



2017 Drinking Water Quality Report

Loyalist Township Utilities Division
Fairfield Drinking Water System
Bath Drinking Water System



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2017 Drinking Water Quality Report

Loyalist Township Utilities Division

1. Introduction

This annual summary report is prepared and submitted to our water customers who have their drinking water supplied by the **Fairfield** Drinking Water System, the **Bath** Drinking Water System and to the Council of Loyalist Township, in accordance with Section 11 and Schedule 22 of *Ontario Regulation 170/03*, as amended.

The report covers the period of January 1st to December 31st, 2017

The quality of Loyalist Township's drinking water is continuously monitored and tested by advanced on-line instrumentation, Supervisory Control and Data Acquisition (SCADA) system and is operated and maintained by certified Township staff who have successfully completed rigorous training and testing to become certified Drinking Water treatment and Distribution System Operators.

This report confirms that Loyalist Township continues to deliver safe, high quality drinking water to the residents and businesses of our community

2. Availability of the Annual Summary Report

In light of Section 11 (7) and 11 (10) of Ontario Regulation 170/03, the notice of availability is generally done on-line through the Township's website and on the customers' bi-monthly water bill.

The annual report is available to the public by visiting the Township's web site at: www.loyalist.ca/go/drinkingwater

Copies of the report can also be obtained, at no charge, from Loyalist Township offices located at 263 Main Street, Odessa, ON, (613) 386-7351.

Any member of the public can also request to inspect, under Section 12 of Ontario Regulation 170/03, any sample results and reports prepared under Section 11 and Schedule 22 of Ontario Regulation 170/03, free of charge, during Loyalist Township regular office hours.

If you are a person with a disability and need Loyalist Township information in another format, please contact 613-386-7351 ext. 100 between 8:30 a.m. – 4:30 p.m. or e-mail info@loyalist.ca.

3. Executive Summary

The water delivered to the customers of the Bath and Fairfield drinking water systems (DWS) continues to meet all water quality standards.

In 2017, 1.2 million litres of potable water was delivered to the Fairfield water distribution system (56% of that volume generated revenue) and 0.6 million litres to the Bath water distribution system

(79% generated revenue). The maximum daily treated water volume was recorded at 56% of the Fairfield Water Treatment Plant rated capacity and 41% for the Bath Water Treatment Plant.

All sampling required by the applicable acts, regulations, permits and licenses has been conducted in accordance with the legislation.

All reports and notifications required by applicable acts, regulations, permits and licenses have been prepared and submitted in accordance with the legislation. An administrative issue was noted by the MOECC with regards to the submission of notification for an upgrade made to the Bath WTP chemical addition equipment. The issue was addressed promptly, no further action is required.

Proper disinfection was achieved at all times and filter effluent turbidity did not exceed limits of the Ontario Drinking Water Quality Standard (ODWQS). All inorganic and organic chemical parameters tested were well within maximum allowable concentration (MAC).

There were two incidents of adverse water quality indication in the Fairfield drinking water system. The first was related to a distribution system sample testing positive for total coliforms. Required notifications and corrective actions took place. The second was related to a boil water advisory issued to the residents of Morden Cres in Amherstview, following a damaged watermain during construction activities in the area. The sampling that followed the required corrective actions confirmed the safety of the water. The advisory was in place for 3 days.

To the best of our knowledge, both drinking water systems are in compliance with all regulatory requirements of the Drinking Water Works Permit, Municipal Drinking Water License, Permit to Take Water, Safe Drinking Water Act and its regulations.

Commitment to:

comply with
applicable
legislation

supply safe
drinking water

maintain and
continually
improve the QMS

4. Quality Management System Policy

Municipal drinking water systems in Ontario must operate under a licensing program. One of the requirements of the Municipal Drinking Water License is to have a quality

management system (QMS) in place that meets the minimum requirements of the Ontario Drinking Water Quality Management Standard.

Management systems are preventive and proactive in nature and focus on consistency and continuous improvement. A QMS follows a cycle that includes **planning** what you are going to do, **do** what you planned, **check** what you did and **improve**.

Loyalist Township QMS Policy: Loyalist Township is committed to comply with all applicable legislative and regulatory requirements, as it relates to drinking water quality, to supply our consumers with safe drinking water and is committed to the maintenance and continual improvement of the QMS.





5. Description of the Fairfield DWS

Drinking Water System Number:	220009229
Drinking Water System Name:	Fairfield Drinking Water System
Owner & Operator:	Corporation of Loyalist Township
Operating Authority Accreditation:	CERT-0094905
Drinking Water System Category	Large Municipal Residential
Drinking Water Works Permit:	158-201
Municipal Drinking Water License:	158-101
Design Capacity:	8,000 m ³ per day
Type of Filtration:	micro/ultrafiltration
Commissioned in the Year:	2000
Original Design Period:	2000-2023
Permit to take Water:	6024-9LUKNX
Rate of Taking:	9,000 m ³ per day
Raw Water Source:	Lake Ontario
Population Served:	9885

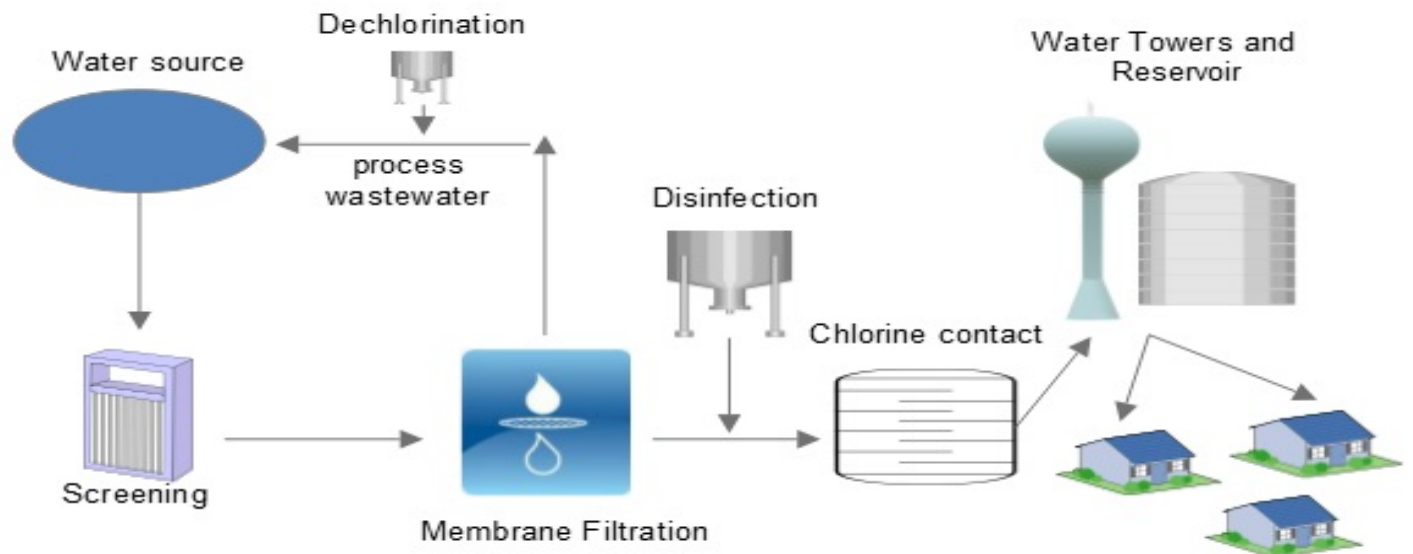
The Fairfield Water Treatment Plant currently serves the population of Amherstview, Odessa, Harewood, Brooklands and Taylor-Kidd Blvd / Loyalist East industrial parks.

The Fairfield water treatment facility consists of a membrane ultrafiltration system followed by chlorination for disinfection. A target (average) free chlorine residual of 1.1 to 1.2 mg/l at the effluent of the chlorine contact chamber is desired to maintain a free chlorine residual of 1 mg/l at the effluent of the treatment plant. Granular activated carbon adsorbers are used at certain times of the year to assist in the control of taste and odour as well as a raw water intake chlorination system for Zebra Mussel control.

With the introduction of ultrafiltration technology, the Fairfield Water Treatment Plant is surpassing the Ministry of the Environment and Climate Change's minimum treatment guidelines for waterworks using a surface water source.

The distribution system uses elevated water storage located in Amherstview (1,100 m³ capacity) and Odessa (900 m³ capacity). There is a booster pumping station on County Road # 6, north of Taylor Kidd Blvd, with a water reservoir (4,225 m³ capacity) and chlorination booster capability to ensure the maintenance of acceptable chlorine residual in the system. The Odessa water tower, located at the east end of Main Street, Odessa, is also equipped with chlorination booster capability. Chlorine residual in the water leaving each of the reservoirs is monitored continuously with free chlorine residual analyzers.

Chemicals used within the Fairfield Drinking Water System (DWS) for treatment/disinfection are chlorine gas (disinfection), sodium hypochlorite (disinfection) and sodium bisulphite (treatment of plant residue back to the raw water source). The chlorine gas and sodium hypochlorite used within the Fairfield DWS meet all applicable standards set in the Municipal Drinking Water License, in line with the American Water Works Association (AWWA) and the American National Standards Institute (ANSI) safety criteria standards NSF/60.



6. Description of the Bath DWS



Drinking Water System Number:	220002217
Drinking Water System Name:	Bath Drinking Water System
Owner & Operator:	Corporation of Loyalist Township
Operating Authority Accreditation:	CERT-0094905
Drinking Water System Category:	Large Municipal Residential
Drinking Water Works Permit:	158-202
Municipal Drinking Water License:	158-102
Design Capacity:	6,000 m ³ /day (gross capacity) 5,650 m ³ /day (net capacity)
Type of Filtration:	non-typical conventional
Commissioned in the Year:	1997
Design Period:	1997-2040
Permit to Take Water:	4521-9LTHDP
Rate of Taking:	7,515 m ³ per day
Source of Water:	Lake Ontario
Population Served:	3033

The Bath Drinking Water System currently serves the population of Bath and the Bath and Millhaven Correctional Services Canada Institutions (CSC).

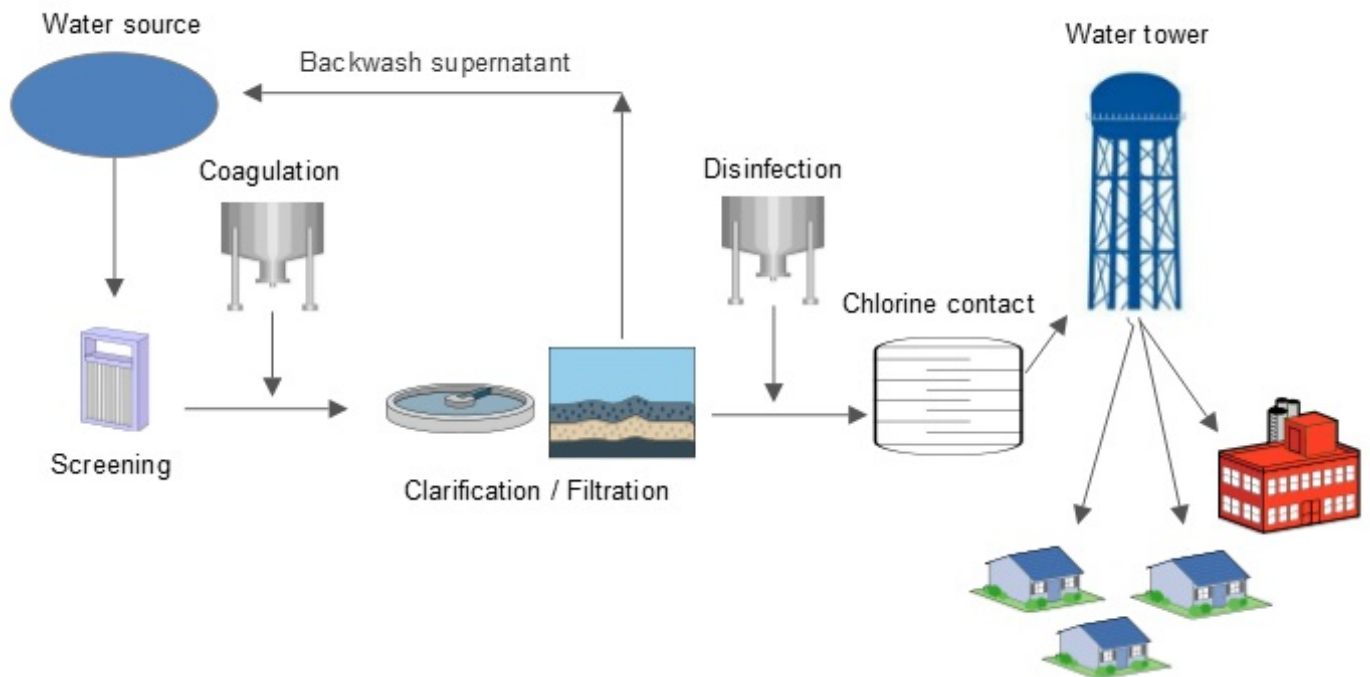
The Bath Water Treatment Plant consists of coarse screens, a direct filtration package-plant using two multi-media filters (granular activated carbon, silica sand and gravel) with coagulant addition, automated chlorination for Zebra Mussel control and disinfection. Emergency power supply equipment is installed at the treatment plant to ensure safe drinking water is supplied to our customers even during power outages. Turbidity in the water leaving the filters and free chlorine residual in the water leaving the treatment facility are monitored continuously.

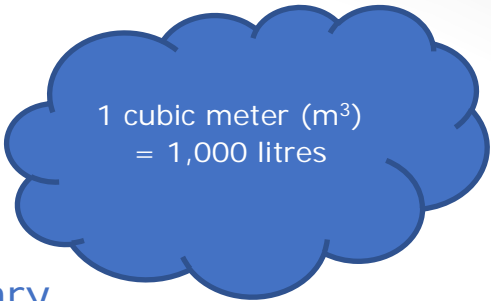
The distribution system has an elevated storage reservoir of 1,891 m³ capacity located adjacent to the west side of the Millhaven

Correctional property, in the east end of the Village. Chlorine residual in the water leaving the reservoir is monitored continuously with a free chlorine residual analyzer

The facility meets the Ministry of the Environment's minimum treatment guidelines for waterworks using a surface water source.

Chemicals used for water treatment/disinfection within the Bath Drinking Water System (DWS) are chlorine gas (disinfection), polyaluminum chloride Sternpac and PAX XL56 (coagulation). The chlorine gas and coagulant used meet all applicable standards set in the Municipal Drinking Water License in line with the American Water Works Association (AWWA) and the American National Standards Institute (ANSI) safety criteria standards NSF/60.





7. Flow Summary

The Ministry of the Environment and Climate Change (MOECC) issues permits to take water (PTTW), allowing municipal drinking water systems to draw from a water source for water treatment and distribution purposes.

7.1 Fairfield DWS

The MOECC issued Loyalist Township its most recent PTTW on July 15, 2014. The permit is valid for 10 years and allows the Township to draw a maximum of 9,000 m³ of water per day from Lake Ontario for the Fairfield Water Treatment Plant.

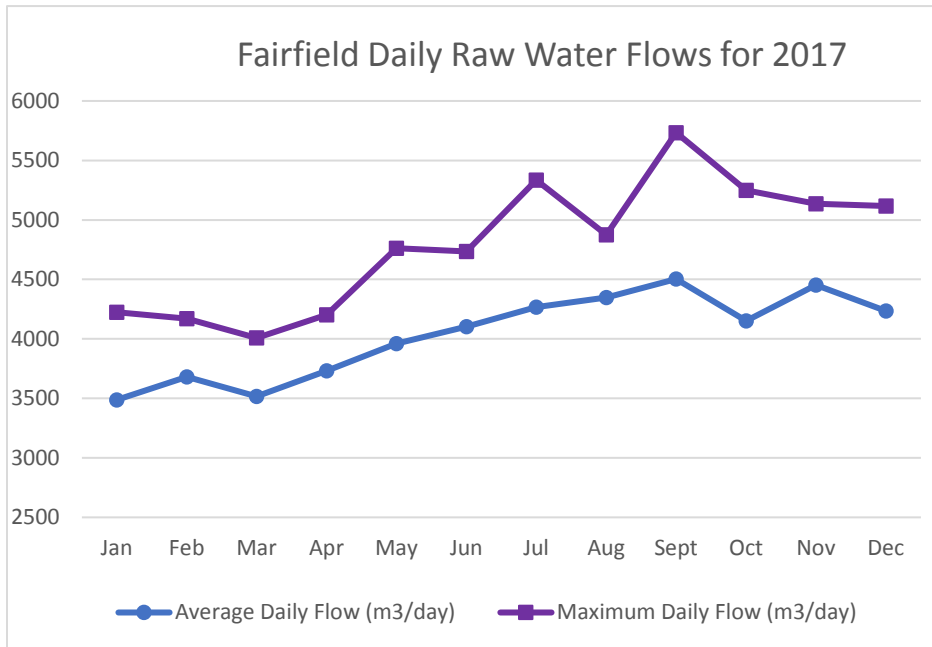
Fairfield DWS

Total Raw Water Taken in 2017

1,473,757 m³

Maximum Daily Raw Water Volume Taken

5,734 m³
(64% of limit)



Fairfield DWS

Total treated water sent to the distribution system in 2017

1,159,537 m³

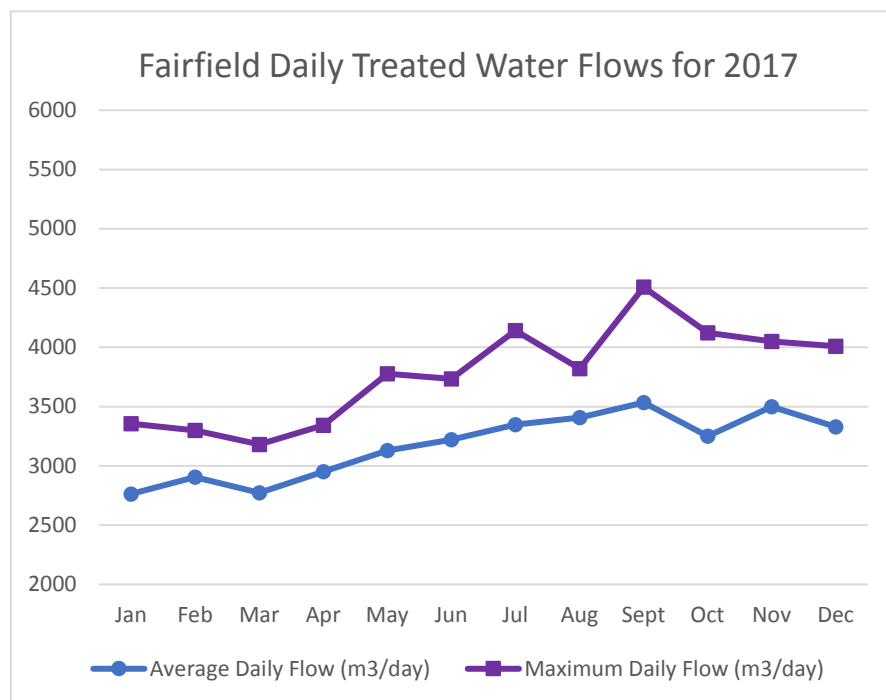
Maximum Daily Treated water Volume

4,507 m³/day

(56% of rated capacity)

Based on the current Municipal Drinking Water License, the water treatment plant's rated capacity (8,000 m³ per day) is assessed as being the volume of water that flows from the treatment system to the distribution system or water demand.

For 2017, the water demand reached 56% of the plant's rated capacity.

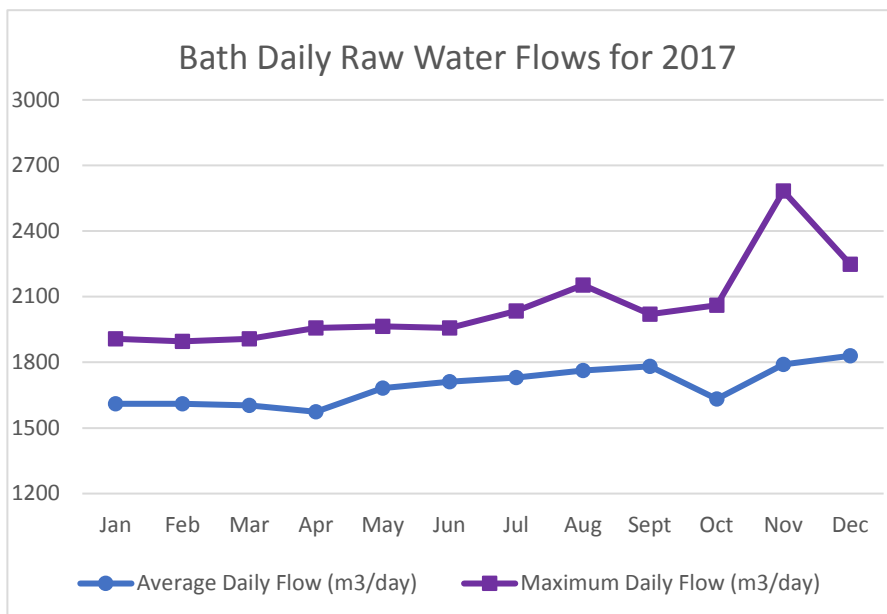


The uncommitted reserve capacity calculation performed in 2017 places the expansion of the Fairfield Water Treatment Plant at the year 2032, considering 100 units/year with the current inventory of draft plan approved development. This expansion date is subject to change forward

or backwards based on size of development being approved, changes in limits of the service area, actual growth rate, water demand and water losses.

7.2 Bath DWS

The most recent PTTW for this system was issued on July 18, 2014. The permit is valid for 10 years and allows the Township to draw a maximum of 7,515 m³ of water per day from Lake Ontario for the Bath Water Treatment Plant.



Bath DWS

Total Raw Water Taken in 2017

618,209 m³

Maximum Daily Raw Water Volume Taken

2,583 m³

(34% of limit)

Bath DWS

Total treated water sent to the distribution system in 2017

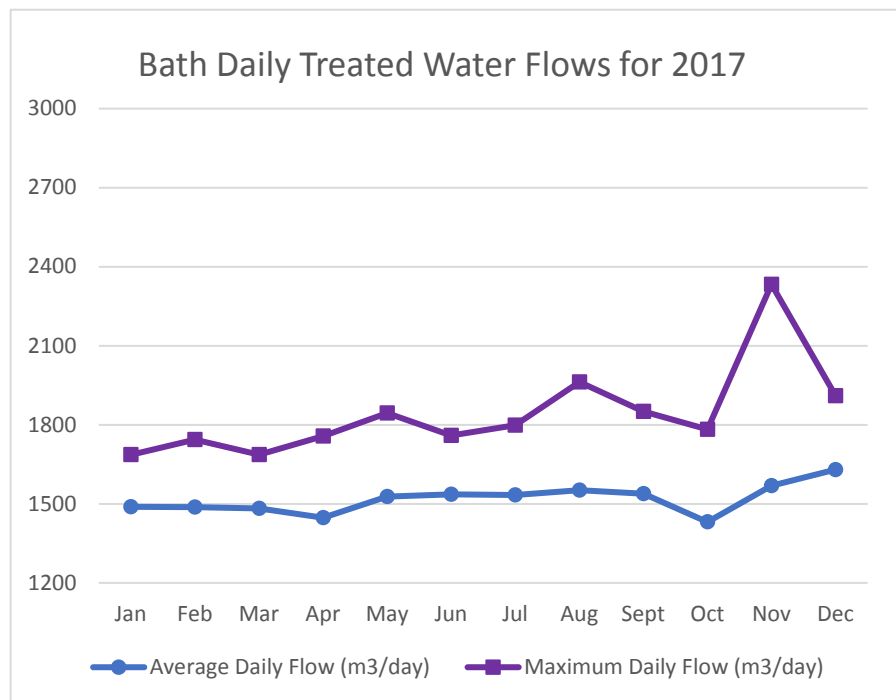
554,294 m³

Maximum Daily Treated Water Volume

2,333 m³/day
(41% of rated capacity)

Based on the current Municipal Drinking Water License, the water treatment plant's rated capacity (5,650 m³ per day) is assessed as being the volume of water that flows from the treatment system to the distribution system or water demand.

For 2017, the water demand reached 41% of the plant's rated capacity.



7.3 Water Losses

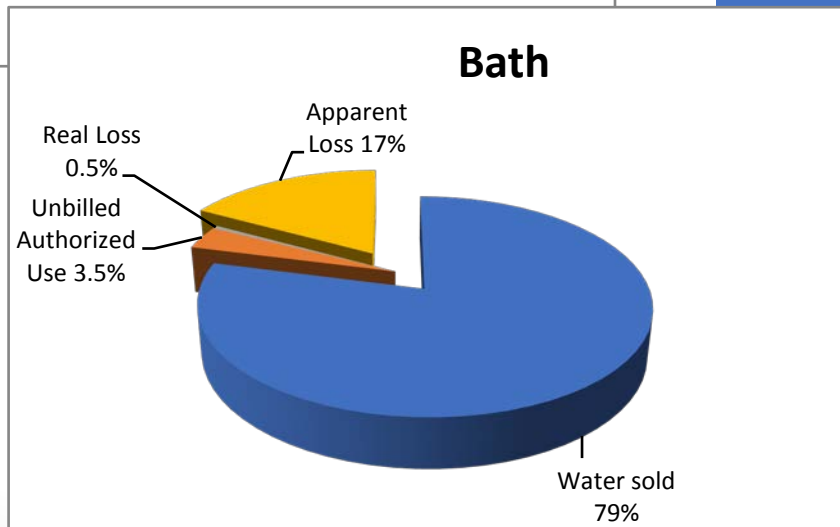
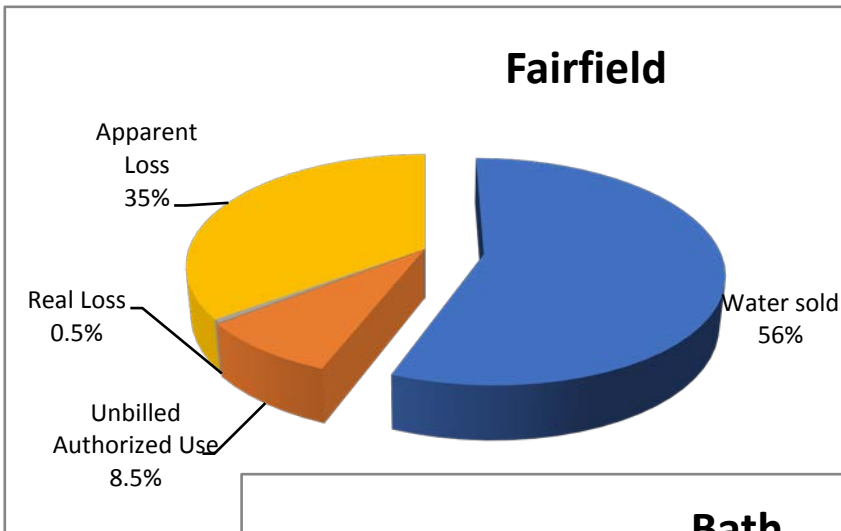
With regards to water losses, the MOECC Design Guideline for Drinking Water Systems refers to “unaccounted for water” when considering rated capacity. Their policy requires system owners to consider unaccounted for water to the level of 15% of the average daily demand.

For 2017, 44% of water sent to the Fairfield water distribution system and 21% for the Bath water distribution system is water for which no revenue was generated. Not all is considered unaccounted for.

Apparent Water Losses

Fairfield 35%

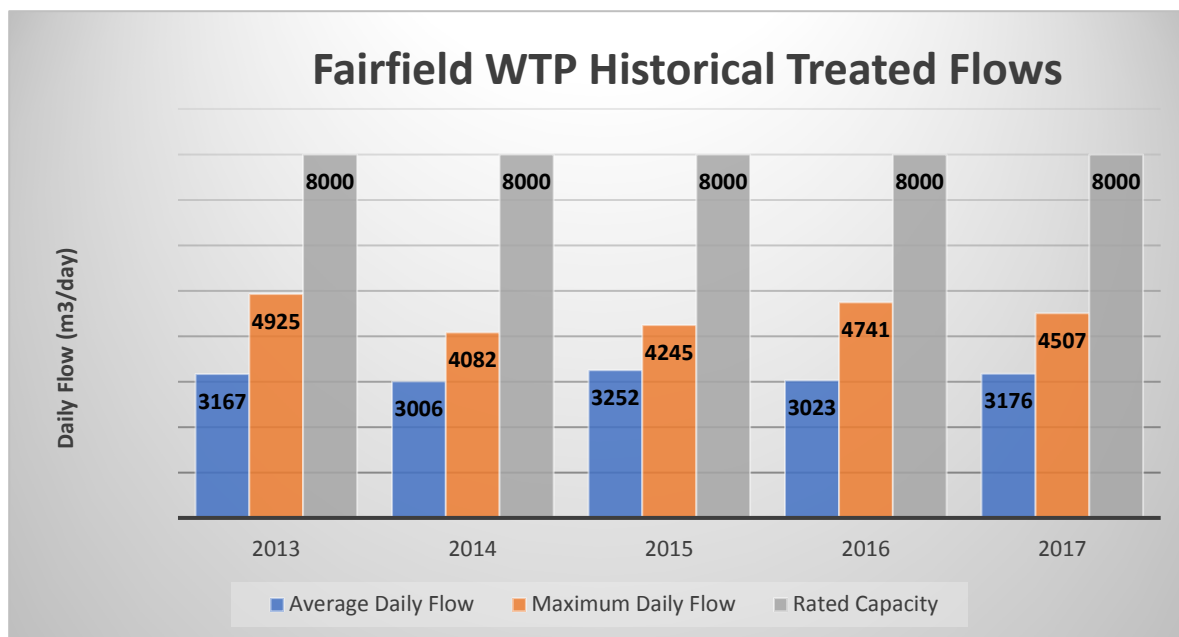
Bath 17%



Non-revenue water (NRW) is generally categorized as **unbilled authorized consumption** (water use inside the treatment facilities, distribution system flushing, water used for construction activities, fire training / fire fighting purposes and water used for recreation purposes), **real water losses** (watermain breaks and leaks) and **apparent water losses** (unauthorized consumption / theft, unknown water usage and metering / data inaccuracies).

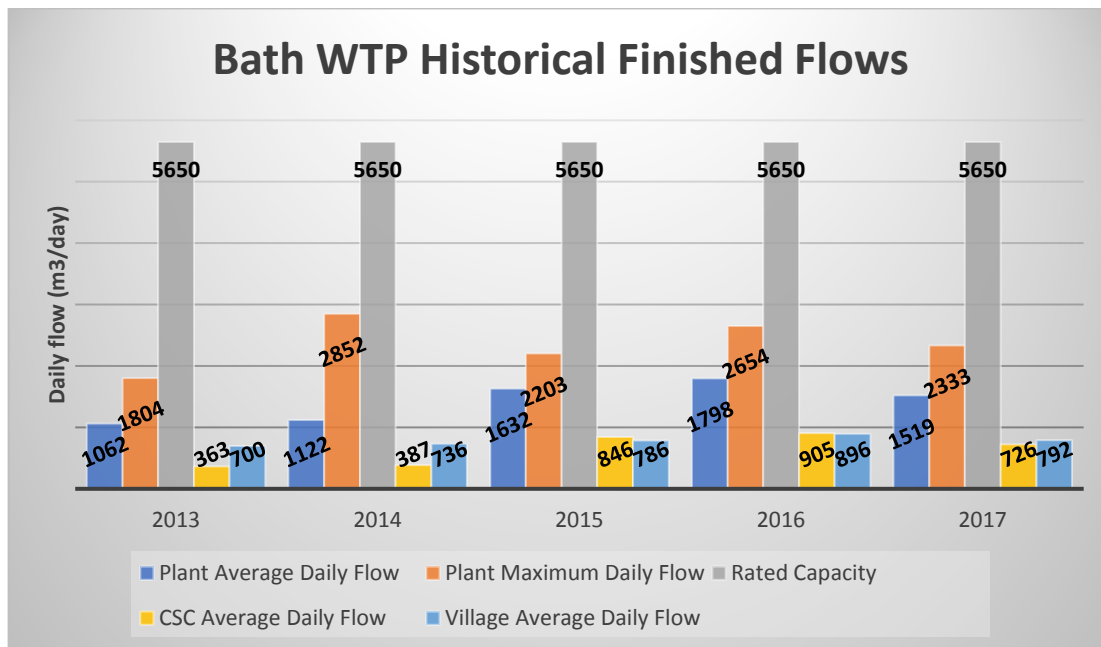
7.4 Historical trends

Historical trending indicates that total water consumption (annual average daily flow) has not changed significantly over the years for the Fairfield DWS although development and population continues to grow. The increase in flow demand expected with a population growth is balanced with household water usage efficiencies and a reduction in water losses achieved by replacing older watermains.



As expected, the fluctuation of the maximum daily flow is very much a function of precipitation and major events in the distribution system such as the drinking water advisory in Amherstview (2013), above average precipitation (2014), large watermain break or significant leaks (2015), drought conditions (2016) and although 2017 saw a lot of precipitation, the number of replacement and rehabilitation projects in the distribution system was unprecedented and brought a significant volume of lost water through watermain damage due to construction activity and unmetered temporary water services during construction.

For Bath, trending indicates that water consumption (annual average daily flow) is on a gentle climb but is very much influenced by water demand from CSC and the number of high turbidity events affecting treatment filter performance. With major renovations on CSC property in 2013 and 2014, the water demand was unusually low as inmates were temporarily relocated to other institutions and the system saw a net increase in 2015, coinciding with units at CSC being turned back on and fairly significant leaks on their property from 2014 on (maximum daily flow).



8. Waterworks Upgrade and Major Maintenance

The following upgrades and major maintenance activities took place in 2017:

- Bath – WTP raw and chlorine contact chamber chlorine ejector rebuilt and tubing replacement
- Bath – WTP finished water online turbidity analyzer replacement
- Bath – WTP backflow preventer replacement
- Bath – Davy St watermain extension
- Bath – Water tower UPS replacement
- Fairfield – WTP low lift pumps 1 and 3 and permeate pump 1 drive replacement
- Fairfield – WTP reject pump 1A replacement
- Fairfield – WTP raw and permeate actuators replacement
- Fairfield - Morden Cres and Frink Ave watermain replacement
- Fairfield - Fairfield Blvd, Sherwood Ave and Clairton watermain relining

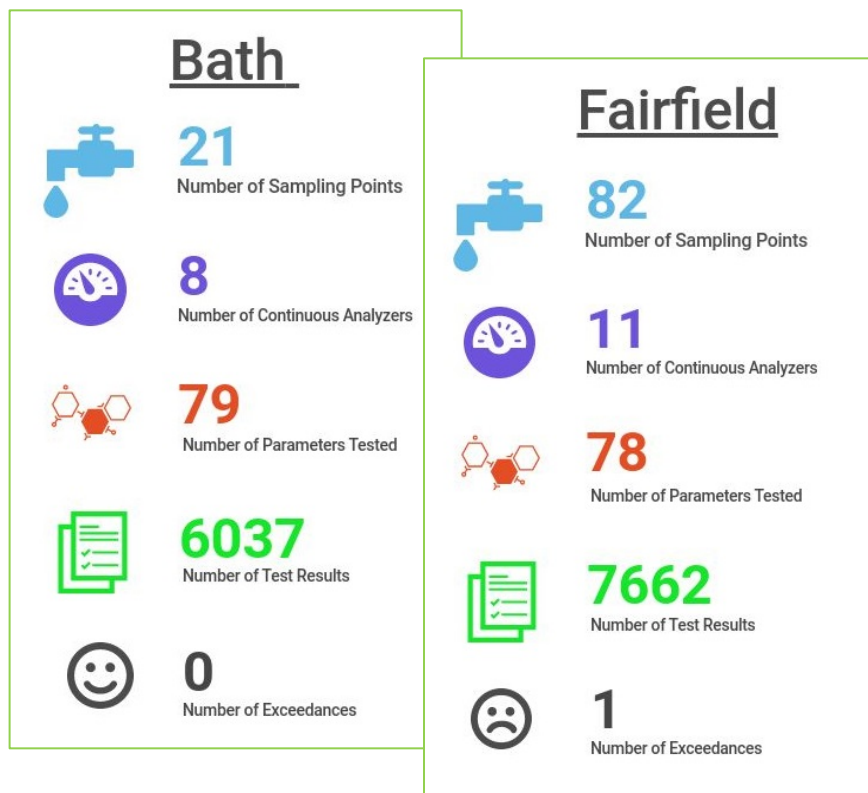
9. Regulatory Sampling Requirements

Regulatory samples are analyzed by laboratories that are accredited to conduct these specific analyses. When allowed, operational checks, testing and sampling are also conducted by certified operators and/or continuous analyzers.

9.1 Sampling Locations

Samples are collected at the following locations on a set schedule, as required by the regulation and more frequently if required operationally:

- › Raw water
- › Each filter effluent
- › Treated water (point where water enters the distribution system)
- › Process water discharge to water source
- › Distribution system (point with maximum residency time)
- › Distribution system (routine microbiological and lead sampling locations)
- › Distribution system (water towers and water reservoir)



Filter effluent turbidity did not exceed the Ontario Drinking Water Quality Standard at any time in 2017

9.2 Equipment Calibration

All testing instruments are calibrated regularly as per manufacturer's specifications. Although not required to do so, we also retain a third-party instrumentation service provider to conduct annual servicing on the majority of our laboratory equipment, as a quality control measure.

9.3 Turbidity and Free Chlorine Residual Sampling

Sampling for turbidity and free chlorine residual is required by **Schedule 7** of *O.Reg. 170/03*. Continuous free chlorine residual and turbidity analyzers are installed throughout the treatment plant and continuous free chlorine analyzers are installed in the water distribution system at the Amherstview, Bath and Odessa water towers as well as at the Odessa water booster station, all in accordance with the requirements of the Drinking Water Works Permit.

Readings from these analyzers are trended by the Supervisory Control and Data Acquisition (SCADA) system at each water treatment plant and reports of minimum, maximum and average values during a 24-hour period are automatically printed and reviewed by a certified operator on a daily basis.

Turbidity is defined as the cloudiness of the water caused by suspended matter and is an important measure of filter performance. Its measurement is expressed in Nephelometric

Turbidity Unit (NTU). Water becomes “cloudier” as the NTU’s increase.

Turbidity in the water interferes greatly with the disinfection process, as the particles causing high turbidity can shield or entrap disease-causing organisms, making it difficult for the disinfectant to reach and destroy.



The filter performance criteria for membrane micro/ultrafiltration (Fairfield) is 0.1 NTU in 99% and for conventional filtration (Bath) 0.3 NTU in 95% of all turbidity readings taken in the course of 1 month. Turbidity higher than 1 NTU at the filter effluent for a duration of 15 minutes is an indicator of “adverse water quality”.

Free chlorine residual is the concentration of residual chlorine that is the most effective at killing or inactivating disease-causing organisms in water. Its measurement is expressed in milligram per litre (mg/l).

For the Fairfield water treatment plant, the minimum free chlorine residual required in treated water to confirm proper disinfection has been achieved is 0.80 mg/l and 0.90 mg/l for the Bath water treatment plant.

The recommended minimum concentration in the distribution system to protect from bacterial re-growth and biofilm formation is 0.2 mg/l.

Improper disinfection is considered an “adverse water quality” indicator. Proper disinfection was achieved at all times in 2017.

Proper
disinfection was
achieved at all
times in 2017

2017 Filter Turbidity Results				
	Number of samples	Range of Results (min - max)	Average	Unit
Fairfield				
Turbidity Train 1	Continuous sampling	0.01 – 0.89	0.01	NTU
Turbidity Train 2	Continuous sampling	0.01 – 0.21	0.02	NTU
Bath				
Turbidity Filter 4100	Continuous sampling	0.02 - 2.00	0.06	NTU
Turbidity Filter 4200	Continuous sampling	0.01 - 1.77	0.05	NTU

2017 Free Chlorine Residual Results				
	Number of samples	Range of Results (min - max)	Average	Unit
Fairfield				
Free Chlorine Residual (treated)	Continuous & grab samples (daily)	0.81 – 2.41	1.61	mg/l
Free Chlorine Residual (distribution system)	Continuous & 600 grab samples (weekly)	0.26 - 5.00	1.32	mg/l
Bath				
Free Chlorine Residual (Finished)	Continuous & grab samples (daily)	0.92 - 2.11	1.49	mg/l
Free Chlorine Residual (distribution system)	Continuous & 177 grab samples (weekly)	0.68 - 2.43	1.26	mg/l

9.4 Microbiological sampling

Microbiological sampling of raw, treated and distribution water is required by **Schedule 10** of *O.Reg. 170/03*.

Organisms such as bacteria may come from storm water, sewage plants, livestock operations, septic systems and wildlife. Most

present little or no health concerns for humans. The indicator tests include total coliforms, Escherichia coliforms (E.coli) and heterotrophic plate count (HPC).

The presence of any total coliform or E.Coli in water leaving a treatment plant (following the disinfection process) signifies inadequate treatment and an increased risk to public health.

2017 Microbiological Results					
	Number of Samples	Range of E.Coli (min-max) (count/100ml)	Range of Total Coliform (min-max) (count/100ml)	Number of HPC samples	Range of HPC (min-max) (count/ml)
Fairfield					
Raw	52	0 - 14	0 – >400	n/a	n/a
Treated	58	0	0	52	<10 – 50
Distribution	600	0	0 - 40	156	<10 – 530
Bath					
Raw	52	0 - 158	0 – 850	n/a	n/a
Finished	53	0	0	53	<10 – 370
Distribution	177	0	0	66	<10 – 30

Heterotrophic plate count (HPC) results give an indication of overall water quality in drinking water systems. While a gradual change in results can indicate a change in overall water quality or a problem such as bacteria regrowth in the distribution system, a sudden high result is more an indication of sampling point contamination, issue with sample preparation for analysis or with the analysis itself.

For these systems, we are expecting HPC results of 20 count/ml or less in the treated and distribution water. It is not unusual to see occasional higher results but as a guideline, each result should be less than 500 count/ml.

Elevated HPC results occurred in samples collected at the Odessa water tower (September 2017) and at the Bath water treatment

No results of samples collected as per Schedule 13 of *O.Reg. 170/03* exceeded the standards prescribed in the ODWQS

plant (July 2017). The free chlorine residual in either sample was at an acceptable level and HPC results in weeks prior to and after the high results were in the range of 10 – 20 CFU/ml. No further action required.

The total coliform count above 0 occurred in the Fairfield DWS. Refer to section 11 below for more details.

9.5 Quarterly Chemical Sampling

Quarterly sampling and testing for nitrates and nitrites in a treated water sample and haloacetic acids and trihalomethanes in a distribution sample is required by **Schedule 13** *O.Reg. 170/03*.

Trihalomethanes (THMs) and Haloacetic Acids (HAAs) are by-products of disinfection and are formed when chlorine reacts with organic matter naturally present in water. The level of THMs and HAAs in treated water depends on numerous factors including total organic carbon, temperature, pH, chlorination dose and residency time in the distribution system.

For THMs, the maximum acceptable concentration (MAC) is 0.100 mg/l and based on a four-quarter moving average. The standard for HAAs has been established at 0.80 mg/l (four-quarter moving average) but is not in effect until 2020.

2017 Quarterly Chemical Results			
	Number of Samples	Results Range (min-max) (mg/l)	MAC (mg/l)
Fairfield			
Nitrate (finished)	4	0.2 - 0.4	10
Nitrite (finished)	4	<0.1	1
Trihalomethanes (distribution)	4	0.037 – 0.072 (average 0.058)	0.100 (average)
Haloacetic Acids (distribution)	4	0.041 – 0.085 (average 0.054)	n/a
Bath			
Nitrate (finished)	4	0.2 – 0.5	10
Nitrite (finished)	4	<0.1	1
Trihalomethanes (distribution)	4	0.016 – 0.041 (average 0.030)	0.100 (average)
Haloacetic Acids (distribution)	4	<0.005 – 0.022 (average 0.015)	n/a

9.6 Annual Organic and Inorganic Sampling

Yearly sampling of specific inorganic and organic parameters in a treated water sample is required by **Schedules 23 and 24** of *O.Reg. 170/03*.

If the result for a parameter listed in these schedules exceeds half of the standard prescribed by the ODWQS, then the frequency of testing for that parameter must be increased to quarterly.

2017 Annual Inorganic Results		
	Bath	Fairfield
Parameter	(ug/l)	(ug/l)
Antimony	0.1	0.1
Arsenic	0.5	0.9
Barium	23	24
Boron	<5	<5
Cadmium	< 0.02	< 0.02
Chromium	< 2	< 2
Mercury	< 0.02	< 0.02
Selenium	< 1	< 1
Uranium	0.22	0.38

2017 Annual Organic Results					
	Bath	Fairfield		Bath	Fairfield
Parameter	(ug/l)	(ug/l)	Parameter	(ug/l)	(ug/l)
Alachlor	<0.3	<0.3	Diuron	< 5	< 5
Atrazine & Metabolites	<0.5	<0.5	Glyphosate	< 25	< 25
Azinphos-methyl	<1	<1	Malathion	< 5	< 5
Benzene	<0.5	<0.5	MCPA	< 0.12	< 0.12
Benzo(a) pyrene	<0.005	<0.005	Metolachlor	< 3	< 3
Bromoxynil	<0.3	<0.3	Metribuzin	< 3	< 3
Carbaryl	<3	<3	Monochlorobenzene	< 0.2	< 0.2
Carbofuran	<1	<1	Paraquat	< 1	< 1
Carbon Tetrachloride	<0.2	<0.2	Pentachlorophenol	< 0.1	< 0.1
Chlorpyrifos	<0.5	<0.5	Phorate	< 0.3	< 0.3
Diazinon	<1	<1	Picloram	< 5	< 5
Dicamba	<5	<5	PCBs	< 0.05	< 0.05
Dichlorobenzene 1,2-	<0.1	<0.1	Prometryne	< 0.1	< 0.1
Dichlorobenzene 1,4-	<0.2	<0.2	Simazine	< 0.5	< 0.5
Dichloroethane 1,2-	<0.1	<0.1	Terbufos	< 0.3	< 0.3
Dichloroethylene 1,1-	<0.1	<0.1	Tetrachloroethylene	< 0.2	< 0.2
Dichloromethane	<0.3	<0.3	Tetrachlorophenol- 2,3,4,6	< 0.1	< 0.1
2,4-dichlorophenol	<0.1	<0.1	Triallate	< 10	< 10
2,4-dichlorophenoxy acetic acid (2,4-D)	<5	<5	Trichlorophenol - 2,4,6	< 0.1	< 0.1
Diclofop-methyl	<0.5	<0.5	Trichloroethylene	< 0.1	< 0.1
Dimethoate	<1	<1	Triflualin	< 0.5	< 0.5
Diquat	<5	<5	Vinyl Chloride	< 0.2	< 0.2

None of the organic or inorganic parameters test results exceeded half of the standard prescribed in the ODWQS

9.7 Fluoride and Sodium Sampling

There is a requirement to sample and test for sodium and fluoride in one treated water sample once every 5 years. Next sampling is due for 2018. The results of the latest test are summarized below. Results met the requirements of the ODWQS.

2017 Fluoride and Sodium Results				
	Date	Fluoride	Sodium	Unit
Bath WTP	08/01/2013	0.2	12.5	mg/l
Fairfield WTP	08/01/2013	0.3	12.6	mg/l
MAC	n/a	1.5	n/a	mg/l

9.8 Distribution System Lead Sampling

Bi-annual sampling in the distribution system for pH and alkalinity is a requirement of **Schedule 15.1 O.Reg. 170/03**. The Fairfield Drinking Water System qualified for reduced sampling as lead concentrations in samples collected from residential plumbing and the distribution system did not pose a risk to public health, based on the ODWQS.

The requirement for reduced sampling is based on population so for the Fairfield DWS, samples must be collected at three different locations in the distribution system and at two locations for the Bath DWS. The samples must be analyzed for pH and alkalinity.

In addition, every three years, the samples must also be analyzed for lead.

No results of samples collected as per Schedule 15.1 of *O.Reg. 170/03* exceeded the standards prescribed in the ODWQS

2017 Schedule 15.1 Results

Parameter	AO / *MAC	Unit	Date collected	Number of samples	Result (min - max)
Fairfield					
Alkalinity	30 - 500	mg/l	11-Apr-17	3	89 – 91
			11-Jul-17	3	88
pH	6.5 - 8.5	no unit	11-Apr-17	3	7.4 – 7.9
			11-Jul-17	3	7.8 – 8.0
Lead	10*	ug/l	11-Apr-17	3	0.06 – 0.13
			11-Jul-17	3	0.02 – 0.17
Bath					
Alkalinity	30 - 500	mg/l	11-Apr-17	2	88 – 89
			11-Jul-17	2	86 - 89
pH	6.5 - 8.5	no unit	11-Apr-17	2	7.5
			11-Jul-17	2	7.9 - 8.0
Lead	10*	ug/l	11-Apr-17	2	0.05 – 0.07
			11-Jul-17	2	0.02 – 0.07

Received an exemption from sampling lead in private plumbing in 2011 for both drinking water systems based on results obtained in two rounds of community wide lead sampling

10. Municipal Drinking Water License Sampling Requirements

Under Schedule C section 1.5 of the license for each of our DWS, there is a requirement to sample the backwash/wastewater of the treatment plant at the point of discharge to Lake Ontario.

For the Fairfield WTP, free chlorine residual in the discharge must be sampled monthly. The residual must remain below 0.05 mg/l (as an annual average).

For the Bath WTP, suspended solids concentration must be sampled monthly and remain below 25 mg/l (as an annual average).

Operationally, we test for each respective parameter several times each month.

Municipal Drinking Water License 2017 Sampling - Residue Management						
System	Parameter	Required frequency	Limit (mg/l)	Number of Samples	Result Range (min- max) (mg/l)	Annual Average (mg/l)
Fairfield (reject)	Free Chlorine Residual	monthly	0.05	51	0 – 0.07	0.02
Bath (supernatant)	Suspended Solids	monthly	25	38	0 - 22	3

11. Adverse Water Quality Indicator Notifications

All adverse water quality indication (AWQI) incidents were immediately verbally reported and in writing within 24 hours to the

MOE Spills Action Centre and the Medical Officer of Health, as required under *Ontario Regulation 170/03*.

2017 Adverse Water Quality Indicator Notices					
Date Sampled	System	Parameter	Issue	Corrective Action	Completed Action
04-Jul-17	Fairfield	Total coliform	Suspected sampling point contamination (distribution system)	Resample and test	05-Jul-17
10-Oct-17	Fairfield	Abnormal observation	Category 2 watermain break on Morden Cres	Boil water advisory, flush, resample and test	12-Oct-17

The July 2017 AWQI report was filed for a sample collected at the Amherstview Fire Station that yielded a total coliform count of 40 CFU/100ml. The free chlorine residual at that location was 1.06 mg/l. The corrective action required in accordance with O.Reg. 170/03 is to resample at the same location, upstream and downstream and retest for the parameter that exceeded. All samples came back negative for the presence of total coliform. Considering the acceptable level of chlorine residual in the original sample, the positive coliform result was most likely from contamination during sample collection, sample preparation for analysis or an issue with the analysis itself.

The October 2017 AWQI report was filed as a result of construction damage to the existing watermain on Morden Cres, Amherstview. There was suspicion of potential contamination before the watermain was completely isolated. After consulting with the Public Health Unit, it was decided to impose a boil water advisory until

satisfactory microbiological sample results were obtained, post repair. The advisory was in place for 3 days.

12. Non-Compliance Incidents

There is a requirement under Schedule 22 of O.Reg 170/03 to report any incidents of non-compliance with the SDWA, its regulations, DWWP, MDWL or any orders applicable to the system.

An administrative issue was noted during the annual MOECC compliance inspection of the Bath Drinking Water System. An upgrade to the chemical pumps at the Bath WTP was made without the proper notification to the Director of Approvals.

The upgrading of chemical pumps is a pre-approved condition under our permit, but a Director's Notification should have been submitted to have the description changed. The notification was submitted shortly after the inspection. No further action was required.

13. Definitions and Terms

Adverse Water Quality

Presence of specific parameters in the drinking water identified as indicator of adverse water quality (potential health effects); listed in Schedule 16 of O.Reg. 170/03

Aesthetic Objective (AO)

Aspects of drinking water quality (namely taste, odour, colour and clarity) that are perceivable by the senses

Inorganic parameters

Substances such as salts and metals can be naturally occurring or a result of urban storm runoff, industrial or domestic wastewater discharge, mining or agriculture. Some may be a result of

treatment and distribution of water (for example, lead from old solder in pipes)

Maximum Acceptable Concentration (MAC)

This is a health-related drinking water standard established for contaminants having known or suspected adverse health effects when above a certain concentration. The length of time the MAC can be exceeded without injury to health will depend on the nature and concentration of the parameter.

Organic parameters

Substance that can be naturally occurring, but most organics of concern are synthetic. They originate from industrial discharges, urban storm runoff and other sources. Included in this group are pesticides that originate from both rural and urban areas. Some may originate from treatment of drinking water (for example, chlorination byproducts such as trihalomethanes and haloacetic acid).

Reference material:

- › Technical Support Document for Ontario Drinking Water Standards, Objectives and Guideline, Ministry of Environment, PIBS 4449e01 revised June 2006
- › Entry level drinking water operator course manual, Ministry of Environment, 3rd Edition (revised 02-2010)

14. Acts and Regulations

In addition to meeting permits and license requirements issued for the Fairfield Drinking Water System, all acts and regulations made with regards to operating, licensing of facilities, licensing of operators, quality standards must also be met. A summary of pertinent legislation is as follows:

- *Safe Drinking Water Act, 2002*
 - Drinking Water Systems O.Reg. 170/03
 - Licensing of Municipal Drinking Water Systems O.Reg. 188/07
 - Certification of Drinking Water Operators O.Reg. 128/04
 - Ontario Drinking Water Quality Standards O.Reg. 169/03
 - Drinking Water Testing Services O.Reg. 248/03
 - Financial Plans O.Reg. 453/07
 - Procedure for Disinfection of Drinking Water in Ontario
 - Watermain Disinfection Procedure
- *Ontario Water Resources Act, 1990*
 - Water Taking O.Reg. 387/04
 - Charges for Industrial and Commercial Water Users O.Reg. 450/07
- *Environmental Protection Act* and its regulations
- Several other MOECC guidelines and protocols

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15. Key Contacts

For further information on this report or a related topic or if there are any questions regarding the information contained in this report, please contact:

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16. Useful References

Canadian Association for Laboratory Accreditation (www.caeal.ca)

Canadian Water and Wastewater Association (www.cwwa.ca)

e-Laws (www.e-laws.gov.on.ca)

Environment Canada (www.ec.gc.ca/water)

Health Canada (www.hc-sc.gc.ca)

MOECC (www.ontario.ca/page/drinking-water)

Ontario Municipal Water Association (www.omwa.org)

Ontario Water and Wastewater Certification Office (www.owwco.ca)

Ontario Waterworks Association (www.owwa.com)

Walkerton Clean Water Centre (www.wcwc.ca)