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Peterborough  
Utilities  
Commission



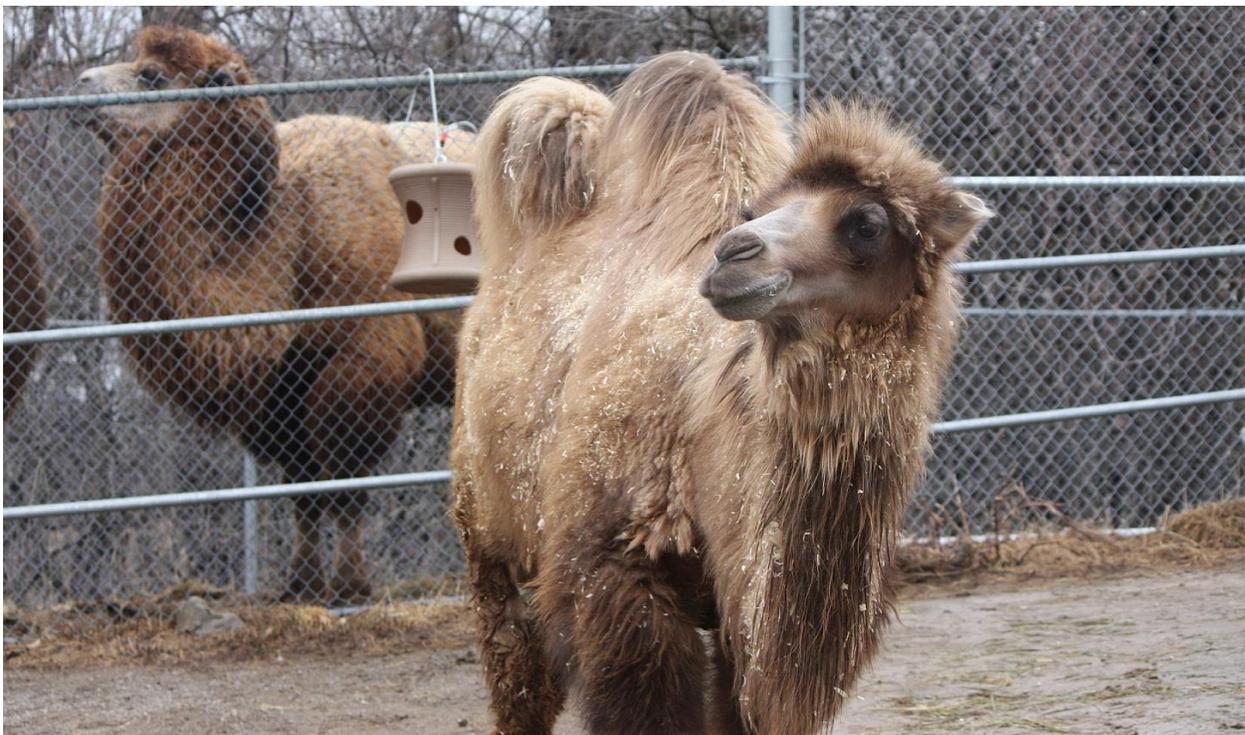
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# Annual Drinking Water Report

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## 2017

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# 2017 Annual Drinking Water Report

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## 2017 COMMISSION

Mayor Daryl Bennett..... Chair  
Councillor Lesley Parnell..... Vice-Chair  
Councillor Gary Baldwin ..... Commissioner  
Councillor Dave Haacke..... Commissioner  
Councillor Don Vassiliadis..... Commissioner

## 2017 RIVERVIEW PARK & ZOO ADVISORY COMMITTEE

<b>Name of Volunteer</b>	<b>Date Appointed</b>
Alex Jackson	February 2014
Lindsey Reynolds	February 2014
Dave Haake	January 2015
Dennis Carter-Edwards	January 2016
Mike Kirkpatrick	January 2016
Wally Davidson	Lifetime Member

### **On the Cover**

The Riverview Park & Zoo acquired a young Bactrian camel, named Baika. She is just over a year old (14 months). The Bactrian camels are critically endangered in the wild. Less than 1000 wild Bactrian camels exist in the world, in China and Mongolia.

Baika is named after Lake Baikal, which is the largest freshwater lake in the world that happens to be located by her species natural habitat. This camel's coat is sandy beige to dark brown in colour and becomes thick and shaggy in winter when desert temperatures can reach -30°C (-22°F); although they live in hot desert climates, Bactrian camels are well adapted, rugged, cold-climate animals

*Questions or comments*

Please contact us either by mail, phone or email.

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## **Introduction**

All Peterborough Utilities Commission facilities are managed and operated under contract by Peterborough Utilities Services Inc. (PUSI). The Water Utility section of PUSI includes the following operating departments:

- Water Treatment Plant
- Water Distribution
- Riverview Park and Zoo

## **Drinking Water Process Description**

### **Source Water**

The source of raw (untreated) water for Peterborough's drinking water is the Otonabee River. The Otonabee River Water is of good quality and can be described as a moderately coloured water of low turbidity. The river water temperature ranges from 0°C (winter) to approximately 26°C (summer). The raw river water is what we call a surface water supply, which means that it is considered to be an unprotected source.

Accordingly, we assume that raw water always requires full treatment at the Peterborough Water Treatment Plant to make it drinkable or potable.

The river water quality is monitored by staff at the plant as well as the Otonabee Region Conservation Authority (ORCA) and the Peterborough Health Unit (beaches only).

The watershed is protected by planning and approvals processes through the City of Peterborough and ORCA. Since 1998, ORCA has monitored water quality in the Otonabee watershed under the Watershed 2000 Program and the Provincial Water Quality Monitoring Network.

Peterborough Utilities continued its participation in the Source Water Protection Committee in 2017.

### **Treatment Plant Operations**

The plant is located at 1230 Water Street North, Peterborough, adjacent to the Riverview Park & Zoo. The plant was initially built in 1922 and expanded in 1952, 1965, 1995 and 2016. The conventional treatment process includes coagulation, flocculation, sedimentation, filtration and chlorine disinfection and a process waste treatment facility to dewater the backwash sludge.

Total raw water processed in 2017 was 11,104.80 megalitres (ML), this is an average of 30.42 ML daily (Table 1). The maximum daily pumpage of 40.80 ML, occurred on August 3<sup>rd</sup>, was a 16.75% decrease from the maximum daily value (49.01 ML) recorded on August 23<sup>rd</sup>, 2016.

Table 1

Water Treatment Plant Operations	2016	2017
Total Annual Raw Water	11,566.31	11,104.80
Average Day ML	31.69	30.42
Total Annual Plant Effluent	10,505.93	9,969.46
Average Day ML	28.61	27.30
Max. Daily Pumpage	49.01 – Aug 23	40.80 – Aug 3
Max. Daily City Consumption	51.48 – Aug 23	44.56 – Aug 3
Peak Hourly Consumption Rate	100.92 – July 20 @ 2200h	67.70 – Aug 29 @ 1130h
Total Wash Water	197.33	192.85
Average of Plant Effluent	1.9%	1.9 %
Total Zone #1 Pumpage	5,919.15	5,723.15
Average Day	16.17	15.68
Total Zone #2 Pumpage	4,586.78	4,246.31
Average Day	12.53	11.63

### Reservoirs, Elevated Tanks, Water Booster Pumping Stations

Treated water is stored at various locations throughout the City in underground reservoirs and elevated storage tanks. Storage is used to supplement supply during times of high water demand and in emergency situations such as firefighting. The water

storage capacity in the system is 55.36 ML, including the Water Treatment Plant. Water storage around the city is as follows:

Water Treatment Plant	7.1 ML
High Street Elevated Tank	4.55 ML
Clonsilla Avenue Reservoir	18.18 ML
Towerhill Reservoir	22.73 ML
Sherbrooke Elevated Tank	2.3 ML
Milroy Elevated Tank	0.5 ML

## Water Distribution

The water distribution system consists of approximately 447 kilometres of pipe (water mains), 2,276 hydrants and 27,019 individual water services. Hydrants are colour-coded according to the Ontario Fire Code requirements to indicate the available flow rate at a 20 psi residual pressure.

## Water Main Replacement

Approximately 0.7 km of distribution water mains were replaced on:

- ◆ Marina Blvd

## New Water Main Installation

Approximately 1.8 km of water main was installed on:

- ◆ Old Norwood Road
- ◆ Mason Homes Subdivision

## Water Service Replacement

A total of 79 water services were replaced and 4 water services were replaced in 2017.

## Water Main Rehabilitation

Cleaning and lining of approximately 4.1 km of existing distribution water mains took place on:

- ◆ Albertus Avenue
- ◆ Anne Street
- ◆ Aylmer Street
- ◆ Bensfort Road
- ◆ Charlotte Street
- ◆ Dublin Street
- ◆ Gilmour Street
- ◆ Hastings Avenue
- ◆ Hazeldean Avenue
- ◆ Homewood Avenue
- ◆ Kenneth Avenue
- ◆ King Street
- ◆ Kingsway Court
- ◆ Lake Street
- ◆ Lansdowne Street E
- ◆ Leslie Avenue
- ◆ Lock Street
- ◆ Monaghan Road
- ◆ Murray Street
- ◆ Otonabee Drive
- ◆ Park Street
- ◆ Parkhill Road
- ◆ Riverview Heights
- ◆ Romaine Street
- ◆ Rubidge Street
- ◆ Sherbrooke Street
- ◆ Stewart Street
- ◆ The Kingsway

Structural lining of approximately 0.8 km of existing distribution water mains took place on:

- ◆ Glebmount Crescent
- ◆ Oriole Drive
- ◆ Glendale Drive
- ◆ Hatfield Crescent

## Summary of Inspection & Compliance

### Ministry of Environment and Climate Change Inspection

The MOECC performed an inspection of the Water Treatment Plant in 2016 and their established inspection protocol is between 12-18 months, as such there was no inspection in 2017.

### Adverse Water Quality Incidents

There were seven incidents of adverse drinking water quality in 2017. All incidents were reported to the MOECC and appropriate corrective action was taken. Details and corrective action are described below.

An adverse water quality sample was reported on May 12, 2017 for a water main break on Crawford Drive. Positive pressure was maintained in the main and therefore it was deemed a Category 1 water main break and no additional sampling or disinfection was required.

Four adverse water quality samples were reported for the presence of total coliform in 2017. The locations were Scollard Drive pumping station, Scollard Drive hydrant, McFarlane Street and Bellevue Sampling Station. In all instances, samples were re-submitted for the same location as well as additional samples above and below the original location. All samples reported zero total coliforms.

Two adverse water quality samples were reported for a momentary spike in the fluoride analyzer. The fluoride pump was flushed, re-sampled and trending indicated the fluoride dose was within normal range.

## Flows

### Permit to Take Water

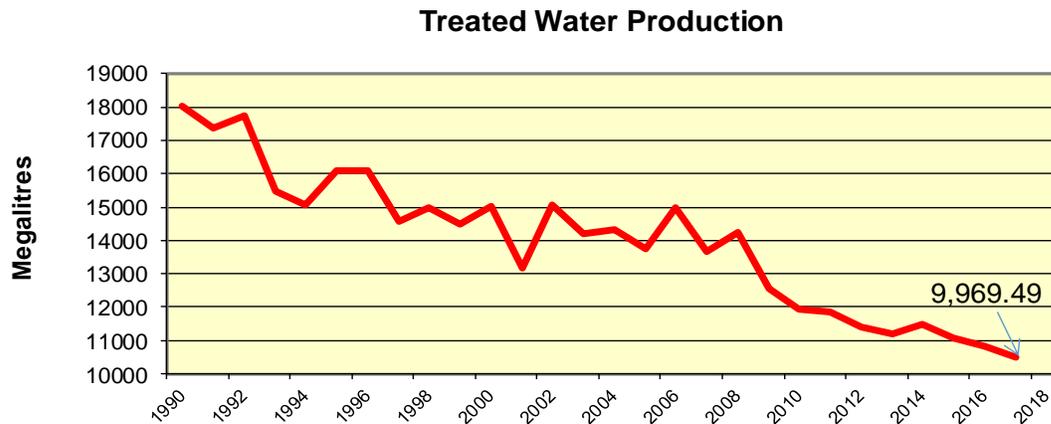
The *Ontario Water Resources Act, Regulation 387/05* authorized Peterborough Utilities Commission in accordance with Permit to Take Water, 5167-9BVR6A the withdrawal of 190.68 ML per day. Under this Regulation we are required to report the daily water taking annually by March 31 each year.

In 2017, there were no instances of water taking in excess of this daily limit. The total volume of water pumped into the water treatment plant was 11,104.78 megalitres (ML), this is an average of 30.42 ML daily.

### Treated Water Production

The Water Treatment Plant produced 9,969.46 megalitres (ML) in 2017, this is an average of 27.30 ML daily (Table 1). Historically the highest water consumption recorded was in 1980 (18,621.20 ML). This year's low water production was last seen in 1955, when the City population was only 41,400.

Figure 1



Peterborough Utilities meters water usage and the majority of water usage in 2017 was by industrial, institutional and large commercial users. There was a certain amount of water used for distribution system maintenance in order to maintain the water quality in the distribution system.

### Water Quality Results

No known health-related water quality guidelines for inorganic (Table 2) and organic (Table 3) parameters were exceeded in 2017 in Peterborough’s drinking water. In order to assure that Peterborough’s water is safe to drink; water quality is carefully monitored and subject to constant surveillance.

In addition to continuous monitoring of turbidity, chlorine, fluoride and pH levels at the Water Treatment Plant, thousands of water samples are taken each year for chemical, physical and microbiological tests. These tests are carried out on water samples before and after treatment as well as on samples collected from different points in the water distribution system.

A total of approximately 20,000 individual tests were performed on Water Treatment Plant and water distribution samples in 2017. Approximately 13,000 individual tests were performed in the Water Treatment Plant Laboratory and approximately 6,000 microbiological and chemical tests were performed by Peterborough Environmental Protection Laboratory and SGS Lakefield Research Limited.

Results of the laboratory testing continue to confirm that the Peterborough Water Treatment Plant produces good quality water and this quality is maintained throughout the water distribution system to the customer’s tap.

O. Reg. 169/03 contains the *Ontario Drinking Water Quality Standards* (ODWQS). The purpose of the Province’s ODWQS is to establish parameter limits to protect public health.

# 2017 Annual Drinking Water Report

An exceedance of any parameter would result in an adverse water quality event with notification to the Medical Officer of Health and the MOECC. Appropriate corrective action would have to be initiated to address the adverse incident.

The zebra mussel population in the river could also be a contributing factor for the cyclical increase and decreases in raw water turbidity. Raw water turbidity has slowly dropped since 2008.

## Chlorine Residual

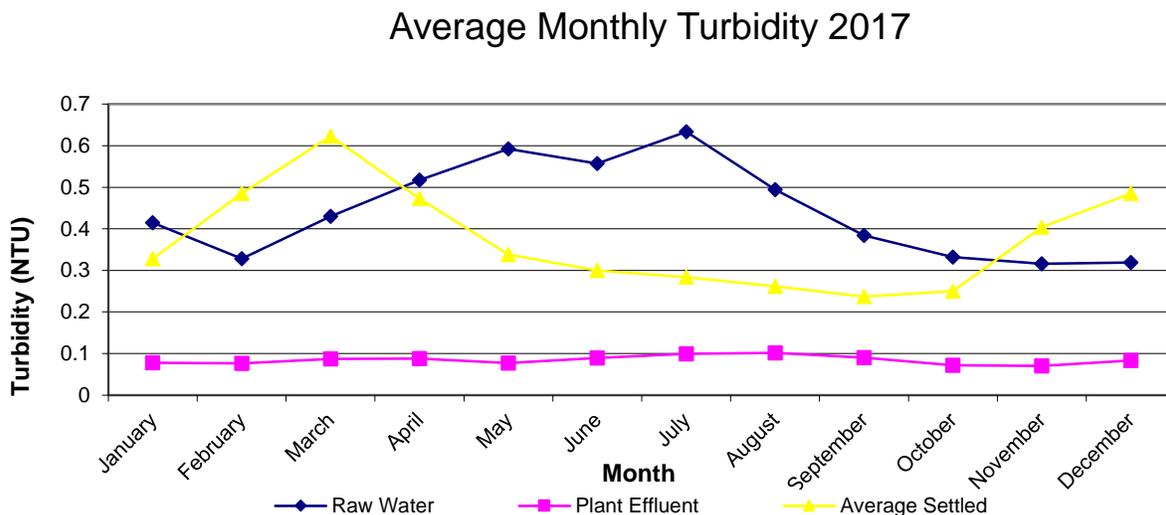
The Peterborough Water Treatment Plant uses chlorine for disinfection against viruses and bacteria in accordance with O Reg. 170/03. Sample results reported under Schedule 7 for plant effluent were 0.63 -2.66 mg/L.

The performance criteria for filtered water is 0.30 NTU for 95% of the time, without exceeding 1.0 NTU. The average filtered water turbidity was 0.05 NTU for 2017 and in 2016 was 0.04 NTU. Filters are taken off-line when the turbidity exceeds 0.15 NTU. The 2017 average treated water turbidity was measured at 0.08 NTU.

## Turbidity

The average raw water turbidity in 2017 was 0.44 NTU; average during 2016 was 0.51 NTU. The monthly raw water turbidity peak occurred in July at 0.63 NTU. A 20-year trend of Otonabee River (raw water) and finished treated water (plant effluent) turbidity is shown in Figure 2. The past 20-year average raw water turbidity was 0.57 NTU.

Figure 2



## Microbiological Standards Testing

### E coli

During 2017, a total of 248, E. coli samples were analyzed from the Otonabee River (at the WTP intake) to assist in determining the source of fecal contamination within our source water. Monthly values ranged from 0 to 120 Colony Forming Units (CFU) per litre. A total of 1478 E. coli samples were analyzed from the plant effluent and distribution system, in 2017 there were no instances where E coli was detected in the potable drinking water.

### Inorganic Parameters

Table 2

Schedule 23		2017 Results	MAC
Antimony	mg/L	0.00004	0.006
Arsenic	mg/L	<0.02	0.025
Barium	mg/L	0.0254	1.0
Boron	mg/L	0.007	5.0
Cadmium	mg/L	0.000005	0.005
Chromium	mg/L	0.00075	0.05
Mercury	mg/L	<0.00001	0.001
Selenium	mg/L	<0.00004	0.01
Uranium	mg/L	0.000009	0.02

## Total Coliform

The MOECC guidelines for clostridium perfringens is to have all samples collected from the plant effluent to be zero CFU (colony forming units) per litre of water sampled. While the MOECC does not require this parameter to be tested, the bacteria is analyzed as an indicator of treatment efficiency for protection from parasitic protozoan giardia and cryptosporidium.

## Organic Parameters

Table 3

Schedule 24		2017 Results	MAC
Alachlor	mg/L	<0.00002	0.005
Atrazine + N-dealkylated metabolites	mg/L	<0.00001	0.005
Azinphos-methyl	mg/L	<0.00005	0.02
Benzene	mg/L	<0.00032	0.005
Benzo(a)pyrene	mg/L	<0.000004	0.00001
Bromoxynil	mg/L	<0.00033	0.005
Carbaryl	mg/L	<0.00005	0.09
Carbofuran	mg/L	<0.00001	0.09
Carbon Tetrachloride	mg/L	<0.00016	0.005
Chlorpyrifos	mg/L	<0.00002	0.09
Diazinon	mg/L	<0.00002	0.02
Dicamba	mg/L	<0.0002	0.12
1,2-Dichlorobenzene	mg/L	<0.00041	0.2
1,4-Dichlorobenzene	mg/L	<0.00036	0.005
1,2-Dichloroethane	mg/L	<0.00035	0.005
1,1-Dichloroethylene (vinylidene chloride)	mg/L	<0.00033	0.014
Dichloromethane	mg/L	<0.00035	0.05
2,4-Dichlorophenol	mg/L	<0.00015	0.9
2,4-Dichlorophenoxy acetic acid (2,4-D)	mg/L	<0.00019	0.1
Diclofop-methyl	mg/L	<0.0004	0.009
Dimethoate	mg/L	<0.00003	0.02
Diquat	mg/L	<0.001	0.07
Diuron	mg/L	<0.00003	0.15
Glyphosate	mg/L	<0.001	1
Malathion	mg/L	<0.00002	0.19
2-Methyl-4-chlorophenoxyacetic acid	mg/L	<0.00012	0.00012
Metolachlor	mg/L	<0.00001	0.05
Metribuzin	mg/L	<0.00002	0.08
Monochlorobenzene	mg/L	<0.0003	0.08
Paraquat	mg/L	<0.001	0.01
Pentachlorophenol	mg/L	<0.00015	0.06
Phorate	mg/L	<0.00001	0.002
Picloram	mg/L	<0.001	0.19
Polychlorinated Biphenyls (PCB)	mg/L	<0.00004	0.003
Prometryne	mg/L	<0.00003	0.001
Simazine	mg/L	<0.00001	0.01
Terbufos	mg/L	<0.00001	0.001

Schedule 24		2017 Results	MAC
Tetrachloroethylene (perchloroethylene)	mg/L	<0.00035	0.03
2,3,4,6-Tetrachlorophenol	mg/L	<0.0002	0.1
Triallate	mg/L	<0.0001	0.23
Trichloroethylene	mg/L	<0.00044	0.005
2,4,6-Trichlorophenol	mg/L	<0.00025	0.005
Trifluralin	mg/L	<0.00002	0.045
Vinyl Chloride	mg/L	<0.00017	0.002

## Trihalomethanes -THM

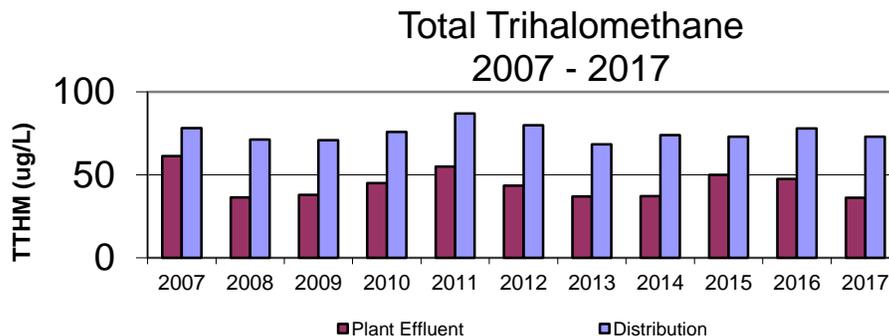
In Ontario, the Ministry of the Environment and Climate Change's MAC for total THM's (total concentration of chloroform, bromoform, bromodichloromethane and dibromochloromethane) are set to 100 µg/L (annual average) for the distribution system. According to O Reg. 170/03, distribution THM samples must be collected and analyzed quarterly.

Trihalomethanes (THM's) are formed as a by-product when chlorine is used to disinfect water for drinking. The presence of organic materials along with the use of chlorine in the water treatment process can contribute to the formation of disinfection by-products. The THM's may have adverse health effects at high concentrations and many governments set limits on the amount permissible in drinking water.

The THM average values found leaving the water treatment plant during 2017 was 39 µg/L. The past 10-year average plant effluent has been 42 µg/L.

Distribution levels are always found to be higher than those leaving the water treatment plant since THM's continue to form as the water travels through the distribution piping system. During 2017, one distribution location was selected to assist in determining areas of the city where THM's may be highest. The annual average 2017 THM value in the distribution system was 78 µg/L (Figure 3). The average THM value during 2016 was 73 µg/L. The 10-year average of distribution THM concentration was found to be 75 µg/L.

Figure 3



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## Haloacetic Acid

HAA's are another group of chemicals that are formed as disinfection by-products similar to trihalomethanes (THM); they are a relatively new disinfection by-product being studied.

The 2017 average treated water HAA was 30.8 µg/L and the average distribution sample was found to be 66.6 µg/L.

## Sodium

Sodium is not part of Schedule 23 or 24 but is required to be tested at least once every five (5) years. It has been sampled every year and was found to be below the ODWS aesthetic objective of 200 mg/L. In 2017, the sodium result was found to be 8.68 mg/L (was 8.80 mg/L in 2016). The local MOH must be notified when the sodium concentration exceeds 20 mg/L so that this information may be passed on to local physicians.

## Lead

Lead sampling is required under O Reg. 170/03, schedule 15.1. Peterborough requires 8 distribution samples to be collected and analyzed for lead, pH and alkalinity plus two non-residential samples every sampling period. Peterborough is required to sample any residential house in the city that requests sampling for the same parameters mentioned above.

## Summary Report

The summary of water delivered as per O Reg. 170/03 Schedule 22 in 2017 is in Table 4.

Table 4

Month	Average Day (ML/d)	Maximum Day (ML/d)	Peak Flows (L/m)
January	25.94	32.50	22,572
February	25.86	27.69	19,226
March	25.43	27.76	19,280
April	25.57	29.14	20,233
May	27.51	31.52	21,888
June	29.17	34.59	24,021
July	29.75	32.93	22,871
August	30.96	40.80	28,334
September	29.40	33.33	23,146
October	26.87	35.75	24,825
November	25.47	28.35	19,688
December	25.70	31.05	21,560
Rated Capacity	----	104.00	----
Approved Flowrate	----	190.68	132,743 L/m

## Taste and Odour

During 2017, the primary source of taste and odour in our raw water was from the naturally occurring compounds Geosmin (name derived from the Greek ‘earth’ and ‘smell’) and 2MIB (2-methylisoborneol). These compounds are monitored as a precursor to taste and odour complaints (earthy/musty) of the water and are not a health concern. They can be detected by humans at very low levels (less than 10ng/L). The bacteria actinomycetes, zebra mussels and some species of algae can produce Geosmin and 2MIB, though all of the contributing organisms are not known. Observations have shown that when we have greater zebra mussel and/or algae populations we experience higher amounts of Geosmin and 2MIB.

Previous annual data indicates that Geosmin and 2MIB would hit peaks at the same time during the summer months. There is usually a large peak near the end of the summer when the water temperature is highest and sunlight hours are high. The concentration peaks for both taste and odour causing compounds occurred approximately August to November.

Geosmin is thought to originate higher in the water column and produce an earthy odour. The average raw water value during 2017 was 6.3 ng/L and the average plant treated water was 8.0 ng/L (Figure 4).

The 2MIB is produced in the sediment or benthic layer and gives off a musty odour. 2MIB can reproduce well when sunlight can penetrate down to the bottom of lakes and streams. The average raw water value during 2017 was 4.0 ng/L and the average plant effluent was 4.5 ng/L (Figure 5).

The reduction of geosmin and 2MIB due to water treatment processes (coagulation, sedimentation, filtration and chlorination) was negligible. Both geosmin and 2MIB compounds resist oxidation (disinfection) and are difficult to remove by conventional water treatment processes.

Figure 4

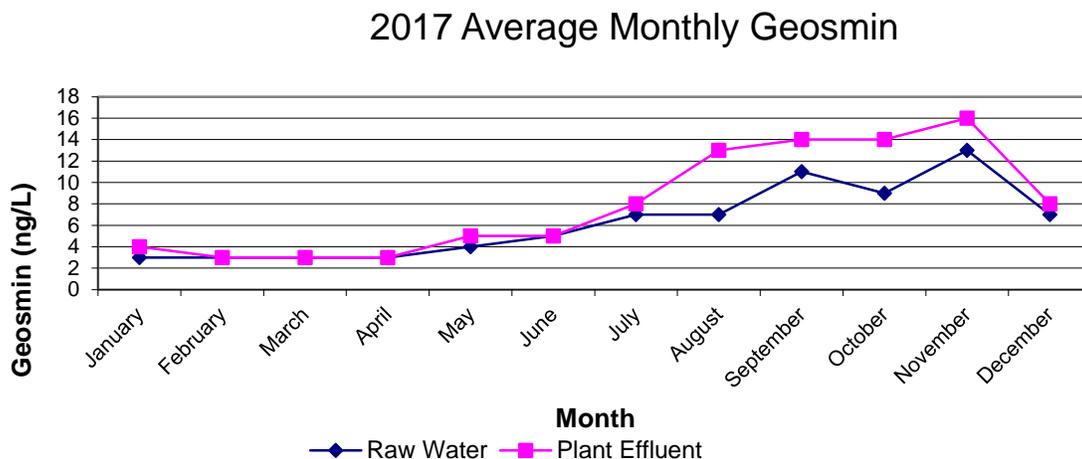
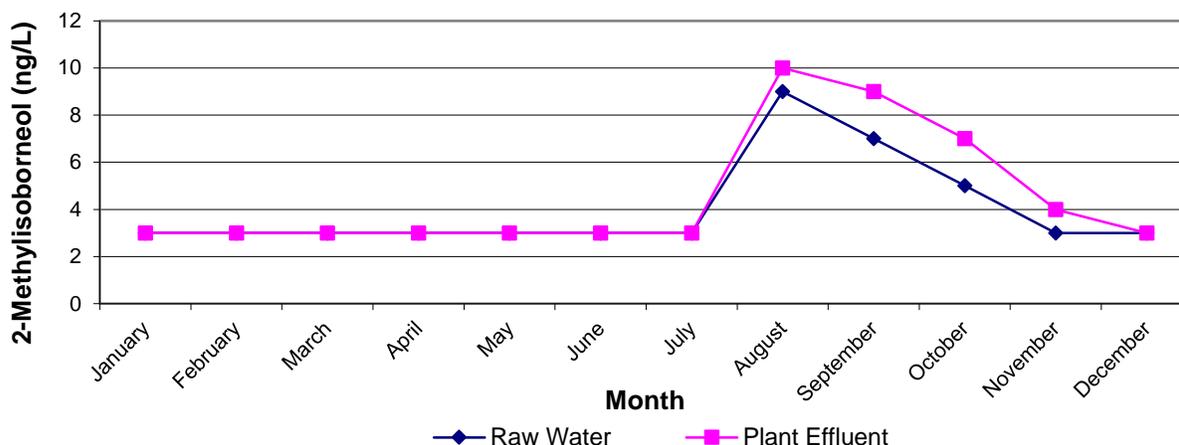


Figure 5

## 2017 Average Monthly 2-Methylisoborneol (2-MIB)



## Chemical Consumption

Table 5

Chemical Use	2016	2017
Total Chlorine	36,335 kg	36,337 kg
Average Dosage	1.2 mg/L	1.27 mg/L
Total Aluminum Sulphate	597,243 L	801,989 L
Average Dosage	38.1 mg/L	47.3 mg/L
Total Hydrofluosilicic Acid	16,931 L	12,547 L
Average Dosage	0.50 mg/L	0.43 mg/L
Total BW46M Sodium Silicate	86,308 L	124,451 L
Average Dosage	6.24 mg/L	7.05 mg/L

## Chlorine

The average dose of chlorine for 2017 was 1.27 mg/L (Table 5). This value fluctuates throughout the year as higher doses of primary chlorine are required during the summer months because it takes more chlorine to disinfect the water when the water is warmer.

Chlorine is also added into the treated water before it leaves the WTP. This secondary chlorine is added to help maintain the chlorine residual throughout the distribution system to comply with the Ontario Drinking Water Standards (ODWS).

Zebra mussel control for the water treatment plant included adding approximately 0.5 mg/L of chlorine into the water treatment plant intakes from May to October. The addition of zebra mussel chlorine is dosed only during the months when there are warmer water temperatures (usually when water temperature is above 12°C). This is when the zebra mussels will colonize on surfaces such as the intake pipe walls.

### Hydrofluorosilicic Acid (Fluoride)

Hydrofluorosilicic acid (fluoride) was added to the treated water to attain a combined concentration (target value) of 0.65 mg/L. Fluoride is added to the water depending on the total concentration required in the treated water and also the concentration of the raw water. The average dosage of fluoride added to the water in 2017 was approximately 0.43 mg/L (Table 5). The average treated water fluoride residual was 0.58 mg/L. The average fluoride concentration found in the raw water (natural fluoride) during 2017 was 0.12 mg/L.

### Sodium Silicate

Sodium silicate (BW46) is normally added to the plant effluent for corrosion control within the distribution system as well as plant effluent pH adjustment. The use of chlorine and aluminium sulphate (alum) during the water treatment process lowers the pH level causing the water to be slightly acidic (corrosive). The addition of BW46 increases the pH to a more acceptable value of 7.1. The addition of BW46 contributes to the total silica level found in the water. The level of silica in the distribution system is monitored monthly. Silica levels throughout the distribution system generally ranged

between 1.0 mg/L and 13.0 mg/L with an annual average of 7.1 mg/L (Table 5).

### Aluminium Sulphate (Alum)

Aluminium Sulphate (Alum) is used as our primary coagulant causing particles (silt, sand, algae, and bacteria) to coagulate or 'clump' to form a floc, which can settle in the sedimentation basins. The water is further treated by filtration. Alum was added to the water during 2017 at an average rate of 47.3 mg/L. The average alum dosage during 2016 was 40.5 mg/L. Aluminium residual found in the WTP treated water can be a by-product of the addition of alum. The average treated water Aluminium residual for 2017 was 0.024 mg/L the Operational Guideline for Aluminium is 0.1 mg/L (Table 5).

### Drinking Water Quality Management System

On October 30, 2006, the finalized standard was issued on the Environmental Bill of Rights Registry. The purpose of this Standard is to assist owners and operating authorities in the effective management and operation of their municipal residential drinking water systems. This Standard outlines requirements for a Quality Management System (QMS) to ensure high quality drinking water. In the development of a QMS, the Operating Authority must create an Operational Plan; this document will define the QMS and will be subject to external audits for accreditation. Staff developed and implemented a QMS specific to the Peterborough municipal water system, which received full scope accreditation in June 2011.

The Peterborough Drinking Water System maintained accreditation to the Drinking Water Quality Management Standard (DWQMS). In advance of the on-site verification audit an internal audit was conducted in July 2017. The internal audit found five opportunities for improvement and three corrective action that all were corrected before the external audit. The external audit, conducted in November 2017 described that the management system was well documented and continues to be effective.

## **Maintenance Summary**

### **Water Treatment Plant**

Annual maintenance was conducted at the Water Treatment Plant, Water Street Pumphouse, reservoirs, elevated tanks and booster pumping stations. Two of the pad mount transformers that feed primary power to the Water Treatment Plant via Utility #1 and Utility #2 failed and required replacing.

### **Water Distribution**

Annual water distribution review and maintenance programs are necessary to ensure the safe delivery of drinking water in Peterborough. These programs include:

- ◆ Valve maintenance
- ◆ Hydrant maintenance
- ◆ Dead end flushing
- ◆ Service post repair

## **Capital Works Summary**

### **Water Treatment Plant Capital Upgrades**

The major capital project of replacing Greenhill Underground Pumping Station with Greencrest above ground Pumping Station was completed and the station

was fully commissioned by the end of October.

## **Impact of Climate Event**

The temperature during June, July and August averaged approximately 17.8°C. 18.3°C is considered to be an average normal summertime temperature according to published values from Environment Canada (normal data 1981 – 2010). In 2017, there was only 1 day where temperatures were higher than 30°C. Rainfall totals for the three summer months of June, July and August was 226.8 mm. Overall it was a wet cool summer.

## **Pilot Plant**

The Peterborough Water Treatment Plant (WTP) has partnered with the University of Toronto's Drinking Water Research Group (DWRG) to perform pilot-scale studies in an effort to optimize production, improve water quality, and investigate next-generation treatment technologies.

A 5000:1 scale-model version of the main treatment facility, the pilot plant includes processes such as coagulation, tapered mixing, flocculation, settling and filtration (Figure 6). In addition to conventional water treatment studies, ozone and advanced oxidation applications have been investigated (Figure 7). The ozone pilot plant was designed to incorporate one or two separate treatment trains, utilizing both ozone and the addition of hydrogen peroxide (advanced oxidation). The primary objectives were to determine if ozone, advanced oxidation, and biofiltration will enhance our water quality and provide operational flexibility as an integral component of our multi-barrier approach to water treatment.



Pilot studies also focused on enhanced coagulation through pH adjustment and distribution corrosion control optimization. Enhanced coagulation and corrosion control studies were conducted to investigate water treatment techniques that will improve water quality using our existing infrastructure. Our primary objectives were to focus on the reduction of disinfection by-product (DBP) formation and mitigating corrosion impacts on lead release in premise plumbing.



## Ozone and Advanced Oxidation

The application of ozone prior to biofiltration was shown to be effective for the removal of DBP precursors and taste-and-odour compounds, geosmin (GSM) and 2-methylisoborneol (2-MIB). Ozone efficiency was shown to be improved with the addition of hydrogen peroxide. When ozone preceded biologically active carbon (BAC) filters, GSM removals of 80% were achieved. Ozone and advanced oxidation were also effective in reducing DBP precursors, resulting in a 37% reduction in trihalomethanes (THMs) and 10% reduction in haloacetic acids (HAAs). Moving forward in 2018, ozone and advanced oxidation will also be used to evaluate the treatment efficiency on emerging contaminants, including pharmaceuticals, endocrine disrupting compounds (EDCs), and cyanotoxins released by blue-green algae. The ozone pilot plant will play a key role in evaluating long-term treatment alternatives for the City of Peterborough's Otonabee River.

## Enhanced Coagulation

The pilot scale study used sulphuric acid to adjust the pH in an effort to optimize our coagulation process. The study monitored the potential of enhanced coagulation to reduce organic carbon and DBP formation, in addition to assessing the impact on taste-and-odour compounds and chlorine demand. Water quality studies were conducted throughout the spring, summer, and fall to determine the effectiveness under a variety of seasonal conditions. Sulphuric acid pre-treatment was shown to reduce our coagulant dose by upwards of 50% and improve water quality. Organic carbon was reduced 10% and THMs were shown to decrease by 25%. Chlorine demand was also reduced using enhanced coagulation and filter

performance was improved through the reduction in turbidity and particle counts. However, enhanced coagulation was not shown to reduce HAA formation or taste-and-odour compounds, geosmin and 2-MIB. The ability to improve water quality, under a variety of seasonal conditions, without the requirement for extensive infrastructure investment will provide operational flexibility for the Peterborough water treatment facility.

### Corrosion Control

Pipe-loop systems were designed, installed, and monitored in the distribution system in order to simulate worst-case

premise plumbing conditions. The pipe loops were constructed of lead pipe and copper soldered with 70:30 lead-to-tin solder. The study was performed to monitor our distribution water quality and the impact of corrosion. The Langelier's Saturation Index (LSI), chloride-to-sulphate mass ratio (CSMR), and lead release were monitored to assess the corrosiveness of the water and potential for galvanic corrosion. Current studies are examining alternative chemicals to increase pH and alkalinity to mitigate potential lead release in premise plumbing in an effort to reduce corrosion and enhance public health.

### Customer Service

#### Water Rates

Table 6

	<b>Meter Basic Charge</b>	2016	2017
	15mm (5/8") Meter	\$19.72	\$20.25
	20mm (1/2") Meter	\$19.72	\$20.25
	25mm (1") Meter	\$36.33	\$37.31
	40mm (1 1/2") Meter	\$62.28	\$63.96
	50mm (2") Meter	\$88.23	\$90.61
	75mm (3") Meter	\$157.78	\$162.04
	100mm (4") Meter	\$319.03	\$327.64
	150mm (6") Meter	\$553.62	\$568.57
	200mm (8") Meter	\$788.19	\$809.47
	250mm (10") Meter	\$1,100.86	\$1,130.58
	300 mm (12") Meter	\$1,563.19	\$1,605.40
	<b>Consumption Charge</b>		
	0-20 cubic metres	\$1.2871	\$1.3217
	21-100 cubic metres	\$1.3494	\$1.3858
	101-4,999 cubic metres	\$0.7040	\$0.7230
	5,000+ cubic metres	\$0.4854	\$0.4985
	<b>Flat Rate Service</b>		
	Basic Charge	\$11.8149	\$12.13
	Rooms	\$2.5392	\$2.61

# 2017 Annual Drinking Water Report

	Lot Area (charge subject to 1500 m <sup>2</sup> maximum)	\$2.3471/100 m <sup>2</sup>	\$2.41/100 m <sup>2</sup>
	Swimming Pool	\$0.2351/ m <sup>3</sup>	\$0.24/ m <sup>3</sup>
	<b>Snowbirds</b> A \$62 fee will apply for customers who request to have their service disconnected during the winter months; a \$62 fee will also apply for reconnection of the service. The applicable Basic Charges still apply during the months when the service is off.		
	<b>Seasonal Water Meters</b> Services that are removed for the winter and re-installed in the spring will incur a \$151 fee for both the installation and removal of the meter.		
	<b>Flat Rate Surcharge</b> Customers who have not allowed the installation of a water meter are subject to a 65% surcharge on each billed component.		
	<b>Turn-on/Turn-off Service</b> There is no charge for this service during normal business hours unless it is on a repeat basis. Repeat requests during normal working hours are subject to a \$62 fee and a \$151 minimum fee plus actual costs for after hour requests.		

Table 7

	Number of Customer Accounts	2017	
		Metered	Flat Rate
	Residential	22,921	129
	Industrial, Institutional, Commercial & Multi- Residential	5,361	79
	Woodland Acres	1	0
		<u>28,283</u>	<u>208</u>
	Total	<u>28,491</u>	

## Tours

Tours have been an important part of public education at the Peterborough Water Treatment Plant. Over 305 people had a tour of the Water Treatment Plant process during 2017 (over 2,528 people in the last 10 years).

## Customer Calls

Customer concerns relating to water are tracked by WTP staff and logged using computer software. Some questions and concerns that were asked from our WTP staff were related to taste and odour, colour, hardness, general water quality,

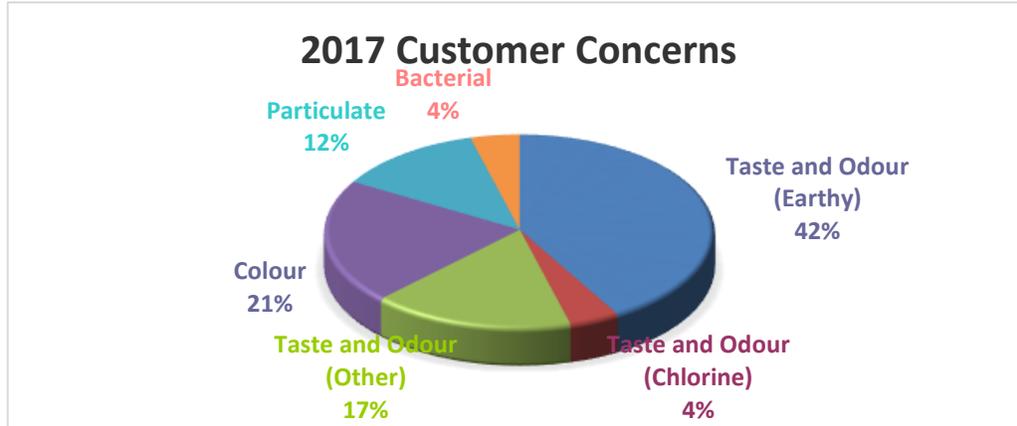
information on water treatment, sampling, operations, and questions to assist with school projects on water treatment.

In 2017, the staff responded to a total of 24 inquiries, this was a decrease of 22% from 2016. The 24 inquiries were related to the following concerns; 21% of customer concern calls were relating to colour (usually rusty coloured water), 12% were relating to particulate matter, a total of 63% relating to taste & odour, and 4% relating to bacteriological concerns (Figure 8). In every inquiry regarding bacteriological issues, the water was tested for bacteria and none was found.

A further breakdown of the 15 taste and odour complaints revealed the following; 10 concerns were for an earthy musty odour, 1 concern was for a chlorine taste

and odour, and 4 concerns were for various other taste and odours, from metallic to medicinal.

Figure 6



# 2017 Annual Drinking Water Report

## Riverview Park & Zoo

In 2017 Riverview Park and Zoo was open and operating during regular hours (8:30 AM – dusk) from January 1<sup>st</sup> to December 31<sup>st</sup>. Attendance was somewhat hit and miss and thought to be lower than normal due to the rainy start to the summer with total annual attendance estimated at more than 231,000 visitors.



Ongoing improvements to the facilities and equipment continued in 2017 and included upgrades to several animal exhibits, accessibility upgrades, a new post mortem facility and continuation of the rehabilitation of the miniature train rail bed.

The zoo's animal collection saw many changes in 2017 with the deaths of some of our older animals as well as new acquisitions. Deaths included several birds of different species. New animals included a young Bactrian camel and two Goeldi's monkeys. Births/hatchings included a wallaby.

## Park Operation & Facilities

The miniature train ride opened for Victoria Day weekend. The ride ran daily (weather permitting) from May 21<sup>st</sup> until

September 5<sup>th</sup>. Ridership was up for the year with an estimated 66,000 train riders in 2017.



The Kiwanis Club of Peterborough operated the Snack bar again in 2017 daily from May through September 4<sup>th</sup> and on weekends in the fall until Thanksgiving Day. Snack bar profits remained high for the third year in a row. Proceeds from the snack bar were shared between the Park and Zoo and the Kiwanis Club of Peterborough. The Kiwanis Club's accountant also identified HST overpayments over several years and successfully obtained a significant reimbursement, of which 50% was included in our portion of the 2017 revenue.

## Zoo Operations & Facilities

Regular and emergency veterinary care was provided by consulting veterinarian Dr. John Sallaway throughout 2017. Park and Zoo animal care staff worked with Dr. Sallaway throughout the year to provide planned animal health care to the animals in our collection. Animals were examined and/or treated as part of their health care program. This included physical exams, surgery, numerous vaccinations/treatments, blood samples, the trimming of many hooves/claws/beaks/tusks, dentistry and dental cleaning.

One of our female reindeer was treated was removed from the exhibit and treated for a serious trauma to her eye (likely due to interaction with another reindeer).

In 2017 there were 5 births and 14 deaths of animals during the year (Table 9). Post mortems were performed on those animals that had died, in an attempt to determine cause of death. There were no deaths attributed to communicable disease. 12 new animals were acquired during the year.



As of December 31, 2017, the animal collection on site consisted of 133 animals, representing a total of 61 species (including fish and invertebrates). The collection had 30 animals in on loan and 8 animals out on loan.



## Capital Program

The 2017 capital program included the second phase of a three-year rehabilitation of the miniature train rail bed, paving of the north parking lot driveway, and a long term accessibility plan for the playground.

Staff also completed a renovation of the former south storage building to provide a new necropsy room. Other capital items included an ultrasound machine for the animal health centre, new emergency lighting in zoo buildings and load beams and hoists for the upper level of the barn.

# 2017 Annual Drinking Water Report

There was also a significant amount of unplanned electrical work associated with an Electrical Safety Authority facility inspection that identified numerous deficiencies in the Park and Zoo's electrical systems.

A total of \$244,687 revenue was provided to the Park and Zoo through operational sources and fundraising in 2017 and an additional \$ 22,907 in donations (Table 8).

## Revenue Contributions

Table 8

	2016	2017
Train Ticket Sales	\$131,647	\$131,999
Donation Boxes/ Fountain	\$9,412	\$7,422
Snack Bar Revenue	\$12,000	\$21,000
Other Donations<\$25,000	\$21,671	\$15,485
Animal Adoption Program	\$10,345	\$9,098
RPZ 5 km Fun Run	\$3,500	\$12,465
Education Programs	\$5,733	\$7,654
Facility Rentals	\$3,656	\$2,843
Guest Services Kiosk	\$48,706	\$59,128
<b>TOTAL DONATIONS &amp; REVENUE</b>	<b>\$246,670</b>	<b>\$267,594</b>

## Zoo Animal Collection

Table 9

	January 1, 2017	Birth/ Hatchings	Deaths	Acquisitions	Disposition	December 31, 2017
# ANIMALS OWNED ON SITE	106	4	11	10	12	95
# ANIMALS IN ON LOAN	34	1	3	2	3	30
# ANIMALS OUT ON LOAN	5	0	0	0	0	8

developed in partnership with the Ontario Turtle Conservation Centre.

## Conservation & Education

The 2017 education program continued to grow and benefited from strong support from our volunteers and our partnership with the School of Education at Trent University. Last year's program included Educators with roving "touch-tables", public speaking engagements, "behind-the-scenes" tours, the parent & tot "Zoo Crew" program, formal guided tours, our "Zoo Academy" and "Zoo Trek" half-day curriculum-based day sessions as well as the new Turtle Trek joint-facility program



The Park and Zoo also collaborated with Otonabee Conservation to deliver the renowned Bondar Challenge education program at Riverview and the Warsaw Caves Conservation Area. Developed by The Roberta Bondar Foundation, the Bondar Challenge is a unique experiential program that helps children make a connection to nature through the art of photography.

Other programming included the “Meet the Keeper” sessions, custom sessions for visiting groups, and our seasonal conservation exhibit. This year, the “Community of Conservation” exhibit featured contributions from several local conservation organizations including Camp Kawartha, Peterborough Green Up, Otonabee Conservation, the Ontario Turtle Conservation Centre, Peterborough Distribution Inc., etc. and included a series of conservation events/activities.

Last year the Park and Zoo’s conservation program included cooperative projects with the Otonabee Region Conservation Authority as well as supporting the Ontario Turtle Conservation Centre’s conservation work by donating heat lamp bulbs and turtle feed (smelt). The Park and Zoo also participated in the Association of Zoos and Aquariums (AZA) Stud Book for red-necked wallaby, Sichuan takin and bobcat.

The Riverview Park & Zoo also participated in the African red-billed hornbill, Goeldi’s monkey, meerkat and squirrel monkey AZA Species Survival Plans, the Emu and Brazilian agouti Population Management Plans.

## Research

In 2017 the Park and Zoo participated in the Ontario Turtle Conservation Centre’s Blanding’s Turtle research project as well as hosting research projects by university biology and conservation biology students.



## Riverview Park & Zoo:

- 16<sup>th</sup> annual Peterborough Children's Water Festival,
- Eight musical groups performed in the 2017 summer season at the Gazebo,
- The Annual Father's Day Car Show,
- The 8<sup>th</sup> annual 5 km Fun Run with the Animals, raising \$8,500 for the Zoo.

## Staff & Volunteers

As of December 2017, permanent staff



included 1 Manager and Curator, 1 Supervisor, 1 Groundskeeper, 1 Animal Care Tech., 3 Zookeepers and 1 Park & Zoo Maintenance.

From May to August a total of 18 seasonal student employees assisted with Park and Zoo operations. Student employee positions included 3 zookeepers, 1 zoo maintenance worker, 2 public educators, 2 Guest Services representatives, 2 park maintenance workers, 4 horticulture/groundskeeping workers and 4 train operators.

A total of 5 student employees worked part-time hours starting in September. The students operated Guest Services on weekends until Thanksgiving, assisted with workload in the park until the end of October, and assisted zoo staff on weekends for the remainder of the calendar year.

The Park and Zoo hosted twelve college/university student placements over the year as well as two high school co-op placement students.

In 2017 the Volunteer Program continued to have strong support with a total of 31 volunteers assisting with our education program, and the operation of our seasonal conservation exhibit.

## Appendix A – Financial Statement

**PETERBOROUGH UTILITIES COMMISSION  
FINANCIAL STATEMENTS  
AT DECEMBER 31, 2017**

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## INDEPENDENT AUDITOR'S REPORT

### TO THE CHAIR AND MEMBERS OF THE PETERBOROUGH UTILITIES COMMISSION

#### Report on the Financial Statements

We have audited the accompanying financial statements of the Peterborough Utilities Commission, which comprise the statement of financial position as at December 31, 2017 and the statements of operations and accumulated surplus, cash flows and changes in net financial assets for the year then ended and a summary of significant accounting policies and other explanatory information.

#### Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian Public Sector Accounting, and for such internal controls as management determines are necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

#### Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal controls relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion of the effectiveness of the entity's internal controls. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

#### Opinion

In our opinion, these financial statements present fairly, in all material respects, the financial position of the Peterborough Utilities Commission as at December 31, 2017, and the results of its operations and cash flows for the year then ended in accordance with Canadian Public Sector Accounting Standards.

*Collins Barrow Kawarthas LLP*

Chartered Professional Accountants  
Licensed Public Accountants

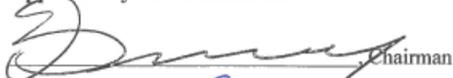
Peterborough, Ontario  
April 26, 2018

**PETERBOROUGH UTILITIES COMMISSION**

**STATEMENT OF FINANCIAL POSITION  
At December 31, 2017**

	2017 \$	2016 \$
<b>FINANCIAL ASSETS</b>		
Cash (Note 3)	14,320,856	14,932,363
Accounts receivable		
Customer accounts	887,151	918,651
Sewer surcharge	831,962	872,652
Sundry	337,743	263,843
Unbilled water revenue on customer accounts	1,397,000	1,325,000
Unbilled sewer surcharge	1,306,000	1,242,000
	19,080,712	19,554,509
<b>LIABILITIES</b>		
Accounts payable and accrued charges	2,064,784	2,314,064
Sewer surcharge payable	2,726,964	2,682,858
Long term debt (Note 4)	12,344,783	13,695,344
Customer deposits	607,610	607,393
	17,744,141	19,299,659
<b>NET FINANCIAL ASSETS</b>	<b>1,336,571</b>	<b>254,850</b>
<b>NON-FINANCIAL ASSETS</b>		
Inventories	223,257	181,248
Tangible capital assets (Note 5)	119,624,934	119,485,060
Prepaid expenses	89,859	-
	119,938,050	119,666,308
<b>ACCUMULATED SURPLUS (Note 6)</b>	<b>121,274,621</b>	<b>119,921,158</b>

Approved By The Commission

 Chairman  
 Member

The accompanying notes are an integral part of this financial statement.

**PETERBOROUGH UTILITIES COMMISSION**

**STATEMENT OF OPERATIONS AND ACCUMULATED SURPLUS**  
For The Year Ended December 31, 2017

	Budget 2017 \$ (Unaudited)	Actual 2017 \$	Actual 2016 \$
<b>REVENUES</b>			
Sale of water	16,940,000	16,718,003	16,819,526
Contributed capital installation charges	518,000	146,608	218,103
Development charges earned	192,000	91,449	262,908
Fire protection	650,000	650,000	650,000
Sewer surcharge billings	398,000	398,000	390,000
Riverview Park and Zoo (Schedule 2)	195,000	244,687	212,087
Interest	131,000	164,482	120,761
Other	210,000	286,488	220,891
Electricity	462,000	439,931	338,319
Donations	25,000	22,907	49,623
	19,721,000	19,162,555	19,282,218
<b>EXPENSES</b>			
Water treatment and storage	4,293,000	3,773,936	4,122,414
Water distribution	2,186,000	2,408,678	2,217,243
Riverview Park and Zoo (Schedule 2)	1,478,000	1,683,503	1,507,210
Administration	3,556,000	3,480,365	3,602,905
Amortization	6,245,000	6,047,497	5,966,644
Interest	522,000	415,113	321,449
	18,280,000	17,809,092	17,737,865
<b>ANNUAL SURPLUS</b>	1,441,000	1,353,463	1,544,353
<b>OPENING ACCUMULATED SURPLUS</b>	119,971,000	119,921,158	118,376,805
<b>CLOSING ACCUMULATED SURPLUS</b>	<b>121,412,000</b>	<b>121,274,621</b>	<b>119,921,158</b>

The accompanying notes are an integral part of this financial statement.

**PETERBOROUGH UTILITIES COMMISSION**

**STATEMENT OF CASH FLOWS**  
**For The Year Ended December 31, 2017**

	2017 \$	2016 \$
<b>CASH PROVIDED BY (USED IN):</b>		
<b>OPERATIONS</b>		
Annual surplus	1,353,463	1,544,353
Add: Non-cash charges to operations		
Amortization	6,047,497	5,966,644
Contributed capital installation charges	(146,608)	(218,103)
	7,254,352	7,292,894
Change in non-cash working capital items (Note 8)	(474,535)	(353,204)
	6,779,817	6,939,690
<b>INVESTING ACTIVITY</b>		
Purchase of tangible capital assets	(6,040,763)	(8,941,167)
<b>FINANCING ACTIVITIES</b>		
Repayment of long term debt	(1,350,561)	(1,038,431)
Acquisition of long term debt	-	6,000,000
	(1,350,561)	4,961,569
<b>NET CHANGE IN CASH DURING THE YEAR</b>	<b>(611,507)</b>	<b>2,960,092</b>
<b>CASH POSITION - BEGINNING OF YEAR</b>	<b>14,932,363</b>	<b>11,972,271</b>
<b>CASH POSITION - END OF YEAR</b>	<b>14,320,856</b>	<b>14,932,363</b>

The accompanying notes are an integral part of this financial statement.

PETERBOROUGH UTILITIES COMMISSION

STATEMENT OF CHANGES IN NET FINANCIAL ASSETS  
For The Year Ended December 31, 2017

	Budget 2017 \$ (Unaudited)	Actual 2017 \$	Actual 2016 \$
<b>Annual Surplus</b>	1,441,000	1,353,463	1,544,353
Acquisition Of Tangible Capital Assets	(8,271,000)	(6,187,371)	(9,159,270)
Amortization Of Tangible Capital Assets	6,245,000	6,047,497	5,966,644
Decrease (Increase) in Inventories	11,000	(42,009)	(5,919)
Decrease (Increase) in Prepaid Expenses	(10,000)	(89,859)	6,530
<b>Change In Net Financial Assets</b>	(584,000)	1,081,721	(1,647,662)
<b>Net Financial Assets, beginning of year</b>	(716,000)	254,850	1,902,512
<b>Net Financial Assets, end of year</b>	<b>(1,300,000)</b>	<b>1,336,571</b>	<b>254,850</b>

The accompanying notes are an integral part of this financial statement.

## PETERBOROUGH UTILITIES COMMISSION

### NOTES TO THE FINANCIAL STATEMENTS For The Year Ended December 31, 2017

#### 1. NATURE OF ORGANIZATION

Operating under the authority of the Municipal Act, the Peterborough Utilities Commission (the "Commission") provides water services to the residents of the City of Peterborough along with operational governance and funding for the Riverview Park and Zoo.

#### 2. SIGNIFICANT ACCOUNTING POLICIES

The financial statements of the Peterborough Utilities Commission have been prepared in accordance with Canadian generally accepted accounting principles for local governments and their local boards as recommended by the Public Sector Accounting Board of the Chartered Professional Accountants Canada.

Significant aspects of the accounting policies adopted by the Commission are as follows:

##### (a) Recognition of Revenue and Expenses

Revenue is recorded using the accrual basis of accounting, as water is used by customers. Unbilled revenue is calculated as the estimated consumption between the last meter reading date and the year end date.

The value of distribution systems installed by developers is recorded in revenue as capital installation charges in the year in which the Commission assumes ownership.

Development charges are recognized as revenue when they are transferred out of the reserve fund and spent on growth related projects.

Revenue from fire protection, sewer charges and electricity is recognized when the service is provided.

Expenses are recognized in the period the goods or services are acquired and a legal liability is incurred by transfers are due.

##### (b) Use of Estimates

The preparation of financial statements in conformity with Canadian generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities as well as the disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenditures during the year. Significant estimates and assumptions used in the preparation of financial statements include, but are not limited to: estimates of revenue, allowance for doubtful accounts, and amortization rates and carrying values of property, plant and equipment. Actual results could differ from these estimates.

##### (c) Inventories

Inventories consist of maintenance supplies and construction materials and are valued at the lower of moving average cost and replacement cost.

##### (d) Tangible Capital Assets

Tangible capital assets are stated at cost or deemed cost. Amortization on the water treatment plant and reservoirs, distribution system and Riverview Park and Zoo (purchased from operating and donated funds) is recorded on a declining balance basis at a rate of 5% per annum. Water meters are amortized on a straight line basis over 20 years. The Commission capitalizes assets with a value of \$5,000 or greater.

Tangible capital assets categorized as construction-in-progress are not amortized until they are put into service.

## PETERBOROUGH UTILITIES COMMISSION

### NOTES TO THE FINANCIAL STATEMENTS For The Year Ended December 31, 2017

#### 2. SIGNIFICANT ACCOUNTING POLICIES - (Continued)

##### (e) Reserve Funds

Certain amounts as approved by the Commission and those required under legislative or other authority are set aside in reserve funds for future operating or capital purposes. Transfers to and/or from reserve funds are an adjustment to the respective fund when approved or required by agreement.

The following reserve funds are included in the accumulated surplus:

##### (i) Water Treatment Plant Reserve Fund

In December 1990, the City of Peterborough passed a by-law authorizing the Peterborough Utilities Commission to establish a reserve fund for the purpose of upgrading the water treatment plant. The established practice is to appropriate 4.2% of the water revenues to this fund each year. Utilization of these funds is authorized by the Commission.

##### (ii) Development Charges Act Reserve Fund

The Peterborough Utilities Commission is authorized under the City of Peterborough by-law to establish a reserve fund for development charges. The purpose of the fund is to cover growth related net capital costs incurred by the Water Utility for water treatment, storage and distribution systems.

##### (iii) Park And Zoo Major Projects Reserve Fund

In September 1993, the City of Peterborough passed a by-law authorizing the Peterborough Utilities Commission to establish a reserve fund for major projects at the Riverview Park and Zoo. The revenues received for this fund include donations from estates and the general public, the utility's share of profits from the refreshment booth operations and profits from the sale of birds and animals. Utilization of these funds is authorized by the Commission on a project by project basis based upon the recommendation of the Riverview Park and Zoo Advisory Committee.

##### (iv) Park and Zoo Animal Care Reserve Fund

In July 1999, the City of Peterborough passed a by-law authorizing the Peterborough Utilities Commission to establish a reserve fund for animal care at the Riverview Park and Zoo. The fund was established through a capital donation from a Peterborough resident. The income generated annually will be used for the care, treatment, habitat or display of the animals at the Riverview Park and Zoo for special or exceptional purposes beyond standard care.

##### (v) Park and Zoo State of Good Repair Reserve Fund

November 2016, the Commission authorized the establishment of an internally restricted Riverview Park and Zoo state of good repair reserve fund. The purpose of the fund is to cover major repair and maintenance costs incurred by the Riverview Park and Zoo that would be required to maintain the quality of its tangible capital assets.

##### (f) Non-Financial Assets

Tangible capital and other non-financial assets are accounted for as assets by the Commission because they can be used to provide services in future periods. These assets do not normally provide resources to discharge the liabilities of the Commission unless they are sold.

**PETERBOROUGH UTILITIES COMMISSION**

**NOTES TO THE FINANCIAL STATEMENTS  
For The Year Ended December 31, 2017**

**3. CASH**

	2017 \$	2016 \$
Unrestricted cash	6,747,776	8,194,455
Restricted cash	7,573,080	6,737,908
	14,320,856	14,932,363

**4. LONG TERM DEBT**

Long term debt is issued on behalf of the Commission by The Corporation of the City of Peterborough and consists of the following:

Date of Maturity/Payment Terms	Interest Rate %	2017 \$	2016 \$
March 5, 2020, annual principal payments of \$660,000, interest paid semi-annually	3.893	1,980,000	2,640,000
July 5, 2027, semi-annual blended payments of \$274,120	3.180	4,664,783	5,055,344
November 6, 2036, semi-annual principal payments of \$150,000 plus interest	2.790	5,700,000	6,000,000
		12,344,783	13,695,344

Future repayments for the long term debt are as follows:

	Principal \$	Interest \$	Total \$
2018	1,363,080	375,836	1,738,916
2019	1,376,000	326,001	1,702,001
2020	1,389,334	274,740	1,664,074
2021	743,095	236,956	980,051
2022	757,297	214,384	971,681
Thereafter	6,715,977	1,075,183	7,791,160
	12,344,783	2,503,100	14,847,883

**PETERBOROUGH UTILITIES COMMISSION**

**NOTES TO THE FINANCIAL STATEMENTS  
For The Year Ended December 31, 2017**

**5. TANGIBLE CAPITAL ASSETS**

	Water Treatment Plant and Reservoirs \$	Water Distribution System \$	Riverview Park and Zoo \$	Other \$	Construction In Progress \$	Total \$
<b>Cost Or Deemed Cost</b>						
Balance at January 1, 2016	46,279,233	158,575,886	9,260,555	17,403	1,084,500	215,217,577
Additions	3,867,450	5,191,906	228,889	-	(128,975)	9,159,270
Balance At December 31, 2016	50,146,683	163,767,792	9,489,444	17,403	955,525	224,376,847
Additions	449,590	3,910,142	448,833	-	1,378,806	6,187,371
Balance At December 31, 2017	50,596,273	167,677,934	9,938,277	17,403	2,334,331	230,564,218
<b>Accumulated Amortization</b>						
Balance at January 1, 2016	21,033,385	74,000,441	3,874,101	17,216	-	98,925,143
Amortization for the year	1,246,494	4,445,095	275,045	10	-	5,966,644
Balance At December 31, 2016	22,279,879	78,445,536	4,149,146	17,226	-	104,891,787
Amortization for the year	1,292,095	4,477,157	278,236	9	-	6,047,497
Balance At December 31, 2017	23,571,974	82,922,693	4,427,382	17,235	-	110,939,284
<b>Net Book Value</b>						
At December 31, 2016	27,866,804	85,322,256	5,340,298	177	955,525	119,485,060
At December 31, 2017	27,024,299	84,755,241	5,510,895	168	2,334,331	119,624,934

**PETERBOROUGH UTILITIES COMMISSION**

**NOTES TO THE FINANCIAL STATEMENTS  
For The Year Ended December 31, 2017**

**6. ACCUMULATED SURPLUS**

Accumulated surplus consists of the following:

	2017 \$	2016 \$
Operating surplus	6,406,994	7,393,534
Investment in tangible capital assets		
Tangible capital assets - net book value	119,624,934	119,485,060
Long term debt	(12,344,783)	(13,695,344)
Reserve funds (Schedule 1)	7,587,476	6,737,908
	121,274,621	119,921,158

**7. RELATED PARTY TRANSACTIONS**

In the ordinary course of business, the Commission enters into transactions with the Corporation of the City of Peterborough and other related corporations. These transactions, which include the sale of water and the purchase and sale of other goods and services, take place at fair market value. The affiliated corporations of the Commission are:

The City of Peterborough Holdings Inc.,  
Peterborough Utilities Services Inc.,  
Peterborough Distribution Inc., and  
Peterborough Utilities Inc.

Details of services provided to Peterborough Utilities Commission during the year by Peterborough Utilities Services Inc. are as follows:

	2017 \$	2016 \$
Expenditures		
Professional services	8,525,051	8,701,729
Building rent	385,971	402,713
Software and equipment rent	114,541	123,198
	9,025,563	9,227,640

**PETERBOROUGH UTILITIES COMMISSION**

**NOTES TO THE FINANCIAL STATEMENTS  
For The Year Ended December 31, 2017**

**8. CHANGE IN NON-CASH WORKING CAPITAL ITEMS**

	2017 \$	2016 \$
Accounts receivable	(1,710)	(218,469)
Unbilled revenue and sewer surcharge	(136,000)	(82,000)
Inventories	(42,009)	(5,919)
Prepaid expenses	(89,859)	6,530
Accounts payable and sewer surcharge payable	(205,174)	(82,895)
Customer deposits	217	29,549
	(474,535)	(353,204)
Other information:		
Interest paid	423,620	295,539

**9. BUDGET FIGURES**

The budget, approved by the Commission, for 2017 is reflected on the Statement of Operations and Accumulated Surplus and the Statement of Changes in Net Financial Assets. The budgets established for capital investment in tangible capital assets are on a project-oriented basis, the costs of which may be carried out over one or more years and, therefore may not be comparable with current year's actual amounts. Budget figures have been reclassified for the purposes of these financial statements to comply with Public Sector Accounting Board reporting requirements. Budget figures are not subject to audit.

**PETERBOROUGH UTILITIES COMMISSION**

**SCHEDULE 1 - RESERVE FUNDS  
For The Year Ended December 31, 2017**

	Budget 2017 \$	Actual 2017 \$	Actual 2016 \$
<b>TRANSFERS FROM OPERATIONS:</b>			
Sale of water	706,000	693,583	698,938
Development charges	192,000	91,449	262,908
Interest	66,000	83,445	63,536
Donations	25,000	22,907	49,624
Riverview park and zoo	50,000	50,000	-
	1,039,000	941,384	1,075,006
<b>TRANSFERS</b>			
For tangible capital assets	(294,000)	(91,816)	(664,329)
<b>CHANGE IN RESERVE FUNDS</b>	745,000	849,568	410,677
<b>OPENING RESERVE FUNDS</b>	6,534,000	6,737,908	6,327,231
<b>CLOSING RESERVE FUNDS</b>	<b>7,279,000</b>	<b>7,587,476</b>	<b>6,737,908</b>

**ANALYZED AS FOLLOWS:**

<b>INTERNALLY RESTRICTED</b>			
Water treatment plant reserve fund	6,533,000	6,532,375	5,767,591
Park and zoo state of good repair reserve fund	50,000	50,000	-
	6,583,000	6,582,375	5,767,591
<b>EXTERNALLY RESTRICTED</b>			
Park and Zoo major projects reserve fund	504,000	536,833	507,647
Park and Zoo major animal care reserve fund	192,000	468,268	462,670
	696,000	1,005,101	970,317
	<b>7,279,000</b>	<b>7,587,476</b>	<b>6,737,908</b>

**PETERBOROUGH UTILITIES COMMISSION**

**SCHEDULE 2 - STATEMENT OF OPERATIONS FOR RIVERVIEW PARK AND ZOO  
For The Year Ended December 31, 2017**

	Budget 2017 \$	Actual 2017 \$	Actual 2016 \$
<b>EXPENSES</b>			
Maintenance park	571,000	595,620	550,298
Maintenance train	86,000	79,252	76,367
Animal care and zoo maintenance	821,000	1,008,631	880,545
	1,478,000	1,683,503	1,507,210
<b>REVENUES</b>			
Train	120,000	131,999	131,647
Miscellaneous	75,000	112,688	80,440
	195,000	244,687	212,087
<b>NET EXPENSES FOR THE YEAR</b>	<b>1,283,000</b>	<b>1,438,816</b>	<b>1,295,123</b>

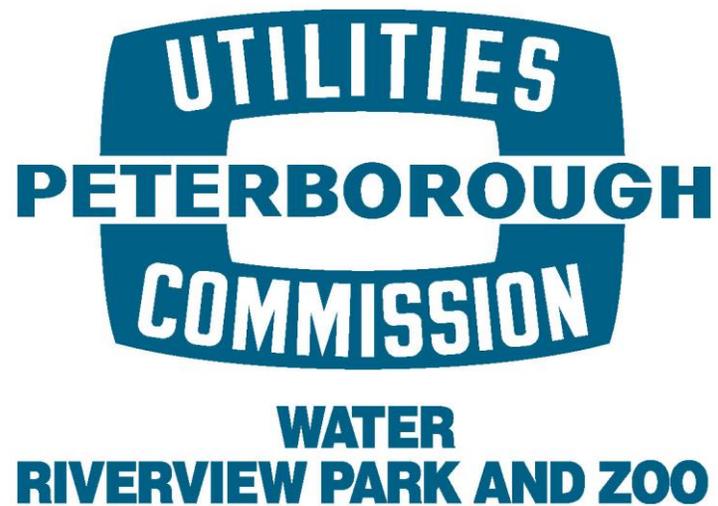
## **Appendix B – Abbreviations**

2-MIB	2-methlisoborneol
CFU	Colony Forming Unit
COD	Chemical Oxidization Demand
CTS	Calcium Thiosulphate
DBP	Disinfection by-product
DWQMS	Drinking Water Quality Standard
DWRG	Drinking Water Research Group
EDC	Endocrine disrupting compounds
HAA	Haloacetic Acid
KM	Kilometers
L/m	Litres per Minute
m <sup>2</sup>	Square Meters
m <sup>3</sup>	Cubic Meters
MAC	Maximum Acceptable Concentration
mg/L	Milligram per Litre
ML	Megalitres
MOECC	Ministry of Environment & Climate Change
MOH	Medical Officer of Health
ng/L	Nanogram per Litre
NTU	Nephelometric Turbidity Unit
ODWQS	Ontario Drinking Water Quality Standards
ORCA	Otonabee Region Conservation Authority
ORP	Oxidative Reduction Potential
PACL	Polyaluminum Hydroxychloride
PUC	Peterborough Utilities Commission
PUSI	Peterborough Utilities Services Inc.
RP& Z	Riverview Park & Zoo
STS	Sodium thiosulphate
THM	Trihalomethane
TOC	Total Organic Carbon
µg/L	Microgram per Litre
UVA	Ultra Violet Absorbance
WTP	Water Treatment Plant

# 2017 Annual Drinking Water Report

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**WATER**  
**RIVERVIEW PARK AND ZOO**

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