

BUFFALO  
POUND  
WATER

BOARD OF  
DIRECTORS

ANNUAL  
REPORT



2019



## BUFFALO POUND WATER

### MANAGEMENT TEAM



The Buffalo Pound Water Treatment Plant is located approximately thirty kilometres northeast of the City of Moose Jaw, Saskatchewan, on Highway No. 301, seventeen kilometres north of the intersection with Highway No. 1.

The Plant's mailing address is  
PO Box 944, Moose Jaw,  
Saskatchewan, S6H 2V2.

The telephone number is  
306-694-1377.

Information about the Buffalo Pound Water Treatment Plant is also available from the Plant's website. This may be accessed by going to:

**<http://www.buffalopoundwtp.ca>**

**Plant management staff may be reached by e-mail at the following addresses:**

**Ryan Johnson**

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**Harry Gahra**

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**BUFFALO POUND WATER**  
**ANNUAL REPORT 2019**



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## BOARD CHAIRPERSON'S LETTER

DALE SCHOFFER

F CPA, FCA, C. DIR

On behalf of the Board, I am pleased to present the 2019 Annual Report of the Buffalo Pound Water Treatment Corporation (BPWTC).

The BPWTC's mission recognizes that it provides a critical service for the residents of Regina, Moose Jaw and surrounding Region. Its future is driven by the vision of continued high quality water that always meets the demands of our customers in a reliable and cost-effective manner. This vision underpins the BPWTC strategic plan with a focus on capital investment, staffing, processes, financial stability, risk management and governance.

BPWTC completed Phase 1 of the \$45 million Electrical Capital Upgrade Project with a significant capital investment in its electrical supply infrastructure. Phases 2 and 3 commenced during the year and will both be completed in 2020. This will address the most significant risks in the production and reliability of the water supplied to the Cities. This project was made possible by a \$20.6 million grant from the federal and provincial governments under the Provincial-Territory Infrastructure Component of the New Building Canada Fund program. Once this project is completed, backup power generation capabilities will mitigate the consequences of power outages.

In addition to electrical upgrades, efforts continue to address the aging 65-year-old Plant facilities. In 2019, work continued on the development of the Plant Renewal Project, which will augment or replace the existing water treatment processes and physical Plant. The estimated cost ranges from \$127 to \$224 million, which has not yet been financed. The Plant Renewal Projects will ensure a reliable supply of potable water long into the future. The Board plans to award the design portion of the project in early 2020.

In September, the Board of Directors adopted a Diversity Policy to formalize procedures that ensure diversity at the board table is maintained and increased going forward.

The continued success of BPWTC is entirely due to the hard working and dedicated staff of the organization, under the leadership of General Manager Ryan Johnson and his management team. I would like to thank each and every one of them for their commitment and enthusiasm.

Dale Schoffer, FCPA, FCA, C.Dir



## GENERAL MANAGER'S LETTER

**RYAN JOHNSON**  
CD, M.A.SC., P.ENG.

On behalf of the Buffalo Pound Water Treatment Corporation's Management Team and Staff, I am very pleased to present the 2019 Annual Report.

2019 was a very good year for operations at the Buffalo Pound Water Treatment Plant. The Plant provided safe drinking water to over 260,000 people in Moose Jaw, Regina and surrounding Region.

The Plant met all regulatory requirements and criteria for the production of safe drinking water. As well, the Corporation met its obligations under the Unanimous Membership Agreement and mandate established by the Cities.

There were minimal problems during the year impacting the Corporation's operations. The issues were related to loss of power, raw water quality and equipment failure. There remains some regulatory issues with the operations of the Plant's process waste lagoons discharging back into the environment. Short term adjustments are being made to processes and procedures to improve the operation. However, the Plant Renewal Project will properly address these deficiencies.

The Draft Water Access and Supply Agreements were provided to the Cities in December.

The raw water quality continues to improve with increased water flows from Lake Diefenbaker and releases from Buffalo Pound Lake. The continued improvement in raw water quality resulted in a reduction in chemical costs for three consecutive years.

The Corporation's Safety Management System Certificate of Recognition continues to be certified by the Safety Association of Saskatchewan Manufacturers at the Bronze Level. The Safety Management System continues to contribute to the strengthening of our safety culture core value.

Consistent with our core values, the Corporation is striving to become a process-driven organization. The Plant substantially completed the implementation of the Computerized Maintenance Management System (CMMS) to strengthen maintenance practices and better retain institutional knowledge. The system

will enable the Corporations to execute the maintenance process in a consistent manner, reduce equipment related risks and optimize the capital planning process.

Phase 1 of the Electrical Capital Upgrade Project was completed which included a new electrical substation and backup generators at the Main Plant. This work has mitigated a significant risk to the Corporation's ability to meet its mandate.

Phases 2 and 3 of the electrical upgrade project, which includes the Transmission Line and Lake Pump Station Renewal, commenced construction in 2019 and will both be completed in 2020. These projects will improve the electrical system reliability and efficiency, optimize raw water pumping operation, replace the electrical substation and add backup generators to ensure the reliability of future water supply. The Province and Federal Government committed \$20.6 million in grant funds under the Provincial-Territorial Infrastructure Component (PTIC) of the New Building Canada Fund in 2018 for Phases 2 and 3 of the Electrical Capital Upgrade Project.

The Plant Renewal Project (PRP) will ensure the long-term viability of the Buffalo Pound Water Treatment Plant. The PRP will address the increasing challenges to treat the lake water. The PRP is essential to ensure the Plant can meet current and future regulatory requirements. By addressing aging infrastructure issues the PRP will fulfill the Corporation's mandate for generations to come. The PRP progressed on schedule in 2019.

In April, 2019, the Corporation submitted an "Expression of Interest" under the Investing in Canada Infrastructure Program – Green Infrastructure Stream. This is the first stage of the application process



by which the Corporation seeks to secure up to \$215.4 million in federal and provincial government funding.

The Corporation received \$9.3 million for capital work in 2019 from water sales, PTIC grant proceeds and interest earned. The Corporation spent \$19.6 million during the year. The amount of approved funding carried forward to complete projects already in progress was \$33.3 million.

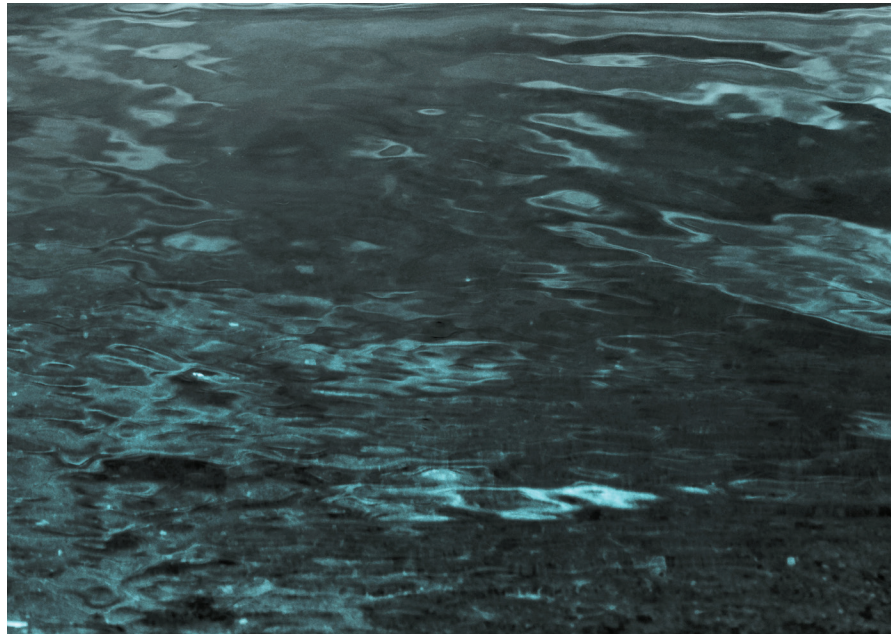
Water sales were strong, especially in the first half of 2019. Revenues were \$13.3 million and expenses were \$11.6 million, which resulted in a surplus of approximately \$1.7 million at year end. The surplus was added to the Corporation's reserve funds.

I want to thank the Buffalo Pound Water Management Team and Staff for their collective hard work

and dedication to ensure that the Corporation met its regulatory requirements, mandate and objectives throughout the year.

Finally, I would also like to express my gratitude to the Board of Directors for their continued insight and input they provide to ensure the Corporation is able to meet its mandate and mission.

Ryan Johnson, CD, M.A.Sc., P.Eng.





The Corporation will reliably and efficiently provide safe, high quality and affordable drinking water to the Cities.

To provide a reliable and affordable supply of safe, high-quality drinking water which meet the needs and expectations of consumers for the Cities of Regina and Moose Jaw.

- Treated water that meets the quality expectations of the citizens of Moose Jaw and Regina, as well as meeting, or exceeding, all government regulated parameters.
- Operational practices and controls that ensure a continuous and safely-treated supply of water within an environmentally-responsible and cost-efficient operation.
- Judicious monitoring of the treated water from the Plant to the end of the Cities' distribution systems. Appropriate monitoring of the water in Buffalo Pound Lake, the Upper Qu'Appelle River and Lake Diefenbaker to identify long-term trends and areas of concern to protect the water supply.
- Water quality research to identify possible chemical and microbiological contaminants and to test and implement the best available treatment technologies, thus ensuring that the Water Treatment Plant can meet current and future expectations for regulated parameters.

Safety | Team Culture | Accountability | Process Driven | Innovation | Continuous Improvement

Buffalo Pound Water (BPW) is an expertly operated, independent, and trusted entity, that will be positioned to provide sustainable and reliable water as a critical service for generations to come.

**MISSION  
(WHY WE EXIST)**

To provide a reliable and affordable supply of safe, high quality drinking water which meets the needs and expectations of consumers for the Cities of Regina and Moose Jaw.

**VALUES  
(HOW WE OPERATE)**

**SAFETY | TEAM CULTURE | ACCOUNTABILITY | PROCESS-DRIVEN | INNOVATION |  
CONTINUOUS IMPROVEMENT**

**VISION  
(WHERE WE ARE GOING)  
3-YEAR BUSINESS PLAN  
2018-2020**

BPW is an expertly operated, independent, and trusted entity, that will be positioned to provide sustainable and reliable water as a critical service *for generations to come.*

**Deliver on Mission, and by 2020, Renewal Construction begins.**

**CORE SERVICES**

**WATER QUALITY**

Regulatory Requirements and Customer Expectations Met 100% of the Time

**WATER QUANTITY**

Meet Customer Demand 100% of the Time

**PROJECTS**

**RENEWAL PROJECT**

**2018 Renewal Vision is Clear |  
2018 Funding Pre-approval**

**CRITICAL PROJECTS**

**Electrical Project | SCADA Project |  
Chlorine Project | CMMS Project**

**PEOPLE**

**SAFETY  
CULTURE**

Plant-wide Safety Management System

**PEOPLE DEVELOPMENT  
& PERFORMANCE**

Performance Plans, Learning Plans, Plant-wide and Department Goals

**COMMUNICATIONS &  
MANAGING CHANGE**

Internal Communication to Create One Team, Successful Change Implementation, Evolution of Project Management

**BOARD GOVERNANCE**

Bylaws, Policies, Customer Services Agreement, Asset Transfer, Board Education & On-boarding

**FINANCIAL & RISK  
MANAGEMENT**

**FUNDING SOURCES**

Grants, Loans, Research New Lines of Business

**FINANCIAL OPERATING  
PERFORMANCE**

Budget Variance

**RISK MANAGEMENT**

Risk Registry & QMS Framework

**ASSET LIFECYCLE  
MANAGEMENT**

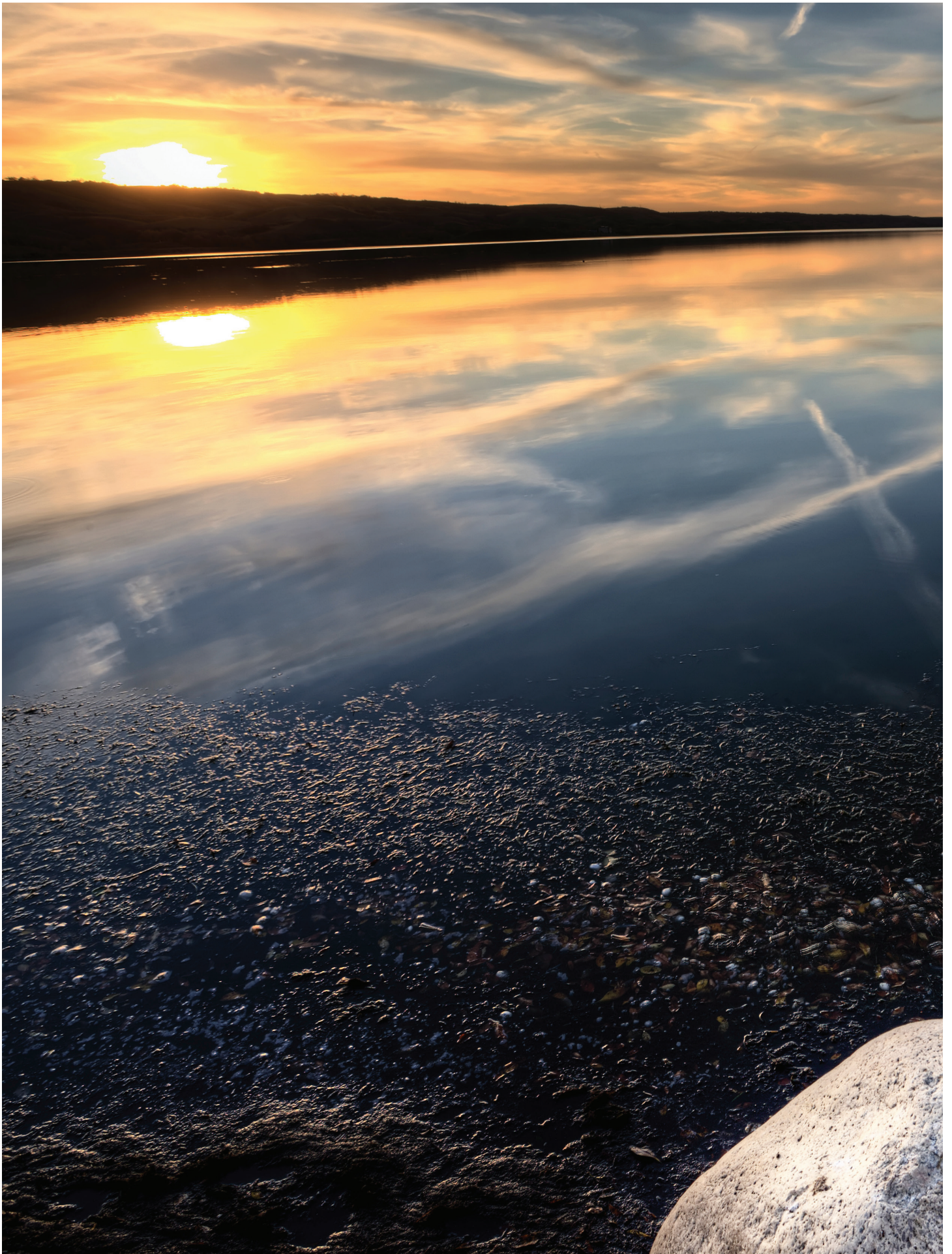
Asset Maintenance Plan

**MANDATE,  
MISSION, GOALS  
AND VALUES  
CONTINUED**

**STRATEGIC PLAN  
2018 – 2020**

The Corporation's Strategic Plan for 2018 -2020 is summarized above. The Plant's KPIs use targets that are set by the Board through the Strategic Plan's Balanced Scorecard. The Board reviews the targets and adjusts them accordingly at the Annual Retreat.

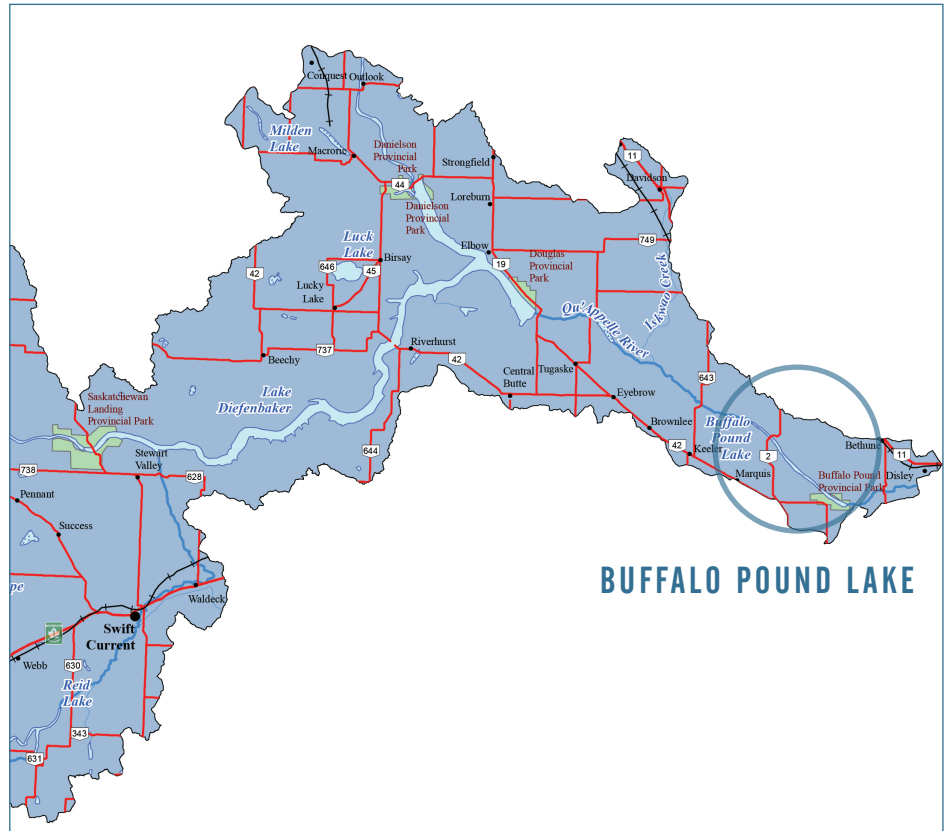






# THE YEAR IN REVIEW

## RESOURCES



**FIGURE 1: UPSTREAM SOURCE WATER IN SASKATCHEWAN**

### WATER SOURCE

Water for Regina and Moose Jaw is taken from Buffalo Pound Lake, a shallow reservoir in the Qu'Appelle Valley, which is a part of the Upper Qu'Appelle River. Illustrated in Figure 1, the lake is 29 km long, 1 km wide, but has an average depth of only 3 metres. The surface area of Buffalo Pound Lake is 2900 hectares, meaning it has a capacity of 90 million cubic metres at the “full supply level” of 509.3 metres above sea level. Water levels in Buffalo Pound Lake are controlled by the Saskatchewan Water Security Agency and maintained by the release of water from the Qu'Appelle Dam on Lake Diefenbaker. The mean annual water release from Lake Diefenbaker has ranged from 1.2 to 4.2 m<sup>3</sup>/sec in the past 10 years. Rain, snow melt and flood waters from the Moose Jaw River have compromised water quality, creating significant treatment challenges. The lake water

is potentially affected by discharges from point sources (upstream cities) and non-point sources (agricultural and recreational).

Buffalo Pound Lake is generally free of industrial pollution but is naturally rich in nutrients (phosphate, nitrogen and dissolved organic carbon) which encourage the growth of phytoplankton (typically diatoms in the winter and green algae or cyanobacteria in the summer). Weed growth can also be extensive. Algae and weeds pose many treatment challenges such as high chemical demands and undesirable tastes or odours. The lake and watershed appear to also be impacted by ground waters and surface runoff infusing minerals.

## THE YEAR IN REVIEW CONTINUED

## RESOURCES (CONTINUED)

### PLANT TREATMENT

Raw water from Buffalo Pound Lake passes through a series of treatment stages designed to remove impurities such as algae, bacteria, clay particles and dissolved organic materials. The objective of this treatment is to produce water that is clear, colorless, odor free, aesthetically pleasing and safe to drink.

The treatment process consists of seven stages: chlorination, cascade de-gasification, coagulation/flocculation, clarification, filtration, carbon adsorption and disinfection with ultraviolet light.

Lake water enters a pumping station located on the south shore of Buffalo Pound Lake through two submerged intakes. Raw water is chlorinated and then pumped to the Plant via two pipelines connecting the pumping station to the main treatment Plant. The pipelines are 1.05 and 1.35 metres in diameter, extend a distance of approximately 3,000 metres and rise 82 metres. After reaching the Plant, water is initially divided into two streams, each of which has cascade de-gasification, coagulation/flocculation and clarification. The streams are then recombined for the final stages of treatment, including filtration, carbon adsorption, disinfection through ultraviolet radiation and chlorination.

Cascade operation is used to remove excessive dissolved gas levels in the raw lake water. Excessive dissolved gases are most commonly produced by photosynthetic bacteria and algae. During cascade de-gasification, the water falls over a series of steps which releases excess dissolved gasses and prevents the formation of gas bubbles in later treatment processes. Clarification and filtration processes could be impeded by gas bubbles that attach to particles of floc, causing them to float, rather than sink, and by causing air binding in the filters.

If conditions warrant, Powdered Activated Carbon (PAC) is added to reduce taste and odour. The use of PAC, while relatively infrequent, is occasionally necessary when the granular activated carbon contactors are off line or to temporarily reduce the odour loading when the contactors are online. PAC was last used in 2015.

Coagulation and flocculation are the next steps in the treatment process. Aluminum sulphate (alum), for the summer season, and polyaluminum chloride (PACl), for the winter season, is vigorously mixed with the water. In the process of coagulation, the alum and PACl neutralize surface charges on particulate matter contained in the water and forms a fluffy precipitate (floc) that entraps suspended materials such as algae and clay particles. The water is then stirred slowly in flocculation tanks to allow floc particles to become larger and denser prior to their removal.

The floc-bearing water then flows through clarifiers, where most (more than 95%) of the floc with its entrapped impurities is allowed to settle by gravity to the bottom while clear water is constantly removed from the top. Settled floc is removed from the clarifiers as sludge and is pumped to holding lagoons where it is further separated into clear water (returned to the lake) and solid sludge (removed for disposal).

Any floc that was not removed by clarification is separated in the filtration stage. Water is passed through mixed-media filters consisting of a top layer of coarse anthracite followed by successive layers of fine silica sand, and even finer garnet sand. Any remaining particulate matter or floc is trapped by the filters. Filters are cleaned by backwashing with clean water. The filtration step completes the removal of particulate impurities. The removal of dissolved organic impurities, which are responsible for



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taste and odour, is accomplished next in the carbon adsorption stage of treatment. Large rectangular tanks (contactors) contain Granular Activated Carbon (GAC) to a depth of three metres. Water is lifted by Archimedes screw pumps from the bottom of the filters and taken to the top of the contactors where it is allowed to flow by gravity down through the GAC. GAC contains many microscopic pores which adsorb dissolved chemical impurities. Water is in contact with the GAC for 30 to 80 minutes, depending on flow rates, and emerges freed of the dissolved organic materials which cause objectionable taste and odour.

The GAC filtration process at the Plant was designed for taste and odour removal and is used during periods of poor taste and odour in the raw water. The normal period of operation is from May until December.

The water will then go through one final process where it flows through the ultraviolet reactors as a final disinfection stage.

All stages of water treatment are now essentially complete. Prior to delivery by pipeline to the consumers, chlorine levels are adjusted, if necessary, to provide adequate disinfection and to counteract any possible contamination encountered during its travel to the Cities' reservoir and distribution systems. Water delivered to the City of Moose Jaw is also fluoridated during pumping when their equipment is functioning properly.

The carbon used in the contactors retains its effectiveness for taste and odour reduction up to seven months, after which time it must be regenerated or replaced. It was found to be cost effective as well as environmentally responsible to regenerate the spent GAC rather

than to discard it and purchase new. Regeneration is accomplished by heating the spent GAC to 850°C in an oxygen-free atmosphere contained in a fluidized bed gas-fired furnace. Spent GAC is transferred by pipeline as a slurry from the contactors to the furnace, regenerated to process specifications, and returned to the contactors for reuse. Carbon regeneration is usually performed at the Plant from mid-November to mid-April.

## ENVIRONMENTAL PROTECTION AND CONSERVATION

The Plant, like any large industrial facility, has the potential to affect the environment. The Plant has facilities in place to handle all process wastes including alum sludge, off gases from the carbon regeneration facility, laboratory wastes, various solid wastes generated by Plant operations, process wastewater and sewage. The Plant uses a considerable quantity of electrical energy in its operation. Conservation efforts give returns in the form of reduced demands on the environment and lower operating costs. Upgrades to the Lake Pump Station, which are currently under construction, to convert the pumps to variable frequency drives should also reduce power consumption at the lake.

A series of sludge lagoons are used in the treatment of the alum sludge waste stream. This form of sludge management can be very effective in ensuring that the sludge is not released to the environment. Sludge is exposed to a natural freeze-thaw cycle that dewateres it to produce a nearly dry, granular material which is transported to a landfill site. Buffalo Pound is one of the few water treatment plants in Canada with the ability to manage waste sludge in this manner.

## THE YEAR IN REVIEW CONTINUED

## RESOURCES (CONTINUED)

The natural gas-fired furnace in the carbon regeneration facility produces off gases which are thoroughly scrubbed before released to the atmosphere.

Waste disposal agencies are contracted to handle laboratory wastes and solid wastes generated by the Plant. As it becomes necessary, firms specializing in hazardous waste disposal are contracted to dispose of chemical wastes.

The Plant recycles fiber-based materials and metals.

Sewage generated by the Plant is pumped to treatment and evaporation lagoons located on Plant property. The primary lagoon has a geotextile fabric and bentonitic clay liner to prevent seepage.

## WATER QUALITY MONITORING

A well-equipped accredited laboratory is located on site and used to monitor the quality of raw and treated water as well as water quality at several intermediate steps in the treatment process. Major process control parameters (turbidity, pH, chlorine residual, particle counts, dissolved oxygen and temperature) are monitored continuously by instrumentation communicating with the Plant process computer system.

Analyses are performed in-house for parameters regulated on a daily to monthly schedule. For parameters required less often (most trace-level organics and metals), samples are sent to commercial laboratories. Analytical results are compared to Canadian Federal guidelines and to Saskatchewan Ministry of Environment (MOE) objectives. All criteria for safe drinking water were satisfied by the Plant in 2019.

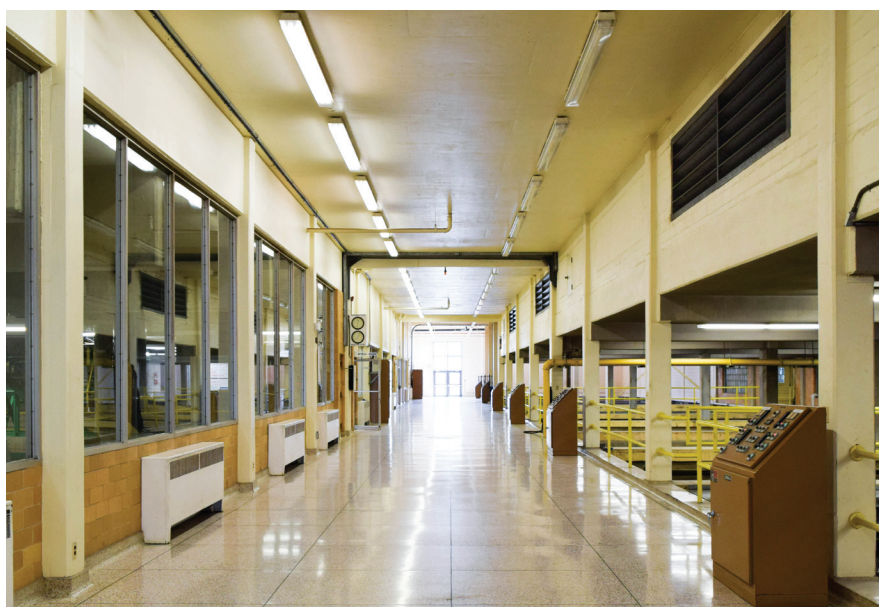
Analyses for a wide variety of physical, chemical, and microbiological parameters are performed in the Buffalo Pound Laboratory. Some 65 different constituents are routinely determined. The 2019 results are summarized in Appendix 1. Over the course of the year, those analyses exceeded 4,000 in number.

The quality of the regenerated granular activated carbon is monitored by Plant staff for a variety of physical and chemical parameters.

A vigorous in-house quality control program is maintained to ensure data generated by the Plant Laboratory is valid. The laboratory is accredited by the Canadian Association for Laboratory Accreditation (CALA) to ISO/IEC 17025 for 32 chemical and bacteriological parameters.

## THE YEAR IN REVIEW CONTINUED

# PLANT OPERATIONS AND MAINTENANCE



## WATER PRODUCTION

Monthly water production and potable water sales (in megaliters) were as shown in Table 1. (See also related Graphs 1 and 2.) Total annual potable water sales to the Cities in 2019 were 30,265.48 ML to Regina and 5,195.93 ML to Moose Jaw. Sales to Regina decreased 5.29% from 2018 and sales to Moose Jaw decreased 5.91%.

Sales to SaskWater Corporation in 2019 decreased by 4.88%, to 206.32 ML. Sales to SaskWater represent less than one percent of the Plant's production.

Graph 3 shows annual raw water withdrawal from Buffalo Pound Lake by year since the Plant began operation in 1955.

### 2019 WATER SALES IN MEGALITRES (ML)

TABLE 1

Month	Regina	Moose Jaw	SaskWater Corp.	Totals
January	2251.88	358.99	15.30	2626.17
February	2179.48	361.84	15.95	2557.27
March	2798.88	433.49	17.70	3250.07
April	2236.86	374.87	19.06	2630.79
May	2747.37	488.70	23.77	3259.84
June	3053.98	563.40	25.25	3642.63
July	2941.06	576.38	19.77	3537.21
August	3012.84	554.70	19.13	3586.67
September	2318.30	389.00	13.54	2720.84
October	2244.90	400.48	12.74	2658.12
November	2198.00	346.95	11.71	2556.66
December	2281.93	347.13	12.40	2641.46
<b>Totals</b>	<b>30,265.48</b>	<b>5,195.93</b>	<b>206.32</b>	<b>35667.73</b>

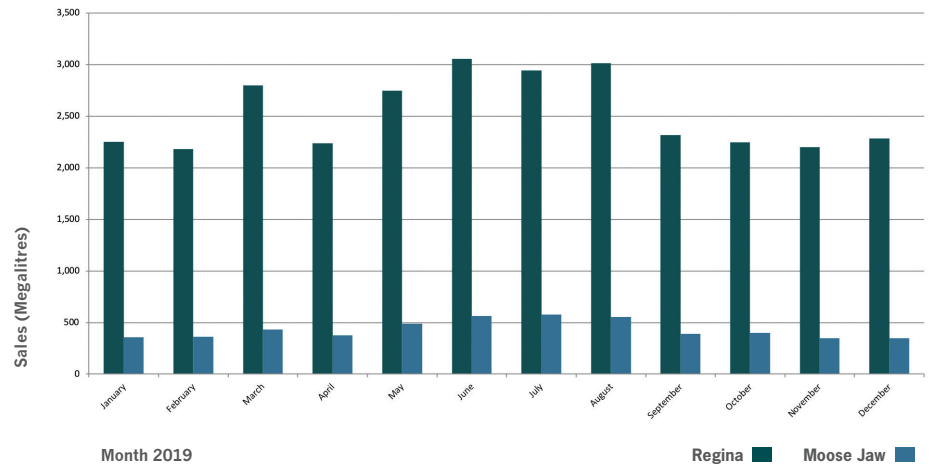


## THE YEAR IN REVIEW CONTINUED

## PLANT OPERATIONS AND MAINTENANCE (CONTINUED)

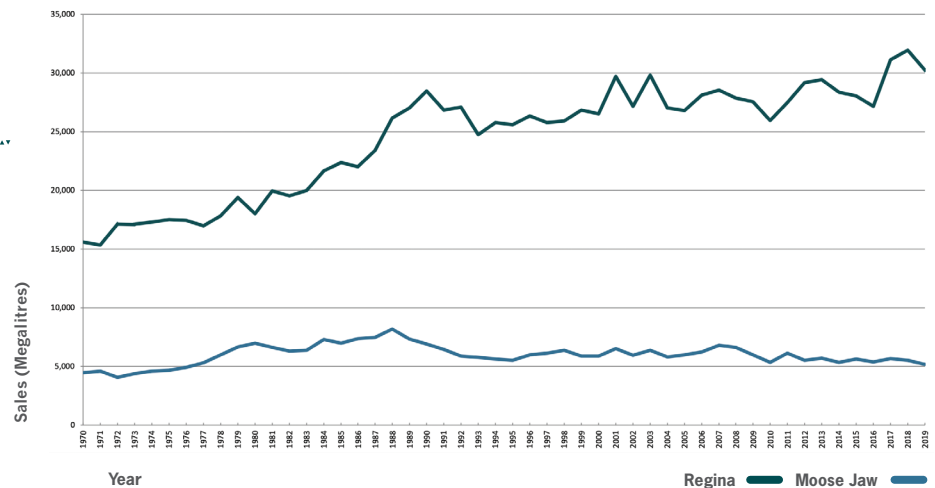
GRAPH 1

### MONTHLY POTABLE WATER SALES TO REGINA AND MOOSE JAW



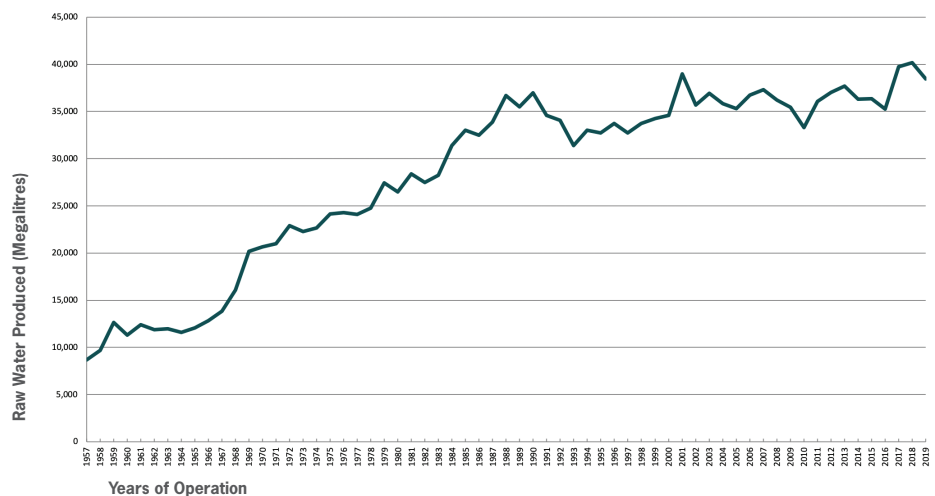
GRAPH 2

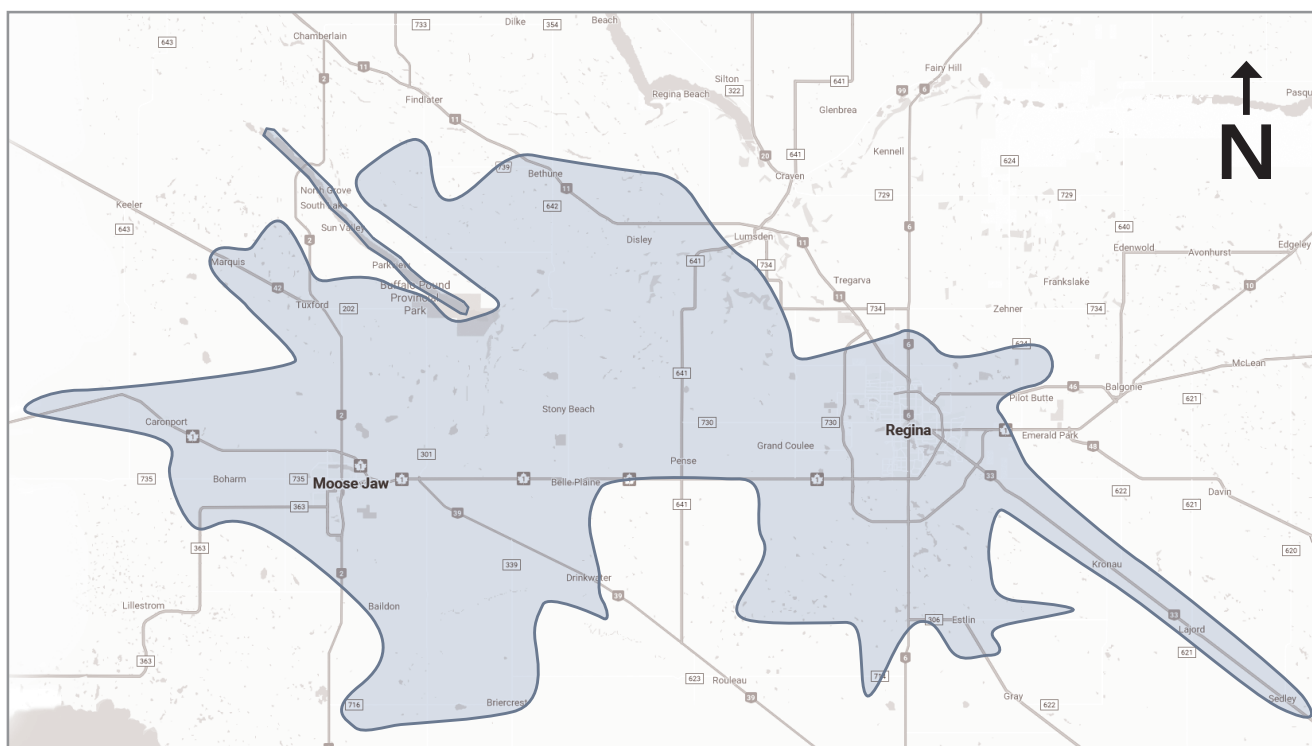
### ANNUAL POTABLE WATER SALES TO REGINA AND MOOSE JAW



GRAPH 3

### ANNUAL RAW WATER WITHDRAWN FROM BUFFALO POUND LAKE





## BUFFALO POUND REGIONAL WATER SYSTEM SERVICE AREA

A map representing the Region where over 260,000 people obtain their potable water from the Buffalo Pound Water Treatment Plant.

## PLANT OPERATIONS

The processes employed at the Plant are modified during the year as required by changing water quality in Buffalo Pound Lake. Ice came off of Buffalo Pound Lake on April 17<sup>th</sup>. The lake froze over October 26<sup>th</sup>.

Lake water quality continued to improve in terms of Dissolved Organic Carbon (DOC) and mineral content. Average DOC concentrations declined to 5.5 mg/L from 6.0 mg/L & 7.6 mg/L in 2018 and 2017 respectively. Furthermore, the character of DOC continues to change to a less humic form. This has resulted in a continued reduction in the production of trihalomethanes in the treated water.

Trihalomethanes (THMs) at the Plant averaged 36 µg/L (weekly analyses); as compared to the 38 & 50 µg/L annual averages produced in 2018 and 2017 respectively. Most of this THM reduction is due to the reduced formation of the brominated forms of THMs [Bromodichloromethane ( $\text{CHBrCl}_2$ ), Dibromochloromethane

( $\text{CHBr}_2\text{Cl}$ ) and Bromoform ( $\text{CHBr}_3$ )]. This reflects the lower mineral content of Buffalo Pound Lake. Bromide occurs naturally in lake water as a result of local run off and ground water intrusion. Bromide is oxidized by aqueous chlorine to hypobromous acid and can then react to form the brominated forms of THMs. Chloroform ( $\text{CHCl}_3$ ), which is most impacted by the character and concentration of the DOC, has not changed significantly over the last 2 years.

The granular activated carbon contactors (GAC) were put into operation May 27<sup>th</sup>. They remained in service until January 2, 2020.

Cold water temperatures bring about different problems for water treatment. The kinetics of alum coagulation is much slower in cold water, so the Plant used a Polyaluminum Chloride coagulant from March 28<sup>th</sup> until May 29<sup>th</sup> and again after December 12<sup>th</sup>. Polyaluminum Chloride forms a better floc somewhat faster than

alum, which benefits the Plant in terms of reduced chemical addition and residuals production. Another benefit from Polyaluminum Chloride use is that the finished water is of slightly higher pH and so is somewhat less corrosive. The Plant does not have provision for the addition of alkaline chemicals that could raise the pH of the treated water to more appropriate levels.

A cationic polymer was added as a flocculent aid at doses that ranged 0.1 – 0.15 mg/L. This treatment is done to strengthen floc interbridging and resist zones of high shear within treatment equipment and clarifier short-circuiting.

There were no major production events that occurred where the Owners' demands were not met. There were three minor events: loss of power, thermal gradients and mechanical failure which occurred for several hours.

The peak production of 164.9 ML occurred on July 23<sup>rd</sup>.

## THE YEAR IN REVIEW CONTINUED

### PLANT OPERATIONS AND MAINTENANCE (CONTINUED)

#### CARBON REGENERATION FACILITY

The carbon is regenerated during the winter so that it can be used to remove taste and odour from the water the following summer. The 2018/2019 regeneration season was from November 12, 2018 to March 24, 2019. The 2019/2020 regeneration season commenced November 19, 2019.

#### WASTEWATER FACILITY

The clarifier underflow removes particulate matter (alum sludge) from the raw water. The effluent stream is directed to sludge lagoons where the sludge is deposited and the clear water overflow returns to Buffalo Pound Lake. The sludge from the stockpile location was removed and sent to the Moose Jaw landfill. The sludge from one lagoon was excavated to the stockpile location.

#### MAINTENANCE AND CAPITAL PROJECTS

Effective maintenance plays a key role in keeping the Plant running efficiently and producing high quality water. All vessels are drained, cleaned and inspected at least annually. All critical Plant equipment is inspected, tested and maintained at least annually to help ensure satisfactory operation during peak flow demands. All water quality monitoring instruments are calibrated on a periodic basis and the results are verified by laboratory testing.



THE YEAR  
IN REVIEW  
CONTINUED

CAPITAL PLAN

PLANT CAPACITY

The two primary measurements of Plant Capacity are Firm Capacity and Total Capacity. Plant Capacity is commonly used in context of Firm Capacity. Firm Capacity is the capacity factoring the smallest bottleneck in the Plant without redundant equipment. However, some equipment uses its redundancy due to its extremely reliable nature. This was done on an equipment by equipment basis throughout the Plant to arrive at the Firm or Plant Capacity of 205 MLD.

The Plant distributes water to the City of Regina, the City of Moose Jaw, SaskWater, Buffalo Pound Provincial Park and the Buffalo Pound Water Treatment Plant Truck Fill. Plant Demand is the total water taken by these users. SaskWater, Buffalo Pound Provincial Park and the Buffalo Pound Water Treatment Plant Truck Fill represent a fraction of a percent of total flows.

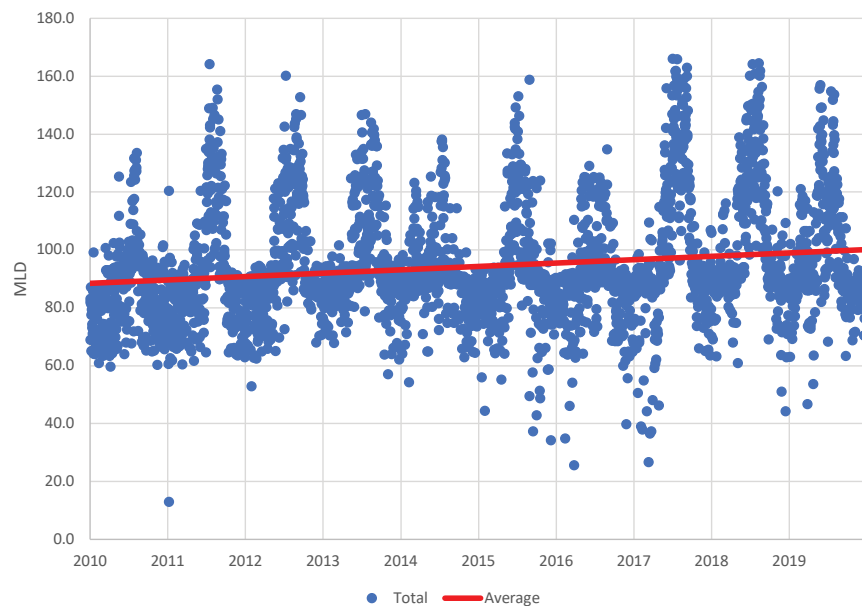
Diurnal fluctuations within each City are managed through the use of reservoirs in each City, thus the Plant Capacity is designed around daily demands. Water demand is

tightly correlated to population. An examination of the data for both Cities shows that with an increasing population, water demand has only increased marginally. This is attributed to the efforts of each City and their respective water conservation strategies.

Ideally, a plant is designed such that it will achieve capacity at the end of its useful life. The last capacity expansion was in 1989, some 30 years ago. This is beyond the lifespan of most mechanical, electronic and electrical assets. Using 175 MLD as the current demand, the Plant is at approximately 85% of its capacity.

There can be considerable variance errors in the estimation of future growth and per capita usage. The variances are due to the unpredictable nature of local economies and population dynamics. Assuming per capita consumption stabilizing at 2019 levels and a moderate population growth, as provided by each City, it estimated that the Maximum Daily Demand may equal Firm Capacity in approximately 2037.

BPWTP WATER DEMAND  
2010-2019





## THE YEAR IN REVIEW CONTINUED

### CAPITAL PLAN (CONTINUED)



### CAPITAL PROJECTS

Capital Projects are infrastructure projects that may increase capacity, improve performance or renew the lifecycle of an asset or group of assets. These projects are typically undertaken when the scope cannot be performed with internal staffing and resources. The Board of Directors formed a

committee to oversee the Capital Projects at the Portfolio level. The Capital Projects Committee currently oversees the Plant Renewal Project, Quality Management System, Computerized Maintenance Management System, SCADA, Chlorine Safety Upgrade, Lake Pump Station Renewal and the Lake Pump Station Power Line Replacement.

## PLANT RENEWAL PROJECT

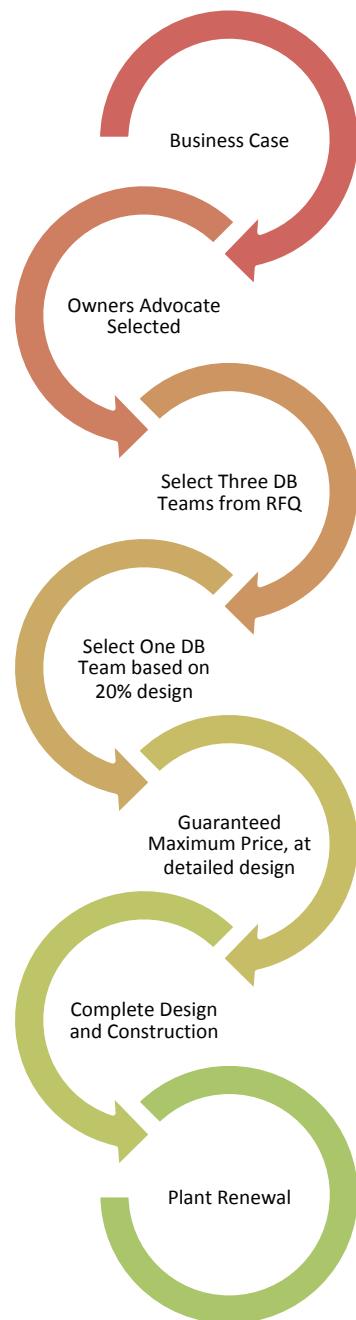
Over the last ten years, assessments and analysis primarily conducted by engineering consultants have identified a growing body of risks. The risks are related to the Corporation's ability to meet its mandate. Most significant risks stem from aging assets, limited ability to treat dynamic raw water conditions, achieving process wastewater discharge regulatory requirements, and meet future regulations.

At the conceptual level in 2014, the total work required at the Plant was estimated to exceed \$150 million.

The value of this renewal program was conceptually approaching the value of a new water treatment plant. It was prudent for the Board to objectively evaluate options to determine the optimal approach to address these needs. To that end, a financial consultant was retained to develop a Business Case Strategy, which in turn was used to retain a consultant to develop a Business Case for the sustainment or renewal of assets best capable of delivering treated water to Corporation's customers.

The Corporation retained the services of Jacobs to perform a business case to objectively evaluate the range of investment options and provide direction on the delivery method using a Value for Money analysis. The major findings from this Business Case were that the Progressive Design Build (PDB) procurement method was the most advantageous for the Corporation to use and that the scope of the Plant Renewal Project will fall between a new water treatment plant built to meet future capacity, or a complete renovation that would allow for an expansion when it is required.

The Plant Renewal Strategy was that three PDB teams (engineering consultant(s) with a general



## THE YEAR IN REVIEW CONTINUED

### CAPITAL PLAN (CONTINUED)

contractor(s)) would be selected to use their collective strengths to find a solution for the Plant Renewal Project. The team with the best overall score at the 20% design phase would be selected to complete the design. A Guaranteed Maximum Price (GMP) would be obtained near the end of the design phase. The Corporation has the ability to accept the GMP and commence construction, or the Corporation can reject the GMP, and complete the project as a Design Bid Build.

The Plant Renewal Project will cost somewhere between \$127 and \$224 million.

A Request for Qualifications (RFQ) was released in October 2018. The RFQ established the process for soliciting and evaluating Statements of Qualifications (SOQs) from those entities (Respondents) interested in serving as the Design-Builder. The SOQs were received November 23, 2018, and were reviewed and evaluated in accordance with the provisions of the RFQ to develop a shortlist (Shortlist) of qualified Respondents (Shortlisted Respondents). Only those Respondents selected as Shortlisted Respondents were issued a Request for Proposals (RFP) and invited to submit a proposal in response to the RFP.

The RFP, released May 6, 2019, solicited detailed technical and cost proposals (Proposals) from the shortlisted respondents. It provided the Project technical requirements, detailed requirements for preparing the Proposals, the relative weighting of technical and cost proposals, and the process by which the Proposals will be evaluated, among other matters. The draft Design-Build Agreement (DBA) forms

part of the RFP. There were three confidential meetings with each of the proponents, 73 Requests for Information and dozens of technical reports were developed and issued to the proponents. Two proposals were received December 20, 2019. Award is expected by March 2020.

## OTHER PROJECTS

Construction on the Lake Pump Station Power Line was commenced in November, 2019. The new power line will be completed in March 2020.

The Lake Pump Station Renewal construction contract was awarded. Similar to the Main Plant Substation project, this project includes a new substation and generators. This project also includes upgrades to the pumping system. It is anticipated that construction will be completed in October 2020.

The equipment supply procurement process for the Control System Upgrade Project was started in 2019 and is currently under review. The project is planned to be completed in 2021.

THE YEAR  
IN REVIEW  
CONTINUED

PLANT SAFETY

PLANT SAFETY

The Safety Management System (SMS), which received its Certificate of Recognition (COR) in 2018, continued to function well for the Corporation. The Corporation passed its internal audit in 2019.

As programs, processes and procedures continue to change or be developed, staff are trained accordingly prior to implementation. Weekly Tool Box meetings continue; 44 different sessions were conducted in 2019. Bi-monthly staff meetings continue to have a safety component in them combined with Corporate objectives and initiatives.

The Safety Association of Saskatchewan Manufacturers (SASM) continues to be the safety association with whom the Corporation has an active membership.

This membership provides the Corporation with valuable training, resources and guidance in the continued development of the Safety Management System.

The Corporation is now looking into adding more application-based safety tools for staff to use to both benefit interaction and effectiveness as well as to collect more information to drive continuous improvement initiatives.

The Corporation had zero lost time incidents, zero first aid injury/illness, zero near misses and one no-lost time incident from a third party.



## THE YEAR IN REVIEW CONTINUED

# RISK REVIEW

## RISK REVIEW

The Corporation operates within a complex environment and is exposed to a variety of risks that can impact the ability of the Plant to achieve its mandate. The Corporation's Board and Management Team manages risk through a formal risk management framework. The Corporation's risk management framework is designed to address the top business and asset risks that could arise from internal and external sources.

The Corporation implements the risk management framework through a risk management process to identify, analyze, evaluate and treat risk. The Management Team is responsible for identifying, analyzing and evaluating risks. The Board is responsible for reviewing the top risks and determining if the appropriate controls and mitigations are in place and evaluating the effectiveness of the risk management framework.

The Corporation risk assessment process considers the entire system from the source water to the customer boundary. The following is a description of the types of risks the Corporation manages.

## AGING INFRASTRUCTURE

Since the Plant was first constructed and started operating in 1955, there have been combinations of expansions and upgrades. As the Plant and infrastructure age, there is a risk of increased failure that could impact services, compromise regulatory compliance or increase operations and maintenance costs.

## REGULATORY CHANGES

The supply of drinking water requires strict compliance with health, safety and environmental regulations. Federal and Provincial regulators continually review and update regulations. There is a potential that changes in regulations will require investment in new treatment processes, or upgrades to existing infrastructure and increase operation and maintenance costs.

## THIRD PARTY INFLUENCES

Damages, or other negative influences, are a consistent source of risk for water supply organizations. A power supply interruption, damages to infrastructure and contamination of the watershed could cause service impacts, compromise regulatory compliance or increase operations and maintenance costs.

## CLIMATE AND WEATHER

Extreme, and even more modest changes in climate and weather, are potential sources of risk. An increase in frequency or intensity of such events could cause service impacts, compromise regulatory compliance, increase investment in infrastructure resiliency, or increase in operations and maintenance costs.

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## GENERAL BUSINESS

There are several types of risks that could arise that the Corporation views as part of its general business. These include general economic conditions, human resource management, reputation, purchasing and information systems. While the cause and consequence for each are different, there is the potential for any of these risks to have financial and non-financial impacts on the Corporation.

In addressing risks that arise, the Corporation uses several strategies that include:

- Capital Investments
- Operations Procedures
- Enhanced Maintenance
- Emergency Response Plans
- Communication with Third Parties
- Transfer of Risk

In 2019, there were 35 active risks. However, many of these risks will be mitigated through the Board's actions relating to Capital Investment; Operational Procedures, Enhanced Maintenance, Emergency Response Plans, Communications and Risk Transference.

The Risk Profile decreased from 2,185 in 2018 to 2,002 in 2019. The decrease is mainly from the mitigation of some of the more severe risks by the Board and Management. These risks are reviewed with regards to the likelihood and consequence over time.

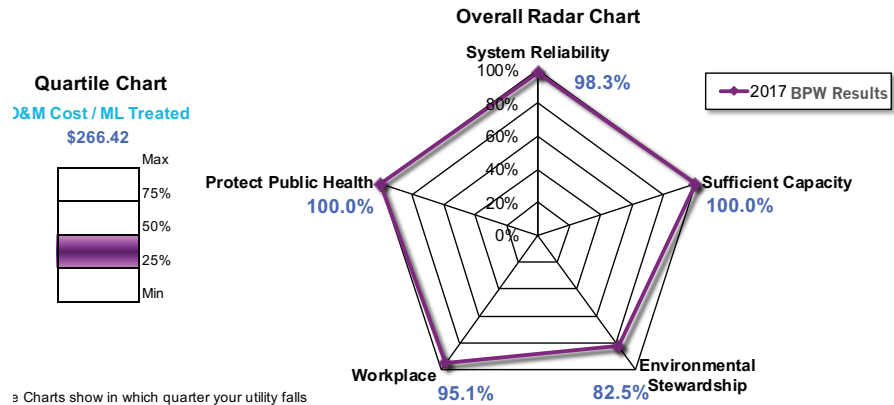
## ASSET MANAGEMENT

In consideration of the Plant Renewal Project, wherein the majority of the assets will be renewed, the Corporation has adopted a risk-based approach for managing the assets for their remaining life. The assets representing greatest risk to the organization were identified and appropriate risk mitigation strategies were put in place including monitoring, refurbishment and renewal. The Computerized Maintenance Management System (CMMS) has been fully implemented and is being used to optimize maintenance activities.



## OVERALL RADAR CHART

2017 Results



## GOALS

### Provide Reliable Service and Infrastructure

5 year Average Capital Reinvestment / Replacement Value  
# of Unplanned Hours that Plant Could Not Operate at Rated Capacity  
Unplanned Maintenance Hours / Total Maintenance Hours

### Protect the Environment

% of Water Wasted During Treatment Process  
GHG Emissions from Energy Consumed / ML Treated

### Protect Public Health

# of days over Group Target for Turbidity  
# of days with Total Coliforms  
# of days over Group Target for Nitrates

### Ensure Adequate Capacity

ADD / Existing Licence Capacity  
# of Days Plant Operated at >100% Capacity

### Provide Safe and Productive Workplace

# of sick days taken per O&M employee  
# of O&M Accidents with Lost Time / 1,000 O&M labour hours  
# of Lost Hours due to O&M Accidents / 1,000 O&M labour hours



## THE YEAR IN REVIEW CONTINUED

### KPIs (CONTINUED)

## 2019 KEY PERFORMANCE INDICATORS

The Corporation uses internal KPIs which are based on targets established by the Board, NWWBI results or regulatory requirements. These are reviewed annually by the Board with the targets being adjusted accordingly.

The KPIs are rated based on a comparison of the Plant's score versus the target. These are used to make decisions internally.

The actual KPIs have been included in the Strategic Plan which is available to the public.

All items on the Balanced Scorecard are on track or have been completed, with the exception of:

- (i) There were two unexpected service interruptions of 4.5 hours due to thermal gradients in July and 14 hours with a loss of power in September.
- (ii) The Board developed a draft Financing Strategy and obtained input from the Cities' Finance Directors. The decision was made to delay approving the Financing Strategy until greater cost certainty was done by advancing the Plant Renewal Project to the 20% design and obtain a Class 3 estimate. This should be completed in Q1 2020.
- (iii) The Customer Service Agreements (Water Access and Supply) between the Corporation and Cities should be completed in early 2020.

### WATER QUALITY:

Objective – meets regulatory requirements and customer expectations 100% of the time.

### WATER QUANTITY:

Objective - to deliver water that meets customer demand 100% of the time.

### RENEWAL PROJECT:

Objective – Successful achievement of all aspects of this massive undertaking to transform the Plant's ability to deliver, meeting its mission and vision.

### CRITICAL PROJECTS:

Objective – Critical projects are delivered.

### SAFETY CULTURE:

Objective – To operationalize plant-wide a Safety Management System.

### PEOPLE DEVELOPMENT & PERFORMANCE:

Objective – To design, implement, and monitor people development and performance processes plant-wide.

### COMMUNICATION & MANAGING CHANGE:

Objective – To evolve all communication and project management processes plant-wide.

### BOARD GOVERNANCE:

Objective – To continue to evolve board governance effectiveness.

### FUNDING SOURCES:

Objective – Establish funding sources into the Corporation.

### FINANCIAL OPERATING PERFORMANCE:

Objective – To meet budget variance targets.

### RISK MANAGEMENT:

Objective – To manage risk and take action on risk items.

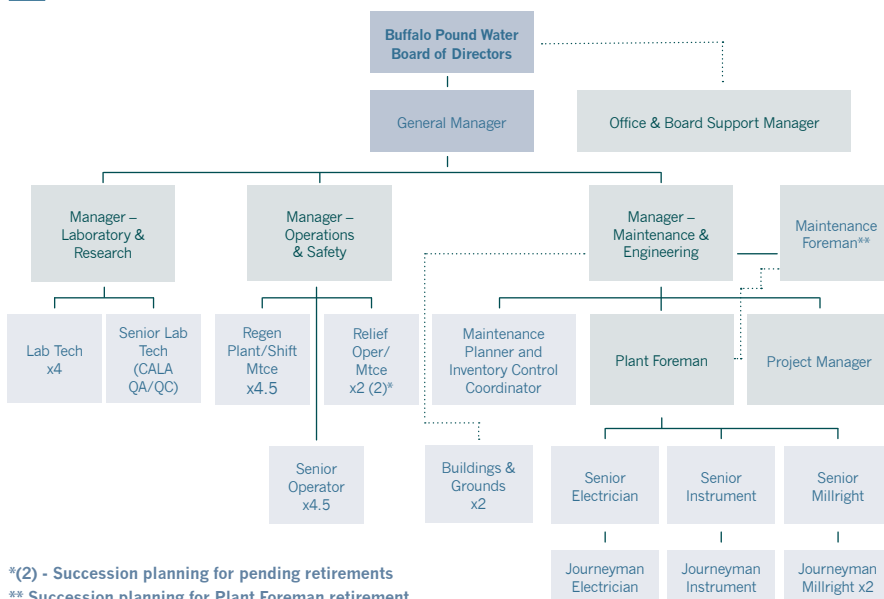
### ASSET MANAGEMENT:

Objective – To adopt a formal asset lifecycle management approach.



December 2019

## BUFFALO POUND WATER ORGANIZATIONAL CHART



\*(2) - Succession planning for pending retirements  
 \*\* Succession planning for Plant Foreman retirement

## THE YEAR IN REVIEW CONTINUED

## HUMAN RESOURCES

## HUMAN RESOURCES

In 2019, the Plant employed a total permanent staff of 36, consisting of eight (8) out-of-scope staff, nine (9) operating staff, five (5) laboratory technologists, seven (7) journeyman maintenance persons, five (5) maintenance persons, and two (2) buildings and grounds staff. Included in the staff complement are three (3) developmental positions for succession planning for the current senior operations staff and to support other personnel changes within the Corporation.

The in-scope staff is represented by UNIFOR Local No. 595.

The Collective Bargaining Agreement expired December 31, 2019.

There were 2 staff retirements in 2019 and 1 staff member's employment was terminated.

Staff at the Plant participate in the Regina Civic Employees Pension Plan.



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## WATERSHED PROTECTION

The Corporation continues to be involved in consultation processes dealing with watershed protection in the Upper Qu'Appelle River and Buffalo Pound Lake.

## MISCELLANEOUS

The General Manager attended the Windows on Ottawa conference in Ottawa, ON and the National Water and Wastewater conference in Banff, AB as a Board member of the Canadian Water and Wastewater Association.

The General Manager; Research & Laboratory Manager and the Project Manager attended the Western Canada Water and Wastewater Association conference in Edmonton, AB.

The Maintenance and Engineering Manager attended the National Water and Wastewater Benchmarking Initiative workshop in Halifax, NS.

The Operations & Safety Manager attended the Saskatchewan Safety Council annual conference in Regina, SK.

The Plant Foreman and four staff members attended the Saskatchewan Water and Wastewater Association annual conference in Saskatoon, SK.



## THE YEAR IN REVIEW CONTINUED

## RESEARCH

### RESEARCH AND ANALYTICAL PROGRAM PROCESS DEVELOPMENT

#### Process Development

A major research study to examine alternative processes that reduce the production of trihalomethanes was completed in 2018. The report entitled “Reduction of Trihalomethanes: Evaluation of Alternative Treatments” recommended that removing prechlorination would be the easiest and least expensive modification to reduce THM formation. In 2019, management has prepared the Plant and operations to remove prechlorination from the treatment process. Prechlorination will be ceased in early 2020. Pre and post removal of prechlorination THM and Haloacetic Acid (HAAs) concentrations continue to be monitored to confirm the study’s findings in full scale operation.

#### Source Water Quality

The Buffalo Pound Water Treatment Corporation has supported, and contributed, to the research undertaken by Dr. Helen Baulch from the Global Institute for Water Security at the University of Saskatchewan since 2014. The research project entitled “FormBloom” has provided benefits for the Corporation that include: development of forecasting tools and ongoing deployment of sensor-based buoy technology; assessment of seasonal changes in lake water quality affecting Plant operations; improved characterization of the suite of cyanobacterial toxins present, and timing of toxin occurrence; characterization of long-term changes of biomass and turbidity associated with climate change; and a greater understanding of the drivers of ecological change.

In 2019, the Corporation committed in-kind and financial resources in support of a three year grant

renewal that will allow Dr. Baulch to continue FormBloom research through 2022. The next phase of work will evaluate potential changes in source water quality that may impact future Plant design.

#### Lagoon Residuals

In 2017, a wastewater regulatory limit for total suspended solids (TSS) was introduced to the Plant’s Permit to Operate. Currently, the Plant’s process waste lagoons effluent does not meet the TSS limit 100% of the time. In November 2019, the laboratory began bench scale evaluations of adding high molecular weight cationic polyacrylamide polymers (CPAM) to clarifier sludge. Clarifiers are the main source of waste solids produced by the water treatment process.

The purpose of the investigation is to explore additional treatment applications to enhance settling, dewatering and compression of clarifier solids in the settling lagoons so as to reduce the number of TSS non-compliances of lagoon effluent.

Bench scale testing has demonstrated that adding CPAMs to both alum and polyaluminum chloride clarifier solids enhances aggregation and substantially promotes settling and dewatering of the solid particles compared to not using polymer.

Freeze drying of sludge in a quiescent lagoon is necessary to further dewater and compress a prior layer before the lagoon can be placed back into service. This process was also tested on solids with, and without, polymer. Results suggest that CPAMs do not interfere with freeze drying and dewatering after thawing. These freeze-dried solids also maintain a hydrophobic characteristic, as does aluminum based solids without polymer.

Further testing of potential benefits of polymer(s) addition to better



## THE YEAR IN REVIEW CONTINUED

## RESEARCH (CONTINUED)

manage clarifier sludge will continue in 2020. It is hypothesized that in full scale operation, the enhancement of settling, dewatering and compression of polymer induced sludge may increase the number of TSS compliances of lagoon effluent by making the settled sludge less susceptible to disturbances caused by high winds and wide variations of influent flow rates. An engineering design and cost estimate for a full scale mixing and injection system will also be sought.

While the above is an interim solution, the Plant Renewal Project will provide a long term solution by ensuring the lagoons are sized appropriately.

## ADDITIONAL WATER QUALITY MONITORING

### Raw Water

The analyses required in the Permit to Operate on treated water represent only a portion of those carried out at the Plant. Staff also carry out regular monitoring of raw water quality as this would provide early warning of chemicals that could impact treated water quality. This work was contracted out to a laboratory capable of providing analyses as low as parts per trillion. Ninety-three pesticide and herbicide compounds were tested for. Most of those are without Health Canada Guidelines. Various anthropogenic compounds (47 in total), such as pharmaceuticals and personal care products, were also tested for. The laboratory also conducts regular analyses throughout the year for benzene, toluene, xylenes and ethylbenzene that would indicate spilled gasoline or diesel fuels. Thus far, Buffalo Pound Lake does not seem impacted to any level of concern for the above suites of chemical pollutants.

### Residuals Treatment - Lagoons

Solids recovered from the clarification processes are settled out in lagoons and ultimately taken to the Moose Jaw landfill for disposal. The lagoons were designed and constructed over 30 years ago when Plant flows were lower. Regulatory limits of effluent quality also did not apply. With the introduction of a regulatory monitoring and compliance schedule in 2017, the effluent remaining after treatment is monitored weekly for solids and chlorine. Total and dissolved aluminum are measured monthly. Twice a year samples are sent for acute toxicity evaluation. Results of these analyses are reviewed by the Water Security Agency.

The effluent samples did not demonstrate acute trout toxicity. However, solids and chlorine analyses from the lagoon overflow indicate that the lagoons do not always meet quality requirements. The 2019 compliance score card for solids, free chlorine, and total chlorine were 64%, 96% and 30% respectively. The causes of non-compliance include solids and hydraulic overloading, poor overflow design, no underdrains, and not controlling for wind effects. The deficiencies in residuals handling have been recognized in engineering studies and lagoon improvements have been identified as a requirement in the future Plant upgrade. Until a redesign can be completed and implemented, with the Plant Renewal Project, management has been taking steps over the past year to reduce wastewater volumes and decrease effluent overflow rates to maximize solids settling times.

### Watershed Monitoring

Monitoring of the Upper Qu'Appelle River watershed, including Buffalo Pound Lake, is typically carried out on an annual basis. In 2019, two sampling episodes were carried out to examine expected changes



resulting from different flow rates in releases from the Qu'Appelle Dam. During the May survey, ten sites were sampled. They included Lake Diefenbaker via the Riverhurst Ferry, six locations throughout the reach of the Upper Qu'Appelle River, the west arm of Buffalo Pound Lake, the Plant's raw water intake and the Buffalo Pound Lake Dam at the east end of Buffalo Pound Lake. The second survey conducted in September was restricted to six locations which included the Qu'Appelle Dam, the bridges at Eyebrow, Keeler & Marquis, the west arm of Buffalo Pound Lake, and the raw water intake.

Releases from the Qu'Appelle Dam were highest for the year at  $11 \text{ m}^3/\text{sec}$  from around April 8<sup>th</sup> to May 20<sup>th</sup>. Flow was reduced to  $\sim 7 \text{ m}^3/\text{sec}$  the week of May 27<sup>th</sup> and just prior to collection done during that week. Surprisingly, concentrations of suspended solids through the Upper Qu'Appelle river were less than average. As expected, suspended solids were above normal in the west arm of Buffalo Pound Lake which functions as a solids settling area. Suspended solids were near average at the other two Buffalo Pound Lake sites. Total phosphorus levels in the May collections were at or below average at all ten locations. Normally, high flow rates within the Upper Qu'Appelle River cause progressively higher levels of suspended solids and total phosphorus due to erosion of light soils in the river channel and as water travels through the Qu'Appelle Dam to Buffalo Pound Lake. Phosphorus is a nutrient that promotes the growth of cyanobacteria.

Releases from the Qu'Appelle Dam were reduced to  $\sim 2.4 \text{ m}^3/\text{sec}$  during the second week of September with sampling being done the week of September 23<sup>rd</sup>. Concentrations of suspended solids and total



phosphorus were above average in both Buffalo Pound Lake sites. Total phosphorus concentrations from Lake Diefenbaker and through the Upper Qu'Appelle River were at, or below, average.

Sampling for various pharmaceuticals and anthropogenic compounds was also carried out during the May sampling. A variety of herbicides used for broad leaf weed control were detected in the west arm of Buffalo Pound Lake and at the Plant intake. There were two herbicides found with average concentrations: 2, 4 D (39 parts per trillion) and Fluroxypur (33 parts per trillion). Diazinon is an insecticide used in agriculture to control insects on fruit, vegetable, nut and field crops and was detected (12 parts per trillion). All of these compounds were found at concentrations many orders of magnitude less than drinking water guidelines; for example, in the case of 2, 4 D, found at the highest concentrations,  $\sim 2500$  times less. None of the above compounds were detected in treated water analyzed during the summer as shown in the Compliance Report.

Only one compound associated with wastewater was detected at the west arm of Buffalo Pound Lake N,N-diethyl-meta-toluamide, better known as DEET with a concentration of 15 parts per trillion.

For a sixth summer, a buoy with various water quality sensors was deployed near the Plant's water intakes by the University of Saskatchewan team lead by Dr. Helen Baulch. Data from this buoy continued to aid understanding of what triggers rapid changes to water quality parameters influenced by wind speed and cyanobacteria counts.

The laboratory at the Plant has been analyzing many components of raw and treated water over the years. The database of Buffalo Pound Lake water quality extends from 1969 to the present. The database of the Upper Qu'Appelle River Watershed, which includes Lake Diefenbaker, covers the years from 1979 to the present. These long-term databases prove very useful to various government agencies including the Water Security Agency.

## THE YEAR IN REVIEW CONTINUED

## BUDGET

### OPERATIONS BUDGET

The 2019 water rate for the Cities of Regina and Moose Jaw increased by 2.90% from the 2018 rate to \$355.00 per megalitre. The electrical rate was set at \$0.11089 per KWH for 2019; an increase of 3.00% from 2018.

The Cities of Regina and Moose Jaw forecasted water sales of 29,200 ML and 5,350 ML respectively. Actual water sales were up 3.65% from Regina's and down 2.88% from Moose Jaw's water sales forecasts.

Total water sales to the Cities in 2019 were 30,265.5 ML to Regina and 5,195.9 ML to Moose Jaw. Sales to Regina decreased 5.29% (from 2018 actuals) and sales to Moose Jaw decreased 5.91%.

Operations at the Plant resulted in a surplus of \$1.7 Million in 2019. Water sales generated \$13.3 Million in revenue and expenses were \$11.6 Million.

The largest contribution to the surplus was the sale of water being higher than forecasted due to the weather and higher demand, earlier in the year. The actual expenses were under budget by \$0.9 Million. The bulk of the cost savings was due to lower chemical usage as there was continued improvement in the raw water quality during the year.

The Board of Directors has set a target of \$2 Million for the operating reserve. The reserve may be used if deficits are incurred during periods of low water demand.

Audited financial statements are contained in Appendix 2. Graph 4 on the following page summarizes operational expenses for 2019 as a percent of the total budget.

### CAPITAL BUDGET

The 2019 Capital Water Rate was \$188.00 per megaliter. There was no increase from 2018. The Capital Water Rate is projected to increase to approximately \$375.00 per megalitre by 2024 to fund necessary projects.

The Capital Budget started the year with \$55.3 Million in reserves. Total Capital revenues of \$9.3 Million were realized with the Capital Water Rate, proceeds from the PTIC-NRP Grant, and interest earnings. The amount spent on capital projects in 2019 was \$19.6 Million.

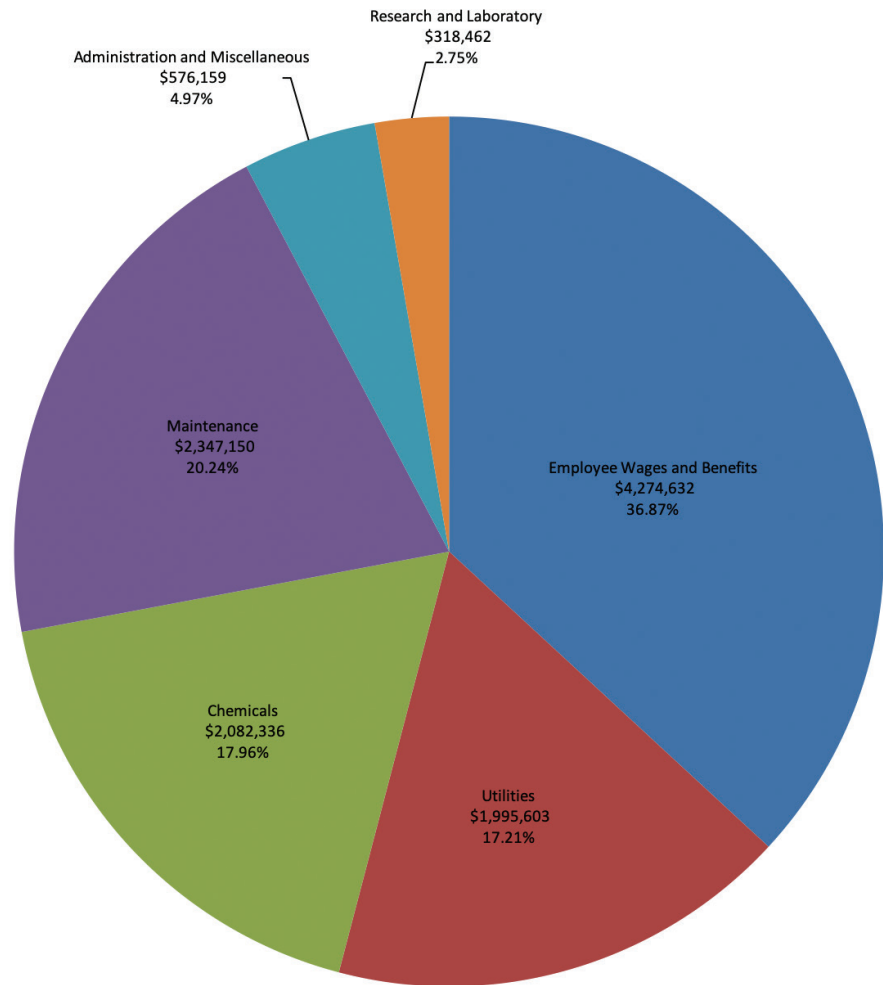
At year end, \$33.3 Million was carried forward into 2020 to complete projects initiated in 2019. The total Capital Reserve Balance is \$45.0 Million.

Any unallocated Capital Reserve funds will be allocated to the Plant Renewal Project to reduce the amount of financing required.

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## EXPENSES SUMMARY

GRAPH 4











# APPENDICES

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2019

## APPENDIX 1 WATER QUALITY ANALYTICAL DATA – 2019

- Drinking Water Quality and Compliance Report for 2019
  - Raw and Treated Water Analysis
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## APPENDIX 2 AUDITED FINANCIAL STATEMENTS – 2019

[illegible]

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## WATER QUALITY STANDARDS – BACTERIOLOGICAL QUALITY

According to its Permit to Operate a Waterworks the Buffalo Pound Water Treatment Plant is required to analyze one sample every week from the treated water for Bacteriological Quality. Results of that sampling follow. All required samples were submitted over the year, none of which had detectable coliform or background organisms.

Parameter	Limit	Number of Samples Submitted	Number of Samples Exceeding Limit
Total Coliforms	0 per 100 mL	52	0
Background Organisms	<200 per 100 mL	52	0

## WATER QUALITY STANDARDS – FILTER TURBIDITY

The Buffalo Pound Water Treatment Plant is required to monitor the effluent turbidity from all twelve filters on a continuous basis. The turbidity from each individual filter shall be less than 0.3 NTU, 95% of the time. The turbidity shall not exceed 0.3 NTU for more than 12 consecutive hours and shall never exceed 1.0 NTU. If, on those occasions when the monthly average of the source water turbidity is less than 1.5 NTU, the water turbidity levels from each filter must be less than 0.2 NTU, 95% of the time, the turbidity will not exceed 0.2 NTU for more than 12 consecutive hours and shall never exceed 1.0 NTU.

This Plant's SCADA Control System automatically generates an alarm if a filter effluent turbidity exceeds 0.3 NTU. If the turbidity exceeds 0.4 NTU at any time, the Plant's SCADA Control System automatically closes the filter effluent valve, turning off the filter. The Plant's operating permit requires online turbidity monitoring on the effluent of each of its twelve filters. A problem with the turbidity monitor or data transfer system to the Plant's SCADA requires a shutdown of the affected filter. To address this possibility the Plant has a second independent turbidimeter on each filter so that continuous monitoring can be maintained even if the first turbidimeter fails. A fault condition on any one turbidimeter will also generate an alarm.

## WATER QUALITY STANDARDS – FLUORIDE

The Buffalo Pound Water Treatment Plant did not add fluoride to the water pumped to the City of Moose Jaw in 2019. Operation of the fluoride feeder was terminated the first week of October in 2018 due to an equipment failure. The equipment is antiquated and it is no longer possible to obtain replacement parts. The replacement of the equipment is the responsibility of the City of Moose Jaw.

## APPENDIX 1 (CONTINUED)

### DRINKING WATER QUALITY AND COMPLIANCE REPORT FOR 2019 (CONTINUED)

#### WATER QUALITY STANDARDS – CHLORINE RESIDUAL

To ensure adequate disinfection, the Buffalo Pound Water Treatment Plant must monitor the chlorine residual of the treated water on a continuous basis, and the free chlorine residual shall not be less than 0.1 mg/L. The normal operating range for the free chlorine residual in the treated water is 0.9 to 1.1 mg/L. The SCADA control system will automatically shut off pumping to the Cities if the chlorine level is less than 0.5 mg/L. A high level chlorine alarm will alert the operator if chlorine levels in the clearwell exceed 1.3 mg/L.

#### WATER QUALITY STANDARDS – CHEMICAL – GENERAL

As part of the Plant's "Permit to Operate" a general chemical analysis is required once in every three-month period from the treated water. Only two of these parameters have an established Maximum Acceptable Concentration (MAC). Eight others have an Aesthetic Objective (AO) which is desirable but has no impact on human health. Four analytes have no MAC or AO but are collected upon the request of the WSA.

Parameter (mg/L) unless stated	Feb. 11	May 13	Aug 12	Nov. 12	MAC	No. of Samples Exceeding MAC or AO
Nitrate	0.80	0.44	0.40	0.24	45	0
Fluoride	0.12	0.12	0.08	0.09	1.5	0
					AO	
Alkalinity	185	154	67	112	500	0
Chloride	24.2	30.4	22.6	18.3	250	0
Hardness	268	208	142	180	800	0
Magnesium	30.0	22.0	18.9	21	200	0
pH (pH units)	7.40	7.53	6.89	7.17	6.5 – 9.0	0
Sodium	62.9	46.2	37.3	39.6	300	0
Sulphate	200	124	142	146	500	0
Total Dissolved Solids	508	362	304	330	1500	0
Carbonate	ND	ND	ND	ND	None*	
Calcium	55.4	48.6	24.8	38.2	None*	
Conductivity (uS/cm)	769	605	482	550	None*	
Bicarbonate	225	188	82	136	None*	

(ND) Not Detected

\*No MAC or AO but requested by the WSA

#### WATER QUALITY STANDARDS – CHEMICAL – HEALTH

The Buffalo Pound Water Treatment Plant is required to sample the treated water for the following parameters once in every six-month period. Thirteen of these parameters have an established MAC. Three parameters have guideline values which establish a target that could be expected from well-functioning water treatment plants or are aesthetic objectives for the taste or appearance of treated water. Silver is included here upon the request of the Water Security Agency.



Parameter (mg/L)	May 7	Nov 5	MAC	Number of Samples Exceeding MAC
Antimony	<0.0002	<0.0002	0.006	0
Arsenic	0.0003	0.0003	0.010	0
Barium	0.056	0.045	1.0	0
Boron	0.05	0.04	5.0	0
Cadmium	<0.00001	<0.00001	0.005	0
Chromium	<0.0005	<0.0005	0.050	0
Copper	0.001	0.0002	2.0	0
Cyanide	<0.001	0.002	0.200	0
Lead	<0.0001	<0.0001	0.010	0
Manganese	<0.0005	<0.0005	0.12	0
Mercury	0.000002	0.000003	0.001	0
Selenium	0.0003	0.0002	0.010	0
Uranium	0.0007	<0.0001	0.020	0
			Guideline	# of Samples Exceeding Guideline
Aluminum	0.036	0.0068	0.1 (annual average)	0
Iron	<0.0005	0.0008	0.3	0
Silver	<0.00005	<0.00005	None*	0
Zinc	<0.0005	<0.0005	5.0	0

\*Health Canada has not established a guideline as drinking water is not a significant source of silver.

## WATER QUALITY STANDARDS – PESTICIDES

Once per year the Buffalo Pound Water Treatment Plant is required to have the treated water analyzed for the following pesticides. Fourteen of the parameters listed below have an established MAC or IMAC (interim MAC).

Parameter (mg/L)	Aug. 26	MAC	IMAC	Number of Samples Exceeding Limit
Atrazine	<0.0001		0.005	0
Bromoxynil	<0.0001		0.005	0
Carbofuran	<0.0005	0.09		0
Chlorpyrifos	<0.0001	0.09		0
Dicamba	<0.0005	0.12		0
2,4-D	<0.0001		0.1	0
Diclofop-methyl	<0.0001	0.009		0
Dimethoate	<0.0002		0.02	0
Glyphosate	<0.0001	0.28	0.28	0
Malathion	<0.0001	0.19		0
MCPA	<0.0005	0.10		0
Pentachlorophenol	<0.0001	0.06		0
Picloram	<0.0001		0.19	0
Trifluralin	<0.0001		0.045	0

## APPENDIX 1 (CONTINUED)

### DRINKING WATER QUALITY AND COMPLIANCE REPORT FOR 2019 (CONTINUED)

#### WATER QUALITY STANDARDS – DISINFECTION BY-PRODUCT – TOTAL TRIHALOMETHANES

As part of the Plant's "Permit to Operate" an analysis for total trihalomethanes is required once per month from the treated water. The MAC is 0.1 mg/L, or, 100 ug/L (parts per billion) for the sum of four trihalomethanes on an annual average. The annual average of total trihalomethanes was 35 ug/L which is well below the MAC.

Parameter (ug/L)	Jan 2	Feb 4	Mar 4	Apr 1	May 6	Jun 3
Chloroform	21	23	22	26	38	2
Bromodichloromethane	12	10	10	13	12	<1
Dibromochloromethane	2	3	3	4	2	<1
Bromoform	<1	<1	<1	<1	<1	<1
Total Trihalomethanes	35	36	35	43	52	2
	Jul 2	Aug 6	Sep 8	Oct 7	Nov 12	Dec 5
Chloroform	4	40	49	36	27	25
Bromodichloromethane	<1	4	10	9	8	9
Dibromochloromethane	<1	<1	<1	<1	<1	<1
Bromoform	<1	<1	<1	<1	<1	<1
Total Trihalomethanes	4	44	59	45	35	34

#### WATER QUALITY STANDARDS – DISINFECTION BY-PRODUCT – HALOACETIC ACIDS (HAA'S5)

The Buffalo Pound Water Treatment Plant is obligated to sample for Haloacetic Acids every three months. The annual average of quarterly samples (12.8 ug/L) was well below the MAC of 80 ug/L which is also based on an average of four samples. The results are as follows:

Parameter (ug/L)	Jan 31	May 7	Aug 7	Nov 5	Annual Average	MAC (Average)
HAA's5	18	33	<10	<10	13	80

## WATER QUALITY STANDARDS – SYNTHETIC ORGANICS

The Buffalo Pound Water Treatment Plant is required to submit one sample per year for analysis for various organics originating from industrial activities.

Parameter (mg/L)	Aug 20	MAC	Number of Samples Exceeding Limit
Benzene	<0.00050	0.014	0
Benzo(a)pyrene	<0.005	0.050	0
Carbon Tetrachloride	<0.0003	0.900	0
Dichlorobenzene 1,2	<0.00050	0.14	0
Dichlorobenzene 1,4	<0.00050	0.08	0
Dichloroethane 1,2	<0.00001	*	0
Dichloroethylene 1,1	<0.00001	*	0
Dichloromethane	<0.00050	0.01	0
Dichlorophenol 2,4	<0.0005	0.1	0
Ethylbenzene	<0.0010	0.05	0
Monochlorobenzene	<0.0005	0.005	0
Perfluorooctanesulfonate	<0.00050	0.002	0
Perfluorooctanoic Acid	<0.00050	0.09	0
Tetrachloroethylene	<0.0005	0.01	0
Tetrachlorophenol 2,3,4,6	<0.0005	0.1	0
Trichloroethylene	<0.0001	0.05	0
Trichlorophenol 2,4,6	<0.0005	0.005	0
Vinyl Chloride	<0.0005	0.002	0
Xylenes	<0.0005	0.09	0

\*under development by Health Canada

## WATER QUALITY STANDARDS – RADIOLOGICAL

The Buffalo Pound Water Treatment Plant is required to submit one sample per year for the measurement of gross alpha and gross beta activity. Should those measures exceed the MACs, an additional larger sample must be submitted for the estimation of contributions to activity from various individual radioisotopes. Additional analyses were not necessary as the gross alpha and gross beta activity were both less than the MAC.

Parameter (mg/L)	Sep 10	MAC
Gross Alpha (Becquerel/L)	<0.18	0.5
Gross Beta (Becquerel/L)	0.23±0.04	1.0

## APPENDIX 1 (CONTINUED)

### DRINKING WATER QUALITY AND COMPLIANCE REPORT FOR 2019 (CONTINUED)

#### WATER QUALITY STANDARDS – MICROCYSTIN

The Buffalo Pound Water Treatment Plant is required to submit monthly samples from May through October for Microcystin LR or Total Microcystin toxins from both the raw and treated water. Microcystins may be produced by various cyanobacteria. The microcystin MAC for drinking water is 1.5 ug/L. Microcystin was not detected in the treated water.

Date	Microcystin (ug/L)	
	Raw Water	Treated Water
May 6	<0.1	<0.1
June 17	0.3	<0.1
July 15	0.6	<0.1
August 12	4.5	<0.1
September 16	0.3	<0.1
October 28	0.3	<0.1

#### RAW WATER ANALYSIS GIARDIA AND CRYPTOSPORIDIUM

Although not a regulated water quality parameter, the Buffalo Pound Water Treatment Plant is required to sample the raw water on a quarterly basis for the presence of Giardia spp. and Cryptosporidium spp. which are waterborne protozoa. The filter cartridges are limited by particulates in the raw water so the volumes actually filtered can vary substantially. Cryptosporidium oocysts and giardia cysts were not detected in the four raw water samples.

Date	Giardia (cysts per 100L)	Cryptosporidium (oocysts per 100L)
Mar. 5	<0.8	<0.8
May 13	<2.1	<2.1
August 27	<6.5	<6.5
November 20	<1.6	<1.6



**APPENDIX 1  
(CONTINUED)**

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**BUFFALO POUND WATER  
TREATMENT PLANT  
LABORATORY ANALYTICAL  
DATA 2019**

**RAW AND TREATED  
WATER ANALYSIS**

# RAW LAKE WATER ANALYSIS

Parameters	Units	JAN Avg	FEB Avg	MAR Avg	APR Avg	MAY Avg	JUN Avg	JUL Avg	AUG Avg	SEP Avg	OCT Avg	NOV Avg	DEC Avg	YEAR AVG	YEAR MIN	YEAR MAX
PHYSICAL																
Colour (Apparent)	Pt/Co	5	<DL	<DL	5	5	<DL	16	25	25	5	8	8	10	<DL	30
Conductivity	µS/cm	730	764	777	678	586	563	488	449	472	506	537	564	609	448	786
Bench Diss. Oxygen	mg/L	7.3	5.8	7.4	11.5	7.9	8.3	8.1	8.3	8.4	9.8	11.2	10.6	8.4	5.1	12.7
Bench Diss. Oxygen	%	56.0	43.3	57.2	97.6	75.1	86.8	85.9	90.9	86.4	78.6	83.3	81.7	75.4	39.4	108.8
ON-LINE Diss. Oxygen	%	74.9	52.0	67.3	110.8	99.5	103.9	106.5	102.5	100.1	97.8	101.0	91.6	92.8	39.0	137.7
Odour	T.O.N.	24	21	17	71	83	56	57	186	140	34	31	33	62	3	267
pH	pH units	7.91	7.77	7.78	8.22	8.24	8.39	8.61	9.05	8.73	8.40	8.29	8.13	8.30	7.70	9.15
Temperature	° C	4.1	3.4	4.3	8.1	11.8	17.7	19.1	19.8	16.3	6.7	3.4	4.6	9.9	2.1	22.0
Turbidity	NTU	1.1	0.9	0.9	2.2	1.3	1.5	3.7	7.9	9.3	7.8	2.6	1.4	3.4	0.6	24.8
TDS	mg/L	461	494	507	417	370	345	308	281	288	310	324	358	378	276	508
Langelier Saturation Index	pH units (calc)	-0.08	-0.11	-0.04	0.35	0.34	0.58	0.64	0.83	0.55	0.09	0.04	0.03	0.30	-0.17	0.94
MAJOR CONSTITUENTS																
Alkalinity(p)	mg/L CaCO3	<DL	<DL	<DL	<DL	<DL	1	6	11	9	<DL	<DL	<DL	3	<DL	12
Alkalinity(total)	mg/L CaCO3	206	221	225	197	175	166	132	113	126	137	147	156	169	112	225
Bicarbonate	mg/L	251	270	273	240	213	200	147	111	134	167	179	190	200	107	274
Carbonate	mg/L	<DL	<DL	<DL	<DL	<DL	2	7	13	10	<DL	<DL	<DL	3	<DL	14
Calcium	mg/L	53	57	58	52	48	46	34	27	32	36	39	44	44	26	59
Magnesium	mg/L	30	31	31	27	22	21	19	18	18	19	21	22	24	18	32
Hardness (total)	mg/L CaCO3	255	270	278	241	209	201	162	142	155	168	184	192	208	141	279
Sodium	mg/L	59	65	66	55	46	44	38	37	38	38	41	41	48	37	67
Potassium	mg/L	6.8	7.1	7.1	6.2	5.8	5.6	5.3	5.1	4.9	4.7	4.9	5.1	5.8	4.7	7.2
Sulphate	mg/L	166	174	175	149	122	116	104	100	101	109	117	119	131	98	179
Chloride	mg/L	20.0	21.1	21.6	18.3	15.5	14.7	14.1	14.5	14.5	15.2	16.4	16.5	17.0	14.0	21.9
TRACE CONSTITUENTS																
Aluminum (dissolved 0.45µ)	ug/L	8	<DL	10	7	14	22	24	74	63	15	14	11	22	<DL	74
Aluminum (Total)	ug/L	15	24	25	13	48	81	66	139	98	73	27	28	53	13	139
Ammonia N	mg/L N	0.21	0.22	0.16	0.06	<DL	<DL	0.23	0.35	0.36	0.07	0.05	0.15	0.16	<DL	0.44
BOD (5-day)	mg/L	2.6	1.5	0.7	2.3	2.2	1.6	3.0	6.1	4.7	3.8	4.2	4.3	3.0	0.7	6.1
Bromide	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Chlorophyll a	µg/L	7	4	13	8	4	7	44	104	51	13	15	14	25	3	111
Fluoride	mg/L	0.19	0.18	0.19	0.19	0.15	0.17	0.16	0.16	0.17	0.16	0.17	0.17	0.17	0.15	0.19
Iron (dissolved)	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	0.02
Manganese (dissolved)	mg/L	0.01	0.03	0.06	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	0.01	0.01	<DL	0.07
Nitrate	mg/L	0.17	0.18	0.19	0.12	0.11	0.12	0.10	0.07	0.06	0.10	0.12	0.11	0.12	0.06	0.23
Organic N	mg/L N	0.17	0.51	0.42	0.60	0.45	0.35	0.75	0.95	0.80	<0.04	0.70	0.40	0.56	<0.04	1.00
Raw TOC	mg/LC(UV)	5.9	5.9	6.2	5.9	5.2	4.9	5.5	6.6	6.8	5.8	5.9	5.6	5.9	4.8	7.6
Raw DOC (GF diss)	mg/LC(UV)	5.8	5.9	5.8	5.2	4.9	4.7	5.4	6.4	6.7	5.2	5.2	5.0	5.5	4.4	7.0
UV absorbance @ 254nm	Abs10cm <sup>-1</sup>	0.936	0.961	0.983	0.894	0.905	0.835	0.915	1.016	0.984	0.868	0.820	0.846	0.911	0.790	1.035
SUVA	L/mg.m <sup>-1</sup>	1.613	1.637	1.695	1.716	1.849	1.765	1.648	1.565	1.480	1.664	1.583	1.685	1.660	1.449	1.929
PreFM UV abs @ 254nm	Abs10cm <sup>-1</sup>	0.783	0.830	0.835	0.741	0.732	0.681	0.722	0.826	0.813	0.715	0.701	0.722	0.756	0.642	0.863
Phosphate(ortho)	µg/L P	31	31	16	4	12	15	5	<DL	6	12	10	7	13	<DL	34
Phosphate(total)	µg/L P	57	50	48	44	37	49	82	114	198	66	50	42	72	28	245
Silica (SiO3)	mg/L	4.9	5.4	5.4	2.7	2.1	0.8	0.7	2.2	0.6	2.3	2.4	2.6	2.8	0.6	5.6

## RAW LAKE WATER ANALYSIS (CONT'D)

Parameters	Units	JAN Avg	FEB Avg	MAR Avg	APR Avg	MAY Avg	JUN Avg	JUL Avg	AUG Avg	SEP Avg	OCT Avg	NOV Avg	DEC Avg	YEAR AVG	YEAR MIN	YEAR MAX
TRACE CONSTITUENTS																
PreFM																
TTHM's (total)	µg/L(calc)	26	26	26	35	40	44	58	70	58	40	26	28	40	24	75
Chloroform	µg/L	17	18	17	23	29	31	43	54	44	31	20	20	29	16	58
Bromodichloromethane	µg/L	7	7	7	10	9	11	13	15	13	9	6	7	9	6	16
Chlorodibromomethane	µg/L	2	2	2	3	1	2	2	1	2	1	<DL	1	2	<DL	3
Bromoform	µg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
BIOLOGICAL																
Blue Green Algae (x10³)	per litre	<DL	<DL	<DL	209	244	125	1,933	11,889	6,194	3,578	506	236	2,032	<DL	16,667
Green Algae (x10³)	per litre	600	164	872	3,324	2,194	556	1,680	17,611	16,861	5,916	2,478	1,653	4,389	44	33,333
Diatoms (x10³)	per litre	61	28	36	391	264	144	271	1,806	750	391	217	127	368	<DL	4,444
Flagellates (x10³)	per litre	44	28	<DL	413	458	206	564	3,778	833	396	217	109	571	<DL	6,111
Crustaceans	per litre	35	43	18	68	38	125	56	25	56	11	3	<3	39	<3	197
Nematodes (x10³)	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Rotifers (x10³)	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	17	<DL	<DL	<DL	44
Other (x10³)	per litre	<DL	<DL	78	751	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	78	<DL	3,044
Total Algae (x10³)	per litre	606	167	872	3,533	2,439	681	3,613	29,500	23,055	9,493	2,983	1,889	3,173	1,333	4,800
BACTERIOLOGICAL																
Total Coliforms (mEndo)	per 100 ml	10	<DL	<DL	20	<DL	<DL	400	<DL	500	60	13	2	88	<DL	2,000
Total Coliforms (background)	per 100 ml	575	440	898	1,650	4,500	4,500	68,900	203,500	50,750	7,100	1,220	622	28,478	100	536,000
Faecal Coliforms (mFC)	per 100 ml						2	<DL		4	2	<DL		2	<DL	5
Total Coliforms (MPN)	per 100 ml	117	104	112	133	676	1,796	1,280	1,171	1,186	125	28	12	536	7	2,420
E.coli (MPN)	per 1 ml	<DL	<DL	<DL	5	<DL	2	3	6	6	2	<DL	<DL	2	<DL	26
Standard Plate Count	per 1 ml	11	8	16	49	67	103	1,345	980	699	185	76	18	302	6	2,910
CHEMICAL DOSES																
Alum	mg/L	60	59	55	55		40	57	78	75	72	71	75	63	37	80
Alum\Raw DOC	ratio	10.34	10.01	9.48	9.42		8.46	10.02	11.93	11.29	13.84	13.78	14.87	11.21	7.12	16.85
Alum-DOC Stoich	ratio	0.84	0.81	0.77	0.76		0.69	0.81	0.97	0.92	1.12	1.12	1.21	0.91	0.58	1.37
Chlorine-pre	mg/L	2.3	2.9	2.8	2.1	2.5	2.6	4.6	6.4	5.0	3.3	2.4	4.2	3.4	1.6	7.3
Chlorine-intermed	mg/L															
Chlorine-post	mg/L	1.0	1.1	1.0	1.0	0.9	1.3	1.3	1.4	1.3	1.4	1.4	1.5	1.2	0.9	1.8
Plant Flow	MLD	101.0	97.8	111.0	101.6	118.8	132.3	106.6	128.8	109.0	98.0	91.8	85.6	106.2	80.0	174.0
Qu'Appelle Dam Flow	cu m/s	2.20	2.20	1.49	9.18	10.05	6.98	5.05	5.53	3.05	0.40			4.63	0.0	11.0
Fluoride (Set Point for MJ)	mg/L															
Powdered Carbon	mg/L															
CPAC Train A	mg//L				24.0	23.8							37.3	27.3	20.0	40.0
CPAC Train B	mg//L				22.5	23.8							37.3	27.0	20.0	40.0
Total Chlorine dose	mg/L (Calc)	3.3	3.9	3.8	3.1	3.4	3.8	5.9	7.8	6.3	4.7	3.8	5.7	4.7	2.7	8.8
Date GAC's ON														27-May		
Date GAC's OFF														02-Jan		
Date Ice ON Lake														26-Oct		
Date Ice OFF Lake														17-Apr		
Date PAC ON																
Date PAC OFF																
Chlorine Residuals Exit Plant (week avg.)																
Free Chlorine	mg/L	1.17	1.18	1.16	1.14	1.15	1.13	1.14	1.15	1.16	1.14	1.13	1.15	1.15	1.07	1.25
Combined Chlorine	mg/L	0.33	0.33	0.37	0.32	0.24	0.08	0.14	0.18	0.17	0.15	0.19	0.23	0.23	<DL	0.39

CONTINUED >

# TREATED WATER ANALYSIS

Parameters	Units	JAN Avg	FEB Avg	MAR Avg	APR Avg	MAY Avg	JUN Avg	JUL Avg	AUG Avg	SEP Avg	OCT Avg	NOV Avg	DEC Avg	YEAR AVG	YEAR MIN	YEAR MAX
PHYSICAL																
Colour (Apparent)	Pt/Co	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Conductivity	µS/cm	739	769	794	701	605	583	512	480	491	520	550	579	613	478	800
Dissolved Oxygen	mg/L	11.2	12.1	12.4	11.0	11.1	8.6	6.7	7.6	8.3	10.8	11.9	11.3	10.3	6.7	12.4
Dissolved Oxygen (Sat'n)	%	84.7	89.8	92.5	92.3	100.4	90.1	79.5	85.1	86.9	86.0	86.0	85.2	88.5	79.5	100.4
Odour (Dechlorinated)	T.O.N.	3	3	3	5	3	1	1	2	2	1	3	2	2	<1	7
PreGAC Odour	T.O.N.					6	7	23	86	57	12	5	4	26	3	112
Odour Removal by Coagulation and Filtration	%	86.3	87.8	69.0	92.7	94.0	87.5	60.1	50.9	55.3	62.6	82.2	87.7	76.3	14.8	95.2
Odour Removal Overall	%	86.3	87.8	69.0	92.7	95.7	98.1	97.6	99.0	98.4	95.5	91.5	95.2	92.5	33.3	100.0
PreFM pH	pH units	7.75	7.68	7.60	7.98	8.09	8.16	8.17	8.47	8.33	8.08	8.12	7.80	8.02	7.09	8.68
Coagulation pH - Channel 1	pH units	7.15	7.20	7.19	7.53	7.53	7.49	7.13	6.77	6.86	6.97	7.05	7.22	7.17	6.71	7.76
Coagulation pH - Channel 2	pH units	7.15	7.18	7.17	7.48	7.46	7.37	7.12	6.80	6.85	6.96	7.05	7.18	7.15	6.75	7.55
Clearwell pH	pH units	7.32	7.38	7.38	7.64	7.66	7.53	7.28	6.94	7.10	7.09	7.21	7.27	7.31	6.89	7.76
Temperature	° C	3.8	3.4	3.9	8.1	11.9	17.8	21.6	20.5	16.8	6.8	2.4	3.6	10.0	1.5	23.6
Turbidity	NTU	0.08	0.08	0.09	0.08	0.07	0.09	0.09	0.08	0.08	0.08	0.06	0.07	0.08	0.06	0.13
Total Dissolved Solids	mg/L	480	508	516	484	362	362	330	304	290	302	330	362	386	290	516
Turbidity Log Removal	(calc)	1.11	1.02	0.97	1.40	1.29	1.22	1.56	2.00	2.00	1.84	1.57	1.31	1.45	0.76	2.61
Langier Saturation Index	pH units (calc)	-0.61	-0.59	-0.64	-0.38	-0.42	-0.33	-1.11	-1.50	-1.35	-1.31	-1.20	-1.12	-0.88	-1.50	-0.33
MAJOR CONSTITUENTS																
Alkalinity (p)	mg/L CaCO <sub>3</sub>	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Alkalinity (total)	mg/L CaCO <sub>3</sub>	170	188	190	180	159	142	93	68	82	98	112	117	136	67	196
Bicarbonate	mg/L	207	229	231	219	194	173	113	83	99	120	136	143	166	82	239
Carbonate	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Calcium	mg/L	53	55	58	56	49	47	34	25	29	35	38	44	44	25	58
Magnesium	mg/L	29	30	32	31	22	21	20	19	19	19	21	22	24	19	32
Hardness (total)	mg/L CaCO <sub>3</sub>	249	268	278	265	208	202	164	142	149	167	181	191	205	142	278
Sodium	mg/L	57	63	69	63	46	44	40	37	38	38	40	41	48	37	69
Potassium	mg/L	6.6	7.1	7.1	6.9	5.9	5.8	5.4	5.2	5.0	4.7	4.9	5.1	5.8	4.7	7.1
Sulphate	mg/L	193	200	207	169	124	137	140	142	139	146	146	157	158	124	207
Chloride	mg/L	23.1	24.2	24.9	35.1	30.4	17.9	20.0	22.6	20.8	18.5	18.3	19.3	22.9	17.9	35.1
TRACE CONSTITUENTS																
CLEAR WELL																
Aluminum (dissolved 0.45u)	µg/L Chart	37	41	42	57	50	39	24	11	11	<DL	<DL	10	27	<DL	57
Aluminum (total)	µg/L Chart	42	60	76	57	49	40	27	13	11	6	<DL	7	33	<DL	76
Aluminum (total 12 mo avg)	µg/L	36	37	40	41	40	40	39	38	38	37	36	35			
Aluminum (particulate)	µg/L (Calc)	<DL	19	34	<DL	<DL	<DL	<DL	<DL	<DL	6	<DL	<DL	6	<DL	34
MIXED MEDIA FILTER A																
Aluminum (total)	µg/L	65	54	61	59	56	64	53	27	26	19	30	26	45	19	65
MIXED MEDIA FILTER L																
Aluminum (total)	µg/L	43	54	64		49	60	52	25	27	21	7	15	38	7	64
PREGAC																
Aluminum (dissolved)	µg/L	Offline	Offline	Offline	Offline	Offline	58	56	17	19	15	21	17	29	15	58
Aluminum (total)	µg/L Chart	Offline	Offline	Offline	Offline	Offline	63	71	23	25	18	23	22	35	18	71
CLEAR WELL																
Ammonia N	mg/L N	0.07	<DL	0.06	<DL	<DL	<DL	<DL	<DL	0.09	<DL	<DL	0.11	<DL	<DL	0.11
Bromide	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Fluoride	mg/L	0.12	0.12	0.13	0.15	0.12	0.13	0.09	0.08	0.09	0.08	0.09	0.10	0.11	0.08	0.15
Fluoride (MJ dose ISE wk avg)	mg/L															
Iron (dissolved)	mg/L	0.02	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	0.02

TREATED WATER ANALYSIS (CONT'D)

Parameters	Units	JAN Avg	FEB Avg	MAR Avg	APR Avg	MAY Avg	JUN Avg	JUL Avg	AUG Avg	SEP Avg	OCT Avg	NOV Avg	DEC Avg	YEAR AVG	YEAR MIN	YEAR MAX
Iron (total)	mg/L	0.02	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	0.02
Manganese (dissolved)	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Manganese (total)	mg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	0.01	<DL	<DL	<DL	<DL	<DL	0.01
Nitrate	mg/L N	0.13	0.18	0.19	0.13	0.10	0.09	0.12	0.09	0.09	0.06	<DL	0.06	0.11	<DL	0.19
Organic N	mg/L N	0.29	<DL	0.27	0.30	0.20	<DL	<DL	0.20	0.30	<DL	0.20	0.10	0.16	<DL	0.30
CW TOC	mg/L C	3.9	4.1	4.3	3.9	2.6	0.8	1.4	1.6	1.8	1.8	2.2	2.6	2.6	0.4	4.6
CW DOC (GF diss)	mg/L C	3.9	4.1	4.3	3.9	2.6	0.8	1.4	1.6	1.8	1.9	2.2	2.6	2.6	0.4	4.6
PreGAC DOC (GF diss)	mg/L C					3.5	3.4	3.5	3.3	3.3	2.8	2.9	3.1	3.2	2.7	3.6
DOC Removal by Coagulation & Filtration	% Removal	33.0	30.6	26.7	25.2	30.8	28.0	35.3	48.9	51.0	45.6	43.4	37.9	36.6	20.7	52.7
DOC Removal by GAC Filtration	% Removal					87.6	77.2	60.4	52.6	43.3	34.8	24.3	17.1	44.7	15.5	87.6
Total DOC (% Removal)	% Removal	33.0	30.6	26.7	25.2	46.7	83.6	74.5	75.8	72.2	64.5	57.1	48.5	53.2	20.7	91.0
CW Organic Carbon (diss@ <sub>254nm</sub> )	Abs 10 cm	0.518	0.542	0.565	0.502	0.352	0.051	0.119	0.148	0.173	0.184	0.239	0.295	0.305	0.033	0.570
PreGAC Organic Carbon (diss@ <sub>254nm</sub> )	Abs 10 cm					0.502	0.462	0.458	0.439	0.436	0.399	0.437	0.439	0.440	0.376	0.502
Conventional SUVA	L/mg.m	1.332	1.330	1.331	1.287	1.385	1.359	1.318	1.358	1.338	1.406	1.489	1.406	1.361	1.218	1.621
CW SUVA	L/mg.m	1.332	1.330	1.331	1.287	1.240	0.653	0.860	0.942	0.937	0.995	1.078	1.136	1.091	0.604	1.422
Phosphate (ortho)	µg/L P	<DL	<DL	<DL	4	<DL	5	3	<DL	4	<DL	<DL	<DL	<DL	<DL	5
Phosphate (total)	µg/L P	7	<DL	5	6	5	7	4	6	9	4	3	5	5	<DL	9
Silica (SiO3)	mg/L	4.6	4.9	5.2	3.4	1.9	0.7	0.8	1.8	0.6	2.1	2.2	2.4	2.6	0.6	5.2
CLEAR WELL																
THMs (total)	µg/L(calc)	34	34	37	43	51	2	15	50	58	42	34	34	36	1	64
Chloroform	µg/L	21	22	23	28	36	2	14	44	47	33	27	24	27	1	49
Bromodichloromethane	µg/L	10	10	11	12	13	<DL	1	6	10	9	8	9	8	<DL	14
Chlorodibromomethane	µg/L	3	3	3	3	2	<DL	<DL	<DL	1	<DL	<DL	1	1	<DL	5
Bromoform	µg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
CHANNEL																
THMs (total)	µg/L(calc)	29	25	29	37	43	44	53	75	60	34	25	27	40	25	75
Chloroform	µg/L	18	16	19	23	30	31	38	57	44	25	19	19	28	16	57
Bromodichloromethane	µg/L	9	7	8	11	11	11	13	16	14	8	6	7	10	6	16
Chlorodibromomethane	µg/L	2	2	2	3	2	2	2	2	2	1	<DL	1	2	<DL	3
Bromoform	µg/L	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
PreGAC																
THMs (total)	µg/L(calc)	Offline	Offline	Offline	Offline	Offline	48	56	67	55	39	28	31	46	27	71
Chloroform	µg/L	Offline	Offline	Offline	Offline	Offline	33	41	51	40	30	21	21	34	19	54
Bromodichloromethane	µg/L	Offline	Offline	Offline	Offline	Offline	12	13	14	13	9	7	9	11	7	15
Chlorodibromomethane	µg/L	Offline	Offline	Offline	Offline	Offline	2	2	1	2	1	<DL	1	1	<DL	3
Bromoform	µg/L	Offline	Offline	Offline	Offline	Offline	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
BIOLOGICAL																
Blue Green Algae	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Green Algae	per litre	<DL	22,222	<DL	33,333	99,999	<DL	<DL	22,222	<DL	<DL	44,444	77,777	25,000	<DL	99,999
Diatoms	per litre	<DL	<DL	<DL	11,111	<DL	22,222	<DL	<DL	<DL	<DL	<DL	<DL	2,778	<DL	22,222
Flagellates	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Crustaceans	per litre	<2	<2	<2	<2	<2		<2	<2	<2	<2	<2	<2	<2	<2	<2
Nematodes	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Rotifers	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Other	per litre	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
BACTERIOLOGICAL																
Total Coliforms (mEndo)	per 100 ml	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Total Coliforms (background, mEndo)	per 100 ml	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Faecal Coliforms (mFC)	per 100 ml															
Total Coliforms (MPN)	per 100 ml	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
E. coli (MPN)	per 100 ml	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Standard Plate Count	per 1 mL	<DL	<DL	<DL	<DL	<DL	0.5	0.2	<DL	<DL	<DL	0.5	<DL	0.1	<DL	2.0

NA · Not Analyzed, ND · Not detected (for biological parameters), Offline · Chemical or process not in use, <(less than) · Not found at a detectable concentrations (for chemica parameters)  
\*Faecal Coliforms analyzed ONLY if Total Coliforms Detected.







# FINANCIAL STATEMENTS 2019



# INDEPENDENT AUDITOR'S REPORT

To the Chairman and Members of the Board of Directors of Buffalo Pound Water Treatment Corporation:

## Opinion

We have audited the financial statements of the Buffalo Pound Water Treatment Corporation (the "Organization"), which comprise the statement of financial position as at December 31, 2019, and the statements of operations, 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 Organization as at December 31, 2019, and the results of its operations 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 Organization 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.

## Other Information

Management is responsible for the other information. The other information comprises that information included in the annual report, but does not include the financial statements and our auditor's report thereon.

Our opinion on the financial statements does not cover the other information and we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit or otherwise appears to be materially misstated. If, based on the work we have performed on this information, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

## Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian public sector accounting standards, 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 Organization'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 Organization or cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Organization'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 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.



# INDEPENDENT AUDITOR'S REPORT

As part of an audit in accordance with Canadian generally accepted auditing standards, we exercise professional judgement 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 Organization'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 Organization'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 Organization 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.

Regina, Saskatchewan

March 25, 2020

*MNP LLP*

Chartered Professional Accountants

**MNP**

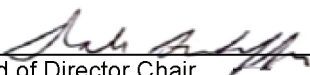
**Buffalo Pound Water Treatment Corporation**  
**STATEMENT OF FINANCIAL POSITION**  
*[in dollars]*

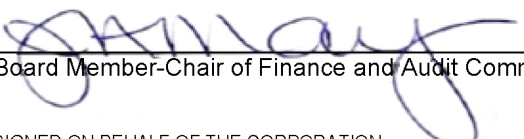
As at December 31

	2019	2018
<b>FINANCIAL ASSETS</b>		
Cash	57,453,176	57,318,582
Accounts receivable		
City of Regina	1,264,864	924,191
City of Moose Jaw	383,033	400,501
GST receivable	665,634	442,149
Other	-	7,757
<b>Total financial assets</b>	<b>59,766,707</b>	<b>59,093,180</b>
<b>FINANCIAL LIABILITIES</b>		
Accounts payable and accrued liabilities	11,349,079	1,953,609
Employee benefit obligations (Note 3)	769,691	853,179
Long term debt (Note 6)	42,653,000	43,847,000
<b>Total financial liabilities</b>	<b>54,771,770</b>	<b>46,653,788</b>
<b>Net financial assets</b>	<b>4,994,937</b>	<b>12,439,392</b>
<b>NON-FINANCIAL ASSETS</b>		
Inventory of chemicals	161,119	99,285
Tangible capital assets (Note 4)	71,348,909	52,969,615
<b>Accumulated surplus (Note 5)</b>	<b>76,504,965</b>	<b>65,508,292</b>

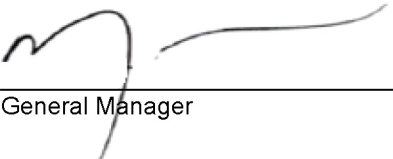
See accompanying notes.

SIGNED ON BEHALF OF THE BOARD

  
 Board of Director Chair

  
 Board Member-Chair of Finance and Audit Committee

SIGNED ON BEHALF OF THE CORPORATION

  
 General Manager



**Buffalo Pound Water Treatment Corporation**  
**STATEMENT OF OPERATIONS**  
*[in dollars]*

For the year ended December 31

	Budget	2019	2018
<b>REVENUE</b>			
Operating contributions			
City of Regina	10,366,000	<b>10,744,243</b>	11,024,348
City of Moose Jaw	1,899,250	<b>1,844,555</b>	1,905,180
Sask Water	76,300	<b>73,241</b>	74,828
Capital contributions			
City of Regina	5,489,600	<b>5,689,909</b>	6,007,471
City of Moose Jaw	1,005,800	<b>976,835</b>	1,038,185
Sask Water	58,800	<b>56,414</b>	54,114
	<b>18,895,750</b>	<b>19,385,197</b>	20,104,126
Contributed assets (Note 4)	-	<b>3,452,472</b>	13,386,932
Power charges	477,700	<b>611,110</b>	593,507
Miscellaneous revenue	9,000	<b>5,975</b>	9,715
Interest	40,000	<b>1,248,731</b>	895,648
Government contributions (Note 8)	12,532,000	<b>1,309,609</b>	-
	<b>31,954,450</b>	<b>26,013,094</b>	34,989,928
<b>EXPENSES</b>			
Employee wages and benefits (Schedule 1)	4,066,900	<b>4,079,212</b>	3,954,886
Amortization of tangible capital assets	-	<b>2,167,712</b>	2,149,303
Utilities (Schedule 1)	2,175,000	<b>1,995,603</b>	2,155,269
Chemicals (Schedule 1)	2,790,000	<b>2,082,336</b>	2,194,723
Equipment maintenance (Schedule 1)	2,325,000	<b>1,938,348</b>	1,986,366
Miscellaneous (Schedule 1)	374,500	<b>472,131</b>	362,568
Laboratory supplies and research (Schedule 1)	355,000	<b>318,463</b>	220,144
Building and ground maintenance (Schedule 1)	145,000	<b>207,281</b>	122,940
Administration (Schedule 1)	310,000	<b>265,071</b>	287,722
Interest expenses and bank charges (Schedule 1)	1,521,545	<b>1,490,264</b>	1,534,771
	<b>14,062,945</b>	<b>15,016,421</b>	14,968,692
<b>Excess of revenue over expenses</b>	<b>17,891,505</b>	<b>10,996,673</b>	20,021,236
Accumulated surplus, beginning of year		<b>65,508,292</b>	45,487,056
<b>Accumulated surplus, end of year</b>		<b>76,504,965</b>	65,508,292

See accompanying notes.

# STATEMENT OF CHANGE IN NET FINANCIAL ASSETS

[in dollars]

For the year ended December 31

	2019	2018
Excess of revenue over expenses	10,996,673	20,021,236
Acquisition of tangible capital assets	(20,547,006)	(16,084,848)
Amortization of tangible capital assets	2,167,712	2,149,303
Consumption of inventory of chemicals	2,082,336	2,194,723
Acquisition of inventory of chemicals	(2,144,170)	(2,135,268)
(Decrease) increase in net financial assets	(7,444,455)	6,145,146
Net financial assets, beginning of year	12,439,392	6,294,246
<b>Net financial assets, end of year</b>	<b>4,994,937</b>	<b>12,439,392</b>

See accompanying notes.

**STATEMENT OF CASH FLOWS***[in dollars]*

For the year ended December 31

	2019	2018
<b>OPERATING ACTIVITIES</b>		
Excess of revenue over expenses	10,996,673	20,021,236
<b>Non-cash item</b>		
Contributed assets transferred from cities (Note 4)	(3,452,472)	(13,386,932)
Amortization of tangible capital assets	2,167,712	2,149,303
<b>Net change in non-cash working capital balances</b>		
in accounts receivable	(538,933)	725,027
in accounts payable and accrued liabilities	9,395,470	1,021,300
in employee benefit obligations	(83,488)	74,340
in inventory of chemicals	(61,834)	59,455
<b>Cash provided by operating activities</b>	<b>18,423,128</b>	<b>10,663,729</b>
<b>CAPITAL ACTIVITIES</b>		
Acquisition of tangible capital assets	(17,094,534)	(2,697,916)
<b>FINANCING ACTIVITIES</b>		
Payment of long-term debt	(1,194,000)	(1,153,000)
<b>Increase in cash position</b>	<b>134,594</b>	<b>6,812,813</b>
<b>Cash, beginning of year</b>	<b>57,318,582</b>	<b>50,505,769</b>
<b>Cash, end of year</b>	<b>57,453,176</b>	<b>57,318,582</b>

*See accompanying notes.*

**Buffalo Pound Water Treatment Corporation**  
**NOTES TO THE FINANCIAL STATEMENTS**  
*[in dollars]*

**For the year ended December 31, 2019**

**1. BASIS OF OPERATIONS**

Buffalo Pound Water Treatment Corporation (the "Corporation") was incorporated under *The Non-Profit Corporations Act*, 1995 on January 1, 2016. The City of Regina owns 74 Class A voting memberships and the City of Moose Jaw owns 26 Class A voting memberships of the Corporation. The City of Regina and the City of Moose Jaw entered into a Unanimous Membership Agreement effective January 1, 2016.

The Corporation is responsible for reliable and efficient provision of safe, high quality and affordable drinking water to the City of Regina and the City of Moose Jaw. The Corporation is a not-for-profit organization, and is not subject to either federal or provincial income taxes.

**2. SIGNIFICANT ACCOUNTING POLICIES**

The financial statements of the Corporation are the representation of management and have been prepared in accordance with Canadian public sector accounting standards, as recommended by the Chartered Professional Accountants of Canada (CPA Canada).

The significant accounting policies used in the preparation of these financial statements are summarized below:

**Use of estimates**

The preparation of financial statements in conformity with Canadian public sector accounting standards requires management to make estimates and use assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the year. Actual results could differ from those estimates. Significant estimates include the amortization of tangible capital assets and employee benefits obligations.

**Employee benefit obligations**

Employee benefit obligations relating to severance or retirement benefits are recognized to the extent that they are vested and could be taken in cash by an employee on termination. The obligations have been determined on an actuarial basis using the projected benefit method prorated on services. Experience gains/losses are amortized over the estimated average remaining life of the employee group.

**Pension benefit obligations**

The Corporation is one of the sponsors of a multi-employer defined benefit pension plan. The Corporation follows defined benefit accounting under which pension expense is limited to the Corporation's contributions to the plan.

**Inventory of chemicals**

Inventory of chemicals are valued at the lower of net realizable value and average cost.



**Buffalo Pound Water Treatment Corporation**  
**NOTES TO THE FINANCIAL STATEMENTS**  
*[in dollars]*

For the year ended December 31, 2019

**2. SIGNIFICANT ACCOUNTING POLICIES (Continued)**

**Contributions**

Contributions are considered government transfers and are recognized in the financial statements as revenues and expenses in the period in which events giving rise to the transfer occur, providing the transfers are authorized, eligibility criteria have been met and reasonable estimates of the amounts can be made.

Operating and capital contributions for water consumed based upon the following established rates:

	2019	2018
General water rate, \$ per megalitre	355.00	345.00
Electricity rate, \$ per kilowatt hour	0.11089	0.10766
	2019	2018
Capital water rate, \$ per megalitre	188.00	188.00

**Financial instruments**

Financial instruments are any contracts that give rise to financial assets of one entity and financial liabilities or equity instruments of another entity. The Corporation recognizes a financial instrument when it becomes a party to the contractual provisions of a financial instrument. Financial instruments of the Corporation include cash, accounts receivable, accounts payable and accrued liabilities and long term debt and an associated derivative.

**Credit Risk**

Credit risk is the risk of financial loss to the Corporation if a customer or counterparty to a financial instrument fails to meet its contractual obligations. The Corporation's credit risk is primarily attributable to accounts receivable. This risk is limited as accounts receivable is due mainly from the City of Regina and the City of Moose Jaw.

**Liquidity Risk**

Liquidity risk is the risk that Corporation will not be able to meet its financial obligations as they become due. The City of Regina staff on behalf of the Corporation manages liquidity risk by continually monitoring cash flow requirements to ensure that it has sufficient funds to meet obligations when they become due. The Corporation has established operating and capital rates which are calculated using a full cost recovery model that will generate sufficient revenues to cover the operating costs and capital investments.

**Interest Rate Risk**

Interest rate risk is the risk that value of a financial instrument might be adversely affected by a change in interest rates. Changes in market interest rates may have an effect on the cash flows associated with some financial assets and liabilities, known as cash flow risk, and on the fair value of the other financial assets and liabilities, known as price risk.

Exposure on the Company's long term debt is managed by using a declining balance interest rate swap. The Company entered into an interest rate swap agreement to fix the interest rate on its long term debt the terms of which are disclosed in Note 6.

**Buffalo Pound Water Treatment Corporation**  
**NOTES TO THE FINANCIAL STATEMENTS**  
*[in dollars]*

For the year ended December 31, 2019

**2. SIGNIFICANT ACCOUNTING POLICIES (Continued)**

**Tangible capital assets (TCA)**

Tangible capital assets are recorded at cost which includes all amounts that are directly attributable to acquisition, construction, development or betterment of the asset. The cost, less residual value, of the tangible capital assets are amortized on a straight-line basis over their estimated useful lives as follows:

General		
	Vehicles and equipment	6 to 20 years
	Office and information technology	10 to 15 years
Infrastructure		
	Plants and facilities	5 to 40 years
	Roads	15 years

Assets under construction are not amortized until the asset is available for productive use.

Tangible capital assets received as contributions are recorded at their fair value at the date of receipt and also are recorded as revenue.

**3. EMPLOYEE BENEFIT OBLIGATIONS**

The employee benefit obligations accrued at year end are as follows:

	2019	2018
Vacation pay	381,691	409,179
Vested termination payments	388,000	444,000
	769,691	853,179

Based upon an agreement with UNIFOR Local 595, termination payments for union employees vest after 10 years of service and upon retiring with unreduced pension. The amount payable on termination after vesting is 20 hours pay for each completed year of service.

In 2017, the Board of Directors approved a decision to end the vesting of termination payments for out-of-scope employees as of December 31, 2017. Out-of-scope employees were provided the option to have their severance paid out on December 31, 2017 or to elect to defer the payment until they leave the Corporation. For employees who elected to defer, the payment will neither increase nor decrease from the December 31, 2017 assessment.

An actuarial valuation of vested sick leave and severance payments was completed using the projected benefit method at December 31, 2019. The actuarial valuation was based on assumptions about future events including employee turnover and mortality, wage and salary increases, sick leave usage and interest rates. These rates are consistent with superannuation plan. The discount rate used to determine the unfunded employee benefit was 2% and the inflation rate was 2.25%. Compensation rates for employees are assumed to increase at an average rate of 3.65% per annum plus merit and promotion thereafter.

**Buffalo Pound Water Treatment Corporation**  
**NOTES TO THE FINANCIAL STATEMENTS**  
*[in dollars]*

**For the year ended December 31, 2019**

**3. EMPLOYEE BENEFIT OBLIGATIONS (Continued)**

The Corporation is a member of the City of Regina Civic Employees' Superannuation and Benefit Plan (the Plan), which is overseen by its own Administrative Board. All eligible permanent and probationary employees of the Corporation are members of the Plan. This multi-employer Plan provides defined retirement benefits and is integrated with the Canada Pension Plan (CPP). The Plan provides a lifetime monthly pension based on an employee's years of service and the average of the best three consecutive years of earnings for service before 2016. For service after 2015, a best-five-years average is used. For 2019 employees contributed 8.80% (2018 - 8.80%) of their earnings below the CPP maximum and 13.10% (2018 - 13.10%) of earnings above the CPP maximum. The Corporation's contribution rates were set as 9.80% (2018 - 9.80%) of their earnings below the CPP maximum and 14.60% (2018 - 14.60%) of earnings above the CPP maximum.

Financial statements as at December 31, 2018 indicate the Plan had a deficit of net assets of \$38,997,000 (2017 - \$43,772,000).

The Plan is a multi-employer defined benefit plan; therefore neither benefits nor contributions are segregated by employer. The Plan has been accounted for using the method appropriate for defined contribution plans and, as such, the amount of pension expense is equal to the contributions required for the year. Pension costs of \$311,073 (2018 - \$298,601) based on employer contributions were expensed during 2019.

The Corporation is a member of the Regina Civic Employees' Long-term Disability Plan (the Disability Plan). Financial statements as of December 31, 2018 indicate a surplus of net assets available for benefits of \$32,087,000 (2017 - \$33,940,000).

The Long-Term Disability Plan is a multi-employer plan and consequently, identification of individual employer's assets is not available from the Disability Plan managers. Accordingly, no portion of the surplus has been recognized as an asset or expense reduction in the financial statements. For all permanent employees, disability benefits are based on 75% of the member's salary and will be paid either throughout the duration of the disability until recovery, until the member elects voluntary early retirement, reaches age 65 or upon death, whichever occurs first. The Disability Plan has been accounted for using the method appropriate for defined contribution plans and, as such, the amount of benefit expense is equal to the contributions required for the year. Member contributions are made to the Plan at a rate of 0.46% with the employer matching contributions.

As well, the Corporation provides for additional coverage to its employees through the Out-Of-Scope Employment and Benefits policy and the Collective Bargaining Agreement. The Corporation guarantees full salary for out-of-scope employees (those employed before January 1, 2015) for the first two (2) years of such a disability and thereafter 90% of such employee's salary less benefit payments from all other sources. The Corporation guarantees 70% of an in-scope employee's salary through Article 30 less benefit payments from all other sources. The Corporation recorded disability premium costs for 2019 of \$13,698 (2018 - \$13,387). Dental and medical plans are also provided for most employees and are paid by the Corporation.

**Buffalo Pound Water Treatment Corporation**  
**NOTES TO THE FINANCIAL STATEMENTS**  
*[in dollars]*

For the year ended December 31, 2019

**4. TANGIBLE CAPITAL ASSETS**

	Net Book Value	
	2019	2018
<b>General</b>		
Land	88,535	88,535
Vehicles and equipment	366,913	329,680
Office and information technology	28,108	51,487
<b>Infrastructure</b>		
Plants and facilities	33,763,945	35,433,134
Roads	407,760	437,965
<b>Assets under construction</b>	<b>36,693,648</b>	<b>16,628,814</b>
	<b>71,348,909</b>	<b>52,969,615</b>

**Contributed Assets:**

The Corporation entered into an agreement of capital upgrades with the City of Regina and the City of Moose Jaw in 2010 whereby each city agreed to finance the capital upgrades by the share of 72.65% and 27.35% respectively. At the end of 2019, \$3,452,472 (2018 - 13,386,932) worth of capital upgrades to a new electrical substation and other electrical upgrades were transferred to the Corporation.

**5. ACCUMULATED SURPLUS**

The Board of Directors of the Corporation has approved the establishment of a capital reserve.

	Unappropriated Surplus	Capital replacement reserve	Investment in Tangible Capital Assets	2019	2018
Opening balance	1,047,969	11,490,708	52,969,615	65,508,292	45,487,056
Excess of revenue over expenses	10,996,673	-	-	10,996,673	20,021,236
Expenditures from reserve for replacement of capital assets	18,432,389	(18,432,389)	-	-	-
Transfer from operations	(10,900,000)	10,900,000	-	-	-
Change in TCA investment	(18,379,294)	-	18,379,294	-	-
Accumulated surplus	1,197,737	3,958,319	71,348,909	76,504,965	65,508,292



**Buffalo Pound Water Treatment Corporation**  
**NOTES TO THE FINANCIAL STATEMENTS**  
*[in dollars]*

For the year ended December 31, 2019

**5 ACCUMULATED SURPLUS (Continued)**

During the year, the Board of Directors approved the transfer of \$10,900,000 from operations to the Capital Replacement Reserve. In addition, the Board of Directors approved the following expenditures from the capital replacement reserve:

LPS 138kV Transmission Line	843,259
Computerized maintenance management system	184,239
Plant Renewal Project	907,976
Main Plant Redundant Power	195,798
LPS pump and electrical upgrades	14,335,913
Loan interest and bank expenses	1,490,264
SCADA Upgrade	474,940
	<b>18,432,389</b>

**6. LONG TERM DEBT**

	2019	2018
Term loan payable to Bank of Montreal in monthly principal payments ranging from \$98,000 to \$101,000 based on a 25-year mortgage style amortization with interest rate fixed at 3.46% through an interest rate swap. The term loan is non-revolving and is subject to renewal on November 30, 2027. The term loan is guaranteed by the City of Regina and the City of Moose Jaw.	42,653,000	43,847,000

In 2017, the City of Regina and the City of Moose Jaw approved the Corporation to enter into a non-revolving term loan with Bank of Montreal for the purpose of financing the Electrical Upgrade Capital Project (EUCP) with any remaining funds for the Plant Renewal Project. The Corporation entered into an interest rate swap agreement for a 25 year term.

Principal repayments on long term debt in each of the next five years are estimated as follows:

2020	1,239,000
2021	1,283,000
2022	1,328,000
2023	1,374,000
2024	1,423,000

**For the year ended December 31**

## **7. CONTRACTUAL OBLIGATIONS**

The Corporation entered into an agreement with Jacobs (formerly CH2M Hill Canada Ltd) to serve as the Owner's Advocate for the Water Treatment Plant Renewal Project. The remaining contract is valued at \$4,422,700 before tax and will cover the services up to 2024.

The Corporation entered into a construction contract on January 28, 2019 with Westridge Construction for the Lake Pump Station Electrical and Pumping Upgrades. The remaining contract is valued at \$16,149,800 before tax and will cover the services up to 2021.

The Corporation entered into a construction contract on October 31, 2019 with Arctic Arrow Holdings Limited for the installation and supply of materials for the Lake Pump Station 138kV Transmission Line. The contract is valued at \$1,326,100 before GST plus 10% contingency and will cover the services up to the middle 2020.

## **8. CONTRACTUAL RIGHTS**

The Corporation entered into an agreement in November 2018 with the Minister of Infrastructure and Communities of the Government of Canada as part of a program entitled the New Building Canada Fund - Provincial - Territorial Infrastructure Component - National Regional Projects (the "Program"). Under this agreement, the Corporation has a contractual right to receive contributions for eligible expenditures up to a maximum of \$10,291,000 by March 31, 2024. The Corporation also entered into an agreement in January 2019 with the Minister of Government Relations of the Province of Saskatchewan as part of the Program. Under this agreement, the Corporation has a contractual right to receive contributions for eligible expenditures up to a maximum of \$10,291,000 by June 30, 2021. The Corporation will use these funds for the electrical capital upgrade projects commencing in 2019. Up until December 31, 2019, the Corporation has claimed and received a total \$654,805 from each of the Federal and the Provincial governments.

## **9. SUBSEQUENT EVENT**

Subsequent to year end, the Corporation approved a contract to provide design services for the Plant Renewal Project at an estimated cost of \$20 million.

Subsequent to December 31, 2019, the outbreak of Coronavirus, specifically identified as "COVID-19" has resulted in governments worldwide enacting emergency measures to combat the spread of the virus. These measures, which include the implementation of travel bans, self-imposed quarantine periods and social distancing, have caused material disruption to businesses globally resulting in an economic slowdown. Global equity markets have experienced significant volatility and weakness. Governments and central banks have reacted with significant monetary and fiscal interventions designed to stabilize economic conditions. The duration and impact of the COVID-19 outbreak is unknown at this time, as is the effectiveness of the government and central bank interventions. It is not possible to reliably estimate the length and severity of these developments and the impact on the financial results and condition of the Corporation.

Buffalo Pound Water Treatment Corporation  
**SCHEDULE OF EXPENDITURES**  
*[in dollars]*

Schedule 1

For the year ended December 31

	Budget	2019	2018
<b>EMPLOYEE WAGES AND BENEFITS</b>			
Wages - permanent employees	3,200,000	<b>3,329,898</b>	3,095,074
Employee benefits - permanent employees	595,000	<b>623,480</b>	549,110
Overtime wages - permanent employees	145,000	<b>126,944</b>	147,970
WCB premiums	35,000	<b>(6,898)</b>	6,898
Premium pay - permanent employees	40,000	<b>37,926</b>	34,554
Car allowance	10,900	<b>10,400</b>	9,903
Clothing and boot allowance	5,500	<b>3,654</b>	6,890
Employee benefits - vacation, sick and termination	-	<b>(83,488)</b>	74,340
Employee awards and gifts	2,500	<b>7,416</b>	696
Other compensation	3,000	<b>3,670</b>	1,598
Health spending account	30,000	<b>26,210</b>	27,853
	4,066,900	<b>4,079,212</b>	3,954,886
<b>UTILITIES</b>			
Electricity	1,900,000	<b>1,881,127</b>	1,861,770
Natural gas	275,000	<b>114,476</b>	293,499
	2,175,000	<b>1,995,603</b>	2,155,269
<b>CHEMICALS</b>			
Alum	1,850,000	<b>1,264,104</b>	1,356,446
Granular activated carbon	670,000	<b>632,000</b>	628,000
Chlorine	180,000	<b>158,558</b>	160,725
Powder activated carbon	50,000	-	-
Polymer	40,000	<b>27,674</b>	49,552
	2,790,000	<b>2,082,336</b>	2,194,723
<b>EQUIPMENT MAINTENANCE</b>			
Filtration plant	335,000	<b>402,981</b>	235,093
Wastewater system	1,000,000	<b>946,912</b>	1,015,653
Regeneration plant	130,000	<b>104,006</b>	126,808
Lake pump station	70,000	<b>42,214</b>	16,315
Computer and communications	70,000	<b>195,361</b>	77,377
High power electrical	40,000	<b>34,938</b>	207,163
Pipeline	20,000	<b>7,090</b>	119,827
Maintenance and repair	625,000	<b>142,456</b>	171,712
Maintenance equipment	35,000	<b>62,390</b>	16,418
	2,325,000	<b>1,938,348</b>	1,986,366

Buffalo Pound Water Treatment Corporation  
**SCHEDULE OF EXPENDITURES (CONTINUED)**  
*[in dollars]*

Schedule 1

For the year ended December 31

	Budget	2019	2018
<b>MISCELLANEOUS</b>			
Insurance	90,000	128,217	91,415
General supplies	19,000	32,516	26,877
Telephone	20,000	25,883	26,908
Professional and membership fees	22,500	17,735	33,097
Travel and conventions	25,000	30,485	26,210
Fuel and gas	30,000	12,824	13,648
Stationary and office supplies	25,000	20,492	18,850
Contracted services	75,000	109,669	80,532
Advertising	10,000	10,036	6,489
Education and training	25,000	31,233	17,660
Reception and meetings	10,000	8,927	8,391
Other purchase	5,000	17,047	6,509
Vehicle license and registration	3,000	3,081	2,843
Software maintenance	15,000	23,986	3,139
	374,500	472,131	362,568
<b>LABORATORY SUPPLIES AND RESEARCH</b>			
Laboratory supplies	85,000	99,874	96,473
Research	200,000	137,650	30,568
Laboratory equipment	46,000	54,942	65,115
Contract analytical	10,000	10,390	12,288
Accreditation	14,000	15,607	15,700
	355,000	318,463	220,144
<b>BUILDING AND GROUND MAINTENANCE</b>			
Filtration plant	120,000	197,764	115,001
Regeneration plant	10,000	8,237	3,943
Lake pump station	15,000	1,280	3,996
	145,000	207,281	122,940
<b>ADMINISTRATION</b>			
City of Regina administration	70,000	68,264	64,607
Board expenses	220,000	159,428	176,051
Audit services	20,000	37,379	47,064
	310,000	265,071	287,722
<b>INTEREST EXPENSES AND BANK CHARGES</b>			
Banking services for loan	-	(1,593)	325,490
Interest for loan	1,521,545	1,491,857	-
	1,521,545	1,490,264	1,534,771

# SCHEDULE OF TANGIBLE CAPITAL ASSETS

[in dollars]

for the year ended December 31

	General				Infrastructure			2019	2018
	Land Improvements	Land	Vehicles and Equipment	Office and Information Technology	Plants and Facilities	Roads	Assets Under Construction		
Year	88,535	11,373	1,227,681	113,922	98,847,802	455,389	16,628,814	<b>117,373,516</b>	101,288,668
Depreciation	-	-	101,797	-	246,422	-	20,198,787	<b>20,547,006</b>	16,084,848
Impairment	-	-	-	-	133,953	-	-	<b>133,953</b>	-
Disposal	-	-	-	-	-	-	133,953	<b>133,953</b>	-
	88,535	11,373	1,329,478	113,922	99,228,177	455,389	36,693,648	<b>137,920,522</b>	117,373,516
Amortization									
Year	-	11,373	898,001	62,435	63,414,668	17,424	-	<b>64,403,901</b>	62,254,598
	-	-	64,564	23,379	2,049,564	30,205	-	<b>2,167,712</b>	2,149,303
Depreciation	-	-	-	-	-	-	-	-	-
	-	11,373	962,565	85,814	65,464,232	47,629	-	<b>66,571,613</b>	64,403,901
Due	<b>88,535</b>	-	<b>366,913</b>	<b>28,108</b>	<b>33,763,945</b>	<b>407,760</b>	<b>36,693,648</b>	<b>71,348,909</b>	52,969,615





BUFFALO  
POUND  
WATER  
BOARD OF  
DIRECTORS

2019  
ANNUAL  
REPORT