WATER
RIVERVIEW PARK AND ZOO

Annual Drinking Water Report 2019

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2019 Peterborough Utilities Commission

Mayor Diane Therrien..... Chair

Councillor Don Vassiliadis..... Vice-Chair

Councillor Gary Baldwin..... Commissioner

Councillor Kim Zippel/ Dean Pappas..... Commissioner

Councillor Stephen Wright..... Commissioner

2019 Riverview Park and Zoo Advisory Committee

Name of Volunteer	Date Appointed
Wally Davidson	Lifetime Member
Mike Kirkpatrick	January 2016
Janet Lafortune	January 2018
Dennis Carter-Edwards	January 2018
Paul Hartung	January 2018

On the Cover

The newly refurbished Sherbrooke Water Tower had an extensive rehabilitation (page 4) in 2019. This photo was captured using drone photography, which allows the viewer to see the expansive City in the back drop. The tower now displays the new Peterborough logo.

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 PUG Services Corp. (PUGSC). The Water Utility section of PUGSC includes the following operating departments:

- Water Treatment Plant
- Water Distribution
- Water Engineering Services
- 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 2019.

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 2019 was 11,037.65 megalitres (ML), this is an average of 30.24 ML daily (Table 1). The maximum daily pumpage of 40.07 ML, occurred on August 2nd, was a 4% decrease from the maximum daily value (41.84 ML) recorded on June 29, 2018.

Table 1

Water Treatment Plant Operations	2018	2019
Total Annual Raw Water	11,455.40	11,037.65
Average Day ML	31.38	30.24
Total Annual Plant Effluent	10,252.18	9,741.72
Average Day ML	28.07	26.68
Max. Daily Pumpage	41.84 – June 29	40.07 – Aug 2
Max. Daily City Consumption	40.40 – July 9	38.48 – Aug 2
Peak Hourly Consumption Rate	73.25 – Sept 15 @ 11:30h	70.09– May 14 @ 15:30h
Total Wash Water	197.74	238.81
Average of Plant Effluent	2.0 %	2.5 %
Total Zone #1 Pumpage	5,925.93	5,706.92
Average Day	16.23	15.63
Total Zone #2 Pumpage	4,326.26	4,034.80
Average Day	11.84	11.05

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	8.5 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 462 kilometres of pipe (water mains), 2,304 hydrants and 27,252 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.

PTBO H_20

The Utilities' mobile drinking water station, named PTBO H_20 operated from May – October for the fourth season in 2019 This year PTBO h20 participated in municipally sponsored events, concerts, sporting events and local festivals.

The mobile drinking water station stations was create d in order to provide fresh clean tap water to event patrons. Visitors to the mobile station can us a fountain to have a drink or to refill their

water bottle while staff promotes our tap water and other conservation activities. The mobile unit compliments our corporate values on the Environment, with the promotion of resource conservation

Capital Works Summary

Water Street Pumphouse

The multi-year project on the Water Street Pumphouse was completed in 2019, including repairs to the parapets and painting on the North, East, West walls.

Sherbrook Street Water Tower

The Sherbrook Street water tower was rehabilitated in 2019. This project required construction of scaffolding surrounding the airtight enclosure of the tower to safely remove existing exterior lead coating using sand blasting techniques. The project also involved removal of the interior coating. Patching and welding of interior and exterior pits was completed prior to the epoxy-zinc coating being applied. The new City of Peterborough logo was also added. Replacement of existing steel fill pipe with new stainless-steel piping, insulation and heat tracing was completed and the tank fully commissioned by the end of December.

Water Main Replacement

Approximately 150 m of distribution water mains were replaced on:

- Euclid Avenue
- Rogers Street
- Armour Road
- Parkhill Road West

New Water Main Installation

Approximately 2.2 km of water main was installed on:

- Lily Lake East Subdivision
- Harper Road
- Parkhill Road West

Water Service Replacement

A total of 77 water services were repaired and 24 water services were replaced in 2019.

Water Main Rehabilitation

Cleaning and lining of approximately 4.5 km of existing distribution water mains took place on:

- Walnut Street
- Monaghan Road
- Hopkins Avenue
- Weller Street
- Homewood Avenue
- Gilmour Street
- Sherbrooke Street
- John Street
- William Street
- Thomas Street
- Rutherford Avenue
- Victory Crescent
- Boswell Avenue
- Pearl Avenue
- Elias Avenue
- Margaret Avenue
- Frederick Avenue
- Maitland Avenue

Structural lining of approximately 1.5 km of existing distribution water mains took place on:

- Lansdowne Street East

Summary of Inspection & Compliance

Ministry of Environment Conservation & Parks Inspection

During 2019, there was a Ministry of the Environment, Conservation & Parks (MECP) Inspection on November 4th, report #1-L4FPN. The Peterborough Drinking Water System received a 100% compliance rating. There were no recommended best practices noted in the report.

Adverse Water Quality Incidents

There were zero incidents of adverse drinking water quality in 2019.

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 September 2019. The internal audit found three opportunities for improvement and no corrective actions required. The external audit, conducted by NSF International, later in September 2019 described that the management system was well documented and continues to be effective.

Water 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 31st each year.

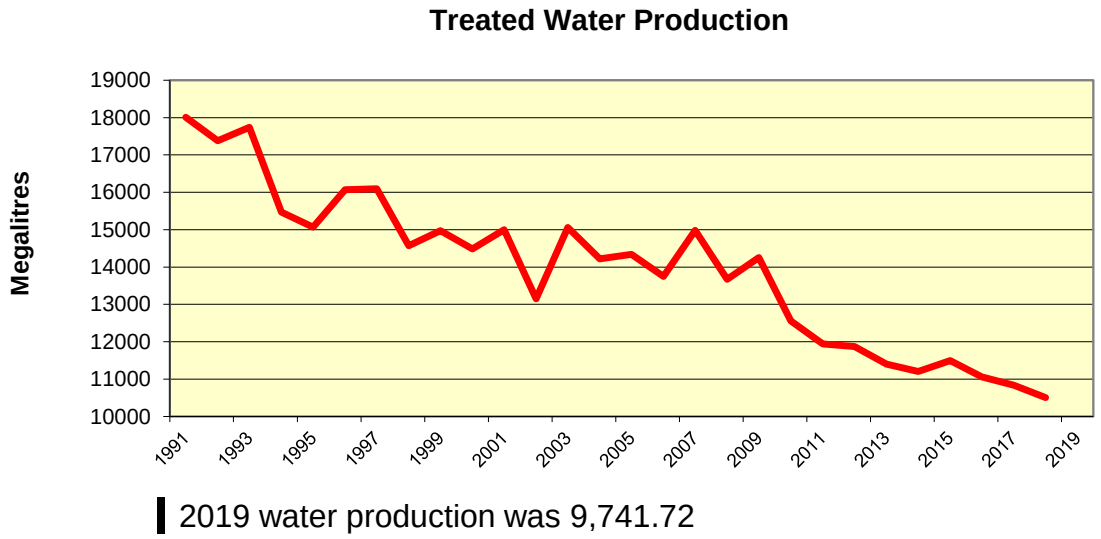
In 2019, there were no instances of water taking in excess of this daily limit. The total volume of water pumped into the Water Treatment Plant was 11,037.65 megalitres (ML); this is an average of 30.24 ML daily.

Treated Water Production

The Water Treatment Plant produced 9,741.72 megalitres (ML) in 2019, this is an average of 26.68 ML daily (Chart 1). Historically the highest water consumption recorded was in 1980 (18,621.20 ML).

Peterborough Utilities meters water usage and the majority of water usage in 2019 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.

Chart 1



2019 water production was 9,741.72

Water Quality Results

No known health-related water quality guidelines for inorganic (Table 2) and organic (Table 3) parameters were exceeded in 2019 in Peterborough's drinking water. In order to ensure 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 2019. 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. An exceedance of any parameter would result in an adverse water quality event with notification to the Medical Officer of Health and the MECP. Appropriate corrective action would have to be initiated to address the adverse incident.

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 0.74 -2.24 mg/L.

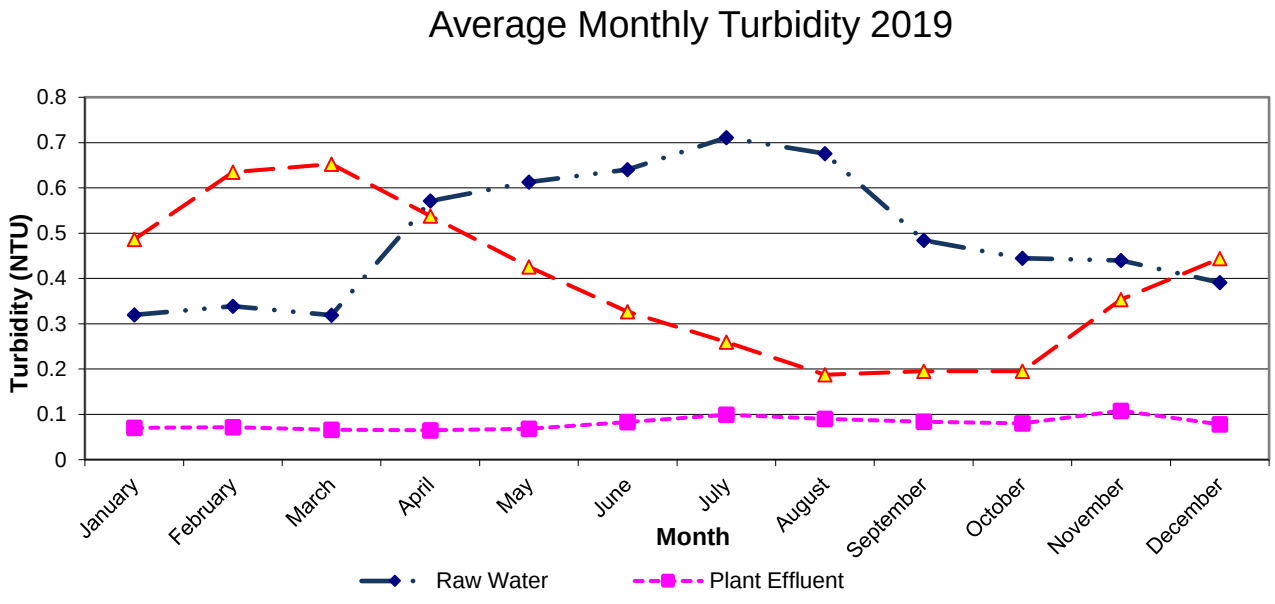
Turbidity

The average raw water turbidity in 2019 was 0.50 NTU; average during 2018 was 0.48 NTU. The monthly raw water turbidity peak occurred in July at 0.71 NTU as shown in Chart 2. The past 20-year average raw water turbidity was 0.57 NTU and treated water turbidity was 0.09 NTU.

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

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 0.04 NTU for 2019 and in 2018 was 0.04 NTU. Filters are taken off-line when the turbidity reaches 0.15 NTU. The 2018 average treated water turbidity was measured at 0.08 NTU.

Chart 2



Microbiological Standards Testing

Escherichia coli

During 2019, a total of 249 Escherichia coli (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 135 Colony Forming Units (CFU) per litre. A total of 1533 3 E.coli samples were analyzed from the plant effluent and distribution system. In 2019, there were no instances where E.coli was detected in the potable drinking water.

Total Coliform

The MECP guidelines for clostridium perfringens is to have all samples collected from the plant effluent to be zero CFU per litre of water sampled. While the MECP 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.

Inorganic Parameters

Table 2

Schedule 23	Unit	2019 Results	MAC
Antimony	mg/L	<0.00005	0.006
Arsenic	mg/L	<0.00002	0.025
Barium	mg/L	0.0247	1.0
Boron	mg/L	0.011	5.0
Cadmium	mg/L	0.000003	0.005
Chromium	mg/L	0.00008	0.05
Mercury	mg/L	<0.00001	0.001
Selenium	mg/L	0.00004	0.01
Uranium	mg/L	0.000029	0.02

Organic Parameters

Table 3

Schedule 24	Unit	2019 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

Schedule 24	Unit	2019 Results	MAC
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
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	<0.00006	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
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

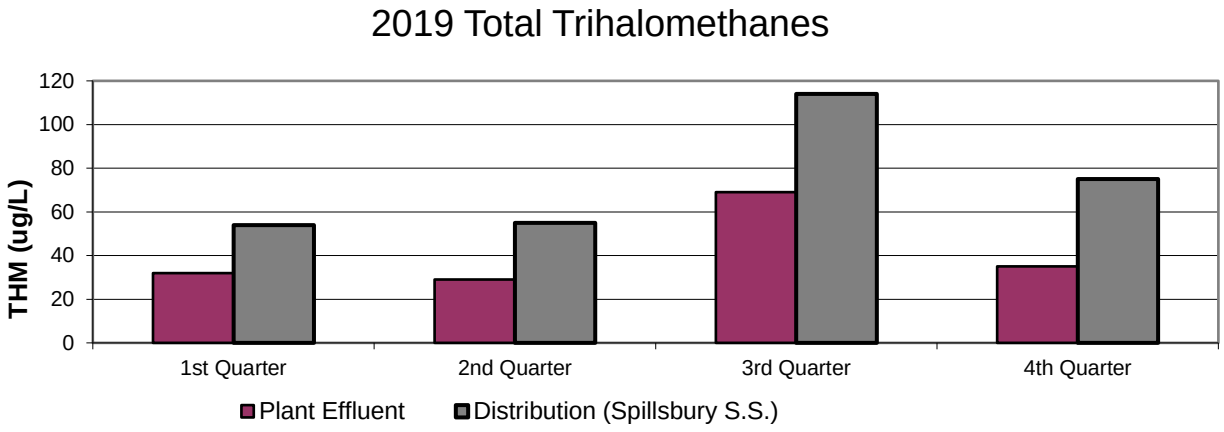
In Ontario, the Ministry of the Environment Conservation & Parks Maximum Acceptable Concentrations (MAC) for total THM's (total concentration of chloroform, bromoform, bromodichloromethane and dibromochloromethane) are set to 100 μg/L (annual average) for the distribution system. According to O. Reg. 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 2019 was 41 μg/L. The past 10-year average plant effluent has been 43 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 2019, one distribution location was selected to assist in determining areas of the city where THM's may be highest. The annual average THM value in the distribution system was 75 μg/L (Chart 3). The average THM value during 2018 was 77 μg/L. The 10-year average of distribution THM concentration was found to be 76 μg/L.

Chart 3



Haloacetic Acid

HAA's are another group of chemicals that are formed as disinfection by-products similar to trihalomethanes (THM).

The 2019 average treated water HAA was 39.6 μg/L and the average distribution sample was found to be 62.6 μg/L. O Reg. 170/03 was amended to include HAAs in 2020. The regulatory limit for distribution samples are 80 μg/L; therefore, the Peterborough Drinking Water System maintained compliance.

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 2019, the sodium result was found to be 8.2 mg/L (10.6 mg/L in 2018). 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.

In 2019, we sampled 45 private plumbing (residential) and 60 distribution points for lead. Customers are offered free testing of their private dwelling. Of the 45 samples taken only 4 exceeded the Ministry guidelines. Zero distribution samples tested over 0.0005 mg/L which indicates that the distribution system does not contribute to lead contamination.

Taste and Odour

During 2019, 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 2-MIB (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 10ηg/L). The bacteria actinomycetes, zebra mussels and some species of algae can produce geosmin and 2-MIB, 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 2-MIB.

Previous annual data indicates that geosmin and 2-MIB 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 July to November.

Geosmin is thought to originate higher in the water column and produce an earthy odour. The average raw water value during 2019 was 7 ηg/L and the average plant treated water was 8 ηg/L (Chart 4).

The 2-MIB is produced in the sediment or benthic layer and gives off a musty odour. 2-MIB can reproduce well when sunlight can penetrate down to the bottom of lakes and streams. The average raw water value during 2019 was 5 ηg/L and the average plant effluent was 5 ηg/L (Chart 5).

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

Chart 4

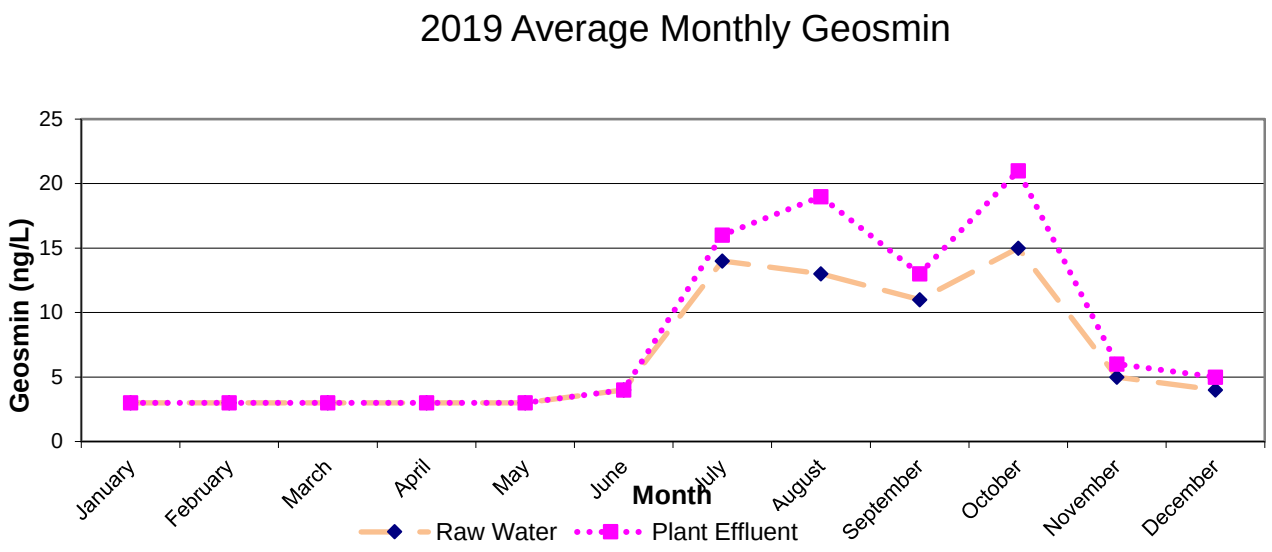
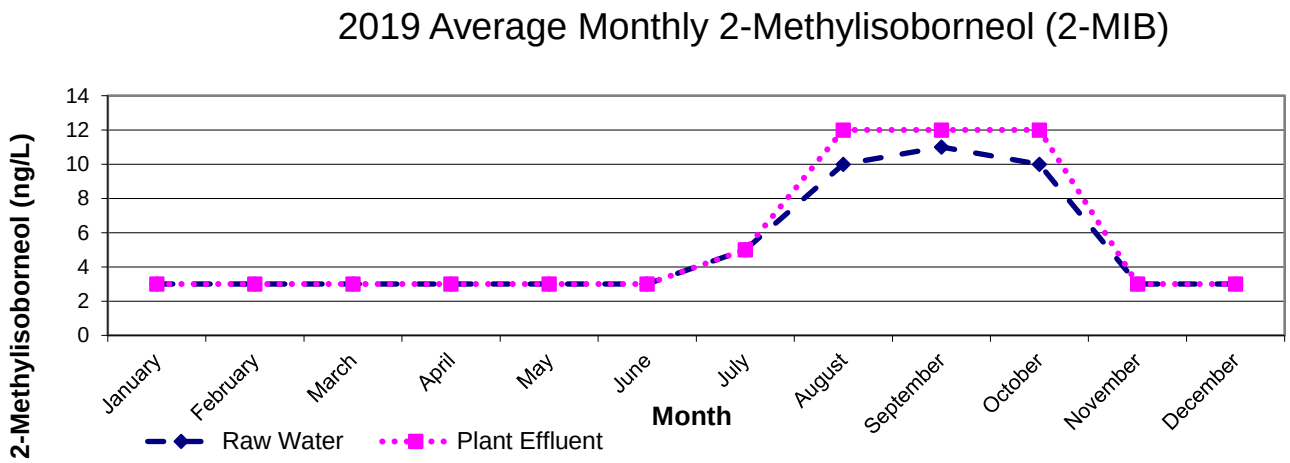


Chart 5



Summary Report

The summary of water delivered as per O. Reg. 170/03 Schedule 22 in 2019 is in Table 4.

Table 4

Month	Average Day (M^3/d)	Maximum Day (M^3/d)	Peak Flows (L/m)
January	26,267	37,126	25,782
February	25,298	33,555	23,302
March	24,745	27,430	19,049
April	24,458	29,005	20,142
May	25,380	28,543	19,822
June	28,180	30,558	21,221
July	32,896	37,619	26,124
August	31,109	40,067	27,824
September	28,236	30,701	21,320
October	25,234	27,478	19,082
November	24,842	26,505	18,406
December	24,463	33,843	23,502
Rated Capacity	104.00	----	----
Approved Flowrate	----	190.68	132,743 L/m

Chemical Consumption

Table 5

Chemical Use	2018	2019
Total Chlorine	40,422 kg	39,366 kg
Average Dosage	1.23 mg/L	1.26 mg/L
Total Aluminum Sulphate	807,321 L	827,259 L
Average Dosage	46.1 mg/L	48.5 mg/L
Total Hydrofluosilicic Acid	24,298 L	24,702 L
Average Dosage	0.67 mg/L	0.69 mg/L
Total BW46M Sodium Silicate	21,071	97,776
Average Dosage	7.4 mg/L	8.5 mg/L

Chlorine

The average dose of chlorine for 2019 was 1.26 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 0.70 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 2019 was approximately 0.69 mg/L (Table 5). The average treated water fluoride residual was 0.57 mg/L. The average fluoride concentration found in the raw water (natural fluoride) during 2019 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 2.0 mg/L and 14.0 mg/L with an annual average of 5.1 mg/L.

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 2019 at an average rate of 48.5 mg/L (Table 5). The average alum dosage during 2018 was 46.1 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 2019 was 0.017 mg/L the operational guideline for aluminium is 0.1 mg/L.

Water Treatment Plant

Annual maintenance was conducted at the Water Treatment Plant, Water Street Pumphouse, reservoirs, elevated tanks and booster pumping stations.

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

Impact of Climate Event

The temperature during June, July and August averaged approximately 26.2°C. This is considered to be above normal summertime temperature. Environment Canada data describes the average normal value of 18.3°C (normal data 1981 – 2010). The summer months in 2019 were hotter than normal with 16 days where temperatures were higher than 30°C. Rainfall totals for the three summer months of June, July and August was 153.9 mm. This is considered to be below normal rainfall values for the three summer months.

Otonabee Regional Conservation Authority (ORCA) issued a Level 1 Low Water declaration on September 11, 2019. This advisory notice is based on the preceding three months period, receiving less than 80% of normal precipitation. Low precipitation levels continued in September and a Level 2 Low was issued on October 3. All advisories were lifted by ORCA on November 8, 2019.

Pilot Plant

The Peterborough Water Treatment Plant has conducted pilot-scale studies in an effort to improve water quality, optimize production, and investigate next-generation treatment technologies for the citizens of Peterborough.

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. In addition to conventional water treatment studies, ozone and advanced oxidation applications have been investigated. The primary objectives using the ozone pilot 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.

Ozone and Advanced Oxidation

Ozone application and the benefits for enhanced water quality has been an important focus of our pilot-scale research program since 2015. Ozone has been shown as an effective technology in the reduction of organic carbon, disinfection by-product (DBP) formation, and taste-odour-compounds, geosmin (GSM) and 2-methylisoborneol (2-MIB). Advantages to ozone application also play a prominent role in the oxidation of cyanotoxins and environmental pollution, including endocrine disrupting compounds and pharmaceuticals. Our current studies remained focused on integration of

ozone into full-scale applications as a next generation technology. Application of ozone post-filtration was shown to reduce natural organic matter 30%, resulting in a corresponding reduction of regulated DBPs, including trihalomethanes (THMs) and haloacetic acids (HAAs), by 50% and 40%, respectively. Post-filtration ozonation was also shown to effectively improve water quality, enhance disinfection, and reduce chlorine demand. Similar to the application of ozone pre-filtration, integration and infrastructure capital costs remain barriers to the implementation of this technology. Moving forward in 2020, ozone application and integration as a pre-treatment technology will be the focus. Early results indicate pre-treatment application will improve water quality without the requirement of prohibitive capital infrastructure costs.

Granular Activated Carbon Media

Pilot-scale studies have focused on enhanced water quality and improved water quality aesthetics through the use of Granular Activated Carbon (GAC) media. Our objective in 2019 was to optimize our current treatment strategy to mitigate DBP formation and taste-and-odour compounds, GSM and 2-MIB. GAC media caps integrated with our current filtration technology, were shown to decrease THM and HAA formation by 10% and 12%, respectively. GSM and 2-MIB compounds were reduced below the odour threshold concentration of 9 parts-per-trillion (ppt). GAC media was also shown to reduce filtered water turbidity, reduce chlorine demand, and provide enhanced organic carbon removal and bioactivity, further enhancing water quality and performance. The installation of GAC media caps in 2020 will play a prominent role to immediately enhance water quality and improve aesthetics for our consumers.

Chloramination

The application of chloramination as a secondary disinfectant for our distribution system remained a key focus of our pilot-scale research program in 2019. The focus of the program was to investigate alternative treatment strategies to improve water quality, mitigate DBP formation, and ameliorate chlorine taste-and-odour issues for our consumers. During the annual study, chloramination was shown to reduce THM and HAA formation, resulting in a 40% and 45% reduction, respectively.

Chloramination was also shown to provide increased stability as a secondary disinfectant in our distribution system. Increased stability of a secondary disinfectant has the potential to improve water quality aesthetics, mitigate taste-and-odour issues, and reduce operational costs.

Our current focus in 2020 is to determine the optimal pH setpoint required for monochloramine formation, and to evaluate any potential impacts of chloramination on lead-corrosion in premise plumbing. The integration of ozone pre-treatment in conjunction with chloramination as a secondary disinfectant will also be examined for any potential synergistic effects.

Customer Service

Customer Calls

Customer concerns relating to water are tracked by WTP staff and logged using computer software. Some questions and concerns that were asked to 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 2019, staff responded to a total of 35 inquiries, this was an increase of 34.6% from 2018. The 35 inquiries were related to the following concerns; 17% of customer concern calls were relating to colour (usually rusty coloured water), 12% were relating to particulate matter, a total of 60% relating to taste and odour, and 11% relating to bacteriological concerns (Chart 5).

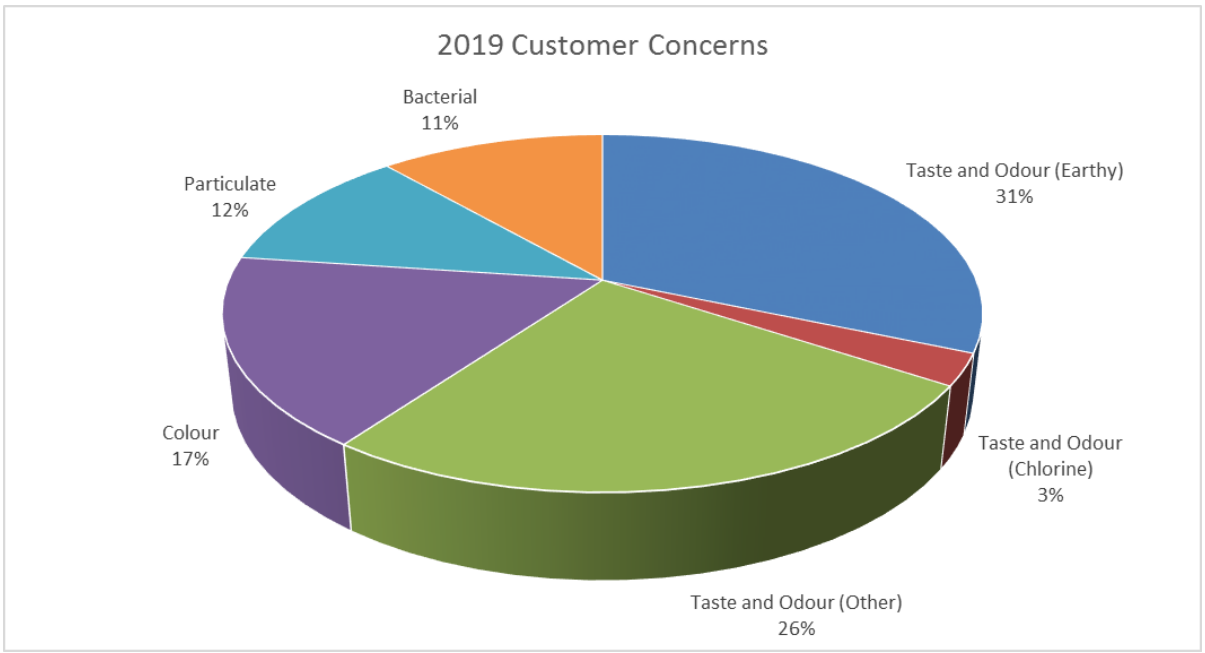
In every inquiry regarding bacteriological issues, the water was tested for bacteria and none was found.

A further breakdown of the 21 taste and odour complaints revealed the following: 11 concerns were for an earthy musty odour, 1 concern was for a chlorine taste and odour, and 9 concerns were for various other taste and odours, from metallic to medicinal.

Tours

Tours have been an important part of public education at the Peterborough Water Treatment Plant. Over 549 people had a tour of the Water Treatment Plant process during 2019 (over 2,862 people in the last 10 years).

Chart 6



Water Rates

Table 6

Meter Basic Charge	2018	2019
15mm (⅝C) Meter	$20.76	$21.28
20mm (½") Meter	$20.76	$21.28
25mm (1") Meter	$38.24	$39.20
40mm (1½") Meter	$65.56	$67.20
50mm (2") Meter	$92.88	$95.20
75mm (3") Meter	$166.09	$170.24
100mm (4") Meter	$335.83	$344.23
150mm (6") Meter	$582.78	$597.35
200mm (8") Meter	$829.71	$850.45
250mm (10") Meter	$1,158.84	$1,187.81
300 mm (12") Meter	$1,645.54	$1,686.68

Table 7

Consumption Charge	2018	**2019**
0-20 cubic metres	$1.3549	$1.3888
21-100 cubic metres	$1.4204	$1.4560
101-4,999 cubic metres	$0.7411	$0.7596
5,000 plus cubic metres	$0.5110	$0.5238

Table 8

Flat Rate Service	2018	2019
Basic Charge	$12.43	$12.74
Rooms	$2.68	$2.75
Lot Area (charge subject to 1500 m^2 maximum)	$2.47/100 m^2	$2.53/100 m^2
Swimming Pool	$0.25/ m^3	$0.26/ m^3

Seasonal Shut off Requests

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.

Seasonal Water Meter

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.

Flat Rate Surcharge

Customers who have not allowed the installation of a water meter are subject to a 65% surcharge on each billed component.

Turn on/ Turn Off Services

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 9

	Metered	Flat Rate
Residential	26,211	153
Industrial, Institutional, Commercial & Multi-Residential	2,169	0
Woodland Acres	1	0
	28,381	153

The total number of customer connection is 28,534.

Riverview Park & Zoo

In 2019 Riverview Park and Zoo was open and operating during regular hours (8:30 AM – dusk) from January 1st to December 31st. Attendance was not as strong in 2019 with total annual attendance estimated at less than 250,000 visitors. This was likely impacted in part by a late and very wet spring.

Ongoing improvements to the facilities and equipment continued in 2019 and included major upgrades to animal exhibits, accessibility upgrades, replacement of the deck at the river's edge, repairs to the snack bar building and numerous improvements made in preparation for our CAZA Accreditation Audit.

The zoo's animal collection saw many changes in 2019 with the deaths of some of our older animals as well as new acquisitions. Deaths included a whooper swan, a Gouldi's monkey, our female two-toed sloth, as well as the sudden and unexpected death of our male Bactrian camel. Other changes included the acquisition of two new young river otters and a Eurasian Lynx.

Park Operation & Facilities

The miniature train ride opened approximately four weeks late due to delays on the Pumphouse Rehabilitation Project. Completion of this project was later than planned due to a late and very rainy spring. The ride ran daily (weather permitting) from June 14th until September 22nd. With the late start, ridership was down significantly with an estimated 53,000 train riders in 2019.

The Park and Zoo's implementation of the PerfectMind software was completed for the most part in the spring of 2019. This new package facilitates facility bookings, program registrations, retail sales, donations, memberships, etc.

The Kiwanis Club of Peterborough operated the snack bar again in 2019 daily from May through September 4th and on weekends in the fall until Thanksgiving Day. Snack bar profits remained high for the fourth year in a row. Proceeds from the snack bar were shared between the Park and Zoo and the Kiwanis Club of Peterborough.

Zoo Operations & Facilities

The Park and Zoo's CAZA accreditation audit was conducted on July 16th, 17th and 18th following more than a year of extensive preparation by department staff and with additional support from other utility staff. The audit was very positive and the audit team stated they were very pleased with their findings. They identified seven areas of non-compliance and made seven additional recommendations for improvements. Park and Zoo staff were able to promptly resolve each of the issues and recommendations. Staff continue to

exploring options to address automated perimeter containment options. The Park and Zoo was granted accreditation at the CAZA national conference in September of 2019.

Regular and emergency veterinary care was provided primarily by consulting veterinarian Dr. John Sallaway throughout 2019 with some occasional care being provided by Dr. Mike Cranfield. 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 annual 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.

Zoo Animal Collection

In 2019 there were 3 births and 15 deaths of animals during the year. Post mortems were performed on those animals that had died in an attempt to determine cause of death. 22 new animals were acquired during the year.

As of December 31, 2019, the animal collection on site consisted of 111 animals, representing a total of 43 species (excluding groups of fish and invertebrates). The collection had 29 animals in on loan and 13 animals out on loan (Table 10).

Table 10

	January 1	Birth/ Hatchings	Acquisitions	Deaths	Disposition	December 31
# Animals Owned on site	74	8	14	13	1	82
# Animals at Zoo on Loan	29	0	8	2	6	29
# Animals out on loan	13	0	0	0	0	13
Total Animals On Site	103	8	22	15	7	111

Capital Program

The 2019 capital program included the wrap up of the outdoor cat exhibit expansion and upgrade as well as a complete overhaul and expansion of the indoor meerkat exhibit.

Other capital items included new shade shelters for the splash pad, replacement of the deck at the river's edge, repairs to the snack bar building and upgrades to many of the food preparation/animal servicing facilities.

There were also numerous upgrades made to various animal exhibits and holdings.

Revenue Contributions

In 2019, Riverview Park and Zoo saw an increase in revenue from gift shop sales, educational programming and room rentals fees reaching over $86,000. An interesting addition to the gift shop merchandise was Riverview Park and Zoo branded honey. This is prepared from honeycomb gathered from a new apiary located on the Park and Zoo's grounds.

Fundraising efforts grew significantly with an increase of 50% over 2018 totals. This included a 120% increase of individual donors who gifted over $41,000, animal adoptions that were up 10% and bench dedications that were up 225%.

Notable fundraising achievements included obtaining the support of 100 Men Peterborough, who donated $11,900 towards the expansion and upgrade of the slender-tailed meerkat exhibit. This project also benefited from a record-breaking 10th Anniversary Fun Run and Walk which raised an additional $13,500 towards the project. The event had 429 participants and was supported by 20 community partners and business sponsors. Another significant donation was made by the Rotary Club of Peterborough Kawartha who provided $30,000 toward the purchase of an outdoor musical playground.

A total of $290,180 revenue was provided to the Park and Zoo through operational sources and fundraising in 2019 (Table 11).

Table 11

Fundraising Activity	2018	2019
Train Ticket Sales	$133,573	$106,037
Donation Boxes/ Fountain	$8,340	$19,400
Snack Bar Revenue	$7,000	$17,000
Other Donations<$25,000	$27,220	$30,475
Animal Adoption Program	$13,450	$14,855
RPZ 5 km Fun Run	$12,080	$13,500
Education Programs	$10,561	$11,750
Facility Rentals	$2,532	$3,084
Guest Services Kiosk	$53,401	$74,079
TOTAL DONATIONS & REVENUE	$268,157	$290,180

Education

The 2019 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 animal placement program developed in support of the project pilot of the Pathway to Stewardship and Kinship regional education initiative.

As part of this program, Park and Zoo staff provided a variety of creatures (turtles, fish, a tarantula, etc.), aquariums, and all of the required supplies (on loan) to five classes at local schools. Staff also provided a brief presentation on the species, its conservation significance and instruction on how to care for it.

The Park and Zoo also collaborated with Otonabee Conservation to deliver the renowned Bondar Challenge education program at Riverview Park and Zoo 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, sleepover programs for Brownies/Scouts, the Homeschool Spelling Bee, and our seasonal conservation exhibit. Last year, the "Canada's Accredited Zoos and Aquariums" exhibit featured content highlighting the significance of accreditation, the important contribution CAZA's members make to conservation and education and also noted significant achievements of the Park and Zoo. The exhibit also included a series of special events delivered by partner organizations including Camp Kawartha, Otonabee Conservation, the Ontario Turtle Conservation Centre, and Kawartha Wildlife Rehabilitation.

Conservation

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, turtle feed (smelt) and equipment. The Park and Zoo also participated in the Association of Zoos and Aquariums (AZA) Stud Book for red-necked wallaby, Sichuan takin and bobcat. We also participated in the African red-billed hornbill, slender-tailed meerkat and common squirrel monkey AZA Species Survival Plans, as well as the Emu and Brazilian agouti Population Management Plans.

In June, the Park and Zoo Supervisor travelled to Quebec on two occasions to provide animal care support to the Montreal SPCA and Humane Society International. The work was at a non-accredited zoo in Quebec that had been ordered closed and the animals seized. Our staff assisted with health evaluation of the animals, preparing animals for transportation as well as providing a temporary home (at the Park and Zoo) for a few of the seized animals.

Research

In 2019 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.

Special Events

The following events were hosted at the Riverview Park & Zoo:

- 18th Annual Peterborough Children's Water Festival
- Eight musical groups performed in the 2019 summer season at the Gazebo
- The 10th annual 5 km Fun Run with the Animals, raising $13,500 for the Zoo
- Hosting the Rotary Spelling Bee

Staff & Volunteers

As of December 2019, permanent staff included 1 Manager and Curator, 1 Program Supervisor, 1 Groundskeeper, 1 Animal Care Technician, 3.5 Zookeepers and 1 Park & Zoo Maintenance.

From May to August a total of 19 seasonal student employees assisted with Park and Zoo operations. Student employee positions included 3 zookeepers, 2 zoo maintenance workers, 4 public educators, 1 park maintenance worker, 4 horticulture/ grounds keeping workers and 5 train operators.

A total of 6 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 fourteen college/university student placements over the year as well as three high school co-op placement students.

In 2019 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, 2019

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INDEPENDENT AUDITOR'S REPORT

To the Chair and Members of the Peterborough Utilities Commission

Opinion
We have audited the financial statements of Peterborough Utilities Commission (the Commission), which comprise the statement of financial position as at December 31, 2019 and the statements of operations and accumulated surplus, changes in net financial assets and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Commission as at December 31, 2019, and its financial performance and its cash flows for the year then ended in accordance with Canadian Public Sector Accounting Standards.

Basis for Opinion
We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Commission in accordance with the ethical requirements that are relevant to our audit of the financial statements in Canada, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

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

In preparing the financial statements, management is responsible for assessing the Commission's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Commission or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Commission's financial reporting process.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance but is not a guarantee that an audit conducted in accordance with Canadian generally accepted auditing standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Canadian generally accepted auditing standards, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Commission's internal control.

- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Commission's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Commission to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Chartered Professional Accountants
Licensed Public Accountants

Baker Tilly KDN LLP

Peterborough, Ontario
May 26, 2020

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PETERBOROUGH UTILITIES COMMISSION
STATEMENT OF FINANCIAL POSITION
At December 31, 2019

	2019 $	2018 $
FINANCIAL ASSETS		
Cash (Note 3)	15,108,328	15,682,690
Accounts receivable		
Customer accounts	955,369	886,668
Sewer surcharge	903,535	876,985
Sundry	285,532	434,896
Unbilled water revenue on customer accounts	1,362,000	1,316,000
Unbilled sewer surcharge	1,300,000	1,251,000
	19,914,764	20,448,239
LIABILITIES		
Accounts payable and accrued charges	2,923,470	2,705,865
Sewer surcharge payable	2,971,495	2,914,539
Long term debt (Note 4)	9,605,703	10,981,703
Customer deposits	714,327	616,421
	16,214,995	17,218,528
NET FINANCIAL ASSETS	3,699,769	3,229,711
NON-FINANCIAL ASSETS		
Inventories	423,339	363,471
Tangible capital assets (Note 5)	122,125,221	121,580,113
Prepaid expenses	291,424	6,587
	122,839,984	121,950,171
ACCUMULATED SURPLUS (Note 6)	**126,539,753**	**125,179,882**

Approved By The Commission

_____, Chair

_____, Member

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

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PETERBOROUGH UTILITIES COMMISSION
STATEMENT OF OPERATIONS AND ACCUMULATED SURPLUS
For The Year Ended December 31, 2019

	Budget 2019 $ (Unaudited)	Actual 2019 $	Actual 2018 $
REVENUES			
Sale of water	17,615,000	17,539,039	17,394,669
Contributed capital installation charges	518,000	213,590	107,905
Development charges earned	1,810,000	218,888	2,119,948
Fire protection	650,000	650,000	650,000
Sewer surcharge billings	414,000	414,000	406,000
Riverview Park and Zoo (Note 11)	223,000	241,318	232,597
Interest	229,000	336,191	301,136
Other	230,000	348,919	200,934
Electricity	425,000	417,942	467,134
Donations	25,000	19,401	16,908
	22,139,000	20,399,288	21,897,231
EXPENSES			
Water treatment and storage	4,511,000	4,216,040	3,985,702
Water distribution	2,255,000	2,550,019	2,478,251
Riverview Park and Zoo (Note 11)	1,685,000	1,938,691	1,682,650
Administration	3,665,000	3,823,270	3,421,714
Amortization	6,390,000	6,185,433	6,043,949
Interest	478,000	325,964	379,704
	18,984,000	19,039,417	17,991,970
ANNUAL SURPLUS	3,155,000	1,359,871	3,905,261
OPENING ACCUMULATED SURPLUS	125,139,000	125,179,882	121,274,621
CLOSING ACCUMULATED SURPLUS	**128,294,000**	**126,539,753**	**125,179,882**

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

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PETERBOROUGH UTILITIES COMMISSION

STATEMENT OF CASH FLOWS
For The Year Ended December 31, 2019

	2019 $	2018 $
CASH PROVIDED BY (USED IN):		
OPERATIONS		
Annual surplus	1,359,871	3,905,261
Add: Non-cash charges to operations		
Amortization	6,185,433	6,043,949
Contributed capital installation charges	(213,590)	(107,905)
	7,331,714	9,841,305
Change in non-cash working capital items (Note 8)	(13,125)	774,832
	7,318,589	10,616,137
INVESTING ACTIVITY		
Purchase of tangible capital assets	(6,516,951)	(7,891,223)
FINANCING ACTIVITIES		
Repayment of long term debt	(1,376,000)	(1,363,080)
NET CHANGE IN CASH DURING THE YEAR	(574,362)	1,361,834
CASH POSITION - BEGINNING OF YEAR	15,682,690	14,320,856
CASH POSITION - END OF YEAR	**15,108,328**	**15,682,690**

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

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PETERBOROUGH UTILITIES COMMISSION
STATEMENT OF CHANGES IN NET FINANCIAL ASSETS
For The Year Ended December 31, 2019

	Budget 2019 $ (Unaudited)	Actual 2019 $	Actual 2018 $
Annual Surplus	3,155,000	1,359,871	3,905,261
Acquisition Of Tangible Capital Assets	(8,919,000)	(6,730,541)	(7,999,128)
Amortization Of Tangible Capital Assets	6,390,000	6,185,433	6,043,949
Decrease (Increase) in Inventories	-	(59,868)	(140,214)
Decrease (Increase) in Prepaid Expenses	-	(284,837)	83,272
Change In Net Financial Assets	626,000	470,058	1,893,140
Net Financial Assets, beginning of year	2,638,000	3,229,711	1,336,571
Net Financial Assets, end of year	**3,264,000**	**3,699,769**	**3,229,711**

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

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PETERBOROUGH UTILITIES COMMISSION

NOTES TO THE FINANCIAL STATEMENTS
For The Year Ended December 31, 2019

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 at the fair market value.

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, 2019

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

In 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, 2019

3. CASH

	2019 $	2018 $
Unrestricted cash	5,649,929	7,169,688
Restricted cash	9,458,399	8,513,002
	15,108,328	15,682,690

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 %	2019 $	2018 $
March 5, 2020, annual principal payments of $660,000, interest paid semi-annually	3.893	660,000	1,320,000
July 5, 2027, semi-annual blended payments of $274,120	3.180	3,845,703	4,261,703
November 6, 2036, semi-annual principal payments of $150,000 plus interest	2.790	5,100,000	5,400,000
		9,605,703	10,981,703

Future repayments for the long term debt are as follows:

	Principal $	Interest $	Total $
2020	1,389,334	274,740	1,664,074
2021	743,095	236,956	980,051
2022	757,297	214,384	971,681
2023	771,955	191,356	963,311
2024	787,083	168,157	955,240
Thereafter	5,156,939	715,670	5,872,609
	9,605,703	1,801,263	11,406,966

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PETERBOROUGH UTILITIES COMMISSION
NOTES TO THE FINANCIAL STATEMENTS
For The Year Ended December 31, 2019

5. TANGIBLE CAPITAL ASSETS

	Water Treatment Plant and Reservoirs $	Water Distribution System $	Riverview Park and Zoo $	Other $	Construction In Progress $	Total $
Cost Or Deemed Cost						
Balance at January 1, 2018	50,596,273	167,677,934	9,938,277	17,403	2,334,331	230,564,218
Additions	114,745	5,298,214	615,32	-	1,970,838	7,999,128
Balance At December 31, 2018	50,711,018	172,976,148	10,553,608	17,403	4,305,169	238,563,346
Additions	313,710	9,544,779	733,859	-	(3,861,807)	6,730,541
Balance At December 31, 2019	51,024,728	182,520,927	11,287,467	17,403	443,362	24,529,387
Accumulated Amortization						
Balance at January 1, 2018	23,571,974	82,922,683	4,427,382	17,235	-	110,939,284
Amortization for the year	1,241,599	4,511,414	290,828	8	-	6,043,949
Balance At December 31, 2018	24,813,513	87,434,107	4,178,310	17,243	-	116,893,233
Amortization for the year	1,190,231	4,685,083	310,111	8	-	6,185,433
Balance At December 31, 2019	26,003,804	92,119,190	5,028,421	17,251	-	123,168,666
Net Book Value						
At December 31, 2018	25,897,445	85,542,041	5,835,298	160	4,305,169	121,580,113
At December 31, 2019	25,020,924	90,401,737	6,259,046	152	443,362	122,125,221

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PETERBOROUGH UTILITIES COMMISSION
NOTES TO THE FINANCIAL STATEMENTS
For The Year Ended December 31, 2019

6. ACCUMULATED SURPLUS

Accumulated surplus consists of the following:

	2019 $	2018 $
Operating surplus	4,561,836	6,068,470
Investment in tangible capital assets		
Tangible capital assets - net book value	122,125,221	121,580,113
Long term debt	(9,605,703)	(10,981,703)
Reserve funds (Note 10)	9,458,399	8,513,002
	126,539,753	125,179,882

7. RELATED PARTY AND INTER-ENTITY TRANSACTIONS

The Commission is a board of the City of Peterborough and is consolidated with the City's financial statements. 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, are exchanged at the same prices and terms as arm's length customers. The affiliated corporations of the Commission are:

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

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

	2019 $	2018 $
Expenditures		
Professional services	9,029,241	8,628,889
Building rent	393,618	384,729
Software and equipment rent	104,000	114,000
	9,526,859	9,127,618

Billing and collecting for the sewer surcharge is done by the Commission for the City of Peterborough. During the year $414,000 (2018 - $406,000) was recognized as revenue for providing this service. At December 31, the sewer surcharge payable of $2,971,495 (2018 - $2,914,539) recognized on the statement for financial position is payable to the City of Peterborough. All amounts owing to the City are unsecured, without interest and no specific terms of repayment.

PETERBOROUGH UTILITIES COMMISSION
NOTES TO THE FINANCIAL STATEMENTS
For The Year Ended December 31, 2019

8. CHANGE IN NON-CASH WORKING CAPITAL ITEMS AND OTHER INFORMATION

	2019 $	2018 $
Accounts receivable	54,113	(141,693)
Unbilled revenue and sewer surcharge	(95,000)	136,000
Inventories	(59,868)	(140,214)
Prepaid expenses	(284,837)	83,272
Accounts payable and sewer surcharge payable	274,561	828,656
Customer deposits	97,906	8,811
	(13,125)	774,832
Other information:		
Interest paid	325,964	375,836

9. BUDGET FIGURES

The budget, approved by the Commission, for 2019 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
NOTES TO THE FINANCIAL STATEMENTS
For The Year Ended December 31, 2019

10. **RESERVE FUNDS**

	Budget 2019 $ (Unaudited)	Actual 2019 $	Actual 2018 $
TRANSFERS FROM OPERATIONS:			
Sale of water	735,000	728,877	728,152
Development charges	1,810,000	218,889	2,119,948
Interest	153,000	199,650	147,394
Donations	25,000	19,401	16,860
Riverview park and zoo	50,000	-	50,000
	2,773,000	1,166,817	3,062,354
TRANSFERS			
For tangible capital assets	(2,030,000)	(221,420)	(2,136,828)
CHANGE IN RESERVE FUNDS	743,000	945,397	925,526
OPENING RESERVE FUNDS	8,308,000	8,513,002	7,587,476
CLOSING RESERVE FUNDS	**9,051,000**	**9,458,399**	**8,513,002**
ANALYZED AS FOLLOWS:			
INTERNALLY RESTRICTED			
Water treatment plant reserve fund	8,230,000	8,274,498	7,374,136
Park and zoo state of good repair reserve fund	153,000	102,835	100,633
	8,383,000	8,377,333	7,474,769
EXTERNALLY RESTRICTED			
Park and Zoo major projects reserve fund	606,000	594,745	562,551
Park and Zoo major animal care reserve fund	62,000	486,321	475,682
	668,000	1,081,066	1,038,233
	9,051,000	**9,458,399**	**8,513,002**

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PETERBOROUGH UTILITIES COMMISSION
NOTES TO THE FINANCIAL STATEMENTS
For The Year Ended December 31, 2019

11. OPERATIONS FOR RIVERVIEW PARK AND ZOO

	Budget 2019 $ (Unaudited)	Actual 2019 $	Actual 2018 $
EXPENSES			
Maintenance park	659,000	677,966	606,668
Maintenance train	99,000	98,476	70,834
Animal care and zoo maintenance	927,000	1,162,249	1,005,148
	1,685,000	1,938,691	1,682,650
REVENUES			
Train	130,000	106,037	133,573
Miscellaneous	93,000	135,281	99,024
	223,000	241,318	232,597
NET EXPENSES FOR THE YEAR	**1,462,000**	**1,697,373**	**1,450,053**

12. SUBSEQUENT EVENT

On March 11, 2020, the World Health Organization categorized COVID-19 as a pandemic. The potential economic effects within the Commission's environment and in the global markets, possible disruption in supply chains, and measures being introduced at various levels of government to curtail the spread of the virus (such as travel restrictions, closures of non-essential municipal and private operations, imposition of quarantines and social distancing) could have a material impact on the Commission's operations. The extent of the impact of this outbreak and related containment measures on the Commission's operations cannot be reliably estimated at this time, and no amounts have been recorded in these financial statements.

Appendix B – Abbreviations

Abbreviation	Full Description
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
m2	Square Meters
m3	Cubic Meters
MAC	Maximum Acceptable Concentration
mg/L	Milligram per Litre
ML	Megalitres
MECP	Ministry of Environment & Climate Change
MOH	Medical Officer of Health
ηg/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
PUGSC	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

UTILITIES
PETERBOROUGH
COMMISSION

WATER
RIVERVIEW PARK AND ZOO