrode surfaces. Highly corrosive (aggressive) water is not desirable in that it can lead to the leaching of copper and other metals from pipes and plumbing fittings.

In contrast, hard water of high pH and high alkalinity will generally tend to deposit calcium carbonate (form scale) on pipes, plumbing fittings and hot water systems. While encrustation of pipes and fittings is not desirable, a *thin* layer of calcium carbonate on surfaces can be beneficial in that it provides protection against corrosion.

There are no specific standards for alkalinity in drinking water but as it provides resistance against changes in pH that can lead to either corrosion or excessive encrustation, a reasonable level should be maintained in drinking water supplies. What is reasonable for a particular type of water will depend mainly upon its other characteristics of pH and hardness, but a value in the range of 50 to 200 mg/L $CaCO_3$ is generally considered to be optimal. Results of alkalinity monitoring are provided in Table 25.

Table 25: Total Alkalinity measured in calcium carbonate ($CaCO_3$) equivalents* for the 2013-14 financial year

Water treatment plant	Localities supplied	Sampling frequency (samples per time period)	Total No. of samples	Minimum result mg/L as $CaCO_3$	Maximum Result mg/L as $CaCO_3$
Devon North	Alberton Yarram	One per quarter	4	26	99
Dumbalk	Dumbalk	One per quarter	4	28	85
Fish Creek	Fish Creek	One per quarter	4	26	54
Foster	Foster	One per quarter	4	38	46
Korumburra	Korumburra	One per quarter	4	54	74
Lance Creek	Cape Paterson Inverloch Lance Creek Wonthaggi	One per quarter	4	43	60
Leongatha	Leongatha Koonwarra	One per quarter	4	46	61
Meeniyan	Meeniyan	One per quarter	4	30	59
Poowong	Loch Nyora Poowong	One per quarter	4	60	100
Toora	Port Franklin Port Welshpool Toora	One per quarter	4	27	44

* Calcium carbonate equivalent (unit) is used as a convenient method of comparison in chemistry. It is the value obtained when taking into account the different characteristics in relation to reactivity (ability to combine) of various salts such that the overall effect is the same as that produced by the expressed concentration of calcium carbonate. As both alkalinity and hardness are aggregate properties created by the combined effects of different salts, the calcium carbonate equivalent unit is used in each case. This does not, however, mean that alkalinity and hardness are the same. Alkalinity is chemically defined as the sum of all titratable bases in a solution, whereas hardness is the sum of all polyvalent cation (ions having more than one positive charge) concentrations in a solution. With respect to a solution made purely from the compound calcium carbonate, therefore, the property of alkalinity is due to the component carbonate anion (a base), while the property of hardness is due to the component calcium cation.

3.8.2 Colour

Colour may be imparted to water due to the presence of natural organic substances including humic and fulvic acids, and dissolved inorganics, such as iron and manganese. Based on aesthetic considerations, the ADWG specifies that colour should not exceed 15 Hazen Units (HU). Water supplied by South Gippsland Water complied with the guideline value for colour; refer to Table 26.

Table 26: Colour (true) results for the 2013-14 financial year

Locality	Sampling Frequency (samples per time period)	Total No. of samples	Mean result HU	Maximum result HU	Complying with ADWG guideline value (Yes/No)
Alberton	One per month	12	2.0	2.0	Yes
Cape Paterson	One per month	12	3.8	6.0	Yes
Dumbalk	One per month	12	2.0	2.0	Yes
Fish Creek	One per month	12	2.7	6.0	Yes
Foster	One per month	12	2.0	2.0	Yes
Inverloch	Two per month	24	3.8	6.0	Yes
Koonwarra	One per month	12	2.3	4.0	Yes
Korumburra	Two per month	24	4.3	8.0	Yes
Lance Creek	One per month	12	4.8	8.0	Yes
Leongatha	Three per month	36	2.1	4.0	Yes
Loch	One per month	12	7.7	10.0	Yes
Meeniyan	One per month	12	2.0	4.0	Yes
Nyora	One per month	12	7.8	12.0	Yes
Poowong	One per month	12	8.0	12.0	Yes
Port Franklin	One per month	12	2.0	2.0	Yes
Port Welshpool	One per month	12	2.0	2.0	Yes
Toora	One per month	12	2.0	2.0	Yes
Wonthaggi	Four per month	48	4.0	6.0	Yes
Yarram	One per month	12	2.2	4.0	Yes

3.8.3 Hardness

Hardness is a measure of the concentration of calcium and magnesium ions in water. To minimise undesirable build-up of scale in hot water systems, the ADWG specifies that total hardness (as calcium carbonate) in drinking water should not exceed 200 mg/L. Water supplied by South Gippsland Water complied with the guideline value for hardness; refer to Table 27.

Table 27: Total Hardness in calcium carbonate ($CaCO_3$) equivalents* for the 2013-14 financial year

Water treatment plant	Localities supplied	Sampling frequency (samples per quarter)	Total No. of samples	Mean result mg/L as $CaCO_3$	Maximum Result mg/L as $CaCO_3$	Complying with ADWG guideline value Yes/No
Devon North	Alberton Yarram	One per quarter	4	26	28	Yes
Dumbalk	Dumbalk	One per quarter	4	50	160	Yes
Fish Creek	Fish Creek	One per quarter	4	26	41	Yes
Foster	Foster	One per quarter	4	29	38	Yes
Korumburra	Korumburra	One per quarter	4	29	58	Yes
Lance Creek	Cape Paterson Inverloch Lance Creek Wonthaggi	One per quarter	4	54	70	Yes
Leongatha	Leongatha Koonwarra	One per quarter	4	51	61	Yes
Meeniyan	Meeniyan	One per quarter	4	75	120	Yes
Poowong	Loch Nyora Poowong	One per quarter	4	41	73	Yes
Toora	Port Franklin Port Welshpool Toora	One per quarter	4	27	42	Yes

* Calcium carbonate equivalent (unit) is used as a convenient method of comparison in chemistry. It is the value obtained when taking into account the different characteristics in relation to reactivity (ability to combine) of various salts such that the overall effect is the same as that produced by the expressed concentration of calcium carbonate. As both alkalinity and hardness are aggregate properties created by the combined effects of different salts, the calcium carbonate equivalent unit is used in each case. This does not, however, mean that alkalinity and hardness are the same. Alkalinity is chemically defined as the sum of all titratable bases in a solution, whereas hardness is the sum of all polyvalent cation (ions having more than one positive charge) concentrations in a solution. With respect to a solution made purely from the compound calcium carbonate, therefore, the property of alkalinity is due to the component carbonate anion (a base), while the property of hardness is due to the component calcium cation.

3.8.4 Iron

Iron is present in source waters due to dissolution of soil and rock. High iron concentrations in drinking water can occur through rusting of iron pipes and fittings. Based on aesthetic considerations, the ADWG specify that the concentration of iron should not exceed 0.3 mg/L. Water supplied by South Gippsland Water complied with the guideline value for iron; refer to Table 28.

Table 28: Iron results for the 2013-14 financial year

Locality	Sampling Frequency (samples per time period	Total No. of samples	Minimum result mg/L	Maximum result mg/L	Complying with ADWG guideline value (Yes/No)
Alberton	One per quarter	4	<0.01	0.01	Yes
Cape Paterson	One per quarter	4	<0.01	0.01	Yes
Dumbalk	One per quarter	4	<0.01	0.04	Yes
Fish Creek	One per quarter	4	<0.01	0.02	Yes
Foster	One per quarter	4	<0.01	0.10	Yes
Inverloch	Two per quarter	8	<0.01	0.05	Yes
Koonwarra	One per quarter	4	<0.01	0.01	Yes
Korumburra	Two per quarter	8	<0.01	0.10	Yes
Lance Creek	One per quarter	4	<0.01	<0.01	Yes
Leongatha	Three per quarter	12	<0.01	<0.01	Yes
Loch	One per quarter	4	<0.01	<0.01	Yes
Meeniyan	One per quarter	4	<0.01	0.01	Yes
Nyora	One per quarter	4	<0.01	0.01	Yes
Poowong	One per quarter	4	<0.01	0.04	Yes
Port Franklin	One per quarter	4	<0.01	<0.01	Yes
Port Welshpool	One per quarter	4	<0.01	<0.01	Yes
Toora	One per quarter	4	<0.01	<0.01	Yes
Wonthaggi	Four per quarter	16	<0.01	0.01	Yes
Yarram	One per quarter	4	<0.01	<0.01	Yes

3.8.5 pH

pH is a measure of the hydrogen ion concentration of water. It is measured on a logarithmic scale from 0 to 14. A pH of 7 is neutral, a pH greater than 7 is alkaline, and a pH less than 7 is acidic.

To reduce corrosion and encrustation in pipes and fittings, the ADWG specifies that the pH of drinking water should be between 6.5 and 8.5. The ADWG also states that new concrete tanks and cement-mortar lined pipes can significantly increase pH and a value up to 9.2 may be tolerated, provided monitoring indicates no deterioration in microbiological quality.

The reference to microbiological quality is made in the ADWG since the disinfecting power of chlorine in chlorinated systems is greatest at lower pH and gradually declines as pH increases. Significant impairment of chlorine disinfection occurs above pH 8.0. Drinking water supplied by South Gippsland Water in chlorinated systems complied with the guideline range for pH; refer to Table 29.

The chemistry of disinfection (and the effects of pH) where chloramine is used instead of chlorine is different. A higher pH is actually beneficial in chloraminated systems as this slows the natural decay of monochloramine and prevents the formation of dichloramine and trichloramine, which can cause unpleasant taste and odours. A consequence of maintaining a higher pH is that occasional exceedance of the ADWG guideline can occur. Such instances are addressed with watermain flushing to remove aged water from the system. Based on mean pH values, pH in chloraminated systems complied with the ADWG guideline range; refer to Table 30.

Table 29: pH results for chlorinated system in 2013-14 financial year

Locality	Sampling frequency (samples per time period)	Total No. of samples	Minimum result pH	Maximum result pH	Mean result pH	Complying with ADWG guideline (Yes/No)
Dumbalk	One per week	52	7.4	8.2	7.9	Yes
Fish Creek	One per week	52	7.3	8.7	8.1	Yes
Foster	One per week	52	7.5	8.0	7.7	Yes
Koonwarra	One per week	52	7.7	8.4	8.0	Yes
Korumburra	Two per week	104	7.5	8.2	7.8	Yes
Leongatha	Three per week	156	7.4	8.0	7.8	Yes
Meeniyan	One per week	52	6.9	8.8	7.6	Yes
Port Franklin	One per week	52	7.2	8.5	7.7	Yes
Port Welshpool	One per week	52	7.1	7.7	7.4	Yes
Toora	One per week	52	7.0	7.5	7.3	Yes

Table 30: pH result for chloraminated systems in 2013-14 financial year

Locality	Sampling frequency (samples per time period)	Total No. of samples	Minimum result pH	Maximum result pH	Mean result pH	Complying with ADWG guideline (Yes/No)
Alberton	One per week	52	8.5	9.4	9.0	Yes
Cape Paterson	One per week	52	7.1	8.5	7.7	Yes
Inverloch	Two per week	104	7.2	9.0	8.0	Yes
Lance Creek	One per week	52	7.4	8.8	8.1	Yes
Loch	One per week	52	8.3	8.9	8.6	Yes
Nyora	One per week	52	8.2	8.5	8.5	Yes
Poowong	One per week	52	7.9	8.8	8.4	Yes
Wonthaggi	Four per week	208	7.2	9.1	8.2	Yes
Yarram	One per week	52	7.1	9.4	8.5	No

3.9 ANALYSIS OF RESULTS

3.9.1 Compliance comparison

A comparison of analysis results over the past three financial years (refer to Table 31, and Figures 2 and 3) demonstrates consistent compliant with the water quality standards listed in Schedule 2 of the Safe Drinking Water Regulations 2005 for *E. coli*, the chloroacetic acids, trihalomethanes and turbidity.

A decline in compliance with the aluminium water quality standard can be observed for the 2013-14 period. This is due to treatment optimisation challenges at the Meeniyan water treatment plant; refer to part 4 of this report for further details.

Table 31: Comparison of percentage compliance with water quality standards over three years

WATER QUALITY PARAMETER	COMPLIANCE WITH WATER QUALITY STANDARDS					
	PERCENTAGE OF LOCALITIES			PERCENTAGE OF CUSTOMERS		
	2011-12	2012-13	2013-14	2011-12	2012-13	2013-14
Escherichia coli	100	100	100	100	100	100
Chloroacetic Acid	100	100	100	100	100	100
Dichloroacetic Acid	100	100	100	100	100	100
Trichloroacetic Acid	100	100	100	100	100	100
Trihalomethane	100	100	100	100	100	100
Aluminium	100	100	94.7	100	100	98.4
Turbidity	100	100	100	100	100	100

Figure 2: Percentage of water sampling localities where the drinking water complied with the water quality standards

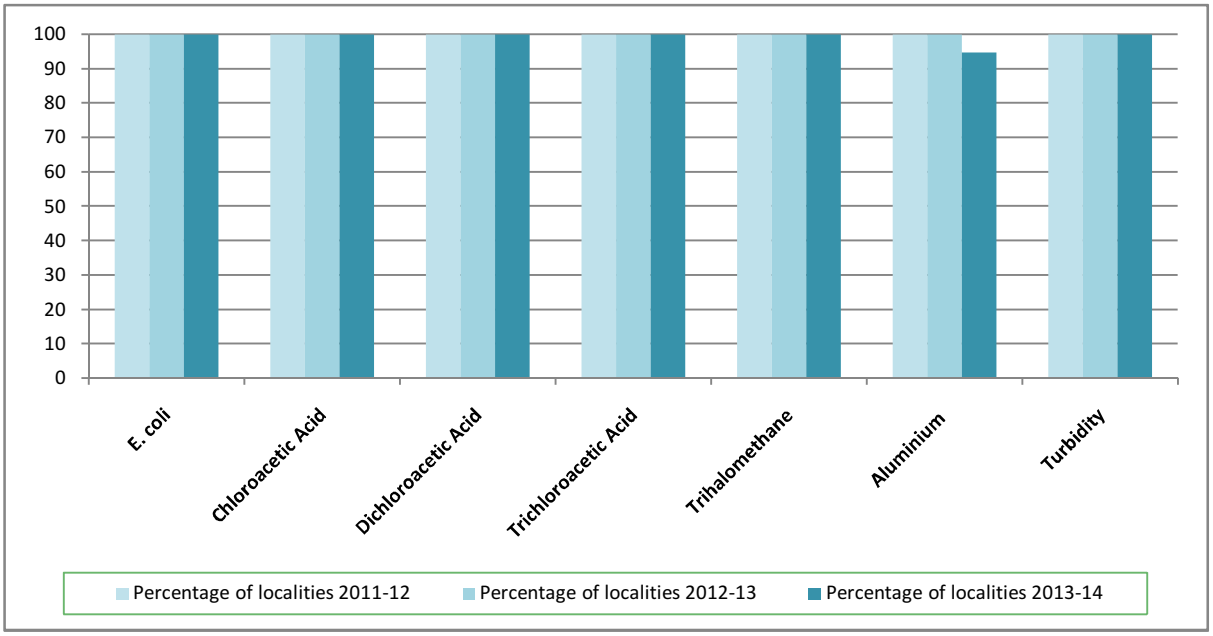
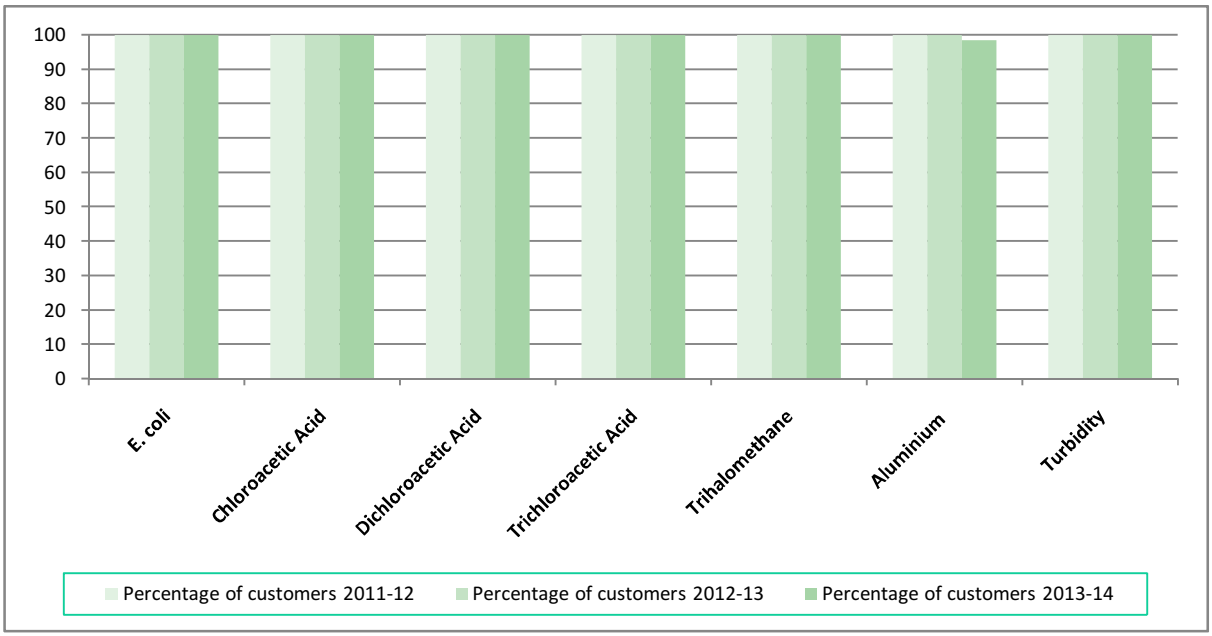


Figure 3: **Percentage of customers supplied with drinking water that complied with the water quality standards**



4. EMERGENCY AND INCIDENT MANAGMENT

4.1 INCIDENTS REPORTED UNDER SECTION 22 OF THE ACT

Section 22 of the *Safe Drinking Water Act 2003* (the Act) requires water suppliers to immediately notify the Department of Health (the Department) of any circumstances where it is believed that drinking water supplied to the public may be the cause of an illness, pose a risk to human health or cause widespread public complaint. Based on this requirement, the incidents described in this section have been reported to the Department of Health in the 2013-14 reporting period. Table 32 provides a summary of events reported under section 22 of the Act.

Table 32: Summary of events reported to the Department of Health under Section 22 of the Act in 2013-14

Water sampling locality affected	Date of Incident	Location of Incident	Nature of Incident	Nature of known or suspected contamination/cause of incident	Ref.
Poowong	23/07/13 to 24/07/13	Poowong Water Tower Internal Site (upper section of tank site)	Microbiological non-conformance	*E. coli*: 30 orgs/100mL	4.1.1.1
Loch	28/10/13 to 30/10/13	Loch Water Tower Outlet	Microbiological non-conformance	*E. coli*: >2400 orgs/100mL	4.1.1.2
Alberton	21/01/14 to 22/01/14	Port Albert Tower Outlet	Microbiological non-conformance	*E. coli*: 10 orgs/100mL	4.1.1.3
Wonthaggi	22/01/14 to 23/01/14	Wonthaggi Tower Outlet	Microbiological non-conformance	*E. coli*: 73 orgs/100mL	4.1.1.4
Inverloch	22/01/14 to 23/01/14	Inverloch Tank Outlet	Microbiological non-conformance	*E. coli*: 18 orgs/100mL	4.1.1.4
Yarram	17/03/14 to 18/03/14	Rogers Street, Yarram	Microbiological non-conformance	*E. coli*: 1 orgs/100mL	4.1.1.5
Wonthaggi	21/03/14 to 22/03/14	Wonthaggi	Potential for widespread public complaint	Loss of water supply due to trunk main break	4.1.2.1
Poowong	22/04/14 to 23/04/14	Poowong Water Tower Internal Site (upper section of tank site)	Microbiological non-conformance	*E. coli*: 1 orgs/100mL	4.1.1.6
Port Franklin	27/05/14 to 28/05/14	Port Franklin - After Chlorine residual trim dosing site	Microbiological non-conformance	*E. coli*: 1 orgs/100mL	4.1.1.7
Cape Paterson Inverloch Lance Creek Wonthaggi	09/06/14 to 23/6/14	Lance Creek Supply System	Widespread public complaint due to taste and odour	Geosmin produced by algae in reservoir at levels greater than taste threshold of 6 ng/L	4.1.2.2

4.1.1 *Escherichia coli* detections

Escherichia coli (*E. coli*) is a species of bacteria that inhabits the intestinal tracts of humans, other mammals and some birds. *E. coli* can also be carried by reptiles and amphibians. While most strains of *E. coli* are not harmful, their presence in water indicates possible contamination with faecal material; hence *E. coli* are used as an indicator in quality monitoring for other potentially pathogenic (and more difficult to detect) microorganisms that may be associated with faeces. Other types of bacteria with similar characteristics as *E. coli* (collectively known as 'coliforms') but not necessarily associated with faecal contamination are also routinely monitored to provide a general gauge on the cleanliness of the water supply system.

Routine weekly microbiological monitoring is performed at water sampling locations as per requirements of the Safe Drinking Water Regulations 2005. For the 2013-14 reporting period, there was one instance of *E. coli* detection for a regulated customer tap sample collected from the locality of Wonthaggi. In addition, there were five instances of *E. coli* detection for samples collected from the Poowong water tower, one for a sample collected from a trunk main site in Wonthaggi, and one for a Korumburra standpipe.

The incident response for microbiological detections as documented in South Gippsland Water's Drinking Water Management System involves the following actions being implemented within 24 hours of positive *E. coli* results being received from the contracted laboratory:

- Notification and reporting to the Department of Health in accordance with section 22 of the Act;
- Review of treatment plant and disinfection system operations to assess possibility of malfunction or disinfection failure.
- Review of distribution systems work (such as mains break repair) and investigation of any other potential sources of contamination;
- Security checks and monitoring of distribution water storages;
- Confirmation of flushing programs conducted prior to the notification;
- Flushing of the water mains at potentially affected locations;
- Retesting of chlorine residuals, pH and turbidity;
- Adjustment of chlorine dosing rates to obtain minimum residual of 0.2 mg/L or an approved level required at a particular sample location; and,
- Follow-up sampling and analysis for the non-conforming sample site and other sites across the relevant sampling locality.

All *E. coli* detections are treated seriously and acted on promptly. If cell numbers are low, and there are no further *E. coli* detections in samples collected subsequent to implementation of corrective actions, then, consistent with safe drinking water legislation, the incident is deemed isolated and not regarded as a cause for concern with respect to public health.

For most instances of *E. coli* detection, obvious sources of contamination cannot be found and a positive result for a drinking water sample may be speculatively attributed to one or more of the following:

- Human error, involving contamination of the sample during the sampling or testing processes;
- Insufficient residual chlorine or chloramine to prevent re-growth of bacteria within the mains and protect treated water throughout the distribution system;
- Release of bacteria from biofilm material that coats the internal walls of pipes and storage tanks. (The slimy biofilm layer can protect organisms from the disinfecting action of chlorine; if bacteria become liberated from the film in regions of the distribution system where the concentration of chlorine is low, then these organisms may survive long enough to be detected in a sample);

- Ingress of groundwater through small undetectable cracks in pipes during transitory low pressure events within the mains. (Again, if chlorine is at a level insufficient for rapid disinfection within the mains, then bacteria may survive and be detected in a sample).

For all of the detection events in the 2013-14 reporting period, low *E. coli* numbers were recorded and there were no further detections in follow-up samplings. The events are described below.

4.1.1.1 *E. coli* detection for Poowong Water Tower internal (upper section of tank) site

A notification under section 22 of the Act was sent to the Department on the 24th July 2013 in relation to *E. coli* detection for the Poowong water tower (internal site). Despite having a total chlorine concentration of 1.4 mg/L, a sample taken on the 23rd July was found to contain coliforms at a level of 90 orgs/100mL, with 30 orgs/100mL being *E. coli*. In response to the detection, the tower was taken offline, drained and refilled with freshly treated water. Follow-up samples collected at the tower and all eight customer tap sites in Poowong on the 24th July were found to contain no *E. coli* or coliforms. An external contractor was engaged to inspect the tower ceiling and clean the internal walls on the 6th August 2013. While no evidence of entry by small animals was found, mesh was fitted to the inlet of the overflow pipe as a precautionary measure.

4.1.1.2 *E. coli* detection for Loch Water Tower outlet site

The Department of Health was notified under section 22 of the Act of an *E. coli* detection at a level of >2,400 orgs/100mL for a sample taken from the Loch water tower outlet on the 28th October 2013. Total chlorine for the site was 3.0 mg/L, which is a concentration normally adequate for disinfection. There was no evidence of treatment or disinfection failures at the treatment plant; nor were there any *E. coli* or coliform detections for the regulatory sample collected in Main Street, Loch, or for any of the other samples collected in Poowong and Nyora that day.

Upon receipt of the result on the 29th October, the tower and entry hatch were inspected and found to be structurally secure. Follow-up samples were collected from all six dedicated customer tap sites in Loch, and both the tower inlet and outlet sites. Operations staff closed the tower outlet valve and adjusted other relevant valves in town to enable supply directly from the Poowong water treatment plant only, rather than via the tower. Filling of the tower to overflow it and remove potentially contaminated water was allowed to continue overnight.

Results of follow-up sampling received on the 30th October indicated the system was clean with no *E. coli* or coliforms being detectable, and high total chlorine levels being recorded at sites across town.

4.1.1.3 *E. coli* detection for Port Albert Standpipe outlet site

E. coli was detected in a sample taken form the Port Albert Tower on the 21st January 2014 at a level of 10 orgs/100mL. Total chlorine at the time of sampling was low at 0.08 mg/L. In response to the detections, calcium hypochlorite tablets were added to the tower to improve disinfection residual. The tower roof was also inspected with no breaches of structural integrity being observed by maintenance staff. There were no detections for four other routine treated water samples collected from the Yarram/Alberton system on the 22nd January; nor were there any detections for six follow-up samples collected from the Port Albert system on the 23rd January.

At the time of sampling, the tower was essentially offline (configured to come on-line only in the event of a pressure drop within the distribution system) so the risk to customers of receiving sub-standard quality water

was actually very low. To eliminate the expense of maintaining quality of water that is not being used, the tower was taken out of service pending review.

4.1.1.4 *E. coli* detection for Wonthaggi Water Tower and Inverloch Tank outlet sites

Two separate notification under section 22 of the Act were reported to the Department of Health in relation to *E. coli* detection for the Lance Creek system on the 22nd January 2014. A count of 73 orgs/100ml was recorded for the Wonthaggi water tower and a count of 13 orgs/100mL was recorded for the Inverloch tank. The total chlorine was at a level normally adequate for disinfection, being 3.6 mg/L and 3.7 mg/L for the tower and tank respectively.

While occurring on the same day, it doesn't appear the incidents were related given that there were no *E. coli* detections for the clear water storage outlet at the plant, the Wonthaggi low-level basin, and nine customer tap sites across Wonthaggi, Inverloch and Cape Paterson sampled that day. Follow-up samples were collected in Wonthaggi and Inverloch on the 23rd January with no further *E. coli* or coliforms being recorded.

The Wonthaggi Tower was inspected and a defected hinge on the entry hatch was noted. The defect would allow the hatch to be opened intentionally but was unlikely to be the cause of any passive ingress of contaminants. There was no additional inspection for the Inverloch tank roof carried out subsequent to the *E. coli* incident, however, biannual site security check carried out in November had found no breaches of structural integrity besides some missing ridge capping that was repaired at that time.

4.1.1.5 *E. coli* detection for Yarram customer tap site

A notification under section 22 of the Act was forwarded to the Department of Health following a low-level *E. coli* detection of 3 orgs/100mL for a customer tap site in Yarram on the 17th March 2014. Total chlorine was at a level of 1.46 mg/L, which is normally adequate for disinfection, and there were no microbial detections for samples taken form the Devon North clear water storage outlet, the Yarram water tower, or a customer tap site in Port Albert. In response to the detection, the relevant water main was flushed and follow-up samples were collected from five sites in Yarram on the 18th March. There were no further *E. coli* detections for the follow-up samples.

4.1.1.6 *E. coli* detection for Poowong Water Tower internal (upper section of tank) site - April

A notification under section 22 of the Act was sent to the Department on the 23rd April 2014 in relation to *E. coli* detection for the Poowong water tower (internal site). Despite having a total chlorine concentration of 1.7 mg/L, a sample taken on the 22nd April was found to contain coliforms at a level of 2 orgs/100mL with 1 orgs/ml being *E. coli* . Follow-up samples were collected from 11 sites across Poowong on the 23rd April; all results indicated the system was clean. The structural integrity of the tower was assessed and found to be secure. While the cause of *E. coli* detection is unknown, it should be noted that there was heavy rain preceding the collection of the non-compliant sample.

4.1.1.7 *E. coli* detection for Port Franklin - after chlorine residual trim dosing unit site

A low-level *E. coli* detection for a Port Franklin site was reported to the Department in May 2014. The sample collected from a tap at a post secondary disinfection site on the 27th May contained *E. coli* at a level of 1 orgs/100mL. Free residual chlorine at the time of sampling was 1.02 mg/L, a level normally adequate for rapid disinfection, and there were no other *E. coli* detections for a Port Franklin customer tap site or any of the five

other routine samples collected from the supplying Toora system on the same day. Follow-up sampling at eight sites conducted on 29th May confirmed the incident was isolated and no further actions were taken.

4.1.2 Incidents causing widespread public complaint

For the 2013-14 financial year, one occurrence of widespread public complaint and one incident that had the potential to cause widespread public complaint were reported to the department of Health. The incidents are described below.

4.1.2.1 Potential for widespread public complaint - Wonthaggi

A section 22 notification was forwarded to the Department advising of the potential for widespread public complaint due to dirty/discoloured water following a mains break, partial drainage of the Wonthaggi water tower and consequent loss of supply to the town on the 21st March 2014. As there was only one dirty water complaint received following restoration of water services, the Department reclassified the incident as a "loss of supply" only. As a sudden loss of pressure can potentially lead to siphonage of contaminants into the distribution system, samples were collected for chlorine and microbiological analysis following the restoration of supply. Results of analysis indicated backflow prevention device were operating effectively, with high total chlorine levels being recorded across town and no microorganisms being detected in any of the samples taken.

To prevent a major loss of water supply incident from occurring again, a bypass around the Wonthaggi water tower was installed as a matter of urgency. A systematic risk-based review of the entire Lance Creek system was also conducted. Vulnerabilities in terms of the design of the bulk supply system, asset age and condition, and contingency options were identified and are being actioned accordingly.

4.1.2.2 Lance Creek System - widespread public complaint due to taste and odour issue

On the 16th June 2014, the Department was notified of widespread public complaint in relation to taste and odour from customers of the Lance creek system. The complaints were due to an unpleasant earthy flavour in tap water caused by the presence of geosmin, which is a compound produced by cyanobacteria (commonly known as "blue-green algae") and other microorganisms growing in the Lance Creek reservoir. While geosmin is non-toxic, it can be sensed by humans at extremely low concentrations of around 5 nanograms per litre (or 5 'parts per trillion'). It cannot be removed using conventional treatment alone and requires the use of powdered activated carbon (PAC).

PAC dosing was implemented at the Lance Creek water treatment plant on the 11th June but as it took some time for geosmin-tainted water in the distribution storages to be replaced, the taste and odour issue continued for an additional fortnight. In total, there were 41 complaints from Inverloch, 16 from Wonthaggi and two from Cape Paterson for the period 9th to 23rd June. Information for customers regarding the cause of the issue and the actions being taken to address it was provided via the South Gippsland Water website and local newspapers.

To improve response time between the development of an issue and initiation of PAC dosing, changes to taste and odour monitoring procedures were made. In addition to daily sensory monitoring carried out by treatment plant operators, water quality officers now conduct weekly palatability checks on the water supply.

To ensure reliability of the PAC dosing system and reduce associated labour costs in the event of future taste and odour issues, a larger chemical storage tank was installed at the Lance Creek water treatment plant in September 2014. The dosing system will also be reconfigured and telemetry installed to allow for monitoring and control by remote access.

4.2 OTHER REPORTED EVENTS

4.2.1 Section 18 reported events

Section 18 of the *Safe Drinking Water Act 2003* (the Act) requires a water supplier to notify the Department of Health where it becomes aware that supplied drinking water does not comply, or is not likely to comply, with any relevant water quality standard. The purpose of section 18 is to ensure the Department is alerted to potential water quality issues that may require further investigation or actions. Three section 18 notifications relating to elevated aluminium levels for the Meeniyan system were forwarded to the Department in the 2013-14 reporting period; refer to discussions below.

Note: Aluminium is naturally present in raw waters and is also added as a coagulating agent in the water treatment process. The regulatory limit of 0.2 mg/L is based on aesthetic considerations, and occasional low-level exceedance is not regarded as a health risk.

4.2.1.1 Elevated aluminium levels for Meeniyan: July 2013

The department was notified that water supplied in Meeniyan did not comply with the water quality standard for aluminium following a result of 0.25 mg/L being recorded for a customer tap sample taken on the 1st July 2013. In response to the non-compliance, a number of corrective actions were implemented. These included: the installation of additional monitoring equipment to allow better overall management of the treatment system; use of polyacrylamide to enhance coagulation and flocculation processes, reprogramming of the programmable logic controller (PLC) so as to prevent filter disturbances; and improvements to the operation of the desludge system.

The corrective actions appeared to be effective with a return to consistently compliant aluminium levels for the Meeniyan supply being achieved by the 29th July 2013.

4.2.1.2 Elevated aluminium levels for Meeniyan: April to June 2014

A section 18 notification in relation to elevated aluminium levels for the Meeniyan supply was forwarded to the Department following a result of 0.65 mg/L being recorded for a customer tap site on the 8th April 2014. In response to the non-compliance, jar testing to optimise both coagulant and polyacrylamide floc aid dosages was conducted. Investigation and adjustment of treatment plant hydraulics to improve plant operation and minimise aluminium floc carry-over and penetration through filters was also carried out.

Despite continued efforts to address the problem, additional monitoring of the Meeniyan system indicated aluminium levels remained high with a result of 0.38 mg/L being recorded for the monthly regulatory customer tap sample taken on the 5th May. A second section 18 notification was submitted to the department to advise of on-going non-compliance.

Use of non-aluminium based coagulants, such as polydiallydimethylammonium chloride (PolyDADMAC) was investigated but not implemented with optimisation of the plant and treatment regime eventually being achieved. While a result of 0.27 mg/L was recorded for the regulatory customer tap sample taken on the 3rd June, samples collected on a weekly basis subsequent to this returned consistently compliant results.

Mains flushing was carried out following the return to compliant aluminium levels to ensure consistent quality across the Meeniyan distribution system.

4.2.2 Blue-green algae (cyanobacteria) blooms reported to DEPI

Notification of an algal bloom to the Department of Health is only required if drinking water supplied from the water source affected by the bloom has the potential to pose a threat to human health or may result in widespread public complaint, as stipulated in section 22 of the Safe Drinking Water Act. For the purposes of regional monitoring and management, however, the Department of Environment and Primary Industries (DEPI) are advised when local algal blooms occur and cell volumes exceed specified limits.

Algal blooms are managed according to the potential toxicity of the identified species, cell numbers and densities, and efficacy of existing treatment processes in removing algae and algae-related compounds from raw water. As part of South Gippsland Water's incident response procedures, which are documented in the Drinking Water Management System, the following actions may be implemented in response to algal detections:

- Increased monitoring for algae and algae-related toxins (when potentially toxic species are identified) and other compounds that may cause taste and odour issues;
- Initiation of powdered activated carbon (PAC) dosing to remove algae-related toxins and other compounds;
- Isolation and containment of the affected reservoir where applicable;
- Selective use of offtakes (where available) at reservoirs to minimise volume of algae cells entering the treatment plant;
- Destratification of reservoir;
- Application of algicide where appropriate; and,
- Notification to major customers advising of potential for taste and odour issues.

With respect to the algae events reported in Table 33, implementation of appropriate incident response procedures resulted in controlled events that had no real potential to affect public health.

Table 33: Blue-green algae (cyanobacteria) blooms reported to DEPI in 2013-14

Location	Date of bloom	Nature of bloom
Lance Creek Reservoir	30/12/13 to 23/01/14	Total cyanobacterial biovolume >0.2 mm^3/L
Korumburra Reservoir No. 1	11/03/14 to 08/04/14	Total cyanobacterial biovolume >0.2 mm^3/L
Korumburra Reservoir No. 2	29/04/14 to 28/05/14	Total cyanobacterial biovolume >0.2 mm^3/L

5. COMPLAINTS RELATING TO WATER QUALITY

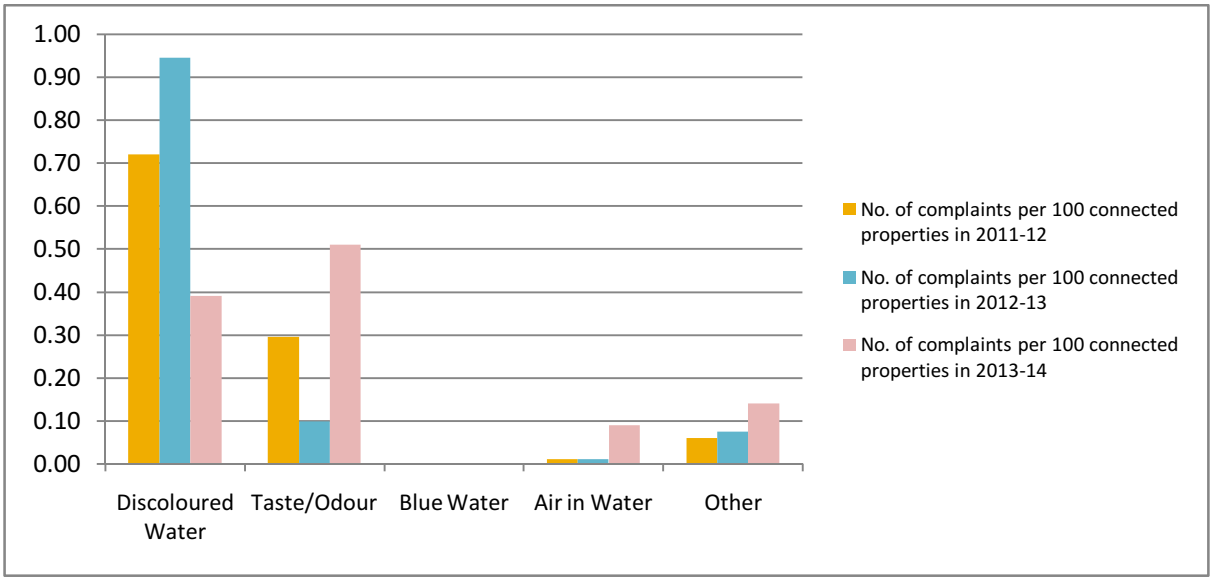
5.1 COMPLAINTS FOR 2013-14

South Gippsland Water records and attends to all complaints relating to drinking water quality to ensure the highest customer satisfaction. Determination of the number of complaints per 100 customers supplied is based on the number of complaints compared with the total number of connected properties. No localities supplied by south Gippsland Water recorded a total number of complaints greater than 10 per 100 customers supplied during the 2013-14 reporting period; refer to Table 34. A comparison of the number of complaints with that of the previous two reporting periods is provided in Figure 4.

Table 34: Customer complaints summary for 2013-14

Type of complaint	Number of complaints	Number of complaints per 100 customers (connected properties) supplied
Discoloured Water	75	0.39
Taste/Odour	98	0.51
Blue Water	0	0.00
Air in Water	18	0.09
Other	20	0.10

Figure 4: Comparison of number of customer complaints for 2013-14 with that of previous reporting periods.



5.2 MANAGEMENT OF COMPLAINTS

Customer complaints relating to water quality are managed in accordance with procedures documented in South Gippsland Water's quality document system. Upon receipt of a complaint, a customer service officer classifies the information and records it in a computer database. An activity sheet is then created for investigation of the complaint within a specified time period. The objective of the investigation is to determine the cause of the complaint and the actions required to rectify the problem. All investigative and corrective actions are recorded in the computer database once complete. The causes of the different types of complaints received and the relevant preventive and corrective actions are described below.

5.2.1 Discoloured water

Discoloured water complaints primarily result from:

- High manganese levels in source waters. The soil in the South Gippsland region is naturally high in manganese, and run-off into reservoirs and rivers is unavoidable. Not all manganese can be removed during the water treatment process so accumulation in the distribution system can occur;
- Accumulation of sediment within water mains over time; and/or
- Unintended scouring of water mains following high flows or recharging of the system.

Corrective actions to address discoloured water include:

- Use of aeration and potassium permanganate dosing systems at water treatment plants to oxidise manganese and maximise physical removal through filtration;
- Implementation of scheduled air-scouring and flushing programs within all water sampling localities to remove manganese and other accumulated sediments;
- Additional flushing when required in response to individual complaints;
- Provision of a commercial cleaning product which removes discolouration marks from laundry items in response to individual customer complaints.

There were 75 complaints received in relation to discoloured water in the 2013-14 financial year.

5.2.2 Taste and odour

Taste and odour complaints result primarily from:

- Algae-related compounds in the water;
- Manganese and/or iron sediment in the water;
- Chlorine in water.

Corrective actions to address taste and odour include:

- Routine monitoring of supplied water for taste and odour, manganese, iron, turbidity, pH and chlorine;
- Specific analysis for taste and odour related parameters (as above) when required in response to individual complaints;
- Use of powdered activated carbon (PAC) at treatment plants to remove algae-related and other taste and odour compounds from water;
- Use of aeration and potassium permanganate dosing systems at water treatment plants to oxidise manganese and maximise removal from source waters.

There were 98 calls relating to taste and odour issues received from customers in 2013-14. Many of these were received from customers of the Lance Creek system in June; refer to 4.1.2.2 for further information.

5.2.3 Blue water

Blue water is caused by corrosion of domestic copper pipes. When taps are not operated frequently (overnight, for example), copper may dissolve and concentrate in the stationary water within the pipes. In response to complaints, the corrosive potential of supplied water is reviewed and customers are advised to flush taps until clear. There were no reports of blue water from South Gippsland Water customers in the 2013-14 period.

5.2.4 Air in water

Air in water complaints are generally received following the implementation of air-scour cleaning programs. While notification is given to residents prior to air-scouring, customers may become concerned at the 'milky' appearance of water. Customers are advised that the white colour of the water is due to the presence of tiny air-bubbles and that flushing through a tap for a few minutes will correct the problem. There were 18 complaints involving air in water from South Gippsland Water customers in the 2013-14 reporting period.

5.2.5 Other complaints

Other complaints generally relate to concerns that are beyond the control and responsibility of South Gippsland Water, such as death of aquarium fish or garden plants, and problems with domestic plumbing or appliances. Results of monitoring programs that may be relevant are reviewed, and additional investigation may be carried out where appropriate. Customers are informed of the likelihood of supplied water being the cause of the problem and given advice on where to seek additional assistance if required. There was a total of 20 complaints/enquiries in this category for 2013-14.

Complaints in this category may also include general queries from customers experiencing illness or dermatological conditions. Customers expressing concern that a health issue relates to tap water are encouraged to consult a medical professional for diagnosis and treatment. Additional monitoring to verify quality of supplied drinking water to the customer's residence is carried out. Details of the complaint, and results of both monitoring and diagnostic testing (if provided) are recorded. Generally, customers are seeking reassurance with regards to water quality rather than alleging that drinking water is the cause of their health problem. In the unlikely event that investigation of reported illness did produce evidence that water quality could be a factor, the Department of Health would be immediately notified. Further actions, which might include issuing of a boil water advisory, would be implemented as a matter of the highest priority.

There were 11 queries received from customers in relation to health concerns for 2013-14. In each case, there was no evidence found through verification monitoring, or provided by the customer, that supplied drinking water was the cause.

6. FINDING OF THE MOST RECENT RISK MANAGEMENT PLAN AUDIT

Under section 7 of the *Safe Drinking Water Act 2003* (the Act), a water supplier is required to prepare, implement and review a risk management plan for the supply of drinking water to the public. Following review by an external, Department of Health-accredited auditor in May 2014, South Gippsland Water was found to be compliant in all auditable elements for the period 27th April 2012 to 26th May 2014. The findings are summarised in Table 35.

Table 35: 2014 Risk management plan audit - summary of findings (from audit report)

Audited Element	Legislative Reference	Present	Effective / Appropriate	Compliance
Risk Management plans prepared	SDWA 7(1) (a) 8(1) (a)	Yes	Yes	Compliant
Identification of risk	SDWA 9(1) (b)	Yes	Yes	Compliant
Risk Assessment	SDWA 9(1) (c)	Yes	Yes	Compliant
Development and implementation of preventive strategies	SDWA 9(1)(d)	Yes	Yes[1]	Compliant with opportunities for improvement (OFI)
Implementation of the Risk Management Plan	SDWA 7(1)(b) 8(1)(b)	Yes	Yes[2]	Compliant with opportunities for improvement (OFI)
Compliance with the requirements of the Risk Management Plan	SDWA 7(1)(b) 8(1)(b)	Yes	Yes[3]	Compliant

Notes from Table 34:

1. South Gippsland Water Corporation (SGW) has a comprehensive water safety plan. For areas audited, the implementation of the Drinking Water Management Systems (DWMS) is adequate to manage the drinking water public health risks to customers.

2. Few identified residual risks in the revised DWMS improvement plan register are yet to be implemented and are planned to be undertaken in Water Plan 3. Northern Towns Supply works identified in Water Plan 3 could address some of the risks.

3. Even though SGW has been active in collaborating with stakeholders in managing their water catchments, significant risks to source water still exist from heavy rainfall events. These need to be monitored adequately to prevent drinking water supply risks.

Items to note and opportunities for improvement (from audit report)

While no non-compliances were recorded, the auditor made a number of observations and identified some specific opportunities for improvement (OFI) ; these are described in the text below.

1. Overall South Gippsland Water Corporation met its regulatory obligations over the audited period 27th April 2012 to 26th May 2014.
2. All risk management activity elements are present within the Water Safety Plan (WSP) in accordance with relevant sections of the Safe Drinking Water Act 2003.
3. Of the six auditable elements as described in Table 34 only two elements (Development and implementation of preventive strategies, and Implementation of the risk management plan) were identified as having opportunities for improvement recorded against the compliance with the requirements of the WSP.
4. Number of identified action items in the Drinking Water Management System (DWMS) improvement plan register needs to be monitored for progress and closure.
5. Undertake full review of the risks through Qualitative Microbial Risk Assessment (QMRA) for water towers with repeated *E. coli* events, e.g. Poowong Water Tower, Port Albert Tower, Wonthaggi Tower, Inverloch Tank, Loch Tower.
6. Network modelling could help to understand water age to maintain disinfection residuals. Knowledge of flow direction and velocities during operational works could minimise water discoloration events and customer outrage, e.g. public incident in Korumburra - breaks in King street area, Lance Creek incident.
7. Continue the practice of validation and confirmation of operational field data with independent test results of key water quality parameters for ongoing water safety. The roll-out of a new water information management system has significantly enhanced the procedure.
8. Strengthen and retain experienced and qualified staff to manage all water systems. Always provide adequate training to keep up with new knowledge and technology.
9. Establish protocols to capture water quality performance during extreme events such as fire, floods or major changes to operations and dead end flushing.
10. Review the SCADA (supervisory control and data acquisition) system data capture protocols, e.g. polling frequency, scaling of measured parameters, storage and reporting of data etc.
11. More work on source water characteristics are recommended to improve the feed water quality into the water distribution network.
12. Over the long term, reduction in dissolved organic carbon from water entering the network to improve the water quality and customer acceptance. Lifecycle costs need to be investigated so as to balance improvement costs against to customer value, less air scouring, less chlorine demand, organisation's reputation etc.

7. UNDERTAKINGS UNDER SECTION 30 OF THE ACT

Section 30 of the *Safe Drinking Water Act 2003* allows for the Secretary to the Department of Health to accept a written undertaking from a water supplier that certain actions will be performed. Water suppliers can apply to the Secretary for an undertaking in the event that they are, or are likely to be, in contravention of the Act or its associated regulations.

There were no undertakings for South Gippsland Water in the 2013-14 reporting period.

8. GLOSSARY OF TERMS AND FURTHER INFORMATION

ADWG	*Australian Drinking Water Guidelines* 2011; published by the National Health and Medial Research Council and the National Resource Management Ministerial Council
Chlorine	An element commonly used as a disinfectant in water treatment
Chloramine	A compound of chlorine and ammonia commonly used for disinfection in water treatment
Coliforms	A general term for certain types of rod-shaped bacteria that share identifying characteristics.
Cyanobacteria	Photosynthetic aquatic bacteria, commonly referred to as 'blue-green algae' (though not actually algae).
DEPI	Department of Environment and Primary Industries, Victoria
DWMS	Drinking Water Management System
'the Department'	Department of Health, Victoria
E. coli	*Escherichia coli*: thermotolerant bacteria used as an indicator of faecal contamination
HACCP	Hazard Analysis and Critical Control Point
<	'Less than' (mathematical term)
>	'Greater than' (mathematical term)
L	Litre: a unit of volume (equal to 1000 cubic centimetres)
mg/L	Milligrams per litre: a unit of concentration (one milligram is equal to 0.001 grams)
ML	Megalitres: a unit of volume (one megalitre is equal to one million litres)
NATA	National Association of Testing Authorities
ng/L	Nanograms per Litre: a unit of concentration (one ng is equal to 0.000000001 grams)
NHMRC	National Health and Medical Research Council
Orgs/100mL	Organisms/per millilitre of solution: a unit of measurement used in microbiology
Pathogen	Disease-causing microorganism
PAC	Powdered activated carbon
PLC	Programmable logic controller: a digital computer used for automation of electromechanical processes
RMP	Risk Management Plan
'the Act'	*Safe Drinking Water Act 2003*
'the Regulations'	Safe Drinking Water Regulations 2005
SGW	South Gippsland Water (South Gippsland Region Water Corporation, 'the Corporation')

Customers and members of the public may obtain further information on the results of water quality monitoring programs or any matters related to this report by contacting South Gippsland Water's Customer Service Department on **03 5682 0444** or by emailing sgwater@sgwater.com.au

South Gippsland Water

"Committed to high quality drinking water"

South Gippsland Water is committed to the management of its water supply systems to ensure the provision of safe, high-quality drinking water that consistently meets the NHMRC/NRMMC Australian Drinking Water Guidelines, relevant regulatory requirements and customer expectations. In order to achieve this objective, in partnership with stakeholders and relevant agencies, the Corporation will:

- Implement and maintain a Drinking Water Quality Management System to minimise risks to drinking water quality at all points from catchment to consumer.
- Develop and implement an appropriate drinking water quality monitoring program and reporting system to provide relevant and timely information, and ensure confidence in the water supply and its management.
- Implement appropriate contingency and incident response systems to effectively manage incidents that may adversely affect drinking water quality.
- Annually review and assess the performance of the Drinking Water Quality Management System with respect to this policy to ensure continual improvement and best practice management.
- Integrate into the Corporation's planning the needs and expectations of its consumers, stakeholders, regulators and employees to ensure both effective and economical solutions for managing safe drinking water supplies.
- Ensure compliance with all relevant regulations, guidelines and standards relevant to drinking water quality.

This policy requires all managers and employees at South Gippsland Water involved in the supply of drinking water to be responsible for understanding, implementing, maintaining and continually improving the drinking water quality management system.

This Water Quality policy is proudly displayed at South Gippsland Water facilities and is communicated to all persons working for or on our behalf during induction or contract proceedings. The policy is available to the public upon request or via the South Gippsland Water website. Our contact details are –

South Gippsland Water
14-16 Pioneer Street
PO Box 102
Foster, Victoria 3960
(03) 5682 1222

or: www.sgwater.com.au

Schedule 1

Regulation 8

Safe Drinking Water Regulations 2005

RISK MANAGEMENT PLAN AUDIT CERTIFICATE

Certificate Number: 98

Audit period: 27th April 2012 to 26th May 2014

To: Mr Philippe du Plessis
Managing Director
South Gippsland Water Corporation
PO Box 102
Foster, Vic 3960

Australian Business Number (ABN): 40 349 066 713

I, Dr.Pararajasegram (Dharma) Dharmabalan, after conducting a risk management plan audit of the water supplied by South Gippsland Water Corporation, am of the opinion that—

South Gippsland Water Corporation has complied with the obligations imposed by section 7(1) of the ***Safe Drinking Water Act*** **2003** during the audit period.

Signature of approved auditor: _____

Dr.P. (Dharma) Dharmabalan

Date: 26th May 2014

Exemplar Global Certified Auditor
Drinking Water QMS Scheme
Certificate Number 14555