

2020-21

Twenty-Fifth Annual Report

March 31, 2021



Cover Page:

Halifax Water staff continuing to provide essential water, wastewater and stormwater services for more than one hundred thousand customers throughout HRM during a global pandemic.

Maintaining these essential services has been a critical part of fighting COVID-19 and protecting public health.

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Get in touch!

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Facebook: @HalifaxWater
YouTube: @HalifaxWater
LinkedIn: HalifaxWater



OUR MISSION, VISION & VALUES

Our Mission

To provide world-class services for our customers and our environment.

Our Vision

We will provide our customers with high quality water, wastewater, and stormwater services.

Through adoption of best practices, we will place the highest value on public health, customer service, fiscal responsibility, workplace safety and security, asset management, regulatory compliance, and stewardship of the environment.

We will fully engage employees through teamwork, innovation, and professional development.

Our Values

Relationships

We nurture relationships with our customers, our team members and the environment. We are engaged in the neighbourhoods we serve and we support continual learning across our team.

Innovation

We are among the top utilities across the continent and we are known on the global stage. We always ask, “how can we improve efficiency, sustainability, creativity and the customer experience?”

Accountability

We refuse to cut corners. We check in with our excellence standards regularly and look to one another for support. Safety steers our decision-making. We are driven to make our policies, decisions and projects as clear as our drinking water.

Protection

Halifax Water protects the health and well-being of our population. We exist to guard natural resources, finding ways to sustain our communities and environment.

OUR LEADERS

Board of Commissioners

March 31, 2021



Craig MacMullin, MBA, CPA, CGA
Chair



Colleen Rollings, P.Eng.
Vice Chair



Brad Anguish, MBA, P.Eng.
Commissioner



Ted Farquhar, P.Eng., CPA
Commissioner



Councillor Becky Kent,
Commissioner



Councillor Pam Lovelace,
Commissioner



Councillor Patty Cuttall,
Commissioner



Councillor Cathy Deagle Gammon,
Commissioner

Executive Staff

March 31, 2021



Cathie O'Toole, MBA, FCPA, FCGA, ICD.D
General Manager



Louis de Montbrun, CPA, CA
Director, Corporate Services/
CFO



Jamie Hannam, MBA, P.Eng.
Director, Engineering &
Information Services



Kenda MacKenzie, P.Eng.
Director, Regulatory Services



Susheel Arora, M.A.Sc., P.Eng.
Director, Wastewater &
Stormwater Services



Reid Campbell, M.Eng., P.Eng.
Director, Water Services



Heidi Schedler,
General Counsel

MESSAGE FROM THE CHAIR

Over the past year, there have been some significant achievements and challenges for Halifax Water as it continued to pursue its mission of providing world-class services for our customers and our environment.

In 2020/21, half of the Halifax Water Board changed, including the Vice-Chair – the long-serving municipal Councillor Russell Walker, who served on the Halifax Water Board for more than ten years. As part of the transition, Halifax Water's Executive Team ensured that new board members and new municipal councillors were oriented to Halifax Water governance, services and operational service delivery.

As Board Chair, I am proud of the organization's commitment to diversity and inclusion and the balance that exists on the Halifax Water Board and Executive Team. As Halifax Water becomes an increasingly diverse organization, it continues to focus on becoming more representative of the customers it serves.

This past year, Halifax Water submitted an application to the NSUARB to increase rates, and on August 27, 2020, that application was approved. The approved application included adjustments to wastewater rates and changes to the Regional Development Charges. Due to the outbreak of COVID-19, Halifax Water reassessed the timing and amount of rate increases, and as a result, put forward a strategy to reduce and defer rate increases, committing to hold water rates for 2020/21 and 2021/22 and to defer increasing wastewater rates until April 1, 2021. The Regional Development Charges will change effective May 31, 2021.

The Halifax Water Board and the Executive Team work hard to balance the competing interests of maintaining and upgrading critical infrastructure, meeting environmental requirements, and prudently planning to support further growth in the municipality while maintaining high-quality services that are affordable for customers.

Halifax Water continues to do excellent work and in 2020/21 was recognized nationally and internationally. In January 2021, Halifax Water was named as one of Atlantic Canada's Top 100 Employers; and in February 2021, it was announced that Halifax Water was awarded the 2021 American Water Works Association (AWWA) Public Communications Achievement Award.

Of course, 2020/21 would not be complete without acknowledging the impact of the COVID-19 global pandemic. Here at home, the Halifax Water Team demonstrated their commitment to customers and their community by continuing to be on the front line, maintaining essential services. That commitment allowed homes, buildings, hospitals, long-term care facilities, breweries and industry to operate, provide water for fire protection, and kept wastewater and stormwater systems running to help protect our environment and public and private property. Staff kept these critical systems running while working safely and taking steps to benefit and assist our customers.

On behalf of the Halifax Water Board, I wish to convey to customers our continued commitment to providing responsible governance and oversight in the provision of water, wastewater and stormwater service by Halifax Water. To the employees of Halifax Water, particularly the front-line workers, I wish to extend my sincere appreciation for your service.



Craig MacMullin, Chair of the Board

MESSAGE FROM THE GENERAL MANAGER

When I think back on the past year, the theme that comes to mind for fiscal 2020/21 is “resilience.” Throughout the entire year, Halifax Water employees demonstrated remarkable commitment, dedication, and a One Team, One Water spirit.

Through the ongoing and ever-changing response to COVID-19, the discovery of a non-toxic algal bloom at Lake Major, and significant water main breaks on Cobequid Road, our team faced these challenges head-on, changing and adapting to the situations around them with a positive can-do attitude. That, to me, exemplifies resilience.

This past year, with our customers top-of-mind, we successfully launched several new programs and service enhancements. This included an enhanced lead service line replacement program, an enhanced algal monitoring program, a new customer portal and a wastewater research program.

In fiscal 2020/21, we also launched our new Water Supply Enhancement Program (WSEP). This program outlines Halifax Water’s plan to spend \$230 million over a ten-year period for asset replacements, process enhancements and upgrades at the Lake Major and Pockwock Water Supply Plants.

As we dealt with the challenges of delivering service as COVID-19 took hold, the Halifax Water team completed a number of significant capital projects, including an upgrade of the Caledonia Road Water Transmission Main and the installation of new water main and storm sewer in the Federal/Romans/McAlpine Avenue area of Halifax. In addition, the team began construction of a new water reservoir to better serve the growing communities of Bedford South, Bedford West, Royale Hemlocks and Birch Cove North.

From a regulatory perspective, Halifax Water made two significant applications to the Nova Scotia Utility and Review Board (NSUARB) in fiscal 2020/21. The first application was requesting approval to increase water and wastewater rates, and the second was seeking approval for an adjustment to Regional Development Charges (RDCs).

These applications are periodically necessary to adjust rates and charges. Through this regulatory process, we can secure the ongoing financial sustainability of the utility and ensure costs are allocated equitably between different customer groups and generations of customers.

The water and wastewater rates application recognized the need to balance investments in critical infrastructure and service with customer needs. While these rates have not increased since April 1, 2016, over that same period Halifax Water has invested \$225 million in water, wastewater and stormwater infrastructure. In addition, it is estimated that Halifax Water will need to invest approximately \$4 billion (\$2.7 billion in today’s dollars) over 30 years between 2019 and 2049. These services are fundamental to the economic well-being of our municipality, the health of residents, and the protection of our environment.

When the rate increase application was put forward in February 2020, it was felt that the utility did not have the ability to absorb all the projected costs without assuming an unacceptable level of risk. However, the outbreak of COVID-19 prompted Halifax Water to take immediate action to offer temporary customer relief and reduce and defer rate increases to keep water rates stable for 2020/21 and 2021/22, and to defer increasing wastewater rates until April 1, 2021.

As an organization, we are committed to the principle of “One Team, One Water.” That would not be possible without the amazing team we have here at Halifax Water. Our people are one of our greatest strengths, and I want to thank each and every one of them. It is through them that we demonstrate our commitment to water, wastewater, and stormwater services and to the residents and businesses of our region.

As an essential service provider, throughout the response to COVID-19, Halifax Water’s focus has been on safely maintaining services, employment and capital work. We currently employ approximately 500 people, with a capital budget of \$96 million and an operating budget of \$155 million in 2020/21. These investments provide significant economic benefit to our community, and that in turn benefits Halifax Water customers.

With investments now and into the future, we will all benefit from the infrastructure that helps provide the economic and environmental backbone for current and future generations.



Cathie O’Toole, General Manager

HIGH QUALITY WATER

Getting the Lead Out of HRM

Halifax Water launched the Lead Service Line Replacement program in 2017. This program included a 25% rebate for property owners to initiate the replacement of their portion of the service line. However, over the past few years, it has become clear that the rebate was not enough of an incentive for property owners to replace their lead service lines.

Recognizing that more needed to be done to achieve the original program goal of removing all lead service lines by 2050, Halifax Water submitted a proposal to the Nova Scotia Utility and Review Board (NSUARB) in February 2020 that recommended enhancements to the Lead Service Line Replacement program. These enhancements included lead service line replacement from the water main in the street to the meter in the customer's home, at Halifax Water's expense.

In October 2020, the NSUARB approved the proposal, and the new program: Get the Lead Out, was born! This program allows Halifax Water to take control of the program timeline with a new, earlier goal of 2038 for the removal of all lead service lines. This is a significant program enhancement in the interest of Halifax Water's customers.

Most lead service line replacements in the new program will be integrated with the Halifax Regional Municipality's (HRM) street paving and renewal schedule to minimize disruption to the community and be cost-efficient for ratepayers. A limited number of replacements will also be completed outside of these large projects, at the request of property owners, and will be selected based on maximizing the benefit to public health.

Program Successes

Lead Service Lines Replaced:

374 Public
426 Private

Since implementing the 25% rebate in August 2017, Halifax Water has provided a total rebate amount of \$250,000 to 262 customers. Halifax Water has removed 374 public lead service lines, totalling \$3,413,000, and customers have replaced 426 private service lines since 2017.



The Lead Service Line Replacement program saw a steady rise in replacement numbers after implementing the rebate in 2017, but then a levelling off and a decrease in 2019/2020 and into 2020/2021. This reduction in program uptake was one of the driving factors for the new Get the Lead Out program.

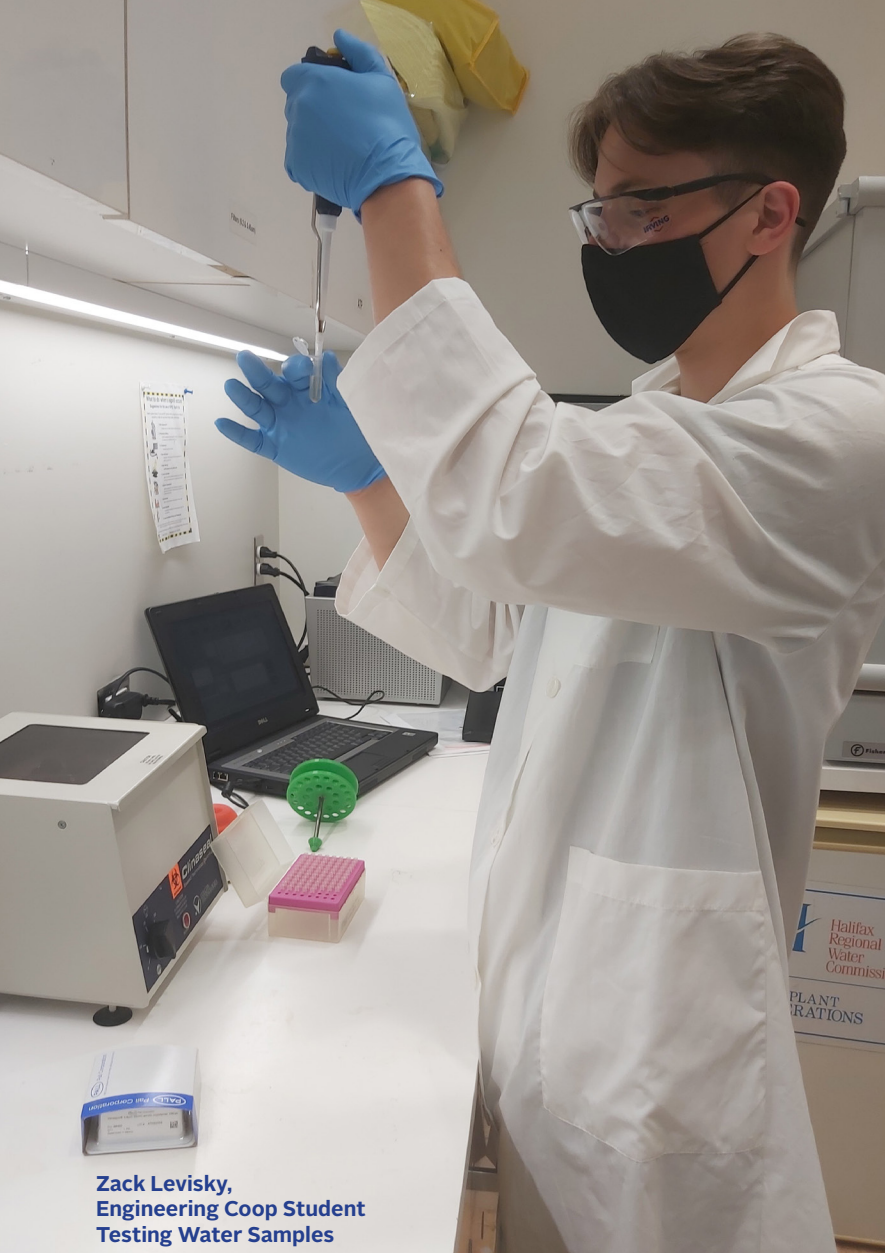
In 2020, Halifax Water received approval from the NSUARB to conduct full public and private lead service line replacements at Halifax Water's expense as part of a larger water main rehabilitation and street reconstruction project. Halifax Water replaced the lead service lines from the water main in the street to the water meter in customers' homes on Berlin Street as part of the project. This project served as a pilot project for developing processes for incorporating lead service line replacements into integrated projects with HRM. In the summer of 2020, 17 public lead service lines and 15 private lead service lines were replaced as part of this project and the processes developed have served as a foundation for the enhanced program and the 2021/22 construction season.

Path Forward

As part of our Get the Lead Out program, Halifax Water has been working with HRM to coordinate replacements for all major street recapitalization projects for the 2021-22 construction season. Based on the current project scope, it is expected that there will be approximately 40 public and 100 private replacements conducted in 2021-22 through this program.

In March 2021, Halifax Water launched Get the Lead Out. This launch included a revamp of our website: halifaxwater.ca/get-the-lead-out. The new web pages include a simple online application process. Applications to this program are prioritized based on risk factors, and replacements are scheduled throughout the construction season.

Knowing where lead service lines are is the foundation for any successful replacement program. To ensure all lead service lines will be replaced, Halifax Water has invested in improving the inventory of lead service lines by developing a machine learning model to predict the likelihood of the presence of lead services. The model incorporates many different historical records and uses inspection of service line material at the service box as a validation tool to train and improve the model over time. The use of this model will help Halifax Water plan future work, coordinate effectively with HRM and ensure the efficiency of the program moving forward.



Zack Levisky,
Engineering Coop Student
Testing Water Samples

Protecting Drinking Water: Algal Monitoring

Monitoring for harmful algal blooms caused by cyanobacteria (blue-green algae) continues to be a priority at Halifax Water to ensure the safety of our drinking water.

Both harmful and non-harmful algae blooms are being identified more frequently in Nova Scotia as we observe the effects of lake recovery and climate change. Lake recovery is the process by which improved air emissions standards have led to less acid rain. As a result, water quality in lakes around Nova Scotia and Atlantic Canada are recovering from historical acidification. Some changes are chemical, including an increase in pH (level of acidity/alkalinity) and natural organic matter, and other changes are biological and include changes to the types of plants and animals our lakes can support.

Many factors contribute to cyanobacteria bloom formation, including water temperature, nutrient supply, and sunlight. Due to the nature of cyanobacteria, wind and water currents are also factors that affect the distribution of a bloom. A bloom can change in composition and location over time. It should be noted that visual observations are not an effective method for determining bloom toxicity as not all cyanobacteria blooms are toxic.

Last year, Halifax Water introduced new tools to its algae surveillance program, which helped provide relevant and timely information and respond to source water quality changes. The algal surveillance plan includes both routine and reactive tools:

Routine tools include continuous monitoring of algal indicators in source water lakes, routine identification and quantification of cyanobacterial species and regulated algal toxins.

Reactive tools are triggered by changes identified through routine monitoring. These include the use of rapid algal toxin test strips, genetic analysis to assess the likelihood of a bloom's ability to produce toxins, as well as additional sampling for algal toxin analysis by third-party accredited laboratories.

Water Supply Plant Upgrades

Halifax Water water supply plants have been providing high-quality water to their customers for many years. In recent years, changes to source water quality have been driven by environmental factors. The combination of climate change and a reduction in acid rain-derived sulphate levels has resulted in more biologically active water sources. The end result of this is increasing levels of organic carbon and taste/odour-causing compounds like geosmin. It also brings an increased risk of algal blooms, which can disrupt treatment processes and bring the risk of algal toxins.

To ensure that Halifax Water can meet this challenge for years to come, a program to examine and upgrade the Lake Major and J.D. Kline Water Supply Plants was initiated. This program will see \$230 million invested in water supply plant upgrades over the next ten years.

Design work for the clarifiers at both water supply plants was started in 2020/21. These major projects will improve the operational effectiveness of both facilities and will be constructed over the next 3-5 years.

Through participation in Water Research Foundation projects on identification, response and modelling of harmful algal blooms, and research through the Natural Sciences and Engineering Research Council of Canada (NSERC)/Halifax Water Industrial Research Chair in Water Quality and Treatment, Halifax Water continues to develop new tools to ensure our algal surveillance program is in line with industry best practices and protective of public health.

RESPONSIBLE FINANCIAL MANAGEMENT

Annual Financial Results

Halifax Water received a clean audit opinion on the financial statements for the fiscal year ended March 31, 2021. The financial statements are presented in accordance with International Financial Reporting Standards (IFRS). Halifax Water also produces financial information in the format required by the Nova Scotia Utility and Review Board (NSUARB) in accordance with the NSUARB Water Utility Accounting and Reporting Handbook (Handbook).

The financial statements prepared under IFRS are used primarily for consolidation with the Halifax Regional Municipality's financial statements. In contrast, the financial information prepared under the Handbook is used for setting water, wastewater and stormwater rates. Summary financial information is presented on page 20 under IFRS and under the Handbook on page 21.

The audited financial statements are audited by Grant Thornton LLP and can be located at halifaxwater.ca/publications-reports.

The financial statements contain the independent auditor's report issued by Grant Thornton, IFRS statements and schedules containing financial information prepared in accordance with the Handbook.

Summarized Statement of Earnings Comparison to Budget					
	Budget 2020/21 '000	Actual 2020/21 '000	Actual 2019/20 '000	2020/21 Budget/Actual \$ Variance	2020/21 Budget/Actual % Variance
Operating revenues	\$ 138,615	\$ 136,569	\$ 137,750	\$ (2,046)	(1.5%)
Operating expenses	118,111	113,690	109,326	(4,421)	(3.7%)
Earnings from operations	20,504	22,879	28,424	2,375	(11.6%)
Financial and other revenues	620	963	1,211	343	55.3%
Financial and other expenditures	37,077	33,726	31,195	(3,351)	(9.0%)
Loss for the year	\$ (15,953)	\$ (9,884)	\$ (1,560)	\$ 6,069	(38.0%)

Actual Loss
\$9.9M

From a budget perspective, the loss of \$9.9M for the year was less than budgeted due to operating expenses and debt servicing being less than expected.

The key differences between the IFRS and Handbook financial statements are related to reporting requirements for the recognition of various expenditures as follows:

- The full actuarial liability of employee future benefits is not considered an expense for the Handbook and could result in either positive or negative impacts on income;
- Principal payments on long-term debt are an expense for the Handbook but not under IFRS;
- Depreciation expense on contributed assets is not an expense for the Handbook, and amortization of contributed capital is not considered revenue under the Handbook; and,
- Various depreciation adjustments, including the add-back of losses on the disposal of utility plant in service, componentization of assets and shorter useful lives, results in higher depreciation under IFRS than under the Handbook.

Under IFRS, the comprehensive loss is \$0.9M. After the adjustments described above, the loss for the year under the Handbook is \$9.9M.

Reconciliation IFRS Results to Handbook Results		
	March 31, 2021 '000	March 31, 2020 '000
IFRS comprehensive (loss) earnings	\$ (919)	\$ 20,899
Add non-cash pension expense	7,086	8,382
Subtract debt principle appropriation expense	(20,379)	(18,719)
Add depreciation expense on contributed assets	18,810	19,025
Subtract amortization on contributed capital	(18,810)	(19,025)
Add various depreciation adjustments	1,099	2,634
Add (subtract) OCI loss (gain)	3,229	(14,756)
NSUARB loss for the year	\$ (9,884)	\$ (1,560)

When compared by service, the primary difference from budget was in water services, where chemical costs, training costs, and debt service costs were lower than budget.

The difference in wastewater services relates to a reduction in training costs, deferral of maintenance, and lower depreciation than budget offset by lower revenues as a result of the decrease in water consumption and discharge of wastewater due to COVID-19.

The change in stormwater services relates to an adjustment to the billed revenue, and the costs allocated from wastewater service and debt service costs were lower than budget.

**Water
Services
Earnings**
\$0.5M

Total earnings for water services were \$0.5M. A \$4.7M decrease from last year.

**Wastewater
Services Loss**
\$8.0M

Increased by \$2.9M over last year with lower consumption, higher wage, depreciation, and debt servicing costs.

**Stormwater
Services
Loss**
\$2.4M

Increased by \$0.7M with revenue adjustments and higher wage, depreciation and debt servicing costs.

Operating Results by Service

	Budget 2020/21 '000	Actual 2020/21 '000	Actual 2019/20 '000	2020/21 Budget/Actual \$ Variance	2020/21 Budget/Actual % Variance	Actual/Actual \$ Change	Actual/Actual % Change
Water	\$ (4,275)	\$ 494	\$ 5,205	\$ 4,769	(111.56%)	\$ (4,711)	(90.51%)
Wastewater	(7,845)	(7,958)	(5,035)	(113)	1.44%	(2,923)	58.05%
Stormwater	(3,833)	(2,420)	(1,730)	1,413	(36.86%)	(690)	39.88%
Loss	\$ (15,953)	\$ (9,884)	\$ (1,560)	\$ 6,069	(38.04%)	\$ (8,324)	533.59%

Revenue

Operating revenues decreased from last year by \$1.2M. Consumption decreased by 1.8% on a volumetric basis resulting in a decrease in consumption revenue. Base charge revenue increased as there were 722 new water accounts.

The wastewater rebate, which is available to certain large customers whose wastewater is a lower proportion of their consumed water, decreased \$0.2M from the prior year due to fewer rebates in the current year as consumption fluctuated based on environmental factors.

Stormwater site generated charge revenue is \$0.2M less than the prior year. The decrease relates to an adjustment to revenue billed.

Fire protection revenues are \$0.4M higher than the prior year due to an approved rate increase effective October 1, 2021.

Operating Revenues

	2020/21 '000	2019/20 '000	\$ Change	% Change
Consumption revenue	\$ 84,539	\$ 86,054	\$ (1,515)	(1.8%)
Base charge revenue	33,544	33,399	145	0.4%
Wastewater rebate	(847)	(1,041)	194	(18.6%)
Metered sales total	117,236	118,412	(1,176)	(1.0%)
Stormwater site generated charge	5,127	5,361	(234)	(4.4%)
Stormwater right of way	3,835	3,835	-	-
Public fire protection	7,336	7,074	262	3.7%
Private fire protection	1,001	881	120	13.6%
Other operating revenue	2,034	2,187	(153)	(7.0%)
Operating revenue total	\$ 136,569	\$ 137,750	\$ (1,181)	(0.9%)

Expenditures

Operating Expenditures

The main driver of the increase was depreciation and amortization expense, which increased \$2.3M over 2019/20.

Salaries and benefits, as well as higher chemical costs due to price increases and higher electricity costs as a result of rate increases contributed to the increase.

Operating Expenditures				
	YTD 2020/21 '000	PYTD 2019/21 '000	\$ Change	% Change
Water supply & treatment	\$ 9,987	\$ 9,573	\$ 414	4.32%
Water transmission & distribution	12,031	10,843	1,188	10.96%
Wastewater collection	14,467	13,963	504	3.61%
Stormwater collection	4,762	4,808	(46)	(0.96%)
Wastewater treatment	20,623	20,633	(10)	(0.05%)
Engineering & information services	8,281	8,436	(155)	(1.84%)
Regulatory services	3,981	3,781	200	5.29%
Customer services	5,081	5,167	(86)	(1.66%)
Administration services	7,076	7,044	23	0.33%
Depreciation & amortization	27,410	25,078	2,332	9.30%
	\$ 113,690	\$ 109,326	\$ 4,364	3.99%

Operating Expenditures Total

\$113.7M

Operating expenditures for 2020/21 are \$113.7M, an increase of \$4.4M or 3.99% compared to the prior year.

Financial & Other Expenditures

Reported financial and other expenditures totalled \$33.7M in 2020/21, an increase of \$2.5M or 8.11% compared to the prior year. The increase was directly attributed to debt servicing costs, including long-term debt principal and interest and the dividend/grant in lieu of taxes which increased due to a new three-year agreement with HRM to pay a dividend of 0.25% on wastewater and stormwater rate-based assets.

Financial and Other Expenditures							
	Budget 2020/21 '000	Actual 2020/21 '000	Actual 2019/20 '000	2020/21 Budget/Actual \$ Variance	2020/21 Budget/Actual % Variance	Actual/Actual \$ Change	Actual/Actual % Change
Interest on long term debt	\$ 8,823	\$ 7,118	\$ 7,144	\$ (1,705)	(19.32%)	\$ (26)	(0.36%)
Repayment on long term debt	21,880	20,379	18,719	(1,501)	(6.86%)	1,660	8.87%
Amortization of debt discount	228	209	187	(19)	(8.33%)	22	11.76%
Dividend/grant in lieu of taxes	6,114	5,951	5,078	(163)	(2.67%)	873	17.19%
Other	32	69	67	37	115.63%	2	2.99%
	\$ 37,077	\$ 33,726	\$ 31,195	\$ (3,351)	(9.04%)	\$ 2,531	8.11%

Regulated & Unregulated Activities

Regulated Activities

Activities regulated by the NSUARB show a loss of \$10.7M, representing an increase of \$8.5M compared to the prior year.

Unregulated Activities

Earnings from unregulated activities increased by \$0.1M from the prior year due to a decrease in airline effluent revenue offset by a decrease in operating costs for the leachate and dewatering facilities.

Results by Activity							
	Budget 2020/21 '000	Actual 2020/21 '000	Actual 2019/20 '000	2020/21 Budget/Actual \$ Variance	2020/21 Budget/Actual % Variance	Actual/Actual \$ Change	Actual/Actual % Change
Regulated activities	\$ (16,259)	\$ (10,711)	\$ (2,260)	\$ 5,548	(34.12%)	\$ 8,451	373.89%
Unregulated activities	306	827	700	521	170.26%	(127)	18.14%
Loss	\$ (15,953)	\$ (9,884)	\$ (1,560)	\$ 6,069	(38.04%)	\$ 8,324	533.53%

Cash

Cash balances are lower than the prior year by \$1.7M due to lower earnings, delay in the fall debenture issue, and lower capital expenditures.

The liquidity on the balance sheet (ratio of current assets divided by current liabilities) is 2.04 (per NSUARB Handbook reporting).

Cash Balance

\$48.2M

Assets

Utility plant in services assets, net of accumulated depreciation, are \$1,280.3M and is \$0.7M or 0.1% lower than last year. At the end of the fiscal year, there was \$30.9M in capital work in progress, compared to \$18.1M last year.

**New Assets
Capitalized in the Fiscal Year**

\$51.2M

Additions to Utility Plant in Service and Intangibles

	Cumulative '000
Port Wallace Transmission Main	\$ 5,913
New Operations Facility Land Purchase	4,824
Fairview/Clayton Park/Bridgeview I&I Program	2,263
Corporate Flow Monitoring Program	1,776
Bennery Lake Access Road Upgrade	1,481
	16,257
All other projects:	
Water	16,759
Wastewater	12,746
Stormwater	5,453
	34,958
Total Additions	\$ 51,215

Capital Work in Progress

	Cumulative '000
Bedford South Reservoir	\$ 2,988
Romans & Federal Avenues Sewer Separation	2,705
Wastewater System Trenchless Rehabilitation	1,931
Pump Station Control Panel/Electrical Replacement	1,512
Infrastructure & IT Operations Governance	1,309
	10,445
All other projects:	
Water	10,056
Wastewater	9,049
Stormwater	1,358
	20,463
Capital Work in Progress	\$ 30,908

Debt

Debt continues to be an important funding source for Halifax Water's capital program. Total long-term debt increased to \$224.7M. New debt of \$25.0M was received in July 2020, and repayments during the year were \$19.5M.

Debt Service Ratio

20.29%

Well below the maximum ratio allowed under the blanket guarantee agreement with HRM.

Regulatory Activities

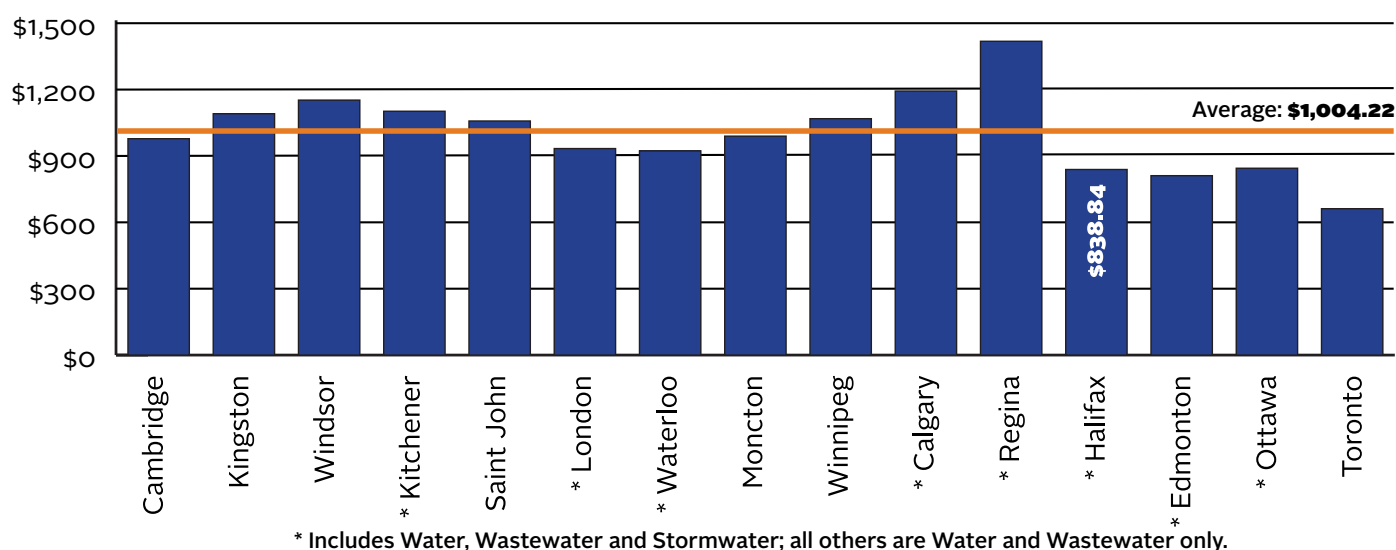
In June 2020, the NSUARB approved Halifax Water's revised rate application. There was no increase in water and wastewater rates for 2019/20, no increase in rates for water services for 2020/21 and an increase in the volumetric rate for wastewater to \$2.073 per cubic metre effective April 1, 2021. Increases in other miscellaneous fees were deferred to April 1, 2021.

Even with these proposed increases, the median residential customer in Halifax would pay 1.08% of their income for water, wastewater and stormwater services. A cost that would continue to be below the average benchmark communities across Canada.

Summary of Rates - Water & Wastewater	
Volumetric Charges (per m ³ or 1000 L)	
Water (Effective April 1, 2016)	\$0.976/1000 L
Wastewater (Effective April 1, 2021)	\$2.073/1000 L
Combined	\$3.049/1000 L
Bases Charges (per month, based on 5/8" residential water meter)	
Water	\$13.00
Wastewater	\$14.00

Summary of Rates - Stormwater	
Residential - Impervious Area	Effective July 1, 2017
Less than 50 m ²	-
50 m ² to 200 m ²	\$14.00
210 m ² to 400 m ²	\$27.00
410 m ² to 800 m ²	\$54.00
Greater than 810 m ²	\$81.00
Culvert only service	\$14.00
ICI rate per m ²	\$0.135

Annual Average Residential Cost Benchmark Cities



Supporting Our Customers During the COVID-19 Pandemic

The COVID-19 pandemic continued throughout the 2020/21 fiscal year. To support our customers, we ceased all collection activity to assist those that may have difficulty paying their accounts. Customers could defer payments, no interest was charged on overdue accounts, fees for dishonoured payments were waived, and disconnection for non-payment of service was suspended until mid-September. Collection activity slowly restarted in September 2020.



Cost Containment

Cost containment continues to be a focus for Halifax Water and is one of the key reasons Halifax Water has been able to maintain rates. A formal cost containment program has been in place since 2013. The Halifax Water cost containment program in 2020/21 resulted in savings of \$1.2M in the following categories:

Procurement Strategies	\$0.4M
Human Resource Strategies	\$0.5M
Facilities/Process Strategies	\$0.3M

Cost Containment Total

\$7.7M

Cost containment initiatives from fiscal years 2013/14 to 2020/21 resulted in savings of \$7.7M.

Pension Plan

All Halifax Water employees are members of one of two defined benefit pension plans.

Employees that transferred from HRM, of which 51 remain, are members of the HRM Pension Plan. Halifax Water is obligated to make contributions for these employees' service to the HRM Pension Plan.

For all other employees, Halifax Water maintains the Halifax Regional Water Commission Employees' Pension Plan (HRWC Employees' Pension Plan). The HRWC Employees' Pension Plan has undergone significant changes that have improved the financial position of the plan.

HRWC Employees' Pension Plan Abbreviated Financial Position at December 31

	2020 '000	2019 '000	\$ Change
Net assets available for benefits	\$ 154,956	\$ 141,580	\$ 13,376
Pension obligations	141,763	132,841	8,922
Surplus	\$ 13,193	\$ 8,739	\$ 4,454

In 2020, the net assets available for benefits increased to \$155.0M from \$141.6M in 2019. The increase was primarily related to an increase in the fair value of the investment assets. Over the same period, the pension obligations increased to \$141.8M from \$132.8M in 2019.

The financial statements for the HRWC Employees' Pension Plan are audited by Grant Thornton LLP and can be located at halifaxwater.ca/publications-reports.

The financial statements contain the independent auditor's report issued by Grant Thornton.

HRWC Employees' Pension Plan Surplus

\$13.2M

On December 31, 2020, the HRWC Employees' Pension Plan had a surplus of \$13.2M, an increase from \$8.7M on December 31, 2019.

HRWC Employees' Pension Plan Abbreviated Change in Net Assets Available for Benefits at the Year Ended December 31

	2020 '000	2019 '000	\$ Change
Revenue	\$ 12,199	\$ 14,084	\$ (1,885)
Contributions	6,540	6,435	105
Expenses	(5,363)	(5,398)	35
Increase in net assets available for benefits	\$ 13,376	\$ 15,121	\$ (1,745)

Financial Overview

Abbreviated Financial Overview (IFRS)

	March 31, 2021 '000	March 31, 2020 '000	\$ Change	% Change
ASSETS				
Current				
Cash and cash equivalents	\$ 48,228	\$ 49,953	\$ (1,725)	(3.45%)
Receivables	38,112	39,440	(1,328)	(3.37%)
Inventory and prepaids	3,573	2,738	835	30.50%
Total current assets	\$ 89,913	\$ 92,131	\$ (2,218)	(2.41%)
Utility plant in services				
Cost	1,562,720	1,524,594	38,126	2.50%
Accumulated depreciation	(282,437)	(243,584)	(38,853)	15.95%
Net utility plant in service	1,280,283	1,281,010	(727)	(0.06%)
Intangible assets	20,588	18,951	1,637	8.64%
Capital work in progress	30,908	18,104	12,804	70.72%
Total non-current assets	1,331,779	1,318,065	13,714	1.04%
Regulatory deferral account	2,620	2,812	(192)	(6.83%)
Total assets and regulatory deferral account	\$ 1,424,312	\$ 1,413,008	\$ 11,304	0.80%

LIABILITIES AND EQUITY

Payables, deposits and unearned revenue	\$ 23,577	\$ 31,852	\$ (8,275)	(25.98%)
Long term debt	224,665	219,146	5,519	2.52%
Deferred contributed capital	898,496	893,948	4,548	0.51%
Employee benefit obligations	73,796	63,365	10,431	16.46%
Total liabilities	1,220,534	1,208,311	12,223	1.01%
Total equity	203,778	204,697	(919)	(0.45%)
Total liabilities and equity	\$ 1,424,312	\$ 1,413,008	\$ 11,304	0.80%

	2021 '000	2020 '000	\$ Change	% Change
EARNINGS AND COMPREHENSIVE EARNINGS				
Operating revenues	\$ 136,569	\$ 137,750	\$ (1,181)	(0.86%)
Operating expenditures (excluding depreciation and amortization)	(93,366)	(92,630)	(736)	0.79%
Depreciation and amortization	(48,607)	(46,410)	(2,197)	4.73%
Earnings from operations	(5,404)	(1,290)	(4,114)	318.91%
Financial and other revenues	19,773	20,236	(463)	(2.29%)
Financial and other expenditures	(11,867)	(12,611)	744	(5.90%)
Earnings for the year	2,502	6,335	(3,833)	(60.51%)
Regulatory deferral account depreciation	(192)	(192)	0	0.00%
Re-measurement on defined benefits plans	(3,229)	14,756	(17,985)	(121.88%)
Total comprehensive earnings (loss) for the year	\$ (919)	\$ 20,899	\$ (21,818)	(104.40%)

Financial Overview

Abbreviated Financial Overview (Handbook)

	March 31, 2021 '000	March 31, 2020 '000	\$ Change	% Change
ASSETS				
Total current assets	\$ 89,913	\$ 92,131	\$ (2,218)	(2.41%)
Utility plant in services				
Cost	1,877,874	1,836,187	41,687	2.27%
Accumulated depreciation	(543,355)	(506,040)	(37,315)	7.37%
Net utility plant in service	1,334,519	1,330,147	4,372	0.33%
Capital work in progress	30,908	18,104	12,804	70.72%
Total non-current assets	1,365,427	1,348,251	17,176	1.27%
Regulatory deferral account	2,620	2,812	(192)	(6.83%)
Total assets and regulatory deferral account	\$ 1,457,960	\$ 1,443,194	\$ 14,766	1.02%
LIABILITIES AND EQUITY				
Payables, deposits and unearned revenue	\$ 23,577	\$ 31,852	\$ (8,275)	(25.98%)
Long term debt	224,665	219,146	5,519	2.52%
Deferred contributions	55,699	42,604	13,095	30.74%
Total liabilities	303,941	293,602	10,339	3.52%
Total equity	1,154,019	1,149,592	4,427	0.39%
Total liabilities and equity	\$ 1,457,960	\$ 1,443,194	\$ 14,766	1.02%
EARNINGS AND COMPREHENSIVE EARNINGS				
Operating revenues	\$ 136,569	\$ 137,750	\$ (1,181)	(0.86%)
Operating expenditure (excluding depreciation and amortization)	(86,280)	(84,248)	(2,032)	2.41%
Dividend/grant in lieu of taxes	(5,951)	(5,078)	(873)	17.19%
Depreciation and amortization	(27,410)	(25,078)	(2,332)	9.30%
Earnings from operations	16,928	23,346	(6,418)	(27.49%)
Financial and other revenues	963	1,211	(248)	(20.48%)
Financial and other expenditures	(27,775)	(26,117)	(1,658)	6.35%
Earnings (loss) for the year	\$ (9,884)	\$ (1,560)	\$ (8,324)	533.59%

SERVICE EXCELLENCE

Customer Care Centre

In March 2020, a new telephony system was implemented for the Halifax Water Customer Care Centre. This modern system enabled our Customer Care staff to provide exceptional service to our customers while working remotely during the COVID-19 pandemic.

We have worked diligently with internal business units to improve processes, increasing the percentage of calls answered the first time contact is attempted.

Over 71% of customer calls were answered within 20 seconds, and the average speed of answer for all calls was 56 seconds. Compare this to the previous year's average of 260 seconds, or just over four minutes.

These efforts have resulted in a year-over-year reduction in incoming calls by 27%, or 23,535 calls. This level of performance is a first for Halifax Water and is the way of the future.

Customer Care Centre Performance						
	Calls Offered	Calls Answered	Calls Abandoned	Abandon Rate	Calls Answered Within 20 Seconds	Average Speed of Answer
2020/21	63,336	60,880	2,456	4%	71%	56 seconds
2019/20	86,871	67,360	19,494	22%	32%	260 seconds

Halifax Water Helping Customers

H2O Fund Grants Provided to Customers in 2020/21

\$23,867

Halifax Water continues to improve its communication about this program as well as the application process.

As with previous years, in 2020/21, Halifax Water continued to provide the H2O (Help to Others) Fund to help customers with low incomes pay their bill.

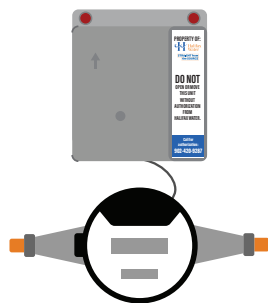
This program is funded by Halifax Water and administered by the Salvation Army, who provides emergency assistance to low-income customers. The program began in 2011 and in April 2018 the income threshold and amount of assistance were increased. Currently, the amount of assistance is a maximum grant of \$275 available once in a 24-month period and the income eligibility thresholds are \$21,000 for single income and \$39,000 for family income.



Advanced Metering Infrastructure (AMI)

The Advanced Metering Infrastructure (AMI) project was initiated in 2016/17. It involved installing updated meters in customer properties along with a fixed network of radiofrequency devices throughout the service area. The updated meters read customer consumption and transmits that information to the remote devices that collect the data. The AMI technology has almost completely eliminated the need for meter readers to walk or drive a route to read meters with portable radio frequency devices.

The AMI project was officially completed in 2020 and operationalized. Commercial meters greater than 3" were upgraded by the Metering team, and as of March 31, 2021, all commercial meters have been upgraded to AMI.



Manual Water Meter Read Fee

\$50

In 2020, the NSUARB approved a \$50 manual meter read fee. This fee covers the cost of having staff manually read water meters on a quarterly basis for customers who elected not to upgrade the water meter on their property.

Customer Connect

Halifax Water successfully launched our highly anticipated customer portal, Customer Connect, on November 23, 2020.

Keep current with alerts.

Sign up for text or email alerts from Halifax Water, including bill updates, leak alerts and more with Customer Connect!

Sign up today:
halifaxwater.ca/customer-connect



Customer Connect has modernized how Halifax Water interacts and provides information to our customers with in-portal announcements, bill notifications, water consumption data and more. Customers who register for Customer Connect now have access to their bills, past and present, can see bill payments, multiple accounts in one spot, an annual summary of consumption and cost and much more.

Since the launch of Customer Connect we have significantly surpassed all expectations of the number of customers who would register in the first year. Based on experiences shared by other utilities and the platform developer, we expected customer participation rates to be approximately 5%; however, we are excited to report that as of March 31, 2021, customer registration rates are in excess of 17%, with many customers opting for the new paperless billing service. The new paperless billing service will reduce the impact to our environment by decreasing the amount of paper utilized during the billing process. By enrolling, customers will receive all billing information electronically.



EFFECTIVE ASSET MANAGEMENT

Capital Infrastructure Projects

Water & Wastewater Main Renewals & Linings in 2020/21

Halifax Water has an extensive asset management plan in place, part of which includes the scheduled replacement or maintenance of ageing assets. Water mains and wastewater mains are replaced with new pipe through capital projects each year. Wastewater mains can also be re-lined from the inside to significantly extend the service life of the pipe. Learn more about this technology on the next page.

Water Mains Replaced: 3.62 KM



Wastewater & Stormwater Mains Relined or Replaced: 9.91 KM



Hemlock Reservoir Project

Construction began on the Hemlock Reservoir in 2020. The reservoir will provide security of water service to the Bedford West, Bedford South and Birch Cove areas.

The reservoir location was identified in the early 2000s and incorporated into plans for water system development and land development plans in the area. The reservoir is funded by developer capital cost contributions approved by the Nova Scotia Utility and Review Board.

The steel reservoir is being constructed at a total project cost of \$8,410,000. Due to space constraints on-site, the reservoir is being constructed using non-traditional methods. The dome and first two shell rings of the reservoir were built on the ground supported by scaffolding. The dome is then being lifted in 3 metre increments using 60 hydraulic jacks around the circumference of the structure. As the dome structure is lifted, a new ring of shell plates is installed. Construction of the reservoir is anticipated to be complete in November 2021.

Hemlock Reservoir Water Capacity 21.5 Million Litres

The reservoir will have a total storage volume of 21.5 million litres and is located on Masthead Court adjacent to Highway 102. The reservoir has a diameter of 30 metres and a total water column height of 30.5 metres.



Trenchless Wastewater Main Lining Program

Over the past seven years, Halifax Water has successfully conducted an ongoing annual mainline sewer rehabilitation program using trenchless cure-in-place (CIPP) lining methods. The primary goals of CIPP are:

- to provide and restore flow capacity, and;
- to restore the structural integrity of ageing and challenged sewer mains, which were making them prone to disruptions.



Cured CIPP liner installed in a brick & clay sewer main, circa 1905.

The CIPP process has proven to have minimal impact on the surrounding environment and results in a long-lasting solution to pipe deterioration. This process has been instrumental in controlling pipe infiltration and ex-filtration.

CIPP is a trenchless pipe rehabilitation option; it does not require excavation, making relining a more cost-effective, less time-consuming, and environmentally friendly process. It also offers the benefits of providing long-term complete structural rehabilitation of the sewer.

The annual program conducted in 2020/21 was comprised of two separate annual sets (the delayed 2019/20 and the new 2020/21 candidate lining sets); therefore, in addition to the 2020/21 work, the remaining portions of the 2019/20 work was also completed. The sewer lengths lined and associated costs of the work in 2020/21 are listed in the table below.

The sewers lined in 2020/21 consisted of streets mainly in the Halifax peninsula and areas in Fairview, followed by smaller sections in Dartmouth and Bedford. These sewers ranged in size from 200 mm to 750 mm in diameter. The average cost of lining in 2020/21 worked out to be approximately \$478 per metre.

2020/21 CIPP Wastewater Main Lining		
Annual Lining Programs	Length of Sewers Lined	Cost
2019/20 Phase 1 - Structural Linings	3,895 m	\$ 2,300,000
2019/20 Phase 2 - Infiltration Linings	3,505 m	\$ 1,100,000
2020/21 - Structural Linings	2,230 m	\$ 1,200,000
Total	9,630 m	\$ 4,600,000

Caledonia Road Transmission Main Project

In 2020, Halifax Water completed the first phase of the Caledonia Road Transmission Main Upgrade project in Dartmouth. This project is part of Halifax Water’s Integrated Resource Plan to twin the existing water transmission main from Main Street in Dartmouth to the Burnside Industrial Park. This phase included the addition of approximately 1.5 km of 750 mm diameter ductile iron water main.

This new transmission main connects to an existing main near the Lake Lemont Emergency Water Supply Plant, paralleling the existing 600 mm transmission main within the Lake Lemont watershed lands and along Caledonia Road, terminating just after Sheiling Lane. The new transmission main also provides redundancy to the existing Caledonia Road transmission main and supports planned development in the Port Wallace area. The project was completed in May 2021 with a final project cost of just under \$6.5 million. The next phase of the project will include the continuation of the 750 mm transmission main north along Caledonia Road, terminating at Appian Way and Breeze Drive.



Transmission main installation



Capital Infrastructure Projects Continued...

Federal Avenue, Romans Avenue & McAlpine Avenue Sewer Separation & Water Main Renewal Project

The sewer separation program within the peninsula of Halifax is an outcome of the Halifax Water West Region Wastewater Infrastructure Plan (WRWIP) and the HRM Regional Centre Local Wastewater Servicing Capacity Analysis (LoWSCA). As a foundational component of the WRWIP, a Wet Weather Flow Management Study was completed. It identified the most cost-effective long-term solution was to separate the combined sewers into independent wastewater and stormwater management systems. This separation will accommodate expected growth, compliance, asset renewal, and operational optimization in the context of no increase in annual combined sewer overflow (CSO) discharges because of growth.

The Romans Avenue and Federal Avenue Sewer Separation project is the first such project to be implemented under this program. Approximately 900 metres of new, separated concrete storm sewer pipe of various sizes (from 300 mm diameter to 750 mm diameter) was installed within Federal and Romans Avenues along with accompanying catchbasins, manholes and lateral connections at a total cost of \$2,849,000. In addition, Halifax Water also removed and replaced approximately 615 metres of 200 mm diameter and 435 metres of 250 mm diameter ductile iron water main for a total cost of \$1,467,000. The project was completed in the fall of 2020.

Burnside Operations Centre

In 2020, plans for Halifax Water's new Burnside Operations Centre moved into the design phase. This new facility, which is currently being designed, will be located on Jennett Avenue in Burnside.

The new facility will replace four existing smaller depots, several of which would otherwise require replacement or significant reinvestment. By combining the four depots, the Burnside Operations Centre is anticipated to help facilitate Halifax Water's transition to a One Water utility. With operations contained all in one area, a new culture of collaboration and interaction will emerge along with consistent business processes.

The One Water Operations Department will also provide efficiencies in terms of meeting customer expectations through consistent service levels, increased employee satisfaction, efficient allocation of tools, equipment and resources to efficiently meet service needs, maximize capacity, and reduce costs. By transforming four ageing buildings into a single energy-efficient building, designed as a LEED silver building, this will help Halifax Water achieve future requirements for building efficiency of Halifax's climate action plan, Halifact 2050.

The design of the Burnside Operations Centre is expected to continue through 2021, with tendering scheduled for early 2022. Operations from the Burnside Operations Center are anticipated for the Fall of 2023.

Energy Management

There is a considerably high level of energy use in municipal water and wastewater/stormwater treatment facilities and their respective distribution and collection. As a result, Halifax Water is continually making efforts to control and reduce energy consumption and reduce our carbon footprint through more efficient energy management practices. These practices help achieve operational, financial and environmental benefits for both Halifax Water and the communities we serve. Some of these improvements in the 2020/21 fiscal include:

- A solar energy project was completed on the Halifax Wastewater Treatment Facility (WWTF) roof, resulting in a peak capacity of 75 kilowatts (kW), or enough energy to power 11 homes annually.
- Upgrades to equipment and infrastructure, as well as several ongoing annual operating initiatives resulting in over 118,348 kilowatt hours equivalent (kWh) in annual energy savings, over \$13,000 in cost savings, and over 75 Tonnes carbon dioxide equivalent (CO₂e) greenhouse gas (GHG) reductions.
- Development of an Ambient Temperature District Energy System. This system will be part of the Cogswell interchange development and will extract heat from the wastewater travelling through the plant and use the energy to heat buildings contained within the new development. The system will also provide cooling in summer.
- Working with building designers to achieve LEED silver certification for the new Burnside Operations Centre. This will help ensure that the building's carbon and energy footprints are consistent with current best practices.
- Continuously pursuing funding opportunities for alternate energy projects and greenhouse gas reduction efforts.

For 2020/21, the utility saw an overall increase of 3.7% in energy use, an aggregate decrease of 7.0% in water and wastewater flows, and an aggregate decrease of 1.0% in GHG emissions, compared to 2019/20. During 2020/21, direct GHG emissions were 1,976 tonnes CO₂e, while indirect emissions were 34,445 tonnes CO₂e.

A focus on further energy efficiency, operational improvements to existing infrastructure, and completing energy use inventories in all our facilities in the coming years will allow Halifax Water to continue optimizing energy use and build on these results.

Solar PV Panels on the roof of the Halifax Wastewater Treatment Facility on Upper Water Street.

**The Halifax WWTF Solar Panels Produce Enough Energy Annually to Power
11 Homes**

On January 6, 2021, our first solar system started feeding electricity to the power grid. Installed on the roof of the Halifax Wastewater Treatment Facility, this system boasts 226 panels, with a peak capacity of 75 kW. It is expected to pay for itself in 10 years.

Information Technology Strategic Plan

Halifax Water completed year three of its five-year IT strategic plan. The intent of the five-year IT strategic plan is to ensure that Halifax Water has the foundational information systems in place to support customer service and effective operations into the future. The strategic plan is a roadmap for technology investments, as well as the structured program approach for implementing the roadmap.

Several significant IT strategic plan milestones were achieved last year, including:

- The launch of Customer Connect in November 2020. Learn more about the early success of exciting project on page 19. Additional phases scheduled for 2021/22 will provide further benefits for our customers.
- Implementation of new telephony system for the Customer Care Centre. Learn more on page 18.
- The first phase of ViP, Halifax Water's human resource management system, was launched in August 2020. This system automates a variety of payroll and human resource management functions and provides employees direct access to their employee records such as pay statements, vacation allotment and training records.
- Upgrades to the Cityworks computerized maintenance management system.
- Migration to Office 365 and adoption of Microsoft Teams as a collaborative work platform.

Also, in 2020/21, several other key projects were launched or are in the early stages. These include:

- A two and a half year project was launched to improve Halifax Water's cybersecurity.
- An Enterprise Resource Planning (ERP) solution project was launched to replace the existing system which will no longer be supported after 2026. Halifax Water has chosen to replace it with a new system that will be less expensive to operate and maintain compared to other ERP products. It will provide enhanced functionality to enable us to modernize processes, integrate with other systems, and manage our financial resources more effectively.
- A vendor was chosen to establish a system for managing Halifax Water's obligations for environmental compliance reporting and water quality data. The initial phase of this project is slated to launch in 2021/22.

In the upcoming year, Halifax Water will take significant steps towards its digital transformation as a water utility. This includes developing our systems to share utility knowledge and data across multiple platforms to improve operational intelligence, support better asset management decisions, and improve customer service.



REGULATORY COMPLIANCE

Environmental Management System

An Environmental Management System (EMS) is a set of processes and practices that enable an organization to reduce its environmental impact and increase its operating efficiency. It is a framework consisting of procedures, records and processes Halifax Water uses to manage environmental issues and assist with regulatory compliance. It also makes day-to-day operations more sustainable and engages employees in health and safety practices that promote stewardship. The EMS program can be audited against ISO 14001 standards, and if found to comply, receives certification through ISO.

Halifax Water staff have successfully obtained ISO 14001 certification for the J. D. Kline, Lake Major and Bennery Water Supply Plants and the Herring Cove, Dartmouth, Halifax, Eastern Passage, Mill Cove Wastewater Treatment Facilities. In September 2021, the scope of audits will expand to include the Aerotech WWTF, community

WWTFs, Timberlea-Lakeside WWTF and Small Systems WSPs under the ISO 14001 banner. Once completed, all water and wastewater facilities at Halifax Water will be ISO 14001-2015 certified by SGS Canada.

With the recent appointment of the EMS Program Manager, Halifax Water will be expanding the EMS program corporate-wide. All internal services that provide support to the water and wastewater facilities will be included in the system. Once internal services are brought into the system, expansion to water distribution and wastewater collections will commence.

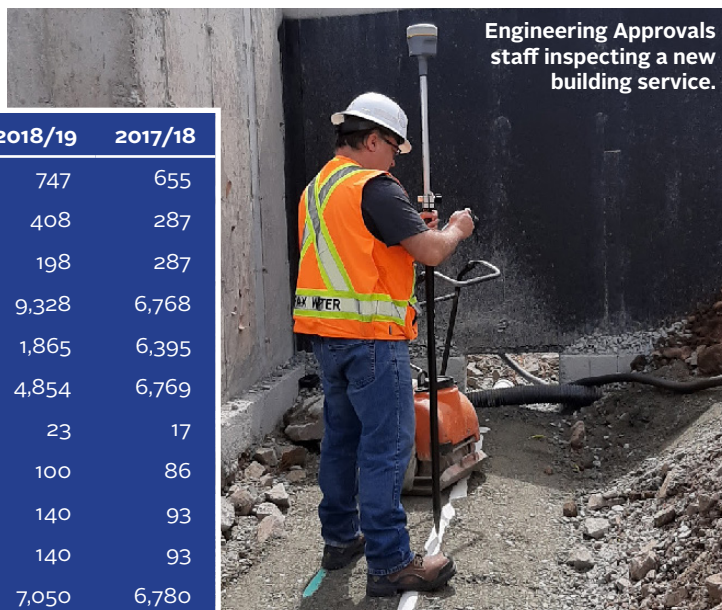


Engineering Approvals

The Engineering Approvals group is focused on adherence to the Halifax Water Design Specifications, the Supplementary Standard Specification and the Schedule of Rates, Rules and Regulations with respect to connections to and expansions of the Halifax Water systems. The administration of the new service connections includes the administration of the Regional Development Charge.

In 2020/21, the Engineering Approvals group processed:

Application Type	2020/21	2019/20	2018/19	2017/18
Building Permit Applications	1,343	1,338	747	655
New Service & Renewal Applications	412	443	408	287
Subdivision Applications	199	273	198	287
Metres of New Water Main	2,175	2,205	9,328	6,768
Metres of New Wastewater Main	1,861	2,191	1,865	6,395
Metres of New Stormwater Main	1,582	2,509	4,854	6,769
Demolition Permits	167	118	23	17
Clearance Letters	80	83	100	86
Tender Reviews	122	112	140	93
New Backflow Prevention Applications	122	112	140	93
Active Backflow Prevention Devices	7,204	7,182	7,050	6,780



Engineering Approvals staff inspecting a new building service.

Halifax Water receives permits from HRM Planning and Development, historically in a hard copy format. In recent years, HRM has been considering the replacement of their permit management software, with a new online platform known as POSSE. The preliminary work completed in developing the online functionalities was beneficial, during the COVID-19 pandemic, when staff were able to quickly adjust business processes and manage the permits remotely. In December 2020, the Approvals Group went live with POSSE.

Regional Development Charge

The application to update the Regional Development Charge (RDC) was submitted to the NSUARB in November 2019 with the associated hearing occurring in June 2020. The proposed RDC was based on the 2019 Infrastructure Master Plan which determined the water and wastewater infrastructure required to support the projected growth within Halifax Regional Municipality in the next 20 years.

Using this information, a charge per new residential dwelling unit and non-residential floor area was created. Halifax Water committed to regular reviews of the RDC using new and best information to identify changes that could result in a 15% +/- change to the charge.

The NSUARB issued a decision in October 2020 with an ultimate final order in April 2021. The decision outlined a number of annual reports and stakeholder consultations that will commence in the upcoming year; and approved a deferral mechanism for affordable housing developments.

Environmental Engineering

During the year, the Environmental Engineering group (EEG) worked with the Geographic Information System (GIS) and Cityworks implementation team to onboard the Pollution Prevention (P2) and Inflow and Infiltration (I&I) program staff. Cityworks has already become a valuable tool in tracking, managing, and advancing work, allowing more effective interaction with the operations group through the ability to access current and historical work orders.

Wastewater operations crews observed an increase in wipes, gloves and masks being flushed, causing blockages in the wastewater collection systems and pump stations. The P2 team assisted the Communications group in reiterating the “Don’t Dump It” campaign.

The I&I Reduction program identifies and resolves private property connections where stormwater is entering the wastewater system.

**ICI Properties
Inspections
350+**

The P2 and I&I program staff are responsible for regulating the quantity and quality of discharge from customer connections to the wastewater and stormwater systems. P2 is responsible for situations where a private wastewater system is inadvertently cross-connected to a stormwater system. Staff also investigate the origin of spills or non-compliant discharges into wastewater and stormwater systems.

The EEG at Halifax Water also played an integral part in COVID-19 research as Halifax Water began monitoring for traces of SARS-CoV-2 in community sewage systems.

Private Property Inspections

1,300+

The I&I team also works on other related initiatives, such as a Downspout Disconnection program. This is in collaboration with the Halifax Water Sewer Separation Program which is being performed by the Engineering department. In the project areas being separated, the adjacent private properties are required to disconnect all downspouts that were connected to the former combined system. Another initiative under development is the Campus Customer Program which involves the compliance of larger private properties, which typically requires a more robust assessment and remedial actions over a longer period of time.



Water Quality Compliance

Providing our customers with safe, reliable, affordable, high-quality drinking water requires investment in infrastructure, research, and robust quality assurance/quality control programs. Halifax Water has made considerable investments in all these areas.

In order to ensure quality control is optimized, we maintain ISO 14001 Environmental Management System registration at the J. D. Kline (Halifax), Lake Major (Dartmouth), and Bennery Lake (Halifax Airport) Water Supply Plants.

Halifax Water undertakes a comprehensive water testing program with bacteriological testing done weekly at 63 locations within the urban core and at each of the small systems.

Approximately 3,275 tests are conducted each year for total coliform bacteria. Halifax water consistently achieves results where 99.9% of samples are absent of bacteria, as shown on this page.

Additional testing of drinking water includes:

- Chlorine level, pH level, and turbidity (clarity) of treated water leaving each plant and multiple points within the facility to monitor and optimize the treatment process.
- Monthly and quarterly sampling of treated water at 29 locations within the distribution systems.
- Quarterly sampling of raw lake water and water from contributing streams.
- Sampling of Lake Major and Pockwock Lake raw and treated water for all parameters in the Health Canada Guidelines for Canadian Drinking Water Quality.
- Testing and sampling for giardia and cryptosporidium in treated and raw water for all surface water systems.

Water test results are reported to Nova Scotia Environment & Climate Change (NSECC) and the Nova Scotia Medical Officer of Health (NSMOH) on a regular basis. Protocols have been established between Halifax Water and the provincial Health and Environment departments to clearly delineate roles and responsibilities in advance of the unlikely event of a disruption in water quality.

During the COVID-19 pandemic, some of the dedicated sampling locations were temporarily replaced with alternatives that could be safely accessed while following COVID-19 safety protocols. These adjustments were reported weekly to NSECC.



Drinking Water Compliance Summary: Total Coliform Results

April 2020 - March 2021

Systems	% Absent	# of Samples
Pockwock	100.0%	880
Pockwock Central	100.0%	521
Lake Major	99.9%	1196
Bennery	100.0%	159
Five Islands	100.0%	104
Silver Sands	100.0%	106
Middle Musquodoboit	100.0%	104
Collins Park	100.0%	104
Bomont	100.0%	104
Total	Avg. 99.9%	3278
Absent		3277
Present		1

Regulatory Compliance staff collecting drinking water samples.

Wastewater Treatment Facility Compliance

Halifax Water's wastewater treatment facilities and all other provincial wastewater facilities are regulated by NSECC.

NSECC sets effluent discharge limits for all wastewater facilities across the province. The limits define maximum concentrations of parameters such as:

- Carbonaceous Biochemical Oxygen Demand (CBOD), a measure of the amount of material in water that will consume oxygen as it decomposes;
- acidity (pH) levels;
- Total Suspended Solids (TSS), a measure of the amount of particulate matter in the water, and;
- E. coli bacteria associated with wastewater.

For some facilities, ammonia and phosphorus, which cause excess algae/plant growth are also regulated.

Halifax Water oversees five large harbour facilities and nine smaller, community-based facilities located throughout Halifax Regional Municipality.

Compliance for the five large harbour facilities, where effluent flows into the harbour, are measured on monthly averages.



Dartmouth WWTF

Wastewater Treatment Facility Compliance Summary April 2020 - March 2021

WWTF	April 2020					May 2020					June 2020				
	CBOD ₅	TSS	E. coli	pH	Toxicity Pass	CBOD ₅	TSS	E. coli	pH	Toxicity Pass	CBOD ₅	TSS	E. coli	pH	Toxicity Pass
Halifax	23	15	N/A	7	YES	22	13	274	7	YES	39	21	2,000	7	YES
Herring Cove	14	13	N/A	7	N/A	16	17	73	7	YES	65	36	61	7	N/A
Dartmouth	35	52	N/A	7	YES	28	28	151	7	YES	51	25	360	7	YES
Eastern Passage	11	12	N/A	7	N/A	13	23	45	7	YES	9	16	73	7	N/A
Mill Cove	14	28	16	6	N/A	13	12	18	6	YES	21	25	74	7	N/A
July 2020					August 2020					September 2020					
Halifax	39	22	4,233	7	YES	59	26	14,316	7	YES	45	24	4,076	7	YES
Herring Cove	44	22	23	7	N/A	52	18	10	7	YES	39	16	54	7	N/A
Dartmouth	62	26	757	7	YES	72	31	1,063	7	YES	72	30	765	7	YES
Eastern Passage	6	16	134	7	N/A	12	11	60	7	YES	11	8	18	7	N/A
Mill Cove	25	31	23	6	N/A	38	30	112	6	YES	23	23	79	6	N/A
October 2020					November 2020					December 2020					
Halifax	39	19	2,361	7	YES	33	14	N/A	7	YES	30	17	N/A	7	YES
Herring Cove	39	23	73	7	N/A	15	9	N/A	7	YES	22	11	N/A	7	N/A
Dartmouth	66	75	2,564	7	YES	81	152	N/A	7	YES	56	50	N/A	7	YES
Eastern Passage	11	7	49	7	N/A	9	8	N/A	7	YES	8	11	N/A	7	N/A
Mill Cove	30	22	94	6	N/A	14	15	14	7	YES	13	15	20	7	N/A
January 2021					February 2021					March 2021					
Halifax	44	45	N/A	7	YES	41	24	N/A	7	YES	36	24	N/A	7	YES
Herring Cove	29	24	N/A	7	N/A	23	22	N/A	7	YES	22	16	N/A	7	N/A
Dartmouth	42	34	N/A	7	YES	44	41	N/A	7	YES	37	28	N/A	7	YES
Eastern Passage	12	13	N/A	7	N/A	9	8	N/A	7	YES	12	16	N/A	7	N/A
Mill Cove	14	17	10	7	N/A	21	20	23	7	YES	17	28	10	7	N/A

N/A due to seasonal disinfection and toxicity requirements

Specific parameter limit achieved

Specific parameter limit not achieved

Compliance for the nine smaller wastewater facilities is based upon quarterly averages. With five of the facilities, Aerotech, Frame, Middle Musquodoboit, Steeves (Wellington) and Uplands Park fully compliant for the year, the results for April 2020 to March 2021 are presented below:

Wastewater Treatment Facility Compliance Summary April 2020 - March 2021									
WWTF	Q1 - April 2020 to June 2020								
	CBOD ₅	TSS	E. coli	Phosphorus	Ammonia	pH	Dissolved Oxygen	Total Chlorine	Toxicity Pass
Aerotech	2	1	10	0.1	0.1	7.4	8.7	N/A	YES
Frame *	4	1	10	N/A	N/A	7.0	N/A	N/A	N/A
Lakeside - Timberlea	7	17	10	1.0	5	6.8	N/A	0.10	YES
Lockview - MacPherson *	5	10	22	0.3	2	7.1	N/A	N/A	N/A
Middle Musquodoboit *	7	9	13	N/A	N/A	7.3	N/A	N/A	N/A
North Preston	COMPLIANCE BASED ON ANNUAL AVERAGES - SEE Q4						N/A	N/A	N/A
Springfield	7	16	63	N/A	N/A	7.0	N/A	N/A	N/A
Steeves (Wellington) *	COMPLIANCE BASED ON ANNUAL AVERAGES - SEE Q4						N/A	N/A	N/A
Uplands Park *	5	10	14	N/A	N/A	6.6	N/A	N/A	N/A
Q2 - July 2020 to September 2020									
Aerotech	3	1	10	0.07	0.2	7.2	8.5	N/A	YES
Frame *	5	1	10	N/A	N/A	7.0	N/A	N/A	N/A
Lakeside - Timberlea	5	16	13	1	2	7.0	N/A	0.10	YES
Lockview - MacPherson *	5	8	31	0.4	3	6.8	N/A	N/A	N/A
Middle Musquodoboit *	5	11	22	N/A	N/A	7.4	N/A	N/A	N/A
North Preston	COMPLIANCE BASED ON ANNUAL AVERAGES - SEE Q4						N/A	N/A	N/A
Springfield	53	342	356	N/A	N/A	7.2	N/A	N/A	N/A
Steeves (Wellington) *	COMPLIANCE BASED ON ANNUAL AVERAGES - SEE Q4						N/A	N/A	N/A
Uplands Park *	5	11	10	N/A	N/A	6.7	N/A	N/A	N/A
Q3 - October 2020 to December 2020									
Aerotech	2	1	10	0.06	0.4	7.3	10.0	N/A	YES
Frame *	4	1	22	N/A	N/A	7.0	N/A	N/A	N/A
Lakeside - Timberlea	6	20	11	1	2	6.9	N/A	0.10	YES
Lockview - MacPherson *	19	71	10	1.6	4	6.6	N/A	N/A	N/A
Middle Musquodoboit *	6	9	38	N/A	N/A	7.3	N/A	N/A	N/A
North Preston	COMPLIANCE BASED ON ANNUAL AVERAGES - SEE Q4						N/A	N/A	N/A
Springfield	5	4	10	N/A	N/A	6.9	N/A	N/A	N/A
Steeves (Wellington) *	COMPLIANCE BASED ON ANNUAL AVERAGES - SEE Q4						N/A	N/A	N/A
Uplands Park *	5	7	41	N/A	N/A	6.7	N/A	N/A	N/A
Q4 - January 2021 to March 2021									
Aerotech	2	1	10	0.0	1.2	7.3	10.4	N/A	YES
Frame *	5	2	10	N/A	N/A	7.2	N/A	N/A	N/A
Lakeside - Timberlea	6	19	10	1	2	6.9	N/A	0.10	YES
Lockview - MacPherson *	5	15	10	0.4	2	7.1	N/A	N/A	N/A
Middle Musquodoboit *	5	12	17	N/A	N/A	7.3	N/A	N/A	N/A
North Preston	6	12	10	0.6	0.4	6.7	N/A	N/A	N/A
Springfield	5	8	14	N/A	N/A	7.0	N/A	N/A	N/A
Steeves (Wellington) *	5	1	10	0.1	1.9	7.0	N/A	N/A	N/A
Uplands Park *	7	5	14	N/A	N/A	6.9	N/A	N/A	N/A

* WWTF Fully Compliant for Entire Year

Specific parameter limit achieved

Specific parameter limit not achieved

STEWARDSHIP OF THE ENVIRONMENT

Wet Weather Management Program

Like many municipalities and utilities across North America, sections of Halifax Water's sanitary sewer system are subject to dramatic flow increases in response to precipitation events. Wet weather flows in the form of inflow and infiltration (I&I) can lead to sanitary sewer overflows, capacity reduction, sewer backups/basement flooding, treatment process upsets and increased operation and maintenance costs.

To address this issue, Halifax Water has developed a proactive approach to address the negative impacts of wet weather events on the sanitary sewer system. Since its inception in 2013, the goal of Halifax Water's Wet Weather Management Program (WWMP) has been to develop a long-term strategy to address wet weather-generated flows cost-effectively. The first phase of the program was a comprehensive pilot program to study the effectiveness and cost of various rehabilitation activities. There are six sewersheds that have undergone pilot activities, including a pilot to study the effectiveness of "private-only" interventions. The program's second phase focused on delivering a full-scale I&I rehabilitation project within Priority Sewersheds identified within the Infrastructure Master Plan (IMP).

The table below summarizes past rehabilitation activities in the various pilot areas as well as the full-scale project areas. The results shown are cumulative to date.



Sanitary Sewer Manhole

Wet Weather Management Plan Project Summary

Sewershed	Rehabilitation Activity					Private-Side Inspections	Peak Flow Reduction (L/sec)	Peak Flow RDII Reduction (%)
	Mainline Lining	Lateral Lining	Manhole Lining	Deep Storm	Public-Side Repairs			
Fairview/Old Clayton Park/Bridgeview (Phase I)	✓	-	-	-	-	-	166*	65%*
Fairview/Old Clayton Park/Bridgeview (Phase II)	✓	-	-	-	-	-	139*	38%*
Total Reduction	-	-	-	-	-	-	305*	48%*
Stuart Harris Pump Station (Pilot)	✓	✓	✓	-	-	✓	13	37%
Leiblin Park (Pilot)	✓	✓		-	-	-	38	33%
Crescent Avenue, MH182 (Pilot)	✓	✓	✓	-	-	✓	43	74%
Crescent Avenue, MH174 (Pilot)	✓	✓	✓	-	-	✓	41	92%
Wanda Lane	-	-	-	✓	-	✓	41**	26%**

Results show overall reductions for each project for a one in ten year storm event.

*Peak flow reductions based on a one in five year storm event based on targets identified in GM Blueplan Wet Weather Flow Management: Sewer Separation, Rainfall Derived Inflow and Infiltration (RDII) Reduction, and Low Impact Development (LID) Feasibility Studies Technical Memorandum.

**Preliminary results (first year post-monitoring)

Fairview, Clayton Park, Bridgeview Mainline Lining CIPP Project

The analysis of flow monitoring data, undertaken as part of the West Region Wastewater Infrastructure Plan (WRWIP) and now Infrastructure Master Plan (IMP), identified the potential for a significant reduction in Rainfall Derived Inflow and Infiltration (RDII) in the Fairview, Old Clayton Park and Bridgeview sewersheds.

The IMP identified a target reduction of 212 L/sec in peak flow during a one in five year rain event across these sewersheds. A multi-year I&I reduction program was initiated in 2017, including project planning, sanitary sewer evaluation surveys (SSES) and engineering design, with rehabilitation projects being completed in December of 2020.

Phase I of the Cured-in-Place Pipe (CIPP) mainline lining project consisted of 11,500 m within the Fairview and Old Clayton Park sewersheds. Phase II (completed December 2020) consisted of 9,200 m of lining in the Old Clayton Park and Bridgeview sewersheds.

RDII reductions of 166 L/sec and 139 L/sec were accomplished for phases I & II, respectively. An overall RDII reduction of 305 L/sec was calculated, exceeding the expected target of 212 L/sec. Flow monitoring and data analysis will continue to confirm RDII reductions for two years post-rehabilitation to continue to assess the effectiveness of the CIPP I&I rehabilitation technique.

Wanda Lane Deep Storm Project

The Wanda Lane Deep Storm project applied many of the techniques and lessons learned from a similar project on Cow Bay Road. The Wanda Lane project included the installation of new stormwater mains, wastewater mains and the conversion of a section of the existing wastewater system to a stormwater system. As a result, a new separated wastewater system was installed within Wanda Lane, and a dedicated stormwater system was made available to service 41 homes with connections provided to the property line requiring the private portion of the connection to be completed by the homeowner.

26% Reduction in Stormwater Infiltration

While reductions observed were significant, 41 L/sec (26%), it should be noted that these are preliminary results, and only one year of post-monitoring data is available at this time. Flow monitoring of this site will continue to assess the success of private-side corrections made post-project completion.

Hornes Road Private Stormwater I&I Reduction Pilot

Hornes Road was chosen for a private-side pilot based on its location within the Eastern Passage Priority Sewershed (FMZ37), operational history, and information gained from previous consultant reports. The collection of baseline data began in 2019/20 with the installation of a flow meter to monitor the entire Hornes Road sewershed and three temporary internal flow meters to isolate flows in known problem areas.

In 2020/21, private-side education for residents of this small sewershed was conducted through an online webinar. Due to COVID-19 impacts in 2020/21, private property inspections and compliance actions are planned for 2021/22.



Wanda Lane Deep Stormwater Main Installation

Sewer System Evaluation Studies (SSES) Activity Update

SSES activities are utilized to identify deficiencies and characterize sources of I&I within the collection system. They include, but are not limited to, flow monitoring, CCTV inspections, smoke testing and private-side inspections.

In 2020/21, there were 39 WWMP contract flow meters in place to collect flow data, focusing on the IMP identified priority sewersheds. This flow data is used to support future RDII reduction projects.

Approximately 30,000 m of CCTV inspections were completed in 2020/21, with a focus on several Priority Sewersheds, including Loon Lake, Fish Hatchery Park pump station and Eastern Passage.

Sewershed Area	CCTV Length Inspected (m)
Loon Lake	5,242
Fish Hatchery Pump Station	19,046
Eastern Passage	4,958
Crescent Avenue East	342
North Preston	78
Total	29,667

In 2020/21, approximately 23,000 m of wastewater main smoke testing investigations were completed in the Dingle pump station, Whimsical pump station, Crescent Avenue East and Fish Hatchery pump station sewersheds. Smoke testing assists in identifying public and private defects and leads to repairs and/or further investigation.

Community Sewersheds

The WWMP monitors six of Halifax Water's small community WWTF systems: Wellington, Frame, Uplands, North Preston, Springfield Lake and Fall River sewersheds. These WWTF flows are monitored with the intent to identify trends of increasing flows within each system. When issues become apparent, the WWMP investigates the sewershed using SSES to identify defects for repair or rehabilitation.

In 2020/21, continued high flows in the North Preston and Springfield Lake WWTF sewersheds prompted the WWMP to further investigate any defects that may be present in the system. Through an extensive review of SSES and coordination with Operations, several public-side repairs were identified and are currently being addressed within the two WWTF sewersheds.

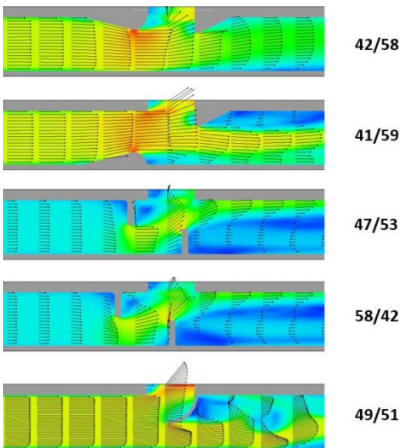
Wastewater System Process Optimizations

Wastewater treatment processes involve mechanical, biological, chemical, and human elements, all of which must fall within the correct range of values for the treatment system to be effective and reliable. The misalignment of just one of these components can result in a process that is inefficient and expensive to maintain. In the worst cases, processes can fail completely, leading to non-compliance with environmental permits or poor-quality water that adversely affects the production process.

This past year, Halifax Water undertook wastewater treatment process optimization to reduce the occurrence of problems, better protect the environment, ensure regulatory compliance, and help the utility save money. Some of the highlights of this work are outlined below and on the following pages:

Hydraulic Optimatization

Treatment facilities often rely on symmetry to achieve hydraulic balancing between treatment trains; however, flow maldistributions can occur due to fluid momentum, infrastructure layouts and control elements. To solve existing flow splitting and loading issues at the Halifax and Dartmouth WWTF, flow distribution was modelled utilizing Computational Fluid Dynamics (CFD). The analysis resulted in the implementation of flow diversion vanes correcting flows split from 40/60 to 50/50, eliminated legacy floating sludge issues at the Dartmouth WWTF and resulted in corrections to chemical mixer configurations and sludge recycle blending.



Unit Process Improvements

Poor settler performance was identified as a long-standing issue at the three enhanced primary WWTFs, Dartmouth, Halifax and Herring Cove. As a result, capital projects were initiated to replace the lamella tube settlers and to add an air scour system to keep them clean and unclogged. The Dartmouth WWTF underwent these improvements from August – October 2021, with Halifax and Herring Cove scheduled to commence in Fall 2021. Because of these capital projects, the Dartmouth WWTF has improved solids removal efficiencies and reduced operational and maintenance requirements.



Additionally, Halifax Water examined options to improve the removal of waste inerts from the treatment processes to improve performance downstream, improve sludge quality and improve the overall appearance of the final effluent at the Halifax Harbour WWTFs. Other objectives included reducing maintenance and operational costs by eliminating causes of damage to downstream processes such as wear and accumulations. The existing screening technologies at these facilities utilized unidirectional bar technology. The new technology utilizing bidirectional perforated plate technology was selected to improve screen capture rates from 35% to >75%. Work at the Dartmouth WWTF was completed in early 2021, and the facility is already seeing improvements. The Halifax and Herring Cove WWTF screen replacements are scheduled to commence in Fall 2021.



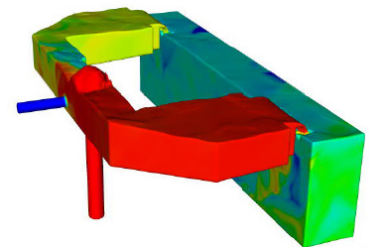
Modelling of Bioreactors

Fully operational in 2018, the Aerotech WWTF is a membrane bioreactor wastewater treatment facility. To confirm the potential for the following issues observed by staff:

- Short-circuiting/breaking-through, and;
- Uneven distribution of microorganisms that are key to process performance.

The entire treatment process was modelled using 3D Computational Fluid Dynamics (CFD) software. An analysis completed for the Aerotech WWTF bioreactor tanks showed short-circuiting and improper mixing.

This CFD model shows a significant misdistribution of influent wastewater and return microorganisms to each treatment train (red indicates the favoured train). These issues were corrected, and the plant saw significant improvement in effluent quality.



Horizon 2040: Wastewater Treatment Innovation for Continuous Improvement of Effluent Quality Update

Last year Halifax Water announced a partnership with Dalhousie University through a Natural Science and Engineering Research Council of Canada (NSERC) Collaborative Research & Development (CRD) Grant. The partnership was to improve effluent quality from the three chemically enhanced primary treatment wastewater treatment facilities in Halifax, Dartmouth and Herring Cove. Stricter compliance requirements are on the horizon with respect to the Federal Wastewater Systems Effluent Regulations. The three plants will require a capital investment in the order of \$425 million to achieve compliance with Wastewater System Effluent Regulations by 2040.

There are numerous opportunities available to optimize compliance, both by exploring existing processes and developing new processes. Some areas for potential improvement include process monitoring tools for chemical dosing decision making, understanding and addressing hydraulic issues within the treatment process, and optimization of chemical additives such as alternative coagulants, coagulant aids, etc. Improvements to Total Suspended Solids (TSS) and Biological Oxygen Demand (BOD) removal within the plants will also improve UV transmittance, lower associated operation and maintenance costs, and help bring the plants closer to the federal regulation requirements by 2040.

The research project is driven by the following thematic research questions:

Chemically Enhanced Primary Treatment Optimization

Can effluent standards be achieved by chemically enhanced primary treatment systems through coagulation optimization?

UV Disinfection Optimization

What factors control effective UV disinfection following chemically enhanced primary treatment?

Removal of Contaminants of Emerging Concern

Can contaminants of emerging concern be effectively controlled by chemically enhanced primary treatment?

Several additional projects have been established through the partnership between Halifax Water and Dalhousie University, including SARS-CoV-2 research to monitor for the Coronavirus at several wastewater treatment plants in HRM and to learn more about the prevalence of COVID-19 infections in the area. Other projects include the sewer grid application of specialized bacterial cultures and bioaugmentation to assist the Timberlea WWTF in meeting ammonia discharge requirements and assisting the Mill Cove WWTF in troubleshooting process issues through the use of advanced charge analysis tools such as zeta potential.

Some of the work completed this past year is discussed below, including a summary of future activities.

Established Wastewater Treatment and Design Laboratory at Dalhousie University

In February 2021, a state-of-the-art Wastewater Treatment and Design Laboratory was completed at Dalhousie University's Sexton Campus. The lab has been outfitted with several biosafety cabinets, refrigerators and freezers, centrifuges, and probes for the analysis and characterization of wastewater samples. Further, through the partnership with Halifax Water, Dalhousie has recently acquired additional equipment, including a spectrophotometer, a streaming current meter, and a custom UVLED collimated beam apparatus - all of which will be used for bench-scale treatment optimization work.



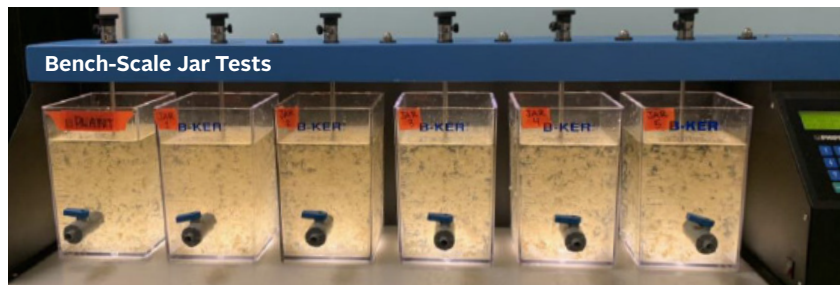
This laboratory is fully functioning and is currently being used on a daily basis for the characterization and analysis of Halifax Water wastewater samples associated with the SARS-CoV-2 project.

Chemically Enhanced Primary Treatment Optimization at Dartmouth WWTF

In collaboration with Halifax Water staff, Dalhousie University has been conducting bench-scale jar tests on a regular basis since fall 2020. These jar tests are used to identify favourable plant operating conditions using the current coagulant (alum) and polymer from the Dartmouth WWTF to identify optimal conditions for improving effluent standards related to permit requirements (BOD and TSS). These tests will also help determine what chemistry is required to achieve optimal removal efficiencies at the Dartmouth WWTF.

Preliminary findings identified:

- Adjust dosing rates from historical operational conditions
- Established dosing conditions to maximize removal efficiencies
- Full-scale implementation of the bench-scale findings to see results



Pilot Testing

A pilot-scale ballasted clarification system was tested at the Dartmouth WWTF in the summer/fall of 2020 in order to evaluate the performance of an alternative ballasted flocculation system in parallel to the current primary treatment system.

Preliminary findings identified:

- System outperformed existing technology
- Faster recovery from wet weather events

UV Disinfection Optimization at Dartmouth WWTF

Dalhousie utilized new analytical equipment to determine UV dose and inactivation rates for microorganisms (e.g. E. coli) in wastewater samples. They continue to compare UV treatment types to determine the optimal conditions for treatment and are examining LED technology for disinfection.

Preliminary findings identified:

- LED UV technology can achieve the same disinfection results as conventional ultraviolet light disinfection
- LED is more economical from an energy perspective
- Additional research is required to develop design parameters for full-scale applications

Contaminants of Emerging Concern

Dalhousie continues to develop methods to detect microplastics and nanoplastics in wastewater which will be used to establish treatment approaches and remove these contaminants of emerging concern to our environment. A multiangle light scattering system (MALS) is the key analytical equipment for this research program, which has been installed at Dalhousie in February 2021. Staff have been trained on the equipment and are in the process of developing methods for plastics analysis.

Additional Research

SARS-CoV2 - Through the ongoing partnership with Dalhousie, Halifax Water has been actively engaged in supporting the wastewater-based surveillance of SARS-CoV-2 at several treatment plants in HRM, including Halifax, Dartmouth and Mill Cove, through coordinating and facilitating weekly sample collection from influent (e.g. composite samples) as well as primary clarifier solids. Environmental surveillance of SARS-CoV-2 in wastewater has the potential to support understanding of COVID-19 occurrence and transmission in communities. As such, wastewater may be monitored for SARS-CoV-2 to determine the prevalence of COVID-19 infections in a given population through wastewater-based epidemiology.

This work gathered baseline data to establish dynamics of SARS-CoV-2 prevalence that may result from travel from outside Nova Scotia and aids in making public health decisions related to identifying the extent of inflection in NS, early detection and safety protocols on social and economic restrictions.

Bioaugmentation - Halifax Water is currently investigating the use of sewer grid bioaugmentation with specialized bacterial cultures as a way to potentially improve biological treatment performance and meet more stringent discharge requirements. The goal is to have the bacteria grow in the sewer grid, converting sewer lines into a partial bioreactor prior to the treatment plant headworks.

A pilot project is underway at the Timberlea WWTF in which a bioaugmentation solution is being added directly into the sewer grid collection system with a goal of reducing influent and effluent parameters (H₂S, FOG, BOD₅, COD, TSS, ammonia, and phosphorus), and improving biological nutrient removal processes to further remove ammonia and phosphorus. Additional benefits may involve improving settleability of secondary sludge at the treatment facility and controlling odours as well as fats, oils and grease.

SAFETY & SECURITY

Safety Audits

Halifax Water and its employees are committed to providing a healthy and safe work environment that prevents occupational illness, injury and promotes mental wellness. As a team, we recognize that health and safety are core to our business function and must be treated as a priority in our work. To ensure this, Halifax Water continually evaluates, develops and improves safety and security initiatives across the organization.

Halifax Water tracks some key lead and lag indicators to benchmark the success of the safety program. Safety audits are conducted on a number of metrics in the field to ensure employees are delivering our services in a safe manner.

**Safety Audit
Annual Average
Score**

94.5%

**Lost Time
Incidents**

**0.59
per 100
Employees**



Operations Staff Safely Maintaining
a Wastewater Pump Station

**Operations Staff
Safely Completing a
Valve Repair**



Safely Providing Essential Services During A Global Pandemic

This past year presented additional challenges with the presence of COVID-19 and the requirement to provide essential services to our customers. As the province went through various phases of the pandemic, Halifax Water had to adjust what and how services were provided. An additional section was added to the Occupational Health and Safety Manual to provide employees with guidance on PPE requirements, appropriate distancing and gathering limits, and hygiene practices. To limit the number of employees within the buildings, those staff able to work remotely have been doing so.



During the pandemic, the safety team worked closely with Human Resources as mental health and employee well-being were observed as unpredicted issues, where employees were juggling home-schooling, isolation, and work commitments. Regular communications were provided to employees with tips for managing stress and adjusting to new routines and available resources through the employee and family assistance program.

Working with Safety Services Nova Scotia

Halifax Water engaged Safety Services Nova Scotia to complete an audit of the Health and Safety program utilizing the Workers' Compensation Board of Nova Scotia Audit Standard. The general observation from the audit was:

"[The Halifax Water] safety program is well structured and innovative. Considerable efforts have been made towards continual improvement, and this was noted in [the] interview process from all levels. Facilities visited during this audit exhibited very good to outstanding housekeeping standards and general standards of safety throughout. Tools and equipment were very well maintained, and employees were well aware of safety requirements and the importance of these requirements."

There were some recommendations noted within the audit which were successfully actioned by the Joint Occupational Health and Safety Committees throughout Halifax Water.

Incident Command System

The Incident Command System (ICS) is a standardized approach to the command, control, and coordination of emergency response providing a common hierarchy within which responders from multiple agencies can be effective. Halifax Water continues to utilize ICS when managing water main and wastewater forcemain breaks and as a planning tool for larger multi-faceted projects. Halifax Water successfully enacted ICS when Hurricane Teddy was approaching Halifax.

MOTIVATED & SATISFIED EMPLOYEES

Continuous Improvement

Creating a work environment where employees are safe, engaged, respectful and inclusive is an ongoing process of continual improvement. That is why motivated and satisfied employees are at the forefront of everything we do.

Halifax Water pays particular attention to areas where the results are less than 10% from the other organizations we are compared against. Three areas fell into this category last year:

- Diversity, Equity and Inclusion;
- Accessibility of Senior Executives; and
- Ensuring employees were held accountable.

Changing organizational culture and how employees feel about that culture takes time. Last year's survey results were excellent in many areas, and we will continue to work on the three areas noted above. One of the areas where we are showing progress is Talent Management, as the number of positions filled with internal candidates increased significantly last year. Developing employees' skills in their current role and for future growth has always been important to Halifax Water and to its success. To help ensure that employees can focus and plan their career paths, an Employee Development Guide has been created to balance the needs of the organization with the career aspirations of our employees. This is a win-win to ensure we align talent for future key roles.

Payroll System Launch

A new payroll and human capital management system, Telus ViP, was launched in the summer of 2020. ViP has proven to be a system that is easy to use, flexible and accessible anywhere and from any device. ViP provides managers and employees with a self-serve portal which makes requesting time off and reporting time worked easy while providing immediate access to pay-related information. This also provides for better internal control and reduces the chance of payroll-related errors.

Supporting Our Employees

Maintaining employee health and well-being has become more challenging with the COVID-19 outbreak and subsequent protocols. Halifax Water has been proactive about communicating the services and support resources available through the Employee Assistance Program (EAP). As a result, the utilization of this program has increased. This year, Halifax Water made improvements to its fitness incentive program to encourage employees to start or maintain a regular fitness regime during COVID-19. Halifax Water also provided mandatory Psychologically Health and Safe workplace training to all employees during 2021.

Top Employer in Atlantic Canada - 2021

Halifax Water's commitment to its employees was realized in January when Halifax Water was recognized as one of the Top 100 Employers in Atlantic Canada for 2021. Employers, selected by Mediaworld Canada Inc., are evaluated based on criteria in eight key areas:

- | | |
|---|---------------------------------------|
| 1. Physical Workplace; | 5. Employee Communications; |
| 2. Work Atmosphere & Social; | 6. Performance Management; |
| 3. Health, Financial & Family Benefits; | 7. Training & Skills Development; and |
| 4. Vacation & Time Off; | 8. Community Involvement. |

Employers are compared to other organizations in their field to determine which offers the most progressive and forward-thinking programs. Canada's Top 100 Employers continue to set the standard for doing business in Canada, with best practices as the norm.



Service Awards

30 Years of Service

Wastewater & Stormwater Services

Reginald Awalt
Andrew Eisan

25 Years of Service

Corporate Services

Brian MacDonald

Engineering & Information Services

Greg Rice

Wastewater & Stormwater Services

Brian Barkhouse
Cleve Barkhouse
Wayne Hiltz
James McEachren
Gerald Ryan

20 Years of Service

Corporate Services

Duane King

Wastewater & Stormwater Services

Michael Edwards
Melissa White

Water Services

Andrew Houlihan

15 Years of Service

Corporate Services

Warren Brake

Engineering & Information Services

Heather Crowell

Wastewater & Stormwater Services

Susheel Arora
Danny Patey

Water Services

Jason Avery
Jason Barkhouse
Melvin Cameron
Paul Canning
Jan-Michael Kidd
Jason Rutledge

10 Years of Service

Corporate Services

Michelle Bennett
Lisa Nickerson
Raymond Snook

10 Years of Service Continued

Engineering & Information Services

Krista Danylkiw
Dwayne Harris
Peter Maynard
Gregory Mesheau
Andrea Power
Drew Roundell
Wilson Wight

Wastewater & Stormwater Services

Gabriel Billard
Robert Christie
Morgen Cobb
David Connolly
Kelly Conway
Jeremy Dauphinee
David Dezagiacomo
Cindy King
Paul Kohoot
Allan MacInnis
Grant Smith

Water Services

Adam Bryson
Jeannie Fraser
Alana Murray
Charles Rudolph

The Carolyn Bruce Customer Service Excellence Award

For more than 22 years, Carolyn Bruce set the standard for customer service excellence as a Customer Service Representative and a Customer Care Supervisor. Sadly, Carolyn passed away in January 2011. Carolyn left a legacy of passionate and dedicated service to all she dealt with.

In honour and memory of Carolyn, the Carolyn Bruce Customer Service Excellence Award was created in 2012 and is presented annually. Employees recognized for providing exemplary Customer Service may be selected to receive this award. In addition, direct nominations from Halifax Water employees are encouraged. Once again this year, many nominations were received, and the award was presented to Jerry MacDonald, Subforeman in the Water Operations group for his exemplary customer service.

In addition to receiving his personal award, Jerry's name has been added to the perpetual plaque for The Carolyn Bruce Customer Service Excellence Award, created to recognize past and present award recipients. Each employee who has received this award since its inception in 2012 will be remembered and recognized for all to see.

Customer Service Superstar Awards were created this year in recognition of employees who were nominated for the Carolyn Bruce Award by their peers for their dedication to providing exemplary customer service throughout the year. The 2020 recipients were Andrea Legassie, Caitlin Sampson, Dino Amaral, Jake Fulton, Kevin Gray, and Lorna Skinner.

Congratulations to all nominees and winners!



CORPORATE SOCIAL RESPONSIBILITY

Halifax Water employees take a great deal of pride in being part of the community throughout the year by supporting a wide variety of events, causes and groups. COVID-19 may have made things more challenging, but it certainly didn't dampen the spirit or enthusiasm of employees.

Halifax Water Employee Fundraising Activities

United Way Halifax

Halifax Water Employees Donated

\$4,880

Every year Halifax Water employees have a big United Way BBQ Fundraiser where they are given the opportunity to donate through a payroll deduction plan. In 2020/21, although the fundraiser event could not take place, our employees raised \$4,880 for United Way Halifax.

H2O (Help to Others) Fund

Halifax Water Employees Donated

\$6,745

Halifax Water's H2O (Help to Others) Fund raised a total of \$6,745 to assist customers who truly needed help with their water/wastewater/stormwater bill. This internal staff fundraising is matched by Halifax Water and is in addition to the \$25,000 Halifax Water donates as a utility. The H2O Fund assisted 98 households in 2020/21.

Water for People

Halifax Water Employees Donated

\$10,938

Halifax Water employees also donated \$10,938 to Water for People.

These funds support the digging of wells to provide clean drinking water for approximately 4 million people in nine different countries.



Festival of Trees in support of the Mental Health Foundation

Halifax Water Donated

\$1,000

The utility provided a corporate donation of \$1,000 to the Festival of Trees in support of the Mental Health Foundation of NS.



Halifax Water's tree
featured a running
water fountain.



Angel Tree gifts waiting to be picked up.

Salvation Army Angel Tree

Halifax Water Employees Donated Gifts for 100 Children

For many years Halifax Water staff have supported the Salvation Army's Angel Tree program. This year staff committed to sponsoring 100 children. Not only did staff meet their goal of collecting toys, hats & mittens for 100 children, but they also raised \$164.

Holiday Fundraisers

Halifax Water Employees Donated \$1,464

The Christmas season fundraising initiatives collected and donated \$1,464 providing support to Bryony House, Feed Nova Scotia, Souls Harbour Mission, Hope Cottage and the Halifax Transition House Association.

Purple Ribbon Campaign

Halifax Water Employees Donated Gifts Cards Worth \$425

Halifax Water staff donated \$425 in gift cards in support of the Purple Ribbon Campaign to the Transition House of Nova Scotia for women who need these transitional homes, empowering them to get the things they need to move forward.

Coat Drive

Halifax Water Employees Donated 75 Coats

The Annual Winter Coat Drive saw Halifax Water employees donate 75 gently used coats along with assorted mittens, gloves, hats and scarves.

Special Olympics NS (SONS) World's Largest Truck Convey

Halifax Water Donated \$1,500

For years, Halifax Water has supported Special Olympics Nova Scotia (SONS) through many different events. The SONS World's Largest Truck Convey, was created to raise funds and awareness for the Special Olympics Nova Scotia. This annual event allows staff to show their pride in their machines and put a smile on the faces of many Special Olympians.

COVID-19 did not stop the fleet from rolling or dampen spirits. The 2020 Convey left CFB Shearwater with 135 trucks winding their way through Dartmouth, Cole Harbour, and Eastern Passage before returning to CFB Shearwater. Along with a \$1,500 sponsorship of the event, Halifax Water was again well represented with an impressive fleet of eight trucks. Halifax Water won awards for the Largest Fleet and Best Detailed Truck.



Halifax Water staff being interviewed by CTV News regarding our proud involvement in the World's Largest Truck Convey.

Supporting Events in the Community

Due to health and safety protocols around COVID-19 and the ongoing pandemic, Halifax Water's Portable Water Station program and mobile information booth were not used this season. It is hoped the programs will be back on track next year.

Halifax Water employees are usually very active supporters of the Scotiabank Bluenose Marathon. The marathon was cancelled this year due to COVID-19. Hopefully, runners will be hitting the streets next year.

Scholarships

Halifax Water is an active supporter of the educational growth of our community through scholarships provided to the Nova Scotia Community College (NSCC). Since 2008, Halifax Water has offered \$111,000 in Scholarships for 39 NSCC students, with accompanying work terms. The scholarships not only benefit the community and recipients, but they have also provided Halifax Water many highly skilled and motivated employees over the years:

Jipuktuk etli apatua'timk Award

\$4,000

Awarded each Fall & Spring

Established by Halifax Water to support First Nations, Métis and Inuit students entering the Civil Engineering Technology, Environmental Engineering Technology, Electronic Engineering Technology, or Mechanical Engineering Technology Programs at NSCC.

jipuktuk etli apatua'timk is the Mi'kmaq word for harbour or port and has been used to describe Halifax Harbour by Mi'kmaq people in Nova Scotia.

Arnold D. Johnson Sr. Award for Water Resources

\$3,600

Awarded each Fall

Established by Halifax Water to support Indigenous African Nova Scotian students entering Environmental Engineering Technology or Mechanical Engineering Technology at NSCC.

Named in honour of Arnold D. Johnson Sr., who served the Preston Area communities as a Halifax County Councillor and was instrumental in creating the Watershed Association Development Enterprise and the Lake Major Watershed Advisory Committee, this award recognizes the foresight and dedication of Mr. Johnson during his many years of public service and his many accomplishments.

Robert T. Peacock Achievement Award

\$2,000

Awarded each Fall

Established by Halifax Water to support students who self-identify as racially visible entering their second year of the Environmental Engineering Technology program at NSCC.

Included with this award is an opportunity for the successful recipient to complete their required work term with Halifax Water.

Women in Non-Traditional Careers

\$2,000

Awarded each Fall

This award is open to women in non-traditional careers that are entering one of the eligible NSCC programs listed. Included with this award is an opportunity for the successful recipient to complete their required work placement with Halifax Water as well as an opportunity for summer employment with Halifax Water.

Halifax Water Achievement Award

\$2,000

Awarded each Fall

This award is open to any student enrolled full-time in the Civil Engineering Technology program at NSCC. Included with this award is an opportunity for the successful recipient to complete their required work term with Halifax Water.

Learn more about Halifax Water scholarships at halifaxwater.ca/corporate-social-responsibility.

Diversity, Equity & Inclusion

As a utility whose services are in the homes and businesses of customers every day, Halifax Water must work to ensure it reflects the values and diversity of the community it serves while maintaining and enhancing a positive reputation with customers and stakeholders. Halifax Water has made significant progress over the last few years, raising awareness with staff and management regarding diversity, equity and inclusion issues.

Halifax Water has a number of initiatives underway to help reach these goals. These include:

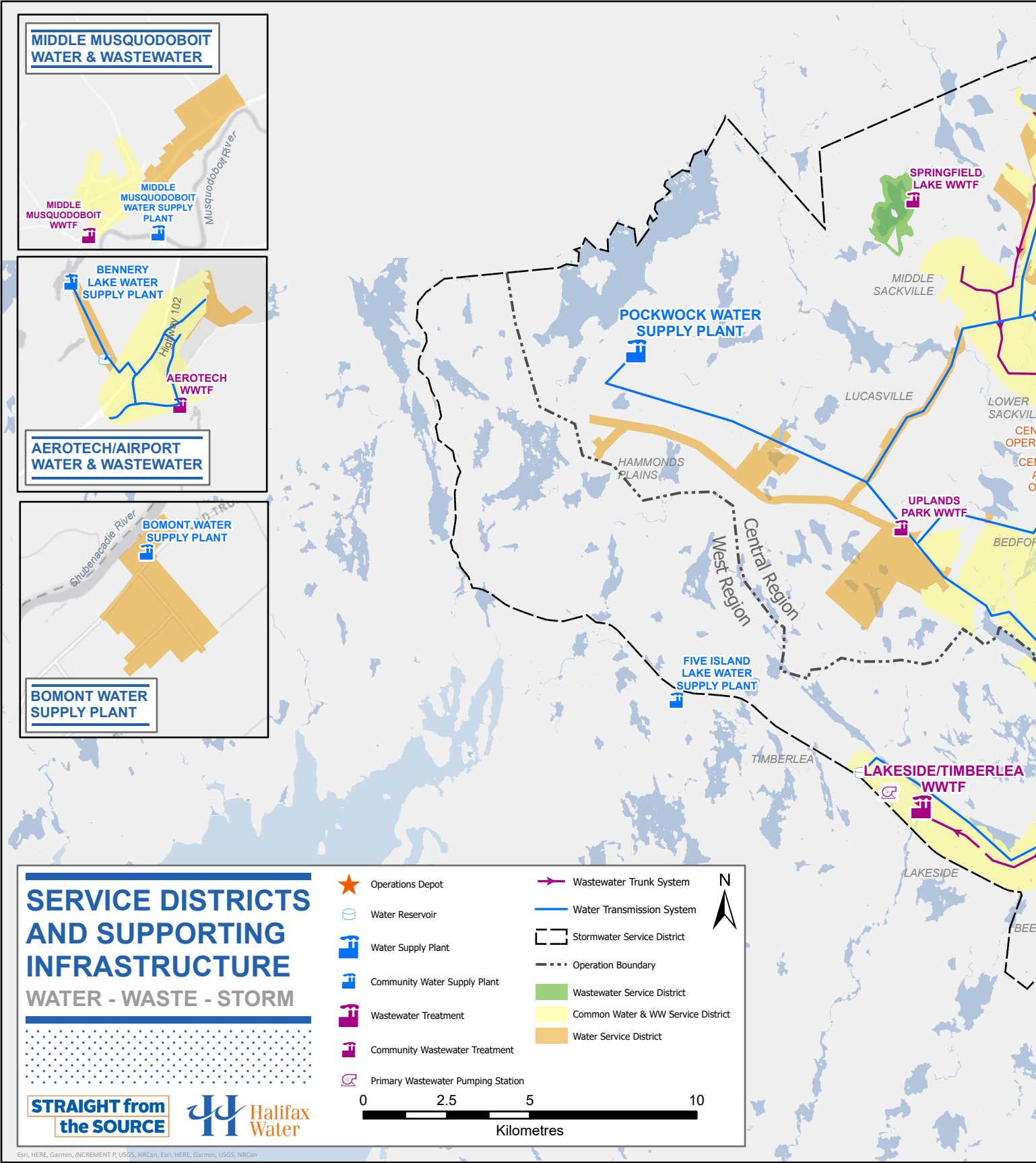
- An updated diversity statement was added to all Halifax Water job postings.
- In an effort to increase the number of diverse job applicants, Halifax Water has developed relationships and started sending postings directly to Immigrant Services Association of Nova Scotia (ISANS), the Mi'kmaq Native Friendship Centre, Women Unlimited, the African Nova Scotian Affairs Office, Women in Skilled Trades, Office to Advance Women Apprentices Nova Scotia, and the Black Cultural Centre for Nova Scotia.
- Halifax Water published information on understanding gender pronouns, published email signature templates, and employees are encouraged to use whatever pronouns they identify with.
- Many different commemorative events and special days are recognized by Halifax Water throughout the year, such as Mental Health – Bell “Let’s Talk” Day, African Nova Scotian Heritage Month, Halifax Pride, and International Women’s Day. In 2020/21, two virtual coffee breaks were hosted on International Women’s Day.

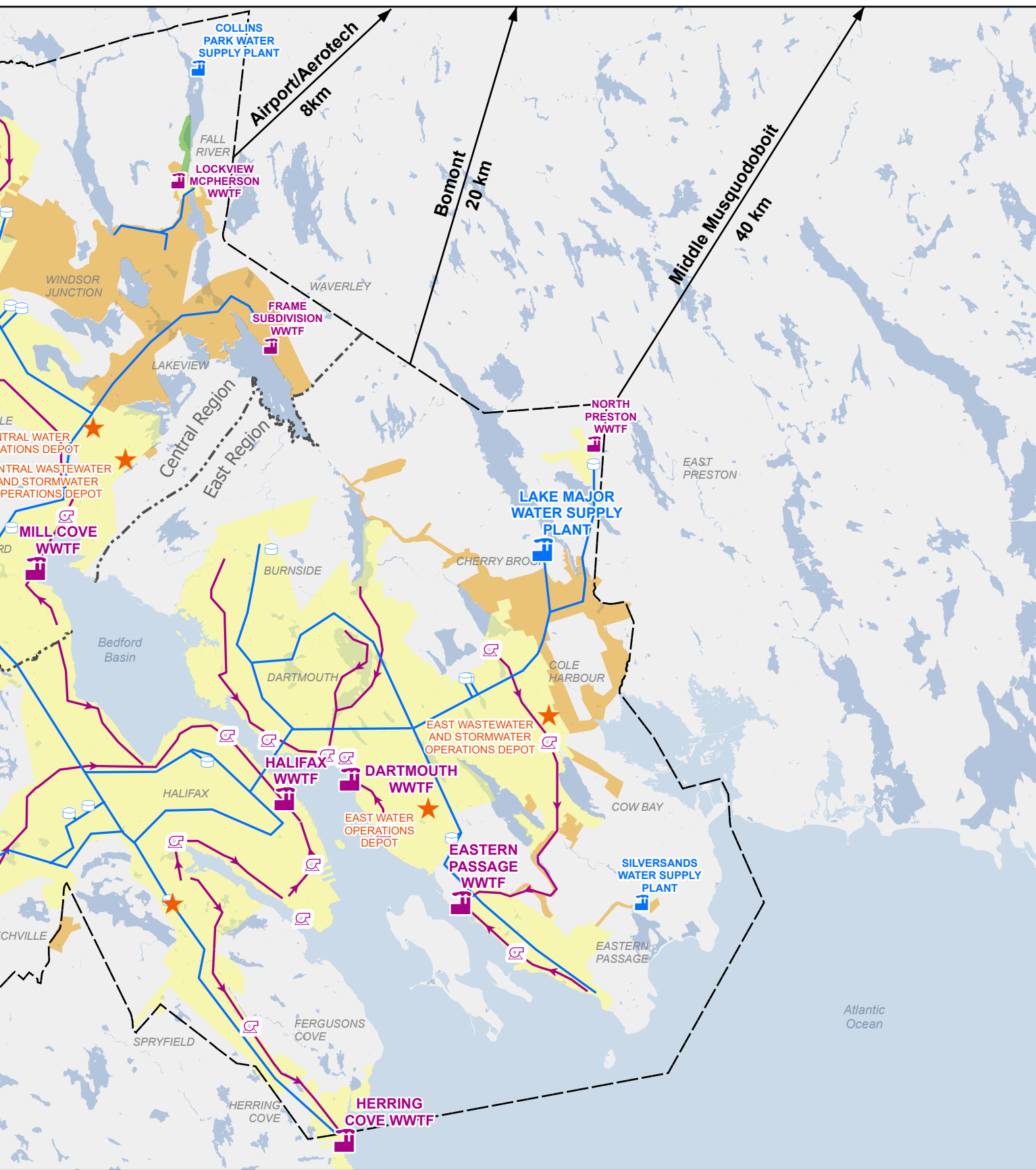


Halifax Regional Municipality has a Diversity and Inclusion Framework, and an office dedicated to Diversity and Inclusion and African Nova Scotian Affairs Integration Office. Halifax Water is a participant in the Diversity and Inclusion Leadership Working Group and is using materials and resources developed by the municipality.

In the coming year, the utility will continue to expand engagement with external stakeholders, the municipality and staff to help ensure we reflect the values and diversity of the community we serve. It is an effort that will evolve as our community evolves.

SERVICE AREA MAP





HALIFAX WATER BY THE NUMBERS

Water Infrastructure as of March 31, 2021

Water Supply Plant	Water Source	Treatment Process	Average Flows/Day	Filter Quantity & Capacity/Day	Maximum Flow Rate	Design Capacity/Day
J. D. Kline	Pockwock Lake	Dual Media Direct Filtration & Manganese Removal	78 736 m ³	8 Filters 143 m ² /filter	0.137 m ³ /m ² per minute	227 000 m ³
Lake Major	Lake Major	Upflow Clarification, Iron & Manganese Removal	33 110 m ³	4 Filters 85 m ² /filter	0.192 m ³ /m ² per minute	94 000 m ³
Bennery Lake	Bennery Lake	Sedimentation, Dual Media Filtration & Manganese Removal	535 m ³	2 Filters 26.65 m ² /filter	0.10 m ³ /m ² per minute	7 950 m ³
Middle Musquodoboit	Musquodoboit River	Raw Water Infiltration Gallery, Ultra/Nano Filtration	48 m ³	2 Ultra Filters 1 Nano Filter	0.139 m ³ /min 0.264 m ³ /min	260 m ³
Collins Park	Lake Fletcher	Ultra/Nano Filtration	55 m ³	2 Ultra Filters 1 Nano Filter	0.111 m ³ /min 0.145 m ³ /min	160 m ³
Bomont	Shubenacadie River	Nano Filtration/ Ionic Exchange Resin	2 m ³	N/A	0.0132 m ³ /min	38 m ³
Silver Sands	2 Wells	Green Sand Pressure Filters, Iron & Manganese Removal	23 m ³	2 Filters	0.378 m ³ /min	30 m ³
Five Island Lake	1 Well	UV Disinfection	15 m ³	N/A	0.016 m ³ /min	N/A

Source Water	Rainfall	Snowfall
Pockwock Lake	1250.75 mm	103.0 cm
Lake Major	1345.10 mm	74.5 cm

Source Watershed Area	Total Watershed Area	Safe Yield /Day
Pockwock Lake	5 661 ha	145 500 m ³
Chain Lake	206 ha	4 500 m ³
Lake Major	6 944 ha	65 900 m ³
Lake Lemont/ Topsail	346 ha	4 500 m ³
Bennery Lake	644 ha	2 300 m ³

Water Supply	Water Production
Pockwock Lake	28 738 500 m ³
Lake Major	12 085 080 m ³
Bennery Lake	195 252 m ³
Small Systems	52 113 m ³
Total	41 070 945 m³

Water Reservoir	Elevation Above Sea Level	Capacity
Lake Major	60 m	9 092 m ³
Pockwock	170 m	13 600 m ³
Geizer 158	158 m	36 400 m ³
Geizer 123	123 m	31 800 m ³
Cowie	113 m	11 400 m ³
Robie	82 m	15 900 m ³
Lakeside	119 m	5 455 m ³
Mount Edward 1	119 m	22 728 m ³
Mount Edward 2	119 m	22 728 m ³
Akerley Blvd.	119 m	37 727 m ³
North Preston	125 m	1 659 m ³
Meadowbrook	95 m	9 091 m ³
Sampson	123 m	12 273 m ³
Stokil	123 m	23 636 m ³
Waverley	86 m	1 364 m ³
Middle Musq.	81 m	275 m ³
Aerotech	174 m	4 085 m ³
Beaver Bank	156 m	6 937 m ³
Total		266 150 m³

Transmission & Distribution System	
Size of Water Mains	19 mm - 1 500 mm
Total Water Mains	1 571 km
Main Valves	15 776
Fire Hydrants	8 476
Distribution Pumping (Booster) Stations	20
Pressure Control & Flow Meter Chambers	144

Water Services & Meters	
Water Sprinkler Systems (25 mm - 300 mm)	2 238
Supply Services (10 mm - 400 mm)	86 188
Water Meters (15 mm - 250 mm)	85 906

Population Served	
Halifax Municipality Est. Population Served	383 000
Consumption per Capita	235 litres/day

Wastewater & Stormwater Infrastructure as of March 31, 2021

Wastewater Treatment Facility	Treatment Process	Design Average Flows/Day	Area(s) Served	Receiving Water	Volume Treated in 2020/21
Halifax	Enhanced Primary UV	139 900 m ³	Halifax	Halifax Harbour	31 188 849 m ³
Dartmouth	Enhanced Primary UV	83 800 m ³	Dartmouth	Halifax Harbour	17 064 871 m ³
Herring Cove	Enhanced Primary UV	28 500 m ³	Halifax & Herring Cove	Halifax Harbour	3 830 966 m ³
Mill Cove	Secondary UV/Pure Oxygen Activated Sludge	28 400 m ³	Bedford & Sackville	Bedford Basin	9 782 168 m ³
Eastern Passage	Secondary UV/Conventional Activated Sludge	25 000 m ³	Cole Harbour & Eastern Passage	Halifax Harbour	3 619 571 m ³
Timberlea	Secondary Sodium Hypochlorite/RBC	4 540 m ³	Lakeside & Timberlea	Nine Mile River	974 549 m ³
Aerotech	Tertiary UV/Membrane Bioreactors	3 000 m ³	Aerotech Park & Airport	Johnson River	219 965 m ³
Springfield Lake	Secondary UV/Activated Sludge	543 m ³	Springfield Lake	Lisle Lake	146 507 m ³
Fall River	Tertiary UV/Activated Sludge & Post Filtration	454.5 m ³	Lockview Road & McPherson Road	Lake Fletcher	56 081 m ³
North Preston	Tertiary UV/SBR & Engineered Wetland	680 m ³	North Preston	Winder Lake	210 004 m ³
Middle Musquodoboit	UV/RBC	114 m ³	Middle Musquodoboit	Musquodoboit River	49 804 m ³
Uplands Park	Secondary UV/Trickling Filter & Wetland	91 m ³	Uplands Park	Sandy Lake	36 778 m ³
Wellington	Tertiary UV/Activated Sludge/ Reed Bed	68 m ³	Wellington	Grand Lake	6 651 m ³
Frame Subdivision	Tertiary UV/Membrane Reactor	80 m ³	Frame Subdivision	Lake William	9 142 m ³

Wastewater & Stormwater Collection System			
Size of Pipes	50 mm - 3 000 mm	Total Ditch Length	Approx. 600 km
Total Collection System Length	2 302 km	Holding Tanks & Retention Ponds	46
Wastewater Services	82 464	Cross Culverts	2 495
Total Manholes	39 021	Driveway Culverts	15 061
Total Pumping Stations	164	Catchbasins	24 695

Glossary of Terms
ha - hectare
m - metre
m ² - square metre
m ³ - cubic metre (1 000 litres)
mm - millimetre
cm - centimetre
km - kilometre

Corporate Balanced Scorecard Results

Since 2001, Halifax Water has been measuring organizational performance using a Corporate Balanced Scorecard (CBS). The CBS ensures that all employees are focused on strategic outcomes. The Critical Success Factors shown below are developed in support of the Halifax Water mission: to provide world-class services to our customers and our environment. The CBS has a proven track record of driving performance within the organization.

Critical Success Factor	2019/20 Results	2019/20 Target	2020/21 Results	2020/21 Target
Adherence with 5 objectives of Water Quality Master Plan for all water systems: Percentage of sites achieving targets	82%	80-100%	76%	80%
Bacteriological tests: Percentage free from Total Coliform	99.9%	99.3%	100%	99.9%
Customer satisfaction about water quality: Percentage from customer survey	87%	85%	84%	85%
Customer satisfaction with service: Percentage from customer survey *Note 1	96%	90%	96%	95%*
Water service outages: Number of connection hours/1000 customers *Note 2	133	200	3612.62	200
Wastewater service outages: Number of connection hours/1000 customers	1.64	8	0.92	4
Average speed of answer: Percentage of calls answered within 20 seconds	32%	70%	71%	70%
Operating expense/revenue ratio percentage	78%	83.8%	81.5%	82%
Annual cost per customer connection: Water	\$469	\$522	\$498	\$543
Annual cost per customer connection: Wastewater	\$718	\$721	\$724	\$758
Water leakage control: Target leakage allowance of 160 litres/service connection/day *Note 3	176	160-170	193	160-170
I&I reduction: Number of inspections to identify private property discharge of stormwater into the wastewater system *Note 4	1086	450	1316*	900
Peak flow reduction from wet weather management capital projects *Note 5	No Data Avail.	34-38 L/sec	70 L/sec*	5-10 L/sec
Percentage of time GIS and Cityworks are available	99.88%	96-98%	100%	96-98%
Capital budget expenditures: Percentage of budget spend by end of fiscal year *Note 6	69%	80-90% Approved	30.78%	70-80%
Average score on internal safety audits	89%	85-95%	94.5%	85-95%
NS Labour and Advanced Education compliance: # of incidents with written compliance orders	0	0-2	0	0-2
Lost time accidents: Number of accidents resulting in lost time per 100 employees	1.6	2.0-3.0	0.59	1.5-2.0
Safe driving: Number of traffic Accidents per 1,000,000 km driven (maximum of 5)	4.2	4	5.5	4
Training: Number of employees trained or re-certified before due date *Note 7	81%	80-90%	59%*	80-90%
Percentage of completed safety talks	81%	80-90%	86%	80-90%
Percentage of public health and environmental regulatory infractions resulting in a summary offense ticket *Note 8	0 SOTs	0-2	0	0-2
Percentage of WWTFs complying with NSE approval permits (Project for 20/21 at end of February)	91.2%	95-100%	93%	95-100%
Number of ICI properties inspected by Pollution Prevention each year *Note 9	500	440	356	500
Energy management kwh/m³ reduction associated with capital projects	4.67%	3%	+8%	3%
Bio-solids residual handling: Percentage of sludge meeting bio-solids concentration targets	99.2%	92-97%	98.6%	92-97%
Number of arbitrations divided by total number of grievances	0.07	0	0	0
Percentage of jobs filled with internal candidates	65%	80%	75%	80%
Employee satisfaction survey result	B+	A	B+	A
Average number of days absenteeism	7.54	<7	5.88	<7

Corporate Balanced Scorecard Notes

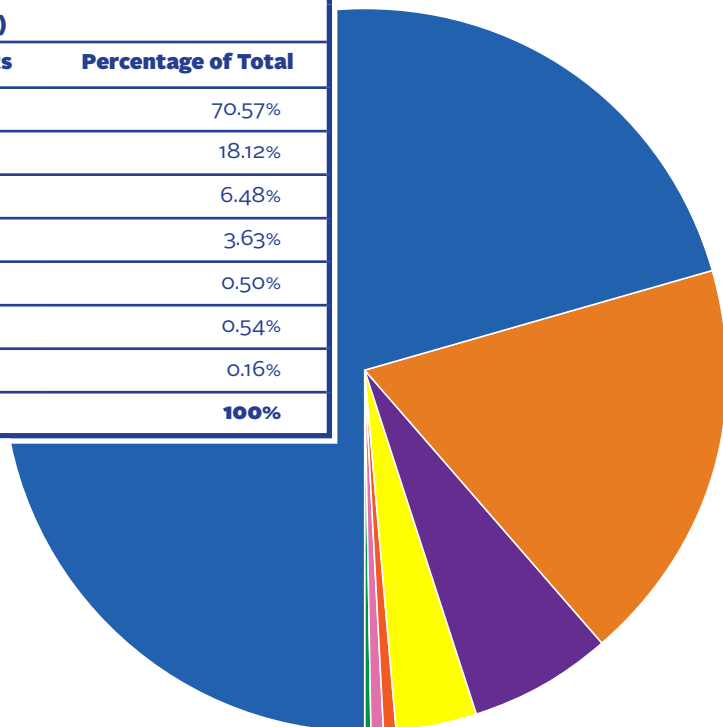
1. The Customer Satisfaction target is recommended to increase from 90% to 95%. Maintaining the current level of customer satisfaction of 96% will be challenged by stormwater service expansion, a cost-of-service hearing, and a potential rate application.
2. Water service outage hours for 2020/21 were exceeded due to the significant Cobequid Road water main breaks in 2020.
3. Water leakage index for 2020/21 was impacted by some significant water main breaks (Cobequid Road). There was also some additional flushing to maintain water quality in the distribution system in areas where flows were lower than normal due to the impact of COVID-19 on water demand and changed consumption patterns. The COVID-19 related flushing was removed from the final calculation.
4. I&I reduction target was lowered in 2020/21 as it was thought that COVID-19 might impact the number of inspections on private property. This was not the case, and there was a record setting number of inspections of private property discharge of stormwater entering the wastewater system.
5. Peak Flow Reduction 2020/21 Result: The data demonstrated a reduction in the range of 70 L/sec (in a significant 6 km portion, of the total 7.4 km lined sections). Data was compromised for 1.4 km of the lined section, therefore that data was excluded. 2021/22 New Target: Crescent Ave East 1.5 km Sewershed CIPP Lining – Target 5-10 L/sec peak flow reduction
6. Capital budget expenditures (2020/21) were impacted by the timing of Cogswell redevelopment, deferral of some integrated projects with the municipality; delays in securing land, or necessary approvals.
7. The number of employees trained and re-certified before due date was impacted by availability of training as some training could not be conducted due to COVID-19.
8. The target percentage of public health and environmental regulatory infractions has been simplified to focus on infractions resulting in a summary offense ticket. It formerly included written Ministerial Orders (Warnings or Directives) or Prosecutions. The rule set and process for summary offense tickets is clearly defined.
9. The number of ICI properties inspected by Pollution Prevention in 2020/21 was impacted by COVID-19.

Customers by Service Type

Halifax Water provides one or more of the following to our customers: water, wastewater and/or stormwater services. Those services support an estimated population of 383,000 people, and countless visitors to the region.

See the table below for a breakdown of the number of customers who receive each type/combination of services.

Customer Numbers by Type		
March 31, 2021 (Fiscal Year: 2020/21)		
	Number of Accounts	Percentage of Total
Water, Wastewater & Stormwater	74 886	70.57%
Stormwater Only	19 227	18.12%
Water & Wastewater	6 874	6.48%
Water & Stormwater	3 858	3.63%
Wastewater & Stormwater	530	0.50%
Water Only	570	0.54%
Wastewater Only	174	0.16%
Total of All Types	106 119	100%



TYPICAL WATER ANALYSIS

TYPICAL ANALYSIS OF POCKWOCK LAKE & LAKE MAJOR WATER

2020 - 2021

(in milligrams per litre unless shown otherwise)

Note: All Regulatory Compliance Analysis are Processed by Third Party Laboratories

PARAMETERS	(Halifax) POCKWOCK		(Dartmouth) LAKE MAJOR		GUIDELINES FOR CANADIAN DRINKING WATER QUALITY	
	Raw Water	Treated Water	Raw Water	Treated Water	Maximum Acceptable Concentration	Aesthetic Objective Concentration
Alkalinity (as CaCO ₃)	19.8	19.3	< 5.0	26.0	-	-
Aluminum	0.102	0.057	0.177	0.014	-	^A 0.20/0.10
Ammonia (N)	0.11	< 0.05	< 0.05	< 0.05	-	-
Arsenic	< 0.001	< 0.001	< 0.001	< 0.001	0.010	-
Calcium	5.7	4.7	1.0	16.0	-	-
Chloride	8.3	8.9	6.5	8.2	-	≤250
Chlorate	< 0.1	< 0.1	< 0.1	< 0.1	1.0	-
Chlorite	< 0.1	< 0.1	< 0.1	< 0.1	1.0	-
Colour (True Colour Units)	15.3	< 5.0	34.3	< 5.0	-	≤15.0
Conductivity (µS/cm)	97	85	34	150	-	-
Copper (Total)	0.0410	< 0.0005	0.0430	0.0010	2.0	≤1.0
Fluoride	< 0.1	0.5	< 0.1	^B 0.7	1.5	-
Hardness (as CaCO ₃)	29.3	13.3	3.8	41.0	-	-
HAA5 (avg.)	-	0.019	-	0.027	0.080	-
Iron (Total)	0.11	< 0.05	0.24	< 0.05	-	≤0.3
Lead (Total) (µg/l)	< 0.5	< 0.5	< 0.5	< 0.5	5.0	-
Magnesium	0.6	0.4	0.4	0.4	-	-
Manganese (Total)	0.064	0.012	0.037	< 0.002	0.12	≤0.02
Mercury (µg/l)	< 0.013	< 0.013	< 0.013	< 0.013	1.0	-
Nitrate (as N)	0.276	< 0.05	< 0.05	< 0.05	10.0	-
Nitrite (as N)	< 0.01	< 0.01	< 0.01	< 0.01	1	-
pH (pH Units)	6.5	7.5	5.7	7.3	-	7.0 - 10.5
Potassium	0.9	0.3	0.2	0.2	-	-
Sodium	4.5	11.0	3.9	9.6	-	≤200
Solids (Total Dissolved)	35.5	34.0	25.5	91.5	-	≤500
Sulphate	3.8	10.1	2.7	38.7	-	≤500
Turbidity (NTU)	1.76	0.08	0.97	0.04	^C 0.15/0.2	-
Total Organic Carbon (TOC)	3.8	1.9	5.8	1.8	-	-
THM's (avg.)	-	0.032	-	0.038	0.100	-
Uranium (µg/l)	< 0.1	< 0.1	< 0.1	< 0.1	20.0	-
Zinc (Total)	< 0.005	0.103	0.006	0.123	-	≤5.0
PCB (µg/l)	-	-	-	-	-	-
Gross Alpha / Gross Beta (Bq/L)	< 0.1 / <0.1	< 0.1 / <0.1	< 0.1 / <0.1	< 0.1 / <0.1	0.5 / 1.0	-

^AAluminum objective is related to type of plant filtration; the aluminum objective for direct filtration (Pockwock) is <0.20 mg/l and conventional filtration (Lake Major) is <0.10 mg/l.

^BFluoride was not being added to the finished water at the Lake Major WSP approximately 75% of the time due to system maintenance.

^CThe Pockwock and Lake Major plants analyze turbidity immediately post-filtration. Each filter must produce water with a turbidity of <0.15 NTU 95% of the time at the Pockwock Water Supply Plant and <0.2 NTU 95% of the time at the Lake Major Water Supply Plant. Both Water Supply Plants must produce water with a turbidity <1.0 NTU 100% of the time, as required by Provincial Permit.

TYPICAL ANALYSIS OF BOMONT WATER

2020 - 2021

(in milligrams per litre unless shown otherwise)

Note: All Regulatory Compliance Analysis are Processed by Third Party Laboratories

PARAMETERS	BENNERY LAKE		BOMONT		GUIDELINES FOR CANADIAN DRINKING WATER QUALITY	
	Raw Water	Treated Water	^A Raw Water	Treated Water	Maximum Acceptable Concentration	Aesthetic Objective Concentration
Alkalinity (as CaCO ₃)	5.2	35.3	-	21.0	-	-
Aluminum	0.119	0.014	-	0.050	-	0.1
Ammonia (N)	< 0.05	0.05	-	< 0.05	-	-
Arsenic	< 0.001	< 0.001	-	< 0.001	0.010	-
Calcium	2.3	16.3	-	4.8	-	-
Chloride	6.5	9.1	-	10.3	-	≤250
Chlorate	5.5	0.2	-	0.2	1.0	-
Chlorite	< 0.1	< 0.1	-	< 0.1	1.0	-
Colour (True Colour Units)	32.7	4.3	-	< 5.0	-	≤15.0
Conductivity (µS/cm)	38	150	-	89	-	-
Copper (Total)	0.1000	0.0250	-	0.0010	2.0	≤1.0
Fluoride	< 0.1	< 0.1	-	0.4	1.5	-
Hardness (as CaCO ₃)	7.7	42.5	-	14.0	-	-
HAA5 (avg.)	-	0.029	-	0.045	0.080	-
Iron (Total)	0.27	< 0.05	-	< 0.05	-	≤0.3
Lead (Total) (µg/l)	< 0.5	< 0.5	-	< 0.5	5.0	-
Magnesium	0.5	0.6	-	0.4	-	-
Manganese (Total)	0.140	0.027	-	0.009	0.12	≤0.02
Mercury (µg/l)	< 0.013	< 0.013	-	< 0.013	1.0	-
Nitrate (as N)	< 0.05	< 0.05	-	< 0.05	10.0	-
Nitrite (as N)	< 0.01	< 0.01	-	< 0.01	1.0	-
pH (pH Units)	6.6	7.4	-	7.7	-	7.0 - 10.5
Potassium	0.2	0.2	-	0.3	-	-
Sodium	4.0	11.7	-	11.0	-	≤200
Solids (Total Dissolved)	29	91	-	47	-	≤500
Sulphate	3.4	28.3	-	9.0	-	≤500
Turbidity (NTU)	0.56	0.05	-	0.32	^B 0.2/1.0; ^C 5.0	-
Total Organic Carbon (TOC)	5.9	1.7	-	1.8	-	-
THM's (avg.)	-	0.044	-	0.033	0.100	-
Uranium (µg/l)	< 0.1	< 0.1	-	< 0.1	20.0	-
Zinc (Total)	< 0.005	0.041	-	0.086	-	≤5.0
PCB (µg/l)	-	-	-	-	-	-
Gross Alpha / Gross Beta (Bq/L)	< 0.1 / <0.1	< 0.1 / <0.1	-	< 0.1 / <0.1	0.5 / 1.0	-

^ARaw water samples were not collected from the Bomont raw water source this past year. Treated water was supplied from either the Lake Major or Pockwock water systems.

^BThe Bennery Lake plant analyzes turbidity immediately post-filtration and must produce water with a turbidity of <0.2 NTU 95% of the time and <1.0 NTU 100% of the time.

^CFiltered turbidity values are not reported due to the fact that the Bomont Water Supply Plant was not treating raw water. Instead, treated water turbidity is reported and calculated from clearwell monitoring and must be less than 5.0 NTU as required by Provincial Permit.

TYPICAL ANALYSIS – SMALL SYSTEMS

2020 - 2021

(in milligrams per litre unless shown otherwise)

Note: All Regulatory Compliance Analysis are Processed by Third Party Laboratories

PARAMETERS	FIVE ISLAND LAKE		SILVER SANDS		GUIDELINES FOR CANADIAN DRINKING WATER QUALITY	
	Raw Water	Treated Water	Raw Water	Treated Water	Maximum Acceptable Concentration	Aesthetic Objective Concentration
Alkalinity (as CaCO ₃)	31.0	36.0	63.0	65.0	-	-
Aluminum	< 0.005	< 0.005	< 0.005	< 0.005	-	0.2
Ammonia (N)	< 0.05	0.096	< 0.05	< 0.05	-	-
Arsenic	0.004	0.004	0.002	< 0.001	0.010	-
Calcium	9.1	8.8	35.5	34.5	-	-
Chloride	8.3	7.9	63.5	68.0	-	≤250
Chlorate	< 0.1	< 0.1	< 0.1	0.3	1.0	-
Chlorite	< 0.1	< 0.1	< 0.1	< 0.1	1.0	-
Colour (True Colour Units)	< 5.0	< 5.0	11.3	< 5.0	-	≤15.0
Conductivity (µS/cm)	93	95	390	390	-	-
Copper (Total)	0.0020	0.0100	< 0.0005	0.0140	2.0	≤1.0
Fluoride	0.3	0.3	0.2	0.2	1.5	-
Hardness (as CaCO ₃)	27.0	26.0	110.0	100.0	-	-
HAA5 (avg.)	-	< 0.005	-	< 0.005	0.080	-
Iron (Total)	< 0.05	< 0.05	0.88	< 0.05	-	≤0.3
Lead (Total) (µg/l)	< 0.5	< 0.5	< 0.5	< 0.5	5.0	-
Magnesium	1.1	1.1	4.7	4.7	-	-
Manganese (Total)	< 0.002	< 0.002	0.967	0.007	0.12	≤0.02
Mercury (µg/l)	< 0.013	< 0.013	< 0.013	< 0.013	1.0	-
Nitrate (as N)	0.055	< 0.05	< 0.05	< 0.05	10.0	-
Nitrite (as N)	< 0.01	< 0.01	< 0.01	< 0.01	1.0	-
pH (pH Units)	7.3	7.7	7.7	7.4	-	7.0 - 10.5
Potassium	0.5	0.5	0.9	0.9	-	-
Sodium	6.0	6.8	23.0	26.0	-	≤200
Solids (Total Dissolved)	55	54	210	230	-	≤500
Sulphate	3.3	1.7	18.5	12.3	-	≤500
Turbidity (NTU)	< 0.1	0.06	11.00	0.18	^A 1.0	-
Total Organic Carbon (TOC)	< 0.5	< 0.5	< 0.5	< 0.5	-	-
THM's (avg.)	-	< 0.001	-	< 0.001	0.100	-
Uranium (µg/l)	9.9	9.5	< 0.1	< 0.1	20.0	-
Zinc (Total)	< 0.005	0.008	< 0.005	< 0.005	-	≤5.0
PCB (µg/l)	< 0.05	< 0.05	-	-	-	-
Gross Alpha / Gross Beta (Bq/L)	0.3 / 0.4	0.2 / < 0.1	< 0.1 / 0.1	< 0.1 / < 0.1	0.5 / 1.0	-

^AThe Five Island Lake and Silver Sands Water Supply Plants must produce water with turbidity of <1.0 NTU 95% of the time, as required by Provincial Permit. Treated water turbidity is calculated from clearwell monitoring.

TYPICAL ANALYSIS - SMALL SYSTEMS

2020 - 2021

(in milligrams per litre unless shown otherwise)

Note: All Regulatory Compliance Analysis are Processed by Third Party Laboratories

PARAMETERS	COLLINS PARK		MIDDLE MUSQUODOBOIT		GUIDELINES FOR CANADIAN DRINKING WATER QUALITY	
	Raw Water	Treated Water	Raw Water	Treated Water	Maximum Acceptable Concentration	Aesthetic Objective Concentration
Alkalinity (as CaCO ₃)	12.0	15.0	45.0	130.0	-	-
Aluminum	0.068	< 0.005	0.044	< 0.005	-	0.1
Ammonia (N)	< 0.05	< 0.05	< 0.05	< 0.05	-	-
Arsenic	0.003	< 0.001	< 0.001	< 0.001	0.010	-
Calcium	6.5	0.5	13.0	3.8	-	-
Chloride	37.0	18.0	9.1	6.0	-	≤250
Chlorate	< 0.1	0.2	< 0.1	0.2	1.0	-
Chlorite	< 0.1	< 0.1	< 0.1	< 0.1	1.0	-
Colour (True Color Units)	22.5	4.2	15.3	< 5.0	-	≤15.0
Conductivity (µS/cm)	160	62	150	240	-	-
Copper (Total)	0.0010	< 0.0005	0.0019	0.0007	2.0	≤1.0
Fluoride	< 0.1	< 0.1	< 0.1	< 0.1	1.5	-
Hardness (as CaCO ₃)	18.0	1.3	54.0	15.0	-	-
HAA5 (avg.)	-	< 0.005	-	< 0.005	0.080	-
Iron (Total)	0.15	< 0.05	0.08	< 0.05	-	≤0.3
Lead (Total) (µg/l)	< 0.5	< 0.5	< 0.5	< 0.5	5.0	-
Magnesium	0.9	< 0.1	4.0	1.3	-	-
Manganese (Total)	0.061	0.007	0.003	< 0.002	0.12	≤0.02
Mercury (µg/l)	< 0.013	< 0.013	< 0.013	< 0.013	1.0	-
Nitrate (as N)	0.14	0.10	0.61	0.60	10.0	-
Nitrite (as N)	< 0.01	< 0.01	< 0.01	< 0.01	1	-
pH (pH Units)	7.2	7.7	6.9	7.6	-	7.0 - 10.5
Potassium	0.8	0.3	1.0	0.6	-	-
Sodium	21.0	13.0	4.8	44.5	-	≤200
Solids (Total Dissolved)	92	43	77	110	-	≤500
Sulphate	8.4	2.5	15.4	< 2.0	-	≤500
Turbidity (NTU)	1.20	0.10	< 0.1	0.05	^A 0.1/0.3	-
Total Organic Carbon (TOC)	4.3	< 0.5	< 0.5	< 0.5	-	-
THM's (avg.)	-	0.007	-	0.002	0.100	-
Uranium (µg/l)	< 0.1	< 0.1	< 0.1	< 0.1	20.0	-
Zinc (Total)	< 0.005	0.064	< 0.005	0.056	-	≤5.0
PCB (µg/l)	-	-	-	-	-	-
Gross Alpha / Gross Beta (Bq/L)	< 0.1 / <0.1	< 0.1 / <0.1	< 0.1 / <0.1	< 0.1 / <0.1	0.5 / 1.0	-

^AUltra-filtration membrane plants must produce water with turbidity of <0.1 NTU 99% of the time and <0.3 NTU 100% of the time, as required by Provincial Permit. Treated water turbidity is calculated from clearwell monitoring.



**STRAIGHT from
the SOURCE**

 **Halifax
Water**