902-420-9287
450 Cowie Hill Road
P.O. Box 8388 RPO CSC
Halifax, Nova Scotia
Canada B3K 5M1

September 17, 2021

Craig MacMullin, MBA, CPA, CGA, Chair
Halifax Water
Halifax, NS

The regular meeting of the Halifax Water Board will be held virtually on Thursday, September 23, 2021 beginning at 9:00 a.m. Visit www.halifaxwater.ca to register to attend the public portion of the meeting.

# AGENDA

## In Camera reports

1C Approval of minutes of the In-Camera meeting held on Thursday, June 17, 2021

***Motion**: That the Halifax Water Board approve the In-Camera minutes of June 17, 2021.*

2C Business arising from minutes
a)

3C *Land Matter*

***Motion:** That the Halifax Water Board convene to In Camera (private) to discuss the matter.*

4C Security matter

***Motion:** That the Halifax Water Board convene to In Camera (private) to discuss the matter.*

5C-I Security matter

6C Governance matter

***Motion:** That the Halifax Water Board convene to In Camera (private) to discuss the matter.*

## Regular reports

1. a) Ratification of In-Camera motions

***Motion:** That the Halifax Water Board ratify the In-Camera Motions.*

b) Approval of the order of business and approval of additions and deletions

***Motion:** That the Halifax Water Board approve the order of business and approve additions and deletions.*

2. Approval of minutes of the Regular meeting held on Thursday, June 17, 2021

***Motion**: That the Halifax Water Board approve the minutes of the June 17, 2021 Regular meeting.*

3. Business arising from minutes
a)

ATLANTIC 2021
2021 Nova Scotia's Top Employers
STRAIGHT from the SOURCE

## Financial

4.1 Operating results for the four months ended July 31, 2021

4.2 Updated Signing Authority Guideline and Financial Approvals List

***Motion:*** *That the Halifax Water Board approve:*

1. *The Signing Authority Guideline as shown in Attachment A.*
2. *The Financial Approval List as shown in Attachment B.*

4.3 Audit Services Request for Proposal Results

***Motion:*** *That the Halifax Water Board:*

1. *Award the contract for audit services for the Halifax Water financial statements and the Halifax Water Employees' Pension Plan financial statements to Grant Thornton LLP for a term of five years.*
2. *Approve the appointment of Grant Thornton LLP as auditors for the Halifax Water financial statements for the year ended March 31, 2022 and the Halifax Water Employees' Pension Plan for the year ended December 31, 2021.*

## Capital approvals

5.1 Capital Expenditures for the five months ended August 31, 2021

5.2 Green Choice Program Enrollment

***Motion:*** *That the Halifax Water Board:*

1. *Approve the development and submission of an Expression of Interest (EOI) to procure up to 120% of Halifax Water's corporate electricity need through the Green Choice Program and to pay the non-refundable application fee to apply for enrollment in the Green Choice Program;*
2. *Confirm desire to enroll if selected by the Minister of Energy and Mines and negotiate Subscriber Agreement details as renewable energy Request for Proposals are reviewed; and*
3. *Direct staff to return to the Halifax Water Board with the finalized Subscriber Agreement, recommended subscription level and term length, and financial risk considerations for approval.*

5.3 ICIP Funded Community Solar PV – Project Approval

***Motion:*** *That the Halifax Water Board approve proceeding with the four (4) projects selected for funding under the Investing in Canada Infrastructure Program (ICIP) at an estimated net-cost to Halifax Water of $446,817, including contingencies, net-HST and overheads.*

## Other Business

6. Procurement Policy Updates

***Motion:*** *That the Halifax Water Board approve the updated Procurement Policy, effective November 1, 2021.*

7. Policy Approval Framework

8. Asset Management Program Status

9. Support for Dalhousie University's NSERC Alliance Grant Proposal

***Motion:*** *That the Halifax Water Board approve Halifax Water's partnership and contribution of $1,480,000 over five years towards the "One Water" Dalhousie NSERC Alliance Grant research program from 2022 to 2027, to be submitted to NSERC in November, 2021.*

ATLANTIC 2021
Nova Scotia's Top Employers 2021
STRAIGHT from the SOURCE
Halifax Water

## Nova Scotia Utility and Review Board Reporting – Information Reports

*The items in this section are the reports ordered to be filed by Halifax Water with the Nova Scotia Utility and Review Board by September 30, 2021. These reports are being provided for information purposes.*

10. Capital Project Spending Summary - 2020/21
11. September 2021 NSUARB Annual Report

## Information Reports

1-I Operational Performance Information Report
2-I Halifax Water Compliance Statement – Quarterly Certification
3-I Halifax Regional Water Commission Employees' Pension Plan Financial Report, Second Quarter, 2021
4-I Halifax Regional Municipality Master Trust Investment Performance, Second Quarter, 2021 HB
5-I Cobequid Road Transmission Main Emergency Replacement
6-I 2020/2021 Halifax Water Annual Report
7-I 2021/2022 Cost Containment Initiatives
8-I Halifax Water Supplemental Pension Plan Report
9-I Transitioning from a Water Quality Master Plan towards a Risk Based Water Safety Plan Process

***Original Signed By:***

Heidi Schedler
Secretary

# ITEM # 4.1
**Halifax Water Board**

**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Digitally signed by Louis de Montbrun Date: 2021.09.17 13:02:40 -03'00'

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

**APPROVED:** Digitally signed by Cathie O'Toole Date: 2021.09.17 13:17:50 -03'00'

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

**DATE:** September 10, 2021

**SUBJECT:** Operating results for the 4 months ended July 31, 2021

## ORIGIN

Financial Information Reporting.
Audit and Finance Committee Meeting – September 2, 2021

## DISCUSSION

Attached are the operating results for the four (4) months ended July 31, 2021, with comparative figures for July 31, 2020.

The following discussion of the operating results reflect direct operating costs by department and allocations among water, wastewater and stormwater for common costs shared across all the services provided by Halifax Water.

**Statement of Financial Position (NSUARB)**

Key indicators and balances from the Statement of Financial Position are provided in the following tables.

**Table 1: Assets**

| July 31 (in thousands) | Notes | 2021 | 2020 | March 31 2021 | From Prior Year $ Change | From Prior Year % Change |
|---|---|---|---|---|---|---|
| **Assets** | | | | | | |
| Current | | | | | | |
| Cash and cash equivalents | A | $ 74,561 | $ 64,708 | $ 48,228 | $ 9,853 | 15.2% |
| Receivables | | | | | | |
| Customer charges and contractual | B | 16,079 | 15,628 | 17,155 | 451 | 2.9% |
| Unbilled service revenues | C | 20,344 | 18,393 | 18,246 | 1,951 | 10.6% |
| Halifax Regional Municipality | D | 11,766 | 4,287 | 2,711 | 7,479 | 174.5% |
| Inventory | | 2,129 | 2,257 | 2,003 | (128) | (5.7%) |
| Prepaids | E | 2,402 | 1,600 | 1,570 | 802 | 50.1% |
| | | 127,281 | 106,873 | 89,913 | 20,408 | 19.1% |
| Capital work in progress | F | 40,854 | 31,242 | 30,908 | 9,612 | 30.8% |
| Utility plant in service | G | 1,320,731 | 1,318,214 | 1,334,519 | 2,517 | 0.2% |
| Total assets | | 1,488,866 | 1,456,329 | 1,455,340 | 32,537 | 2.2% |
| Regulatory deferral account | | 2,557 | 2,749 | 2,620 | (192) | (7.0%) |
| **Total assets and regulatory deferral account** | | **$ 1,491,423** | **$ 1,459,078** | **$ 1,457,960** | **$ 32,345** | **2.2%** |

**Notes related to Table 1:**

A) *Cash and cash equivalents* consist of cash on hand and balances held within financial institutions reduced by outstanding cheques. They have increased $9.9 million from the prior year due to new debt of $20 million in May 2021, reduced by repayments of $20.7 million, receipt of more regional development charges than the prior year, and lower spend on capital.

B) *Customer charges and contractual receivables* have increased $0.5 million from the prior year. The change in receivables is driven by the timing of billing cycles, down $0.9 million from prior year, offset by the billing of capital cost contributions for West Bedford of $1.2 million, and the decrease in the allowance for doubtful accounts related to a year end adjustment.

| Customer charges and contractual | 2021 '000 | 2020 '000 | $ Change | % Change |
|---|---|---|---|---|
| Trade receivables | **$ 17,410** | $ 17,214 | $ 196 | 1.1% |
| Other receivables | **2,029** | 1,930 | 99 | 5.1% |
| Allowance for doubtful accounts | **(3,360)** | (3,516) | 156 | (4.4%) |
| | **$ 16,079** | $ 15,628 | $ 451 | 2.9% |

| Aging of Accounts Receivable (in thousands) | Current | 31 to 60 | 61 to 120 | 120+ | Grand Total |
|---|---|---|---|---|---|
| 2021 | 8,328 | 1,401 | 2,250 | 5,431 | 17,410 |
| 2020 | 7,404 | 1,616 | 1,466 | 6,728 | 17,214 |
| Change | 924 | (215) | 784 | (1,297) | 196 |
| % Change | 12.5% | (13.3%) | 53.5% | (19.3%) | 1.1% |

C) *Unbilled service revenues* have increased $2.0 million due to the timing of billing cycles and the increase in wastewater rates.

D) *Halifax Regional Municipality (HRM) receivable* has increased from the prior year by $7.5 million due to the invoicing for the annual public fire protection charge in July of the current year and August in the prior year, offset by payment for a holdback relating to the Fall River Water servicing project and a decrease in payables.

| HRM Receivables and Payables | | | | |
|---|---|---|---|---|
| | **2021** | 2020 | | |
| | **'000** | '000 | $ Change | % Change |
| Receivables | **$ 13,418** | $ 7,978 | $ 5,440 | 68.2% |
| RDC | **1,318** | 1,009 | 309 | 30.6% |
| Payables | **(2,970)** | (4,700) | 1,730 | (36.8%) |
| | **$ 11,766** | $ 4,287 | $ 7,479 | 174.5% |

E) The increase in *prepaids* of $0.8 million is a result of new software licenses including the new payroll system and the timing of invoice receipt for Microsoft and SAP licenses.

F) The $9.6 million increase in *capital work in progress* relates to expenditures during the year. The top five projects remaining in capital work in progress at July 31, 2021 are detailed below:

| Capital Work in Progress | |
|---|---|
| | **Cumulative '000** |
| Bedford South Reservoir | **$ 3,487** |
| Romans and Federal Avenues Sewer Separation | **2,708** |
| Wastewater System Trenchless Rehabilitation | **2,309** |
| Pump Station Control Panel/Electrical Replacement | **1,588** |
| Infrastructure and IT Operations Governance | **1,311** |
| | **11,403** |
| All other projects: | |
| Water | **16,039** |
| Wastewater | **11,324** |
| Stormwater | **2,088** |
| | **29,451** |
| Capital work in progress | **$ 40,854** |

G) *Utility plant in service* assets total $1.32 billion, an increase of $2.5 million from the prior year. The increase is a result of additions at year end of $52.5 million offset by net disposals of $1.3 million, less depreciation expense of $48.7 million.

**Table 2: Liabilities and Equity**

| July 31 (in thousands) | Notes | 2021 | 2020 | March 31 2021 | From Prior Year $ Change | From Prior Year % Change |
|---|---|---|---|---|---|---|
| **Liabilities** | | | | | | |
| Current | | | | | | |
| Payables and accruals | | | | | | |
| Trade | A | 9,544 | 11,898 | 12,644 | (2,354) | (19.8%) |
| Non-trade | B | 5,092 | 4,880 | 6,192 | 212 | 4.3% |
| Interest on long term debt | | 1,610 | 1,738 | 2,065 | (128) | (7.4%) |
| Contractor and customer deposits | | 2,148 | 2,173 | 2,115 | (25) | (1.2%) |
| Current portion of long term debt | C | 21,559 | 21,184 | 20,559 | 375 | 1.8% |
| Unearned revenue | D | 8,564 | 634 | 561 | 7,930 | 1250.8% |
| | | 48,517 | 42,507 | 44,136 | 6,010 | 14.1% |
| Long term debt | E | 217,489 | 218,531 | 204,106 | (1,042) | (0.5%) |
| Deferred contributions | | 62,169 | 46,212 | 55,699 | 15,957 | 34.5% |
| Total liabilities | | 328,175 | 307,250 | 303,941 | 20,925 | 6.8% |
| **Equity** | | | | | | |
| Accumulated capital surplus | | 1,112,695 | 1,098,819 | 1,103,616 | 13,876 | 1.3% |
| Accumulated operating surplus | | 38,023 | 42,597 | 47,906 | (4,574) | (10.7%) |
| Operating surplus used to fund capital | | 12,380 | 12,380 | 12,380 | 0 | 0.0% |
| Deficiency of revenues over expenditures | | 150 | (1,968) | (9,883) | 2,118 | (107.6%) |
| Total equity | | 1,163,248 | 1,151,828 | 1,154,019 | 11,420 | 1.0% |
| **Total liabilities and equity** | | **$ 1,491,423** | **$ 1,459,078** | **$ 1,457,960** | **$ 32,345** | **2.2%** |

**Notes related to Table 2:**

A) *Trade payables and accruals* have decreased $2.4 million as a result of accruals for completion of capital projects being lower than the prior year offset by an increase in invoices received. A new process to record holdbacks on progress claims has also commenced and the trade payable balance is expected to increase and trade accrued payables expected to decrease.

| Payables and Accruals | 2021 '000 | 2020 '000 | $ Change | % Change |
|---|---|---|---|---|
| Trade payable | **$ 5,165** | $ 3,389 | $ 1,776 | 52.4% |
| Trade accrued payables | **3,604** | 7,450 | (3,846) | (51.6%) |
| Accrued wastewater rebate | **775** | 1,059 | (284) | (26.8%) |
| | **$ 9,544** | $ 11,898 | $ (2,354) | (19.8%) |

| Aging of Accounts Payable (in thousands) | Current | 31 to 60 | 61 to 120 | 120+ | Grand Total |
|---|---|---|---|---|---|
| 2021 | 3,580 | 520 | 415 | 650 | 5,165 |
| 2020 | 3,317 | - | - | 72 | 3,389 |
| $ Change | 263 | 520 | 415 | 578 | 1,776 |
| % Change | 7.9% | 0.0% | 0.0% | 802.8% | 52.4% |

B) *Non-trade payables and accruals* have increased $0.2 million due to the timing of payroll remittances.

C) *Current portion of long term debt* has increased $0.4 million primarily as a result of acquiring new debt.

D) *Unearned revenue* has increased due to the invoicing of the annual public fire protection and stormwater right of way charges to HRM.

E) *Long term debt* has decreased $1.0 million. New debt of $20.0 million was issued in May 2021. Long term debt repayments have been $20.7 million.

Debt servicing ratio is a function of total interest and principal payments (including accrued amounts) plus the amortization of debt issue costs divided by total operating revenue per service. Debt servicing ratio by service as at July 31, 2021 is as follows:

| Debt Servicing Ratio by Service | | |
|---|---|---|
| | **2021/22** | 2020/21 |
| Water | **13.57%** | 12.86% |
| Wastewater | **22.11%** | 25.79% |
| Stormwater | **27.05%** | 22.96% |
| Combined | **19.14%** | 20.26% |

The debt servicing ratio for each service, except wastewater, has increased from the prior year as a result of the issuance of new debt. The wastewater debt servicing ratio has decreased from the prior year due to higher revenues than the prior year as a result of an increase to the wastewater discharge rate.

The combined debt servicing ratio of 19.14% is below the maximum 35.0% ratio allowed under the blanket guarantee agreement with HRM.

**Statement of Earnings (NSUARB)**

**Table 3: Summarized Statement of Earnings (NSUARB)**

| Summarized Statement of Earnings | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Budget** | **Forecast** | YTD Actual | PYTD Actual | | | | |
| | | **2021/22** | **2021/22** | 2021/22 | 2020/21 | From Prior Year | | Budget to Forecast | |
| | **Notes** | **'000** | **'000** | '000 | '000 | $ Change | % Change | $ Change | % Change |
| Operating revenues | | **$ 150,467** | **$ 151,424** | $ 50,233 | $ 44,897 | $ 5,336 | 11.88% | $ (957) | (0.63%) |
| Operating expenditures | | **125,379** | **127,442** | 38,415 | 35,969 | 2,446 | 6.80% | 2,063 | 1.65% |
| Earnings from operations before financial and other revenues and expenditures | | **25,088** | **23,982** | 11,818 | 8,928 | 2,890 | 32.37% | (1,106) | (4.41%) |
| Financial and other revenues | | **722** | **758** | 201 | 257 | (56) | (21.79%) | 36 | 4.99% |
| Financial and other expenditures | | **37,460** | **35,286** | 11,869 | 11,153 | 716 | 6.42% | (2,174) | (5.80%) |
| Earnings (loss) for the year | **A** | **$ (11,650)** | **$ (10,546)** | $ 150 | $ (1,968) | $ 2,118 | (107.62%) | $ 1,104 | (9.48%) |

**Notes related to Table 3:**

A) The *earnings* for the year to date are $0.2 million, an increase over the prior year loss of $2.1 million. The following is a discussion of factors influencing the change.

**Table 4: Operating Revenues:**

| Operating Revenues | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Budget | Forecast | YTD | PYTD | From Prior Year | | Budget to Forecast | |
| | Notes | 2021/22 '000 | 2021/22 '000 | 2021/22 '000 | 2020/21 '000 | $ Change | % Change | $ Change | % Change |
| Consumption revenue | B, C | $ 32,171 | $ 32,195 | $ 32,010 | $ 27,465 | $ 4,545 | 16.55% | $ 24 | 0.07% |
| Base charge revenue | C | 11,334 | 11,438 | 11,157 | 11,192 | (35) | (0.31%) | 104 | 0.92% |
| Wastewater rebate | | (496) | (496) | (234) | (365) | 131 | (35.89%) | - | 0.00% |
| Metered sales total | | 43,009 | 43,137 | 42,933 | 38,292 | 4,641 | 12.12% | 128 | 0.30% |
| Stormwater site generated charge | D | 2,017 | 2,174 | 2,128 | 2,104 | 24 | 1.14% | 157 | 7.78% |
| Stormwater right of way | | 1,278 | 1,278 | 1,278 | 1,278 | - | 0.00% | - | 0.00% |
| Public fire protection | E | 2,542 | 2,542 | 2,543 | 2,358 | 185 | 7.85% | - | 0.00% |
| Private fire protection | E | 437 | 448 | 418 | 298 | 120 | 40.27% | 11 | 2.52% |
| Other operating revenue | F | 867 | 890 | 933 | 567 | 366 | 64.55% | 23 | 2.65% |
| Operating revenue total | A | $ 50,150 | $ 50,469 | $ 50,233 | $ 44,897 | $ 5,336 | 11.88% | $ 319 | 0.64% |

**Notes related to Table 4:**

Operating revenues are presented below, broken down by type:

A) *Operating revenues* have increased $5.3 million as compared to the previous year.

B) *Consumption* has increased 2.3% on a volumetric basis compared to the prior year. The other factor influencing the increase in *consumption revenue* of $4.5 million over the prior year is the rate increase for wastewater discharge effective April 1, 2021 from $1.753 per cubic meter to $2.073 per cubic meter.

| Consumption by Customer Class (m3) | | | | |
|---|---|---|---|---|
| | 2021/22 | 2020/21 | m3 Change | % Change |
| Commercial | **1,870,837** | 1,760,165 | 110,672 | 6.3% |
| Industrial | **642,216** | 624,840 | 17,376 | 2.8% |
| Institutional | **1,208,245** | 1,096,987 | 111,258 | 10.1% |
| Multi-residential | **2,493,945** | 2,425,549 | 68,396 | 2.8% |
| Residential | **4,377,298** | 4,445,439 | (68,141) | (1.5%) |
| | **10,592,541** | 10,352,980 | 239,561 | 2.3% |

C) *Base charge revenue* forecasts have increased $0.1 million compared to budget due to the increase in the number of customers.

D) *Stormwater site generated charge revenue* has been forecast to be $0.2 million more than budget due to the impervious area satellite imagery update.

E) *Public and private fire protection revenues* have increased by a combined $0.3 million from the prior year due to an approved rate increase effective October 1, 2020.

F) *Other operating revenue* has increased $0.4 million over the prior year due to late payment and interest charges being waived in the prior year as a COVID-19 relief measure ($0.2M), the introduction of a new meter reading charge to recoup the cost of manual meter reads for non-AMI meters effective October 1, 2020 ($0.1M), and an increase in drawing review fees which are dependent upon the volume of development activity.

**Table 5: Operating expenditures:**

| Operating Expenditures | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Budget | Forecast | YTD | PYTD | From Prior Year | | Budget to Forecast | |
| | Notes | 2021/22 '000 | 2021/22 '000 | 2021/22 '000 | 2020/21 '000 | $ Change | % Change | $ Change | % Change |
| Water supply and treatment | B | $ 10,778 | $ 11,208 | $ 3,304 | $ 3,118 | $ 186 | 5.97% | $ 430 | 3.99% |
| Water transmission and distribution | | 11,876 | 11,972 | 3,977 | 3,861 | 116 | 3.00% | 96 | 0.81% |
| Wastewater collection | C | 12,604 | 12,699 | 4,943 | 4,277 | 666 | 15.57% | 95 | 0.75% |
| Stormwater collection | D | 5,885 | 5,922 | 1,488 | 1,715 | (227) | (13.24%) | 37 | 0.63% |
| Wastewater treatment | E | 22,071 | 22,046 | 6,649 | 6,263 | 386 | 6.16% | (25) | (0.11%) |
| Engineering and technology services | F | 12,931 | 13,377 | 3,357 | 3,048 | 309 | 10.14% | 446 | 3.45% |
| Regulatory services | | 4,472 | 4,508 | 1,418 | 1,317 | 101 | 7.67% | 36 | 0.81% |
| Customer services | | 5,837 | 5,898 | 1,604 | 1,621 | (17) | (1.05%) | 61 | 1.05% |
| Corporate services | G | 3,124 | 3,396 | 725 | 58 | 667 | 1150.00% | 272 | 8.71% |
| Administration services | G | 4,928 | 4,940 | 1,463 | 1,904 | (441) | (23.16%) | 12 | 0.24% |
| Depreciation and amortization | H | 30,873 | 31,476 | 9,487 | 8,787 | 700 | 7.97% | 603 | 1.95% |
| Total operating expenditures | A | $ 125,379 | $ 127,442 | $ 38,415 | $ 35,969 | $ 2,446 | 6.80% | $ 2,063 | 1.65% |

**Notes related to Table 5:**

A) *Operating expenditures* of $38.4 million are $2.4 million higher than the prior year.

B) *Water supply and treatment* has forecasted an increase of $0.4 million due to an increased demand for phosphate as the dose is planned to double to facilitate the Lake Major clarifier project in addition to the reallocation of one position from small systems.

C) *Wastewater collection* has increased $0.7 million from prior year due to increases in salaries ($165k) based on the allocation of time between wastewater and stormwater services, increase in vehicle cost allocation ($178k) which is dependent upon usage, increase in traffic control costs ($140k) due to an increase in activity over the prior year resulting from COVID-19, and an increase in electricity costs, materials and supplies and equipment repairs to pump stations, generators and other equipment ($125k).

D) *Stormwater collection* has decreased $0.2 million from prior year due to decreases in salaries and benefits ($216k) based on the allocation of time between wastewater and stormwater services, decrease in contract services ($160k) relating mainly to emergency repairs for the Pier A combined sewer overflow (CSO), offset by an increase in traffic control costs ($78k) due to an increased focus on activities that reduce staff contact during COVID-19, and an increase in vehicle cost allocation ($60k) which is dependent upon usage.

E) *Wastewater treatment* has increased $0.4 million from prior year due to increases in salaries and benefits ($75k) relating to new positions and wage rate increases, increases in chemicals ($182k) mostly polymer due to price increases and sodium hypochlorite due to a dry summer requiring more use of the chemical to reduce odors, increase in consulting costs ($81k) for Dalhousie research project due to reduced activity in prior year due to COVID-19, and an increase in electricity costs ($40k).

F) *Engineering and technology services* have increased $0.3 million from prior year due to increases in salaries and benefits ($108k) relating to new positions and wage rate increases, and an increase in costs relating to the customer portal which went live in the fall of 2020. Engineering and technology services are forecasted to increase $0.4 million due to the need for Microsoft Azure licenses and a higher subscription rate by customers for the customer portal than budgeted.

G) *Corporate services and administration services* have increased $0.2 million from the prior year mainly due to increases in salaries and benefits ($160k) relating to new positions and wage rate increases, and an increase in training costs ($60k) due to more availability of courses post prior year COVID-19 cancellations. Corporate services are forecasted to increase $0.3 million due to an updated estimate for insurance policy premiums.

H) *Depreciation and amortization* have increased $0.7 million as a result of additions to utility plant in service and intangibles. Depreciation and amortization are forecasted to increase $0.6 million due to an updated estimate for total assets to be capitalized during the year.

**Table 6: Operating Expenditures by Nature:**

| Operating Expenditures by Nature | | | | | |
|---|---|---|---|---|---|
| | Notes | 2021/22 '000 | 2020/21 '000 | From Prior Year $ Change | From Prior Year % Change |
| Salaries and benefits | A | $ 14,148 | $ 13,903 | $ 245 | 1.76% |
| Training | | 149 | 56 | 93 | 166.07% |
| Contract services | B | 4,223 | 3,890 | 333 | 8.56% |
| Electricity | | 2,327 | 2,230 | 97 | 4.35% |
| Operating supplies | C | 3,601 | 3,222 | 379 | 11.76% |
| Professional services | D | 1,825 | 1,543 | 282 | 18.28% |
| Chemicals | E | 2,161 | 1,759 | 402 | 22.85% |
| Depreciation on assets allocated to departments | F | 494 | 579 | (85) | (14.68%) |
| Depreciation and amortization | F | 9,487 | 8,787 | 700 | 7.97% |
| Total operating expenditures | | $ 38,415 | $ 35,969 | $ 2,446 | 6.80% |

**Notes related to Table 6:**

Operating expenditures of $38.4 million are $2.4 million higher than the prior year.

Compared to the prior year, expense types with the largest changes in costs are:

A) Salaries and benefits increase of $0.2 million is due to wage rate increases, new positions, offset by several retirements.

B) Contract services increase of $0.3 million is due to an increase in traffic control services and hired equipment required relating to an increase in activity post COVID-19.

C) Operating supplies increase of $0.4 million is due in part to higher fuel costs due to an increase in activity and price increases.

D) Professional services increase of $0.3 million is due in part to an increase in the lead service line rebate program and higher consulting costs relating to the Dalhousie research project and the customer portal which became operational in the fall of 2020.

E) Chemicals increase of $0.4 million is due mainly to price increases.

F) Depreciation increase of $0.6 million is due to additions to utility plant in service.

**Table 7: Operating Results by Service:**

| Operating Results by Service | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Budget 2021/22 '000** | **Forecast 2021/22 '000** | YTD 2021/22 '000 | PYTD 2020/21 '000 | From Prior Year | | Budget to Forecast | |
| | | | | | $ Change | % Change | $ Change | % Change |
| Water | **$ (5,221)** | **$ (4,556)** | $ 6 | $ 341 | $ (335) | (98.24%) | $ 665 | (12.74%) |
| Wastewater | **(1,517)** | **(1,839)** | 592 | (1,854) | 2,446 | (131.93%) | (322) | 21.23% |
| Stormwater | **(4,912)** | **(4,151)** | (448) | (455) | 7 | (1.54%) | 761 | (15.49%) |
| Earnings (loss) | **$ (11,650)** | **$ (10,546)** | $ 150 | $ (1,968) | $ 2,118 | (107.62%) | $ 1,104 | (9.48%) |

The results in Table 7 are explained in more detail in Tables 8 to 10.

**Table 8: Operating Results by Service – Water:**

| Operating Results by Service - Water | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Budget 2021/22 '000** | **Forecast 2021/22 '000** | YTD 2021/22 '000 | PYTD 2020/21 '000 | From Prior Year | | Budget to Forecast | |
| | | | | | $ Change | % Change | $ Change | % Change |
| Operating revenues | **$ 58,213** | **$ 58,642** | $ 19,453 | $ 18,455 | $ 998 | 5.41% | $ 429 | 0.74% |
| Operating expenditures | **48,638** | **49,969** | 15,013 | 14,015 | 998 | 7.12% | 1,331 | 2.74% |
| Earnings (loss) from operations | **9,575** | **8,673** | 4,440 | 4,440 | - | 0.00% | (902) | (9.42%) |
| Financial and other revenues | **495** | **547** | 154 | 174 | (20) | (11.49%) | 52 | 10.51% |
| Financial and other expenditures | **15,291** | **13,776** | 4,588 | 4,273 | 315 | 7.37% | (1,515) | (9.91%) |
| Earnings (loss) for the year | **$ (5,221)** | **$ (4,556)** | $ 6 | $ 341 | (335) | (98.24%) | 665 | (12.74%) |

*Water services earnings* have decreased from the prior year by $0.3 million due to the following factors:

a. Increase in consumption of 2.3% on a volumetric basis contributing to the *operating revenue* increase of $0.5 million as a result of more businesses activity compared to prior year as a result of COVID-19.

b. Increase in fire protection revenues of $0.3 million as a result of a rate increase effective October 1, 2020.

c. Increase in late payment fees of $58k, prior year fees were waived for part of the year as a result of COVID-19 relief measures.

d. Increase in miscellaneous revenues of $0.1 million mainly due to new meter reading fee and drawing review fee revenue.

e. Increase in *operating expenditures* of $1.0 million as discussed previously including increases in salaries from wage rate increases and depreciation.

f. Increase in *financial and other expenditures* of $0.3 million due to higher debt servicing costs.

**Table 9: Operating Results by Service – Wastewater:**

| Operating Results by Service - Wastewater | Budget 2021/22 '000 | Forecast 2021/22 '000 | YTD 2021/22 '000 | PYTD 2020/21 '000 | From Prior Year $ Change | From Prior Year % Change | Budget to Forecast $ Change | Budget to Forecast % Change |
|---|---|---|---|---|---|---|---|---|
| Operating revenues | $ 82,167 | $ 82,237 | $ 27,342 | $ 23,032 | $ 4,310 | 18.71% | $ 70 | 0.09% |
| Operating expenditures | 64,837 | 65,499 | 20,486 | 18,881 | 1,605 | 8.50% | 662 | 1.02% |
| Earnings (loss) from operations | 17,330 | 16,738 | 6,856 | 4,151 | 2,705 | 65.17% | (592) | (3.42%) |
| Financial and other revenues | 196 | 186 | 42 | 71 | (29) | (40.85%) | (10) | (5.10%) |
| Financial and other expenditures | 19,043 | 18,763 | 6,306 | 6,076 | 230 | 3.79% | (280) | (1.47%) |
| Earnings (loss) for the year | $ (1,517) | $ (1,839) | $ 592 | $ (1,854) | 2,446 | (131.93%) | (322) | 21.23% |

*Wastewater services earnings* of $0.6 million have increased from the prior year by $2.4 million due to the following factors:

a. Increase in consumption and the wastewater discharge rate from $1.753 to $2.073 effective April 1, 2021, contributing $4.1 million to the increase in *operating revenue*.

b. Increase in late payment fees of $58k, prior year fees were waived for part of the year as a result of COVID-19 relief measures.

c. Increase in miscellaneous revenues of $0.1 million mainly due to new meter reading fee.

d. Increase in *operating expenditures* of $1.6 million as discussed previously including increases in salaries from wage rate increases and depreciation.

e. Increase in *financial and other expenditures* of $0.2 million due to higher debt servicing costs and the new dividend/grant in lieu of taxes on wastewater assets.

**Table 10: Operating Results by Service – Stormwater:**

| Operating Results by Service - Stormwater | Budget 2021/22 '000 | Forecast 2021/22 '000 | YTD 2021/22 '000 | PYTD 2020/21 '000 | From Prior Year $ Change | From Prior Year % Change | Budget to Forecast $ Change | Budget to Forecast % Change |
|---|---|---|---|---|---|---|---|---|
| Operating revenues | $ 10,087 | $ 10,545 | $ 3,438 | $ 3,410 | $ 28 | 0.82% | $ 458 | 4.54% |
| Operating expenditures | 11,904 | 11,974 | 2,916 | 3,073 | (157) | (5.11%) | 70 | 0.59% |
| Earnings (loss) from operations | (1,817) | (1,429) | 522 | 337 | 185 | 54.90% | 388 | (21.35%) |
| Financial and other revenues | 31 | 25 | 5 | 12 | (7) | (58.33%) | (6) | (19.35%) |
| Financial and other expenditures | 3,126 | 2,747 | 975 | 804 | 171 | 21.27% | (379) | (12.12%) |
| Earnings (loss) for the year | $ (4,912) | $ (4,151) | $ (448) | $ (455) | 7 | (1.54%) | 761 | (15.49%) |

*Stormwater services loss* of $0.4 million has decreased from the prior year due to the following factors:

a. Increase of $24k in site generated revenue.

b. Increase in late payment fees of $40k, prior year fees were waived for part of the year as a result of COVID-19 relief measures.

c. Decrease in miscellaneous revenue resulting from an allocation of revenues between services.

d. Decrease in *operating expenditures* of $0.2 million mainly due to decreases in salaries and benefits as resources are allocated between wastewater and stormwater collection.

e. Increase in *financial and other expenditures* of $0.2 million due to higher debt servicing costs and the new dividend/grant in lieu of taxes on stormwater assets.

**Table 11: Financial and other revenues:**

| Financial and other revenues | Notes | Budget 2021/22 '000 | Forecast 2021/22 '000 | YTD Actual 2021/22 '000 | PYTD Actual 2020/21 '000 | From Prior Year $ Change | From Prior Year % Change | Budget to Forecast $ Change | Budget to Forecast % Change |
|---|---|---|---|---|---|---|---|---|---|
| Interest | A | $ 173 | $ 144 | $ 49 | $ 72 | $ (23) | (31.94%) | $ 29 | 20.14% |
| Other | B | 549 | 614 | 152 | 185 | (33) | (17.84%) | 65 | 11.84% |
| **Total financial and other revenue** | | $ 722 | $ 758 | $ 201 | $ 257 | $ (56) | (21.79%) | $ 36 | 4.99% |

**Notes related to Table 11:**

A) *Interest* is lower than the previous year due to a decrease in interest rates and a greater allocation of interest is applied to RDC funds.

B) *Other revenues* include various un-regulated activities such as tower lease revenues, energy generation revenues, consulting activities and contracted service revenues.

**Table 12: Financial and other expenditures:**

| Financial and other expenditures | Notes | Budget 2021/22 '000 | Forecast 2021/22 '000 | YTD Actual 2021/22 '000 | PYTD Actual 2020/21 '000 | From Prior Year $ Change | From Prior Year % Change | Budget to Forecast $ Change | Budget to Forecast % Change |
|---|---|---|---|---|---|---|---|---|---|
| Interest on long term debt | | $ 7,603 | $ 6,824 | $ 2,415 | $ 2,411 | $ 4 | 0.17% | $ 779 | 11.42% |
| Repayment on long term debt | | 22,716 | 21,559 | 7,124 | 6,619 | 505 | 7.63% | (1,157) | (5.09%) |
| Amortization of debt discount | | 258 | 231 | 75 | 67 | 8 | 11.94% | (27) | (10.47%) |
| Dividend/grant in lieu of taxes | | 6,837 | 6,626 | 2,208 | 2,039 | 169 | 8.29% | (211) | (3.09%) |
| Other | | 46 | 46 | 47 | 17 | 30 | 176.47% | 0 | 0.00% |
| **Total financial and other expenditures** | A | $ 37,460 | $ 35,286 | $ 11,869 | $ 11,153 | $ 716 | 6.42% | $ (2,174) | (5.80%) |

**Notes related to Table 12:**

A) *Financial and other expenditures* have increased $0.7 million over the prior year mainly due to an increase in *long term debt payments* due to the acquisition of new debt and an increase in the *dividend/grant in lieu of taxes* due to additions to utility plant in service and a new 3-year agreement with HRM to also pay a dividend of 0.25% on wastewater and stormwater rate based assets.

**Table 13: Debt Servicing by Service:**

| Debt Servicing by Service | | | | | |
|---|---|---|---|---|---|
| | Notes | 2021/22 '000 | 2020/21 '000 | $ Change | % Change |
| Water Services | | | | | |
| Interest on long term debt | | $ 699 | $ 654 | $ 45 | 6.9% |
| Repayment on long term debt | | 1,914 | 1,697 | 217 | 12.8% |
| Amortization of debt discount | | 27 | 23 | 4 | 17.4% |
| **Total debt servicing cost - water services** | **A** | **$ 2,640** | $ 2,374 | $ 266 | 11.2% |
| Wastewater Services | | | | | |
| Interest on long term debt | | $ 1,470 | $ 1,536 | $ (66) | (4.3%) |
| Repayment on long term debt | | 4,533 | 4,365 | 168 | 3.8% |
| Amortization of debt discount | | 41 | 39 | 2 | 5.1% |
| **Total debt servicing cost - wastewater services** | **B** | **$ 6,044** | $ 5,940 | $ 104 | 1.8% |
| Stormwater Services | | | | | |
| Interest on long term debt | | $ 246 | $ 221 | $ 25 | 11.3% |
| Repayment on long term debt | | 677 | 557 | 120 | 21.5% |
| Amortization of debt discount | | 7 | 5 | 2 | 40.0% |
| **Total debt servicing cost - stormwater services** | **C** | **$ 930** | $ 783 | $ 147 | 18.8% |

A) *Water debt servicing costs* of $2.6 million have increased $0.3 million from the prior year as a result of $22.0 million in new debt.

B) *Wastewater debt servicing costs* of $6.0 million have increased $0.1 million from the prior year as a result of $13.4 million in new debt.

C) *Stormwater debt servicing costs* of $0.9 million have increased $0.1 million from the prior year as a result of $9.6 million in new debt.

**Table 14: Operating Results by Activity:**

| Operating Results by Activity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Budget 2021/22 | Forecast 2021/22 | YTD 2021/22 | PYTD 2020/21 | From Prior Year | | Budget to Forecast | |
| Notes | '000 | '000 | '000 | '000 | $ Change | % Change | $ Change | % Change |
| Regulated activities **A** | **$ (12,175)** | **$ (11,092)** | $ (16) | $ (2,299) | $ 2,283 | (99.30%) | $ 1,083 | (8.90%) |
| Unregulated activities **B** | **525** | **546** | 167 | 332 | (165) | (49.70%) | 21 | 4.00% |
| Loss | **$ (11,650)** | **$ (10,546)** | $ 151 | $ (1,967) | $ 2,118 | (107.68%) | $ 1,104 | (9.48%) |

**Notes related to Table 14:**

A) *Regulated activities* loss has decreased from the prior year by $2.3 million due to the factors as previously explained.

B) *Unregulated activities* earnings of $0.2 million have decreased $0.2 million from the prior year due to an increase in operating costs for the leachate and dewatering facilities.

**Results under International Financial Reporting Standards as compared to NSUARB Handbook**

As a rate regulated utility, the AcSB requires Halifax Water, to report financial results using IFRS. The NSUARB requires Halifax Water to report in accordance with the NSUARB Handbook. Table 15 below reconciles the results between IFRS and the NSUARB Handbook:

**Table 15: Reconciliation IFRS to NSUARB:**

| Reconcile IFRS to NSUARB | | | |
|---|---|---|---|
| | | **2021/22** | 2020/21 |
| | **Notes** | **'000** | '000 |
| IFRS comprehensive earnings | | **$ 2,387** | $ 402 |
| Add non-cash pension expense | **A** | **5,021** | 3,401 |
| Subtract debt principal payments | **B** | **(7,124)** | (6,619) |
| Add depreciation expense on contributed assets | **C** | **6,178** | 6,280 |
| Subtract amortization of contributed capital | **C** | **(6,178)** | (6,280) |
| Add various depreciation adjustments | **D** | **(134)** | 848 |
| NSUARB earnings (loss) | | **$ 150** | $ (1,968) |

**Notes related to Table 15:**

Operating revenues are the same under both IFRS and the NSUARB Handbook.

The main differences relate to reporting requirements surrounding the recognition of various expenditures as follows:

A) *Non-cash pension expense* represents the accrual of unpaid contributions to the pension plan and is not considered an expense for NSUARB Handbook reporting purposes.

B) The *principal payments* on long term debt are recognized as an expense for NSUARB Handbook reporting purposes but are not an expense under IFRS.

C) *Depreciation expense on contributed assets* is not an expense for NSUARB Handbook purposes, however, it is offset by the removal of the amortization of contributed capital. IFRS requires *contributed capital* to be treated as a long term liability and amortized, resulting in higher long term liabilities and lower equity on the statement of financial position.

D) The *various depreciation adjustments* include the add back of gains on the disposal of utility plant in service and IFRS requires componentization of assets and shorter useful lives resulting in higher depreciation than under NSUARB Handbook reporting.

**Table 16: Statement of Earnings and Comprehensive Earnings (IFRS):**

| Summarized Comprehensive Earnings | | | | | |
|---|---|---|---|---|---|
| | Notes | 2021/22 '000 | 2020/21 '000 | $ Change | % Change |
| Operating revenues | A | $ 50,233 | $ 44,897 | $ 5,336 | 11.9% |
| Operating expenditures | B | 50,098 | 46,307 | 3,791 | 8.2% |
| Earnings (loss) from operations before financial and other revenues and expenditures | | 135 | (1,410) | 1,545 | (109.6%) |
| Financial and other revenues | | 6,379 | 6,537 | (158) | (2.4%) |
| Financial and other expenditures | C | 3,935 | 4,533 | (598) | (13.2%) |
| Earnings (loss) for the year before regulatory deferral account depreciation | | 2,579 | 594 | 1,985 | 334.2% |
| Regulatory deferral account depreciation | | (192) | (192) | - | 0.0% |
| Total comprehensive earnings for the year | | $ 2,387 | $ 402 | $ 1,985 | 493.8% |

**Notes related to Table 16:**

Key indicators and balances from the Statement of Earnings and Comprehensive Earnings are as follows:

A) *Operating revenues* of $50.2 million are $5.3 million higher than the prior year. Details have been discussed in preceding pages.

B) *Operating expenditures* of $50.1 million are $3.8 million higher than the prior year. This is primarily the result of the following factors:
   a. Increase in depreciation and amortization expense of $0.4 million as a result of additions to utility plant in service.
   b. Increase in accrued pension expense of $1.6 million as a result of the actuarial extrapolation at year end, resulting in a higher estimate for this current fiscal year.

C) *Financial and other expenditures* have decreased $0.8 million from the prior year. This is a result of gains on sale of both land and vehicle assets.

Report prepared by: Alicia Scallion

Digitally signed by Alicia Scallion
Date: 2021.09.17 13:17:23 -03'00'

Alicia Scallion, CPA, CA,
Manager, Accounting, (902) 497-9785

# ITEM # 4.2

**Halifax Water Board**

**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Digitally signed by Louis de Montbrun Date: 2021.09.15 14:44:57 -03'00'

Louis de Montbrun, Director of Corporate Services/CFO

**APPROVED:** Digitally signed by Cathie O'Toole Date: 2021.09.15 14:31:31 -03'00'

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

**DATE:** September 10, 2021

**SUBJECT:** **Update Signing Authority Guideline and Financial Approvals List**

## ORIGIN

Regular review and update of the Signing Authority Guideline and the Financial Approval Limits.

The Halifax Water Audit and Finance Committee met on September 2, 2021 and has reviewed and approved the following motion:

The Audit and Finance Committee recommend that the Halifax Water Board approve:

1. The Signing Authority Guideline as shown in Attachment A.
2. The Financial Approval List as shown in Attachment B.

## RECOMMENDATION

It is recommended that the Halifax Water Board approve:

1. The Signing Authority Guideline as shown in Attachment A.
2. The Financial Approval List as shown in Attachment B.

## BACKGROUND

Periodically Halifax Water reviews governance and internal controls to ensure the organization is keeping up to date with best practices and updating key policies to reflect any organizational changes.

The Signing Authority Guideline and Financial Approval List applies to both rate regulated and unregulated transactions.

## DISCUSSION

The Halifax Water Board has the ultimate responsibility for the good governance and management of the organization. It is the Board's fiduciary responsibility to ensure that the resources of the organization are well managed by implementing necessary checks and balances.

In September 2019, the Board approved the Governance Manual, which reflects how authority is delegated to the General Manager and outlines how the organization is governed. In November 2019, the Board approved the Signing Authority Guideline and a Financial Approvals List.

Updating the Signing Authority Guideline and the Financial Approval List, as noted in Attachment A and Attachment B will strengthen Halifax Water's internal control environment, assist with risk management, provide clarity for staff, and increase efficiency.

In summary:

The Signing Authority Guideline has been updated to include the General Counsel and Senior Managers as Level 3 and to adjust the approval levels for various transactions to improve operational efficiencies.

The Financial Approval List has been updated to reflect the recent organizational restructuring and to increase the financial approval amount for the General Counsel and the Senior Managers.

A redline version of the Guideline and Financial Approvals List is provided for reference purposes in Attachment A and Attachment B.

## BUDGET IMPLICATIONS

There are no human resource or budget implications associated directly with this report. The recommended updates to the Guideline and Financial Approvals List are sufficient to ensure adequate internal control and meet operational requirements.

Any changes in transactions that various positions within the organization can authorize do not impact job title, job description, job rating or compensation.

## ALTERNATIVES

The Halifax Water Board could choose to recommend alternate amendments to the Guideline and Financial Approvals List.

## ATTACHMENTS

Attachment A - Signing Authority Guideline
Attachment B - Financial Approvals List

Report Prepared by: Digitally signed by Louis de Montbrun Date: 2021.09.15 15:01:34 -03'00'

Louis de Montbrun
Director of Corporate Services/CFO (902) 490-3685

Financial Reviewed by: Digitally signed by Louis de Montbrun Date: 2021.09.15 15:01:46 -03'00'

Louis de Montbrun
Director of Corporate Services/CFO (902) 490-3685

**Original Approved by the Halifax Water Board November 28, 2019**

**Revised presented to Audit and Finance Committee on September 2, 2021**

# SIGNING AUTHORITY GUIDELINE

## Purpose and Scope

In October 2020, Halifax Water Board updated the Governance Manual to provide direction and clarity on the roles and responsibilities of the Board and staff to reflect current practices. This Signing Authority Guideline builds on that direction and clarity and ensures the efficient operation of Halifax Water by identifying appropriate delegation of authority required for various transactions and activities.

## Guideline Statement

Accountability for the management of the property, assets, financial and human resources of Halifax Water rests with the General Manager and the Board. This Guideline aids in administering this accountability, safeguarding utility resources by establishing and maintaining sound business controls for contractual commitments, management of risk and proper use of resources. This Guideline identifies signature authority delegations for various Halifax Water transactions, approvals and other decisions.

## Levels of Signature Authority

Signature Authority levels are as follows:

Level 1: Board Chair, Board Vice-Chair
Level 2: General Manager, Corporate Treasurer
Level 3: Directors, General Counsel, Senior Managers
Level 4: Superintendents, Managers, Operation Engineers
Level 5: Supervisors, Intermediate Engineers
Level 6: Technical Staff, Junior Engineers

Staff cannot delegate an authority under this Guideline to a lower level authority. Any delegation as 'acting' status includes the signature authority delegations in this Guideline.

For transactions not specifically listed in the Signing Authority Guideline, please seek advice from the General Manager, Corporate Secretary or Treasurer.

The following table provides a detailed listing of applicable transactions and the required signing authority levels.

**Accounting & Finance**

| | |
|---|---|
| Budget transfer request | Level 4 |
| Delegation authority request | Level 4 |
| Establish petty cash fund | Level 4 |
| Establish account or program | Level 4 |
| Financial information provided to actuaries | Level 3 |
| Correspondence with CRA | Level 2 |
| Financial statements | Level 2 |
| Management representation letter | Level 2 |
| Financial review of board reports | Level 3 |
| Correspondence regarding pension | Level 3 |
| Pension annual information return | Level 2 |
| Journal entries | Level 4 |
| Confirmation letter | Level 4 |
| Annual indexation for pensioners | Level 2 |
| SAP – new cost centres or general ledger accounts | Level 4 |
| SAP – FI/CO/AA modules | Level 4 |
| SAP – creation of new orders | Level 4 |
| SAP – MM module | Level 4 |
| Purchase card administration | Level 5 |
| Lead service rebate | Level 4 |
| Wastewater rebate | Level 4 |
| Lateral loan program | Level 4 |
| Capital cost contribution invoicing / refund | Level 4 |
| Regional development charge invoicing / refund | Level 4 |

**Contracts, Agreements and Legal Submissions**

| | |
|---|---|
| Agreement/Contract/MOU => $5,000,000 | Level 1 |
| Agreement/Contract/MOU => $250,000 and < $5M | Level 2 |
| Agreement/Contract/MOU < $250,000 | Level 3 |
| MOU – non-monetary | Level 3 |
| Collective agreement | Level 2 |
| Employment contract | Level 3 |
| Banking contract | Level 2 |
| Debenture agreement | Level 2 |
| MOU and LOU's with union | Level 3 |
| Water systems agreement | Level 2 |
| Submission to Municipal Auditor General (not including staff responses to specific requests for information) | Level 2 |
| Submission to WCB | Level 2 |
| Application (initiating proceedings) to NSUARB | Level 2 |

| | |
|---|---|
| IRs to NSUARB | Level 3 |
| Appeal to NSUARB | Level 3 |
| Easement agreement | Level 2 |
| Temporary access agreement | Level 2 |
| Lease | Level 2 |
| Non-disclosure agreement | Level 3 |
| Lien | Level 2 |
| Data licensing contract | Level 3 |

**Customer Service and Billing**

| | |
|---|---|
| Water shut off – regulatory non-compliance | Level 4 |
| Water shut off – collection | Level 4 |
| Non-payment letter | Level 4 |
| Acceptance of payment arrangement | Level 4 |
| Stormwater exemption | Level 4 |
| SAP – changes to billing | Level 4 |
| Adjustment to customer account | Level 4 |

**Human Resources**

| | |
|---|---|
| In-range progression | Level 2 |
| Appointment letter | Level 3 |
| Professional development plan | Level 5 |
| Position description | Level 2 |
| Confirmation of employment letter | Level 6 |
| LTD benefit application | Level 4 |
| Life insurance claim application | Level 4 |
| Annual adjustments to non-union compensation | Level 2 |
| Payroll approval | Level 4 |
| Discipline letter - warning | Level 4 |
| Discipline letter - suspension | Level 3 |
| Discipline letter - termination | Level 2 |
| VIP – payroll changes | Level 4 |
| Return to work accommodation | Level 4 |

**Procurement**

| | |
|---|---|
| Pre-tender review approval letter | Level 5 |
| Tender document | Level 4 |
| Request for proposal | Level 3 |
| RFP / Tender evaluation | Level 4 |
| Technical study / report (from consultant) | Level 3 |
| Award letter | Level 5 |
| Alternative purchase arrangement | Level 2 |

**Regulatory**

| | |
|---|---|
| Compliance agreement | Level 3 |
| Enforcement action | Level 3 |
| Corrective action agreement | Level 4 |
| Corrective action required | Level 5 |
| Temporary discharge agreement | Level 5 |
| Requests for customer action / information | Level 6 |
| Distribution of educational material / notice | Level 6 |
| Service connection inspection | Level 6 |
| Subdivision approval letter – concept | Level 4 |
| Subdivision approval letter – preliminary | Level 4 |
| Subdivision approval letter – final | Level 4 |
| Building permit approval letter | Level 5 |
| New service application approval letter | Level 5 |
| Demolition or development permit approval letter | Level 5 |
| Planning application letter | Level 5 |
| Domestic meter and BFP approval letter | Level 5 |
| Sprinkler and BFP approval letter | Level 5 |
| Change in meter size approval | Level 6 |
| Temporary meter approval | Level 6 |
| Clearance letter | Level 6 |
| Inter-office memo infrastructure acceptance | Level 6 |
| Infrastructure acceptance | Level 4 |
| Design and construction specification variance | Level 4 |
| BFP testers list | Level 5 |
| Drainage complaint letter | Level 4 |

**Stormwater / Water/ Wastewater Operations**

| | |
|---|---|
| Locate certification | Level 6 |
| Repair letter to customer | Level 4 |
| Planned service interruption letter to customer | Level 4 |

**Travel and Expenses - Executive Level**

| | |
|---|---|
| Travel for GM | Level 1 |
| Travel for directors | Level 2 |
| Travel claims/reimbursement for GM | Level 1 |
| Travel claims/reimbursements for directors | Level 2 |

# Halifax Water – Financial Approval List

*(Amounts shown on a before-tax basis)*

ATTACHMENT B

**Issue Date: August 2021**

| GENERAL MANAGER'S OFFICE | CORPORATE SERVICES | ENGINEERING & TECHNOLOGY SERVICES | REGULATORY SERVICES | OPERATIONS |
|---|---|---|---|---|

## Approvals - OVER $75,000

**** Requires any *two* signatures**

- **GM, Directors and General Counsel for any expenditure**
- **Senior Managers only for Operations' expenditures**

## Approvals – Up to $75,000

| | | | | |
|---|---|---|---|---|
| General Manager | | | | |
| General Counsel | Director, Corporate Services/CFO | Director, Engineering and Technology Services | Director, Regulatory Services | Director, Operations |
| | | | | Senior Manager:<br>• Water Services<br>• Wastewater/Stormwater Collection |

## Approvals – Up to $25,000

| | | | | |
|---|---|---|---|---|
| Manager:<br>• Human Resources<br>• Enterprise Risk Management | Manager:<br>• Accounting<br>• Customer Care<br>• Finance<br>• Metering & Billing<br>• Procurement | Manager:<br>• Asset Management<br>• Engineering Information<br>• Information Services<br>• Infrastructure Program<br>• Energy & WW Treatment Infrastructure Engineering<br>• Stormwater Infrastructure Engineering<br>• Water Infrastructure Engineering | Manager:<br>• Engineering Approvals<br>• Environmental Engineering<br>• Safety & Security | Manager:<br>• Water Quality<br>• Watershed<br>• Wastewater Infrastructure Engineering |
| | | | Development Engineer | Operations Engineer |
| | | | Environmental Engineer:<br>• I & I<br>• P2 | Senior Supervisor<br>Halifax WWTP |
| | | Infrastructure Engineer | Infrastructure Engineer | Supervisor<br>• Plant<br>• Fleet Maintenance & Bldg.<br>• WPCP<br>WWTP |
| | | Project Engineer | Project Manager:<br>• Engineering Approvals | |
| | | Intermediate Project Engineer | Stormwater Engineer | Superintendent:<br>• Regional Operations<br>• Technical Services<br>• Water Supply Plant<br>• HHSP<br>• Regional Treatment Facilities |
| | | WWTF Project Engineer | | |
| | | Project Manager:<br>• Asset Management<br>• Design & Construction | | |
| | | Senior Project Manager | | Coordinator<br>• Biosolids Aerotech |
| | | Water Infrastructure Project Engineer | | |
| | | WW SW Infrastructure | | |

ATLANTIC CANADA'S TOP EMPLOYERS 2021
2021 Nova Scotia's Top Employers
STRAIGHT from the SOURCE

# Halifax Water – Financial Approval List

*(Amounts shown on a before-tax basis)*

**Issue Date: August 2021**

| GENERAL MANAGER'S OFFICE | CORPORATE SERVICES | ENGINEERING & TECHNOLOGY SERVICES | REGULATORY SERVICES | OPERATIONS |
|---|---|---|---|---|

## Approvals – Up to $10,000

| | | | | |
|---|---|---|---|---|
| Manager:<br>• Communications & Public Relations | Supervisor<br>• Billing | Asset Management Program Coordinator | Environmental Coordinator | Supervisor:<br>• Electrical & Instrumentation<br>• SCADA & ICS Security<br>• SCADA & Process Control<br>• Water Quality Program<br>• Collection System Operations<br>• Construction Collection<br>• Pumping Station Collection |
| | | Business Solutions Coordinator | Coordinator<br>• Regulatory Compliance<br>• Inspections | |
| | | GIS Updating Coordinator | | |
| | | Information Services Project Manager | | |
| | | Technical Coordinator<br>• GIS<br>• Information Services | | Works Supervisor |
| | | Senior Business Analyst | | |

## Approvals – Up to $5,000

| | | | | |
|---|---|---|---|---|
| Admin. Assistant II | Supervisor:<br>• Customer Administration<br>• Customer Service Quality<br>• Metering | Engineering Approvals Technologist | | Industrial Electrician |
| Compensation & Benefits Specialist | | | | Lead Operator:<br>• Small Systems<br>• Water Supply Plant |
| Human Resource Consultant | | | | Apprentice:<br>• Collection System Operations |

## Approvals – Up to $2,500

| | | | | |
|---|---|---|---|---|
| Communications Associate | Admin. Assistant I | Admin. Assistant I | Admin. Assistant I * | Admin. Assistant I |
| Admin. Assistant I | Billing Coordinator-Data Processing Clerk | Office Assistant I | Office Assistant II | Office Assistant II |
| Record Analyst – Office Assistant | Office Assistant II | Office Assistant II | | Operations Support |
| | Procurement Assistant | | | Sub Foreman<br>• Construction Collection<br>• Pumping Station Collection |
| | | | | Works Advisor |
| | | | | Process Technician |

ATLANTIC 2021
2021 Nova Scotia's Top Employers
STRAIGHT from the SOURCE

# ITEM # 4.3
**Halifax Water Board**

**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Louis de Montbrun
Digitally signed by Louis de Montbrun
Date: 2021.09.15 14:39:11 -03'00'

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

**APPROVED:** Cathie Goole
Digitally signed by Cathie O'Toole
Date: 2021.09.15 14:30:46 -03'00'

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

**DATE:** September 10, 2021

**SUBJECT:** **Audit Services Request for Proposal Results**

## ORIGIN

The term with Grant Thornton LLP to provide audit services for the Halifax Water ends on December 31, 2021. With the completion of the audit of the corporate financial statements for the fiscal year ended March 31, 2021, and the completion of the audit of the pension plan financial statements for the year ended December 31, 2020, Halifax Water have initiated a procurement process for audit services.

## RECOMMENDATION

It is recommended the Halifax Water Board award the contract for audit services for the Halifax Water financial statements and the Halifax Water Employees' Pension Plan financial statements to Grant Thornton LLP for a term of five years.

It is recommended the Halifax Water Board approve the appointment of Grant Thornton LLP as auditors for the Halifax Water financial statements for the year ended March 31, 2022 and the Halifax Water Employees' Pension Plan for the year ended December 31, 2021.

## BACKGROUND

Halifax Water is required to procure audit services every five years and the contract with the existing auditors is ending on December 31, 2021.

## DISCUSSION

A request for proposal (RFP) for external audit services was issued on May 12, 2021 with a closing date of June 2, 2021. There were two submissions, one from the existing auditor, Grant Thornton LLP, and one from KPMG LLP.

The RFP stipulated that a minimum score of 75 of 100 points was required on the technical proposal before a proponent could be evaluated on their financial proposal. The proponent with the lowest cost in their financial proposal would then be awarded the contract. An evaluating committee, made up of Alicia Scallion, Manager of Accounting, Allan Campbell, Manager of Finance, and Louis de Montbrun, Director of Corporate Services/CFO reviewed the technical proposals of the proponents, both of whom achieved the required minimum score. The financial proposals from both proponents were opened.

The results of the financial proposal are below. In addition, the actual costs for the final year are included for informational purposes.

| Financial Proposal - Audit Services | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Halifax Water financial statements** | **Current fee** | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | Total Financial Proposal |
| Grant Thornton | **$ 51,327** | $ 45,000 | $ 45,000 | $ 46,000 | $ 47,000 | $ 48,000 | $ 231,000 |
| KPMG | **n/a** | $ 80,000 | $ 81,600 | $ 83,230 | $ 84,890 | $ 86,590 | $ 416,310 |
| | | | | | | | |
| **Pension Plan** | **Current fee** | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | Total Financial Proposal |
| Grant Thornton | $ 8,058 | $ 8,000 | $ 8,000 | $ 8,200 | $ 8,400 | $ 8,600 | $ 41,200 |
| KPMG | **n/a** | $ 14,000 | $ 14,280 | $ 14,570 | $ 14,860 | $ 15,160 | $ 72,870 |
| | | | | | | | |
| **Administration Fee** | **Current fee** | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | Total Financial Proposal |
| Grant Thornton | **$ 1,026** | $ - | $ - | $ - | $ - | $ - | $ - |
| KPMG | **n/a** | $ 6,580 | $ 6,712 | $ 6,846 | $ 6,982 | $ 7,123 | $ 34,243 |

Based on the criteria set forth in the RFP, it is recommended that Grant Thornton LLP be awarded the contract and appointed as auditors for the Halifax Water financial statements for the year ended March 31, 2022 and the Halifax Water Employees' Pension Plan for the year ended December 31, 2021.

Report prepared by: Alicia Scallion

Digitally signed by Alicia Scallion
Date: 2021.09.16 07:57:39 -03'00'

Alicia Scallion, CPA, CA, Manager, Accounting, (902) 497-9785

# ITEM # 5.1
**Halifax Water Board**

**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Reid Campbell Digitally signed by Reid Campbell Date: 2021.09.16 16:20:57 -03'00'

Reid Campbell, M.Eng., P.Eng.
Director, Engineering and Technology Services

Digitally signed by Louis de Montbrun Date: 2021.09.16 13:53:18 -03'00'

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

**APPROVED:** Digitally signed by Cathie O'Toole Date: 2021.09.16 13:41:13 -03'00'

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

**DATE:** September 16, 2021

**SUBJECT:** Capital expenditures for the five months ended August 31, 2021

## ORIGIN

Capital expenditure reporting.

## BACKGROUND

The Halifax Regional Water Commission (Halifax Water) Board is required to review periodic financial information throughout the year.

## DISCUSSION

The Engineering and Technology Services department will be updating forecasted capital expenditures to the end of the 2021/22 fiscal year based on actual expenditures year to date and knowledge of project timelines and contract pricing. Below is the breakdown by asset class and project status of the expenditures for the five (5) months ending August 31, 2021.

## Capital Expenditure Report

| Budget Category | Total Budget Available | Expenditures to March 31, 2021 | Expenditures April 1, 2021 to August 31, 2021 | Total Expenditures to August 31, 2021 | Remaining Budget Available as of August 31, 2021 | Total Expenditures to August 31, 2021 as a Percentage of Total Budget Available |
|---|---|---|---|---|---|---|
| **Active** | | | | | | |
| Water | $ 90,315,726 | $ 14,149,263 | $ 8,215,552 | $ 22,364,815 | $ 67,950,911 | 24.8% |
| Wastewater | 104,030,866 | 15,362,507 | 5,777,077 | 21,139,584 | 82,891,282 | 20.3% |
| Stormwater | 16,330,015 | 1,272,710 | 1,287,901 | 2,560,611 | 13,769,404 | 15.7% |
| | **210,676,607** | **30,784,480** | **15,280,530** | **46,065,010** | **164,611,597** | 21.9% |
| **Pending** | | | | | | |
| Water | 20,959,440 | 28,057 | 169 | 28,226 | 20,931,214 | 0.1% |
| Wastewater | 29,158,000 | - | - | - | 29,158,000 | 0.0% |
| Stormwater | 784,238 | (227) | - | (227) | 784,465 | 0.0% |
| | **50,901,678** | **27,830** | **169** | **27,999** | **50,873,679** | 0.1% |
| | **$ 261,578,285** | **$ 30,812,310** | **$ 15,280,699** | **$ 46,093,009** | **$ 215,485,276** | 17.6% |

The Total Budget Available of $261.6 million represents total approved budgets for pending and active projects as at the end of August 31, 2021.

Total Expenditures to August 31, 2021 of $46.1 million include expenditures of $30.8 million incurred prior to April 1, 2021 and expenditures of $15.3 million in the current fiscal year. This results in a Remaining Budget Available as of August 31, 2021 of $215.5 million.

Project Managers are currently working on updating forecasted total expenditures to the end of the 2021/22 fiscal year and to the end of each project.

In the Pending project category, there is $28.4 million that have been deferred or cancelled. For projects that are deferred or cancelled, there will be funding available that could be reallocated to existing projects, if required, or used to fund future capital budgets. A strategy is currently being developed to reallocate this funding.

As projects are completed, they will be moved to the closed category. No projects have yet been closed in this fiscal year, most are closed in the last quarter of the fiscal year.

## ATTACHMENT

Project details by category and status

Report prepared by: Alicia Scallion

Digitally signed by Alicia Scallion
Date: 2021.09.16 15:49:38 -03'00'

Alicia Scallion, CPA, CA, Manager, Accounting, (902)-497-9785

**Capital Expenditure Report**
**For the Period Ending August 31/21**

| Status | Service | Asset Category | Total Budget Available | Expenditures to March 31, 2021 | Expenditures April 1, 2021 to August 31, 2021 | Total Expenditures to August 31, 2021 | Remaining Budget Available as of August 31, 2021 |
|---|---|---|---|---|---|---|---|
| Active | W | Water - Land | 315,000 | 44,449 | - | 44,449 | 270,551 |
| | | Water - Transmission | 6,087,468 | 847,267 | 217,510 | 1,064,777 | 5,022,691 |
| | | Water - Distribution | 8,504,080 | 147,152 | 1,327,360 | 1,474,512 | 7,029,568 |
| | | Water - Energy | 200,000 | - | - | - | 200,000 |
| | | Water - Structures | 15,585,000 | 4,581,181 | 1,799,067 | 6,380,248 | 9,204,752 |
| | | Water - Treatment Facilities | 9,439,000 | 167,820 | 403,974 | 571,794 | 8,867,206 |
| | | Water - Security | 50,000 | 14,010 | 40,367 | 54,377 | (4,377) |
| | | Water - Equipment | 13,053,000 | 1,676,444 | 949,669 | 2,626,113 | 10,426,887 |
| | | Water - Corporate Projects | 37,082,178 | 6,670,940 | 3,477,605 | 10,148,545 | 26,933,633 |
| | **W Total** | | **90,315,726** | **14,149,263** | **8,215,552** | **22,364,815** | **67,950,911** |
| | WW | Wastewater - Trunk Sewers | 17,725,000 | 19,021 | 14,326 | 33,347 | 17,691,653 |
| | | Wastewater - Collection System | 42,000,337 | 9,706,057 | 1,697,578 | 11,403,635 | 30,596,702 |
| | | Wastewater - Forcemains | 3,110,000 | 94,869 | 65,340 | 160,209 | 2,949,791 |
| | | Wastewater - Structures | 14,829,527 | 3,017,140 | 1,167,271 | 4,184,411 | 10,645,116 |
| | | Wastewater - Treatment Facility | 16,492,774 | 2,178,096 | 1,780,644 | 3,958,740 | 12,534,034 |
| | | Wastewater - Energy | 739,000 | 56,265 | 521 | 56,786 | 682,214 |
| | | Wastewater - Security | 200,000 | 902 | 60,422 | 61,324 | 138,676 |
| | | Wastewater - Equipment | 460,000 | 49,397 | 11,437 | 60,834 | 399,166 |
| | | Wastewater - Corporate Projects | 8,429,228 | 202,972 | 979,538 | 1,182,510 | 7,246,718 |
| | | Wastewater - Unregulated | 45,000 | 37,788 | - | 37,788 | 7,212 |
| | **WW Total** | | **104,030,866** | **15,362,507** | **5,777,077** | **21,139,584** | **82,891,282** |
| | SW | Stormwater - Pipes | 4,989,000 | 204,807 | 175,774 | 380,581 | 4,608,419 |
| | | Stormwater - Culverts/Ditches | 4,687,000 | 644,470 | 714,164 | 1,358,634 | 3,328,366 |
| | | Stormwater - Structures | 6,593,000 | 73,821 | 335,656 | 409,477 | 6,183,523 |
| | | Stormwater - Corporate Projects | 61,015 | 349,612 | 62,307 | 411,919 | (350,904) |
| | **SW Total** | | **16,330,015** | **1,272,710** | **1,287,901** | **2,560,611** | **13,769,404** |
| **Active Total** | | | **210,676,607** | **30,784,480** | **15,280,530** | **46,065,010** | **164,611,597** |
| Pending | W | Water - Land | 580,000 | - | - | - | 580,000 |
| | | Water - Transmission | 3,912,400 | - | - | - | 3,912,400 |
| | | Water - Distribution | 902,000 | 169 | 169 | 338 | 901,662 |
| | | Water - Energy | 455,000 | - | - | - | 455,000 |
| | | Water - Structures | 2,300,000 | - | - | - | 2,300,000 |
| | | Water - Treatment Facilities | 8,244,000 | - | - | - | 8,244,000 |
| | | Water - Corporate Projects | 4,566,040 | 27,888 | - | 27,888 | 4,538,152 |
| | **W Total** | | **20,959,440** | **28,057** | **169** | **28,226** | **20,931,214** |
| | WW | Wastewater - Collection System | 7,531,000 | - | - | - | 7,531,000 |
| | | Wastewater - Forcemains | 60,000 | - | - | - | 60,000 |
| | | Wastewater - Structures | 10,674,000 | - | - | - | 10,674,000 |
| | | Wastewater - Treatment Facility | 8,975,500 | - | - | - | 8,975,500 |
| | | Wastewater - Energy | 1,662,500 | - | - | - | 1,662,500 |
| | | Wastewater - Security | 100,000 | - | - | - | 100,000 |
| | | Wastewater - Equipment | 150,000 | - | - | - | 150,000 |
| | | Wastewater - Corporate Projects | 5,000 | - | - | - | 5,000 |
| | **WW Total** | | **29,158,000** | **-** | **-** | **-** | **29,158,000** |
| | SW | Stormwater - Pipes | 381,238 | (227) | - | (227) | 381,465 |
| | | Stormwater - Culverts/Ditches | 280,000 | - | - | - | 280,000 |
| | | Stormwater - Structures | 93,000 | - | - | - | 93,000 |
| | | Stormwater - Corporate Projects | 30,000 | - | - | - | 30,000 |
| | **SW Total** | | **784,238** | **(227)** | **-** | **(227)** | **784,465** |
| **Pending Total** | | | **50,901,678** | **27,830** | **169** | **27,999** | **50,873,679** |
| **Grand Total** | | | **261,578,285** | **30,812,310** | **15,280,699** | **46,093,009** | **215,485,276** |

Halifax Water
Halifax Regional Water Commission

# ITEM #5.2
**Halifax Water Board**
**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Reid Campbell
Digitally signed by Reid Campbell
Date: 2021.09.16 16:31:45 -03'00'

Reid Campbell, P. Eng.
Director, Engineering & Technology Services

**APPROVED:** Cathie O'Toole
Digitally signed by Cathie O'Toole
Date: 2021.09.16 14:39:10 -03'00'

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

**DATE:** September 7, 2021

**SUBJECT:** **Green Choice Program Enrollment**

## ORIGIN

Halifax Water's Mission and Vision highlight the commitment to the stewardship of the environment.

## RECOMMENDATION

It is recommended that the Halifax Water Board:

1. Approve the development and submission of an Expression of Interest (EOI) to procure up to 120% of Halifax Water's corporate electricity need through the Green Choice Program and to pay the non-refundable application fee to apply for enrollment in the Green Choice Program;
2. Confirm desire to enroll if selected by the Minister of Energy and Mines and negotiate Subscriber Agreement details as renewable energy Request for Proposals are reviewed; and
3. Direct staff to return to the Halifax Water Board with the finalized Subscriber Agreement, recommended subscription level and term length, and financial risk considerations for approval.

## BACKGROUND

The federal government has committed to purchasing 100% of electricity used in federal buildings across Canada from renewable sources by 2022. This renewable energy will be purchased from large scale wind and solar developments across the country. In October 2019, the Province of Nova Scotia passed the Sustainable Development Goals Act, legislating provincial emission reduction targets of 53% below 2005 levels by 2030, and net zero emissions by 2050. In February 2021, the Province announced that 80% of electricity consumption within the province would come from renewable sources by 2030. To achieve these targets, the Province of Nova Scotia passed legislation to amend the Electricity Act. The amendment and accompanying regulations have created the Green Choice Program which gives large electricity consumers the ability to purchase clean electricity from new, local, renewable energy projects. In June 2020, HRM approved the Municipality's long-term climate action plan, HalifACT[1], which outlines a suite of actions that are necessary to achieve a low carbon future. One of these actions is showing municipal leadership by achieving net-zero municipal operations by 2030. To assist in achieving this target, Halifax Water considered participation in the Green Choice Program.

## DISCUSSION

### The Green Choice Program

The Green Choice Program (GCP) will offer large electricity consumers (in excess of 10,000 megawatt-hours annually) the option of enrolling up to 120% of their annual electricity load through subscriptions to new, local renewable sources. Subscriptions of up to 120% of current energy load will allow subscribers to allow for potential growth in energy use during the GCP contract period. As shown in Figure 1[2], customers will purchase this renewable energy via a Green Tariff, which is made up of a Power Purchase Agreement (PPA) price plus an integration charge. The green tariff would appear as a separate line item on the customer's electricity bill. The PPA price will be negotiated separately with renewable energy developers who will construct and connect new renewable energy generation capacity to the grid to cover the subscribed capacity.

[1] HalifACT – Acting on Climate Together, Halifax Regional Council Package
https://www.halifax.ca/sites/default/files/documents/city-hall/regional-council/200623rc916.pdf
[2] NS Dept. of Energy & Mines + CustomerFirst Renewables, Subscriber Briefing Webinar, March 26, 2021,
https://novascotiagcp.com/for-buyers

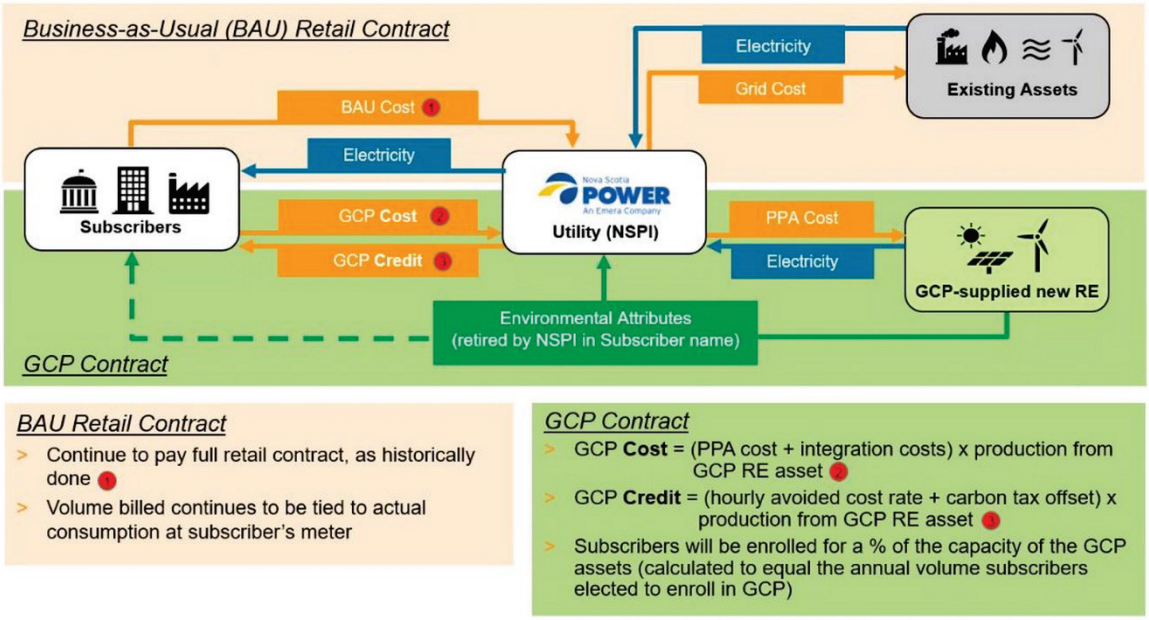



*Figure 1 – Green Choice Program Structure*

The PPA price will be determined by a Procurement Administrator through a competitive Request for Proposal (RFP) process that will see the development of new renewable energy generation assets. The RFP will be led by CustomerFirst Renewables (CFR), an energy advisor based in Maryland that has more than a decade of experience conducting renewable energy procurements for institutional and corporate users. The procurement process will follow similar best practices used in other recent procurements in Canada, which have resulted in record low pricing.[3] If these results are similar, the final Green Tariff is expected to be competitive with current electricity tariffs being paid by the customer. CFR has indicated their experience has shown this to be the case and may even save customers costs on their energy bills. A conceptual sample of a GCP bill breakdown is shown in Figure 2[4].

[3] "Renewable Electricity Program" Alberta https://www.alberta.ca/renewable-electricity-program.aspx
[4] NS Dept. of Energy & Mines + CustomerFirst Renewables, Subscriber Briefing Webinar, March 26, 2021, https://novascotiagcp.com/for-buyers

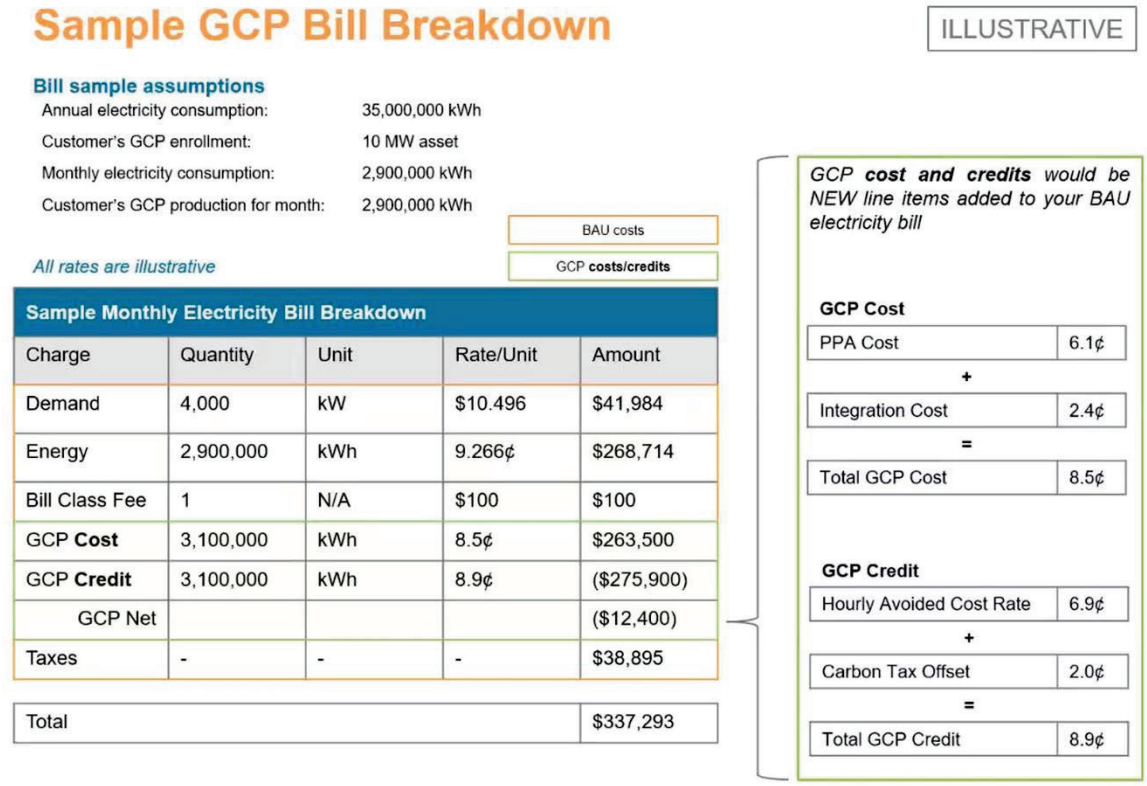



*Figure 2 - Sample NSPI/GCP Bill Breakdown*

The Province launched the GCP in February 2021, and in March issued a voluntary survey to be completed by qualified customers potentially interested in subscribing to the Green Choice Program. The intent of the survey was to help the Department of Energy and Mines and CFR better understand customer interests, potential energy load, and motivation for participation. Halifax Water completed this survey and has subsequently participated in a number of on-line briefings for interested subscribers.

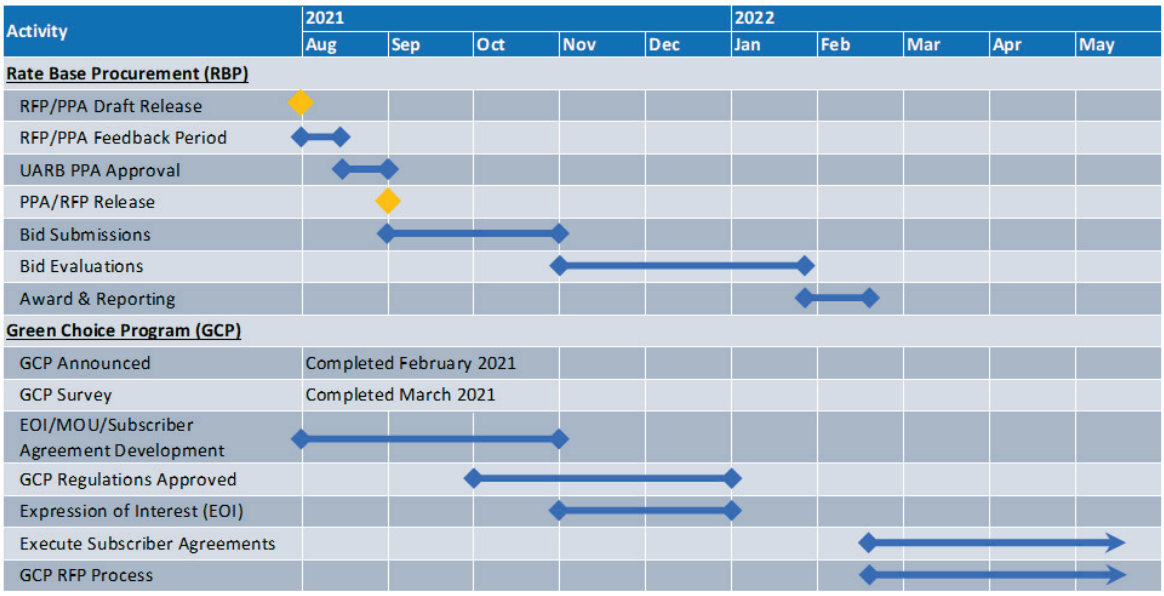
In parallel with the GCP, a Rate Base Procurement (RBP) process for new renewable energy generation supply was launched in July 2021, and a draft Request for Proposal (RFP) for the RBP was issued in August 2021 via the Nova Scotia Rate Base Procurement website[5]. The RBP RFP will be used to collect, evaluate and award 350 MW of new electrical energy generation from renewable sources. The RBP process will be completed first and will impact the overall timeline for the GCP.

The approximate timelines for both the RBP and GCP processes are shown in Figure 3[6].

[5] Nova Scotia Rate Base Procurement Website, https://novascotiarbp.com/rfp
[6] Adapted from NS Dept. of Energy & Mines + CustomerFirst Renewables, RBP Announcement + GCP Updates, July 22, 2021, https://novascotiagcp.com/updates

## Rate Base Procurement (RBP) + Green Choice Program (GCP) Timelines

NON-BINDING




| Program | Activity | Details |
|---|---|---|
| **Rate Base Procurement (RBP)** | **PPA** | > **Release draft** to website via email *(late July)*<br>> Open two-week **feedback window** *(August)*<br>> Submit for **UARB Approval** *(late August)*<br>> **Release PPA to website** *(late August)* |
| | **RFP Release** | > **Release draft** to website and via email *(early August)*<br>> Open two-week **feedback window** *(August)*<br>> **Release RFP to website** (late August) |
| | **RFP Bid Evaluation** | > Suppliers **submit Proposals** *(late October)*<br>> **Select Shortlist Portfolio/Request BAFO** *(December)*<br>> **BAFO Proposal Evaluation** *(January '22)* |
| | **RFP Award and Reporting** | > **Notify RFP awardee(s)** *(February '22)*<br>> **Execute PPA(s)** *(February '22)* |
| **Green Choice Program (GCP)** | **EOI** | > EOI/MOU/Subscriber Agreement Development *(early October)*<br>> **EOI Released** *(mid-October)*<br>> **Open** EOI submission window *(early November)*<br>> **Close** EOI submission window *(mid-December)*<br>> **Execute Subscriber Agreements** *(after RBP RFP award)* |
| | **RFP** | > After RBP RFP award *(Q2-Q3 2022)* |

Please note timing indicated is non-binding and subject to change

*Figure 3 - Rate Base Procurement (RBP) + Green Choice Program (GCP) Timelines*

In November 2021, an EOI will be issued to potential subscribers requesting the total energy load to be purchased, the electricity meter locations and a non-refundable application fee of $500.00. The deadline for EOI submissions is anticipated to be mid-December. Upon review by the Minister of Energy and Mines, enrollment in the GCP will be determined and written approval will be issued to each successful subscriber. Successful subscribers will confirm their desire to be enrolled in the program and based on the final total load, CFR will issue the GCP RFP for further renewable energy development, and the GCP PPA's, sometime after the RBP RFP process in Q2 - Q3 2022.

The EOI submissions will be considered, and approved subscribers will be re-engaged to execute a Subscriber Agreement with Nova Scotia Power Inc. (NSPI). The final Subscriber Agreements are expected to be ready for execution sometime in Q2-Q3 2022, after the

GCP RFP process has been completed. The GCP RFP is expected to be awarded in Q2 - Q3 2022, at which point the finalized, 25-year PPA will be executed between the utility and successful proponent(s). The GCP PPA, integration charges and Subscriber Agreement will ultimately be approved by the Nova Scotia Utility and Review Board to ensure minimal impact on the non-participating rate payer. The renewable energy plants are expected to be in operation no later than 2025.

Details of the Subscriber Agreement will be determined as bids are received; however, it is understood that customers will have the option of selecting a term length between 5 and 25 years. The Green Tariff will remain unchanged for the duration of the selected term, with longer terms offering a more attractive tariff. Customers who sign a Subscriber Agreement will have the option of ending the agreement at any time after paying a termination fee that has yet to be determined. If after executing an agreement the customer sees a significant reduction in energy demand, partial termination penalties may be enforced.

All details related to the RBP RFP and GCP processes are subject to the results of the 2021 Provincial and Federal elections, and to Provincial Cabinet and NSUARB approvals.

## CORPORATE POTENTIAL AND RISK

The latest (2020) Halifax Water energy use analysis found that a total of approx. 55.5 gigawatt-hours of electrical energy was consumed by utility-owned facilities. It is recommended that an EOI be submitted to procure the maximum allowable under the GCP to ensure all electricity consumed in our facilities is 100% renewable. This purchase would effectively reduce Halifax Water's annual indirect emission levels by 88%[7]. It should also be noted that up to 120% of Halifax Water's current electrical energy use can be subscribed, allowing for anticipated growth in energy use during the GCP contract period.

Participating in the GCP will not negate the need to continue to search for and implement energy efficiency or renewable energy projects, as we still have the responsibility to show environmental leadership as per our mission and vision, and to reduce operational costs through reduced energy use. While it is recommended that 120% of our eligible energy consumption be submitted for consideration, the risk for over subscribing is low even though energy efficiency improvement will continue to be found. While our total energy consumption will decrease, electricity needs will increase due to a number of factors, including increasing water and wastewater flows due to population growth, the eventual electrification of some of our utility fleet vehicles, and the transition of our larger water and wastewater facilities to more energy intensive processes to satisfy water and wastewater effluent quality/regulatory requirements. Alternatively, should our electricity consumption increase in future years, Halifax Water may have the option of increasing its purchase through possible future intakes to the GCP. The finalized Subscriber Agreement

[7] "Indirect emissions" means emissions released by NSPI as a result of electrical energy use by Halifax Water.

and recommended term length will be presented to the Halifax Water Board for consideration, however a 15-year term may be most flexible and advantageous as it would provide price stability, maximize GHG emission reduction and cost benefits, and give the utility time to plan and gain a better understanding of electricity consumption impacts of any long term changes to our facilities. A 15-year term would also be able to be extended by 5-year increments for up to an additional 10-years (i.e. up to the maximum 25-year total subscription term).

As mentioned, the Green Tariff is anticipated to remain unchanged for the duration of the selected term. This would provide Halifax Water with cost stability and security against future electricity rate increases, allowing for more stable long-term budget planning. It will also offer substantial financial benefit as the Green Tariff is expected to be competitive with a customer's current electricity costs, if not generate some level of savings. While future rate increases by NSPI are unknown, the average annual rate increase over the past 10 years for all of Halifax Water's NSPI rate classes has been 2.9%. Using this rate escalation and based on the preliminary rates provided by CFR for the GCO tariff, and assuming an 80% enrollment, Halifax Water could expect to pay less for electricity throughout the entire term of the program. Savings would then continue for the remainder of the CGP term, driven by GCP rate stability versus business-as-usual rate variability and inflation. At a 15-year GCP term, Halifax Water could see approximately $2.74 million in cumulative savings and a net present value of approximately $2.13 million. At a 25-year GCP term, Halifax Water could see approximately $4.57 million in cumulative savings and a net present value of approximately $3.08 million.

## BUDGET IMPLICATIONS

Budget implications include a non-refundable $500.00 application fee and staff time needed to gather information to complete the EOI. The application fee will be paid out of funds available from the *Energy & Wastewater Treatment Infrastructure Engineering* operating budget.

## ALTERNATIVES

Halifax Water can choose not to submit an EOI to the Green Choice Program. This is not recommended because without participation in the GCP it will be very difficult for Halifax Water to meet its commitments under HalifACT 2050, reduce GHG emissions and receive GHG credits resulting from Halifax Water's significant use of electrical energy, and fulfil Halifax Water's mission of stewardship of the environment. There is little risk with proceeding as any enrolled customer can cancel their enrollment before signing the Subscriber Agreement, losing only the application fee described above.

## ATTACHMENTS

1. GCP - Financial Analysis - 80% Enrollment
2. GCP Enrollment Form - Draft
3. GCP Stakeholder Engagement Document

Report Prepared by: Jeff Knapp Digitally signed by Jeff Knapp Date: 2021.09.16 15:17:18 -03'00'

Jeff Knapp, FEC, P.Eng., CEM, CAMP
Manager, Energy, WWTF Engineering & Business Development, 902-471-2791

Financial Reviewed by: Digitally signed by Louis de Montbrun Date: 2021.09.16 15:03:17 -03'00'

Louis de Montbrun, CPA, CA
Director, Corporate Services/CFO, 902-490-3685

Halifax Regional Water Commission
Green Choice Program - Financial Analysis - 80% Enrollment
J. Knapp
September 7, 2021

**Preliminary**

NSPI Annual Energy Escalation Rate 2.90%

| Description | | Units | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Halifax Water Energy Data** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rate 10 | NSPI Rate [1] | $/kWh | $0.1454 | $0.1460 | $0.1470 | $0.1513 | $0.1556 | $0.1602 | $0.1648 | $0.1696 | $0.1745 | $0.1796 | $0.1848 | $0.1901 | $0.1956 | $0.2013 | $0.2071 | $0.2132 | $0.2193 | $0.2257 | $0.2322 | $0.2390 | $0.2459 | $0.2530 | $0.2604 | $0.2679 | $0.2757 |
| | Energy (100%) | kWh | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 | 1,018,862 |
| | Energy (80%) | kWh | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 | 815,090 |
| Rate 11 | NSPI Rate [1] | $/kWh | $0.0900 | $0.0927 | $0.0954 | $0.0982 | $0.1010 | $0.1040 | $0.1070 | $0.1101 | $0.1133 | $0.1165 | $0.1199 | $0.1234 | $0.1270 | $0.1307 | $0.1345 | $0.1384 | $0.1424 | $0.1465 | $0.1507 | $0.1551 | $0.1596 | $0.1642 | $0.1690 | $0.1739 | $0.1790 |
| | Energy | kWh | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 | 1,895,061 |
| | Energy (80%) | kWh | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 | 1,516,049 |
| Rate 21 | NSPI Rate [1] | $/kWh | $0.0879 | $0.0904 | $0.0930 | $0.0957 | $0.0985 | $0.1013 | $0.1043 | $0.1073 | $0.1104 | $0.1136 | $0.1169 | $0.1203 | $0.1238 | $0.1274 | $0.1311 | $0.1349 | $0.1388 | $0.1428 | $0.1469 | $0.1512 | $0.1556 | $0.1601 | $0.1647 | $0.1695 | $0.1744 |
| | Energy | kWh | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 | 10,322,859 |
| | Energy (80%) | kWh | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 | 8,258,287 |
| Rate 22 | NSPI Rate [1] | $/kWh | $0.0835 | $0.0867 | $0.0900 | $0.0926 | $0.0953 | $0.0981 | $0.1009 | $0.1038 | $0.1068 | $0.1099 | $0.1131 | $0.1164 | $0.1198 | $0.1233 | $0.1268 | $0.1305 | $0.1343 | $0.1382 | $0.1422 | $0.1463 | $0.1506 | $0.1549 | $0.1594 | $0.1640 | $0.1688 |
| | Energy | kWh | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 | 41,485,596 |
| | Energy (80%) | kWh | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 | 33,188,477 |
| Total Energy (100%) | | kWh | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 | 54,722,378 |
| Total Energy (80%) | | kWh | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 | 43,777,902 |
| **Preliminary GCP Billing** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BAU | Total Cost of Energy (100%) | $ | $4,691,581 | $4,855,601 | $5,024,300 | $5,170,005 | $5,319,915 | $5,474,213 | $5,632,965 | $5,796,321 | $5,964,414 | $6,137,382 | $6,315,366 | $6,498,512 | $6,686,969 | $6,880,891 | $7,080,437 | $7,285,769 | $7,497,057 | $7,714,471 | $7,938,191 | $8,168,399 | $8,405,282 | $8,649,035 | $8,899,857 | $9,157,953 | $9,423,534 |
| | Total Cost of Energy (80%) | $ | $3,753,265 | $3,884,481 | $4,019,440 | $4,136,004 | $4,255,948 | $4,379,370 | $4,506,372 | $4,637,057 | $4,771,531 | $4,909,906 | $5,052,293 | $5,198,810 | $5,349,575 | $5,504,713 | $5,664,349 | $5,828,615 | $5,997,645 | $6,171,577 | $6,350,553 | $6,534,719 | $6,724,226 | $6,919,228 | $7,119,886 | $7,326,363 | $7,538,827 |
| | Net HST | $ | $160,865 | $166,489 | $172,273 | $177,269 | $182,410 | $187,700 | $193,143 | $198,744 | $204,508 | $210,439 | $216,541 | $222,821 | $229,283 | $235,932 | $242,774 | $249,814 | $257,059 | $264,514 | $272,185 | $280,078 | $288,200 | $296,558 | $305,158 | $314,008 | $323,114 |
| | Total | $ | $3,914,130 | $4,050,970 | $4,191,713 | $4,313,273 | $4,438,358 | $4,567,070 | $4,699,515 | $4,835,801 | $4,976,039 | $5,120,344 | $5,268,834 | $5,421,631 | $5,578,858 | $5,740,645 | $6,907,123 | $6,078,430 | $6,254,704 | $6,436,091 | $6,622,737 | $6,814,797 | $7,012,426 | $7,215,786 | $7,425,044 | $7,640,370 | $7,861,941 |
| | Avg. Weighted Rate | $/kWh | $0.08573 | $0.08873 | $0.09181 | $0.09448 | $0.09722 | $0.10004 | $0.10294 | $0.10592 | $0.10899 | $0.11215 | $0.11541 | $0.11875 | $0.12220 | $0.12574 | $0.12939 | $0.13314 | $0.13700 | $0.14097 | $0.14506 | $0.14927 | $0.15360 | $0.15805 | $0.16264 | $0.16735 | $0.17221 |
| GCP - PPA | PPA Cost | $/kWh | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 | $0.0610 |
| | Integration Cost | $/kWh | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 | $0.0240 |
| | Total GCP Cost | $/kWh | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 | $0.0850 |
| | GCP Cost for Energy | $ | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 | $3,721,122 |
| GCP - Credit | Hourly Avoided Rate Cost | $/kWh | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 | $0.0690 |
| | Carbon Tax Offset | $/kWh | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 | $0.0200 |
| | Total GCP Credit | $/kWh | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 | $0.0890 |
| | GCP Credit for Energy | $ | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 | $3,896,233 |
| Total GCP Bill (Energy only) | | $ | $3,578,153 | $3,709,369 | $3,844,328 | $3,960,892 | $4,080,836 | $4,204,259 | $4,331,260 | $4,461,945 | $4,596,420 | $4,734,794 | $4,877,181 | $5,023,698 | $5,174,463 | $5,329,601 | $6,489,238 | $5,653,504 | $5,822,534 | $5,996,465 | $6,175,441 | $6,359,607 | $6,549,114 | $6,744,117 | $6,944,774 | $7,151,251 | $7,363,715 |
| Net HST | | $ | $153,360 | $158,984 | $164,768 | $169,764 | $174,905 | $180,195 | $185,638 | $191,239 | $197,003 | $202,933 | $209,036 | $215,316 | $221,776 | $228,427 | $235,269 | $242,309 | $249,554 | $257,009 | $264,679 | $272,573 | $280,695 | $289,051 | $297,653 | $306,503 | $315,609 |
| Total | | $ | $3,731,513 | $3,868,353 | $4,009,096 | $4,130,656 | $4,255,741 | $4,384,453 | $4,516,898 | $4,653,184 | $4,793,422 | $4,937,727 | $5,086,217 | $5,239,014 | $5,396,241 | $5,558,028 | $5,724,506 | $5,895,813 | $6,072,088 | $6,253,474 | $6,440,121 | $6,632,180 | $6,829,809 | $7,033,169 | $7,242,427 | $7,457,754 | $7,679,324 |
| Net Annual Savings | | $ | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 | $182,617 |
| Total Cumulative Savings (15 Year) | | $ | $2,739,253 | | | | | | | | | | | | | | | | | | | | | | | | |
| Net Present Value (15 Year) | | $ | $2,133,506 | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Cummulative savings (25 Year) | | $ | $4,565,422 | | | | | | | | | | | | | | | | | | | | | | | | |
| Net Present Value (25 Year) | | $ | $3,076,201 | | | | | | | | | | | | | | | | | | | | | | | | |

**Note:**
(1) NSPI Rates for 2020, 2021, 2022 are fixed as part of the NSPI Rate Stabilization Plan implemented in 2019.

# DRAFT

## GREEN CHOICE PROGRAM
## EXPRESSION OF INTEREST

Administered by
CustomerFirst Renewables

This is an application for applicant enrollment into Nova Scotia's Green Choice Program (GCP). **Applicants must submit a completed Expression of Interest (EOI) form to novascotia@customerfirstrenewables.com.** The application window will close at 5pm (Atlantic) on [month] [day], 2021. Failure to submit an EOI by close of application window may result in rejection of enrollment into GCP.

GCP Introduction

GCP will enable large energy users in Nova Scotia to have renewable energy procured on their behalf to meet their energy and climate change goals. The program will drive new renewable energy capacity in Nova Scotia.

**Minimum requirements to enroll into GCP are as follows:**

- Applicant must be a current or new customers of Nova Scotia Power (NSPI)
- Applicant must have a 3-year average annual load of at least 10,000 MWh to be eligible, or be a public institution – with a load of over 2,000 MWh per year – aggregating with other public institutions to collectively exceed 10,000 MWh per year
- Applicant or aggregation group (i.e., public institutions aggregating their average annual load to exceed the 10,000 MWh threshold) must elect a Designated Representative to submit EOI on behalf of the group
- Aggregation group must submit an agreement (e.g., MOU, LOI) acknowledging the intent of all applicants to aggregate their load to meet the 10,000 MWh minimum

For more detailed information on GCP please visit: http://novascotiagcp.com

For questions related to this program you may contact:

- Department of Energy and Mines: greenchoice@novascotia.ca
- Procurement Administrator: CustomerFirst Renewables novascotia@customerfirstrenewables.com

GCP Enrollment Mechanics

Step 1: Interested applicants must submit this Expression of Interest (EOI) to be considered for enrollment in the program. The EOI asks applicants to specify the quantity of renewable electricity that they wish to procure through the GCP. *The Procurement Administrator may request additional information for clarifying purposes after the EOI has been submitted and prior to Minister enrolling the applicant.*

Step 2: The Minister of Energy & Mines will review and confirm enrollment of applicants.

Step 3: The Procurement Administrator will issue a competitive Request for Proposal from industry to build new renewable energy projects to meet the energy needs of enrolled applicants (up to a program cap of 500MW).

Step 4: Upon final selection of the successful renewable energy project(s), enrolled applicants will execute a [participant agreement] with NSPI.

Step 5: Awarded renewable energy project(s) will enter into long-term Power Purchase Agreement(s) with NSPI.

Step 6: After PPA award, renewable energy project(s) are built and connected to the Nova Scotia electrical grid, enrolled applicants will begin to receive the benefits and incur the costs associated with their GCP enrollment. Cost and credits will show up on enrolled applicants' electricity bills and title to the environmental attributes will be provided in an annual report from NSPI.

EOI Terms and Conditions

**By completing and signing this application, applicant acknowledges the following:**

- Applicant has read and understands the Updated Stakeholder Engagement Documents
- EOI submission does not guarantee that applicant enrollment will be confirmed
- EOI submission does not guarantee that requested GCP volume will be satisfied
- EOI submission is only complete upon receipt of $500 application fee
- Applicant permits Procurement Administrator to verify accounts are in good standing with NSPI
- Information collected here will be treated as confidential and only viewed by the Procurement Administrator, the Province of Nova Scotia, and NSPI for the purposes of implementing the GCP. Information will not be shared beyond those parties without the written permission of the applicant

# GREEN CHOICE PROGRAM
# EXPRESSION OF INTEREST

Administered by
CustomerFirst Renewables

☐ Yes, I want to participate in Nova Scotia's Green Choice Program

## SECTION 1: APPLICANT INFORMATION

Company name (as it appears on your primary electric bill): _____

Business street address (as it appears on your bill): _____

City: _____ Province: _____ Postal code: _____

Primary contact title: _____

Primary contact name (first/last): _____

Primary contact email address: _____

Primary contact phone number: _____

Secondary contact title: _____

Secondary contact name (first/last): _____

Secondary contact email address: _____

Secondary contact phone number: _____

**Identified contacts should be able to access or request organization's electric billing information.**

**This primary contract is to be acknowledged as the Designated Representative for a single applicant and an aggregation group.**

### Applicant Type (select one)

☐ Educational facility (university, college, or education centre)
☐ Government (federal, provincial, municipal, agency, or crown corporation)
☐ Mi'kmaq Community in Nova Scotia
☐ Non-profit or social enterprise
☐ Commercial and industrial
☐ Medical facility (hospital, clinic, or other medical services)
☐ Other | Please specify _____

### Climate Change Goals

☐ Yes, the organization has climate change goals
☐ No, the organization does not have climate change goals

If yes, please define climate change goal(s) and expected timing below (e.g., 100% renewable energy by 2030, 25% increase in renewable energy sourcing by 2025, 50% reduction in GHG emissions – from 2005 levels – by 2035, etc.)

## SECTION 2: TERM SELECTION (non-binding)

### Preferred Term Length (select one)

☐ Up to 31/12/2030 ☐ 10 years ☐ 15 years ☐ 20 years ☐ 25 years

*Please note the following:*

- *Term election is not binding on the EOI. Term election is only binding on the [participant agreement].*
- *Term lengths that do not align with the PPA length of 25 years are likely to be subject to tiered pricing. Enrolled applicants who signed [agreements] shorter than 25 years may pay a premium between 1% to 5% above the PPA costs, pending term length election.*

## SECTION 3: AGGREGATION (public entities only)

### Intent to Aggregate (select one)

☐ No, I do not wish to enroll through an aggregation with another public entity
☐ Yes, I wish to enroll through an aggregation with another public entity (or entities)

If yes, please confirm Designation Representative status
☐ _____ *[contact name + organization]* has been elected as the Designation Representative of the aggregation group

**If applicant has NOT been elected as the Designation Representative, applicant must contact their Designated Representative to confirm intent to submit EOI on behalf of the aggregation group.**

Please identify aggregation partners below:

| |
|---|
| |

Please attach a signed document to your EOI, acknowledging the intent for all parties to enroll through an aggregation of parties that collectively exceed the 10,000 MWh/year threshold. The EOI will not be considered complete without this document.

*Please note that aggregation supports the intake process and ongoing engagement before executing participant agreements. Each member within the aggregation group will sign an individual participant agreement.*

## SECTION 4: CREDIT REQUIREMENTS

There is a credit rating threshold for GCP participation. Applicants who do not meet the Investment Grade criteria (i.e., BBB- with Fitch or S&P, Baa3 with Moody's) may require NSPI evaluation of their payment history to ensure accounts are in "good standing."

Please indicate business credit rating: _____
*Ex. BBC- with Fitch or S&P, Baa3 with Moody's*

In place of providing a business credit rating, applicants may provide a letter of good standing from NSPI, or Procurement Administrator may verify accounts are in good standing with NSPI.

## SECTION 5: ENERGY USAGE & GCP VOLUME

Enrolled applicants have limited opportunities to make subscription adjustments after GCP start and may only reduce their subscription level (i.e., electricity load attributed to GCP) by up to 10%. The allocations recorded below should account for expected energy efficiency efforts, account closures, and – in the event of allocations exceeding 100% – electrification and building expansion plans that align with your anticipated agreement term length.

Enrolled applicants anticipating a reduction in their electricity consumption over the contract term are advised to allocate less than 100% of their load to GCP. Conversely, applicants anticipating an increase in the electricity consumption of the duration of the term are advised to allocate more than 100% of their load to GCP.

Any electricity generated by direct contracts such as enhanced net-metering agreements, non-export metering of on-site low-impact renewable energy generation, or other customer direct commercial agreements for the sale and purchase of renewable energy currently in the applicant's name must be excluded from the total included below (e.g., 300 kW of enhanced net-metering solar across facilities listed below).

### GCP Account Allocation:

Please add accounts that will be subscribed to the program. If more rows are needed, please duplicate the format in an excel document and submit it together with your EOI.

| Applicant | Account Number | Account Address | Annual Usage (kWh) | GCP allocation (%) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## SECTION 6: APPLICATION FEE

**EOI application is only complete upon receipt of a CAD 500 application fee payable to the Nova Scotia Minister of Finance.**

Please send checks to the c/o Department of Energy and Mines:

1690 Hollis Street PO Box 2664
Halifax, NS
B3J 3P7
ATTN: Bernice Webb

APPLICANT RECOGNIZES THAT THIS APPLICATION DOES NOT GUARANTEE THAT GCP ENROLLMENT WILL BE APPROVED. BINDING COMMITMENT TO GCP TERMS AND CONDITIONS WILL NOT OCCUR UNTIL [PARTICIPANT AGREEMENT] HAS BEEN EXECUTED BETWEEN APPLICANT AND NOVA SCOTIA POWER.

THIS APPLICATION WILL NOT BE CONSIDERED COMPLETE UNTIL THE PROCUREMENT ADMINISTRATOR HAS CONFIRMED RECEIPT OF THE $500 APPLICATION FEE.

DETAILS ON GCP CAN BE FOUND ON THE PROGRAM WEBSITE (https://novascotiagcp.com/).

**Applicant signature:** _____ **Date:** _____
[OR Designated Representative]

Please email the completed application form and supporting documents to
novascotia@customerfirstrenewables.com




# Stakeholder Engagement Document

*This document was created to support stakeholder engagement on the proposed Green Choice Program. The intent is to provide an overview of the proposed program for the purpose of informing stakeholders and garnering informed feedback on the proposed design as part of the collaborative innovation process.*

*This information should be used as a **reference resource ONLY** for understanding the program, as some aspects are likely to change pending ongoing discussions and feedback from our engagement with key stakeholders. This information is **not meant** for general distribution or to **reflect final program regulations, rules, or design**.*

## Glossary of Terms

**Customer**: A current or new customer of Nova Scotia Power Inc. or other regulated electric utility

**Energy load**: Total energy consumption of the customer per year – this could be combined across multiple meters or multiple facilities expressed in megawatt hours per year (MWh/year).

**Enrolled/Subscribed Customer:** A customer that has completed the Expression of Interest (EOI), has paid the application fee, and has been approved to participate in the Green Choice Program.

**Expression of Interest (EOI):** Subscription action for enrollment to the Green Choice Program. This will be open for interested customers and an application fee will be associated with the process.

**IPP**: Independent Power Producers as defined by the Renewable Electricity Regulations

**Large energy user**: Electricity rate class 10 and above or about 16,668 MWh per year of energy consumption; visit: https://www.nspower.ca/about-us/electricity/rates-tariffs for more information on your rate category.

**Power Purchase Agreement (PPA)**: A long-term commercial contract between an Independent Power Producer (IPP) and the utility that defines the terms and conditions on the production and sale of renewable energy to the grid.

**Procurement Administrator**: An independent, non-governmental third-party that is appointed by the Governor in Council to conduct a fair, transparent, and competitive procurement of new low-impact renewable energy.

DRAFT FOR CONSULTATION

**Subscriber Agreement**: The contract between customers and the utility with commercial terms and conditions for the volume of energy to be bought and the price of the energy to be paid.

**Customer Survey**: Interested customers are asked to complete a quick voluntary survey to help the Department of Energy and Mines and CustomerFirst Renewables better understand you, your energy needs, and your interest in the program.

**UARB**: Utility and Review Board; the independent regulator of all public utilities in Nova Scotia, such as electric, water and natural gas utilities. Role in setting rates and ensuring consumers receive a safe and reliable service at a reasonable price.

# Overview of the Green Choice Program

## Objective:

The Green Choice Program will enable large energy users in Nova Scotia to enroll and have renewable energy procured on their behalf to meet their energy needs and climate change goals. The program will also drive new renewable energy investments in Nova Scotia.

FIND MORE RESOURCES AND INFORMATION ON THE GREEN CHOICE PROGRAM WEBSITE:
**www.novascotiagcp.com**

## Roles and Responsibilities of Energy and Mines and CustomerFirst Renewables:

Department of Energy and Mines (DEM) has retained the services of CustomerFirst Renewables (CFR), an expert with a decade of experience advising large energy buyers and designing successful green tariff programs, such as the Green Choice Program. In coming months CFR and DEM will be working together to engage with key stakeholders (IPPs, customers, and utility) to seek input and feedback as the program's regulations are drafted and finalized. DEM and CFR have divided the work and will be reaching out following two webinar sessions to schedule focused engagement with each stakeholder group.

CustomerFirst Renewables (CFR) has also been appointed by the Governor in Council as the Procurement Administrator for this program and will handle most administrative components of this program. All components of the program will be conducted in collaboration, cooperation, and coordination through ongoing engagement with key stakeholders and partners.

| Task | Responsibility |
|---|---|
| Key Stakeholder and partner engagement (IPP, utility, customers, First Nations) | DEM & CFR |
| Customer Survey | DEM & CFR |
| Expression of Interest | DEM & CFR |
| Alignment of PPA, rate structure, RFP and Subscriber Agreements | DEM & CFR |
| PPA and rate (tariff) | UARB |
| Final decision on enrollment | DEM |
| RFP launch | CFR |
| Bid submissions and evaluation | CFR |

DRAFT FOR CONSULTATION

| | |
|---|---|
| Final awards-execution of PPA and subscriber agreements | CFR |

If you are a **First Nation, utility representative or a member of the IPP community**, DEM will be leading these follow-up sessions with the support of CFR.

Where possible, members of an industry association should filter their comments and input to association representatives. If your business is not currently represented by an industry association and you have comments or input, please let us know.

If you are **an interested customer or a person(s) representing interested customer(s)**, CFR will be leading the follow-up engagement sessions.

Please contact us at:

- DEM email: GreenChoice@novascotia.ca
- CFR email: novascotia@customerfirstrenewables.com

## When:

The subscriber enrollment intake process will be open for a designated window of time, and there may be multiple intake processes over the next few years. A notice will be issued in advance of the program launch to allow interested customers time to gather the necessary information required for application.

## Customers:

Interested customers will be asked to complete a voluntary survey about their motivations and interests in the program to help ensure the program is designed to address those needs. Find the survey at https://novascotiagcp.com/for-buyers.

### Eligible Customers:

Public institutions, and commercial and industrial customers such as:

- Governments (federal, provincial, and municipal)
- Government agencies and crown corporations
- First Nations
- Education institutions (universities, colleges, education centres)
- Health authorities or other medical facilities (hospitals, clinics, medical facilities)
- Corporate, industrial, or commercial entities
- Non-profit or social entreprises

All interested customers **must enroll, at minimum, 10,000 megawatt hours per year (MWh/year)** of energy to be eligible for the Green Choice Program.

---

*10,000 MWh = 10 GWh = 10,000,000 kWh*

---

DRAFT FOR CONSULTATION

This program is generally available for electricity rate class of 10 and up (small business, general, industrial).

A single meter (one facility) may meet this requirement OR the same institutional or corporate entity may own multiple meters and facilities at multiple locations across Nova Scotia, where the combined (aggregated) load of those facilities to be enrolled in the program equals 10,000 MWh/year.

An eligible public institution with an intent to individually purchase at least 2,000 MWh/year through the Green Choice Program, may aggregate with other public institutions to combine each of their total energy loads, at multiple facilities throughout the province, to meet the 10,000 MWh/year requirement. As an example, public institutions, like universities in Nova Scotia, may aggregate their load to meet the 10,000 MWh/year requirements. A Memorandum of Understanding (MOU), Letter of Intent (LOI), or similar structure must be in place aligning the institutions' participation in the enrollment process. A single representative should be chosen to represent the partnership (aggregate), where that representative is authorized to speak on behalf of the aggregated organizations and have the ability to enter into contractual negotiations on behalf of the aggregated entities. Contractual terms and conditions will need to be aligned among aggregate groups. One Subscription Agreement template is intended to be used for all aggregated participants (i.e., one Subscriber Agreement template where terms and conditions are agreed upon by all in the aggregate). Ultimately, each customer in the aggregate will individually sign the same template Subscriber Agreement reflecting their entity's portion of the aggregated purchase. This is to reduce administrative burden.

---

*CFR has a long history of helping interested customers undergo analysis and learn about the key benefits of green tariff programs such as Green Choice Program. Understanding what key terms and conditions for aggregation your organization may wish to consider can be a part of the ongoing discussion with interested customers.*

---

## Energy Load Eligible to be Enrolled:

Approximately 40% of the current electrical system in Nova Scotia is powered by renewable energy; therefore, this program only targets the remaining portion of the customer's energy load that is not currently met by renewable energy (effectively 60%). This means customers may enroll 60% of their energy consumption into the Green Choice Program. To meet the requirements of enrolling 10,000 MWh/year in the Green Choice Program, a customer's energy load may look like the following:

Total energy load of the customer must equal approximately: 16,668 MWh/year

- 6,668 MWh currently met by renewable energy already on electrical system = 40%
- 10,000 MWh* available to enroll into the Green Choice Program = 60%

**16,700 MWH PER YEAR IS APPROXIMATELY $1.7 MILLION PER YEAR IN ENERGY BILLS**
***(DEPENDENT ON YOUR RATE CLASS)***

DRAFT FOR CONSULTATION

**The Minister of Energy and Mines may consider permitting the enrollment of a customer's energy load that is greater than 100% of customer's current energy needs (up to 115%) if a significant new load is anticipated (e.g., through the addition of new facilities/expansions or electrification measures at current facilities.)*
*If this is important to you, please let us know!*

A customer may enroll any portion (%) of their energy load up to the 60% maximum requirements.

*EXAMPLE*:

*Where a customer's energy load is already 40% renewable based on the current electrical grid, this leaves approximately 60% of the remaining energy load available for enrollment into the Green Choice Program. Of that 60% a customer may enroll any percentage to achieve their climate change goals.*

*For example, a customer may enroll 40% of their energy load into the program to meet a total of 80% of their total energy load to be met by renewable energy sources.*

*40% renewable energy met by current electrical grid* +

*Customer enrolls 40% (up to 60% maximum) of their energy into Green Choice Program* =

*80% of energy load is met by renewable energy*

*Regardless of what portion or percentage the customer chooses to enroll, the energy* ***enrolled in the Green Choice Program*** *must still meet the* ***minimum*** *10,000 MWh/year requirement.*

## Intake Process for Customers:

1. *Submit an Expression of Interest (EOI):*

- Non-refundable application fee; currently expected at $500
- Location of all facilities to be enrolled
- All electricity meter and customer account numbers to be enrolled in the program
- The total energy load to be enrolled in the program for each enrolled facility
- Total quantity of energy to be enrolled in the program
- Any other stated preferences at the time of the EOI.

The EOI's will be reviewed to ensure all requirements are met.

An EOI is required for a customer to be enrolled in the program.

The Minister of Energy and Mines will review and make final decision on enrollment in the program during each round of intake.

2. *Enrollment:*

In response to the EOIs, written notification will be issued to each customer by the Minister of Department of Energy and Mines for decision on enrollment in the program.

Customers will be asked to confirm and verify the information contained within the EOI and to confirm their desire to be enrolled into the program. However, note that final commitment and execution of

DRAFT FOR CONSULTATION

Subscriber Agreement will not be expected until after the competitive request for proposal (RFP) process for renewable energy supply has been completed. Additional information may be requested at this time.

Customers must be in good standing with their energy bills to participate.

If a customer is a new customer to the utility and there are no known bills to validate their energy needs, nor is there the ability to assess that the customer is in good standing; additional assurances may be required for these customer's enrollment in the program.

The amount of energy for which customers have enrolled will determine the amount of energy to be procured through a competitive request for proposals process (RFP) from the Independent Power Producer (IPP) industry.

The customer will bear all risk associated with changes to their energy load over the duration of the contract. For example, if significant energy efficiency measures are planned during the contract, or if significant growth through electrification is planned, it is the responsibility of the customer to do this analysis in advance to ensure the amount of energy they are enrolling in the Green Choice Program reflects these potential changes. There may be limited opportunity to address these changes within the Subscriber Agreement.

Enrolled Customers will be engaged as the RFP documents are designed and informed about the evaluation of project bid submissions.

An Enrolled Customer may elect to cancel their enrollment prior to the signing of contractual agreements, at any time, in writing to the Procurement Administrator. Note the application fee is non-refundable.

### Contracts:

A template Subscriber Agreement will be prepared by the Procurement Administrator in consultation with all key stakeholders (IPP, utility, and customers). Subscriber Agreements will be signed between the Enrolled Customers and the utility. In other words, if you are a customer of Nova Scotia Power Inc. (NSPI), you will remain a customer of NSPI.

Contracts may include some flexibility around term length with a minimum term of five years or a maximum term that aligns with the PPA term of 25 years. Contracts with less than 25-year terms may include the option for 5-year extensions.

Contracts may also include early termination penalties that will provide protection to non-participating rate payers should an Enrolled Customer choose to terminate or default on their contract.

Contracts may be assigned, sold, or transferred to another subsidiary or similar eligible entity. The flexibility to allow this must be negotiated during the discussions for Subscriber Agreements. A fee may be required to review and approve a request to assign, sell or transfer a subscriber agreement. The replacement customer must meet the Green Choice Program requirements to be considered under this program (e.g., similar energy needs, sign the same contract, and be in good standing with the utility). This will be considered on a case-by-case basis and consistent with the terms and condition outlined in Subscriber Agreements.

DRAFT FOR CONSULTATION

*We are interested in learning more from all interested participants, the vision for Nova Scotia Power Inc.'s participation and role in this program.*

### Costs and Billing:

Customers will only pay the Green Choice Program (GCP)-associated tariff for the portion of their load that they successfully enroll in GCP. The balance of load not addressed by GCP (no less than 40%) will continue to be billed consistently with the historical rate for the load.

GCP customers will be responsible for paying the full cost of the energy produced by their share of the renewable assets sourced under the GCP program and any integration fees associated with the cost of the new renewable energy projects to the electrical grid.

Customers will be billed similarly to their current energy bill structure, continuing to pay all other applicable energy service and taxes in a business-as-usual model; however, the GCP will be a separate line item on a customer's bill. For the GCP portion, customers may no longer be subject to any non-renewable energy components of their bill or any current or future carbon taxes. These may be replaced with the price of the new renewable energy project plus the integration costs amortized over all participants for the duration of the contracts.

The GCP program costs are expected to be competitive with a customer's current electricity costs. The Program will aim to communicate costs and provide more detailed analysis as participants are ready to enroll.

Program costs will be expressed in the following form and calculated in one of the two proposed ways:

- A fixed cost (renewable energy PPA cost + integration charge) that remains unchanged for the duration of the contract term, which would replace the Fuel Adjustment Mechanism costs under the standard tariff, OR
- A cost/credit structure that reflects the costs of the actual production from the renewable energy assets associated with subscriber enrollment amount, and the value of that production on the Nova Scotia grid. These would not replace the Fuel Adjustment Mechanism but would be reflected in additional line items on customers' bills.

*We are actively seeking feedback on these proposed rate structures from interested key stakeholders.*

## Procurement of New Renewable Energy:

### Request for Proposals Requirements:

A new Power Purchase Agreement (PPA) which potentially considers the renewable energy generator's ability to provide ancillary services is being drafted. Industry will be consulted on this drafting.

The RFP requirements and timelines will be drafted in consultation with key stakeholders.

DRAFT FOR CONSULTATION

The program is technology agnostic and open to any low-impact renewable energy technology as defined by the Electricity Act. However, customers may indicate a preference of technology(ies) to meet their energy needs, though there are no guarantees this will be the technology selected.

At a minimum, the following are required for submissions to the RFP:

- Project must be in Nova Scotia
- Must be low-impact renewable energy, as defined by the Electricity Act and its Renewable Electricity Regulations
- Must provide best value to ratepayers
- Must submit bid submission fee as determined in the RFP
- Registered to do business in Nova Scotia
- New build or expansion to current sites; not re-powering of current sites
- Include year of anticipated delivery
- May include components of First Nations ownership and participation yet to be determined through ongoing engagement.

The Department will provide an advanced notification of the RFP launch date, which will include the duration of the RFP, and details about the evaluation and award process.

The intent of this RFP is to follow similar best practices as seen in other recent renewable energy procurements in Canada (e.g., Alberta, Ontario) and utilize lessons learned from these procurements.

### Additional resources:

- Nova Scotia's Ancillary Service Provision by Variable Output Renewable Energy Report completed by Power Advisory
- Updated Transmission System Integration Requirements December 2020

### Bid Evaluation:

The bid evaluation process will be staged so only the best quality submissions will advance to the final stage of review and approval.

The Procurement Administrator will review the submitted bids for compliance and will select which ones will proceed to further review. Enrolled Customers will be kept informed about the winnowing and selection process.

A select few bid submissions will be provided the opportunity to provide a Best and Final Offer to meet customer needs. Final awards will be issued to those projects that have been determined to meet all program requirements, qualifications and are the most competitive in terms of price and other RFP selection criteria.

### Awards:

Enrolled customers will be re-engaged on contractual provisions as award decisions approach to begin finalizing contracts. Customers will sign contracts for 5-year to 25-year terms (in five-year increments). Pricing structures are likely to favour and encourage longer-term commitments from customers.

DRAFT FOR CONSULTATION

IPPs will be notified of their successful participation in the process and proceed to sign 25-year PPA contracts with the utility.

A summary of these final decisions will be reported to the Minister of Energy and Mines.

## Climate Change Goals Met:

New renewable energy projects will be built and come online to meet customer needs, based on the timelines stated in their bid submissions.

Customers will receive the portion of renewable energy for which they have enrolled, for the duration of the contract terms, thus allowing subscribers to meet their carbon emission reduction commitments.

DRAFT FOR CONSULTATION

# ITEM #5.3

**Halifax Water Board**

**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Reid Campbell Digitally signed by Reid Campbell Date: 2021.09.17 12:05:43 -03'00'

Reid Campbell, M. Eng., P.Eng.
Director, Engineering & Technical Services

**APPROVED:** Cathie Goob Digitally signed by Cathie O'Toole Date: 2021.09.17 13:15:44 -03'00'

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

**DATE:** September 15, 2021

**SUBJECT:** **ICIP Funded Community Solar PV – Project Approval**

## ORIGIN

- Halifax Water's 2021-22 Capital Budget
- HRWC Board Report, dated August 28, 2020

## RECOMMENDATION

It is recommended that the Halifax Water Board approve proceeding with the four (4) projects selected for funding under the Investing in Canada Infrastructure Program (ICIP) at an estimated net-cost to Halifax Water of $446,817, including contingencies, net-HST and overheads.

## BACKGROUND

In July 2020, the Government of Nova Scotia issued a formal call for applications under the ICIP climate change mitigation sub-stream.

Halifax Water applied under this program in September 2020 for our multi-facility Community Solar PV project. Halifax Water's application was subsequently approved on June 16, 2021, and included four (4) projects, as follows:

1. Aerotech Wastewater Treatment Facility, 449 Aerotech Drive, Goffs, NS
2. 450 Cowie Hill Road, Halifax, NS
3. 455 Cowie Hill Road, Halifax, NS
4. New East Operations Facility, Jennett Avenue, Dartmouth, NS

## DISCUSSION

A total of $1,228,537 in funding support has been approved via the ICIP. Total project costs are estimated to be $1,675,355, with Halifax Water's portion of the costs estimated to be $446,817. A summary of capital costs and the funding breakdown for each project location is provided in Table 1.

*Table 1 - Capital Cost Estimates + Funding Breakdown*

| Project Location | Size | Estimated Capital Costs (1) | | |
|---|---|---|---|---|
| | | Total Cost | Fed/Prov Portion (73.33%) | Halifax Water Portion (26.67%) |
| Existing Aerotech Wastewater Treatment Facility, 449 Aerotech Drive, Goffs | 125 $kW_{AC}$ | $526,384 | $385,997 | $140,387 |
| Existing Halifax Water Administration Building, 450 Cowie Hill Road | 100 $kW_{AC}$ | $382,990 | $280,847 | $102,143 |
| Existing Halifax Water West Operations Facility, 455 Cowie Hill Road | 100 $kW_{AC}$ | $382,990 | $280,847 | $102,143 |
| New Halifax Water East Operations Facility, 1248B Jennet Ave., Dartmouth | 100 $kW_{AC}$ | $382,990 | $280,847 | $102,143 |
| **Totals** | **425 $kW_{AC}$** | **$1,675,355** | **$1,228,537** | **$446,817** |

Notes: (1) Estimated costs include contingencies, net-HST, and overheads

The financial analysis for each individual project, as well as the overall portfolio of projects are positive.

*Table 2 - Financial Analyses*

| Project Location | Estimated Financial Analysis | |
|---|---|---|
| | Year 1 Annual Revenues | Simple Payback |
| Existing Aerotech Wastewater Treatment Facility, 449 Aerotech Drive, Goffs | $23,214 | 6.3 years |
| Existing Halifax Water Administration Building, 450 Cowie Hill Road | $13,870 | 7.7 years |
| Existing Halifax Water West Operations Facility, 455 Cowie Hill Road | $13,870 | 7.7 years |
| New Halifax Water East Operations Facility, 1248B Jennet Ave., Dartmouth | $15,105 | 7.1 years |
| **Totals** | **$66,059** | **7.1 years** |

Greenhouse gas reductions over the life of the asset are expected to be 5,576 tonnes $CO_2e$, including allowances for future NSPI emission intensity reductions.

Based on the preliminary capital cost and financial analyses of the proposed projects, it is recommended that the HRWC Board approve proceeding with the Community Solar PV projects.

## BUDGET IMPLICATIONS

Halifax Water's portion of the total funding amount for the construction and commissioning of the Community Solar PV systems is $446,817, including contingencies, net HST and overheads. Funding is available from surpluses in previously closed projects or projects that have been deferred or cancelled.

Table 2 indicates that Halifax Water will reduce it costs and recover the investment within the next 8 years.

The ICIP requirements are that to be eligible for the funding, Halifax Water must provide evidence that our Board approves of setting aside capital funds for this projects. As these projects were not explicitly named in the 2021-22 capital budget, we are seeking Board approval to satisfy this requirement.

## ALTERNATIVES

The Halifax Water Board may choose not to proceed with the ICIP funded Community Solar projects.

## ATTACHMENT

Attachment 1 – Project Details + Financial Analyses

Attachment 2 – Halifax Water Community Solar Projects – Climate Lens Part 1: Greenhouse Gas Mitigation Assessment – Executive Summary

Report Prepared by: Jeff Knapp Digitally signed by Jeff Knapp Date: 2021.09.17 13:09:55 -03'00'

Jeff Knapp, FEC, P. Eng., CEM
Manger, Energy, WWTF Engineering & Business Development

Financial Reviewed by: Digitally signed by Louis de Montbrun Date: 2021.09.17 12:08:29 -03'00'

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

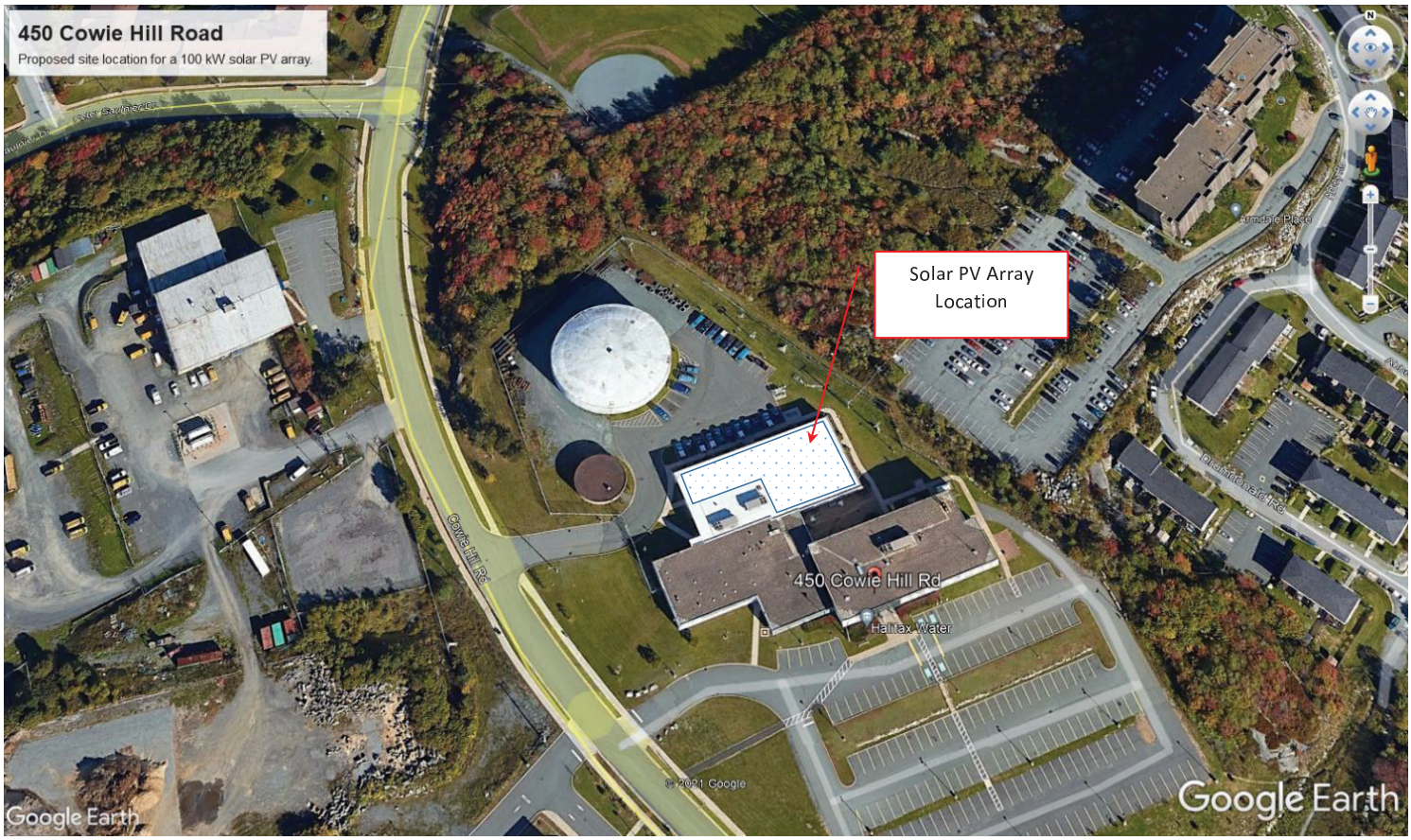
**Project Details**

**Halifax Water Community Solar PV Projects**

The Halifax Water Community Solar Photovoltaic (Solar PV) project will see the installation of approx. 425 $kW_{AC}$ of Solar PV panels at four (4) Halifax Water facilities. The renewable energy generated will offset Halifax Water's current electrical use and will reduce GHG emissions by over 6,975 $tCO_{2e}$ over the expected life of the project, including allowances for any anticipated NSPI related emission intensity grid reductions. The project will also reduce the Utility's operating costs by over $1.6 million over the expected life of the project, directly benefiting Halifax Water's overall rate base.

Project details are as follows:

| Project Location | Size | Estimated Capital Costs | | | Estimated Financial Analysis | | | Target Completion | Status |
|---|---|---|---|---|---|---|---|---|---|
| | | Total Cost | Fed/Prov Portion (73.33%) | Halifax Water Portion (26.67%) | Project NPV | Project IRR | Simple Payback | | |
| Existing Aerotech Wastewater Treatment Facility, 449 Aerotech Drive, Goffs | 125 $kW_{AC}$ | $526,384 | $385,997 | $140,387 | $218,210 | 15.7% | 6.3 years | 2021-22 | Conceptual Design |
| Existing Halifax Water Administration Building, 450 Cowie Hill Road | 100 $kW_{AC}$ | #382,990 | $280,847 | $102,143 | $105,069 | 12.0% | 7.7 years | 2022-23 | Conceptual Design |
| Existing Halifax Water West Operations Facility, 455 Cowie Hill Road | 100 $kW_{AC}$ | $382,990 | $280,847 | $102,143 | $105,069 | 12.0% | 7.7 years | 2022-23 | Conceptual Design |
| New Halifax Water East Operations Facility, 1248B Jennet Ave., Dartmouth | 100 $kW_{AC}$ | $382,990 | $280,847 | $102,143 | $123,936 | 13.3% | 7.1 years | 2023-24 | Conceptual Design, Included in facility design scope |
| **Totals** | **425 $kW_{AC}$** | **$1,675,355** | **$1,228,537** | **$446,817** | **$544,532** | **13.4%** | **7.1 years** | | |




Location: Halifax Water Administrative Offices

Latitude: 44°37'34.23"N

Longitude: 63°37'25.25"W

Address: 450 Cowie Hill Road, Halifax, NS, B3P 2V3

Property ID:

## Halifax Regional Water Commission

**Project Location:** 450 Cowie Hill Road
**Project Details:** One 100 kW Solar PV Installation
**Completed By::** J. Knapp
**Date/Version:** September 15, 2021

# Preliminary

## 450 Cowie Hill Road

### One 100 kW Solar PV Installation

| Technical Assumptions | Value | Units |
|---|---|---|
| DC System Size | 118.60 | $kW_{dc}$ |
| AC System Size | 100.00 | $kW_{ac}$ |
| Module Type | Monocrystaline | |
| Array Type | Fixed, Roof Mount | |
| Module Output | 385 | W |
| No. of Modules | 308 | |
| Module Area | 1.938 | $m^2$ |
| Total Module Area (Panels Only) | 597.1 | $m^2$ |
| Total Module Area (Panels Only) | 708.8 | $m^2$ |
| Module Efficiency | 17.8% | |
| Inverter Efficiency | 96.0% | |
| System Losses | 10.50% | |
| Soiling | 2.0% | |
| Shading | 0.0% | |
| Snow | 2.0% | |
| Mismatch | 1.0% | |
| Wiring | 1.5% | |
| Connections | 0.5% | |
| Light-Induced Degredation | 1.5% | |
| Nameplate Rating | 1.0% | |
| Age | 0.0% | |
| Availability | 1.0% | |
| Tilt | 10.0 | deg. |
| Azimuth | 180.0 | deg. |
| Install Latitude | 44.61 | deg. N |
| Install Longitude | 63.62 | deg. W |
| Average Annual Energy Production | 145,357 | kWh/yr |
| Average Daily Irradiation | 4.01 | $kWh/m^2/day$ |
| Average Annual Irradiation | 1463.7 | $kWh/m^2/yr$ |
| GHG Reductions ($CO_2$ Equivalent) | 92 | Tonnes/yr |

**Comments**

As per Aztek/Raysolar Tender.
PV Array Info
No. Modules = 308
Module Tilt = 0 deg.
Module Orientation = South 180 deg.
Module Info
Manufacturer: Can Solar KuMax CS3U-390MS-AG
Cell Type: Monocrystaline
Dimensions: 2000 x 992 x 35 mm
Electrical Specs (NMOT):
Vmp = 37.5 V, Voc = 45.3 V
Imp = 7.76 A, Isc = 8.20 A
Warranty:
10 Year Repair or Replacement
25 Year Peak Power Degredation
Inverter Info
No. of Inverters = 3
Manufacturer: Solar Edge
Model: SE33.3K
Peak Output Power = 33300 VA
Output Voltage = 480 Vac
Output Current = 40 A x 3 Ph, per inverter
Warranty: 20 Year
Branch Info
Number of Optimizers = 114

| Financial/Economic Assumptions | Value | Units | Comments |
|---|---|---|---|
| Base Year Value of Power Sold | $95.41 | $/MWh | Based on 2022 NSPI rates, Rate Class 11 |
| Base Year Cost of Purchased Power | $95.41 | $/MWh | Based on 2022 NSPI rates, Rate Class 11 |
| Annual Maintenance | $0.010 | $/kWh | Cleaning, testing, inspecting. |
| Capacity Cost (DC) | $3,229 | $/kW_{DC}$ | |
| Capacity Cost (AC) | $3,830 | $/kW_{AC}$ | |
| Total Capital Cost | $382,990 | | Assumption |
| External Funding | 73.3% | | Assumption |
| Net Capital Cost | $102,143 | | |
| Debt | | | |
| Debt Contribution | 0% | | Assumption. Choose Scenario. |
| Total Debt Requirement | $0 | | |
| Cost of Debt | 3.62% | | As per W. Brake. |
| Equity | | | |
| Equity Contribution | 100% | | Assumption. Choose Scenario. |
| Total Equity Requirement | $102,143 | | |
| Cost of Equity | 3.00% | | Assumption |
| Weighted Average Cost of Capital | 3.00% | | |
| Corporate Discount Rate for NPV Analysis | 3.00% | | As per C. O'Toole |
| Annual Escalation Rate - Inflation | 1.9% | | Assumption. |
| Harmonized Sales Tax (Net) | 4.286% | | As per W. Brake. |
| Labour Rate | $30.00 | /hr | $30.00/hr Average for WWTF Technicians |
| Benefit Costs | 23.0% | | As per C. O'Toole |
| Labour Hours | 1.0 | hrs/week | Estimate. |
| Amortization Term | 0.0 | years | Assumption. Choose Scenario. |
| Depreciation Term | 20.0 | years | Assumption |

**Solar Calculations**

| Month | AC System Output (kWh) | DC System Output (kWh) | Solar Radiation ($kWh/m^2/day$) | Plane of Array Irradiance ($W/m^2$) | Revenue ($ CDN) |
|---|---|---|---|---|---|
| January | 6452 | 6716 | 1.99 | 61.8 | $616 |
| February | 8651 | 8964 | 2.97 | 83.1 | $825 |
| March | 13414 | 13871 | 4.21 | 130.4 | $1,280 |
| April | 14756 | 15268 | 4.86 | 145.8 | $1,408 |
| May | 16853 | 17435 | 5.49 | 170.1 | $1,608 |
| June | 17228 | 17819 | 5.91 | 177.4 | $1,644 |
| July | 17310 | 17904 | 5.79 | 179.4 | $1,652 |
| August | 16134 | 16682 | 5.44 | 168.8 | $1,539 |
| September | 13733 | 14197 | 4.74 | 142.3 | $1,310 |
| October | 9999 | 10358 | 3.20 | 99.3 | $954 |
| November | 5811 | 6063 | 1.89 | 56.6 | $554 |
| December | 5014 | 5236 | 1.58 | 48.9 | $478 |
| Annual | 145357 | 150513 | 4.01 (avg.) | 122.0 (avg.) | $13,868 |

Ref. National Renewable Energy Laboratory
https://pvwatts.nrel.gov/

**Based on 20 year Power Purchase Agreement (PPA) with NSPI**

| | Capital Cost | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Base Data** | | | | | | | | | | | |
| Operating Period | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Operating Year | | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Generation Capacity (MWh) | | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 |
| **Income Statement** | | | | | | | | | | | |
| Revenues | | | | | | | | | | | |
| SECBPP Energy Price ($/MWh) | | $95 | $97 | $99 | $101 | $103 | $105 | $107 | $109 | $111 | $113 |
| Energy Revenues | | $13,870 | $14,133 | $14,402 | $14,675 | $14,954 | $15,238 | $15,528 | $15,823 | $16,123 | $16,430 |
| **Sub-Total Revenues** | | $13,870 | $14,133 | $14,402 | $14,675 | $14,954 | $15,238 | $15,528 | $15,823 | $16,123 | $16,430 |
| O&M Expenses | | | | | | | | | | | |
| Major Component Replacement | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $4,000 |
| Annual Maintenance | | $1,454 | $1,481 | $1,509 | $1,538 | $1,567 | $1,597 | $1,627 | $1,658 | $1,690 | $1,722 |
| **Sub-Total O&M** | | $1,454 | $1,481 | $1,509 | $1,538 | $1,567 | $1,597 | $1,627 | $1,658 | $1,690 | $5,722 |
| Debt Servicing | | | | | | | | | | | |
| Starting Balance | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Ending Balance | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Principal | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Interest | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Sub-Total Debt Servicing (P &I)** | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Revenues + O&M Exp + Interest** | ($102,143) | $12,416 | $12,652 | $12,892 | $13,137 | $13,387 | $13,641 | $13,900 | $14,164 | $14,433 | $10,708 |
| **Total Cumulative Cash Flow** | ($102,143) | ($89,727) | ($77,076) | ($64,183) | ($51,046) | ($37,659) | ($24,018) | ($10,118) | $4,046 | $18,480 | $29,187 |
| **Total Cumulative Cash Flow After Depreciation** | ($102,143) | $12,416 | $12,652 | $12,892 | $13,137 | $13,387 | $13,641 | $13,900 | $14,164 | $14,433 | $10,708 |
| | | ($89,727) | ($77,076) | ($64,183) | ($51,046) | ($37,659) | ($24,018) | ($10,118) | $4,046 | $18,480 | $29,187 |
| **Depreciation (Assumes Straight Line to Term)** | Term = 20 yr | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| | | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 |
| | Capital Cost | | | | | | | | | | |
| **Total Net Income (excludes Depreciation)** | ($102,143) | $12,416 | $12,652 | $12,892 | $13,137 | $13,387 | $13,641 | $13,900 | $14,164 | $14,433 | $10,708 |
| **Total Net Income (includes Depreciation)** | ($102,143) | $7,309 | $7,545 | $7,785 | $8,030 | $8,280 | $8,534 | $8,793 | $9,057 | $9,326 | $5,600 |

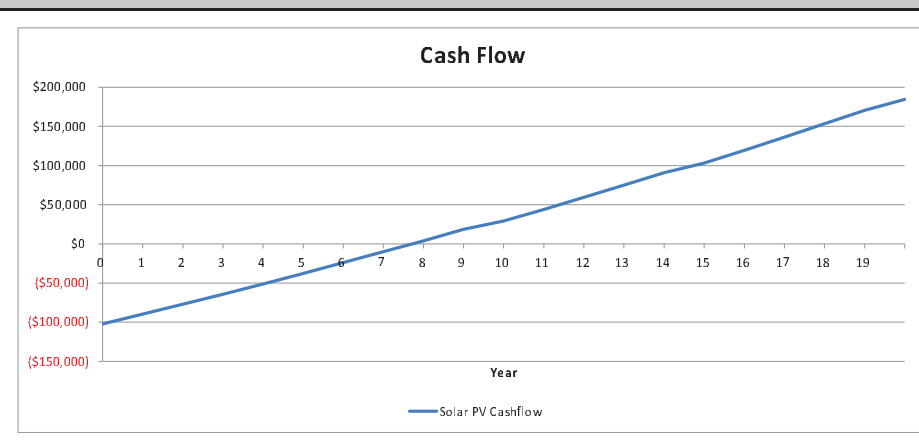
| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|
| Operating Period | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Operating Year | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |
| Generation Capacity (MWh) | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 |
| SECBPP Energy Price ($/MWh) | $115 | $117 | $120 | $122 | $124 | $127 | $129 | $131 | $134 | $136 |
| Energy Revenues | $16,742 | $17,060 | $17,384 | $17,714 | $18,051 | $18,394 | $18,743 | $19,099 | $19,462 | $19,832 |
| **Sub-Total Revenues** | $16,742 | $17,060 | $17,384 | $17,714 | $18,051 | $18,394 | $18,743 | $19,099 | $19,462 | $19,832 |
| Major Component Replacement | $0 | $0 | $0 | $0 | $4,000 | $0 | $0 | $0 | $0 | $4,000 |
| Annual Maintenance | $1,755 | $1,788 | $1,822 | $1,857 | $1,892 | $1,928 | $1,964 | $2,002 | $2,040 | $2,078 |
| **Sub-Total O&M** | $1,755 | $1,788 | $1,822 | $1,857 | $5,892 | $1,928 | $1,964 | $2,002 | $2,040 | $6,078 |
| Starting Balance | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Ending Balance | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Principal | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Interest | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Sub-Total Debt Servicing (P &I)** | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Revenues + O&M Exp + Interest** | $14,987 | $15,272 | $15,562 | $15,858 | $12,159 | $16,466 | $16,779 | $17,097 | $17,422 | $13,753 |
| **Total Cumulative Cash Flow** | $44,174 | $59,446 | $75,008 | $90,866 | $103,025 | $119,490 | $136,269 | $153,367 | $170,789 | $184,542 |
| **Total Cumulative Cash Flow After Depreciation** | $14,987 | $15,272 | $15,562 | $15,858 | $12,159 | $16,466 | $16,779 | $17,097 | $17,422 | $13,753 |
| | $44,174 | $59,446 | $75,008 | $90,866 | $103,025 | $119,490 | $136,269 | $153,367 | $170,789 | $184,542 |
| **Depreciation (Assumes Straight Line to Term)** | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 |
| **Total Net Income (excludes Depreciation)** | $14,987 | $15,272 | $15,562 | $15,858 | $12,159 | $16,466 | $16,779 | $17,097 | $17,422 | $13,753 |
| **Total Net Income (includes Depreciation)** | $9,880 | $10,165 | $10,455 | $10,750 | $7,052 | $11,359 | $11,672 | $11,990 | $12,315 | $8,646 |

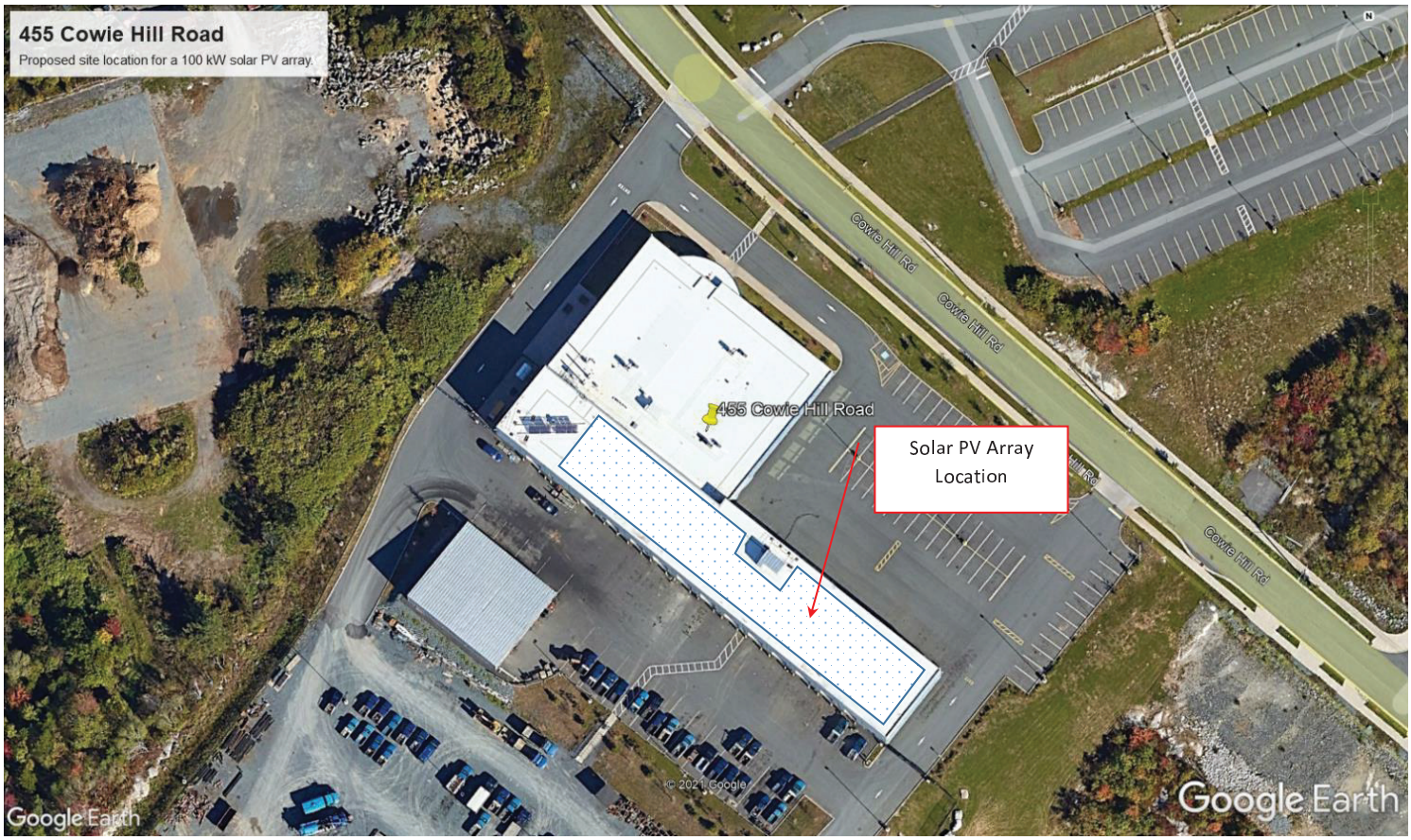
**Choose a Scenario**

100% Equity / 0% Debt / No Ext Fund / 0 Year Term

| NPV/IRR Analysis | O&M + Int |
|---|---|
| Project NPV (based on Net Income) | $105,069 |
| Project IRR | 12.0% |
| Simple Payback | 7.7 yrs |

| Financing Scenario | Equity | Debt | Ext Fund | Term | NPV | IRR | SPB |
|---|---|---|---|---|---|---|---|
| 1 100% Equity / 0% Debt / No Ext Fund / 0 Year Term | 100% | 0% | $0 | 0 | $105,069 | 12.0% | 7.7 |
| 2 50% Equity / 50% Debt / No Ext Fund / 10 Year Term | 50% | 50% | $0 | 10 | $97,028 | 11.1% | 8.3 |
| 3 25% Equity / 75% Debt / No Ext Fund / 10 Year Term | 25% | 75% | $0 | 10 | $92,443 | 10.6% | 8.7 |
| 4 0% Equity / 100% Debt / No Ext Fund / 10 Year Term | 0% | 100% | $0 | 10 | $87,481 | 10.1% | 9.1 |
| 5 50% Equity / 50% Debt / No Ext Fund / 15 Year Term | 50% | 50% | $0 | 15 | $93,901 | 10.8% | 8.5 |
| 6 50% Equity / 50% Debt / No Ext Fund / 20 Year Term | 50% | 50% | $0 | 20 | $91,057 | 10.7% | 8.5 |






Location: Halifax Water Operations Depot

Latitude: 44°37'30.38"N

Longitude: 63°37'27.77"W

Address: 455 Cowie Hill Road, Halifax, NS, B3P 2V3

Property ID:

**Halifax Regional Water Commission**

| | |
|---|---|
| **Project Location:** | 455 Cowie Hill Road |
| **Project Details:** | One 100 kW Solar PV Installation |
| **Completed By::** | J. Knapp |
| **Date/Version:** | September 15, 2021 |

**Preliminary**

**455 Cowie Hill Road**

**One 100 kW Solar PV Installation**

| Technical Assumptions | Value | Units |
|---|---|---|
| DC System Size | 118.60 | $kW_{dc}$ |
| AC System Size | 100.00 | $kW_{ac}$ |
| Module Type | Monocrystaline | |
| Array Type | Fixed, Roof Mount | |
| Module Output | 385 | W |
| No. of Modules | 308 | |
| Module Area | 1.938 | $m^2$ |
| Total Module Area (Panels Only) | 597.1 | $m^2$ |
| Total Module Area (Panels Only) | 708.8 | $m^2$ |
| Module Efficiency | 17.8% | |
| Inverter Efficiency | 96.0% | |
| System Losses | 10.50% | |
| Soiling | 2.0% | |
| Shading | 0.0% | |
| Snow | 2.0% | |
| Mismatch | 1.0% | |
| Wiring | 1.5% | |
| Connections | 0.5% | |
| Light-Induced Degredation | 1.5% | |
| Nameplate Rating | 1.0% | |
| Age | 0.0% | |
| Availability | 1.0% | |
| Tilt | 10.0 | deg. |
| Azimuth | 180.0 | deg. |
| Install Latitude | 44.61 | deg. N |
| Install Longitude | 63.62 | deg. W |
| Average Annual Energy Production | 145,357 | kWh/yr |
| Average Daily Irradiation | 4.01 | $kWh/m^2/day$ |
| Average Annual Irradiation | 1463.7 | $kWh/m^2/yr$ |
| GHG Reductions ($CO_2$ Equivalent) | 92 | Tonnes/yr |

**Comments**

As per Aztek/Raysolar Tender.
PV Array Info
No. Modules = 308
Module Tilt = 0 deg.
Module Orientation = South 180 deg.
Module Info
Manufacturer: Can Solar KuMax CS3U-390MS-AG
Cell Type: Monocrystaline
Dimensions: 2000 x 992 x 35 mm
Electrical Specs (NMOT):
Vmp = 37.5 V, Voc = 45.3 V
Imp = 7.76 A, Isc = 8.20 A
Warranty:
10 Year Repair or Replacement
25 Year Peak Power Degredation
Inverter Info
No. of Inverters = 3
Manufacturer: Solar Edge
Model: SE33.3K
Peak Output Power = 33300 VA
Output Voltage = 480 Vac
Output Current = 40 A x 3 Ph, per inverter
Warranty: 20 Year
Branch Info
Number of Optimizers = 114

| Financial/Economic Assumptions | Value | Units | Comments |
|---|---|---|---|
| Base Year Value of Power Sold | $95.41 | $/MWh | Based on 2022 NSPI rates, Rate Class 11 |
| Base Year Cost of Purchased Power | $95.41 | $/MWh | Based on 2022 NSPI rates, Rate Class 11 |
| Annual Maintenance | $0.010 | $/kWh | Cleaning, testing, inspecting. |
| Capacity Cost (DC) | $3,229 | $/kW_{DC}$ | |
| Capacity Cost (AC) | $3,830 | $/kW_{AC}$ | |
| Total Capital Cost | $382,990 | | Assumption |
| External Funding | 73.3% | | Assumption |
| Net Capital Cost | $102,143 | | |
| Debt | | | |
| Debt Contribution | 0% | | Assumption, Choose Scenario. |
| Total Debt Requirement | $0 | | |
| Cost of Debt | 3.62% | | As per W. Brake. |
| Equity | | | |
| Equity Contribution | 100% | | Assumption. Choose Scenario. |
| Total Equity Requirement | $102,143 | | |
| Cost of Equity | 3.00% | | Assumption |
| Weighted Average Cost of Capital | 3.00% | | |
| Corporate Discount Rate for NPV Analysis | 3.00% | | As per C. O'Toole |
| Annual Escalation Rate - Inflation | 1.9% | | Assumption. |
| Harmonized Sales Tax (Net) | 4.286% | | As per W. Brake. |
| Labour Rate | $30.00 | /hr | $30.00/hr Average for WWTF Technicians |
| Benefit Costs | 23.0% | | As per C. O'Toole |
| Labour Hours | 1.0 | hrs/week | Estimate. |
| Amortization Term | 0.0 | years | Assumption. Choose Scenario. |
| Depreciation Term | 20.0 | years | Assumption |

| Solar Calculations | | | | | |
|---|---|---|---|---|---|
| Month | AC System Output (kWh) | DC System Output (kWh) | Solar Radiation ($kWh/m^2/day$) | Plane of Array Irradiance ($W/m^2$) | Revenue ($ CDN) |
| January | 6452 | 6716 | 1.99 | 61.8 | $616 |
| February | 8651 | 8964 | 2.97 | 83.1 | $825 |
| March | 13414 | 13871 | 4.21 | 130.4 | $1,280 |
| April | 14756 | 15268 | 4.86 | 145.8 | $1,408 |
| May | 16853 | 17435 | 5.49 | 170.1 | $1,608 |
| June | 17228 | 17819 | 5.91 | 177.4 | $1,644 |
| July | 17310 | 17904 | 5.79 | 179.4 | $1,652 |
| August | 16134 | 16682 | 5.44 | 168.8 | $1,539 |
| September | 13733 | 14197 | 4.74 | 142.3 | $1,310 |
| October | 9999 | 10358 | 3.20 | 99.3 | $954 |
| November | 5811 | 6063 | 1.89 | 56.6 | $554 |
| December | 5014 | 5236 | 1.58 | 48.9 | $478 |
| **Annual** | 145357 | 150513 | 4.01 (avg.) | 122.0 (avg.) | $13,868 |

Ref. National Renewable Energy Laboratory
https://pvwatts.nrel.gov/

**Based on 20 year Power Purchase Agreement (PPA) with NSPI**

| | Capital Cost | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Base Data** | | | | | | | | | | | |
| Operating Period | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Operating Year | | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Generation Capacity (MWh) | | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 |
| **Income Statement** | | | | | | | | | | | |
| **Revenues** | | | | | | | | | | | |
| SECBPP Energy Price ($/MWh) | | $95 | $97 | $99 | $101 | $103 | $105 | $107 | $109 | $111 | $113 |
| Energy Revenues | | $13,870 | $14,133 | $14,402 | $14,675 | $14,954 | $15,238 | $15,528 | $15,823 | $16,123 | $16,430 |
| **Sub-Total Revenues** | | $13,870 | $14,133 | $14,402 | $14,675 | $14,954 | $15,238 | $15,528 | $15,823 | $16,123 | $16,430 |
| **O&M Expenses** | | | | | | | | | | | |
| Major Component Replacement | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $4,000 |
| Annual Maintenance | | $1,454 | $1,481 | $1,509 | $1,538 | $1,567 | $1,597 | $1,627 | $1,658 | $1,690 | $1,722 |
| **Sub-Total O&M** | | $1,454 | $1,481 | $1,509 | $1,538 | $1,567 | $1,597 | $1,627 | $1,658 | $1,690 | $5,722 |
| **Debt Servicing** | | | | | | | | | | | |
| Starting Balance | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Ending Balance | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Principal | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Interest | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Sub-Total Debt Servicing (P &I)** | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Revenues + O&M Exp + Interest** | ($102,143) | $12,416 | $12,652 | $12,892 | $13,137 | $13,387 | $13,641 | $13,900 | $14,164 | $14,433 | $10,708 |
| **Total Cumulative Cash Flow** | ($102,143) | ($89,727) | ($77,076) | ($64,183) | ($51,046) | ($37,659) | ($24,018) | ($10,118) | $4,046 | $18,480 | $29,187 |
| **Total Cumulative Cash Flow After Depreciation** | ($102,143) | $12,416 | $12,652 | $12,892 | $13,137 | $13,387 | $13,641 | $13,900 | $14,164 | $14,433 | $10,708 |
| | | ($89,727) | ($77,076) | ($64,183) | ($51,046) | ($37,659) | ($24,018) | ($10,118) | $4,046 | $18,480 | $29,187 |
| **Depreciation (Assumes Straight Line to Term)** | Term = 20 yr | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| | | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 |
| | Capital Cost | | | | | | | | | | |
| **Total Net Income (excludes Depreciation)** | ($102,143) | $12,416 | $12,652 | $12,892 | $13,137 | $13,387 | $13,641 | $13,900 | $14,164 | $14,433 | $10,708 |
| **Total Net Income (includes Depreciation)** | ($102,143) | $7,309 | $7,545 | $7,785 | $8,030 | $8,280 | $8,534 | $8,793 | $9,057 | $9,326 | $5,600 |

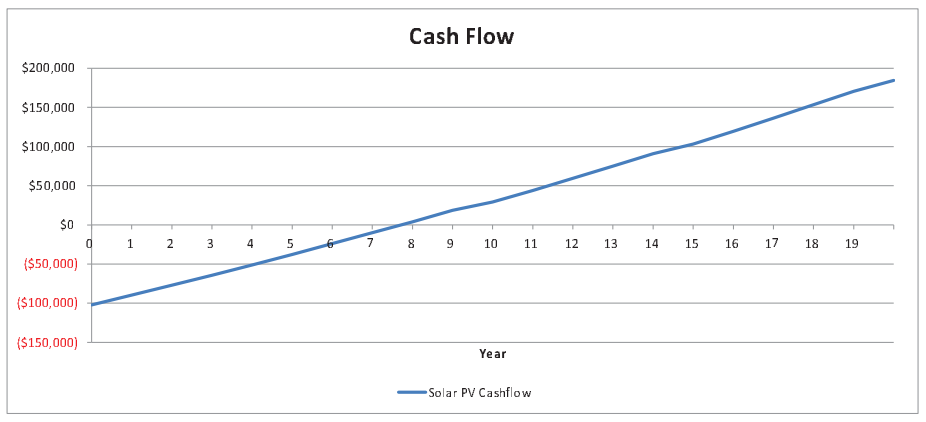
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Base Data** | | | | | | | | | | |
| Operating Period | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Operating Year | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |
| Generation Capacity (MWh) | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 | 145.4 |
| **Income Statement** | | | | | | | | | | |
| **Revenues** | | | | | | | | | | |
| SECBPP Energy Price ($/MWh) | $115 | $117 | $120 | $122 | $124 | $127 | $129 | $131 | $134 | $136 |
| Energy Revenues | $16,742 | $17,060 | $17,384 | $17,714 | $18,051 | $18,394 | $18,743 | $19,099 | $19,462 | $19,832 |
| **Sub-Total Revenues** | $16,742 | $17,060 | $17,384 | $17,714 | $18,051 | $18,394 | $18,743 | $19,099 | $19,462 | $19,832 |
| **O&M Expenses** | | | | | | | | | | |
| Major Component Replacement | $0 | $0 | $0 | $0 | $4,000 | $0 | $0 | $0 | $0 | $4,000 |
| Annual Maintenance | $1,755 | $1,788 | $1,822 | $1,857 | $1,892 | $1,928 | $1,964 | $2,002 | $2,040 | $2,078 |
| **Sub-Total O&M** | $1,755 | $1,788 | $1,822 | $1,857 | $5,892 | $1,928 | $1,964 | $2,002 | $2,040 | $6,078 |
| **Debt Servicing** | | | | | | | | | | |
| Starting Balance | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Ending Balance | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Principal | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Interest | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Sub-Total Debt Servicing (P &I)** | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Revenues + O&M Exp + Interest** | $14,987 | $15,272 | $15,562 | $15,858 | $12,159 | $16,466 | $16,779 | $17,097 | $17,422 | $13,753 |
| **Total Cumulative Cash Flow** | $44,174 | $59,446 | $75,008 | $90,866 | $103,025 | $119,490 | $136,269 | $153,367 | $170,789 | $184,542 |
| **Total Cumulative Cash Flow After Depreciation** | $14,987 | $15,272 | $15,562 | $15,858 | $12,159 | $16,466 | $16,779 | $17,097 | $17,422 | $13,753 |
| | $44,174 | $59,446 | $75,008 | $90,866 | $103,025 | $119,490 | $136,269 | $153,367 | $170,789 | $184,542 |
| **Depreciation (Assumes Straight Line to Term)** | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 |
| **Total Net Income (excludes Depreciation)** | $14,987 | $15,272 | $15,562 | $15,858 | $12,159 | $16,466 | $16,779 | $17,097 | $17,422 | $13,753 |
| **Total Net Income (includes Depreciation)** | $9,880 | $10,165 | $10,455 | $10,750 | $7,052 | $11,359 | $11,672 | $11,990 | $12,315 | $8,646 |

**Choose a Scenario**

100% Equity / 0% Debt / No Ext Fund / 0 Year Term

| NPV/IRR Analysis | O&M + Int |
|---|---|
| Project NPV (based on Net Income) | $105,069 |
| Project IRR | 12.0% |
| Simple Payback | 7.7 yrs |

| Financing Scenario | Equity | Debt | Ext Fund | Term | NPV | IRR | SPB |
|---|---|---|---|---|---|---|---|
| 1 100% Equity / 0% Debt / No Ext Fund / 0 Year Term | 100% | 0% | $0 | 0 | $105,069 | 12.0% | 7.7 |
| 2 50% Equity / 50% Debt / No Ext Fund / 10 Year Term | 50% | 50% | $0 | 10 | $97,028 | 11.1% | 8.3 |
| 3 25% Equity / 75% Debt / No Ext Fund / 10 Year Term | 25% | 75% | $0 | 10 | $92,443 | 10.6% | 8.7 |
| 4 0% Equity / 100% Debt / No Ext Fund / 10 Year Term | 0% | 100% | $0 | 10 | $87,481 | 10.1% | 9.1 |
| 5 50% Equity / 50% Debt / No Ext Fund / 15 Year Term | 50% | 50% | $0 | 15 | $93,901 | 10.8% | 8.5 |
| 6 50% Equity / 50% Debt / No Ext Fund / 20 Year Term | 50% | 50% | $0 | 20 | $91,057 | 10.7% | 8.5 |






Location: Aerotech Wastewater Treatment Facility

Address: 449 Aerotech Drive, Goffs, NS, B2T 1K3

Latitude: 44°51'21.93"N

Property ID:

Longitude: 63°31'35.40"W

## Halifax Regional Water Commission

**Project Location:** Aerotech WWTF
**Project Details:** One 125 kW Solar PV Installation
**Completed By::** J. Knapp
**Date/Version:** September 15, 2021

**Preliminary**

**Aerotech WWTF**

**One 125 kW Solar PV Installation**

| Technical Assumptions | Value | Units |
|---|---|---|
| DC System Size | 148.25 | $kW_{dc}$ |
| AC System Size | 125.00 | $kW_{ac}$ |
| Module Type | Monocrystaline | |
| Array Type | Fixed, Roof Mount | |
| Module Output | 385 | W |
| No. of Modules | 385 | |
| Module Area | 1.938 | $m^2$ |
| Total Module Area (Panels Only) | 746.4 | $m^2$ |
| Total Module Area (Panels Only) | 886.0 | $m^2$ |
| Module Efficiency | 17.8% | |
| Inverter Efficiency | 96.0% | |
| System Losses | 11.84% | |
| Soiling | 2.0% | |
| Shading | 2.0% | |
| Snow | 2.0% | |
| Mismatch | 1.0% | |
| Wiring | 1.5% | |
| Connections | 0.5% | |
| Light-Induced Degredation | 1.5% | |
| Nameplate Rating | 1.0% | |
| Age | 0.0% | |
| Availability | 1.0% | |
| Tilt | 45.0 | deg. |
| Azimuth | 180.0 | deg. |
| Install Latitude | 44.85 | deg. N |
| Install Longitude | 63.54 | deg. W |
| Average Annual Energy Production | 187,769 | kWh/yr |
| Average Daily Irradiation | 4.33 | $kWh/m^2/day$ |
| Average Annual Irradiation | 1580.5 | $kWh/m^2/yr$ |
| GHG Reductions ($CO_2$ Equivalent) | 118 | Tonnes/yr |

**Comments**

As per Aztek/Raysolar Tender.
PV Array Info
- No. Modules = 308
- Module Tilt = 0 deg.
- Module Orientation = South 180 deg.

Module Info
- Manufacturer: Can Solar KuMax CS3U-390MS-AG
- Cell Type: Monocrystaline
- Dimensions: 2000 x 992 x 35 mm
- Electrical Specs (NMOT):
  - Vmp = 37.5 V, Voc = 45.3 V
  - Imp = 7.76 A, Isc = 8.20 A
- Warranty:
  - 10 Year Repair or Replacement
  - 25 Year Peak Power Degredation

Inverter Info
- No. of Inverters = 3
- Manufacturer: Solar Edge
- Model: SE33.3K
- Peak Output Power = 33300 VA
- Output Voltage = 480 Vac
- Output Current = 40 A x 3 Ph, per inverter
- Warranty: 20 Year

Branch Info
- Number of Optimizers = 114

| Financial/Economic Assumptions | Value | Units | Comments |
|---|---|---|---|
| Base Year Value of Power Sold | $118.55 | $/MWh | Based on 2022 NSPI rates, Rate Class 22 |
| Base Year Cost of Purchased Power | $118.55 | $/MWh | Based on 2022 NSPI rates, Rate Class 22 |
| Annual Maintenance | $0.010 | $/kWh | Cleaning, testing, inspecting. |
| Capacity Cost (DC) | $3,551 | $/kW_{DC}$ | |
| Capacity Cost (AC) | $4,211 | $/kW_{AC}$ | |
| Total Capital Cost | $526,384 | | Assumption |
| External Funding | 73.3% | | Assumption |
| Net Capital Cost | $140,387 | | |
| Debt | | | |
| Debt Contribution | 0% | | Assumption. Choose Scenario. |
| Total Debt Requirement | $0 | | |
| Cost of Debt | 3.62% | | As per W. Brake. |
| Equity | | | |
| Equity Contribution | 100% | | Assumption. Choose Scenario. |
| Total Equity Requirement | $140,387 | | |
| Cost of Equity | 3.00% | | Assumption |
| Weighted Average Cost of Capital | 3.00% | | |
| Corporate Discount Rate for NPV Analysis | 3.00% | | As per C. O'Toole |
| Annual Escalation Rate - Energy | 1.9% | | Assumption. |
| Harmonized Sales Tax (Net) | 4.286% | | As per W. Brake. |
| Labour Rate | $30.00 | /hr | $30.00/hr Average for WWTF Technicians |
| Benefit Costs | 23.0% | | As per C. O'Toole |
| Labour Hours | 1.0 | hrs/week | Estimate. |
| Amortization Term | 0.0 | years | Assumption. Choose Scenario. |
| Depreciation Term | 20.0 | years | Assumption |

**Solar Calculations**

| Month | AC System Output (kWh) | DC System Output (kWh) | Solar Radiation ($kWh/m^2/day$) | Plane of Array Irradiance ($W/m^2$) | Revenue ($ CDN) |
|---|---|---|---|---|---|
| January | 12405 | 12980 | 3.20 | 99.1 | $1,471 |
| February | 13958 | 14611 | 4.03 | 112.9 | $1,655 |
| March | 17973 | 18888 | 4.77 | 147.9 | $2,131 |
| April | 17499 | 18325 | 4.87 | 146.0 | $2,075 |
| May | 17667 | 18512 | 4.83 | 149.6 | $2,094 |
| June | 17137 | 17956 | 4.90 | 147.1 | $2,032 |
| July | 19042 | 19931 | 5.36 | 166.2 | $2,257 |
| August | 18836 | 19693 | 5.35 | 165.7 | $2,233 |
| September | 18256 | 19070 | 5.28 | 158.3 | $2,164 |
| October | 14830 | 15508 | 4.03 | 125.1 | $1,758 |
| November | 10448 | 10951 | 2.85 | 85.5 | $1,239 |
| December | 9718 | 10181 | 2.51 | 77.7 | $1,152 |
| **Annual** | 187769 | 196606 | 4.33 (avg.) | 131.8 (avg.) | $22,260 |

Ref. National Renewable Energy Laboratory
https://pvwatts.nrel.gov/

**Based on 20 year Power Purchase Agreement (PPA) with NSPI**

| | Capital Cost | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Base Data** | | | | | | | | | | | |
| Operating Period | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Operating Year | | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Generation Capacity (MWh) | | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 |
| **Income Statement** | | | | | | | | | | | |
| **Revenues** | | | | | | | | | | | |
| PPA Energy Price ($/MWh) | | $119 | $121 | $123 | $125 | $128 | $130 | $133 | $135 | $138 | $140 |
| Energy Revenues | | $23,214 | $23,655 | $24,105 | $24,563 | $25,029 | $25,505 | $25,989 | $26,483 | $26,986 | $27,499 |
| **Sub-Total Revenues** | | $23,214 | $23,655 | $24,105 | $24,563 | $25,029 | $25,505 | $25,989 | $26,483 | $26,986 | $27,499 |
| **O&M Expenses** | | | | | | | | | | | |
| Major Component Replacement | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $5,000 |
| Annual Maintenance | | $1,878 | $1,913 | $1,950 | $1,987 | $2,025 | $2,063 | $2,102 | $2,142 | $2,183 | $2,224 |
| **Sub-Total O&M** | | $1,878 | $1,913 | $1,950 | $1,987 | $2,025 | $2,063 | $2,102 | $2,142 | $2,183 | $7,224 |
| **Debt Servicing** | | | | | | | | | | | |
| Starting Balance | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Ending Balance | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Principal | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Interest | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Sub-Total Debt Servicing (P &I)** | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Revenues + O&M Exp + Interest** | ($140,387) | $21,336 | $21,742 | $22,155 | $22,576 | $23,005 | $23,442 | $23,887 | $24,341 | $24,804 | $20,275 |
| **Total Cumulative Cash Flow** | ($140,387) | ($119,050) | ($97,308) | ($75,154) | ($52,578) | ($29,573) | ($6,131) | $17,756 | $42,097 | $66,901 | $87,176 |
| **Total Cumulative Cash Flow After Depreciation** | ($140,387) | $21,336 | $21,742 | $22,155 | $22,576 | $23,005 | $23,442 | $23,887 | $24,341 | $24,804 | $20,275 |
| | | ($119,050) | ($97,308) | ($75,154) | ($52,578) | ($29,573) | ($6,131) | $17,756 | $42,097 | $66,901 | $87,176 |
| **Depreciation (Assumes Straight Line to Term)** | Term = 20 yr | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| | | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 |
| | Capital Cost | | | | | | | | | | |
| **Total Net Income (excludes Depreciation)** | ($140,387) | $21,336 | $21,742 | $22,155 | $22,576 | $23,005 | $23,442 | $23,887 | $24,341 | $24,804 | $20,275 |
| **Total Net Income (includes Depreciation)** | ($140,387) | $14,317 | $14,722 | $15,136 | $15,556 | $15,985 | $16,423 | $16,868 | $17,322 | $17,784 | $13,256 |

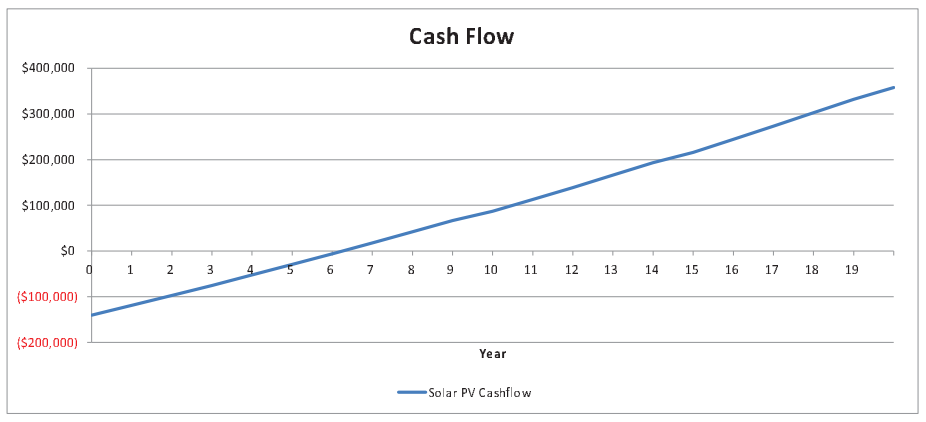
| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|
| Operating Period | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Operating Year | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 |
| Generation Capacity (MWh) | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 | 187.8 |
| PPA Energy Price ($/MWh) | $143 | $146 | $149 | $151 | $154 | $157 | $160 | $163 | $166 | $170 |
| Energy Revenues | $28,022 | $28,554 | $29,097 | $29,649 | $30,213 | $30,787 | $31,372 | $31,968 | $32,575 | $33,194 |
| **Sub-Total Revenues** | $28,022 | $28,554 | $29,097 | $29,649 | $30,213 | $30,787 | $31,372 | $31,968 | $32,575 | $33,194 |
| Major Component Replacement | $0 | $0 | $0 | $0 | $5,000 | $0 | $0 | $0 | $0 | $5,000 |
| Annual Maintenance | $2,267 | $2,310 | $2,353 | $2,398 | $2,444 | $2,490 | $2,538 | $2,586 | $2,635 | $2,685 |
| **Sub-Total O&M** | $2,267 | $2,310 | $2,353 | $2,398 | $7,444 | $2,490 | $2,538 | $2,586 | $2,635 | $7,685 |
| Starting Balance | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Ending Balance | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Principal | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Interest | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Sub-Total Debt Servicing (P &I)** | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Revenues + O&M Exp + Interest** | $25,755 | $26,244 | $26,743 | $27,251 | $22,769 | $28,297 | $28,834 | $29,382 | $29,940 | $25,509 |
| **Total Cumulative Cash Flow** | $112,931 | $139,175 | $165,918 | $193,169 | $215,938 | $244,235 | $273,069 | $302,451 | $332,391 | $357,901 |
| **Total Cumulative Cash Flow After Depreciation** | $25,755 | $26,244 | $26,743 | $27,251 | $22,769 | $28,297 | $28,834 | $29,382 | $29,940 | $25,509 |
| | $112,931 | $139,175 | $165,918 | $193,169 | $215,938 | $244,235 | $273,069 | $302,451 | $332,391 | $357,901 |
| **Depreciation (Assumes Straight Line to Term)** | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 | $7,019 |
| **Total Net Income (excludes Depreciation)** | $25,755 | $26,244 | $26,743 | $27,251 | $22,769 | $28,297 | $28,834 | $29,382 | $29,940 | $25,509 |
| **Total Net Income (includes Depreciation)** | $18,736 | $19,225 | $19,724 | $20,232 | $15,750 | $21,277 | $21,815 | $22,363 | $22,921 | $18,490 |

**Choose a Scenario**

100% Equity / 0% Debt / No Ext Fund / 0 Year Term

| NPV/IRR Analysis | O&M + Int |
|---|---|
| Project NPV (based on Net Income) | $218,210 |
| Project IRR | 15.7% |
| Simple Payback | 6.3 yrs |

| Financing Scenario | Equity | Debt | Ext Fund | Term | NPV | IRR | SPB |
|---|---|---|---|---|---|---|---|
| 1 100% Equity / 0% Debt / No Ext Fund / 0 Year Term | 100% | 0% | $0 | 0 | $218,210 | 15.7% | 6.3 |
| 2 50% Equity / 50% Debt / No Ext Fund / 10 Year Term | 50% | 50% | $0 | 10 | $207,158 | 14.8% | 6.7 |
| 3 25% Equity / 75% Debt / No Ext Fund / 10 Year Term | 25% | 75% | $0 | 10 | $200,856 | 14.3% | 7.0 |
| 4 0% Equity / 100% Debt / No Ext Fund / 10 Year Term | 0% | 100% | $0 | 10 | $194,037 | 13.7% | 7.3 |
| 5 50% Equity / 50% Debt / No Ext Fund / 15 Year Term | 50% | 50% | $0 | 15 | $202,860 | 14.6% | 6.8 |
| 6 50% Equity / 50% Debt / No Ext Fund / 20 Year Term | 50% | 50% | $0 | 20 | $198,951 | 14.4% | 6.8 |






Location: Halifax Water East/Central Operations Depot

Address: Jennett Avenue, Dartmouth, NS, B3B 0G9

Latitude: 44°42'57.79"N

Property ID:

Longitude: 63°34'18.31"W

## Halifax Regional Water Commission

**Project Location:** Jennett Avenue
**Project Details:** One 100 kW Solar PV Installation
**Completed By::** J. Knapp
**Date/Version:** September 15, 2021

**Preliminary**

**Jennett Avenue**

**One 100 kW Solar PV Installation**

| Technical Assumptions | Value | Units |
|---|---|---|
| DC System Size | 118.60 | $kW_{dc}$ |
| AC System Size | 100.00 | $kW_{ac}$ |
| Module Type | Monocrystaline | |
| Array Type | Fixed, Roof Mount | |
| Module Output | 385 | W |
| No. of Modules | 308 | |
| Module Area | 1.938 | $m^2$ |
| Total Module Area (Panels Only) | 597.1 | $m^2$ |
| Total Module Area (Panels Only) | 708.8 | $m^2$ |
| Module Efficiency | 17.8% | |
| Inverter Efficiency | 96.0% | |
| System Losses | 10.50% | |
| Soiling | 2.0% | |
| Shading | 0.0% | |
| Snow | 2.0% | |
| Mismatch | 1.0% | |
| Wiring | 1.5% | |
| Connections | 0.5% | |
| Light-Induced Degredation | 1.5% | |
| Nameplate Rating | 1.0% | |
| Age | 0.0% | |
| Availability | 1.0% | |
| Tilt | 35.0 | deg. |
| Azimuth | 180.0 | deg. |
| Install Latitude | 44.73 | deg. N |
| Install Longitude | 63.58 | deg. W |
| Average Annual Energy Production | 158,308 | kWh/yr |
| Average Daily Irradiation | 4.37 | $kWh/m^2/day$ |
| Average Annual Irradiation | 1595.1 | $kWh/m^2/yr$ |
| GHG Reductions ($CO_2$ Equivalent) | 100 | Tonnes/yr |

**Comments**

As per Aztek/Raysolar Tender.
PV Array Info
No. Modules = 308
Module Tilt = 0 deg.
Module Orientation = South 180 deg.
Module Info
Manufacturer: Can Solar KuMax CS3U-390MS-AG
Cell Type: Monocrystaline
Dimensions: 2000 x 992 x 35 mm
Electrical Specs (NMOT):
Vmp = 37.5 V, Voc = 45.3 V
Imp = 7.76 A, Isc = 8.20 A
Warranty:
10 Year Repair or Replacement
25 Year Peak Power Degredation
Inverter Info
No. of Inverters = 3
Manufacturer: Solar Edge
Model: SE33.3K
Peak Output Power = 33300 VA
Output Voltage = 480 Vac
Output Current = 40 A x 3 Ph, per inverter
Warranty: 20 Year
Branch Info
Number of Optimizers = 114

| Financial/Economic Assumptions | Value | Units | Comments |
|---|---|---|---|
| Base Year Value of Power Sold | $95.41 | $/MWh | Based on 2022 NSPI rates, Rate Class 11 |
| Base Year Cost of Purchased Power | $95.41 | $/MWh | Based on 2022 NSPI rates, Rate Class 11 |
| Annual Maintenance | $0.010 | $/kWh | Cleaning, testing, inspecting. |
| Capacity Cost (DC) | $3,229 | $/kW_{DC}$ | |
| Capacity Cost (AC) | $3,830 | $/kW_{AC}$ | |
| Total Capital Cost | $382,990 | | Assumption |
| External Funding | 73.3% | | Assumption |
| Net Capital Cost | $102,143 | | |
| Debt | | | |
| Debt Contribution | 0% | | Assumption. Choose Scenario. |
| Total Debt Requirement | $0 | | |
| Cost of Debt | 3.62% | | As per W. Brake. |
| Equity | | | |
| Equity Contribution | 100% | | Assumption. Choose Scenario. |
| Total Equity Requirement | $102,143 | | |
| Cost of Equity | 3.00% | | Assumption |
| Weighted Average Cost of Capital | 3.00% | | |
| Corporate Discount Rate for NPV Analysis | 3.00% | | As per C. O'Toole |
| Annual Escalation Rate - Energy | 1.9% | | Assumption. |
| Harmonized Sales Tax (Net) | 4.286% | | As per W. Brake. |
| Labour Rate | $30.00 | /hr | $30.00/hr Average for WWTF Technicians |
| Benefit Costs | 23.0% | | As per C. O'Toole |
| Labour Hours | 1.0 | hrs/week | Estimate. |
| Amortization Term | 0.0 | years | Assumption. Choose Scenario. |
| Depreciation Term | 20.0 | years | Assumption |

| Solar Calculations | | | | | |
|---|---|---|---|---|---|
| Month | AC System Output (kWh) | DC System Output (kWh) | Solar Radiation ($kWh/m^2/day$) | Plane of Array Irradiance ($W/m^2$) | Revenue ($ CDN) |
| January | 9967 | 10318 | 3.03 | 94.0 | $951 |
| February | 11446 | 11853 | 3.93 | 109.9 | $1,092 |
| March | 15646 | 16390 | 4.98 | 154.3 | $1,493 |
| April | 15095 | 15714 | 5.04 | 151.1 | $1,440 |
| May | 16382 | 16982 | 5.37 | 166.4 | $1,563 |
| June | 14984 | 15533 | 5.17 | 155.1 | $1,430 |
| July | 16561 | 17146 | 5.58 | 172.9 | $1,580 |
| August | 16392 | 16957 | 5.59 | 173.3 | $1,564 |
| September | 15120 | 15640 | 5.24 | 157.3 | $1,443 |
| October | 11921 | 12339 | 3.86 | 119.6 | $1,137 |
| November | 8003 | 8307 | 2.56 | 76.8 | $764 |
| December | 6792 | 7059 | 2.08 | 64.4 | $648 |
| Annual | 158308 | 164237 | 4.37 (avg.) | 132.9 (avg.) | $15,104 |

Ref. National Renewable Energy Laboratory
https://pvwatts.nrel.gov/

**Based on 20 year Power Purchase Agreement (PPA) with NSPI**

| | Capital Cost | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Base Data** | | | | | | | | | | | |
| Operating Period | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Operating Year | | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Generation Capacity (MWh) | | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 |
| **Income Statement** | | | | | | | | | | | |
| **Revenues** | | | | | | | | | | | |
| PPA Energy Price ($/MWh) | | $95 | $97 | $99 | $101 | $103 | $105 | $107 | $109 | $111 | $113 |
| Energy Revenues | | $15,105 | $15,392 | $15,685 | $15,983 | $16,286 | $16,596 | $16,911 | $17,232 | $17,560 | $17,893 |
| **Sub-Total Revenues** | | $15,105 | $15,392 | $15,685 | $15,983 | $16,286 | $16,596 | $16,911 | $17,232 | $17,560 | $17,893 |
| **O&M Expenses** | | | | | | | | | | | |
| Major Component Replacement | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $4,000 |
| Annual Maintenance | | $1,583 | $1,613 | $1,644 | $1,675 | $1,707 | $1,739 | $1,772 | $1,806 | $1,840 | $1,875 |
| **Sub-Total O&M** | | $1,583 | $1,613 | $1,644 | $1,675 | $1,707 | $1,739 | $1,772 | $1,806 | $1,840 | $5,875 |
| **Debt Servicing** | | | | | | | | | | | |
| Starting Balance | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Ending Balance | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Principal | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Interest | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Sub-Total Debt Servicing (P &I)** | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Revenues + O&M Exp + Interest** | ($102,143) | $13,522 | $13,779 | $14,041 | $14,308 | $14,579 | $14,856 | $15,139 | $15,426 | $15,719 | $12,018 |
| **Total Cumulative Cash Flow** | ($102,143) | ($88,621) | ($74,842) | ($60,801) | ($46,494) | ($31,915) | ($17,058) | ($1,919) | $13,507 | $29,226 | $41,244 |
| **Total Cumulative Cash Flow After Depreciation** | ($102,143) | $13,522 | $13,779 | $14,041 | $14,308 | $14,579 | $14,856 | $15,139 | $15,426 | $15,719 | $12,018 |
| | | ($88,621) | ($74,842) | ($60,801) | ($46,494) | ($31,915) | ($17,058) | ($1,919) | $13,507 | $29,226 | $41,244 |
| **Depreciation (Assumes Straight Line to Term)** | Term = 20 yr | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| | | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 |
| **Total Net Income (excludes Depreciation)** | ($102,143) | $13,522 | $13,779 | $14,041 | $14,308 | $14,579 | $14,856 | $15,139 | $15,426 | $15,719 | $12,018 |
| **Total Net Income (includes Depreciation)** | ($102,143) | $8,415 | $8,672 | $8,934 | $9,200 | $9,472 | $9,749 | $10,031 | $10,319 | $10,612 | $6,911 |

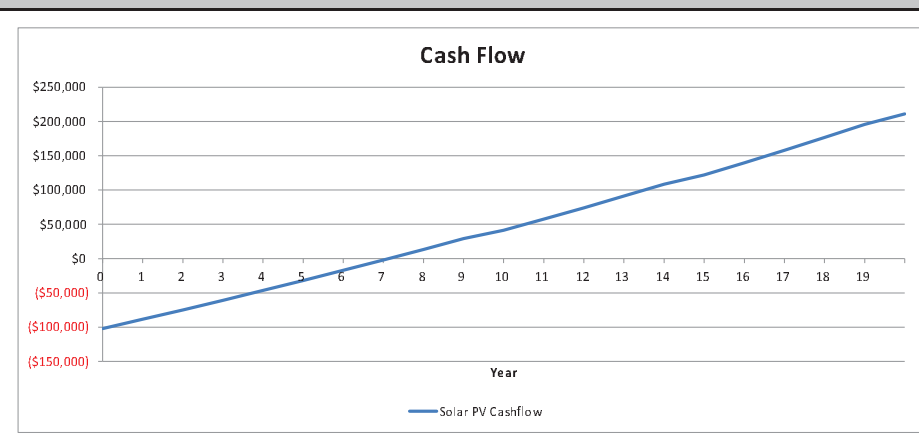
| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|
| Operating Period | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Operating Year | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 |
| Generation Capacity (MWh) | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 | 158.3 |
| PPA Energy Price ($/MWh) | $115 | $117 | $120 | $122 | $124 | $127 | $129 | $131 | $134 | $136 |
| Energy Revenues | $18,233 | $18,580 | $18,933 | $19,292 | $19,659 | $20,032 | $20,413 | $20,801 | $21,196 | $21,599 |
| **Sub-Total Revenues** | $18,233 | $18,580 | $18,933 | $19,292 | $19,659 | $20,032 | $20,413 | $20,801 | $21,196 | $21,599 |
| Major Component Replacement | $0 | $0 | $0 | $0 | $4,000 | $0 | $0 | $0 | $0 | $4,000 |
| Annual Maintenance | $1,911 | $1,947 | $1,984 | $2,022 | $2,060 | $2,099 | $2,139 | $2,180 | $2,221 | $2,264 |
| **Sub-Total O&M** | $1,911 | $1,947 | $1,984 | $2,022 | $6,060 | $2,099 | $2,139 | $2,180 | $2,221 | $6,264 |
| Starting Balance | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Ending Balance | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Principal | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Interest | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Sub-Total Debt Servicing (P &I)** | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Revenues + O&M Exp + Interest** | $16,322 | $16,632 | $16,948 | $17,270 | $13,599 | $17,933 | $18,274 | $18,621 | $18,975 | $15,335 |
| **Total Cumulative Cash Flow** | $57,566 | $74,199 | $91,147 | $108,418 | $122,016 | $139,949 | $158,222 | $176,843 | $195,818 | $211,153 |
| **Total Cumulative Cash Flow After Depreciation** | $16,322 | $16,632 | $16,948 | $17,270 | $13,599 | $17,933 | $18,274 | $18,621 | $18,975 | $15,335 |
| | $57,566 | $74,199 | $91,147 | $108,418 | $122,016 | $139,949 | $158,222 | $176,843 | $195,818 | $211,153 |
| **Depreciation (Assumes Straight Line to Term)** | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 | $5,107 |
| **Total Net Income (excludes Depreciation)** | $16,322 | $16,632 | $16,948 | $17,270 | $13,599 | $17,933 | $18,274 | $18,621 | $18,975 | $15,335 |
| **Total Net Income (includes Depreciation)** | $11,215 | $11,525 | $11,841 | $12,163 | $8,491 | $12,826 | $13,166 | $13,514 | $13,867 | $10,228 |

**Choose a Scenario**

100% Equity / 0% Debt / No Ext Fund / 0 Year Term

| NPV/IRR Analysis | O&M + Int |
|---|---|
| Project NPV (based on Net Income) | $123,936 |
| Project IRR | 13.3% |
| Simple Payback | 7.1 yrs |

| Financing Scenario | Equity | Debt | Ext Fund | Term | NPV | IRR | SPB |
|---|---|---|---|---|---|---|---|
| 1 100% Equity / 0% Debt / No Ext Fund / 0 Year Term | 100% | 0% | $0 | 0 | $123,936 | 13.3% | 7.1 |
| 2 50% Equity / 50% Debt / No Ext Fund / 10 Year Term | 50% | 50% | $0 | 10 | $115,895 | 12.4% | 7.7 |
| 3 25% Equity / 75% Debt / No Ext Fund / 10 Year Term | 25% | 75% | $0 | 10 | $111,310 | 11.9% | 8.0 |
| 4 0% Equity / 100% Debt / No Ext Fund / 10 Year Term | 0% | 100% | $0 | 10 | $106,348 | 11.4% | 8.4 |
| 5 50% Equity / 50% Debt / No Ext Fund / 15 Year Term | 50% | 50% | $0 | 15 | $112,768 | 12.2% | 7.8 |
| 6 50% Equity / 50% Debt / No Ext Fund / 20 Year Term | 50% | 50% | $0 | 20 | $109,924 | 12.0% | 7.8 |



## Halifax Regional Water Commission

**Project Location:** Combined Projects
**Project Details:** Four Solar PV Systems - 425 $kW_{ac}$ Total
**Completed By:** J. Knapp
**Date/Version:** September 15, 2021

**Preliminary**

**Combined Projects**
Four Solar PV Systems - 425 kWAC Total

| Technical Assumptions | Value | Units |
|---|---|---|
| DC System Size | 544.05 | $kW_{dc}$ |
| AC System Size | 425.00 | $kW_{ac}$ |
| Module Type | Monocrystalline | |
| Array Type | Fixed, Roof Mount | |
| Module Output | 365 | W |
| No. of Modules | 1,309 | |
| Module Area | 1,938 | $m^2$ |
| Total Module Area (Panels Only) | 2537.8 | $m^2$ |
| Total Module Area (Panels Only) | 3012.4 | $m^2$ |
| Module Efficiency | 17.8% | |
| Inverter Efficiency | 96.0% | |
| System Losses | 10.50% | |
| Soiling | 2.0% | |
| Shading | 0.0% | |
| Snow | 2.0% | |
| Mismatch | 1.0% | |
| Wiring | 1.5% | |
| Connections | 0.5% | |
| Light-Induced Degredation | 1.5% | |
| Nameplate Rating | 1.0% | |
| Age | 0.0% | |
| Availability | 1.0% | |
| Tilt | | deg, |
| Azimuth | | deg, |
| Insol. Latitude | | deg, N |
| Insol. Longitude | | deg, W |
| Average Annual Energy Production | 616,751 | kWh/yr |
| Average Daily Irradiation | 4.26 | $kWh/m^2/day$ |
| Average Annual Irradiation | 1,131.67 | $kWh/m^2/yr$ |
| GHG Reductions ($CO_2$ Equivalent) | 287.62 | Tonnes/yr |

| Comments |
|---|
| **Power Inverter Type:** |
| SMA Inverters |
| No. Models = 10 |
| Models Tl = 3 Inv. |
| Models Ontario = South 155 Inv. |
| Module Info: |
| Manufacturer Canadian Solar/Kuma CS3N-410MS-AG |
| Cell Type: Monocrystalline |
| Dimensions 2015 x 991 x 35 mm |
| Electrical Data (STC): |
| Vmp = 37.3 V, Voc = 45.1 V |
| Imp = 7.71 A, Isc = 8.21 A |
| Warranty: |
| 10 Year Material and Workmanship |
| 25 Year Peak Power Guarantee |
| Inverter Info: |
| No. of Inverters = 1 |
| Manufacturer: Schneider |
| Model: SCS125K |
| Peak Output Power = 131000 VA |
| Output Voltage = 480 Vac |
| Output Current = 454 A x 3 Phase |
| Warranty: 10 Year |
| Racking Info: |
| Number of Units Needed = 314 |

| Financial/Economic Assumptions | Value | Units | Comments |
|---|---|---|---|
| Base Year Value of Power Sold | $86.7679 | $/MWh | Combined, Based on 2021 NSPI Rates |
| Base Year Cost of Purchased Power | $86.7679 | $/MWh | Combined, Based on 2021 NSPI Rates |
| Annual Maintenance | $0.010 | $/kWh | Citizens, Income Assumptions. |
| Capacity Cost (DC) | $3,324 | $/kW_dc | |
| Capacity Cost (AC) | $3,942 | $/kW_ac | |
| Total Capital Cost | $1,675,335 | | Assumption |
| External Funding | 79.31% | | Assumption |
| Net Capital Cost | $346,817 | | |
| Debt | | | |
| Debt Contribution | 0% | | Assumption, Discussions. |
| Total Debt Requirement | $0 | | |
| Cost of Debt | 3.62% | | Average Weighted. |
| Equity | | | |
| Equity Contribution | 100% | | Assumption, Discussions. |
| Total Equity Requirement | $346,817 | | |
| Cost of Equity | 3.00% | | Assumption |
| Weighted Average Cost of Capital | 3.00% | | |
| Corporate Discount Rate for NPV Analysis | 3.00% | | Average Client |
| Annual Escalation Rate - Energy | 1.9% | | Assumption, |
| Harmonized Sales Tax (Nova | 4.280% | | Average Weighted. |
| Labour Rate | $30.00 | /hr | $15 Electrician Assistant/WWTP Technicians |
| Benefit Costs | 20.0% | | Average Client |
| Labour Hours | 1.0 | hrs/week | Estimate. |
| Amortization Term | 0.0 | years | Assumption, Discussions. |
| Depreciation Term | 20.0 | years | Assumption |

| Overall Prod. + Revenue | | | |
|---|---|---|---|
| 450 Cowie | 145,357 | $0.200000 | $13,082 |
| 455 Cowie | 145,357 | $0.200000 | $13,082 |
| Commons Ave | 158,306 | $0.200000 | $14,248 |
| Aerotech WWT | 187,769 | $0.111855 | $22,260 |
| | 636,790 | | 62,672 |
| | Blended Rate ($/kWh): | | $98,4185 |

**Based on 20 year Power Purchase Agreements (PPA) with NSPI**

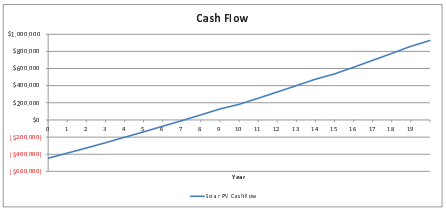
| Basic Data | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operating Period | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Operating Year | | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 |
| Generation Capacity (MWh) | | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 | 636 |
| **Income Statement** | | | | | | | | | | | | | | | | | | | | | |
| **Revenues** | | | | | | | | | | | | | | | | | | | | | |
| PPA Energy Price ($/MWh) | | $99 | $101 | $103 | $105 | $107 | $109 | $111 | $113 | $115 | $117 | $119 | $122 | $124 | $126 | $129 | $131 | $134 | $136 | $139 | $141 |
| Energy Revenues | | $65,913 | $66,859 | $68,120 | $69,414 | $70,743 | $72,077 | $73,447 | $74,842 | $76,264 | $77,713 | $79,190 | $80,694 | $82,227 | $83,790 | $85,382 | $87,004 | $88,657 | $90,342 | $92,058 | $93,807 |
| **Sub-Total Revenues** | | $65,913 | $66,859 | $68,120 | $69,414 | $70,743 | $72,077 | $73,447 | $74,842 | $76,264 | $77,713 | $79,190 | $80,694 | $82,227 | $83,790 | $85,382 | $87,004 | $88,657 | $90,342 | $92,058 | $93,807 |
| **O&M Expenses** | | | | | | | | | | | | | | | | | | | | | |
| Major Component Replacement | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $17,000 | $0 | $0 | $0 | $0 | $0 | $17,000 | $0 | $0 | $0 | $17,000 |
| Annual Maintenance | | $6,368 | $6,489 | $6,612 | $6,738 | $6,866 | $6,996 | $7,129 | $7,265 | $7,403 | $7,543 | $7,687 | $7,833 | $7,982 | $8,133 | $8,288 | $8,445 | $8,606 | $8,769 | $8,936 | $9,106 |
| **Sub-Total O&M** | | $6,368 | $6,489 | $6,612 | $6,738 | $6,866 | $6,996 | $7,129 | $7,265 | $7,403 | $24,543 | $7,687 | $7,833 | $7,982 | $8,133 | $25,288 | $8,445 | $8,606 | $8,769 | $8,936 | $26,106 |
| **Debt Servicing** | | | | | | | | | | | | | | | | | | | | | |
| Starting Balance | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Ending Balance | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Principal | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Interest | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Sub-Total Debt Servicing (P &I)** | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | Capital Cost | | | | | | | | | | | | | | | | | | | | |
| Revenues + O&M Exp + Interest | ($446,817) | $59,236 | $60,361 | $61,508 | $62,677 | $63,867 | $65,081 | $66,317 | $67,577 | $68,861 | $53,170 | $71,503 | $72,862 | $74,246 | $75,657 | $60,094 | $78,559 | $80,051 | $81,572 | $83,122 | $67,702 |
| Total Cumulative Cash Flow | ($446,817) | ($387,582) | ($327,221) | ($265,713) | ($203,036) | ($139,169) | ($74,088) | ($7,771) | $59,807 | $128,668 | $181,838 | $253,341 | $326,203 | $400,448 | $476,105 | $536,199 | $614,758 | $694,809 | $776,382 | $859,504 | $927,206 |
| Total Cumulative Cash Flow After Depreciation | ($446,817) | $59,236 | $60,361 | $61,508 | $62,677 | $63,867 | $65,081 | $66,317 | $67,577 | $68,861 | $53,170 | $71,503 | $72,862 | $74,246 | $75,657 | $60,094 | $78,559 | $80,051 | $81,572 | $83,122 | $67,702 |
| | | ($387,582) | ($327,221) | ($265,713) | ($203,036) | ($139,169) | ($74,088) | ($7,771) | $59,807 | $128,668 | $181,838 | $253,341 | $326,203 | $400,448 | $476,105 | $536,199 | $614,758 | $694,809 | $776,382 | $859,504 | $927,206 |
| Depreciation (Assumes Straight Line to Term) | Term = 20 yr | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% | 5.0% |
| | | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 | $22,341 |
| | Capital Cost | | | | | | | | | | | | | | | | | | | | |
| Total Net Income (excludes Depreciation) | ($446,817) | $59,236 | $60,361 | $61,508 | $62,677 | $63,867 | $65,081 | $66,317 | $67,577 | $68,861 | $53,170 | $71,503 | $72,862 | $74,246 | $75,657 | $60,094 | $78,559 | $80,051 | $81,572 | $83,122 | $67,702 |
| Total Net Income (includes Depreciation) | ($446,817) | $36,895 | $38,020 | $39,167 | $40,336 | $41,527 | $42,740 | $43,977 | $45,237 | $46,521 | $30,829 | $49,162 | $50,521 | $51,905 | $53,316 | $37,753 | $56,218 | $57,711 | $59,232 | $60,781 | $45,361 |

Choose a Scenario

100% Equity / 0% Debt / No Ext Fund / 0 Year Term

| NPV / IRR Analysis | O&M Mix Inv. |
|---|---|
| Project NPV (based on Net Income) | $544,532 |
| Project IRR | 13.4% |
| Simple Payback | 7.1 yrs |

| Financing Scenario | Equity | Debt | Ext Fund | Term | NPV | IRR | SPB |
|---|---|---|---|---|---|---|---|
| 1 100% Equity / 0% Debt / No Ext Fund / 0 Year Term | 100% | 0% | $0 | 0 | $544,532 | 13.4% | 7.1 |
| 2 50% Equity / 50% Debt / No Ext Fund / 10 Year Term | 50% | 50% | $0 | 10 | $509,357 | 12.2% | 7.7 |
| 3 25% Equity / 75% Debt / No Ext Fund / 10 Year Term | 25% | 75% | $0 | 10 | $480,299 | 12.2% | 8 yr |
| 4 0% Equity / 100% Debt / No Ext Fund / 10 Year Term | 0% | 100% | $0 | 10 | $467,594 | 11.4% | 8 yr |
| 5 50% Equity / 50% Debt / No Ext Fund / 15 Year Term | 50% | 50% | $0 | 15 | $495,679 | 12.2% | 7 yr |
| 6 50% Equity / 50% Debt / No Ext Fund / 20 Year Term | 50% | 50% | $0 | 20 | $480,327 | 12.1% | 7 yr |



**ITEM # 5.3**
**Halifax Water Board**
**September 23, 2021**
**ATTACHMENT 2**

Stantec

# Halifax Water Community Solar Projects – Climate Lens Part 1: Greenhouse Gas Mitigation Assessment

Final Report

May 18, 2021

Prepared for:

Halifax Water
450 Cowie Hill Road
PO Box 8388 RPO CSC
Halifax NS  B3K 5M1

Prepared by:

Stantec Consulting Ltd.
165 Maple Hills Avenue
Charlottetown PE  C1C 1N9

File: 121416840

# Attestation of Completeness

I/we the undersigned attest that this GHG Mitigation Assessment was undertaken using recognized assessment tools and approaches (i.e., *ISO 14064-2: Specification with guidance at the project level for quantification, monitoring, and reporting of greenhouse gas emissions reductions or removal enhancements, and the GHG Protocol for Project Accounting) and* complies with the General Guidance and any relevant sector-specific technical guidance issued by Infrastructure Canada for use under the Climate Lens.

Respectfully submitted,

**Stantec Consulting Ltd.**




**Vicki Corning**, P.Eng.
Senior Associate,
Environmental Services
Tel: (506) 440-6726
Vicki.Corning@stantec.com




**Brian Bylhouwer**, M.R.M.
Associate, Environmental Services
Tel: (902) 620-0258
Brian.Bylhouwer@stantec.com

# Table of Contents

**EXECUTIVE SUMMARY** ..... **II**

**ABBREVIATIONS** ..... **IV**

**1.0 INTRODUCTION** ..... **1**
1.1 PURPOSE ..... 1

**2.0 METHODOLOGY** ..... **2**
2.1 PROJECT BOUNDARY ..... 2
2.1.1 Project Overview and Spatial Boundaries ..... 2
2.1.2 Temporal Boundaries ..... 4
2.2 GREENHOUSE GASES CONSIDERED ..... 4
2.3 GHG EMISSIONS - SCOPES ..... 5
2.4 GHG EMISSION CALCULATION PROCEDURES ..... 6
2.5 ASSUMPTIONS ..... 7
2.5.1 Construction ..... 7
2.5.2 Operation ..... 8

**3.0 GHG MITIGATION ASSESSMENT** ..... **9**
3.1 BASELINE SCENARIO ..... 9
3.2 PROJECT SCENARIO ..... 9
3.3 PROJECT NET GHG EMISSIONS ..... 9
3.4 COST-PER-TONNE ..... 9
3.5 GHG MITIGATION ACTIONS ..... 9
3.5.1 Construction ..... 10
3.5.2 Operation ..... 10

**4.0 CLOSURE** ..... **11**

## LIST OF TABLES

Table 1 Project Funding and GHG Emissions Summary ..... iii
Table 2 Sources of GHG Emissions – Project and Baseline Scenarios ..... 6
Table A-1 EEIO GHG Emission Factors ..... Appendix A
Table A-2 Baseline Scenario Natural Gas and Electricity Consumption and Operating Periods ..... Appendix A
Table B-1 Project GHG Emissions Estimates ..... Appendix B

## LIST OF APPENDICES

Appendix A Assessment of Construction and Operation GHG Emissions
Appendix B Detailed GHG Emissions Tables
Appendix C References

# Executive Summary

Halifax Water (the Proponent) proposes to install 425 kW AC of solar photovoltaic power across four different Halifax Water locations to reduce GHG emissions from operations. Construction is expected to take place from Fall 2021 to April 2024, and the Project is expected to have a lifetime of 25 years and therefore the Project's useful life is assumed to be 25 years for this assessment.

Halifax Water is seeking federal funding under the Investing in Canada Infrastructure Program (ICIP). The total expected cost for the Project is $1,675,354 and the total federal funding request is $670,142. This Greenhouse Gas (GHG) Mitigation Assessment has been prepared in accordance with the Infrastructure Canada requirements, specifically their Climate Lens General Guidance v.1.2 (the Guidance) (Infrastructure Canada 2019). The objective of the GHG Mitigation Assessment is to estimate the expected GHG emissions associated with the Project and to estimate the potential changes in GHGs associated with the Project compared to a functionally equivalent baseline scenario. For this assignment, the baseline scenario is the absence of the Project, meaning that the solar energy project would not be constructed and electricity usage at the four facilities would still be entirely provided by the Nova Scotia electrical grid.

Baseline related GHG emissions included the following assumptions:

- There are no construction-related GHG emissions associated with the baseline scenario.
- Electricity at the four sites would be provided solely by the Nova Scotia Power Inc. electricity grid.

Project related GHG emissions include those generated during the following activities:

- Construction of the solar power systems.
- The balance of electricity consumption required at the four locations would still be provided by the Nova Scotia Power Inc. electricity grid.

Emissions related to maintenance of the solar power systems have not been quantified due to the unavailability of data; however, these GHG emissions are not expected to be substantive compared to construction or operational emissions and would be less than or equivalent to maintenance of the electricity supply in the baseline scenario.

The baseline scenario activities that generate GHG emissions are estimated to result in the release of 29,653 tonnes of carbon dioxide equivalent (t $CO_2e$) over 25 years. For the Project, the related GHG emissions from the construction period are estimated to result in the release of 390 t $CO_2e$. Activities during operation of the Project are expected to result in the release of approximately 23,688 t $CO_2e$. The total net Project emissions are estimated to be 24,078 t $CO_2e$ over the lifetime of the Project including operation and construction. The Project is expected to result in a net cumulative decrease of 5,576 t $CO_2e$ over the baseline scenario as a result of the use of solar power to decrease the required use of electricity from the grid.



Summaries of the funding for the Project and the expected GHG emissions are provided in Table 1.

**Table 1 Project Funding and GHG Emissions Summary**

| Aspect | Value | Units |
|---|---|---|
| Total Project Costs | 1,675,354 | $ |
| Total Requested Funding Contribution | 670,142 | $ |
| | | |
| Baseline GHG emissions in 2030 | 1,086 | t CO2e |
| Project GHG emissions in 2030 | 856 | t CO2e |
| Net GHG emissions decrease in 2030 | 231 | t CO2e |
| Federal Dollars/GHG Emissions Reduction in 2030 | 2,906 | $/t CO2e |
| | | |
| Baseline GHG emissions - cumulative to 2030 | 13,361 | t CO2e |
| Project GHG emissions - cumulative to 2030 | 11,244 | t CO2e |
| Net GHG emissions decrease - cumulative to 2030 | 2,117 | t CO2e |
| Federal Dollars/GHG emissions reduction by 2030 | 317 | $/t CO2e |
| | | |
| Baseline scenario GHG emissions, lifetime | 29,653 | t CO2e |
| Project scenario GHG emissions, lifetime | 24,078 | t CO2e |
| Net GHG emissions decrease, lifetime | 5,576 | t CO2e |
| Total Project Cost/Lifetime GHG emissions reduction | 300 | $/t CO2e |



# ITEM # 6
**Halifax Water Board**

**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Digitally signed by Louis de Montbrun Date: 2021.09.17 09:51:13 -03'00'

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

**APPROVED:** Cathie O'Toole Digitally signed by Cathie O'Toole Date: 2021.09.17 09:24:07 -03'00'

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

**DATE:** August 24, 2021

**SUBJECT:** **Procurement Policy Updates**

## ORIGIN

Halifax Water proactively initiated a review of the Procurement Policy and practice as a result of HALIFAX amendments to their procurement policy in 2020 (Administrative Order 2020-004-ADM), and the Municipal Auditor General's 2018 audit of municipal procurement.
On September 2, 2021, the Audit and Finance Committee approved the following motion:

It is recommended that the Audit and Finance Committee recommend that the Halifax Regional Water Commission Board approve the updated Procurement Policy, effective November 1, 2021.

## RECOMMENDATION

It is recommended that the Halifax Water Board approve the updated Procurement Policy, effective November 1, 2021.

## BACKGROUND

The Procurement Policy was reviewed and amended in 2017 to reflect the Canada-EU Comprehensive Economic and Trade Agreement (CETA) which became effective July 1, 2017.

The Procurement Policy has recently been reviewed by Legal Counsel and Procurement as part of an overall review of Procurement processes and procedures. A review was also completed on the process manual, contract templates and tender templates.

## DISCUSSION

The Procurement Policy has been revised. The key changes to the Procurement Policy are:

- Simplified the Policy by moving the process portions to the Procurement Manual;
- Increased the minimum threshold amount for Invitational Competition from $2,500 to $5,000;
- Social Responsibility considerations have been added;
- Supplier Performance & Disqualification section has been expanded and strengthened;
- Disposal of surplus material section has been removed and will become a standalone policy; and
- Complaint process is more clearly defined with timelines.

The Procurement Policy will be complimented with the Process Manual which will provide detailed guidance to staff on the various procurement.

In addition, the contract templates have been updated, streamlined and simplified by the Halifax Water's Legal Counsel.

Halifax Water has engaged *The Procurement Office,* a procurement consulting firm, to provide updated tendering templates. Halifax Water has access to *The Procurement Office's* full suite of recently updated tendering templates which are based on the latest case law and leading global industry standards. The tendering templates ensure compliance across all applicable guidelines, statutes and laws and are tailored, streamlined and in a consistent format that will allow us to improve the tendering cycle while reducing risk and exposure.

## ATTACHMENTS

1. Procurement Policy, updated version 2021
2. Procurement Policy prior version 2017

Report prepared by: Digitally signed by Michelle Comeau DN: cn=Michelle Comeau, o=Halifax Water, ou=Manager, Procurement, email=michellec@halifaxwater.ca, c=CA Date: 2021.09.17 09:11:04 -03'00'

Michelle Comeau, B.Comm., CPPO, CPPB
Manager, Procurement (902) 219-4813

# Halifax Water Procurement Policy

DRAFT

Approved September 2021

STRAIGHT from the SOURCE

Halifax Water

## TABLE OF CONTENTS


1. PURPOSE ..... 1
2. PRINCIPLES ..... 1
   - 2.1 Fair, Open and Transparent ..... 1
   - 2.2 Proper Planning ..... 1
   - 2.3 Avoiding Conflict of Interest ..... 1
   - 2.4 Geographic Neutrality and Non-Discrimination ..... 1
   - 2.5 Accountability ..... 1
   - 2.6 Sustainability ..... 1
   - 2.7 Social Responsibility ..... 1
   - 2.8 Best Value ..... 1
3. SCOPE ..... 2
4. METHODS OF PROCUREMENT ..... 2
   - 4.1 Standing Offers ..... 2
   - 4.2 Invitational Competition ..... 2
   - 4.3 Open Competition ..... 3
   - 4.4 Alternative Procurement ..... 3
     - 4.4.1 No proposals were submitted ..... 3
     - 4.4.2 No suppliers requested participation ..... 3
     - 4.4.3 No supplier satisfied the conditions ..... 3
     - 4.4.4 Suspected collusion among bidders/suppliers ..... 3
     - 4.4.5 Supplied only by a particular supplier ..... 3
     - 4.4.6 Urgent need arises due to health or safety ..... 3
   - 4.5 Joint Procurement ..... 3
5. EXEMPTIONS ..... 4
   - 5.1 Legal services ..... 4
   - 5.2 Insurance services ..... 4


DRAFT

5.3 Banking services ..... 4
5.4 Professional consulting services (valued less than $100,000) ..... 4
5.5 Accountant services (excluding audit services) ..... 4
5.6 Actuary services ..... 4
5.7 Training and education opportunities ..... 4
5.8 Refundable employee expenses ..... 4
5.9 Employer general expenses ..... 4
5.10 Miscellaneous items ..... 4
6. PUBLISHING INTENTION TO PROCURE ..... 4
7. EVALUATION, TIE BIDS AND CONTRACT AWARD ..... 4
8. DISQUALIFICATION ..... 5
8.1 Failed to honour a bid ..... 5
8.2 Failed to disclose a conflict of interest ..... 5
8.3 Engaged in unethical bidding practices ..... 5
8.4 Been convicted of a crime ..... 5
8.5 Submitted a consumer proposal and/or claimed bankruptcy ..... 5
8.6 Performed inadequately for Halifax Water ..... 5
9. DEBRIEFINGS ..... 5
10. COMPLAINTS ..... 5
11. SUPPLIER PERFORMANCE MANAGEMENT ..... 6
12. CONFLICTS OF INTEREST ..... 6
13. CONFIDENTIALITY ..... 6
14. GENERAL ..... 6

DRAFT

# Halifax Water Procurement Policy

## 1. PURPOSE

The purpose of this Policy is to establish guidelines for procurement of goods, services and construction for Halifax Water

## 2. PRINCIPLES

Procurement at Halifax Water will be undertaken in accordance with the following principles:

### 2.1 FAIR, OPEN AND TRANSPARENT

Access for qualified suppliers to compete for Halifax Water's business must be open and the procurement process must be conducted in a fair and transparent manner providing equal treatment to suppliers. Suppliers must have equal access to information on procurement opportunities and processes.

### 2.2 PROPER PLANNING

Prior to any procurement activities, Halifax Water will undertake planning to identify the goods, services and/or construction required to meet its needs, to determine the appropriate procurement method and the appropriate approvals required. Halifax Water will not plan, design, or otherwise structure a procurement process, select a valuation method, or divide procurement requirements in order to avoid the obligations of this Policy.

### 2.3 AVOIDING CONFLICT OF INTEREST

Conflict of interest, whether actual, potential or perceived, must be avoided during the procurement process and the ensuing contract. It is the responsibility of individuals involved in procurement decision-making or a procurement process to disclose any actual, perceived or potential conflicts of interest according to Halifax Water's policies on conflict of interest.

### 2.4 GEOGRAPHIC NEUTRALITY AND NON-DISCRIMINATION

Halifax Water will ensure that access for suppliers to compete for business is geographically neutral and non-discriminatory. Halifax Water will apply regional preference for goods, services and construction in accordance with applicable laws and agreements.

### 2.5 ACCOUNTABILITY

Halifax Water is accountable for the results of its procurement decisions and the appropriateness of its procurement processes.

### 2.6 SUSTAINABILITY

Procurement planning and processes should be undertaken with a view to promoting social, environmental and financial sustainability.

### 2.7 SOCIAL RESPONSIBILITY

Halifax Water is committed to supporting enterprises whose core objectives include advancing equity, diversity, inclusivity, socio-economic interests and/or building healthy communities.

### 2.8 BEST VALUE

Halifax Water is not obligated to determine best value solely on price. The determination of best value may, at the discretion of Halifax Water, also include consideration of social responsibility, environmental

DRAFT



STRAIGHT from the SOURCE

responsibility, quality, capacity and capability of the bidder to meet the stated criteria, timing of the project, and/or impact on Halifax Water customers.

## 3. SCOPE

Subject to the thresholds and exceptions set out herein, this policy applies to purchases of goods, services or construction by Halifax Water.

Halifax Water will determine whether a given purchase of goods, services or construction will be carried out by means of a competitive or non-competitive procurement in accordance with this policy.

Exceptions to competitive bidding requirements must not be for the purposes of avoiding competition or to discriminate against or favour specific suppliers.

## 4. METHODS OF PROCUREMENT

### 4.1 STANDING OFFERS

A standing offer is an offer to purchase goods and/or services repeatedly at pre-arranged prices and/or under set terms and conditions.

Halifax Water will use standing offers to reduce overall cost and achieve benefits through the consolidation of purchases when it is possible to combine requirements and encourage overall standardization of items.

Halifax Water may leverage the benefits of standing offers of other public sector entities, such as provincial or federal governments, municipalities, or other public utilities whenever practical, and/or when the arrangement would be in accordance with the principles of this policy.

### 4.2 INVITATIONAL COMPETITION

Invitational competitions invite three or more qualified suppliers to compete by submitting quotes and/or written proposals to Halifax Water for the supply of goods, services and/or construction.

Halifax Water will award invitational competitions in accordance with the principles of this policy, including best value to Halifax Water.

Financial thresholds for invitational competitions within Halifax Water are:

| Invitational Competition Financial Thresholds | | |
|---|---|---|
| Category | Financial Threshold | |
| | Min | Max |
| Goods | $5,000 | $24,999 |
| Services | | $49,999 |
| Construction | | $99,999 |

For goods, services or construction valued below $5,000, quotes are not required.

DRAFT



STRAIGHT from the SOURCE

### 4.3 OPEN COMPETITION

An open competition is an open and public procurement process that invites suppliers to compete by submitting written proposals to Halifax Water for the supply of goods, services, and/or construction. Examples of open competitions include tenders and requests for proposals.

Halifax Water will award open competitions in accordance with the principles of this policy, including best value to Halifax Water.

Financial thresholds for open competitions within Halifax Water are:

| Open Competition Financial Thresholds | | |
|---|---|---|
| Category | Financial Threshold | |
| | Min | Max |
| Goods | $25,000 | unlimited |
| Services | $50,000 | |
| Construction | $100,00 | |

### 4.4 ALTERNATIVE PROCUREMENT

Alternative procurement processes are specialized and/or exceptional procurement processes that balance open and competitive procurement with urgent, specialized, or exceptional needs of Halifax Water.

Halifax Water may use alternative procurement processes when:

**4.4.1** No proposals were submitted in an open competition,
**4.4.2** No suppliers requested participation in an invitational competition,
**4.4.3** No supplier satisfied the conditions for participation in the procurement process,
**4.4.4** Halifax Water suspects collusion among bidders/suppliers,
**4.4.5** The goods, services and/or construction can be supplied only by a particular supplier and no reasonable alternative exists,
**4.4.6** When an urgent need arises due to an immediate risk to the health or safety of employees, the public, or the possibility of serious damage to public or private property or the environment.

Use of alternative procurement processes must be approved by the General Manager.

### 4.5 JOINT PROCUREMENT

Joint procurement is when Halifax Water engages with another public sector entity, such as provincial or federal governments, municipalities, or other public utilities to procure goods, services and/or construction.

Joint procurement includes Halifax Water extending procurement opportunities to other public sector entities and Halifax Water participating in procurement processes of other public sector entities.

Halifax Water will engage in joint procurement in accordance with the principles of this policy, including best value. The provisions of the applicable trade agreements apply to any Halifax Water joint procurement process.

DRAFT



STRAIGHT from the SOURCE

## 5. EXEMPTIONS

Procurement of the following services is not required to comply with the methods noted in section 4 of this policy:

**5.1** *Legal services* including expert witness services, legal advice and representation, court reporter services, and arbitrators and moderators.
**5.2** *Insurance services*.
**5.3** *Banking services.*
**5.4** *Professional consulting services* valued less than $100,000.
**5.5** *Accountant services* excluding audit services.
**5.6** *Actuarial services*.
**5.7** *Training and education opportunities* including conferences, conventions, tradeshows, seminars, workshops, subscriptions, and association memberships.
**5.8** *Refundable employee expenses* including advances, university courses, entertainment, miscellaneous non-travel, meal allowances, travel expenses, and hotel accommodations.
**5.9** *Employer general expenses* including payroll deduction remittances, grants to agencies, medical and dental expenses, debenture payments, damages, petty cash, tax remittances, employee income, licenses, grants and contributions, real property (including land, buildings, easements, encroachments, licenses), member discretionary funds, and utilities (including water, wastewater, stormwater, power/energy, and telephone services).
**5.10** *Miscellaneous items* including:

- Print, television and radio media advertising
- Publication and distribution of magazines, periodicals or newspapers but not including the sole activity of printing or typesetting
- Production and distribution of audio, film or video recordings
- Customs broker services
- Taxi services
- Courier services
- Catering, meals and small incidentals
- Postage
- Minor items that would otherwise be impractical to purchase through formal procurement methods.

## 6. PUBLISHING INTENTION TO PROCURE

Where applicable, Halifax Water will publish its intention to procure goods, services and/or construction via the Nova Scotia Government hosted website/portal for public entity procurement opportunities.

## 7. EVALUATION, TIE BIDS AND CONTRACT AWARD

Quotes, bids and/or proposals will be evaluated by Halifax Water in accordance with the requirements and criteria published in the chosen method of procurement.

In the event Halifax Water receives tie bids, Halifax Water may, in its sole discretion, award the contract on the basis of best value. Halifax Water may also request the bidders submit an additional best and final offer and/or flip a coin to award the contract.

DRAFT


STRAIGHT from the SOURCE

Prior to awarding a contract for any goods, services and/or construction, Halifax Water will confirm that funding for the procured goods, services and/or construction has been approved and that the procurement is being made in accordance with this policy.

Halifax Water will publish a notice of contract award via the Nova Scotia Government hosted website/portal for public entity procurement opportunities.

## 8. DISQUALIFICATION

Quotes, bids and/or proposals deemed by Halifax Water to be non-compliant will be disqualified from evaluation.

Halifax Water may disqualify a supplier from participation in any procurement of goods, services and/or construction if that supplier has:

**8.1** Failed to honour a bid
**8.2** Failed to disclose a conflict of interest
**8.3** Engaged in unethical bidding practices
**8.4** Been convicted of a crime
**8.5** Submitted a consumer proposal and/or claimed bankruptcy
**8.6** Performed inadequately for Halifax Water

In the event Halifax Water disqualifies a supplier pursuant to this section, the supplier will be notified in writing by Halifax Water and have an opportunity to respond to Halifax Water. The supplier's response must be received by Halifax Water within 15 days of the date of notice of disqualification.

## 9. DEBRIEFINGS

A debriefing is an opportunity for a supplier to meet with Halifax Water to discuss their submission to either an open competition or an invitational competition.

Any request for a debriefing must be in writing and submitted to Halifax Water within ten days of notification of award, non-award or disqualification. Information about bids, submissions and/or proposals submitted by other bidders will not be discussed or disclosed in the debriefing.

A debriefing must be requested prior to submitting a complaint pursuant to section 10 of this policy.

## 10. COMPLAINTS

Complaints regarding a Halifax Water procurement process or decision pursuant to this policy must be submitted in writing within 30 days of completing the debriefing.

Complaints must include details of the reasons for the complaint and the resolution being requested.

DRAFT

Complaints made pursuant to this section will proceed as follows:

| Halifax Water Procurement Complaint Process | |
|---|---|
| **Action** | **Timeline** |
| Debrief complete | |
| Complaint submitted to Halifax Water | Within 30 days |
| Written response provided by Manager of Procurement | Within 20 days |
| Supplier requests in writing further review by Director of Corporate Services | Within 10 days |
| Written response provided by Director of Corporate Services | Within 20 days |
| Supplier requests in writing further review by General Manager | Within 10 days |
| Written response provided by General Manager | Within 20 days |
| Supplier requests in writing the matter be referred to arbitration | Within 10 days |

In the event a complaint proceeds to arbitration, the arbitration will occur in Halifax, Nova Scotia and the arbitrator will be selected by agreement of Halifax Water and the supplier.

## 11. SUPPLIER PERFORMANCE MANAGEMENT

Halifax Water will manage supplier performance for issues such as, but not limited to, poor workmanship, unnecessary contract delays and unsafe work practices.

## 12. CONFLICTS OF INTEREST

A conflict of interest is a situation where a person or company's personal or financial interest conflicts with the interests of Halifax Water. A conflict of interest can be actual or perceived.

Halifax Water will require all bidders to declare that there are no actual or perceived conflicts of interest.

## 13. CONFIDENTIALITY

Halifax Water is subject to the Part XX of the *Municipal Government Act*, S.N.S. 1989, c. 18, as amended, respecting freedom of information and protection of privacy. Halifax Water will comply with these and any other relevant laws as it relates to the disclosure of procurement-related information.

## 14. GENERAL

Halifax Water may engage the services of external consultants to assist with any stage or aspect of procurement.

Halifax Water will document its processes and decisions made pursuant to this policy. Halifax Water may audit its procurement processes from time-to-time for compliance with this policy.

DRAFT



STRAIGHT from the SOURCE

**ITEM # 6**
**Halifax Water Board**
**September 23, 2021**
**ATTACHMENT 2**

Effective January 2018

# HALIFAX WATER PROCUREMENT POLICY

Effective May 1, 1997
As Amended and approved by the Board
May 22, 2012 and November 30, 2017

# Table of Contents


1. Policy Statement ..... 3
2. Guiding Principles ..... 3
3. Adoption of Statutory Definitions ..... 3
4. Definitions ..... 4
5. General ..... 4
6. Authority of the General Manager ..... 5
7. Policy Directives ..... 6
8. Special Services ..... 8
9. Joint Procurement ..... 9
10. Environmental Procurement ..... 9
11. Disposal of Surplus Equipment ..... 10
13. Award of Contracts ..... 10
14. Contract Documents, Bids, and Performance Securities and Specifications ..... 10
15. Award Notification ..... 11
16. Tie Bids ..... 11
17. Debriefings ..... 11
18. Procurement Complaint Process ..... 11
19. Contract Management & Vendor Performance Evaluation ..... 12
20. Supplier Disqualification ..... 12
21. Accountability ..... 13
22. Conflict of Interest ..... 13
23. Confidentiality & Access to Information ..... 14
24. Staff Training ..... 14
25. Monitoring ..... 14
26. References ..... 15
27. Contact Information ..... 15

Appendix 'A' – List of Permanent Exemptions ..... 16

## 1. POLICY STATEMENT

The purpose of this policy is to establish purchasing guidelines compliant with the Public Procurement Act and other applicable legislation and trade agreements, and to ensure the most cost effective methods are used to purchase goods, services and construction for the Halifax Regional Water Commission (HRWC) in the manner approved by the Board.

## 2. GUIDING PRINCIPLES

The following principles will guide the procurement practices of HRWC:

- Procurement Policy provides direction for acquisition of goods, services and construction to complete the projects and programs approved by the HRWC Board of Commissioners in the annual Operating Budget and Capital Budget, consistent with long term Business Plans.

- HRWC's Procurement Policy and procedures will:

  - Provide for the procurement of goods, services and construction in an open, fair and transparent manner resulting in best value to HRWC
  - Promote the most cost effective and efficient manner of acquiring goods, services and construction at the optimum quality, quantity, price, delivery and performance
  - Encourage competition, innovative ideas and solutions while respecting applicable legislation and trade agreements
  - Promote sustainable procurement decisions reflecting full life-cycle costs, including but not limited to; acquisition, operating, training, repair, maintenance, warranty, customer impact, asset disposal and residual value rather than just the lowest bid
  - Encourage best practice contract and risk management

- Promote and obtain competitive offers from the most responsible and responsive vendors. Promote vendors who comply with the provisions of the solicitation and contractual terms and conditions. Use vendors who can be expected to provide satisfactory performance, based on reputation, references, and sufficiency of financial and other resources.

- Participate in joint procurement activities with the Province, MASH sector entities or other publicly funded entities where it is deemed to be in the best interest of HRWC.

## 3. ADOPTION OF STATUTORY DEFINITIONS

All terms in the Public Procurement Act, S.N.S 2011, c.12 (the "Act") have the same meaning in this Procurement Policy, unless otherwise defined herein.

## 4. DEFINITIONS

For the purposes of this policy, the following definitions are provided:

**Alternative Procurement Practices (ALTP)**
Specialized or exceptional practices that allow for deviation from the procurement processes that the value or nature of the goods, services or construction would normally require. This could include a non-competitive procurement in the place of a competitive process, and a limited competition in the place of an open competition.

**Bid**
Refers to a response to a solicitation document.

**Bidder**
Refers to a submission in response to a solicitation document.

**Competitive Process**
Refers to the process for soliciting competitive bids from suppliers and includes an open competition, invitational competition and a limited competition.

## 5. GENERAL

This policy applies to all departments of HRWC. In conformance with the Act, HRWC will:

- Publicly tender for all goods, services and construction in accordance with the applicable regional, national, and international trade agreements by public advertisement on the NS Procurement web portal.

- Post on the N.S. Procurement web portal the name of the successful bidder together with the amount of the contract awarded.

- Post HRWC's Procurement Policy on the HRWC website.

- Abide by Alternative Procurement Practices and exemptions set out in the regulations made under the Act.

- Participate in supplier and public sector entity outreach programs conducted by the Procurement Governance Secretariat established under Section 11 of the Act.

- Participate in professional development programs conducted by the Procurement Governance Secretariat.

- Incorporate contract and risk management into procurement processes and guidelines.

- Be accountable for procurement decisions.

- Ensure that HRWC procurement employees abide by standards set out in Section 15 of the Act.

- Respect all supplier standards, rights and responsibilities established pursuant to Section 16 of the Act.

- Provide an annual report no later than 90 days after the fiscal year end, to the Chief Procurement Officer in the form and manner prescribed by the regulations made under the Act.

- Become familiar with the Competition Bureau of Canada bid rigging awareness and prevention guidelines and adopt applicable practices; and

- Maintain conformance with the Act and any successor legislation.

- Where there is a discrepancy between this Procurement Policy and the Act, the Act will take precedence.

- With the approval of the General Manager (GM), HRWC will be under no obligation to accept the lowest bid or any bid received in response to a verbal or written request.

- Purchase authority and signing authority limits are established by the HRWC Board and apply to this Procurement Policy.

## 6. AUTHORITY OF THE GENERAL MANAGER

The General Manager (GM) of HRWC is responsible to the HRWC Board for the proper administration of the affairs of HRWC in accordance with the HRWC Act and the Halifax Regional Water Commission Regulations approved by the Nova Scotia Utility and Review Board (NSUARB) and the policies and programs approved and established by the HRWC Board.

The GM has the authority to award all contracts and purchase goods, services and construction that are within the budgets approved by the HRWC Board and compliant with this Procurement Policy.

The GM may authorize business practices and procedures consistent with this Procurement Policy and may delegate any such authority under this Policy.

The GM may authorize financing arrangements, including loans, leases, and rentals, for the purchase or rental of goods, services, equipment or property on behalf of HRWC where the purchase is compliant with the other conditions and award limits within this Procurement Policy, provided the period of financing does not exceed 5 years. In the case of leases, the total lease cost will be used to determine the contract award amount.

## 7. POLICY DIRECTIVES

### PROCUREMENT PROJECT PLANNING

Effective project planning is essential to ensuring effective results and limiting risk. The Procurement Project Planning Tool must be completed by the user department for every procurement project. HRWC procurement is responsible for ensuring planning is completed in accordance with the Procurement Project Planning Guidelines found in the Procurement Procedures Manual. The exception to this would be in cases of an Emergency Procurement as outlined in the Alternative Procurement section of this Procurement Policy. User departments must allow sufficient time to properly plan for a procurement project. Planning will take into consideration;

- an initial business case including project description and estimated value;
- other internal advice that may be required (ie: Legal, Finance)
- external resources that may be required (ie: consultants, fairness monitor)
- the appropriate execution strategy (ie: open, non-competitive)
- developing proper specifications and business requirements
- pricing structures
- evaluation plan (open and limited processes only)
- format selection (open and limited processes only)
- justification for using an Alternative Procurement Practice (non-competitive or limited competition only)

### MANDATORY USE OF STANDING OFFERS

It is mandatory to use existing standing offers to achieve contracted benefits through the consolidation of purchases. Procurement will work with the user departments to combine requirements where possible and encourage overall standardization of items to reduce the overall cost to HRWC. If a standing offer exists, related procurements must be conducted in accordance with the applicable Standing Offer Guidelines found in the Procurement Procedures Manual. HRWC will leverage the benefits of standing offers of HRM, Province of Nova Scotia or other MASH sector entities wherever practical when the arrangement results in overall best value to HRWC or other substantial advantages.

### PROCUREMENT OF GOODS, SERVICES AND CONSTRUCTION

If a standing offer does not exist for a spending category, HRWC will procure goods, services and construction over $2,500 in accordance with the following table (all values exclude taxes):

| CATEGORY | INVITATIONAL COMPETITION (Low Value) | | OPEN COMPETITION (High Value) |
|---|---|---|---|
| | Min. 3 Quotes Invited by User Dept. | Min. 3 Quotes Invited by Procurement | Advertised on the NS Procurement Web Portal |
| **Goods** | $2,500 - $10,000 | $10,000 - $ 25,000 | $ 25,000 and above |
| **Services** | $2,500 - $10,000 | $10,000 - $ 50,000 | $ 50,000 and above |
| **Construction** | $2,500 - $10,000 | $10,000 - $100,000 | $100,000 and above |
| **Procurement Project Planning Tool Required** | | ✓ | ✓ |

## Competitive Procurement: Invitational

An invitational competitive procurement process for low value purchases, involves requesting a minimum of three qualified vendors to submit written quotations based on the requirements outlined by HRWC. Low value purchases are not routine in nature, and are not included in a Standing Offer or available in HRWC inventory.

- **If the value of the goods, services and construction is less than $10,000**
  User departments are expected to obtain at least three written competitive quotations in accordance with the principles set out in this Procurement Policy and awarded to the bidder that provides the best value. All documentation will be retained by the user department for auditing purposes. For goods, services and construction less than $2,500, quotes are not required.

- **If the value of the goods, services and construction exceeds $10,000 but is less than open competition thresholds**
  Procurement will conduct an invitational competition on behalf of the user department, to obtain at least three written competitive quotations in accordance with the principles set out in this Procurement Policy and awarded to the bid that provides the best value. The Procurement Project Planning Tool will be completed for every project and all documentation related to low value procurement over $10,000 will be retained by Procurement.

## Competitive Procurement: Open

An open competitive procurement process enables all vendors to compete in a fair and open environment. If the value of the goods, services and construction is a high value and above the invitational competition thresholds, Procurement will conduct an open competitive process. All open competitions will be advertised through the NS Procurement web portal. Tenders in this range will be acknowledged at a public opening at a designated date and time, and all awards will be posted on the NS Procurement web portal. The Procurement Project Planning Tool will be completed for every project.

## ALTERNATIVE PROCUREMENT PRACTICES (ALTP)

To balance the need to be open and competitive with the demands of urgent, specialized, or exceptional circumstances, alternative procurement practices are used under specific justifications in accordance with the Alternative Procurement Guidelines

found in the Procurement Procedures Manual. Alternative procurement practices must not be used to avoid competition between suppliers or to discriminate against specific individual or groups of suppliers. All ALTP awards, including name of supplier and contract value, must be publicly posted on the NS Procurement web portal within 10 days of contract award.

**For high value procurement**

The use of alternative procurement practices must be authorized and supported by the Manger of Procurement and the GM where the GM determines the purchase to be clearly in the best interest of HRWC. The Manager of Procurement may delegate signing authority to an acting procurement officer. The rationale permitting the alternative procurement practice will be documented on the appropriate form and will provide substantiation for the actions taken. Any disagreement between Procurement and the user department with respect to the approval of an alternative procurement practice are to be reviewed by the GM and the Director of Corporate Services.

**For low value procurement**

User departments will be required to complete a low value ALTP form which must be signed by the requesting employee along with the Manager of the user department and approved by both the Manager of Procurement and the GM. In all cases, forms require two signatures and must be kept on file by Procurement for audit purposes.

**Permanent Exemptions**

User departments may apply for a permanent exemption for certain goods or services that are considered at the sole discretion of Procurement not to be subject to tender and are not listed in Appendix 'A'. Any such request must be authorized by the GM or his or her designate and the Director of Corporate Services. The permanent exemptions list will be maintained by Procurement for audit purposes.

**Emergency Procurement**

An emergency procurement occurs when an urgent need arises due to an immediate risk to the health or safety of employees or the general public or because of the possibility of serious damage to public or private property or the environment. If an emergency occurs, a Manager with the Director's approval is authorized to procure the necessary goods, services or construction as he or she determines appropriate. In doing so, the Manager should take into account and fulfill the objectives and requirements of this policy to the extent possible under the circumstances, and use any existing standing offers. The Mandatory use of Standing Offers section of this policy applies to emergency procurement.

## 8. SPECIAL SERVICES

Legal services will be acquired by the Director from a roster of lawyers based upon work requirements, qualifications, experience, services offered, past performance, proposed fees and other relevant considerations. The selection of the lawyer from the roster in an individual case shall be based upon the particular expertise required for that case. Legal

services having a value of less than $25,000 may be acquired by the Director in consultation with corporate legal counsel or his/her designate. Legal services having a value of $25,000 or more shall be approved by the GM or his/her designate. No external legal services should be acquired without first consulting corporate legal counsel.

Insurance Services – All insurance requirements will be acquired in partnership with HRM by public advertisement at intervals determined by HRM.

Architectural, Engineering, Surveying and other consulting services less than $100,000 will be acquired by staff from a HRWC, HRM or Provincial roster of consultants. Consultants will be selected by project, based upon qualifications, experience, services offered, past performance, proposed fees, and other relevant considerations. For services less than $100,000 three written quotations will be solicited from Consultants on the roster. Required services over the value of $100,000 will be publicly advertised through open competition.

Banking Services – General banking services will be acquired in partnership with HRM by public advertisement at intervals determined by HRM.

Auditing Services – Services of External Auditors will be acquired by public advertisement at intervals not greater than every five years. These services may be contracted on a one year term to be renewed on an annual basis up to a five year maximum on terms satisfactory to HRWC. Selection of an external financial auditor shall be completed by the Audit and Finance Committee of HRWC Board and recommended to the Board of Commissioners. Annual renewal of the contract for Audit services shall be made by the Audit and Finance Committee.

## 9. JOINT PROCUREMENT

Joint Procurement is encouraged by the NS Public Procurement Act when the arrangement results in overall best value. If deemed to be in the best interest of HRWC, joint procurement with the Province, MASH sector entity or any other publicly funded entity may be pursued. Joint procurement may result in extending the opportunity to the Province or other MASH sector entities to participate in the established contracts, or HRWC participating in contracts established by the Province or other MASH sector entities through a publicly advertised solicitation. The provisions of the applicable trade agreements shall apply to the procurement process.

## 10. ENVIRONMENTAL PROCUREMENT

To procure necessary goods with due regard to the environment, HRWC will follow the Statement of Principle adopted by the Association of Canadian Cities for Environmentally Sound Strategies.

*"In order to increase the development and awareness of Environmentally Sound Products, Procurement Staff, in conjunction with Departments, will review their contracts and tender specifications for goods and services, to ensure that*

*wherever possible and economical, specifications are amended to provide for expanded use of products and services that contain the maximum level of post-consumer waste and/or recyclable content. This will be done without significantly affecting the intended use of the product or service. Also, it is recognized that cost analysis is required in order to ensure that the products are available at competitive prices."*

## 11. DISPOSAL OF SURPLUS EQUIPMENT

Surplus assets over the value of $50,000 shall be disposed of by open competition and contract for disposal of such assets shall be awarded by the GM.

In other cases, surplus assets shall be disposed of by the GM as reasonably practical in the circumstances. The GM may award the disposal of surplus material without competition to any non-profit corporation, association, or entity, or any MASH sector level of government.

## 12. CONTRACT NEGOTIATIONS

Where the solicitation document provides for negotiation to take place, Procurement may engage in negotiations with the selected proponent(s). Any proposed changes to the standard contract terms and conditions must be reviewed by corporate legal counsel prior to finalizing the contract.

## 13. AWARD OF CONTRACTS

All open competitions shall be presented to the GM for approval except as noted below. A report of the purchasing process along with the procurement planning tool form will be prepared by the user department, approved by the Director and forwarded to the GM for approval.

Awards less than $25,000 for goods, $50,000 for services or $100,000 for Construction can be committed by the Manager of Procurement in consultation with the user department personnel with the appropriate approval authority.

Awards over the value of $25,000 for goods, $50,000 for services but below the value of $100,000 can be committed by the appropriate approval authority level based on the HRWC Approval Authority list.

## 14. CONTRACT DOCUMENTS, BIDS, AND PERFORMANCE SECURITIES AND SPECIFICATIONS

The GM may from time to time approve such standard forms including bid and performance securities, if any, for purchases by Invitation to Tender, Request for Proposal, Request for Quotations, single source, or emergency purchases as well as forms of contract for type of purchase including but not limited to construction, supplies and services as the GM deems advisable.

Bid bonds, performance bonds and other securities, including labour and material bonds, shall be required for such purchases in such form and in such amounts as the GM deems advisable.

## 15. AWARD NOTIFICATION

After a contract has been entered into, pursuant to an open competition, Procurement will post the name of the successful supplier and the value of the awarded contract on the NS Procurement web portal.

For contracts entered into after a limited competition or for a high value non-competitive procurement, Procurement will post the name of the successful supplier and the value awarded on the NS Procurement web portal as is required under applicable trade agreements. HRWC will notify bidders of the outcome of an invitational competition.

## 16. TIE BIDS

In the case of a tie bid, the Manager of Procurement is to request the tie bidders submit a best and final offer. If this is not successful and a tie bid still occurs, the contract may be awarded on the basis of a coin flip.

## 17. DEBRIEFINGS

Debriefings are an important part of a competitive procurement process. A bidder may request a debriefing of their submission for both open competitions and invitational competitions. The purpose of the debriefing is to provide a bidder with constructive feedback about their bid and suggestions for improvements to better prepare for future opportunities. The debriefing process is not a complaint process and should not be treated as such. Information about bids submitted by other bidders will not be discussed or disclosed in the debriefing.

Debriefings are only initiated at the request of a bidder. Requests for a debriefing are directed to the contact person identified in the solicitation document. Bidders are expected to make their request within ten days from notification of award of contract. Requests for a debriefing made after this time period are considered on a case by case basis.

## 18. PROCUREMENT COMPLAINT PROCESS

Subsequent to a debriefing, bidders may file a complaint regarding the outcome of a procurement process if the bidder is not satisfied with the results of the debriefing. The bidder must request and attend a debriefing prior to engaging in the procurement complaint process. Complaints must be made by bidders and responded to by the Director of Corporate Services. Where possible, bidders are encouraged to resolve problems directly with the Procurement Section or the user department staff, as many problems can be resolved before a complaint is formulated.

A complaint refers to a written objection submitted by a bidder regarding a solicitation, contract award, or proposed contract for goods, services and construction. Complaints shall contain written details of the issue and the resolution being requested. Complaints can be submitted during the competitive process, or within thirty days from notification of award of contract.

The Director of Corporate Services or his/her designate will make every effort to acknowledge a formal complaint within ten business days of receipt. Complaints may be resolved, dismissed, or withdrawn. A complaint is resolved if the bidder is satisfied with the explanation provided by HRWC. A complaint is dismissed if the Director of Corporate Services concludes that the complaint is not valid as the review indicates a properly applied, fair procurement process. If the Director of Corporate Services finds that the bidder's complaint has merit, an appropriate response will be prepared and submitted to the bidder. The response will be provided on a "without prejudice" basis, unless otherwise agreed by Procurement.

## 19. CONTRACT MANAGEMENT & VENDOR PERFORMANCE EVALUATION

Establishing contract management practices and assessing vendor performance are both critical to the success of procurement projects. Poor workmanship, unnecessary contract delays and unsafe work practices will not be tolerated. Contracts and standing offers will be managed by the Procurement Section or user department, as required. Upon reasonable notice in writing to the vendor involved, and after a reasonable opportunity for response, a vendor can be disqualified for a period not exceeding three years from participation in a solicitation for goods or services.

## 20. SUPPLIER DISQUALIFICATION

Suppliers may be disqualified, based upon supporting evidence, from participating in future procurement opportunities for any one of the following reasons:

- Bankruptcy or insolvency;
- False declarations;
- Inadequate performance;
- Final judgements in respect of serious crimes or other serious offences;
- Involvement with ongoing litigation with Halifax Water;
- Professional misconduct; or
- Failure to pay amounts owing to HRWC;
- Violation of HRWC regulations.

A written decision shall be issued to the person disqualified or suspended setting out its reasons for disqualification or suspension, to the usual business address of that person as shown in the records of the purchasing department. Disqualification will be approved by the GM.

## 21. ACCOUNTABILITY

Procurement activities at HRWC are expected to be conducted with integrity and professionalism, showing respect for the process, the environment, and safeguard confidential information.

**DIRECTOR OF CORPORATE SERVICES**

The Director of Corporate Services is responsible for promoting, implementing and the overall administration of this policy.

**MANAGER OF PROCUREMENT**

The Manager of Procurement is responsible for ensuring the consistent application of this policy and the provision of the Procurement Section to all user departments in an efficient and diligent manner. The Manager is responsible for ensuring compliance with this policy and is required to address any non-compliance. Where instances of non-compliance are identified, the Manager is expected to submit written confirmation of actions taken to the Director of Corporate Services.

**PROCUREMENT EMPLOYEES**

Procurement employees shall adhere to this policy and are responsible for consistently applying this policy and the guidelines to all procurement projects. Procurement employees must clearly understand their obligations and responsibilities under this policy and all applicable protocols and consult with the Manager of Procurement in respect of any questions regarding the application or interpretation of this policy or any protocols. Procurement employees are expected to provide procurement services in an efficient and diligent manner, and are encouraged to develop and foster productive and cooperative professional relationships with their colleagues.

**USER DEPARTMENTS**

User departments are responsible for procurement activities within their unit and are accountable for achieving the specific objectives of this policy. User departments are to clearly understand their responsibilities in accordance with this policy and are to consult with the Manager of Procurement with respect to any questions regarding the application or interpretation of this policy or any protocols.

## 22. CONFLICT OF INTEREST

All procurement activity must be conducted with integrity so as to maintain the public's trust. Any procurement activity that creates, or appears to create, a conflict of interest, shall not be engaged. Conflicts will be deferred to HRWC Policy #8.17.

**Internal Conflict of Interest**

All participants in a procurement process, including all employees of procurement and all members of the evaluation team, must ensure that there are no undeclared internal conflicts of interest. Evaluation team members must sign individual conflict of interest

declarations stating they have no conflict of interest with respect to the procurement process.

**Bidder's Conflict of Interest**

All bidders will be required to declare that there are no conflicts of interest or provide details for any actual or apparent conflicts of interest at the time of bid submission. Procurement must ensure that all procurement templates include appropriate conflict of interest language and declarations.

## 23. CONFIDENTIALITY & ACCESS TO INFORMATION

**Confidentiality**

Supplier information submitted in connection with a procurement process must be adequately protected.

**Access to Information**

HRWC is subject to the Part XX of the Municipal Government Act respecting *Freedom of Information and Protection of Privacy.* Procurement will adhere to the Act and will respect the maintenance, release and management of all procurement records.

**Personal Information Disclosure**

HRWC must adhere to the requirements under the *Personal Information International Disclosure Protection Act* of Nova Scotia respecting the protection of personal information from disclosure outside of Canada.

## 24. STAFF TRAINING

Procurement will provide orientation and training as required to employees involved in procurement activities at HRWC. Employees involved in procurement activities should be knowledgeable with respect to this policy and the general principles of public procurement. The Procurement Section will provide relevant training and will promote appropriate external education and training opportunities whenever possible.

## 25. MONITORING

**RECORD KEEPING**

All procurement activity must be authorized, properly recorded, maintained and supported by the appropriate documentation required under the applicable guidelines found in the Procurement Procedures Manual.

**AUDIT**

All procurement activity is subject to audit by the Municipal Auditor General.

**PROCUREMENT COMPLIANCE TESTING**

Procurement activities are subject to compliance testing by the Manager of Procurement and the results may be used to develop strategies to improve compliance and

development of training. The Manager of Procurement will establish and regularly review policies and procedures to ensure continuous improvement.

**REPORTING**

Any identified non-compliance will be reported to the Director of the user department with a copy to the Director of Corporate Services. In cases of non-compliance, Procurement reserves the right to revoke the delegation for low value procurement activity.

## 26. REFERENCES

All procedures, guidelines, and forms referred to in this policy can be found on the HRWC website.

Some of the relevant legislation, trade agreements, and reference documents include:

- Public Procurement Act
- Municipal Government Act (Part XX) respecting Freedom of Information and Protection of Privacy (FOIPOP)
- Personal Information International Disclosure Protection Act (PIIDPA)
- Canada Free Trade Agreement (CFTA)
- Canada-European Union Comprehensive Trade Agreement (CETA)
- Atlantic Procurement Agreement (APA)
- Construction Contract Guidelines
- HRWC Standard Terms and Conditions
- Atlantic Standard Terms and Conditions

## 27. CONTACT INFORMATION

For further information or clarification regarding this policy please contact:

Michelle Comeau
Manager of Procurement
Halifax Water, Procurement Services
450 Cowie Hill Road
PO Box 8388, RPO CSC
Halifax, NS B3K 5M1
Phone: (902) 490-4813
procurement@halifaxwater.ca

# APPENDIX 'A'
# LIST OF PERMANENT EXEMPTIONS

The following list of goods and services shall be permanently exempt from the application of the HRWC Procurement Policy. Unless otherwise stated, the approval and procurement of goods and services that are exempt from this policy are subject to the signing authority limits set out in the HRWC Approval Authority List.

(a) **PROFESSIONAL SERVICES**

Services that may, under the laws of Nova Scotia, only be provided by the following licensed professionals: medical doctors, dentists, nurses, pharmacists, veterinarians, engineers*, land surveyors*, architects*, accountants**, actuaries***lawyers**** and notaries.

** Engineers, Land Surveyors and Architects*

Services provided by Engineers, Land Surveyors and Architects are only exempt from the application of this policy if such services have an estimated value of less than $100,000. Such Services shall be procured in accordance with the Special Services section of this policy.

*** Accountants*

Notwithstanding that Services provided by Accountants are otherwise exempt from the application of this Policy, the procurement of Auditing Services shall be done in accordance with the Special Services section of this policy.

****Actuaries*

Notwithstanding that Actuarial Services provided by Actuaries are otherwise exempt from the application of this policy, the procurement of Actuarial Services shall be done in accordance with the Special Services section of this policy.

*****Lawyers*

Notwithstanding that Legal Services provided by Lawyers are otherwise exempt from the application of this Policy. Legal services shall be acquired from a roster of lawyers and in accordance with the Special Services section of this policy. No external legal services should be acquired without first consulting corporate legal counsel.

(b) **LEGAL SERVICES/EXPENSES** (in addition to those provided by lawyers)

- Expert Witness Services
- Legal Opinion and Representation
- Court Reporter Services
- Arbitrators and Moderators
- Discoveries
- Legal Settlements

(c) **PETTY CASH ITEMS**

Funds established in a user department for the purchase of minor items when it would be otherwise impractical to purchase items through the usual purchasing methods.

(d) **TRAINING AND EDUCATION**

- Conferences, Conventions and Tradeshows
- Newspapers, Magazines & Periodicals, including subscriptions
- Memberships
- Seminars, Workshops not specifically designed for HRWC

(e) **REFUNDABLE EMPLOYEE/OTHER EXPENSES**

- Advances
- University Courses
- Entertainment
- Miscellaneous Non-Travel
- Meal Allowances
- Travel Expenses
- Hotel Accommodation
- Refunds: payments, fees

(f) **EMPLOYER'S GENERAL EXPENSES**

- Payroll Deduction Remittances
- Grants to Agencies
- Medical & Dental Expenses
- Debenture Payments
- Payment of Damages
- Petty Cash Replenishment
- Tax Remittances
- Employee Income
- Member's Discretionary Funds
- Real Property, including land, buildings, easements, encroachments and licenses (except for the acquisition of Facilities where HRWC is the tenant)
- Licenses, such as vehicles and elevators
- Charges to and from HRM and other public entities
- Bank Charges and Underwriting Services where covered by agreements
- Grants and Contributions

(g) **UTILITIES**

- Water and Wastewater
- Power and related infrastructure when purchased from a utility
- Telephone Services

(h) **MISCELLANEOUS**

- Print, Television and Radio Media Advertising Accounts
- The publication and distribution of magazines, periodicals or newspapers but not including the sole activity of printing or typesetting
- The production and distribution of audio, film or video recordings
- Customs Broker/Services
- Taxi Services
- Courier Services
- Catering, meals and small incidentals
- Postage

# ITEM # 7
**Halifax Water Board**
**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Digitally signed by Heidi Schedler Date: 2021.09.17 09:53:57 -03'00'

Heidi Schedler, General Counsel

**APPROVED:** Cathie O'Toole Digitally signed by Cathie O'Toole Date: 2021.09.17 09:53:07 -03'00'

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

**DATE:** September 16, 2021

**SUBJECT:** **Policy Approval Framework**

---

## INFORMATION REPORT

## ORIGIN

Halifax Water Governance Manual

## BACKGROUND

The Halifax Water Governance Manual states that the General Manger is responsible to ensure policies and procedures are developed, maintained, disclosed and updated as appropriate.

A policy approval framework was established in 2021 which identifies policy owners and establishes a schedule for regular review of policies. This will establish clear accountabilities and enable over-site to ensure policies regularly get reviewed and updated.

Corporate policies are available to employees through the intranet, and all policies are gradually being moved into a consistent template and made available on the intranet. In conjunction with the work to update policies, it was noted that there was no clear framework to guide which policies require Halifax Water Board approval and which can be approved by the General Manager.

## DISCUSSION

Although specific practices across organizations and governance guides do not provide identical approaches for allocating policy responsibilities, the division of responsibility according to organizational and operational policies remains relatively consistent.

The common practice is to designate organizational policies related to goals and direction, finances, and higher-risk matters to the Board, while management oversees policies related to operational, day-to-day matters. See Table 1 below for Halifax Water policies and recommendations for delegating approval responsibilities between the Board and General Manager

**Table 1: Halifax Water delegation of policy approvals**

| **Legend:** | | | |
|---|---|---|---|
| GM/Legal | Fleet | Finance | HR |
| Procurement | IS | Engineering | Safety |

| Policy | Board | GM | Explanation |
|---|---|---|---|
| Halifax Water Signing Authority Guidelines | ✓ | | Relates to governance and delegation of authority |
| Code of Conduct<br>Conflict of Interest | ✓ | | Relates to reputational risk |
| Corporate Fundraising<br>Electronic Approval | | ✓ | Relates to operations |
| Privacy Breach Protocol<br>Privacy Policy | | ✓ | Relates to operations |
| Public Relations | ✓ | | Relates the organizational public image and reputation |
| Records Management Policy | | ✓ | Relates to operations |
| Social Media | ✓ | | Relates to organizational public image and reputation |
| Transporting Personal Information Outside Canada | | ✓ | Relates to operations |

| Policy | Board | GM | Explanation |
|---|---|---|---|
| Commission Vehicle Policy | | ✓ | Relates to operations |
| Disposal of Materials | | | |
| Vehicle Idling | | | |
| Employment Expense Reimbursement | | ✓ | Relates to operations |
| Mileage | | | |
| Meals – CUPE Local 227 | | | |
| Procurement Policy | ✓ | | Relates to finances |
| Uniforms, Clothing and Boot Allowance | | ✓ | Relates to operations |
| Boot List and Approval Form | | | |
| Anti-reflection coating of eyeglasses | | | |
| Cell Usage | | | |
| Prescription Safety Eyewear | | | |
| Information Services | ✓ | | Relates to organizational risk, security and reputation |
| Energy Management | | ✓ | Relates to operations |
| Health and Safety Policy Statement | | ✓ | Relates to operations |
| Hepatitis A & B Immunization Memo and Approval Form | | | |
| Photo ID | | | |
| Fraud Policy | ✓ | | Relates to organizational risk and reputation |

| Policy | Board | GM | Explanation |
|---|---|---|---|
| Appointments (Medical & Dental) | | ✓ | Relates to operations |
| Attendance at Meetings | | | |
| Attendance Management | | | |
| Benefit Credit | | | |
| Bereavement Leave | | | |
| Conditioning | | | |
| Employee Assistance Program | | | |
| Employee Discipline | | | |
| Fitness Incentive | | | |
| Lifelong Learning | | | |
| Non-Union Attendance Incentive | | | |
| Non-Union Sick Leave | | | |
| Non-Union Vacation policy | | | |
| Personal Illness, Family Leave, Birth/Adoption Leave | | | |
| Personal Leave of Absence | | | |
| Purchased Leave Plan | | | |
| Civility and Respect in the Workplace | | | |
| Retirement Gift Options | | | |
| Scent Free Policy and Products | | | |

| Policy | Board | GM | Explanation |
|---|---|---|---|
| Service Awards | | | |
| Sick Leave | | | |
| Smoke Free Workplace | | | |
| Staffing Process | | | |
| Stay at Work | | | |
| Storm Day | | | |
| Time Off in Lieu of Overtime | | | |
| Training & Development & Payroll Deduction Process | | | |
| Personal Leave Days | | | |
| Fit for Duty | | | |

Report Prepared by:

Digitally signed by Heidi Schedler
Date: 2021.09.17 09:54:17 -03'00'

Heidi Schedler, General Counsel

# ITEM # 8
**Halifax Water Board**
**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Reid Campbell Digitally signed by Reid Campbell Date: 2021.09.16 11:05:51 -03'00'

Reid Campbell, M.Eng., P. Eng., Director, Engineering & Technology Services

**APPROVED:** Cathie O'Toole Digitally signed by Cathie O'Toole Date: 2021.09.16 08:59:09 -03'00'

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

**DATE:** September 2, 2021

**SUBJECT:** **Asset Management Program Status**

---

## INFORMATION REPORT

## ORIGIN

Enterprise Risk Management
September 2, 2021 Halifax Water Board Audit and Finance Committee

## BACKGROUND

In 2011, Halifax Water completed its first asset management (AM) assessment and the resulting Roadmap. The 2011 Roadmap provided a framework for AM activities to be implemented over a five (5) to seven (7) year program. Early initiatives involved defining the AM governance, roles and responsibilities, development of the AM Policy, establishing a consistent condition assessment tool for use across all assets, identification of the need for a computerized maintenance management system (CMMS), a review of existing level of service reporting, and carrying out an organizational capacity assessment to inform Halifax Water on constraints that may impact delivery of key programs.

The initial assessment was envisioned as a benchmark for the AM program. It provided the original framework that was intended to be reviewed periodically and updated. In Q3 of 2020/21, staff decided to engage a consultant to facilitate a review of the AM program and update the Roadmap. The updated Roadmap will guide AM activities for the next five (5) years.

Halifax Water staff provided an overview of its AM Program at the September 2, 2021 Audit and Finance Committee that included a high-level summary of the reassessment and Roadmap activities planned for 2021/22. A copy of the presentation is provided in the Committee Meeting Package.

## DISCUSSION

The AM Program Reassessment project was completed using the Federation of Canadian Municipalities (FCM) Asset Management Readiness Scale (AMRS) tool. The AMRS is an Excel-based tool used to survey an organization in five (5) competency areas: Policy and Governance, People and Leadership, Data and Information, Planning and Decision-Making, and Contribution to AM Practice. Under each competency area, there are three (3) outcome areas with statements indicating outcomes an organization has achieved to meet one of five (5) levels of AM maturity. The competencies and outcome areas as defined in the AMRS tool are provided in Table 1.

*Table 1 – Competency and Outcome Areas of FCM's AMRS*

| Competency | Description (from FCM's AMRS) | Outcome Areas |
|---|---|---|
| **Policy and Governance** | By developing this competency, your organization is putting in place policies and objectives related to asset management (AM), bringing those policies to life through a strategy and roadmap, and then measuring progress and monitoring implementation over time.<br><br>This competency helps you create the policy structure in your organization that lays out your asset management goals and how they will be achieved, leading to organizational alignment and commitment. | • Policy and objectives<br>• Strategy and roadmap<br>• Measurement and monitoring |
| **People and Leadership** | By developing this competency, your organization is setting up cross-functional teams with clear accountability and ensuring adequate resourcing and commitment from senior management and/or elected officials to advance asset management.<br><br>Asset management requires integration of multiple perspectives. At a minimum, your asset management team should be a representation of people who understand finance, decision-making, and the planning and operations of each relevant service area. This competency helps you create and sustain connections across teams and build leadership in asset management. | • Cross-functional teams<br>• Accountability<br>• Resourcing and commitment |

| Competency | Description (from FCM's AMRS) | Outcome Areas |
|---|---|---|
| **Data and Information** | By developing this competency, your organization is collecting and using asset data, performance data and financial information to support effective asset management planning and decision-making.<br><br>This competency helps you improve your data management practices so that you have the information you need about your assets when you need it. | • Asset data<br>• Service data<br>• Financial information |
| **Planning and Decision Making** | By developing this competency, your organization is documenting and standardizing how the organization sets asset management priorities, conducts capital and operations and maintenance (O&M) planning, and decides on budgets.<br><br>This competency helps you implement asset management, be ensuring that asset management policies, objectives and information are consistently informing organizational plans. | • Planning and prioritization [1]<br>• Asset management plans<br>• Budgets and financial planning |
| **Contribution to Asset Management Practice** | By developing this competency, your organization is supporting staff in asset management training, sharing knowledge internally to communicate the benefits of asset management, and participating in external knowledge sharing.<br><br>This competency helps you build your organization's overall asset management practice by ensuring that internal stakeholders are well-informed and that your organization stays current with, and contributes to, leading practices, training and education. | • Training and development<br>• Internal communication and knowledge sharing<br>• External communication and knowledge sharing |

1. If you are an organization responsible for multiple asset types (roads, drinking/wastewater, etc.) consider how you approach planning and prioritization across those assets. If you are an organization responsible for a single asset, consider how you approach planning and prioritization between teams/departments (e.g. engineering, planning, construction, etc.).

The reassessment process was undertaken with the Halifax Water Executive Team in a workshop format. Participants assessed each outcome area against the defined outcome statements for each level of maturity. The maturity scale is from 1 to 5 where 1 indicates early maturity and 5 indicates a very mature AM program. The first workshop provided an overview of AM and introduced the AMRS to the Executive Team. Subsequent workshops were held to complete the assessment for where the program is today (current state) and then to identify how far the utility would like to go with advancing its maturity ratings over the next five (5) years.

Scores typically range across the levels for each competency and outcome area. However, to achieve each outcome level, organizations must meet all requirements defined for that level. To achieve each competency level, all outcomes areas must meet the same level for an organization to be scored at that maturity level. It is not expected that an organization will reach a level 5 score necessarily – this is dependent upon the organization, its vision and objectives, and other competing priorities. The results of the AMRS assessment are shown in Table 2.

*Table 2 – AM Program Reassessment Results*

| Horizon | Policy & Governance | People & Leadership | Data & Information | Planning & Decision Making | Contribution to AM Practice |
|---|---|---|---|---|---|
| **Current** | 1 | 1 | 1 | 2 | 1 |
| **Year 1** | 1 | 2 | 2 | 2 | 1 |
| **Year 3** | 3 | 3 | 2 | 3 | 2 |
| **Year 5** | 3 | 3 | 4 | 3 | 3 |

In some competency areas, movement to the next level may be simple in that a single outcome statement needs to be met to advance.

The results from Table 2 were used to inform the development of the updated Roadmap. 2021/22 Roadmap initiatives are shown in Table 3 (shaded quarters represent planned activity timeline).

*Table 3 – 2021/22 Roadmap Initiatives*

| Project Name | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|
| Update/endorse AM Policy (Executive Team/Halifax Water Board) | | | | |
| Enhance communications for AM program | | | | |
| Offer AM101 training across organization | | | | |
| Establish AM Advisory or Steering Committee | | | | |
| Develop enhanced project prioritization framework | | | | |
| Identify and document critical assets | | | | |
| Develop condition assessment workplan (by asset class) | | | | |
| Develop LOS framework | | | | |

The Roadmap initiatives planned for 2021/22 are prioritized to enable future Roadmap tasks over the remaining five (5) years. Staff will provide an annual update on the program progress in September.

Report Prepared by:

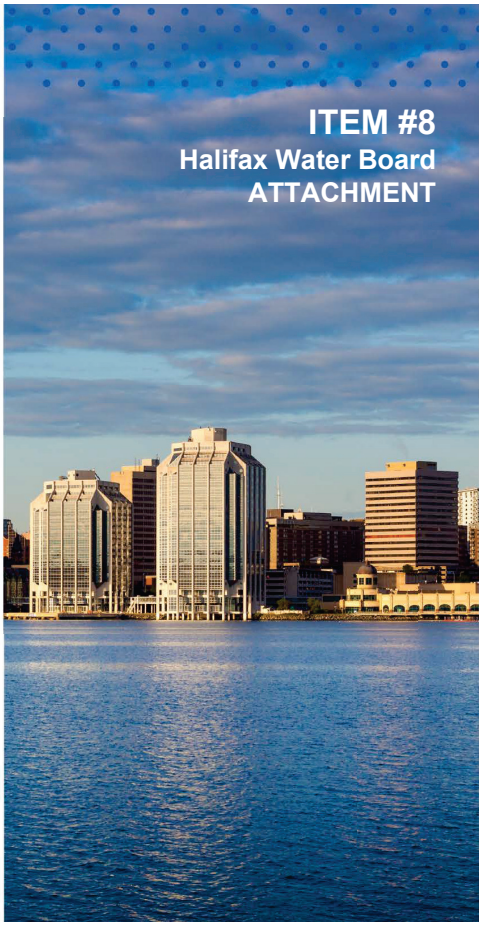
Digitally signed by Valerie Williams
Date: 2021.09.15 16:29:36 -03'00'

Valerie Williams, Manager, Asset Management & Capital Planning
902 476-0195

Halifax Water

# Asset Management Program

## Halifax Water Board Meeting




Valerie Williams
Manager, Asset Management & Capital Planning

September 23, 2021

STRAIGHT from the SOURCE

# Agenda

- Asset management (AM) defined
- AM Program foundations and AM Plan (AMP)
- AM Roadmap
- Resources and links
- Questions

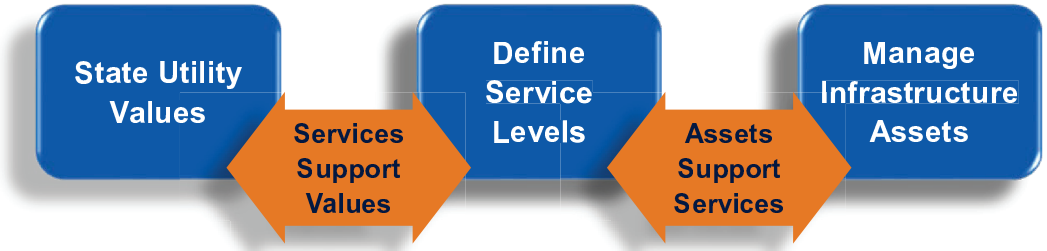


# Asset Management Defined

- As defined in ISO 55000:

  **"Asset management enables an organization to realize value from assets in the achievement of its organizational objectives"**

- Asset management:
  - Connects values, services, and assets
  - Involves multiple departments/stakeholders and collaboration is key
  - Is a continuous improvement program
  - Relies on data

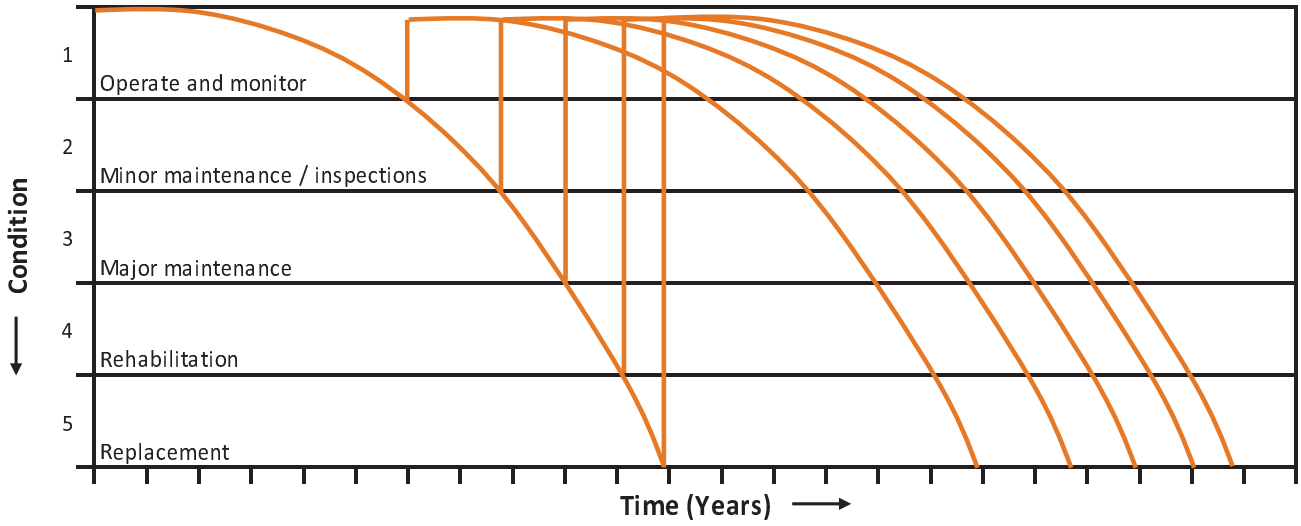


# Asset Management Foundation

- What do we own?
- Where is it located?
- What condition is it in?
- What are the service levels?
- How much is it worth?
- When does it need to be replaced?
- What is the right balance of capital versus maintenance effort/investment?



# Asset Interventions



# Connection of AM and Capital Programs




- Master plan informs the long-term needs
- Assessments or studies may be needed to refine the master plan assumptions
- Preliminary and detailed design is completed, and the projects are constructed
- Assets are operated and maintained
- System and assets are monitored over time

# Asset Management Plan (AMP)

- The Canadian Infrastructure Report Card (CIRC) Asset Management Primer 2014 gives an outline for an AMP
  - *Current State of Infrastructure*
  - *Level of Service*
  - *Plan Improvements*
  - *Asset Strategies*
  - *Financial Strategy*



# Halifax Water's Asset Classes



- Supply Plants
- Supply Dams
- Chambers and Booster Stations
- Transmission Mains
- Distribution Mains
- Reservoirs



- Treatment Facilities
- Pumping Stations
- Gravity Sewers
- Forcemains



- Management Structures
- Gravity Sewers
- Cross Culverts
- Driveway Culverts and Ditches

# Asset Management Plan 2020/21

## Water Facts

### Inventory

**1,571 KM of Water Mains**

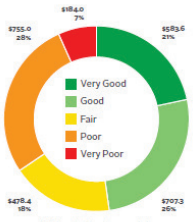
Including transmission and distribution mains.




**8** Supply Plants
**2** Back-Up Water Supplies
**6** Water Supply Dams
**20** Booster Stations
**144** Chambers
**16** Reservoirs

### Condition

**Replacement Value: $2,708.2M**

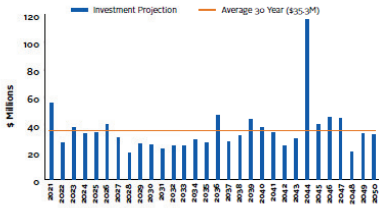



Dollar values have been rounded.

### Reinvestment

**Aggregated 30-Year Water Expenditures - Asset Renewal**

Supply Plants, Supply Dams, Chambers & Booster Stations, Transmission & Distribution Mains, & Reservoirs

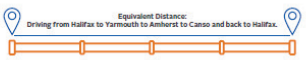



## Wastewater Facts

### Inventory

**1,424 KM of Wastewater Sewers**

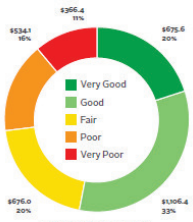
Including forcemains and gravity sewers.




**14** Treatment Facilities
**1** Biosolids Processing Facility
**164** Pumping Stations
**5** Wastewater Holding Tanks

### Condition

**Replacement Value: $3,358.5M**

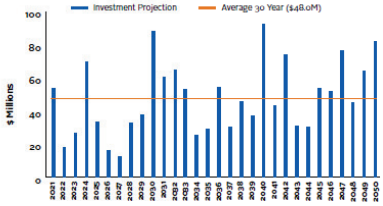



Dollar values have been rounded.

### Reinvestment

**Aggregated 30-Year Wastewater Expenditures - Asset Renewal**

Forcemains, Gravity Sewers, Pumping Stations, and Treatment Facilities




## Stormwater Facts

### Inventory

**878 KM of Stormwater Sewer**

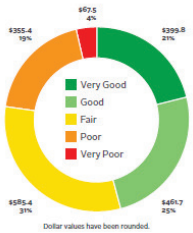
Ranging from 200 mm to 3000 mm in diameter.




**2,495** Cross Culverts
**15,061** Driveway Culverts (estimated)
**602 km** Ditches (estimated)
**40** Stormwater Management Structures

### Condition

**Replacement Value: $1,869.8M**

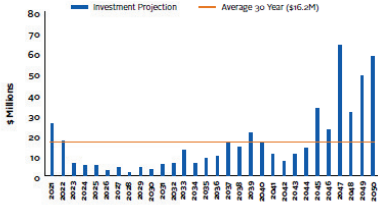



Dollar values have been rounded.

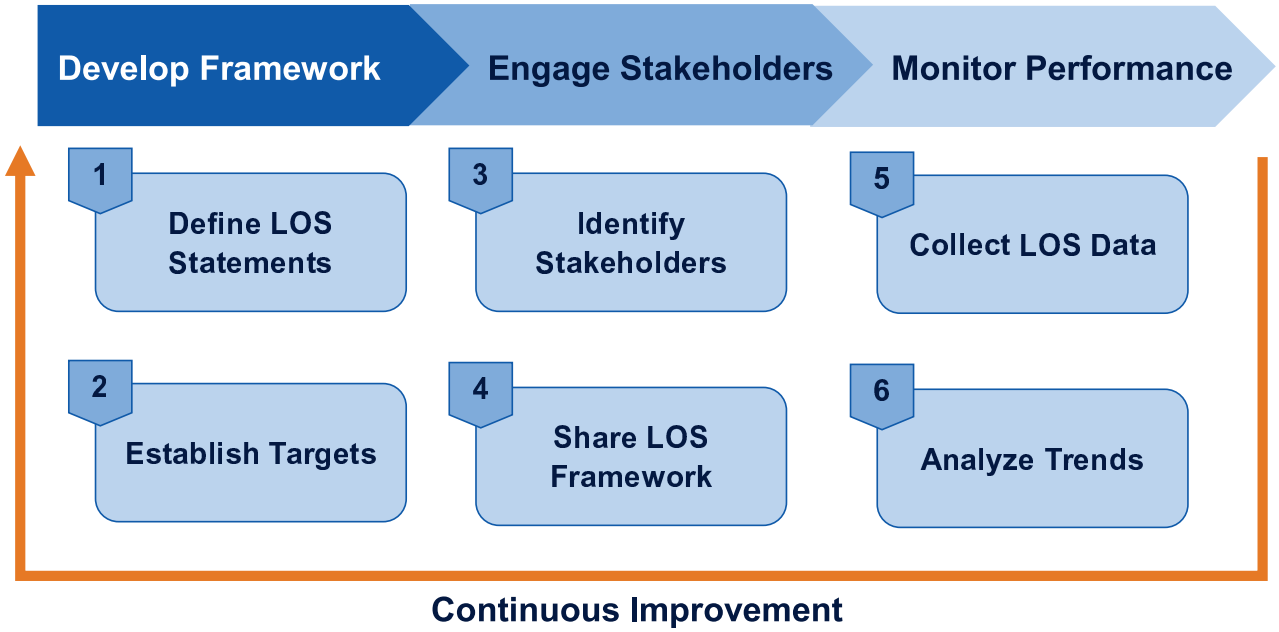
### Reinvestment

**Aggregated 30-Year Stormwater Expenditures - Asset Renewal**

Management Structures, Gravity Sewers, Cross Culverts and Ditches



# Levels of Service (LOS)



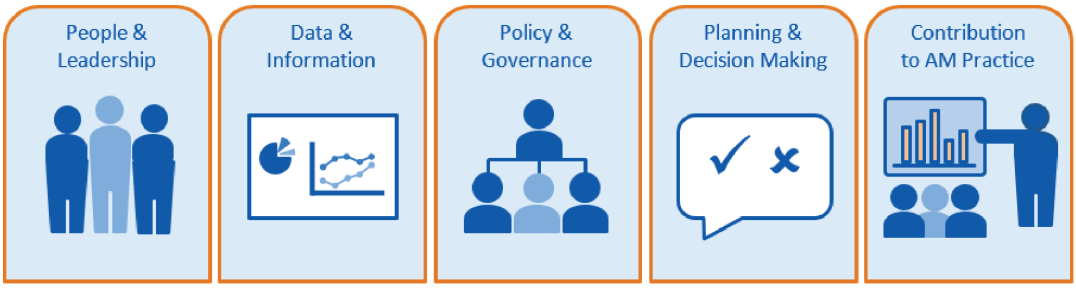
# Developing LOS Framework

| | |
|---|---|
| Level 1 | **Customer Value/Service Criteria** (reason we exist as a utility) |
| Level 2 | **Customer/Corporate LOS** (what customer/corporation gets) |
| Level 3 | **Technical LOS** (what we do/how we do it) |
| Level 4 | **Operational Indicator** (how we know we do it well/we met stated LOS) |
| Level 5 | **Service Standard** (how we measure service) |
| Level 6 | **Target** (must be able to measure) |

- Multiple levels reaching from vision through customer LOS, technical LOS, operational indicators, service standards, and targets
- Using LOS framework can allow staff to understand connection between corporate vision, mission and day to day tasks
- Supports a customer service focus

# AM Program Reassessment

- Assessment using Federation of Canadian Municipalities (FCM) Asset Management Readiness Scale (AMRS) tool




| Current | 1 | 1 | 1 | 2 | 1 |
|---|---|---|---|---|---|
| Year 1 | 2 | 2 | 1 | 2 | 1 |
| Year 3 | 3 | 2 | 3 | 3 | 2 |
| Year 5 | 3 | 4 | 3 | 3 | 3 |

# 2021/22 Roadmap Initiatives

| Year | Project Name | 2021/22 | | | |
|---|---|---|---|---|---|
| | | Q1 | Q2 | Q3 | Q4 |
| 2021 | Update/endorse AM Policy (Executive Team/Halifax Water Board) | | | | |
| 2021 | Enhance communications for AM program | | | | |
| 2021 | Offer AM101 training across organization | | | | |
| 2021 | Establish AM Advisory or Steering Committee | | | | |
| 2021 | Develop enhanced project prioritization framework | | | | |
| 2021 | Identify and document critical assets | | | | |
| 2021 | Develop condition assessment workplan (by asset class) | | | | |
| 2021 | Develop LOS framework | | | | |

# In Summary

- Asset Management:
  - Connects values, services, and assets
  - Is a way of doing business (not just a single project or initiative)
  - Involves multiple departments/stakeholders and collaboration/communication is key (we are all asset managers)
  - Is a continuous improvement program (start anywhere with available information, adaptive)
  - Relies on data
  - Is practiced internationally (look to industry leaders for guidance)
- Halifax Water publishes an asset management plan (AMP) annually now that will be filed with the HW Board, and the NSUARB in September



# Resources and Links

Federation of Canadian Municipalities

- FCM - Why Invest in AM?

Institute of Asset Management

- IAM - What is AM?
- IAM - The AM Journey

icInfrastructure

- Spending Money to Stand Still

# Questions or Comments?



# ITEM # 9
**Halifax Water Board**
**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Susheel Arora
Digitally signed by Susheel Arora
Date: 2021.09.17 11:00:48 -03'00'
Susheel Arora, M.A.Sc., P.Eng. Director of Operations

**APPROVED:** Cathie O'Toole
Digitally signed by Cathie O'Toole
Date: 2021.09.17 10:49:56 -03'00'
Cathie O'Toole, MBA, FCPA, FCGA, ICD.D, General Manager

**DATE:** September 14, 2021

**SUBJECT:** **Support for Dalhousie University's NSERC Alliance Grant Proposal**

---

## ORIGIN

Halifax Water has supported the National Sciences and Engineering Research Council of Canada (NSERC) / Halifax Water Industrial Research Chair (IRC) program with Dr. Gagnon at Dalhousie University since 2007 and has supported the NSERC Collaborative Research Development (CRD) for wastewater research with Dr. Stoddart since 2020. Both research programs are nearing the end of their terms and a new "*One Water"* research program is proposed in its place.

## RECOMMENDATION

It is recommended that the Halifax Water Board approve Halifax Water's partnership and contribution of $1,480,000 over five years towards the "*One Water"* Dalhousie NSERC Alliance Grant research program from 2022 to 2027, to be submitted to NSERC in November, 2021. This research program will support Halifax Water's research needs in developing climate adapted technologies and data driven decision making to support successful development and implementation of the Water Supply Enhancement Program and align with the objectives identified in the Infrastructure Master Plan, Asset Management Plan and Compliance Plane specifically in relation to the challenges associated with meeting the Federal Wastewater Systems Effluent Regulation requirements. The proposal ties together drinking water and wastewater into a "*One Water"* research program that leverages each dollar spent 5.5:1 through investment by NSERC and other research partners.

## BACKGROUND

Halifax Water has supported a drinking water research program with Dalhousie University since 2007 through the NSERC/Halifax Water Industrial Research Chair program. In March 2020, a wastewater research program was awarded with Dalhousie University through a 3-year NSERC CRD. The current term for the drinking water research program ends in March 2022 and the wastewater research program term ends in March 2023.

Research led by Dalhousie and others have demonstrated the impact that lake recovery and climate change has had on water quality, which requires an anticipatory reaction across the water community to address design approaches to mitigate environmental damage of wastewater discharge and to manage water quality and water and wastewater treatment costs into the future. The necessary exploration of sustainable and effective monitoring strategies and design technology approaches extends to both water and wastewater services. Similar to Halifax Water, the research team at Dalhousie University has taken a "*One Water"* approach to the research proposal being submitted this fall to merge both research programs into one for a five-year term. The overarching objective of the proposed research is:

> **Establish innovative approaches for water science and engineering that will contribute the advancement of climate-adapted technologies and decision-making approaches for water and wastewater treatment**.

This will be accomplished through three research themes:

Theme A: Development and Application of Robust Methods and Technologies
Theme B: Climate-Adapted Technologies for Safe Water at the Tap
Theme C: Climate Friendly Technologies for Wastewater

Recently, NSERC has changed their grant program structure and the Industrial Research Chair program has been replaced by the NSERC Alliance program. A benefit of the new Alliance program is that NSERC will contribute 2 dollars for every dollar spent by partners like Halifax Water, compared to the 1:1 leveraging in the IRC program.

The benefits realized from partnership in the NSERC/Halifax Water IRC over the past 15 years are significant and wide reaching:

- On the drinking water side alone, the research program has trained 205 highly qualified personal (31 PhD, 69 Masters, 94 Coops students, 11 Post-Doctoral) and employed 27 staff members since 2006. Many of these young professionals have been hired by Halifax Water or remained in Atlantic Canada working in academia, government and consulting. For example, of the team from CBCL working on the Water Supply Enhancement Program, four members, including the lead engineer, are alumni of the Dalhousie Research Program. The research program has created a center of excellence in Atlantic Canada in drinking water treatment, which benefits Halifax Water directly but also the broader industry in the region, and nationally.

- Research outcomes have led to numerous process changes to respond to regulatory changes and improve drinking water quality at the tap, including changes to the coagulation process, filtration, and corrosion control.

- Research led to the identification of lake recovery and changing source water quality, which has driven the Water Supply Enhancement Program, and identified the need for Atlantic Canada to prepare for changes to source water quality.

- Research outcomes have driven the development of Halifax Water's industry leading Get the Lead Out program.

- Through the research program, Halifax Water has access to advanced analytical equipment which has allowed for much deeper understanding of our processes than most utilities have access to. Advanced analytics have allowed Halifax Water to characterize and understand:

    - Organic matter concentrations and changes over time to optimize treatment processes, investigate taste and odour events, such as geosmin, and develop a robust algal monitoring strategy

    - Factors involved in lead release in the distribution system in order to develop optimal corrosion control practices

- The research partnership has ensured that Halifax Water, although a relatively small utility, remains at the forefront of industry knowledge and is a leader in best practice relative to water quality.

- Involvement in research partnerships in both drinking water and wastewater has led to strong relationships with partners that has allowed Halifax Water to respond quickly to emerging issues. An example is Halifax Water's partnership with the Dalhousie Wastewater SARS-CoV-2 research program funded by Research Nova Scotia. Working together with Halifax Water staff at both the operational and management level, Dalhousie was able to very quickly mobilize and develop new technologies and surveillance tools that have been implemented across Canada and are actively being used to drive public health decision making in several jurisdictions.

- With the addition of Wastewater research in 2020 through the NSERC CRD program, Students are now being trained with skills that mobilize across both water and wastewater realms. Tools that are being developed for wastewater for advanced monitoring and process optimization are now also being incorporated into drinking water. These students will form the basis of the next generation of cross disciplinary highly qualified personnel to enter the workforce in Atlantic Canada filling a major gap that exists in wastewater engineering knowledge.

- Over the past five year term, students within the research chair, led by Dr. Ben Trueman who is currently on a 2 year MITACS Accelerate Post-Doctoral internship with Halifax

Water, have self-organized to develop advanced coding, modeling and data analytic skills that are helping to bring Halifax Water to the forefront of the wave of data driven decision making, leveraging the value of decades of data collection through both research and utility operation. An example outcome of this is recent development of a visual dashboard the incorporates results of over 200 jar tests under varying conditions at the Dartmouth Wastewater Treatment Facility that can be used to model and predict optimal treatment conditions based on raw water quality to be used by operational staff to optimize the treatment process and maintain regulatory compliance under challenging and constantly changing conditions. This tool will be adapted for drinking water to similarly provide optimization information to plant staff under varying water quality conditions.

- Bench and pilot scale studies have been conducted to optimize the chemically enhanced primary treatment process at the Dartmouth wastewater treatment facility (WWTF). Bench scale outcomes to date have indicated a different optimal coagulant dose for different inflow conditions.

- Full scale pilot testing of alternative ballasted flocculation technology identified in the Compliance Plan was tested in 2020 at the Dartmouth WWTF utilizing resources made available from the NSERC CRD program. This research identified areas of improvement that lead to optimization of process chemical dosing to ensure the facility maintains compliance.

- The outcomes from the wastewater pilot work to date have been implemented at full scale with resulting improvement in effluent quality. Further optimization of the ballasted clarification process is in progress which would significantly improve primary chemical treatment, thus improving the effectiveness, and reducing the cost of downstream disinfection. Similar chemical treatment strategies shall be employed at Halifax and Herring Cove wastewater treatment facilities to improve effluent quality through process optimization.

## DISCUSSION

With the utility shift towards "*One Water"*, it is important that our research goals shift to this approach as well. In the past, the research programs have been separate and the IRC only focused on drinking water treatment/corrosion control and the CRD on wastewater optimization. With transferable skills and knowledge between water and wastewater, combining the two will provide more robust training for students and development of highly qualified personnel ready to enter the workforce in "*One Water"*. Halifax Water has adopted an Enterprise Risk Management (ERM) program and the top risks having been identified. The ERM program and shift from the Water Quality Master Plan to a Water Safety Plan approach, as proposed in board report "Item 9-I - Transitioning from a Water Quality Master Plan towards a Risk Based Water Safety Plan Process" presented to the board in September 2021, will be used to drive current and future research needs that are representative of greatest risk. This will help ensure the research is pertinent to Halifax Water. Moving forward, Halifax Water can use the risks identified through the WSP and ERM to

identify the areas of research that will benefit the utility the most and match the research skills of CWRS.

NSERC Alliance grants encourage university researchers to collaborate with partner organizations, which can be from the private, public or not-for-profit sectors. These grants support research projects led by strong, complementary, collaborative teams that will generate new knowledge and accelerate the application of research results to create benefits for Canada. This new program offers better funding leverage as NSERC will provide two thirds of the project costs (2:1 leverage) instead of half the costs (1:1 leverage) as was the case with the IRC program. The maximum annual funding request from NSERC for this new grant is $1 million each year for 1 to 5 years.

The overarching objective of the proposed Alliance Grant to be submitted to NSERC this fall is to establish innovative approaches for water science and engineering that will contribute the advancement of climate-adapted technologies and decision-making approaches for water and wastewater treatment. The proposed research goals are broken up into three main research themes:

- Theme A: Development + application of robust methods & technologies,
- Theme B: Climate-adapted technologies for safe water at the tap, and
- Theme C: Climate friendly technologies for wastewater.

Theme A

With a constantly changing and tightening regulatory environment, development of new or enhanced methods for sampling and analysis for emerging contaminants and already regulated parameters is critical to ensure Halifax Water acts proactively towards existing and future regulatory compliance. Recently, Dalhousie developed a passive sampling method for the SARS-CoV-2 virus that was able to detect the virus in wastewater. This technique can be applied to other contaminants such as the toxins produced by blue-green algae. The development of this passive sampling method for other contaminants of interest is the first sub-goal of this research theme (A1.1). The next goal under this theme is to further develop the analytical techniques for quantifying these contaminants, with algal toxins being one of the contaminants of interest (A1.2). Local analytical capacity and access to fast, accurate results is a major gap in the industry, which presents challenges in risk-based decision making for algal blooms. These methods will be developed using a variety of analytical tools and will not only allow for more in-depth analysis, but also garner faster result allowing for better source water monitoring.

The next phase of this research theme centers around the application of these methods and technologies (A2.1). These methods will be applied in the field and at the pilot scale to supplement the conventional monitoring approach. The SARS-CoV-2 approach for wastewater sampling will be applied to monitor biosolids for metals unique to the water system (e.g. lead, copper, zinc) to help understand the effectiveness of corrosion control and lead service line replacement programs. The last goal of this research theme (A2.2) is focused on the management and visualization of data. Halifax Water has a rich archive of water quality and process data, with minimal current ability to manage and make decisions on these data, both in real time and examining long term trends. Effective data management is just as important as data collection. Use of new data visualization and analytical tools will be developed to ensure that data will be synthesized in a way

that allows for data driven decision making and feeds into Halifax Water's Water Safety Plan and Enterprise Risk Management processes.

Theme B

Research theme B focuses on adapting drinking water technologies to account for the impacts of climate change to ensure safe drinking water at the tap. Halifax Water's current treatment processes are operating outside of design parameters due to impacts from climate change and lake recovery, aging infrastructure, and an evolving and more stringent regulatory environment. The demand for energy-efficient and sustainable processes, with robust and reliable treatment technologies must be developed to ensure safe drinking for future generations. The Water Supply Enhancement Program will provide upgrades to both major water treatment facilities over the next ten years to ensure that finished water quality can meet both current and future needs. Choosing appropriate technologies to address both current and future water quality, while understanding and minimizing unintended consequences on downstream water quality, including disinfection byproducts and lead release, is paramount, and a foundation of the proposed research theme.

The first sub-objective (B1.1) of this theme is to establish reference conditions in response to climate change. Data will be recorded to characterize baseline water quality conditions and capture the changing water quality as time progresses. During this time, bench scale studies evaluating efficacy of various pre-treatment strategies with different source water quality will be conducted. This research will provide Halifax Water with valuable insight on our source waters and supply data to guide investigations for process changes. Sub-objective B1.2 focuses on investigation of physical and chemical processes to deal with shifting water quality from climate change. Removal of algae and algal toxins and taste and odour compounds like geosmin, using dissolved air flotation (DAF) and chemical oxidation will be central to this sub-goal. Investigation into integration of advanced oxidation processes (AOPs) will be done as sub-goal B1.3. AOPs have the potential to deal with the removal of algae and algal toxins, taste and odour compounds, and the reduction of disinfection byproducts (DBPs) in the distribution system through improved natural organic matter removal in the treatment plants.

The unintended consequences on the distribution system of climate change will be researched as goal B2. Changing water treatment processes in the plants will change the characteristics of Natural Organic Matter (NOM) and treatment by-products which will have different interactions with the distribution system. Specifically, inorganic contaminants such as lead, manganese, and copper at the tap as a result of process changes will be investigated via corrosion control studies. Investigation into the impact that these process changes will have on biofilm in the distribution system will also be conducted. Limiting biological growth within the distribution system will help reduce risk on multiple fronts (pathogen reduction, corrosion reduction, etc.) and its importance cannot be understated.

Theme C

The impact of climate change will also be felt by in the wastewater sector, facilities that are also facing increasingly stringent regulations. Much like the drinking water treatment plants, sustainable and energy efficient technologies are desired for wastewater treatment plants. To adapt

the chemically enhanced primary treatment (CEPT) processes of the Harbour Solutions Treatment Plants to the changing climate, several treatment areas are to be considered such as; nutrient recovery, natural polymers and coagulants, membrane technology, and UV disinfection. This work is critical to ensure Halifax Water can meet future wastewater regulatory requirements through the Wastewater Systems Effluent Regulations (WSER) which requires compliance by Halifax Water by 2040. Halifax Water has recently submitted a term of reference to the NSURB outlining a Wastewater Treatment planning study that will directly provide relevant information to support future rate applications and master planning activities that shall direct the path forward in relation to potential upgrade paths for the HHSPs to meet the WSERs. The processes occurring in a wastewater treatment plant (WWTP) are subsequently affected by climate change; more extreme weather events and earlier snowmelt runoff will lead to more untreated sewer overflows, increased flooding, etc. Wastewater treatment, greenhouse gases (GHGs) including carbon dioxide, methane (CH4) and nitrous oxide (N2O) associated with nitrification/denitrification processes, can be emitted to the atmosphere. The various problems associated with climate change and WWT operation and the solutions that can be applied to deal with them need to be researched to ensure HW continues to be stewards of the environment and ensure that future expenditures associated with upgrade to the HHSPs are optimized for nutrient recovery amid climate and regulatory changes.

Developing bio-based polymers as an alternative to the current synthetic polymers used in CEPT is the first sub-goal of this research theme. These polymers would be more sustainable and can produce high quality biosolids for resource recovery. Consideration for future climate scenarios will be given to estimate the effectiveness of these bio-polymers in the future. Investigation of membrane filtration will be tested at the pilot scale to evaluate its feasibility at the full scale as it has potential to greatly improve treatment facility effluent quality and increase biogas and nutrient recovery. This work will help Halifax Water become more sustainable and meet future regulatory requirements.

The second research objective (C2) for this theme focuses on enhancing microbial safety of effluent from wastewater treatment facilities. The evaluation of Ultraviolet Light-Emitting Diode (UV LED) reactors as a modular addition to treatment configurations in replace of traditional mercury lamps will be completed. The carbon footprint of each disinfection technique will be evaluated to help determine the environmental impact of each method. Passive samplers developed in research theme A will be deployed in pilot facilities as a tool to characterize microbes in treated effluent. Other contaminants of interest will also be characterized, giving even more insight into the efficacy of potential process changes.

Research Goals & ERM

The research goals align with reducing the top risk to the utility: capacity restraints/lake recovery, through the development of robust methods and technologies that will allow Halifax Water to tackle challenges associated with changing source water quality through informing the development and outcomes of the Water Supply Enhancement Program. Climate change and adoption of leading practices, both top-20 risks, are also core components of the Dalhousie research proposal. The proposed schedule for this research is outlined in the table below.

| | 2022 | | | 2023 | | | 2024 | | | 2025 | | | 2026 | | | 2027 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W1 | S1 | F1 | W2 | S2 | F2 | W3 | S3 | F3 | W4 | S4 | F4 | W5 | S5 | F5 | W6 |
| **Theme A: Development & Application of Robust Methods and Technologies** | | | | | | | | | | | | | | | | |
| ***Objective A1 Development of Robust Water and Wastewater Methods and Technologies*** | | | | | | | | | | | | | | | | |
| *Activity A1.1* | → | | | | | | | | | | | | | | | |
| *Activity A1.2* | → | | | | | | | | | | | | | | | |
| ***Objective A2 Application of Robust Water and Wastewater Methods and Technologies*** | | | | | | | | | | | | | | | | |
| *Activity A2.1* | | → | | | | | | | | | | | | | | |
| *Activity A2.2* | → | | | | | | | | | | | | | | | |
| **Theme B: Climate-Adapted Water Technologies for safe Water at the Tap** | | | | | | | | | | | | | | | | |
| ***Objective B1 Advanced Treatment Processes to Foster Climate Adaptation for Drinking Water*** | | | | | | | | | | | | | | | | |
| *Activity B1.1* | → | | | | | | | | | | | | | | | |
| *Activity B1.2* | | → | | | | | | | | | | | | | | |
| *Activity B1.3* | | | | → | | | | | | | | | | | | |
| ***Objective B2 Unintended Consequences of Climate Change on Distribution Systems*** | | | | | | | | | | | | | | | | |
| *Activity B2.1* | → | | | | | | | | | | | | | | | |
| *Activity B2.2* | → | | | | | | | | | | | | | | | |
| **Theme C: Climate-Friendly Technologies for Wastewater** | | | | | | | | | | | | | | | | |
| ***Objective C1 Optimization of Processes for Nutrient Recovery amid Climate Change*** | | | | | | | | | | | | | | | | |
| *Activity C1.1* | | | | | → | | | | | | | | | | | |
| *Activity C1.2* | | | | | → | | | | | | | | | | | |
| ***Objective C2 Enhancing Microbiological Safety of Effluents from Resources Recovery Facilities*** | | | | | | | | | | | | | | | | |
| *Activity C2.1* | | | | | → | | | | | | | | | | | |
| *Activity C2.2* | | | | | → | | | | | | | | | | | |

**Table 1:** Proposed research schedule for Dalhousie University's NSERC Alliance Grant. The integration of wastewater research into the program is in 2023, which aligns with the completion of the current NSERC CRD and transition to a "*One Water"* research program.

## BUDGET IMPLICATIONS

The current NSERC/Halifax Water IRC program has a financial contribution from Halifax Water of $190,000 per year for five years. The Current NSERC CRD program has a financial contribution from Halifax Water of $145,000 per year for three years ending in March 2023. **This equals a total current water and wastewater research contribution of $335,000 per year.** NSERC matches each of these contributions 1:1. Additionally, for the IRC, there are partner funds from LuminUltra Technologies, CBCL Ltd., CBRM Water Utility, Mantech, AquiSense Technologies, City of Moncton and AGAT Laboratories that are also leveraged 1:1 with NSERC. Including NSERC and Partner funds, for each dollar spent by Halifax Water on drinking water research, an additional 4.1 dollars are provided by NSERC and other research partners to support the research, therefore the leveraged value of the existing drinking water research is 4:1. The leveraged funding of the current wastewater research program is 1:1.

The requested financial contribution from Halifax Water for the Alliance Grant is shown in Table 2. The total five-year cost of the Alliance Grant to Halifax Water is $1,480,000 for Water and Wastewater Research. For 2022 and 2023, the wastewater research is funded through the existing NSERC CRD program, and wastewater research starts in the Alliance Grant in 2024. The Alliance grant has a 2:1 funding ratio of NSERC to partners, with a total program cost is $8,071,667. This means the total leveraged funding for this research program for both drinking water and wastewater research including partner and NSERC funds is 5.5:1 compared to the existing 4:1 for water and 1:1 for wastewater research.

**Table 2:** Proposed Alliance Research Grant contributions and total program costs.

| Organization | Proposed Yearly Contribution (CAD) | | | | | |
|---|---|---|---|---|---|---|
| | 2022 | 2023 | 2024 | 2025 | 2026 | Total |
| Halifax Water | $215,000 | $215,000 | $350,000 | $350,000 | $350,000 | $1,480,000 |
| Other Research Partners | $345,000 | $345,000 | $345,000 | $345,000 | $345,000 | $1,725,000 |
| NSERC | $933,333 | $933,333 | $1,000,000 | $1,000,000 | $1,000,000 | $4,866,000 |
| Total Program Costs | $1,493,333 | 1,493,333 | $1,695,000 | $1,695,000 | $1,695,000 | $8,071,666 |

Table 3 shows Halifax Water's total proposed water and wastewater research costs for the next five years for the proposed Alliance Grant combined with the existing NSERC CRD for wastewater research. Halifax Water will pay a total of $360,000 per year (existing funding of $145,000 plus new funding identified in table 2 of $215,000) for research for 2022 and 2023. This will result in a total spend of $360,000 in 2022 and 2023. Halifax Water funding will be $350,000 in 2025, 2026 and 2027 for combined water and wastewater research through the NSERC Alliance program. The additional $25,000 in funding required to support the Alliance Grant in 2022 and 2023 will come from reallocation within existing operations budgets. The incremental funding in 2024 and beyond will it be built into future revenue requirements.

**Table 3:** Proposed Halifax Water annual research contributions for the next five years.

| | Proposed Yearly Halifax Water Research Contribution (CAD) | | | | |
|---|---|---|---|---|---|
| | 2022 | 2023 | 2024 | 2025 | 2026 |
| Proposed NSERC Alliance Grant | $215,000 | $215,000 | $350,000 | $350,000 | $350,000 |
| Existing NSERC CRD Grant (Wastewater only) | $145,000 | $145,000 | | | |
| Annual Halifax Water research contribution | $360,000 | $360,000 | $350,000 | $350,000 | $350,000 |

If the research program is renewed, on a go forward basis, Halifax Water will require annual reporting to document the cost and benefit of the program including operational and technical

achievements as well as any operational or capital cost savings which can be reflected through Halifax Water's cost containment reporting process.

## ALTERNATIVES

The alternative to supporting the "*One Water"* research program would be to not fund continued research. This alternative would significantly disadvantage HW's ability to develop operationally sound and cost-effective strategies moving forward to address the current and future challenges identified herein Halifax Water would lose the ability to access advanced analytical equipment to better understand complex relationships between source water, treatment and distribution system water quality, that allow for risk based decision making to protect public health. Halifax Water would lose the value-add of research participation including local development of highly qualified personnel, knowledge transfer, development of partnerships, involvement in emerging issues and ability to remain a utility leader, which have proven the value in investment in the research program time and again.

There is a current need for information and research to feed into capital planning work for the Water Supply Enhancement Program (WSEP) to ensure successful design and commissioning of proposed infrastructure upgrades to meet current and future water quality challenges. Furthermore, wastewater research is required to enable successful, cost effective planning for compliance with the WSER. This work for both drinking water and wastewater is contained within the research proposal, and thus leveraged through partner and NSERC contributions. If the research program is not funded, this work will need to be completed by consultants which would likely be more expensive, and would be funded without the benefit of the NSERC contributions.

Report Prepared by: Wendy Krkosek Digitally signed by Wendy Krkosek Date: 2021.09.17 10:48:28 -03'00'

Wendy Krkosek, Water Quality Manager, (902) 483-4432

Financial Reviewed by: Digitally signed by Louis de Montbrun Date: 2021.09.17 10:53:51 -03'00'

Louis de Montbrun, CPA, CA, Director, Corporate Services/CFO
(902) 490-3685

**ITEM # 11**
**HRWC Board**
**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Digitally signed by Heidi Schedler Date: 2021.09.17 13:56:39 -03'00'

Heidi Schedler, General Counsel

**APPROVED:** Digitally signed by Cathie O'Toole Date: 2021.09.17 13:53:24 -03'00'

Cathie O'Toole, CPA, CGA, MBA, ICD.D, General Manager

**DATE:** September 17, 2021

**SUBJECT:** **September 2021 NSUARB Annual Report**

---

## INFORMATION REPORT

## ORIGIN

Nova Scotia Utility and Review Board (NSUARB) reporting requirements.

## DISCUSSION

Halifax Water is directed to submit reports to the NSUARB on an annual basis in relation to various programs and assets at various times:

- M09201 – 2019 Trenchless Rehabilitation Program
- M09213 – Fairview Clayton Park Bridgeview I/I Reduction, and the projected asset renewal needs identified in the 2019 Integrated Resource Plan (IRP)
- M09730 – 2020 Trenchless Rehabilitation Program and CCTV inspection program optimization project and PACP rating changes
- M09832 – Asset Renewal Management Program
- M09494 – Regional Development Charge

These reports often overlapped in both timing and subject matter. In June 2021, the NSUARB approved a revised annual reporting schedule consolidating various Halifax Water annual reporting requirements. The attached report will be submitted to the NSUARB on or before September 30, 2021, as per the direction of the NSUARB.

## BUDGET IMPLICATIONS

There are no budget implications relating to filing this report with the NSUARB. Any expenditures arising from programs referenced in the reports will be the subject of future funding requests, where appropriate.

## ATTACHMENTS

1. Asset Renewal Management Program
2. Wet Weather Management Program
3. Regulatory Compliance Report

Report Prepared by:

Digitally signed by Heidi Schedler
Date: 2021.09.17 13:57:01 -03'00'

Heidi Schedler, General Counsel
902-490-6101

# HALIFAX WATER ANNUAL REPORTING

## M09494

*M09832 Asset Renewal Management Program Annual Report*

# Contents

Glossary of Terms ..... 1
2. Asset Management Program (M09832) ..... 3
2.1. Introduction ..... 3
2.2. Foundational Asset Management ..... 4
2.2.1. Annual Asset Management Plan (AMP) Update – Executive Summary ..... 4
2.2.2. Asset Management Implementation Teams ..... 7
2.2.3. AM Program Reassessment Project ..... 7
2.3. Halifax Water's Asset Management Program ..... 8
2.3.1. Prioritizing Asset Renewal ..... 8
2.3.1.1. Condition Assessment Considerations and Status ..... 8
2.3.1.2. Risk Considerations ..... 15
2.3.1.3. Current Capital Budget Process ..... 17
2.3.1.4. Halifax Water Enhanced Prioritization Methodology ..... 17
2.3.1.5. Asset Management Decision Support System (M10132) ..... 19
2.3.2. The Right Assets at the Right Time Using the Right Approach for the Right Reasons ..... 21
2.3.3. Update on CCTV Optimization Program and PACP Changes (M09730) ..... 22
2.3.3.1. Pilot Evaluation of PACP Changes Over Time ..... 23
2.3.3.2. Data Collection Technology for Unreinforced Concrete Pipes ..... 23
2.3.3.3. Review of Table 2 – Likelihood of Failure Model Scoring Factors and Descriptions ..... 23
2.3.4. Summary of Accomplishments ..... 23
2.3.5. Schedule of Activities ..... 24

# Glossary of Terms

| | |
|---|---|
| AM | asset management |
| AMBC | Asset Management British Columbia |
| AMIT | asset management implementation team |
| AMP | asset management plan |
| AMRS | Asset Management Readiness Scale |
| CCTV | closed circuit television |
| CDA | Canadian Dam Association |
| CIRC | Canadian Infrastructure Report Card |
| CNAM | Canadian Network of Asset Managers |
| CFM | capital funds management |
| CMMS | computerized maintenance management system |
| COF | consequence of failure |

| | |
|---|---|
| COTS | commercial-off-the-shelf |
| CP | capital planning |
| CPM | capital project management |
| CPM&IS | capital project management and information system |
| CPPD | capital project planning database |
| CPRS | capital project summary report |
| DSR | dam safety review |
| DSS | decision support system |
| ERM | enterprise risk management |
| FCM | Federation of Canadian Municipalities |
| GIS | geographic information system |
| GFMAM | The Global Forum on Maintenance & Asset Management |
| HRM | Halifax Regional Municipality |
| IAM | the Institute of Asset Management |
| IPWEA | The Institute of Public Works Engineering Australasia |
| IRP | Integrated Resource Plan |
| IS | information system |
| ISO | the International Organization for Standardization |
| LOF | likelihood of failure |
| LOS | levels of service |
| NSUARB | Nova Scotia Utility and Review Board |
| O&M | operations and maintenance |
| PACP | pipeline assessment certification program |
| WSEP | water supply enhancement program |
| WSP | water supply plant |
| WWTF | wastewater treatment facility |

**Document Revision History**

| Description | Author | Date Modified | Version |
|---|---|---|---|
| Initial Draft | Val Williams | 2021-08-31 | 1.0 |
| Final document ready for submission | Val Williams | 2021-09-15 | 1.1 |
| | | | |

# 2. Asset Management Program (M09832)

## 2.1. Introduction

Through several capital approval applications to the Nova Scotia Utility and Review Board (NSUARB) including matters M09201 and M09730 – Trenchless Rehabilitation Programs for 2019 and 2020 respectively and M09213 – Fairview Clayton Park Bridgeview I/I Reduction, and the projected asset renewal needs identified in the 2019 Integrated Resource Plan (IRP), the NSUARB recognized the need for Halifax Water to enhance its asset management program. As a result, the NSUARB opened a matter specific to that purpose (M09832 – Asset Renewal Management Program).

In M09494 – Regional Development Charge, the NSUARB directed Halifax Water to file annually by September 30 various reports including:

> A description of Halifax Water's continuing advancement of its asset management program, including enhancing its asset condition data, to prioritize asset renewal and minimize costly disruptive emergency repairs. And,
>
> An update on the existing condition and long-term capital needs of the Utility's stormwater system

In M09730, Halifax Water filed its annual report regarding the CCTV inspection program optimization project and PACP rating changes on June 1, 2021. Subsequent to the filing of this report, the NSUARB noted:

> Board consultants also identified several items from the report that warrant further clarification, and areas for potential improvements. They also noted that they believe there are opportunities to begin collecting data relevant to the asset renewal prioritization program with a PACP Change Tracking Program.
>
> To address these issues, the Board directs Halifax Water to engage with the Board's consultants to discuss the report further and obtain input regarding potential additional improvements to the CCTV Optimization Program and PCAP [sic] rating changes. This engagement shall take place prior to July 31, 2021. Halifax Water is to then submit an enhanced plan as a part of its annual Asset Management Plan filing due on September 30, 2021.

Halifax Water requested direction from the NSUARB in a letter dated May 31, 2021 that included consideration of the consolidation and timing of various annual reporting requirements outlined in Appendix B. In its July 14, 2021 response under Proposed Revisions to Reporting Requirement (M10139), the NSUARB approved the revised annual reporting schedule as set out in Appendix B of Halifax Water's May 31, 2021 letter. In the revised annual reporting schedule, the annual reports identified under the Regional Development Charge decision (M09494) consolidated the asset management (AM) program and the Asset Renewal Management Program (M09832) into the September 30 reporting cycle.

## 2.2. Foundational Asset Management

Halifax Water has been carrying out good utility management for decades. In 2011, the need to formalize an asset management (AM) program was identified. Staff began researching industry leading organizations including the Institute of Asset Management (IAM), the International Organization for Standardization (ISO), The Global Forum on Maintenance & Asset Management (GFMAM), The Institute of Public Works Engineering Australasia (IPWEA) and organizations within Canada to find guidance and examples of AM practices. Canadian resources included Asset Management British Columbia (AMBC), the Canadian Network of Asset Managers (CNAM), and the Canadian Infrastructure Report Card (CIRC).

As defined in ISO 55000: "Asset management enables an organization to realize value from assets in the achievement of its organizational objectives." AM is necessary to ensure sustained service to the beneficiaries of the services Halifax Water provides – our customers. Successful AM programs rely on accurate data, effective cross-departmental collaboration, and a systematic implementation plan.

### 2.2.1. Annual Asset Management Plan (AMP) Update – Executive Summary

Through direct ownership and control over of a vast network of assets, Halifax Water delivers water, wastewater and stormwater services to the customers of Halifax Regional Municipality (HRM). The Asset Management Plan (AMP) is a summary of the organization's assets, including current status, the levels of service, what is required to keep these assets in service, and the financial implications of implementing planned actions and improvements.

The AMP is based on the utility's AM program, which was developed more than a decade ago, and follows best practices for utility management. This approach ensures a high level of service delivery for its customers/ratepayers and provides a robust continuous improvement program that allows the utility to refine its data as more accurate information is collected.

The AMP provides an understanding of the relationship between Halifax Water's assets and its corporate goals. It outlines a clear connection to the utility's mission, vision, and values and the infrastructure that enables it to provide a Wet Weather Management Program, a Water Loss Control Program, an infrastructure master plan, and an Integrated Resource Plan.

In addition, it provides the latest data on the state of that infrastructure, what is owned by Halifax Water, where it is located, what condition it is in and its current valuation.

Halifax Water's AMP has also incorporated risk, performance and climate resilience. The document demonstrates that by establishing Asset Management Implementation Teams (AMITs), it has built an asset management program that is continually assessing and working to mitigate existing and emerging risk factors.

In 2020, Halifax Water commenced a review of levels of service with an understanding that the service it provides has a direct impact on asset management through life cycle costs and risk management. As this document explains, Halifax Water is in the initial phase of performance monitoring that will define level of service statements and the supporting measurement targets.

Halifax Water applies several strategies to maintain, improve and grow its assets in a sustainable, effective manner. The AMP outlines how the organization's asset strategy estimates the limited life expectancy and

the rate of deterioration as part of identifying a set of actions that enable assets to provide the desired level of service in a sustainable way, while managing risk, at the optimal lifecycle cost. It also identifies recommendations that support the integration of an asset management culture at Halifax Water and the lead role that senior management has in establishing the appropriate level of involvement from the various departments.

Any AM program requires sound financial decisions and has an effective long-term funding strategy. The AMP outlines Halifax Water's funding strategy that focuses on the general principles of rate stability and affordability; long-term financial sustainability; and intergenerational equity. It also identifies the natural constraints of using debt, and the complex funding process of drawing from multiple internal and external sources in its efforts to manage its assets and limit the need for rate increases.

Consistent with its goal of continuous improvement, Halifax Water's AMP is intended to drive changes to practices, facilitate decision making and optimized use of information as the program continues to evolve. As a result, the AMP document outlines the steps used to evaluate the effectiveness of the entire process including areas for monitoring and using an updated asset management roadmap to further define activities.

The annual AMP provides an update of Halifax Water's state of the infrastructure (inventory, condition, valuation, and projected investment needs) – refer to Figure 1, highlights of completed tasks for the fiscal reporting year, and outlines future activities for the next fiscal reporting cycle.




*Figure 1 – 2020/21 Asset Management Plan - Poster*

### 2.2.2. Asset Management Implementation Teams

The Asset Management Implementation Teams (AMITs) commenced in fall of 2018. Initially AMIT's were established for one representative asset class from each of the three (3) infrastructure systems: water, wastewater, and stormwater. As a result, AMITs were established in October 2018 for water transmission mains, wastewater forcemains, and stormwater cross culverts. The initial sessions focused on orienting team members with the terms of reference, roles and expectations in addition to determining how frequently meetings would be held. The primary focus given the time remaining in the 2018/19 fiscal year was on resolving critical information and data gaps necessary for the development of the 2019/20 Asset Management Plan.

Since their inception, the AMITs have been expanded to include all fourteen (14) asset classes. The Water AMIT covers transmission and distribution mains, booster stations, chambers, and reservoirs; the Wastewater AMIT includes gravity sewers, forcemains, and pumping stations; and the Stormwater AMIT considers gravity storm sewers, stormwater management structures, cross culverts, and driveway culverts. Two new AMITs have been set up: Water Supply Plants and Dams and Wastewater Treatment Facilities (WWTFs).

The AMITs have shifted focus away from reviewing only data gaps to address the following key AM considerations:

- Discuss condition, performance, risk, and service standards and thresholds that would indicate additional actions
- Document actions to be taken and timeline for each asset class
- Use the information to inform maintenance activities and asset intervention strategies
- Take the maintenance activities and intervention strategies to provide input into operational and capital expenditure programming
- Use the prioritization approach to assess each proposed item

AM awareness training is also provided to members of the AMITs to help them understand the value of adopting an AM philosophy for service delivery. This training is also provided to Halifax Water staff for gaining an understanding of AM and the benefits it brings to the utility and our customers.

### 2.2.3. AM Program Reassessment Project

In 2011, Halifax Water carried out an asset management program assessment that resulted in the AM roadmap (a series of 22 implementation initiatives over five to seven years). Staff began implementing the initiatives following the completion of the 2012 IRP. Recently, staff commenced a project to conduct an AM Program Reassessment. The project concluded early in the 2021 fiscal year with an updated implementation roadmap. The reassessment involved using the Federation of Canadian Municipalities' (FCMs) Asset Management Readiness Scale (AMRS) assessment tool. The tool considers five competency areas:

- Policy and governance
- People and leadership
- Data and information
- Planning and decision making
- Contribution to AM industry

The project involved assessing Halifax Water's AM program maturity against the AMRS competency areas both in the current state and in consideration for how far the program would progress in the next five to seven years. The findings were used to develop an updated AM Program roadmap with initiatives identified for short (immediate and one year), medium (two and three year), and long (four and five year) term implementation and consideration for activities beyond the five-year horizon. The Roadmap provides a guide for implementing the initiatives. Halifax Water will confirm during the annual budget process which projects will move ahead in each upcoming year. Consistent with the philosophy that AM is a continuous improvement process, progress will be tracked and opportunities to reflect on the specific timing and sequencing of future roadmap initiatives is an important part of the annual review.

Early initiatives will enable Halifax Water to solidify its existing AM foundation including updating the AM policy, establishing the AM strategy principles, creating the AM advisory committee, updating the prioritization methodology, identifying critical assets, and providing basic AM training to staff and Halifax Water Board members.

## 2.3. Halifax Water's Asset Management Program

In its September 25, 2020 letter to Halifax Water, the NSUARB outlined specific requirements for the annual report on the Asset Renewal Management Program (M09832). The Board direction was for Halifax Water to consider:

1. Prioritizing asset renewal needs based on a) condition/performance/residual life/risk of failure; and b) criticality/consequence of failure considerations;
2. Optimizing asset renewal strategies (repair, replace, augment, etc.) based primarily on cost-effectiveness;
3. Optimizing the AM investment level to balance performance and costs given level of service (LOS) objectives and risk tolerance; and
4. Ensuring that the right assets are being renewed using the right approach at the right time for the right reasons.

### 2.3.1. Prioritizing Asset Renewal

Several factors can be applied to establish reinvestment priorities. A mature process relies on significant data such as age/date of installation, estimated service life by asset class (or component), condition, performance, or risk. The AM program uses best available information. Halifax Water recognizes the need to 1) proceed with asset investment decisions using best available information and the 'no regrets' principle; and 2) continue to fill data gaps and refine information that will enable more defensible decisions over time. Halifax Water also acknowledges that it is important to have a plan to improve data through a continuous improvement mindset and avoid waiting for perfect data in order to make decisions. As more information becomes available, decisions will be further supported.

#### *2.3.1.1. Condition Assessment Considerations and Status*

Determining the condition of Halifax Water's assets is a multi-staged process that can best be implemented using asset criticality to guide timing of condition assessment prioritization. For many asset classes, Halifax Water currently uses 'age as a surrogate' where field validated condition information is not possible, not practical, or is part of the proposed condition assessment workplan. This is an acceptable industry leading practice and for many organizations, this may remain the primary source of condition

data. Halifax Water has undertaken field level condition assessments for several assets. A summary of the approaches used for each asset class is presented in Table 1. Table 1 is replicated from the response to information request IR-HRWC-9 under matter M09201 – Halifax Regional Water Commission Trenchless Rehabilitation Program in Halifax Water's March 25, 2020 letter to the NSUARB. The information provided in Table 1 is prefaced with the following statement which remains valid today:

> Advancing the condition assessment program is dependent on asset class, availability of current data, and availability of internal resources and budget. Using the AM program and the Asset Management Implementation Team (AMIT), recommendations from the Asset Management Plans (AMPs) are reviewed and prioritized including what type of condition assessment is warranted and when it will be done. Completion of the near term (24 month time horizon) and future condition tasks is dependent on resources, budget, and consensus among AMIT members.

Several different approaches to assessing condition are used in Table 1 including:

- Age-Based – simple age distribution using scale defined in Canadian Infrastructure Report Card
- Break History – uses number of breaks per unit of linear asset
- Condition Assessments – field assessments where empirical data is collected
- Dam Safety Study – required on periodic basis, based on consequence rating as established by the Canadian Dam Association
- Empirical – institutional knowledge and discussions about asset
- Enhanced Age-Based – starts with conventional age-based assessment, modified by additional factors like material, size, era of manufacture
- Statistical Condition Assessment – using field assessments for a statistically representative sample of the asset class

*Table 1 – Preliminary Approach for Assessing Condition by Asset Class*

| Asset Class | Condition Method | Preliminary Planned Condition Tasks (24 Months) | Future Planned Condition Tasks (Longer Term – Beyond 24 Months) |
|---|---|---|---|
| **Water Supply Plants** | Empirical | • Through AMITs, determine timing of additional condition assessment needs<br>• Comprehensive condition-based assessment of asset components together with programmed upgrades at J.D. Kline and Lake Major water supply plants (WSPs) | • Develop condition assessment workplan or project<br>• Implement work plan<br>• Explore similar comprehensive condition-based assessments at other WSPs |
| **Water Supply Dams** | Dam Safety Study | • Last completed in 2019<br>• Review dam study requirements and determine where enhancements specific to condition are recommended | • Next dam safety studies due in 2024 -2029 (incorporate enhancements as appropriate) |

| Asset Class | Condition Method | Preliminary Planned Condition Tasks (24 Months) | Future Planned Condition Tasks (Longer Term – Beyond 24 Months) |
|---|---|---|---|
| **Water Chambers & Booster Stations** | Empirical | • Through Asset Management Implementation Team (AMIT), determine timing of additional condition assessment needs | • Develop condition assessment workplan or project<br>• Implement work plan |
| **Water Transmission Mains** | Enhanced Age-Based | • Use criticality assessment to prioritize level of additional condition assessments to be taken and for which mains<br>• Develop condition assessment implementation program | • Implement condition assessment program |
| **Water Distribution Mains** | Enhanced Age-Based, Break History | • Incorporate statistical methods together with the available enhanced age-based information, and break history | • Ongoing program and analysis |
| **Water Service Reservoirs** | Condition Assessments | • Monitor condition through regular operations and maintenance activities<br>• Identify specific asset interventions relative to condition rating<br>• Build results into computerized maintenance management system (CMMS) and capital planning processes | • Incorporate continuous improvement elements into program |
| **Wastewater Treatment Facilities** | Condition Assessments | • Monitor condition through regular operations and maintenance activities<br>• Identify specific asset interventions relative to condition rating<br>• Build results into CMMS and capital planning processes | • Incorporate continuous improvement elements into program |
| **Wastewater Pumping Stations** | Condition Assessments | • Monitor condition through regular operations and maintenance activities<br>• Identify specific asset interventions relative to condition rating<br>• Build results into CMMS and capital planning processes | • Incorporate continuous improvement elements into program |
| **Wastewater Gravity Sewers** | Age-Based, Condition Assessments | • Conduct sewer inspection program optimization project to identify a | • Ongoing program and analysis |

| Asset Class | Condition Method | Preliminary Planned Condition Tasks (24 Months) | Future Planned Condition Tasks (Longer Term – Beyond 24 Months) |
|---|---|---|---|
| | | risk-based approach to AM condition prioritization<br>• Implement risk-based prioritization method<br>• Continue condition assessments (sewer inspection program) to allow for statistical interpolation across sewer network (this is a long-term undertaking and will continue beyond 24 months) | |
| **Wastewater Forcemains** | Enhanced Age-Based | • Use criticality assessment to prioritize level of additional condition assessments to be taken and for which forcemains<br>• Incorporate break history into prioritization consideration<br>• Develop condition assessment implementation program | • Implement condition assessment program |
| **Stormwater Management Structures** | Empirical | • Develop approach for evaluating condition assessments | • Carry out condition assessments |
| **Stormwater Gravity Sewers** | Age-Based, Condition Assessments | • Conduct sewer inspection program optimization project to identify a risk-based approach to AM condition prioritization<br>• Implement risk-based prioritization method<br>• Continue condition assessments (sewer inspection program) to allow for statistical interpolation across sewer network (this is a long-term undertaking and will continue beyond 24 months) | • Ongoing program and analysis |
| **Stormwater Cross Culverts** | Condition Assessments | • Monitor condition through regular operations and maintenance activities<br>• Identify specific asset interventions relative to condition rating<br>• Build results into CMMS and capital planning processes | • Incorporate continuous improvement elements into program |

| Asset Class | Condition Method | Preliminary Planned Condition Tasks (24 Months) | Future Planned Condition Tasks (Longer Term – Beyond 24 Months) |
|---|---|---|---|
| **Stormwater Driveway Culverts & Ditches** | Statistical Condition Assessments | • Continue building field condition assessments until statistical threshold is achieved<br>• Train operations staff to conduct field-based condition assessments during regular operational activities | • Ongoing field condition assessments at operational level |

While each asset class is different, Halifax Water staff anticipate there will be an ability to use similar approaches across some asset classes (e.g. wastewater and stormwater gravity sewers, vertical assets such as wastewater pumping stations and water booster stations, complex vertical assets such as wastewater treatment facilities and water supply plants, and pressurized linear systems such as water transmission/distribution mains and wastewater forcemains/pressure sewers). In ongoing discussions with the AMITs, staff have outlined a preliminary approach to developing a condition assessment workplan including, but not limited to, the following considerations:

- Review leading practices for assessing condition for each asset class
- Confirm what practices are best suited for Halifax Water
- Use information derived from the AM roadmap program initiative of identifying critical assets
- Consider collecting condition, performance, and risk information simultaneously
- Review ways to simplify data collection to enable incorporation into routine inspections for existing field staff and leverage the existing maintenance management system, geographic information system (GIS), or AM data management solution
- Consider project delivery mode options (individually or in combination):
    - Conduct assessments with in-house staff as resources are available
    - Develop an in-house condition assessment team that can rotate through the asset classes to update condition information
    - Engage consultant support for completing assessments
    - Develop a knowledge transfer approach using consultant support initially and training an in-house team for future condition assessments
- Review and confirm resources that can be dedicated to condition assessment efforts based on the preferred project delivery mode (as a minimum, representatives from Engineering & Technology Services and Operations will be required)
- Determine the frequency for updating condition assessments (may vary by asset class and expected remaining service lives)
- Research methods for tracking asset condition deterioration using models or visualization tools (and determine which team will manage the data and reporting)
- Confirm annual budget requirements for the condition assessment program

The near-term approach is presented in Table 2 below. This allows for continued advancement of the condition assessment workplan while recognizing the ongoing need for filling data gaps across some asset classes. As noted in section 2.2.3 above, a 2021 AM roadmap priority is the identification of critical assets. This work will guide future condition assessment prioritization.

*Table 2 – 2021/22 Condition Assessment Tasks by Asset Class*

| Asset Class | Condition Method | Planned 2021/22 Condition Tasks |
|---|---|---|
| **Water Supply Plants** | Empirical | • AM staff to provide preliminary recommendation re: level in asset hierarchy for recording condition information<br>• AMITs to review and confirm ways to support agreed level of condition assessment (including resources and delivery mode)<br>• Review inventory of assets to be renewed/replaced in Water Supply Enhancement Program (WSEP) for J.D. Kline and Lake Major Water Supply Plants |
| **Water Supply Dams** | Dam Safety Review | • Last completed in 2019; for compliance with Canadian Dam Association (CDA), updates to the Dam Safety Review (DSR) are required on a periodic basis (next due beginning in 2024) |
| **Water Chambers & Booster Stations** | Empirical | • AM staff to provide preliminary recommendation re: level in asset hierarchy for recording condition information<br>• AMITs to review and confirm ways to support agreed level of condition assessment (including resources and delivery mode) |
| **Water Transmission Mains** | Enhanced Age-Based | • Use criticality assessment to prioritize level of additional condition assessments to be taken and for which mains<br>• Develop condition assessment implementation program including reviewing applicable technology and operational feasibility |
| **Water Distribution Mains** | Enhanced Age-Based, Break History | • Incorporate statistical methods together with the available enhanced age-based information, and break history |
| **Water Service Reservoirs** | Condition Assessments | • Condition assessments in place and updates done every five years (next due in 2023)<br>• Monitor condition through regular operations and maintenance activities (incorporate into CMMS and capital planning processes) |
| **Wastewater Treatment Facilities** | Condition Assessments | • AM staff to provide preliminary recommendation re: level in asset hierarchy for recording condition information<br>• AMITs to review and confirm ways to support agreed level of condition assessment (including resources and delivery mode)<br>• Monitor condition through regular operations and maintenance activities (incorporate into CMMS and capital planning processes) |
| **Wastewater Pumping Stations** | Condition Assessments | • AM staff to provide preliminary recommendation re: level in asset hierarchy for recording condition information<br>• AMITs to review and confirm ways to support agreed level of condition assessment (including resources and delivery mode)<br>• Monitor condition through regular operations and maintenance activities (incorporate into CMMS and capital planning processes) |
| **Wastewater Gravity Sewers** | Age-Based, Condition Assessments | • Implement risk-based approach to AM condition prioritization in addition to ongoing reactive sewer inspections<br>• Conduct small scale pilot on selected sewer cohorts to determine deterioration profiles over time |

| Asset Class | Condition Method | Planned 2021/22 Condition Tasks |
|---|---|---|
| | | • Compare field-based inspection data against simple age-based analysis |
| **Wastewater Forcemains** | Enhanced Age-Based | • Use criticality assessment to prioritize level of additional condition assessments to be taken and for which forcemains<br>• Continue using break history and likelihood of failure (LOF)/consequence of failure (COF) to create risk scores for condition assessment prioritization consideration<br>• Develop condition assessment implementation program including reviewing applicable technology and operational feasibility<br>• Update prioritized pipe segments in capital budget deliberations |
| **Stormwater Management Structures** | Empirical | • Confirm inventory of stormwater structures<br>• AM staff to suggest preliminary approach for conducting condition assessments<br>• AMITs to review and confirm ways to support agreed approach for condition assessment (including resources and delivery mode) |
| **Stormwater Gravity Sewers** | Age-Based, Condition Assessments | • Implement risk-based approach to AM condition prioritization in addition to ongoing reactive sewer inspections<br>• Conduct small scale pilot on selected sewer cohorts to determine deterioration profiles over time<br>• Compare field-based inspection data against simple age-based analysis |
| **Stormwater Cross Culverts** | Condition Assessments | • Monitor condition through regular operations and maintenance activities (incorporate into CMMS and capital planning processes)<br>• AMITs to review and confirm ways to support agreed approach for condition assessment (including resources and delivery mode) |
| **Stormwater Driveway Culverts & Ditches** | Statistical Condition Assessments | • Continue building field condition assessments until statistical threshold is achieved<br>• Monitor condition through regular operations and maintenance activities (incorporate into CMMS and capital planning processes) |

In addition to the efforts related to developing physical condition assessment workplans for each asset class, Halifax Water is reviewing its approach to keeping condition data current. This is being done through the "Asset Condition" project. The relationship between completing condition assessments, using the condition assessment data to inform Opex and Capex investment decisions, and the Asset Condition project is presented in Figure 2.

The purpose of the Asset Condition project is to ensure a sustainable process is in place to maintain the quality of corporate asset condition data. This includes assessing current processes for maintaining condition information, assessing applicability and/or constraints of existing software solutions, identifying potential process changes, implementing the business process changes in phases, identifying change management requirements to implement any future process adjustments, and incorporating ongoing audit processes to ensure compliance with any adjusted business processes.

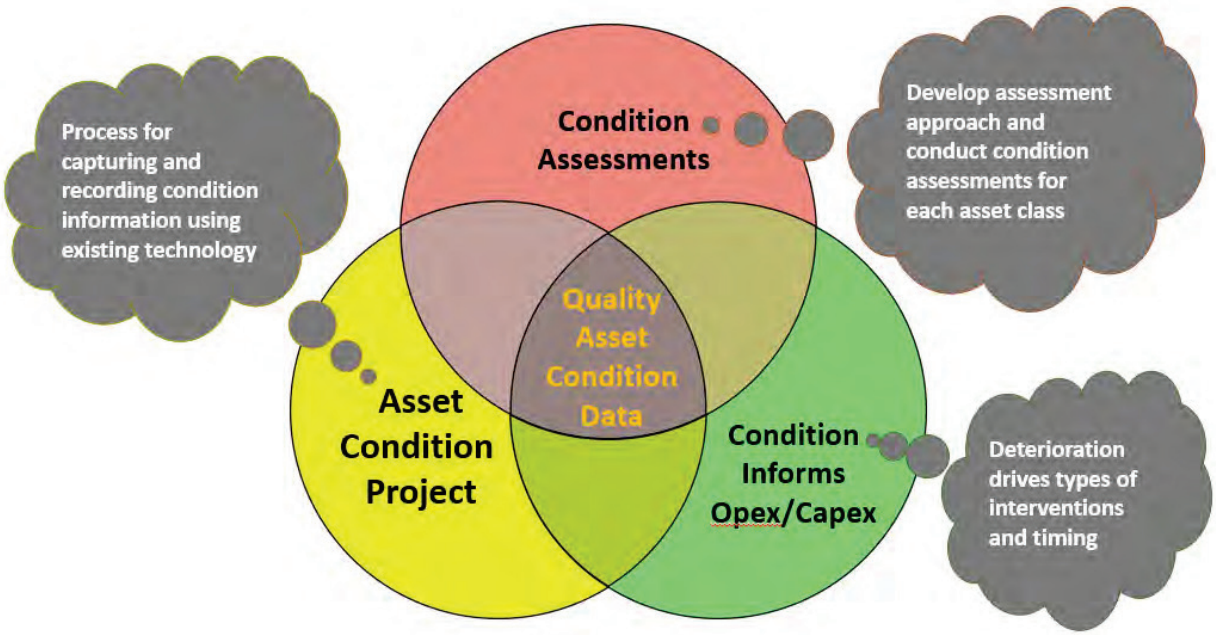



*Figure 2 – Relationship Between Condition Assessments, Opex/Capex, and Asset Condition Project*

The primary objective of the Asset Condition project is to improve the collection, quality and use of asset condition data across the business. Through interviews with staff throughout the organization, the project team will identify opportunities to leverage existing processes and technologies to enhance data currency for condition. Staff anticipate this project will involve significant change management as new or modified business processes will be needed. Additionally, staff that may not traditionally collect data considered to be condition-related may see new data points added to routine inspections. This is proposed with the understanding that all staff play a role in asset management programming.

Activities being conducted in 2021/22 for the Asset Condition project are focused on internal stakeholder engagement and business consultations. The consultations are aimed at conducting a fit gap analysis to compare the current and future state for the business processes, identify gaps related to resources, processes, data, and technology, and develop a change management plan for implementing updated processes.

#### *2.3.1.2. Risk Considerations*

Halifax Water has developed its enterprise risk management (ERM) program to incorporate risk as an operational leading practice and embed risk considerations in its decision-making processes. Risks are prioritized by the utility through risk definitions derived from the product of (likelihood) x (consequence). An approach to formalizing the definitions, descriptions, and rating terminology was envisioned through the ERM project team and was presented to and adopted by the Halifax Water Board. Subsequent efforts to confirm the utility's risk appetite (the level of risk that an organization is willing to accept to achieve its strategic vision) and tolerance (an organization's risk limits aimed at guiding its daily activities) have also been adopted by the Halifax Water Board.

The ERM program has defined corporate risk in terms of likelihood and consequence statements that are correlated to descriptive words and a numerical scale as shown in Table 3. Definitions of the likelihood and consequence factors are provided in Table 4.

*Table 3 – Risk Likelihood and Consequence Scales*

| Likelihood | | Consequence | |
|---|---|---|---|
| **1** | Remote | **1** | Insignificant |
| **2** | Unlikely | **2** | Minor |
| **3** | Possible | **3** | Moderate |
| **4** | Likely | **4** | Major |
| **5** | Almost Certain | **5** | Severe |

*Table 4 – Risk Likelihood and Consequence Factor Definitions*

| Risk = (Likelihood) x (Consequence) | | | |
|---|---|---|---|
| **Likelihood Factors** | | **Consequence Factors** | |
| **Remote** | Risk is very unlikely to occur | **Insignificant** | Insignificant impact to business objectives, operations, infrastructure |
| **Unlikely** | Less than 40% probability of occurring | **Minor** | Minimal impacts to achieving business objectives, operations, infrastructure (immaterial financial impact) |
| **Possible** | Greater than 40% probability of occurring | **Moderate** | Normal operations/infrastructure disrupted (moderate environmental, minor injuries to workers/citizens, financial losses) |
| **Likely** | Greater than 60% probability of occurring | **Major** | Reduced ability to achieving business objectives (major environmental, injuries to workers/citizens, serious financial impacts) |
| **Almost Certain** | Greater than 80% probability of occurring | **Severe** | Severe impact to achieving business objectives (catastrophic environmental, health & safety to workers/citizens, extreme financial impacts) |

Consequence is further differentiated based on the type of impact an event may have to the utility. These additional criteria are outlined in Table 5.

*Table 5 – Consequence Factor Criteria and Descriptions*

| Criteria | Description |
|---|---|
| **Financial & Asset Management** | Minimize financial risk (operating surplus) and impact to critical assets |
| **Service Excellence** | Maintain high professional/ethical standards; limit impact to reputation/service obligations |
| **Public Health** | Provide safe drinking water; limit spills affecting drinking/recreational waters |
| **Regulatory Compliance** | Meet regulatory, legislated requirements and orders |
| **Workplace Safety & Security** | Operations protect public and worker safety/security; ensure cyber security |
| **Environment** | Limit impacts to environment from all service areas |
| **People** | Limit impacts to culture, employee engagement, and worker collaboration |

The risk framework is integrated in the enhanced prioritization methodology discussed in section 2.3.1.4.

#### *2.3.1.3. Current Capital Budget Process*

The annual capital budget cycle allows for the identification of programs and projects and their prioritization within the available funding envelope. Projects are initially identified from several sources including, but not limited to, the IRP and its feeder studies (Infrastructure Master Plan, Compliance Plan, and Asset Management Plan), operational issues, legislative requirements, and coordination with Halifax Regional Municipality's road program. The typical capital budget process involves the following steps:

- Identify potential candidate capital projects (all sources)
- Apply the basic reliability, effectiveness, and consequence scores to provide an initial risk score
- Enter project details in the capital project planning database (CPPD)
- Create capital project summary report (CPSR) and save on server for the respective budget year (this step may be deferred until there is certainty that project will proceed)
- Add projects with CPSR to the candidate master list (by AM Program Coordinator)
- Discuss priorities amongst Engineering Managers and Operations personnel
- Coordinate and facilitate project review meetings (AM Program Coordinator with Engineering Managers, Operations Engineer, and Director Engineering & Technology Services) to fine tune capital budget list
- Identify available budget funding envelope (Director Engineering & Technology Services and Director, Finance & Corporate Services)
- Projects are prioritized within the available funding envelopes
- Director and Engineering Managers document rationale for changes made during the prioritization and budget cycle

The process is iterative and allows for adjustments of priorities based on available funding, resource constraints, opportunities for coordination, and timing and sequencing of projects.

#### *2.3.1.4. Halifax Water Enhanced Prioritization Methodology*

Halifax Water has developed an enhanced prioritization methodology to help ensure projects are planned to provide predictable, reliable, and sustainable services to the ratepayers. It will be piloted in the 2022/23 capital budget development process and adjusted as needed. The methodology is aimed at addressing both infrastructure and non-infrastructure projects using a consistent scoring scheme. Benefits of an enhanced prioritization methodology are to:

- Improve communications across departments and with stakeholders
- Create a clear and consistent rationale for selection of project priorities
- Allow for an integrated and comparative view of projects including within an asset class, across asset classes, and between infrastructure and non-infrastructure projects
- Provide defendable capital prioritization evidence

A tiered approach to project prioritization has been developed using primary and secondary factors. The primary factors assess a candidate project in any given year based on:

A. Compliance (project complies with regulations, legislation, orders)
B. Strategic alignment (project meets strategic objectives and master planning direction)

C. Organizational value (project is consistent with LOS work and connects to one or more of the customer values/service criteria – Quality Water, System Performance, Service Value, Customer Service)
D. Risk exposure (represented by the risk of not proceeding with the project, program, service, or asset intervention and a higher score indicates higher exposure and greater need to address; risk is integrated with ERM program consideration for likelihood and consequence factors)
E. Service criticality (project impact to system or operational performance)

The secondary factors of integration opportunity, dependency, resource capacity, and external commitments, are used to further assess the priority of a project annually. The recommended prioritization process involves first screening projects with both the primary (first tier) factors and secondary (second tier) factors, sum the scores and add the projects to the master candidate list. The secondary factors may be used for relative ranking up or down where there is a constrained funding envelope. Descriptions of the prioritization factors are provided in Table 6 and Table 7.

*Table 6 – Primary Factors Definitions*

| Primary Factor | Definition | 1 | 3 | 5 |
|---|---|---|---|---|
| | | Minimal | Moderate | Significant |
| **Compliance** | Project supports regulations, legislation, or orders | No applicable compliance requirements | Meets one compliance requirement | Meets multiple compliance requirements |
| **Strategic Alignment** | Project aligns with strategic priorities and master planning direction | Minimal alignment with strategic or MP priorities | Meets some strategic and MP priorities | Full alignment with strategic priorities and MP direction |
| **Organizational Value** | Project is consistent with level of service customer value / service criteria | Supports one level of service customer value / service criteria | Supports more than one LOS customer value / service criteria | Supports all LOS customer value / service criteria |
| **Risk Exposure** | Considers corporate risk criteria for likelihood and consequence/impact ratings (Risk = Likelihood x Impact (or Consequence) and then converted to this scale) with focus on risk of not proceeding with project, program, service, or asset intervention | Minimal risk considerations | Moderate risk considerations | Significant risk considerations |
| **Service Criticality** | Project considers impact to the system if asset fails or project is not implemented | Asset or project is not critical to system or operational performance | Asset or project supports system or operational performance | Asset or project is critical to system or operational performance |

*Table 7 – Secondary Factors Definitions*

| Secondary Factor | Definition | 1<br>Low | 3<br>Medium | 5<br>High |
|---|---|---|---|---|
| **Integration Opportunity** | Project considers:<br>• ***Integration*** with HRM projects or other HW operational functions<br>• Timing coordination with other planned initiatives | No integration opportunities | Some integration opportunities | Multiple integration opportunities |
| **Dependency** | Project considers:<br>• Project dependencies<br>• Multi-year coordination | No or minimal dependency considerations | Some dependency considerations | Multiple dependency considerations |
| **Resource Capacity** | Project considers:<br>• Skill set of in-house personnel<br>• Level of project complexity<br>• Availability of in-house personnel<br>• Level of autonomy and independence to conduct project tasks | Project can be carried out by existing in-house personnel using available skills | Project may require additional resources or expertise to support successful project delivery | Project needs specialized skill set, is highly complex and unique, or full external support for successful project delivery |
| **External Commitments** | Project considers:<br>• Commitments made to development community<br>• Stakeholder expectations | Project can proceed without stakeholder engagement or has no development commitments | Project requires minimal stakeholder engagement or has minor development commitments | Project requires extensive stakeholder engagement or has clearly defined development commitments |

A separate but related project also underway is the Capital Project Management and Information System (CPM&IS) project identified in the IT Strategic Plan. This project has multiple components that will provide new capacity or strengthen Halifax Water's existing capabilities in Capital Planning (CP), Capital Project Management (CPM), Capital Funds Management (CFM), and the Capital Information System (IS) pillars. Under the CP pillar, the business process for identifying and prioritizing capital projects is being mapped. As the CPM&IS project progresses, opportunities to improve on the prioritization method will be reviewed.

#### *2.3.1.5. Asset Management Decision Support System (M10132)*

Halifax Water's Asset Management team analyzes the state of the utility's infrastructure to develop a long-term sustainable investment framework. This framework is informed by several studies and plans including the IMP, the IRP, and the annual AMP.

Significant analysis is undertaken in the development of these plans which are reliant on the availability and quality of infrastructure asset data. The analysis uses a variety of asset data types that include physical characteristics (e.g. dimensions, materials) and its asset condition and performance, and considerations related to level of service, risk, and cost of intervention. The information is sourced from Halifax Water systems (e.g. GIS and Cityworks) as well as other AM data collected through studies, plans, and research. Currently, the AM team use a series of complex MS Excel spreadsheets to analyze and optimize necessary investment decisions, which is time consuming and resource intensive.

With the continual evolution of the AM practice globally, efficient web-based AM decision support systems (DSS) have become the industry standard for managing and optimizing asset lifecycles. A modern AM DSS provides advanced tools for calculating complex lifecycle curves and defining the triggers for the decision logic, along with recommending the timing for asset rehabilitation/replacement strategies with related costs. An AM DSS can present user friendly data analytics within web-based dashboards together with automated report generation to support the investment planning and evidence-based decision-making process. Other features of an AM DSS include its ability to:

- Provide advanced analytics that can model optimized asset intervention plans to maximize asset lifecycle
- Use advanced analytics to enable application of lifecycle deterioration models and organization-specific prioritization criteria to develop first principles candidate projects during the capital planning cycle
- Support the recommendations of the Municipal Auditor General report that required clarity on Halifax Water's capital project prioritization process (how candidate projects are brought forward for inclusion in capital budget)
- Incorporate various forms of risk (LOF and COF) and LOS assessments when comparing and choosing infrastructure intervention strategies and potentially for choosing the best candidate projects to advance
- Leverage Halifax Water's existing data and technologies (e.g. Corporate GIS, CityWorks etc.) thereby complementing the systems already in place

An AM DSS is anticipated to enable enhanced prioritization and optimization of capital infrastructure spending. Implementing an AM DSS will benefit Halifax Water because it:

- Follows industry leading direction for mature asset management programs and AMP development
- Allows for optimizing how Halifax Water complies with the recommended $2,138M asset renewal spend identified in the 2019 IRP
- Supports more efficient data management for decision making – shifting the focus from managing and filling data gaps to analyzing data to drive decisions

An AM DSS may also result in significant savings in cost and time where projects may be consolidated within a specific corridor, adjusted for timing to reflect defined risk, or consider sequencing constraints, or aligned with HRM priorities within defined LOS tolerances at Halifax Water. The AM DSS Project supports the Asset Management Program and is highlighted in the IT Strategy Road Map. The project is comprised of three phases as follows:

*Phase 1 – AM DSS Requirements and Data Standards:* Includes the elicitation of business, stakeholder and solution requirements, the definition of AM DSS data standards, data capture protocols and data management workflows required by a future AM DSS (complete)
*Phase 2 – AM DSS Data Capture and Management:* Includes the acquisition and implementation of an AM data management software alongside the collection and management of critical AM data required by a future AM DSS (in progress)
*Phase 3 – AM DSS Implementation:* Includes the acquisition and implementation of an AM DSS technology solution

Phase 1 resulted in a recommendation that Halifax Water purchase and implement an industry-leading AM DSS to support Asset Management team, their planning, as well as other Infrastructure Planning efforts. The options analysis concluded that the preferred approach was to purchase a commercial-off-the-shelf (COTS) software solution. Phase 2 activities are in progress including the development of the procurement document for purchase and implementation of the AM data management solution. Phase 3 works are to follow.

### 2.3.2. The Right Assets at the Right Time Using the Right Approach for the Right Reasons

The essence of the definition of asset management is embodied in this section header. Pulling together all the available information, Halifax Water can identify reinvestment projects that meet the test. Working to create a data rich environment that supports decision-making is ongoing. Through the annual update to the AMP, staff are continuously reviewing, analyzing, and updating data resident in the utility's GIS.

Multiple sources help staff identify prospective capital and operating expenditures. Halifax Water has a defined process for reviewing and prioritizing what projects and programs go into the capital budget annually. And there are multiple considerations that define the mode of project delivery (e.g. using in-house teams versus external service providers versus hybrid arrangements), the construction approach (e.g. using conventional dig and replace versus trenchless solutions), the approach for wet weather management (e.g. pursuing public versus private inflow and infiltration reduction projects), the timing of implementation (e.g. influencing priorities due to HRM's streets program, Halifax Water's operational needs, growth demands), and the timing and approach for ongoing data collection to support decisions (e.g. inspecting sewers, assessing condition, monitoring performance). These converging inputs create a complex system of proposed programming. Maturity of the data that supports the decisions, enhancing processes to reach defendable decisions, and ensuring Halifax Water has the correct skills and resource availability are important for forming an implementation program that fulfills Halifax Water's strategic objectives.

As defined in section 2.2.1, AM is a continuous improvement program. Industry leading practices indicate an overall AM framework and approach, however, there is no singular absolute sequence of events that advance an organization's AM maturity. This is defined by the values and needs of the organization, the gaps in data and process for the organization, leadership support, and skilled workforce available to implement the organization's AM vision. Several initiatives can be occurring across the AM continuum simultaneously. It is imperative to advance the program overall while making reinvestment decisions using best available information. Halifax Water is achieving this yet acknowledging that continued advancement is anticipated.

Determining what are the optimal asset renewal strategies for each asset class is a task assigned to the AMITs. AMITs need time to review detailed condition and performance data and where it does not exist,

to develop programs for acquiring the necessary data. Refer to section 2.3.1.1 and Table 2 for Halifax Water's preliminary plan for dealing with condition assessment.

As Halifax Water's program matures, there will be information to enable an assessment of cost-effective investments for both operations and maintenance (O&M) and capital upgrades. The Halifax Water reinvestment levels can be benchmarked against industry to provide a comparative analysis about the sustainability of the asset renewal program. Benchmarking provides a guide; however individual performance will vary based on factors unique to Halifax Water that may not be applicable to the benchmarking cohort.

### 2.3.3. Update on CCTV Optimization Program and PACP Changes (M09730)

Halifax Water conducts sewer inspections via closed circuit television (CCTV) according to the pipeline assessment certification program (PACP). Halifax Water submitted its Annual Report on CCTV Optimization Program and PACP Changes on June 1, 2021 in response to the NSUARB's August 24, 2020 decision letter for matter 09730 – 2020 Trenchless Rehabilitation Program. On June 16, 2021, the Board directed Halifax Water *"to engage with the Board's consultants to discuss the report further and obtain input regarding potential additional improvements to the CCTV Optimization Program and PACP rating changes. This engagement shall take place prior to July 31, 2021. Halifax Water is to then submit an enhanced plan as part of its annual Asset Management Plan filing due on September 30, 2021."*

Halifax Water staff met with the Board consultants on July 16, 2021 to review points of clarification and discuss opportunities for improvement. There were three areas identified for further investigation that were outlined in a letter from Halifax Water to the NSUARB on July 20, 2021. As noted in the letter, these were:

- The Board consultants recommended that Halifax Water consider a pilot scale evaluation of PACP changes over time. This would be accomplished by utilizing a small amount of the annual inspection program to go back and check condition assessments done in a previous cycle with the cycle to be confirmed by Halifax Water. Halifax Water agrees with this idea and will work to incorporate it in our program at the earliest opportunity.

- A good discussion was held on the differences between reinforced and unreinforced concrete pipe. Halifax Water has difficulty in targeting unreinforced pipe due to the lack of records differentiating it from other types of concrete pipe. The Board consultants shared their concerns about how this lack of knowledge may inappropriately influence intervention strategies. The Board consultants suggested that Halifax Water research to determine if there is a readily deployed tool to make a field determination as to whether concrete pipe is reinforced or unreinforced. Halifax Water agrees with this recommendation. We will undertake the research and consider field testing any tool that shows promise and can be reasonably and cost-effectively deployed.

- Halifax Water staff walked the Board consultants through the likelihood of failure (LOF) and consequence of failure (COF) scoring methodology. We believe we have fully answered the Board consultants' questions. The Board consultants made some suggestions for clarification in the report with specific emphasis on Table 2 which Halifax Water accepts. Staff will review the suggestions relative to the available GIS information and operational knowledge and adjust where possible.

#### *2.3.3.1. Pilot Evaluation of PACP Changes Over Time*

Halifax Water staff are reviewing the areas already inspected through the CCTV inspection program to select areas appropriate for a monitoring pilot. The focus will be on areas that have pipes of materials of most concern to Halifax Water (e.g. clay, steel, asbestos cement, and concrete) and where there are higher occurrences of condition grades of 3 or 4. Ideally, we can choose areas that were last inspected early in the previous five-year inspection program (2016 to 2020). Once potential cohort areas have been determined, staff will confirm the frequency for the next round of inspections. If needed, new cohort areas will be selected to cover the criteria we wish to assess.

#### *2.3.3.2. Data Collection Technology for Unreinforced Concrete Pipes*

Approximately 58% of Halifax Water's wastewater and stormwater sewer network is identified as concrete in the utility's GIS. Records do not differentiate between reinforced and unreinforced concrete therefore, there is a potential that Halifax Water may have a significant proportion of the sewer network being comprised of unreinforced concrete. Staff anecdotally can identify areas that are more likely to be unreinforced concrete based on operational observations and historical repair information in addition to knowledge of eras of construction in which unreinforced concrete was typically used.

Staff will develop a research initiative to explore appropriate scanning technologies and equipment that might be possible to deploy to field investigations. These technologies may include various sub-surface engineering approaches such as, but not limited to, electromagnetic scanning, ground penetrating radar, and radiography. Staff will identify viable approaches, assess the applicability of each approach, review costing, and determine the feasibility of conducting a pilot to test the effectiveness of one or more of the technologies. The first phase of this initiative will be to complete the research and develop a technical memo outlining the findings. This technical memo can be included in the next annual report in September 2022.

#### *2.3.3.3. Review of Table 2 – Likelihood of Failure Model Scoring Factors and Descriptions*

The Board's consultants raised a valid concern regarding the material (LOF) specifically around cast iron. In the report, the LOF scores for material were assigned to different materials with higher scores assigned to unknown pipe material or materials that are problematic in Halifax Water. Cast iron was given a score of 10 with unknown pipe material having the highest score of 11. The Board consultants' concern was around whether cast iron should be rated higher than materials such as asbestos cement (9), clay (8), steel (7), or concrete (5). Staff agreed that the cast score seemed like an outlier however, further review of the data was warranted.

In reviewing the data, staff found anomalies that suggested that the material recorded may not be correct (e.g. pipe material noted as cast iron however with install dates that do not correspond with expected era for cast iron use). With the inaccurate records, staff opted to treat the cast iron cohort slightly lower than the unknown cohort. Within the sewer network, there is 1,652 km of pipe identified with material of cast iron compared to the total length of wastewater and stormwater pipe (2,178 km). The portion identified as cast iron material represents approximately 0.076% of the total length. As staff further refine and update GIS records, consideration will be given to adjusting the material LOF score if needed.

### 2.3.4. Summary of Accomplishments

Accomplishments for the AM program include the following:

- Published the 2020/21 AMP
- Rolled out AMITs across all asset classes
- Completed the AM Program Reassessment Project (updated AM Roadmap)
- Renewed the sewer inspection contract (CCTV inspections for mainline, structures, and laterals)
- Completed the CCTV Inspection Program Optimization Project
- Developed the enhanced prioritization methodology
- Contracted vendor for the implementation of the AM data management solution (prerequisite for AM DSS)

### 2.3.5. Schedule of Activities

Planned activities for work in progress (2021/22) and proposed for the next fiscal year (2022/23) are outlined in Figure 3.

| Source | Project / Initiative Name | 2021/22 | | | | 2022/23 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Roadmap | Update/endorse AM Policy (Executive Team/Halifax Water Board) | | | | | | | | |
| Roadmap | Enhance communications for AM program | | | | | | | | |
| Roadmap | Offer AM101 training across organization | | | | | | | | |
| Roadmap | Establish AM Advisory or Steering Committee | | | | | | | | |
| Roadmap | Develop and use enhanced project prioritization framework | | | | | | | | |
| Roadmap | Identify and document critical assets | | | | | | | | |
| AM Program | Develop condition assessment workplan by asset class (AMITs) | | | | | | | | |
| AM Program | Develop LOS framework | | | | | | | | |
| AM Program | Asset Condition project - consultations and analysis (AMITs) | | | | | | | | |
| AM Program | Confirm asset renewal strategies by asset class (AMITs) | | | | | | | | |
| CCTV Program | Identify pilot areas to evaluate PACP changes over time | | | | | | | | |
| CCTV Program | Research data collection technology to detect reinforced concrete | | | | | | | | |
| CCTV Program | Assess new sewer inspection program contract - QA/QC pilot | | | | | | | | |
| IT Strategy | AM DSS - implement data management solution | | | | | | | | |
| IT Strategy | Procure AM DSS | | | | | | | | |
| Roadmap | Confirm LOS measures and reporting requirements | | | | | | | | |
| Roadmap | Establish AM Program review processes | | | | | | | | |
| Roadmap | Develop AM enterprise/cultural change management planning | | | | | | | | |
| Roadmap | Continue AM101 training | | | | | | | | |
| Roadmap | Complete AM Strategy or Strategic AMP (SAMP) | | | | | | | | |
| Roadmap | Commence condition assessment workplan | | | | | | | | |
| | | | | | | | | | |

*Figure 3– Proposed AM Activities for 2021/22 and 2022/23*

# 1 Introduction

Through several capital approval applications to the Nova Scotia Utility and Review Board (NSUARB) including matters M09201 – Trenchless Rehabilitation Programs, M09592– Bayers Road Sewer Separation Program – Phase II, M09494 - Regional Development Charge Update, and M10188 – 2021/22 Corporate Flow Monitoring Program, the NSUARB has requested Halifax Water report on the advancement of the Wet Weather Management Program (WWMP) specifically related to private inflow and infiltration (I/I) reduction efforts along with the objectives of the corporate flow monitoring program.

Halifax Water requested direction from the NSUARB in a letter dated May 31, 2021 on consolidation and timing of various annual reporting requirements outlined in Appendix B of the submission. In the July 14, 2021 response under Proposed Revisions to Reporting Requirement (M10139), the NSUARB approved the revised annual reporting schedule as set out in Appendix B of Halifax Water's May 31, 2021 letter. In the revised annual reporting schedule, the annual reports identified under the Regional Development Charge decision (M09494) consolidated the wet weather management program into the September 30 reporting cycle.

# 2 Private Side I/I Programs

## 2.1 Private Side Pilot Project

In 2019, the Hornes Road area in Eastern Passage was chosen for a private-side pilot project for the WWMP based on its location within a Priority Sewershed (Eastern Passage, FMZ37) as identified in Halifax Water's Infrastructure Master Plan, operational history and information gained from previous consultant reports. The project area is identified in Figure WWMP-1. Collection of baseline data began in Q3 (July-September), 2019 with the installation of a corporate flow monitor for the collection of data for the entire Hornes Road sewershed and three temporary internal flow monitors to isolate flows in problem areas.

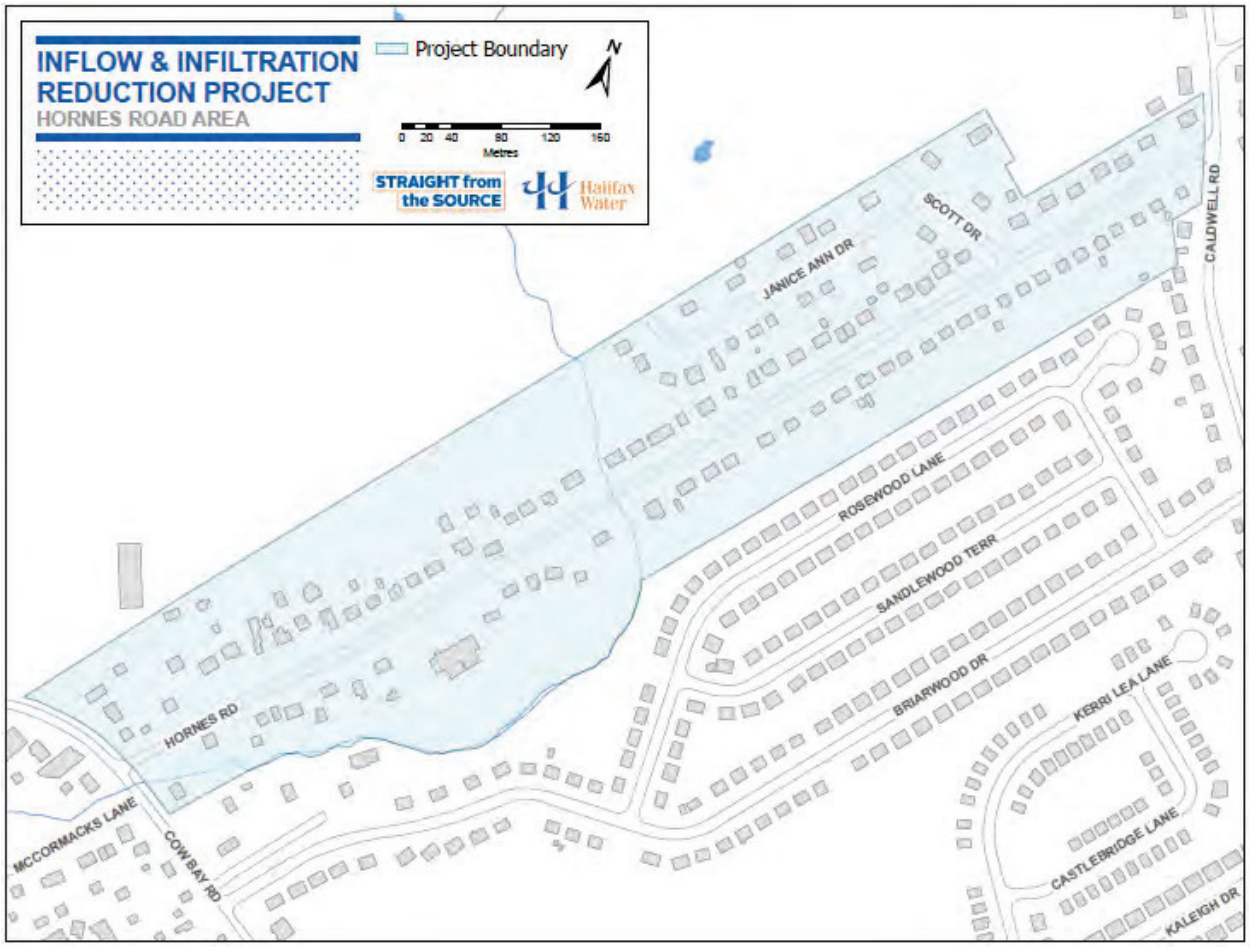



Figure WWMP-1: Hornes Road, Eastern Passage – Private Side I/I Pilot

Smoke testing was completed in August 2019 which identified a few private-side deficiencies. In mid-2020, Halifax Water began private-side education including a community notice and an online webinar on October 6, 2020. Personalized letters were sent to each of the 114 property owners in November 2020 in the project area identifying specific smoke test deficiencies (if any) on their property and requesting them to proactively assess their properties. Property owners were asked to make repairs to any sources of stormwater entering the wastewater system in preparation for mandatory property inspections by Halifax Water in the future once COVID-19 restrictions were eased. Samples of the information Halifax Water shares with property owners is in Appendix WWMP-A.

In September 2021, Halifax Water will send a refresher notice to the property owners and follow up with another personalized letter requiring them to book a mandatory property inspection in October 2021. The property inspections will assess any fixes made by property owners and identify any remaining inflow and infiltration (I/I) violations. Owners will be notified of any necessary compliance actions and fixes will be required within a given timeline.

## 2.2 Downspout Disconnection Program

The Downspout Disconnection Program was integrated with the Sewer Separation Program as a method to remove private downspout stormwater flows from newly separated wastewater systems. Staff from Regulatory Services and Engineering and Technology Services meet regularly to discuss the joint coordination of the two programs. This includes collaboration at the initiation of the sewer separation project, during the design phase and during the construction activities. Joint communication with private property owners about both programs provides updates and education about the sewer separation project activities as well as the need for downspout disconnection.

Presently the areas with active downspout disconnection requirements, as shown in Figure WWMP-2, are:

- Federal / Romans Avenue
- Bayers Road Phase 2
- Chisholm Avenue

The Bayers Road Sewer Separation Pocket was identified in the Infrastructure Master Plan, this includes the Federal/Roman Ave and Bayers Road Phase 2 areas. The Downspout Disconnection Program was engaged for these two project areas. It was discovered that one property owner was responsible for the majority of the buildings in both sewer separation project areas as well as other buildings adjacent to the Federal / Romans project area on Chisolm Avenue. Given the large number of buildings and the complexity of some downspout redirections, this owner was given additional time to complete the work – until the end of October 2021.

As part of the Downspout Disconnection Program other regulatory non-compliance issues may be identified. For example, in this case, it was also discovered that many of these buildings for this one property owner also had sump pumps connected to the wastewater system. The owner agreed, in addition to disconnecting the downspouts, to assess and redirect the sump pumps' discharge from the wastewater system by the end of August 2022.

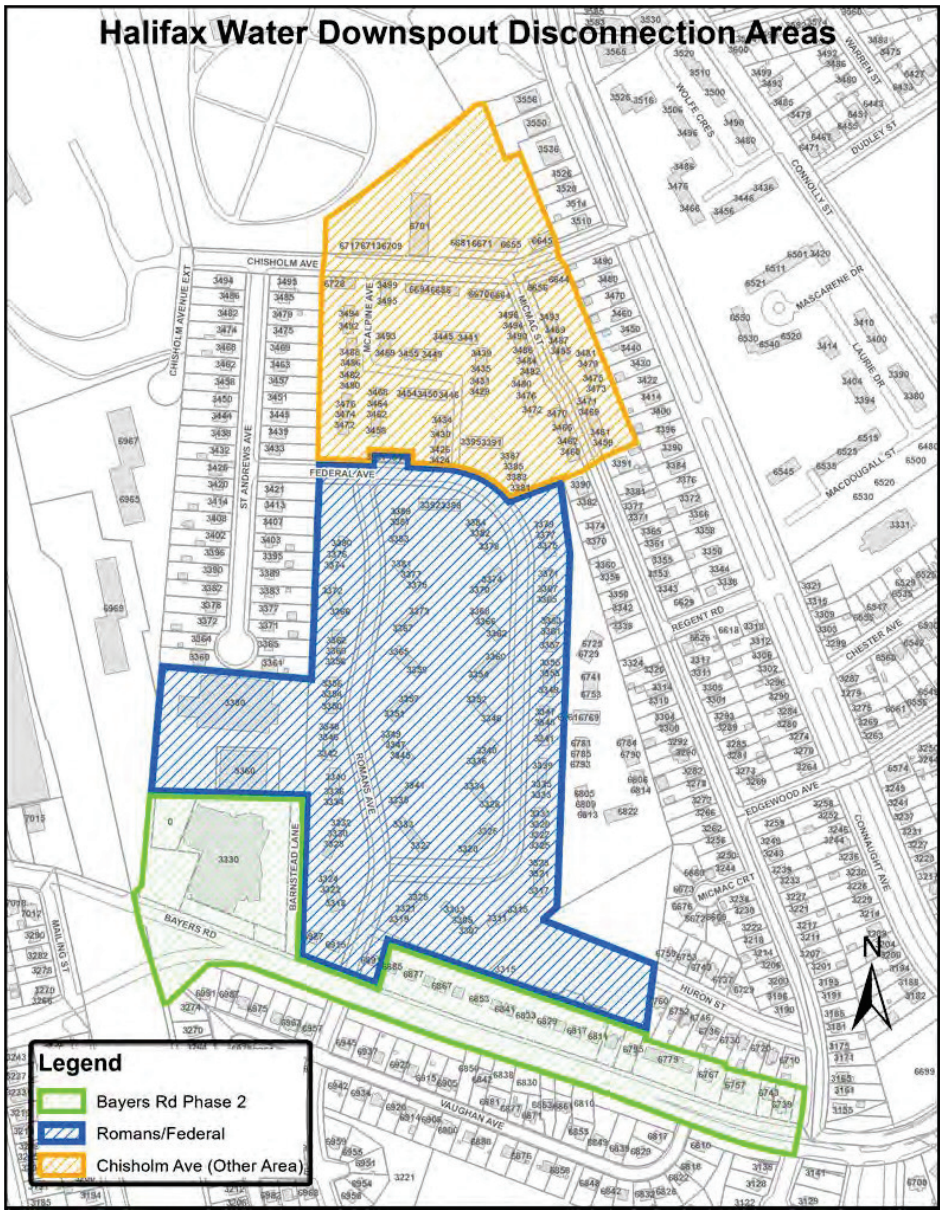



Figure WWMP-2: Downspout Disconnection Areas

### 2.2.1 Federal / Romans Avenue Project Area

The Federal / Romans Avenue area consists of 42 buildings with downspouts to be disconnected (37 multi-unit dwellings, 3 single unit dwellings and 2 Industrial/Commercial/Institutional (ICI) buildings).

This area includes one ICI building with a flat roof. Based on recent construction, this building had installed a separated stormwater lateral that was successfully diverted to the new storm sewer during the sewer separation construction activities on Romans Avenue.

### 2.2.2 Bayer Road Phase 2 Project Area

The Bayers Road Phase 2 area consists of 21 buildings with downspouts to be disconnected (2 multi-unit dwellings and 19 single unit dwellings).

This area includes two multi-unit buildings with a flat roof. Based on previous renovations, one of these buildings had installed a separated stormwater lateral that was successfully diverted to the new storm sewer during the sewer separation construction activities on Bayers Road. The other multi-unit building has a flat roof with internal downspouts that will be arduous to reconfigure, therefore it will be temporarily removed from the downspout disconnection requirement. Given the complexity in disconnecting downspouts with this type of configuration and building type, Halifax Water is planning to develop a viable approach to resolving these situations and this will be a topic within the Stakeholder engagement program.

### 2.2.3 Additional Area – Chisholm Avenue

An additional 27 multi-unit buildings, adjacent to the Federal Romans project area, are operated by the same property owner of the buildings in the Federal Romans project area.

This area includes one multi-unit building with a flat roof that has been temporarily removed from the downspout disconnection requirement.

### 2.2.4 Summary of Reductions

The statistics presented in Table WWMP-1 provide the roof area, number of downspouts and number of buildings in the three project areas. The number of downspouts found at each building and the associated roof area was identified. Various buildings had different numbers of downspouts and most buildings had different roof areas per building. A building was not considered fully disconnected unless all the downspouts were disconnected. The percentages represent the disconnections achieved as of the end of July 2021. Halifax Water is actively monitoring these locations to collect data for further analysis.

Table WWMP-1: Downspout Disconnections as of July 31, 2021

| | **Federal/Romans Ave** | **Bayers Road Phase 2** | **Chisholm Ave** |
|---|---|---|---|
| Total Roof Area [1] | 13,395 $m^2$ | 3679 $m^2$ | 7873 $m^2$ |
| % by Roof Area Disconnected | 76 % | 93 % | 81% |
| # of Downspouts | 171 | 39 | 136 |
| % of Downspouts Disconnected | 70 % | 85 % | 84 % |
| # of Buildings | 42 | 20 | 26 |
| % Buildings Fully Disconnected | 38 % | 70 % | 42 % |

[1] Flat roofs provided temporary exemption are excluded from this table.

### 2.2.4. Challenges Encountered with Downspout Disconnection and Strategies to Overcome Challenges

The Downspout Disconnection Program is in the early stages of development and implementation. Various challenges related to the program have been identified and are outlined in Table WWMP-2.Table WWMP-2: Challenges and Strategies

| Challenge | Issues Identified | Strategy |
|---|---|---|
| Complex properties with multiple buildings under the same ownership | • Can be complicated and timely to assess and implement corrective actions.<br>• Finding a safe location to reroute multiple downspouts. | • Early identification of potential problem locations.<br>• Allow for longer period of time for disconnection<br>• Develop a compliance action plan with property owner |
| Difficult and costly for the customer to disconnect | • Multiple downspouts<br>• Small lots with limited area to infiltrate<br>• Steep grades susceptible to erosion<br>• Discharge in close proximity to neighbouring building or a sidewalk/street (violation of the HRM Streets Bylaw). | • Develop a list of difficult disconnection scenarios<br>• Determine alternative approaches for disconnection (e.g. construct a soak away pit)<br>• Assess if situations may qualify for a time extension and/or exemption |
| Project Timing | The time of year is important. Disconnection of downspouts can occur in the winter months; however, some complex disconnections may require significant work for example re-grading the eaves trough, re-grading the area near the house, or constructing a French drain. | This work is best done in non-winter conditions, allow for this consideration when developing compliance timelines. |
| Internal communication | Collaboration between various Halifax Water departments with related projects/programs (e.g. Sewer Separation Projects, HRM Integrated Projects and Wet Weather Management Program) needs to be enhanced and done early in the project. | • Enhance communication between internal departments at Halifax Water<br>• Engage the necessary departments at the initiation phase of project |
| Internal plumbing connections | Some flat roofs are difficult to redirect because the piping is contained within the building which can be costly and arduous to replumb and redirect | Develop a viable approach to resolving these situations:<br>• Engage with building owner associations (i.e. IPOANS, BOMA)<br>• Establish types and configurations of roofs and internal downspouts |

| | | |
|---|---|---|
| | | • Determine which can be easily disconnected and which cannot<br>Consider flagging buildings that cannot be easily disconnected for future disconnection when applications are made for renovations. |
| Internal Resourcing | Extensive staff resources are required to<br>• assess and inventory the downspouts found at each property.<br>• Communicate with nonresponsive customers at various stages of the private side I/I program | • Undertake initial assessment using desktop tools such as Google Street/Aerial View and conduct site visits where gaps exist.<br>• Establish targets for responses from customers and follow up action plan for managing non-responsive<br>• Additional downspout disconnections will be achieved with a system being developed to link compliance with opening a new service account (i.e.. The New Service Account Compliance Program – NSAC, previously referred to as the "Point of Sale Program" - see details in Section 2.4 below) |
| Corporate Reputational Risk | Availability and affordability of housing are increasingly a concern. Halifax Water does not want to be seen as adding to the existing issues | • Effectively communicate the reasons of the program and benefits<br>• Avoid enforcement tactics which may be perceived as heavy handed or unreasonable |
| Downspout connection to stormwater system | Downspouts are normally not permitted to discharge to the underground stormwater system unless the stormwater system has been designed to convey the flows. | Identify areas where the stormwater system has been designed and constructed to allow for underground connection to the stormwater main on internal GIS. |

## 2.3 Campus Property Program

Halifax Water has a number of customers that can be described as campus property customers. These Customers generally own private wastewater collection systems, or long and/or multiple service connections and typically have multiple buildings on the property.

- Halifax Water is determining the total number of campus properties and to date staff have flow monitored about 58 of these campus properties in the past few years and found 9 where enforcement was needed to correct I/I issues. Enforcement of campus property non-compliance can be complex and may require a variety of approaches due to the diverse nature of these properties.

The next steps for Halifax Water include refining the prioritization methodology and the property list, further developing the program assessment and enforcement process, and continuing the SSES activities. Halifax Water intends to engage with impacted stakeholders (i.e. BOMA, IPOANS, and individual management companies) in the development of Halifax Water's strategy in private side I/I on campus properties. As part of the engagement, Halifax Water intends to seek cooperation with a campus property owner and undertake a pilot project on some of the proposed strategies that are identified through the engagement process, anticipated in Q2 of 2022/23.

## 2.4 New Service Account Compliance Program

In a previous submission, Halifax Water noted the possibility of implementing a "point of sale" program intended to bring non-compliant properties into compliance when a property is being sold. It essentially would require a customer to ensure their lateral(s) were properly connected to the public systems at the time of sale. It was based on the concept that property owners typically have more financial ability to undertake repairs or make repairs as a condition of the property sale. Since the introduction of this concept, Halifax Water has created enabling language within the Halifax Water Regulations to allow and support this program and changed the program name to New Service Account Certification (NSAC).

Sections 64 (4) and (5) of the Regulations state,

> (4) Upon the Commission creating a new Service account for a person, the Commission may require a Wastewater Service Connection to be inspected and brought into compliance with these Regulations, at such person's expense.
>
> (5) The inspection required in subsection (4) shall include the Discharge location of any roof or foundation drain or sump pump and such other inspection activities as will permit the Commission to determine whether a Wastewater Service Connection is in compliance with these Regulations.

Halifax Water notes that there are provisions within the Halifax Water Act and Regulations that would enable staff to issue summary offence tickets and/or suspend service should a customer not allow for property inspections and/or enact changes to their private infrastructure to become complaint with the Halifax Water Regulations. Halifax Water considers the NSAC program a more collaborative approach in gaining compliance with our customers that will optimize staff and financial resources and hopefully minimize the number of customer complaints to the Dispute Resolution Office or NSUARB.

Halifax Water continues to develop a framework for a system to require compliance with the Halifax Water Regulations when a customer wants to create a new service account. A formal program will be established to generate a compliance certificate for confirming compliant downspout and sump pump configuration/connection prior to creating a new service account.

- Subject to Halifax Water Board Approval, Halifax Water will engage stakeholders on this program in Q3/Q4 2021/22. Depending on the outcomes from the stakeholder engagement process, roll-out may commence as early as Q1/Q2 2022/23.

## 2.5 Public Education

A key aspect to private-side I/I reduction programs is public education. Public education is used to inform property owners and customers of the concerns and requirements regarding I/I. Education is a key component to achieve the I/I objectives for the WWMP, the Downspout Disconnection Program, and the Campus Program as well as the New Account Compliance Program which is under development, all of which will be subjects of stakeholder engagement initiatives commencing this year.

General education is available on Halifax Water's website with a dedicated I/I webpage as well as project specific related webpages (Hornes Road & Area - Inflow & Infiltration Project | Halifax Water). Halifax Water has rack cards and an I/I brochure available for mass distribution throughout HRM at locations such as building material suppliers, HRM libraries, HRM permit offices and Halifax Water's main office. Correspondence and presentations have been provided to various industry stakeholders including realtors, insurance companies, home inspectors and construction industry associations. The I/I group also provides internal education to Halifax Water staff via lunch and learn sessions, newsletter articles and on the educational feed on TVs at multiple offices. Recently a videographer created an I/I video which is available on Halifax Water's social media channels including You-Tube, Twitter, Facebook and the Halifax Water website (Homeowner Responsibility | Halifax Water).

More focused education occurs at the start of a specific I/I project. Public consultation occurs through open houses or live webinars which allows for two-way verbal consultation. Community notices will also be delivered to residents in and around the project area. The area councilor is advised of I/I activities within the respective community and they may choose to include additional notices in their newsletters. These will occur, where relevant, in combination with other related projects' communication such as sewer separation projects, lateral lining projects, WWMP projects and other public infrastructure improvements.

Later stages of project communication will focus on specific education to individual property owners in the project area which will personally identify the need to address I/I at their property. Property inspections will be required and results from Halifax Water assessments such as smoke testing will be identified. Education material will be provided to them which could include an inspection form specific to their property, one or more relevant fact sheets, I/I brochure, relevant sections of the Halifax Water Regulations as well as reference to any of the above-mentioned educational material.

All of these educational options are being used to inform and require private-side I/I compliance. Halifax Water will continue to evolve these educational efforts and related I/I programs.

## 2.6 Enforcement

Halifax Water has a four-step internal process to achieve compliance; educate, request corrective action, require corrective action, enforcement action. This process works well for many private I/I compliance issues. However, these four steps can be time consuming to achieve compliance for a percentage (approximately 10-20%) of the private I/I issues. With the future implementation of the NSAC program, Halifax Water will review the current four step process and determine if there are modifications required to this process.

# 3 Update on Jurisdictional Hurdles

HRM oversees the Lot Grading and Subdivision Bylaws, both are predominantly related to new construction and developments, Halifax Water has collaborated with HRM on joint standards for stormwater retention facilities on new ICI properties.

However, with respect to unintended drainage issues created with downspout and/or sump pump disconnection programs, the solution may include installation of new stormwater infrastructure, deep storm pipe. Halifax Water and HRM are collaborating on a Joint Stormwater Policy and meet quarterly to discuss stormwater related issues (Special Technical Committee). A portion of the policy includes formalization of cost sharing agreements, between HRM, Halifax Water and property owners, on installation of deep storm systems that will be used to guide cost sharing arrangements on stormwater related integrated capital projects. The formal cost sharing policy is anticipated to be presented to HRM Council and Halifax Water Board in Q4 2021/22 and will be submitted to the NSUARB for approval. An interim policy to cost share on new deep storm sewers was approved by the NSUARB on June 12, 2013, M05579.

However, the installation of deep storm systems may add additional costs to property owners and may not be a viable solution for addressing overland flow created by discharging downspouts to grade. Continued collaboration with HRM and other stakeholders is required to establish acceptable methods for management of stormwater generated with downspout disconnections.

# 4 Hydraulic Model Calibration

As part of the 2019 Infrastructure Master Plan, Halifax Water developed an all-pipe hydraulic model using Innovyze InfoWorks ICM software. The model represents the “core” system. This is the network servicing the following wastewater treatment facilities (WWTF):

- Halifax
- Dartmouth
- Herring Cove
- Lakeside/Timberlea
- Springfield Lake
- Mill Cove
- Eastern Passage

The satellite system WWTFs are regional infrastructure in the Infrastructure Master Plan and Regional Development Charge. However, their pipe networks do not contain regional infrastructure. Therefore, they have not been included in the regional model.

Traditionally, models created through master planning exercises have only been used for that master plan and not revisited until the next master plan. The new industry trend is to develop a digital twin which is more closely tied to corporate data from GIS, SCADA and corporate flow monitoring (and any other relevant data available in the so called "data lake"). The goal is a model that is maintained in an operational state to provide analytics and decision support on an as-needed basis.

The Halifax Water model was developed with the goal to transition it into the digital twin concept following completion of the Infrastructure Master Plan. In order to use the model for the development of the master plan strategy, the model build followed a hybrid strategy where traditional methods of data import were used with decisions made to facilitate future linking to 'live' corporate data. Building the master plan model in this way allows the Halifax Water team to transition to the digital twin concept with minimal re-work.

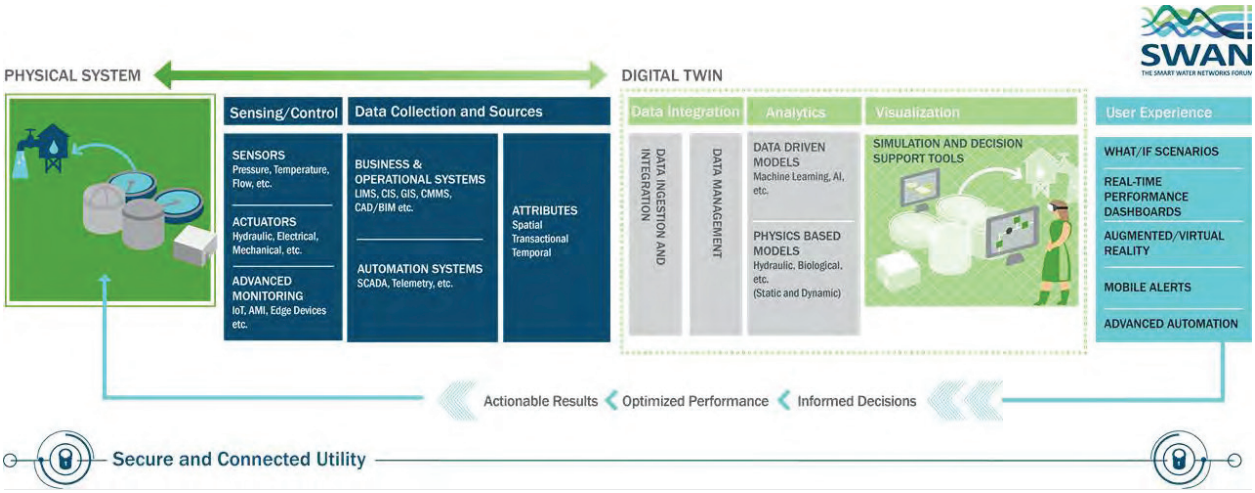



*Figure WWMP-3 - Example Digital Twin Architecture*

The corporate flow monitoring program is one of the data keystones for the hydraulic model. In-system flow monitoring was combined with SCADA and operational information in the creation of the model. Since the model creation, Halifax Water has been working to strengthen the "data integration" link shown in Figure WWMP-3. What was largely a manual process to export sensor information from one system and import it to the model is becoming an automated process.

The digital twin is an emerging trend in the wastewater industry, many of the tools and processes continue to evolve. The request from the NSUARB for a "summary of the hydraulic model calibration changes…" is timely as Halifax Water is currently in the process of developing an annual calibration validation process and report. This is a tool that is intended to be published internally for Halifax Water staff to build confidence in the model among other business units.

*2020/21 Calibration Activities*

Halifax Water is developing an annual model validation and calibration business process.

The annual validation process is not yet in place, however, the data from the corporate flow monitoring program has been used to refine the model calibration to support several ongoing capital projects. In some cases, the calibration was done by Halifax Water staff while in others it has been conducted by consulting resources. The capital projects are:

- Fairview Cove Tunnel Design Capacity Confirmation
- Beaverbank – Local Wastewater Capacity Constraints Projects
- Fairfield Holding Tank
- Young Street Sewer Separation
- Albro Lake and Wyse Road Separation – Preliminary Design

# 5 Flow Monitoring and WWMP Efforts

Halifax Water's WWMP leverages the corporate flow monitoring program for high quality, reliable data and data analysis. A noted objective of the corporate flow monitoring program is to measure the effectiveness of wet weather management efforts, this is done by analyzing the flow monitoring data pre- and post-rehabilitation for the pilot and full-scale projects initiated by the WWMP.

There are currently 39 flow monitors installed specifically supporting the WWMP, the WWMP will use data from other corporate monitors as needed. The corporate flow monitoring program uses the flow monitor and rain gauge data to identify critical events, create velocity-depth scatterplots for data quality control, dry weather flow analysis, quantification of RDII, and design flow estimates. The results are used in the WWMP Decision Matrix to determine sub-sewersheds areas within a larger Priority Sewershed and identify rehabilitation project candidates. The existing peak RDII data (pre-rehabilitation) is plotted against rainfall depth to create a linear regression to extrapolate expected RDII values for a storm of any given return period. The same analysis is completed on post-rehabilitation data to determine an estimated reduction in peak RDII for a storm of any given return period.

A summary of the WWMP project activity, timelines and results are provided in Figure WWMP-4 and Table WWMP-3. In Figure WWMP-4, the blue projects were identified through Infrastructure Master Plan related criteria and direction, and the orange projects are pilots for the WWMP to further evaluate lateral connection rehabilitation and private side related I/I reduction techniques. Table WWMP-3 summarizes past rehabilitation activities in the various pilot areas as well as the full-scale project areas. The results shown are cumulative to date. The results are compared to reduction targets for the specific area identified in the Infrastructure Master Plan or other operational targets. The WWMP will evaluate the success of the rehabilitation projects and adjust the program as necessary over time.

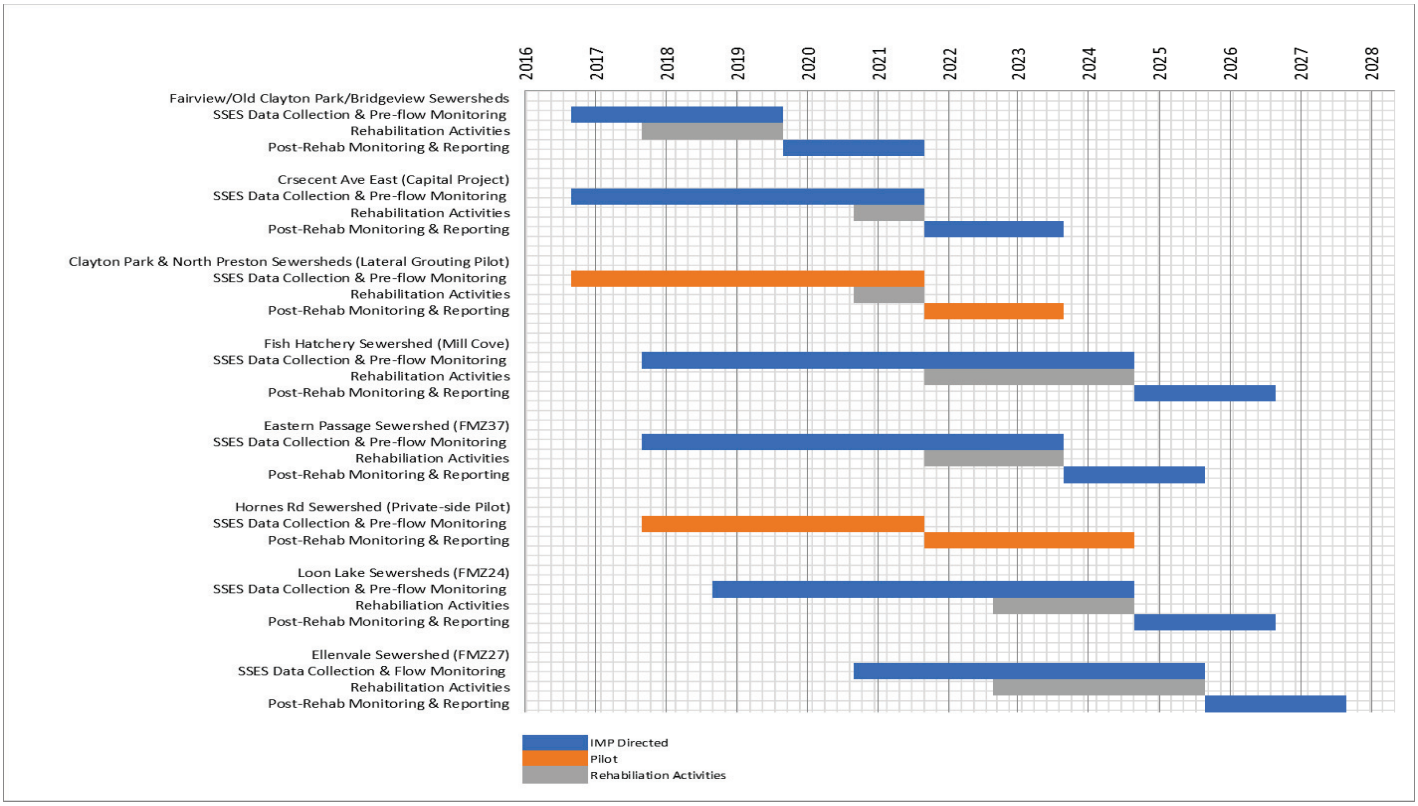



Figure WWMP-4 – WWMP Project Timeline

Table WWMP-3 – 2020/21 WWMP Program Activity Results

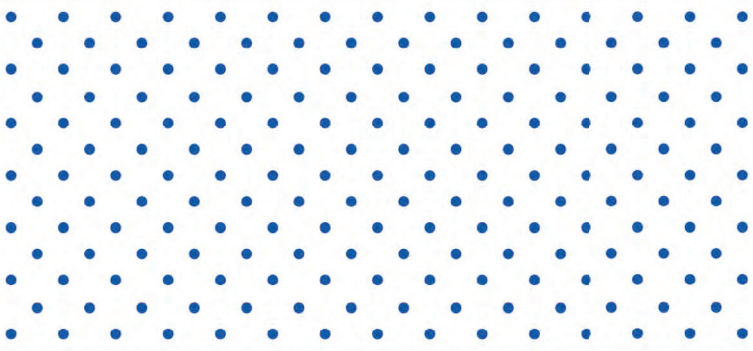
| WWMP Project Summary | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sewershed | Rehabilitation Activity | | | | | Private-side Inspections | Peak Flow Reduction (L/sec) | Peak Flow RDII Reduction (%) |
| | Mainline Lining | Lateral Lining | Manhole Lining | Deep Storm | Public-side Repairs | | | |
| Fairview/Old Clayton Park/ Bridgeview (Phase I) | ✓ | | | | | | 166* | 65%* |
| Fairview/Old Clayton Park/ Bridgeview (Phase II) | ✓ | | | | | | 139* | 38%* |
| **TOTAL REDUCTION** | | | | | | | **305*** | **48%*** |
| Stuart Harris PS (pilot) | ✓ | ✓ | ✓ | | | ✓ | 13 | 37% |
| Leiblin Park (pilot) | ✓ | ✓ | | | | | 38 | 33% |
| Crescent Ave, MH182 (pilot) | ✓ | ✓ | ✓ | | | ✓ | 43 | 74% |
| Crescent Ave, MH174 (pilot) | ✓ | ✓ | ✓ | | | ✓ | 41 | 92% |
| Wanda Lane | | | | ✓ | | ✓ | *41*** | *26%*** |

*Results show overall reductions for each project for 1 in 10 year storm event*

**Peak flow reductions based on 1 in 5 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 (1st year post monitoring)*

# SMOKE TESTING NOTICE



To improve services, Halifax Water will be performing smoke testing of the wastewater system in your area to locate deficiencies sometime during the following dates:

## Aug 19th - Sept 6th, 2019

**between the hours of 8:00 AM and 4:00 PM**

On one of these days, our smoke test crews will walk along your street and around the outside of your house looking for signs of smoke. All Halifax Water employees carry photo ID.

You do not need to be home at the time of testing (we do not need to enter your home). But it is very important all occupants of the building be aware of this testing.

Smoke seen coming from roof plumbing vents and manholes is normal. Smoke should not enter your home. If it does, it may be an indication of a defect in your plumbing that could be allowing harmful sewer gas into your home. This can happen if you have sinks, tubs/showers and floor drains that are not used regularly and the water in their plumbing traps evaporate. You can prevent this by pouring three cups of water down the drain or running the faucet for 60 seconds every so often (i.e. once a month).

The type of smoke used is non-toxic, non-staining, and non-harmful. It has a slight odour and is light gray in colour. For more information visit http://hurcotech.com/wp-content/uploads/2015/12/2015-04-16-02-04-11-docfile-2.pdf

Police, Fire, City Officials, and your neighbours have also received this notification.

**For questions contact Halifax Water:**
**902-483-8187 or inflow@halifaxwater.ca**

STRAIGHT from the SOURCE

Halifax Water

# Community Notice 1

## Hornes Road, Janice Anne Drive, Scott Drive

September 18, 2020

Wet weather is coming. As a property owner how do you manage all the rainwater and rising groundwater levels? This stormwater is not permitted to enter into the Halifax Water wastewater system.

## Inflow & Infiltration (I&I)

The wastewater system is designed to carry the flows from your toilets, sinks, showers, dishwashers and washing machines. When stormwater enters the wastewater system, either through direct connections (sump pumps, downspouts, foundation drains, etc.) or pipe defects (cracks and breaks), it is considered inflow and infiltration (I&I).

The added stormwater I&I causes increased flows that can overwhelm the wastewater system resulting in flooded basements or spills of raw sewage in your neighbourhood.

## I&I Reduction Project

Halifax Water is performing I&I reduction projects throughout HRM, including your area. Repairs have been made to the public wastewater infrastructure in the street.

We now need you to assess your private property's stormwater drainage for I&I connections to the wastewater system. This could include sump pumps, downspouts and interior/exterior drains as well as damage to the wastewater pipe that connects your building to the system in the street. **Where I&I connections are found, please make repairs or modifications to redirect the stormwater.**

At a later date, pending COVID-19 limitations, Halifax Water will be performing mandatory property inspections to examine outside and inside your buildings. If I&I connections are found, you will be given a deadline to make repairs.

## Public Webinar

We will be holding an online webinar on Tuesday, October 6, from 6:00 PM – 8:00 PM to further describe this project and provide examples of I&I issues to look for at your property. You can also ask questions during the webinar. To view the webinar, or to ask questions, please register at the link below:

*halifaxwater.ca/project/hornes-road-area-inflow-infiltration-project*

For those who cannot attend the webinar, it will be made available on the webpage shown above.

## Project Contacts

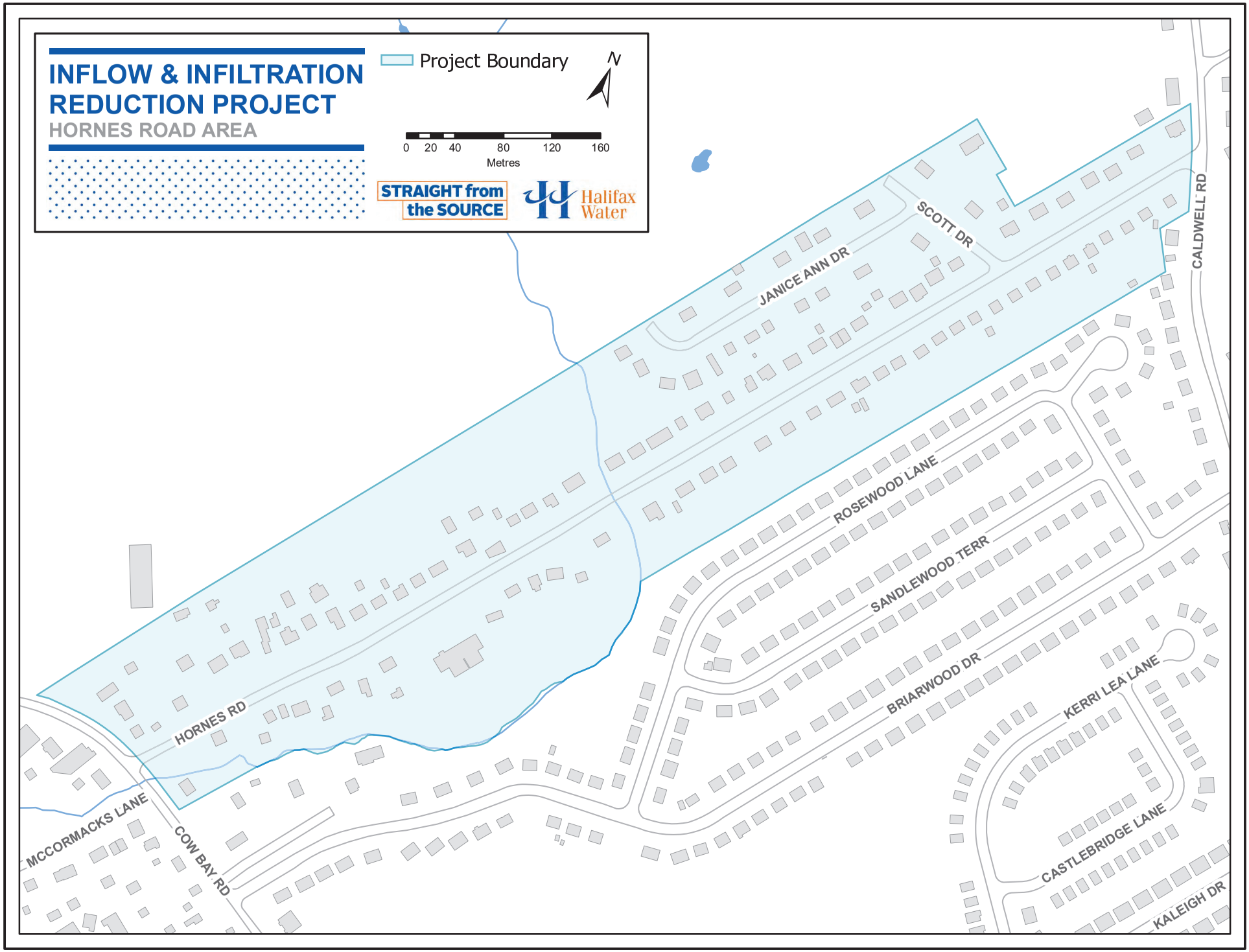

**Halifax Water**
**Inflow & Infiltration Team**

inflow@halifaxwater.ca

**Halifax Water**
**Customer Care Centre**
Mon - Fri 8:00 AM - 8:00 PM
customercare@halifaxwater.ca
902-420-9287


**Learn more about Inflow & Infiltration:** *www.halifaxwater.ca/homeowner-responsibility*

STRAIGHT from the SOURCE


INFLOW & INFILTRATION REDUCTION PROJECT
HORNES ROAD AREA
Project Boundary
N
0 20 40 80 120 160
Metres
STRAIGHT from the SOURCE
Halifax Water
JANICE ANN DR
SCOTT DR
CALDWELL RD
ROSEWOOD LANE
SANDLEWOOD TERR
BRIARWOOD DR
KERRI LEA LANE
CASTLEBRIDGE LANE
KALEIGH DR
HORNES RD
MCCORMACKS LANE
COW BAY RD

Halifax Water

# Questions and Answers

## Inflow and Infiltration Reduction Project
## Hornes Rd, Janice Ann Dr and Scott Dr

### Q&As based on Halifax Water Webinar on October 6, 2020

https://halifaxwater.ca/project/hornes-road-area-inflow-infiltration-project

Property owners in this project area need to assess their property for stormwater sources connected to the Halifax Water wastewater system. Where inflow and infiltration sources are found, property owners need to make repairs. A webinar on October 6, 2020 provided additional information. Questions asked during this webinar are summarized below.

**Q: Is Hornes Road the first area to be going through this type of project?**

A: No. Similar Inflow and Infiltration (I&I) projects have been occurring throughout HRM for numerous years as part of Halifax Water's I&I Reduction Program.

**Q: What is the price range of the repairs that property owners may need to pay?**

A: Costs vary depending on what is found. For example, a clean out cap can be purchased for minimal cost at a home improvement center. For a downspout redirection, a property owner may be able to do the repairs themselves by using a couple tools, an extension pipe and elbow as well as a cap for the disconnected pipe. More complex repairs such as a lateral replacement would be more costly. Owners need to look at their property to assess potential issues. It may be helpful to consult with a plumber or other qualified professional. Halifax Water suggests getting free quotes for repairs from multiple contractors for price comparison.

**Q: Is there financial assistance available if required, or is a payment plan offered?**

A: For full lateral replacements, the property owner can consider using Halifax Water's lateral loan program. Details can be found on Halifax Water's website at https://halifaxwater.ca/lateral-loan. For other repairs, there are no incentives or options for financing.

# Questions and Answers

**Q: is Halifax Water aware of what repairs are necessary at the private properties?**

A: Halifax Water is not aware of all necessary repairs. However, some I&I sources are identified when Halifax Water performs some specific assessment activities, such as smoke testing. When each property owner receives their personalized letter, Halifax Water may identify some specific items for action. The letter will also request the owner to assess their property and make repairs to any other I&I defects.

Later, when Halifax Water performs property inspection inside and outside, other necessary repairs may be identified if missed by the property owner. Repairs will then need to be performed within a given deadline.

**Q: Should residents in the same area communicate with each other to determine if they have similar issues such as needing a plumber?**

A: It may be beneficial for residents to work together to have repairs made. There could be cost savings by combining various similar activities when dealing with a plumber or other professionals for performing repairs.

**Q: How much time do residents have to complete repairs before the property inspections are performed?**

A: During normal circumstances, Halifax Water property inspections would be performed at this time, but due to COVID-19 restrictions, this process is delayed until further notice.

**Q: Will Halifax Water be moving on to other areas in Eastern Passage besides Hornes Road at this time?**

A: Halifax Water has prioritized numerous areas throughout HRM that have significant wet weather issues and related Inflow and Infiltration. Based on this prioritization different areas are assessed each year as part of the long-term multi-year program. These assessments include repairs to both public infrastructure and private properties.

902.H2O.WATR
902.420.9287
450 Cowie Hill Road
P.O. Box 8388 RPO CSC
Halifax, Nova Scotia
Canada B3K 5M1

Nov 6, 2020

<Name>
<Mailing Address>

**Re: Inflow & Infiltration Reduction Project – Hornes Road, Janice Ann Drive and Scott Drive**
**Private Property at <Inspection Address>**

Halifax Water sent a community notice in September and have since given a Public Webinar on October 6, 2020 about stormwater inflow and infiltration (I&I) into the wastewater.

The added stormwater from I&I causes increased flows that can overwhelm the wastewater system and may result in flooded basements or spills of raw sewage in your neighbourhood. As a property owner, fixing your wastewater system benefits you by optimizing your property value, avoiding insurance claims and exercising environmental stewardship.

Halifax Water has completed investigations in your community including smoke testing and closed circuit television (CCTV) videos of the wastewater pipes in the street to assess where stormwater is entering the Halifax Water wastewater system.

To address issues with the public infrastructure, Halifax Water has performed repairs to the wastewater system in the street. Private property owners also need to make repairs to stop stormwater from entering the wastewater system from direct connections (e.g. sump pumps and downspouts) or indirect connections (e.g. leaking lateral) on their property.

From our limited assessment to date, including smoke testing on August 20, 2019, we determined that at your property the wastewater lateral cleanout could permit stormwater to enter the wastewater. You need to secure and ensure the cap has a proper seal so not to allow stormwater into the wastewater system.

There also could be other I&I issues at your property. **Please look around for other stormwater sources that are connected to the wastewater system and make repairs to all defects to redirect the stormwater elsewhere.** Allowing stormwater to enter the wastewater system is a violation of the Halifax Water Regulations (see attached relevant excerpts).

For information about what to look for and possible repair options refer to:
- The enclosed documents including the Inflow & Infiltration brochure
- Our website at https://www.halifaxwater.ca/homeowner-responsibility

- The webinar presentation at https://halifaxwater.ca/project/hornes-road-area-inflow-infiltration-project

You may want to consult with a plumber or other professional for additional help.

At a later date, pending COVID-19 limitations, Halifax Water will be performing mandatory property inspections to examine outside and inside your buildings. We will discuss what repairs you have made and, if applicable, identify other connections that you may have missed. Where remaining I&I connections are found, you will be given a deadline to make repairs.

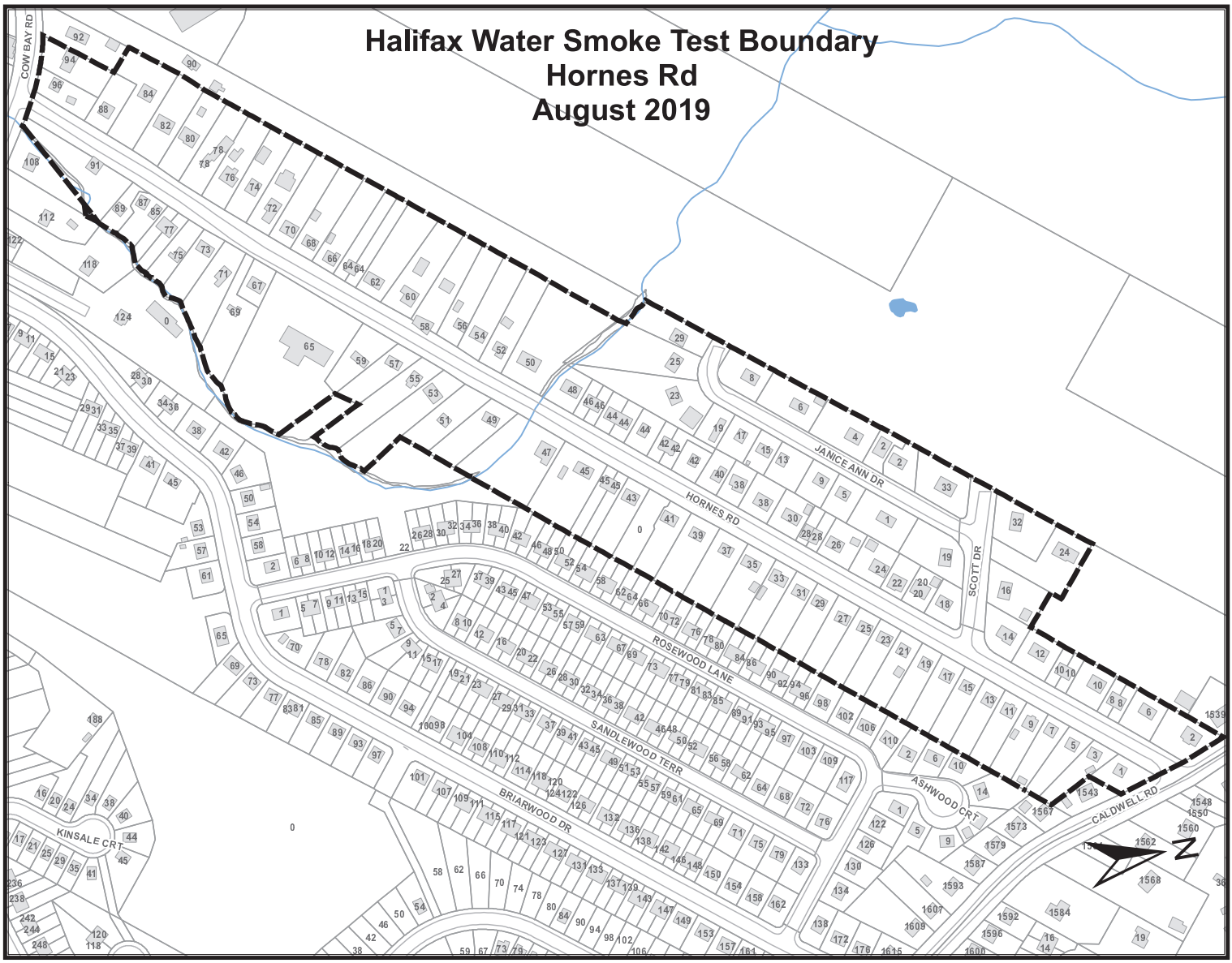
Thank you for your cooperation. If you have any questions or want further information, please contact the undersigned.

Sincerely,

<Name>
Environmental Officer – Halifax Water
Phone: (902) xxx-xxxx
inflow@halifaxwater.ca

cc. <xxx>

Attachment: Reduce Inflow & Infiltration Brochure
Excerpts from Halifax Water Regulations
Fact Sheet – Property Stormwater Drainage
Q&A from October 6, 2020 webinar

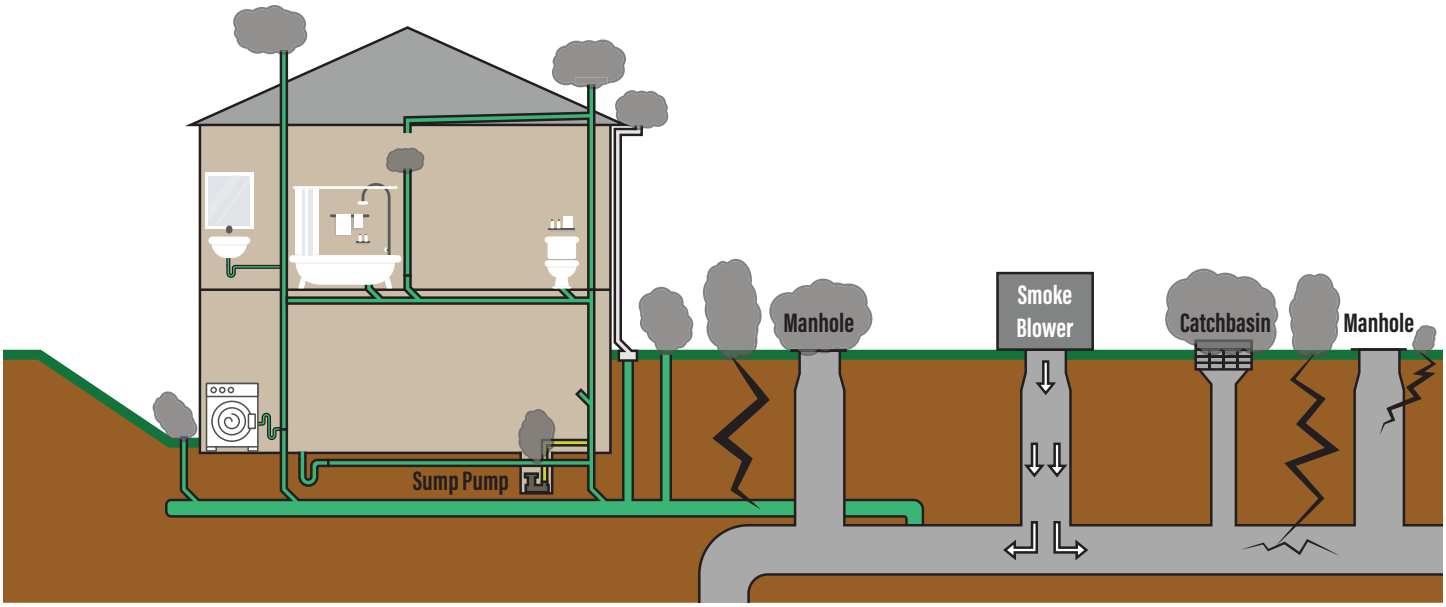

Halifax Water Smoke Test Boundary
Hornes Rd
August 2019
COW BAY RD
HORNES RD
JANICE ANN DR
SCOTT DR
ROSEWOOD LANE
SANDLEWOOD TERR
BRIARWOOD DR
ASHWOOD CRT
CALDWELL RD
KINSALE CRT

# SMOKE TESTING

## Why do we do Smoke Tests?

Smoke testing is used to find possible leaks in the wastewater system. During this test, non-toxic, light gray, artificially created smoke (like a fog machine at a concert) is blown into access points (manholes) in the pipe. This smoke will escape through defects in the pipe, such as holes or cracks, or through illicit connections such as roof leaders or sump pumps and will be visible above ground (see diagram).

Plumes coming from plumbing vents and manhole rims are normal. Other plumes can indicate defects and will be noted and photographed.




## Safety of Smoke

- It will not harm humans, pets, plants or stain clothing, drapes, or furniture.
- If the smoke enters your home, it may be irritating, especially to individuals with existing respiratory issues.
- Smoke can activate smoke alarms.
- Open windows for ventilation.

## What does it mean if smoke enters my home?

- Smoke should not enter your home. If it does, it may be an indication of a defect in your plumbing. This also means sewer gases may enter your home, which can be a health hazard.
- The correction of these defects in your plumbing is the responsibility of the homeowner. A licensed plumber could be consulted to make repairs.
- It's OK if smoke is coming out of the plumbing vents on the roof.

For questions contact Halifax Water at
902.420.9287 or inflow@halifaxwater.ca

STRAIGHT from the SOURCE

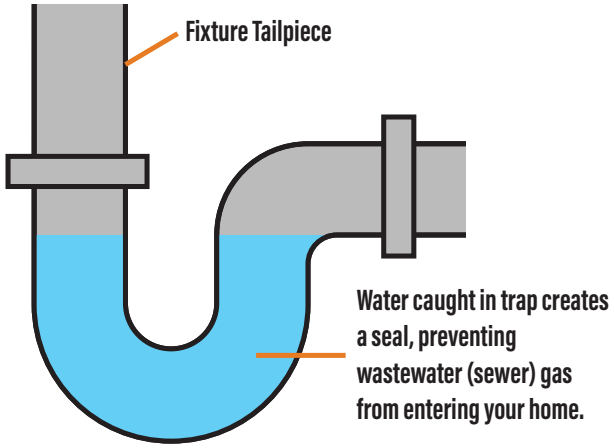
Halifax Water

## What should residents do prior to smoke testing?

- When you are notified that smoke testing is going to occur in your neighborhood you should make sure that all plumbing traps connected to your sinks, tubs/showers and floor drains have water in them. This can be done by pouring three cups of water in them or running the faucet for 60 seconds.
- Frequently used plumbing traps typically have water in them; however, if not frequently used, traps can go dry allowing smoke (and sewer gas) into your home.
- If water is in the plumbing traps, the water will prevent smoke from entering your house through the pipes (see diagram).

## Do I need to be home during the smoke test?

No. Inspection crews will not need to enter your home to complete the smoke test.




## Why is the smoke test date flexible?

This testing cannot be conducted in rainy or very windy conditions, so the test date can sometimes be delayed. Also, other activities in the project may cause the timeline to shift unexpectedly.

## What can be expected on the day of the smoke test?

- Most homes will only be in the test area for one or two set ups.
- Each set up takes approximately 30 minutes.
- Smoke test crews will walk around the outside of your house and yard looking for smoke exiting the sewer system.
- If you are home and see smoke inside or outside your home, you can notify a member of Halifax Water staff on site.

## Who has been notified that smoke testing is occurring?

Police, Fire Departments, District Councillor, Halifax Water Customer Care and your neighbours in the testing area.

For questions contact Halifax Water at
902.420.9287 or inflow@halifaxwater.ca

STRAIGHT from the SOURCE

Halifax Water

## What does Halifax Water do to reduce Inflow & Infiltration?

Halifax Water works to improve public infrastructure by:

- Repairing pipes and manholes;
- Maintaining pump stations;
- Upgrading Wastewater Treatment Facilties.

## What can you do?

Look for inflow & infiltration sources:

- CCTV video your lateral to identify damage;
- Get Halifax Water to help identify sources;
- Disconnect stormwater connections from the wastewater system;
- Repair leaking pipes and connections.



STRAIGHT from the SOURCE

Halifax Water

/HalifaxWater

@HalifaxWater

www.HalifaxWater.ca

STRAIGHT from the SOURCE

Halifax Water

# Reduce Inflow & Infiltration

What you need to do as a property owner.

Contact us for more information:

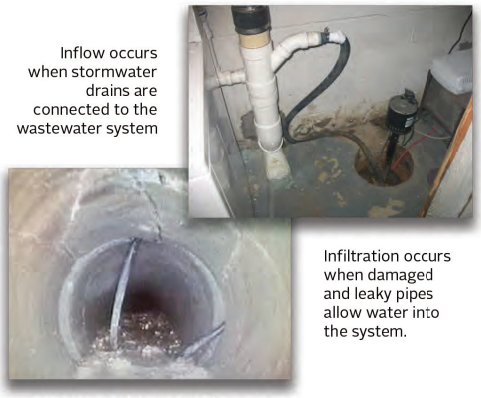
**Inflow@halifaxwater.ca**

**902.420.9287**

## What is Inflow & Infiltration?

Inflow and infiltration (I&I) occurs when stormwater enters the Wastewater System from rainfall, groundwater, snow melt and surface water runoff.

Wastewater systems are only designed to carry wastewater from fixtures such as toilets, sinks, washers and showers.



Inflow occurs when stormwater drains are connected to the wastewater system

Infiltration occurs when damaged and leaky pipes allow water into the system.

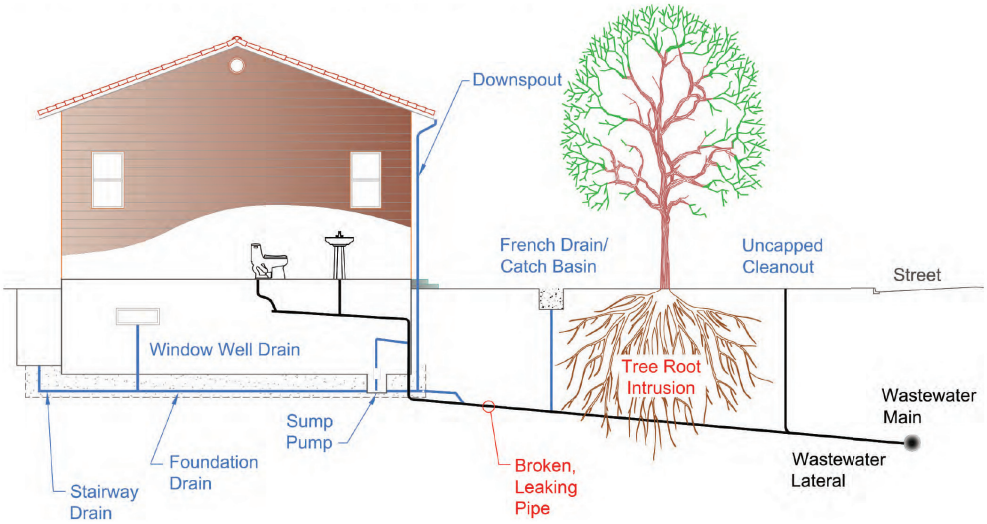
Inflow and infiltration can overwhelm the wastewater system which can lead to:

- Increased customer costs;
- Wastewater releases;
- Impacts to human health and the environment;
- Flooded basements.



## Private Property Sources of Inflow & Infiltration

Stormwater could be entering the Wastewater System from direct connections (inflow) or from leaking infrastructure (infiltration) as shown below.




## Redirect drains connected to the wastewater system for:

- Sump pumps and pits;
- Downspouts;
- Foundation and yard drains:
- Exterior stairwell and window well drains.

## Repair damaged and leaking pipes:

- Cleanout caps;
- Laterals with damage and roots.

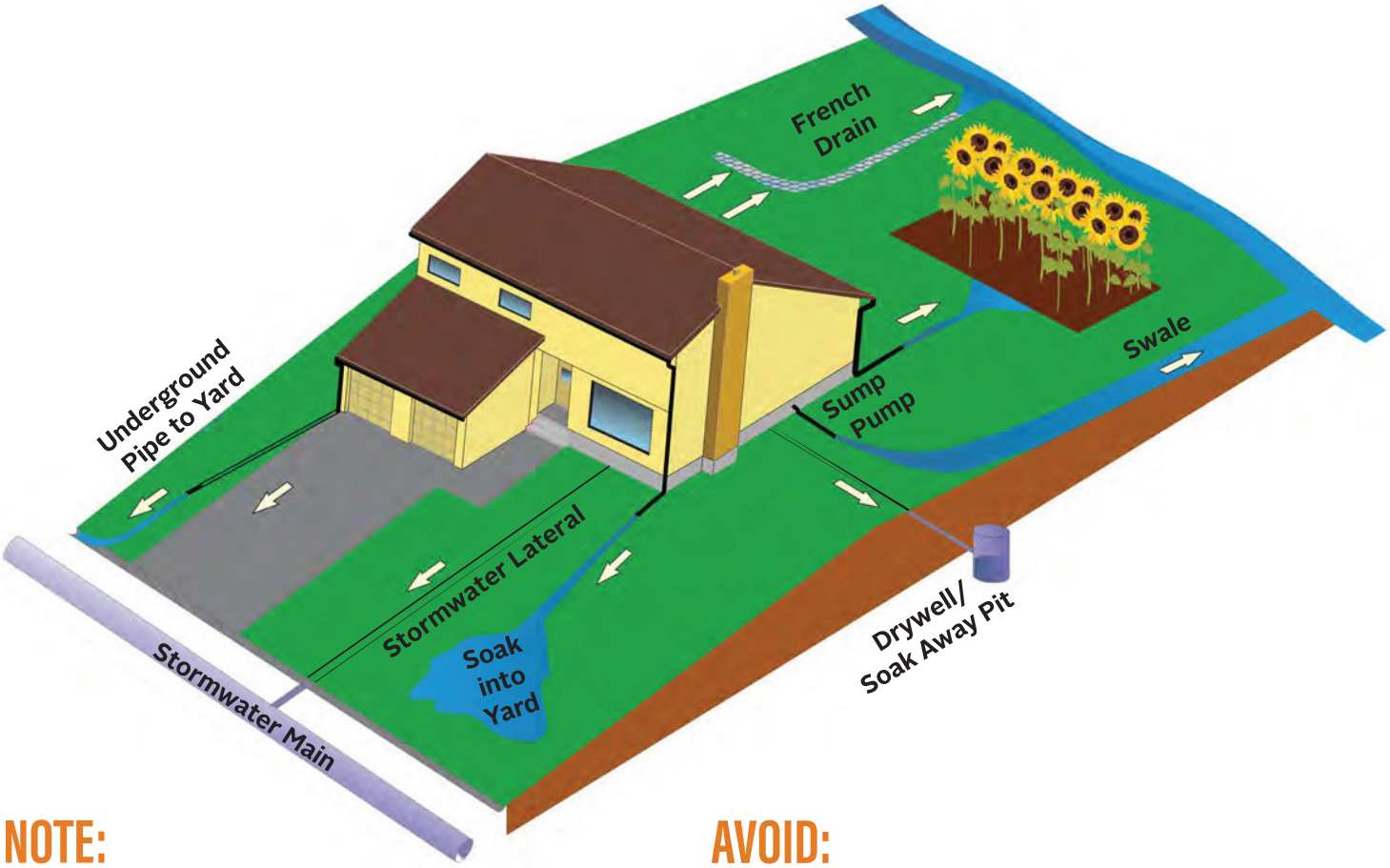
## Possible locations to discharge stormwater:

- Onto your own property (away from your foundation);
- To a garden or a soakaway pit;
- Towards a body of water (e.g. lakes, streams);
- To Halifax Water's stormwater system (ditch or underground pipe.)

# PROPERTY STORMWATER DRAINAGE

## OPTIONS:

1. Direct stormwater to your yard away from your foundation.
2. Direct flow to gardens, swales, ditches, soak-away pits, and towards streams, and lakes.
3. Underground pipes like sump pumps and foundations can connect to the underground Halifax Water Stormwater System (downspouts cannot.) Get a permit.




## NOTE:

This is general information. Consider your specific property conditions. You may wish to consult with a professional.

## AVOID:

1. Water backups and frozen pipes. Slope pipes downhill.
2. Flooding your neighbour.
3. Icing problems in the street and/or sidewalks.
4. Soil erosion and sediment transport.
5. Stormwater can not enter the Halifax Water Wastewater System.

For questions contact Halifax Water at 902.420.9287 or inflow@halifaxwater.ca

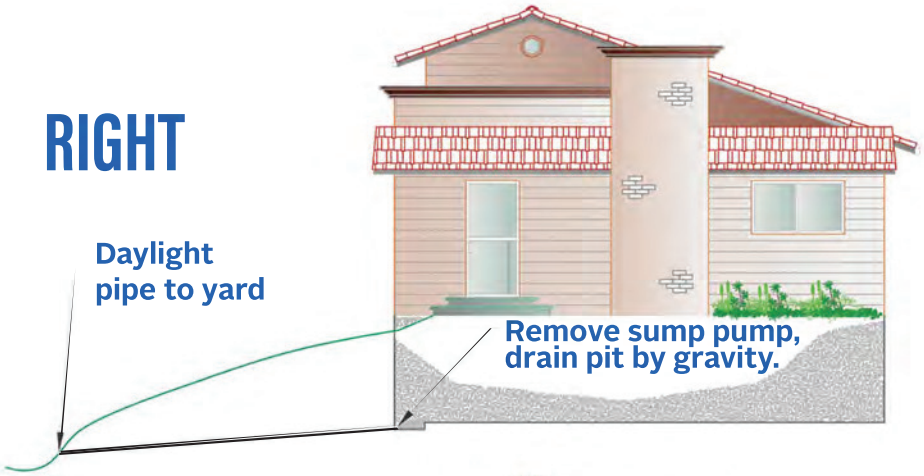
STRAIGHT from the SOURCE

Halifax Water

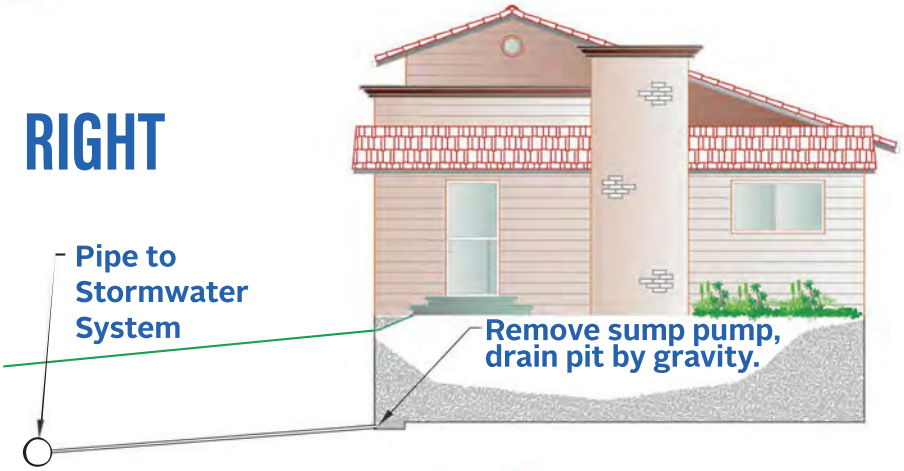
# DISCONNECTING SUMP PUMPS

Sump pumps and sump pits can be used to manage stormwater that is entering your basement. Where you discharge this collected water is important. Do not connect to the wastewater system unless prior approved by Halifax Water. Removing the sump pump and allowing the sump pit to drain by gravity is preferred to avoid mechanical issues and power costs.

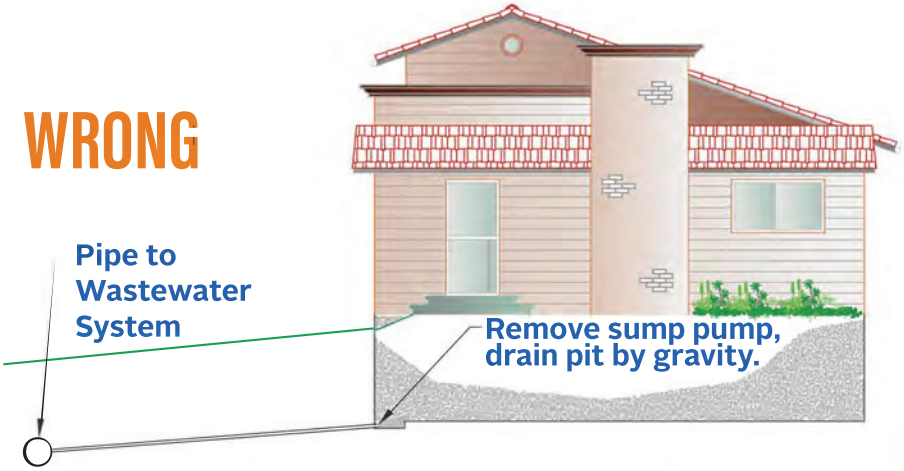
## RIGHT




## RIGHT




## WRONG




## DO:

Discharge to the ground, away from your foundation.

Cap the old discharge pipe.

## AVOID:

Flooding your neighbour.

Icing problems in the street/sidewalks.

## NOTE:

This is general information. Consider your specific property conditions. You may wish to consult with a professional.

For questions contact Halifax Water at 902.420.9287 or inflow@halifaxwater.ca

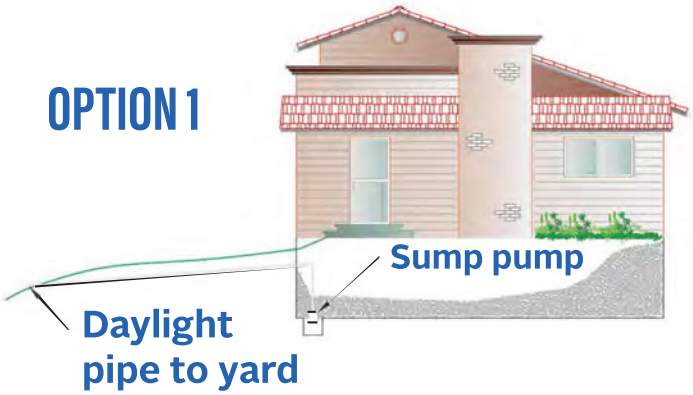
STRAIGHT from the SOURCE

Halifax Water

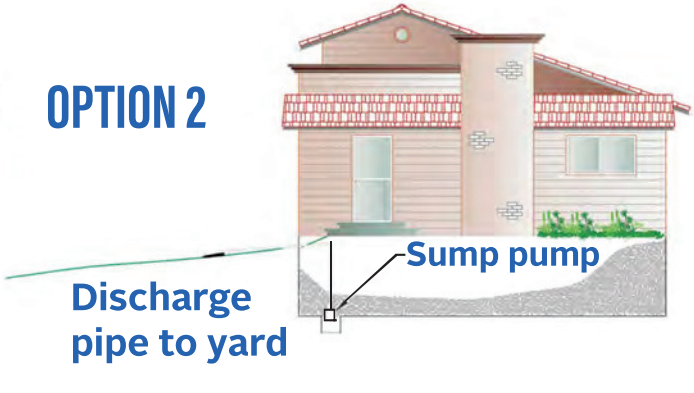
# REDIRECTING SUMP PUMPS

Sump pumps and sump pits can be used to manage stormwater that is entering your basement. Where you discharge this collected water is important. Do not connect to the wastewater system unless prior approved by Halifax Water. Removing the sump pump and allowing the sump pit to drain by gravity is preferred to avoid mechanical issues and power costs (see over).

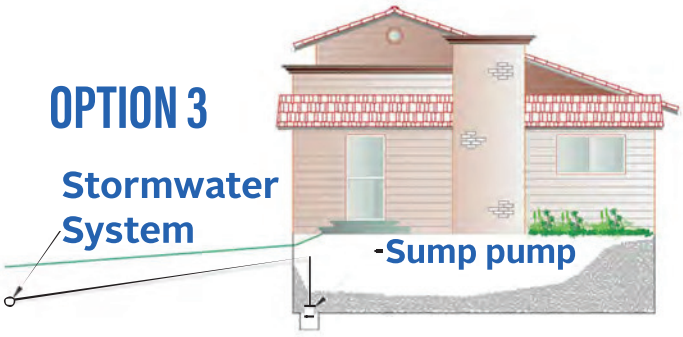
## OPTION 1



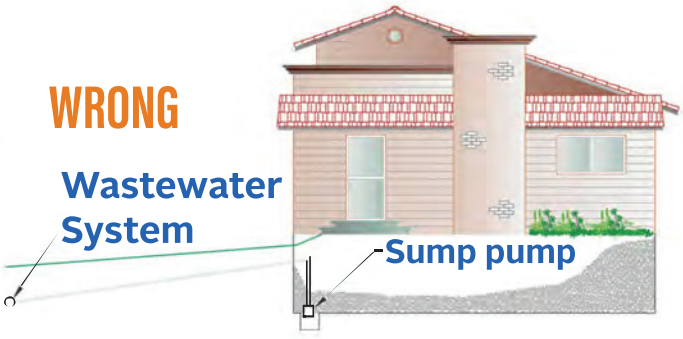

## OPTION 2




## OPTION 3




## WRONG




## DO:

Discharge to the ground, away from your foundation.

Cap the old discharge pipe.

A back-up battery power supply is recommended to maintain protection during power outages.

## AVOID:

Flooding your neighbour.

Icing problems in the street/sidewalks.

## NOTE:

This is general information. Consider your specific property conditions. You may wish to consult with a professional.

For questions contact Halifax Water at 902.420.9287 or inflow@halifaxwater.ca

STRAIGHT from the SOURCE

Halifax Water

# Private Property Inspections

The Inflow & Infiltration (I&I) Reduction Program of Halifax Water performs property inspections of homes and businesses to identify sources of stormwater entering the wastewater system.

## Before the Inspection

Prior to any private property inspection, Halifax Water will contact the property owner to have them book an appointment date and time that is convenient for them and within the required deadline.

Prior to the inspection, property owners will need to do a few minor preparations:

1. If you have a sump pump ensure it is accessible for inspection. The inspector will also need to see where the pipe leading from the sump pump discharges.
2. Consider where the wastewater connection cleanout is located and any other wastewater or stormwater connections to facilitate inspection.

## During the Inspection

Most inspections will last less than 20 minutes. During the inspection, an adult 18 years or older must be present at all times.

When Halifax Water employees arrive to do the inspection, they will be easily identified by their photo ID's.

There is both an inside and an outside component to the inspection:

**Typical Cleanout Configurations (Generally a 10 cm (4") diameter pipe in the basement.)**







**Inside,** the inspectors will:

- look at the wastewater connection cleanout and other wastewater plumbing fixtures
- look at any sump pumps and other drains and where they discharge
- ask property owners if they have had or are having water issues or flooding

**Outside,** the inspectors will inspect:

- downspouts
- window and stairwell drains
- driveway drains and yard drainage

## After the Inspection

If stormwater connections to the wastewater system (sources of 1&1) are found, property owners will receive a follow-up letter from Halifax Water which will indicate that these connections to the wastewater system are not permitted per the Halifax Water Regulations.

The property owner will be required to perform actions to fix the problems within a specified timeframe to bring the property into compliance. Once the repairs are done, the property owner will notify Halifax Water with the details of the work performed.

**If you have questions, please contact the Halifax Water Inflow & Infiltration group at:**
**902-420-9287**
***inflow@halifaxwater.ca***

# 1. Introduction

With the completion of the Regional Development Charge update (M09494), The NSUARB requested Halifax Water provide an assessment of potential future regulations (i.e. reduction in CSO overflows) and related impacts on long-term capital budgets.

The 2019 Integrated Resource Plan (IRP) contained a compliance plan which is intended to provide information for Halifax Water to create a path forward to maintain or achieve compliance for our wastewater, water and stormwater infrastructure systems over the next 30 years. The compliance plan highlights the current state of compliance at our wastewater treatment facilities and water supply plants as well as examines future compliance requirements. Additional sections discuss the wastewater collection systems, sanitary and combined sewer overflows and water distribution systems including water storage reservoirs.

As part of the update to the IRP, Halifax Water will be undertaking various studies and reviews to ensure current and future planned projects align with the regulatory requirements of provincial and federal regulators and will be providing annual updates to the NSUARB on progress on system compliance and adjustments to regulations that will impact operational activities and/or capital expenditures.

# 2. Overview Compliance Requirements

For details on regulatory requirements with Halifax Water operated facilities and systems, please refer to the Integrated Resource Plan (IRP), however the information below provides an overview of the regulatory bodies overseeing compliance of Halifax Water systems. Since the publishing of the compliance plan, there have been no changes to regulations that would impact the capital expenditures identified in the 2019 IRP.

**Wastewater Treatment**

Wastewater management in Canada is governed federally, provincially and at the municipal level. Legislation is issued federally to stipulate minimum standards for wastewater effluent, while provincial governments are responsible for issuing permits or licenses to wastewater treatment facilities to construct and operate under their regulatory framework. Permits are typically site specific and may require increased stringency based on provincial legislation to improve human health and ensure environmental protection based on population density and assimilative capacity of the receiving waters.

The *Fisheries Act* (R.S.C., 1985,c. F-14) is the main tool to control wastewater release in Canada. Within the *Fisheries Act*, Environment and Climate Change Canada (ECCC) administers the key pollution prevention provisions, which prohibit the deposit of deleterious substances in water frequented by fish, unless authorized by the regulations. A deleterious substance is identified as any substance that degrades or alters water quality such that it would be harmful to fish, fish habitat, or the use of fish by people. Nova Scotia Environment and Climate Change (NSECC) has local jurisdiction to implement additional or more stringent requirements pertaining to wastewater effluent.

Emerging trends in the wastewater treatment field include those that could have an increased interest in microplastics and micropfibers both pharmaceutical and personal care product residuals present in wastewater effluents.

Nova Scotia Environment and Climate Change and Environment Canada have not communicated any plans to address nutrient loading and micropollutants at this time and continue to rely on the outcomes of Environmental Discharge Objectives (EDOs) established under completed Environmental Risk Assessments (ERAs) related to expansions and permit changes. Halifax Water will continue to monitor the progress of directions undertaken by NSECC to protect the environment and will address emerging and legislated requirements in subsequent updates to the IRP.

**Combined and Sanitary Sewer Overflows**

Combined sewer systems are sewers that are designed to collect surface runoff and stormwater in such a manner that it mixes with wastewater flows being conveyed within the sewer system. The majority of the sewersheds that are tributary to the Halifax Wastewater Treatment Facility and the Dartmouth Wastewater Treatment Facility are combined systems. Within those systems, there are combined sewer overflow (CSO) points which are designed to discharge wastewater flows during wet weather events. There are 16 and 11 CSO points in the Halifax and Dartmouth sewersheds respectively.

As per the current WSER regulations, Halifax Water records the volume and frequency (# of events and # of days active) of overflows associated with the CSOs to ECCC. To Halifax Water's understanding, there are currently no initiatives underway to modify this reporting requirement.

As per the *Fisheries Act*, Halifax Water is required to report sanitary sewer overflows (SSOs) within the context of "Duty to Notify – Deleterious Substance" which is further detailed in the "Deposit Out of the Normal Course of Events Notification Regulations". This would apply to a SSO resulting from inflow and infiltration as it is an event out of the normal course and is not covered as an allowable overflow under WSER. This also indicates that a dry-weather SSO is not acceptable because that would not fit the definition of something that was "out of the normal course of events". To Halifax Water's understanding, there are currently no initiatives underway to modify this reporting requirement

**Water**

In Nova Scotia, drinking water treatment and delivery is regulated by NSECC through approvals issued under the *Environment Act* (Nova Scotia). Approvals are issued for a period of ten years. Health Canada publishes the Guidelines for Canadian Drinking Water Quality. The guidelines can be published as either Maximum Acceptable Concentrations (MAC's) which are health related parameters; Aesthetic Objectives (AO's) or Operational Objectives. Drinking water approvals in Nova Scotia require that all MAC's must be achieved. While achievement of AO's is not required, many of them must be monitored and reported on. Any new or revised MAC published during the life of an approval is deemed to form part of the approval by NSE.

In Nova Scotia, there is no formal standard for water supply plant process wastewater discharge quality. There are no specific technology requirements for treatment and discharge limits are set on a site-specific basis by NSECC when issuing the approval.

Halifax Water recently launched its Water Supply Enhancement Program (WSEP) to upgrade the J. Douglas Kline and Lake Major water supply plants. While both plants have continually achieved regulatory compliance, changes to source water quality driven by climate change and lake recovery have made the plants more challenging to operate.

The WSEP will upgrade plant technology to make it more appropriate for the emerging source water quality, making the plants more resilient and able to more efficiently maintain compliance. It will also equip the plants to deal with harmful algal toxins which they are not equipped for today. While only a single algal toxin has a MAC in the Guidelines for Canadian Drinking Water Quality, other jurisdictions in Canada and the United States of America regulate additional algal toxins. These changes will equip the plant to deal a broad range of algal toxins as well as taste and odour issues which have also resulted from source water quality changes.

## 3.0 Current Activities:

**Reporting Tracking**

Ensuring ongoing collection of quality data through proper quality assurance and quality control practices is critical to developing accurate long-term plans. Halifax Water has compiled the current regulatory listing of reportable events and data, both emergency and regular. The listing that identifies the agency and the associated legislation that provides oversight on operation of the Halifax Water systems.

These will be tracked and monitored through new software "Klir" that is being introduced through the Quality Data Management Reporting (QDMR) IT initiative. Klir will house data collected by Regulatory Compliance, Water Quality and Facility Operations staff in a central location, providing a more comprehensive data set for staff to draw from when operating systems and planning for enhancements and upgrades. It will be able to track compliance related parameters and reporting requirements with automated alerts. This software will be testing and rolled out to the users by Q4 of 2021/22.

**Environmental Management System (EMS)**

The EMS is a system of procedures, records and processes to manage environmental issues, intended to drive a process of continual improvement towards meeting defined environmental goals and objectives and thereby minimizing environmental impacts. The EMS oversees the adherence to the ISO 14001 – 2015 standard for our certified facilities. As part of the oversight, regular meetings are conducted to identify any impacts to the environment, the associated corrective actions and track any changes that will impact future compliance.

The Canada Gazette is reviewed as a component of the regular reviews of the EMS system. This publication is the official newspaper of the Government of Canada where operational staff can learn about new statues, new and proposed regulations, administrative board decisions and public notices. Senior leadership are members of the Steering Committee and provide direction and support to staff operating within the EMS program.

The formal structure of the EMS program allows for regulatory changes to be identified and will enable Halifax Water to participate in discussions and/or plan for regulatory changes in advance of them coming into force.

**Regulations Monitoring and Research**

Halifax Water actively participates in associations (i.e. American Water Works Association, Water Environment Foundation, Canadian Water Works Association, Water Research Foundation, Atlantic Canadian Water Works Association, Municipal Public Works Association of Nova Scotia) and committees

with federal and provincial regulators where future changes to regulations and standards are reviewed and discussed. Participating in these associations and committees allows for planning and reacting to the changes and implementation of required programs, infrastructure upgrades and operational adjustments. Halifax Water also actively collaborates with Dalhousie University to conduct research on the potential contaminants that could be regulated.

## 4.0 Planned Activities:

In addition to on-going monitoring and tracking of regulatory requirements, in advance of the next IRP update to support the update to the compliance plan commencing in Q2 - 2024/25, Halifax Water plans to undertake the following studies, as illustrated in the AM&IP workplan submitted to the Board in M10139:

- SSO Management Program, currently underway
- WWTF Compliance Plan, commencing Q4 - 2021/22
- Future Regulatory Scenarios Study commencing Q3 - 2022/23

## Impact on Capital Expenditures:

The 2019 compliance plan provided details of the current operations of the WWTFs and WSPs and anticipated short term and long-term capital needs to address any current and future compliance requirements. Since the publishing of the compliance plan and IRP, no changes in regulations have occurred and Halifax Water through its participation in several committees is not aware of any active initiatives to change the current regulations as they pertain to water and wastewater management.

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:**

Digitally signed by Louis de Montbrun
Date: 2021.09.16 12:16:03 -03'00'

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

Susheel Arora
Digitally signed by Susheel Arora
Date: 2021.09.16 11:31:21 -03'00'

Susheel Arora, M.A.Sc., P.Eng. Director, Operations

Kenda MacKenzie
Digitally signed by Kenda MacKenzie
Date: 2021.09.16 14:57:09 -03'00'

Kenda MacKenzie, P.Eng. Director, Regulatory Services

**APPROVED:**

Digitally signed by Cathie O'Toole
Date: 2021.09.16 11:32:04 -03'00'

Cathie O'Toole, MBA, CPA, CGA, ICD.D, General Manager

**SUBJECT:** **Operational Performance Information Report**

## INFORMATION REPORT

**ORIGIN**:

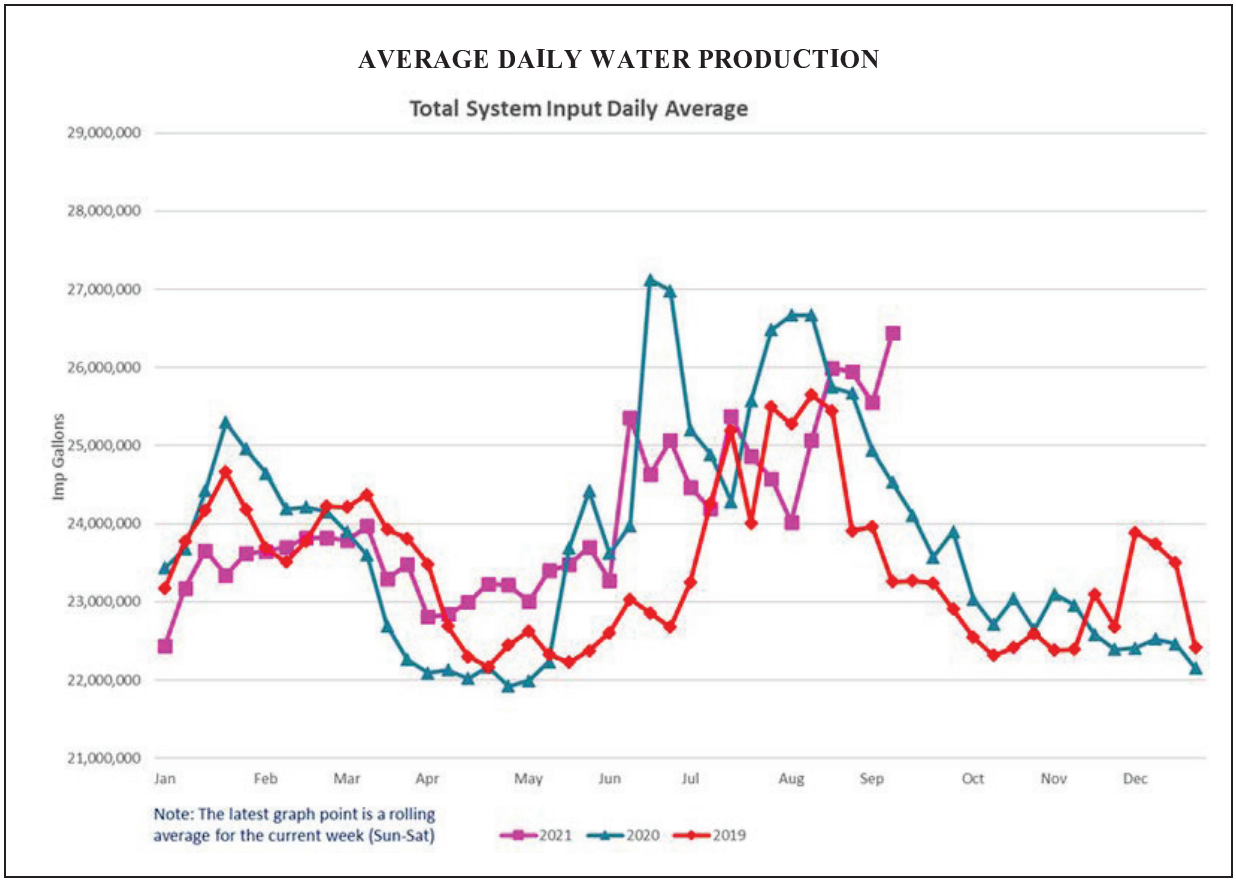
Regular update.

This report provides a high level overview of operational performance for the utility. The safety statistics results are first, followed by indicators and statistics for water and wastewater.

**SAFETY STATISTICS – April 1, 2021 thru June 30, 2021 (unless stated otherwise)**

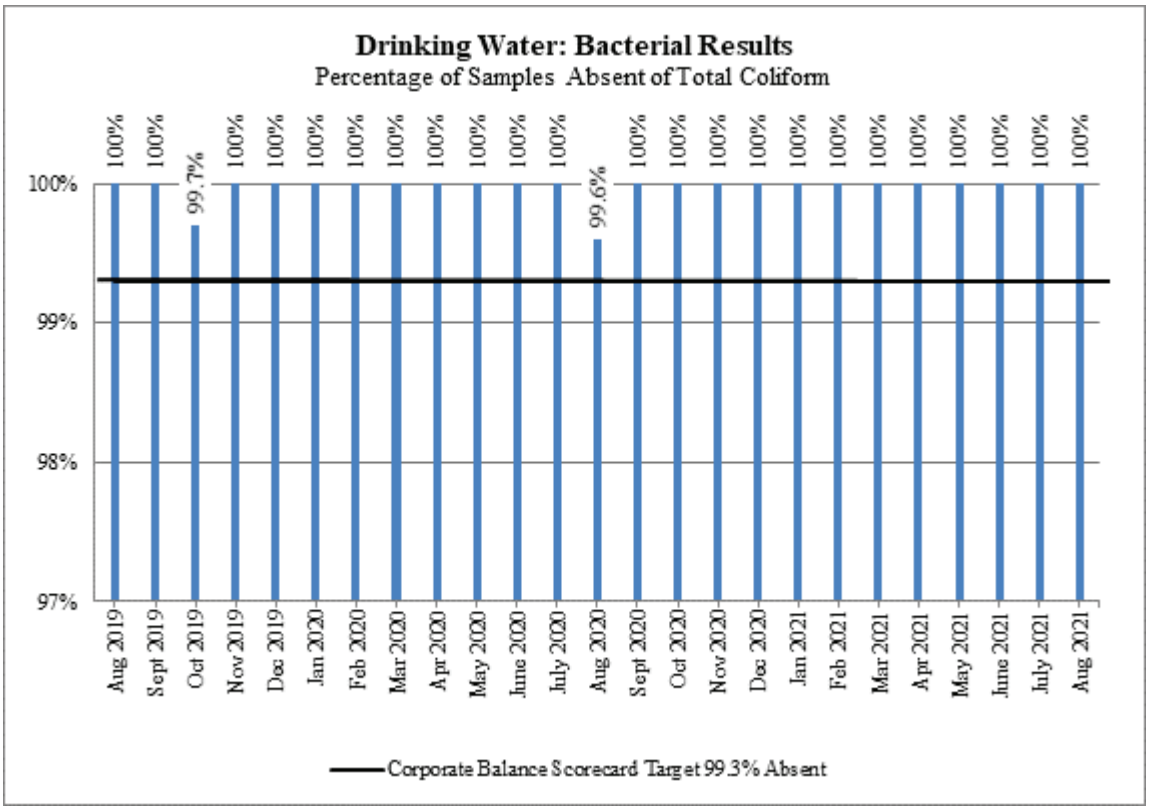
| Organizational Metrics | Results |
|---|---|
| Number of Lost Time Accidents * | 2 |
| Number of motor vehicle accidents per 1,000,000 km driven | 3 |
| Number of workplace inspections conducted * | 53 |
| Percentage of safety talks conducted * | 16% |
| Number of near misses reported * | 18 |
| Number of employees on accommodation or gradual return to work | 10 |
| Number of WCB claims | 2 |
| Number of work refusals | 0 |
| Number of incidents with written compliance orders * | 0 |
| Number of employees trained or recertified before due date * | 165 |
| Total number of courses taken by employees for training/recertification * | 357 |

* Fiscal Year to Date




| Regional Water Main Break/Leak Data | | |
|---|---|---|
| **Year** | **Total Breaks/Leaks** | **Current 12 Month Rolling Total *(up to August 2021)*** |
| **2020/21** | 179 | **195** |
| **2019/20** | 191 | |
| **2018/19** | 226 | |
| **2017/18** | 206 | |
| **2016/17** | 216 | |
| **Total** | **1018** | |
| | | |
| **Yr. Avg.** | **203.6** | |

| Water Accountability |
|---|
| **Losses per Service Connection/Day (International Water Association Standard)** |
| *Period Ending June 30, 2021* |
| Real Losses: 191 litres<br>CBS Target: 160 |




| Water Quality Master Plan Objectives 2021-2022 Q1 | | | | |
|---|---|---|---|---|
| Objective | Total Sites | % Sites Achieving Target | All Sites: 90th Percentile < 15 µg/L | CBSC Awarded Points |
| Disinfection | 62 | 98% | --- | 18 |
| Total Trihalomethanes | 25 | 72% | --- | 0 |
| Haloacetic Acids | 21 | 100% | --- | 20 |
| Particle Removal | 5 | 100% | --- | 20 |
| Corrosion Control | 105 | --- | 4.28 | 20 |
| Summary Total | | | | 78 |

Score: 78/100

In this report each facility is assessed using monthly or quarterly averages, depending on the averaging period specified in its Approval to Operate.

| Wastewater Treatment Facility | Wastewater Treatment Facility Compliance Summary<br>Rolling Averages - May, June and July 2021 | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $CBOD_5$ (mg/L) | | TSS (mg/L) | | E. coli (counts/ 100mL) | | pH | | Ammonia (mg/L) | | Phosphorous (mg/L) | | TRC (mg/L) | | Dissolved Oxygen (mg/L) | | Toxicity | Trend |
| | NSE Limit | Avg. | NSE Limit | Avg. | NSE Limit | Avg. | NSE Limit | Avg. | NSE Limit | Avg. | NSE Limit | Avg. | NSE Limit | Avg. | NSE Limit | Avg. | | |
| Halifax | 50 | 40 | 40 | 19 | 5000 | 2,637 | 6-9 | 6.9 | - | | - | | - | | - | | Not acutely lethal | Continued |
| Dartmouth | 50 | 48 | 40 | 17 | 5000 | 93 | 6-9 | 6.7 | - | | - | | - | | - | | Not acutely lethal | Continued |
| Herring Cove | 50 | 35 | 40 | 22 | 5000 | 15 | 6-9 | 6.9 | - | | - | | - | | - | | Not acutely lethal | Continued |
| Eastern Passage | 25 | 7 | 25 | 8 | 200 | 17 | 6-9 | 7.1 | - | | - | | - | | - | | Not acutely lethal | Continued |
| Mill Cove | 25 | 13 | 25 | 16 | 200 | 12 | 6-9 | 6.7 | - | | - | | - | | - | | Not acutely lethal | Continued |
| Springfield | 20 | 5 | 20 | 17 | 200 | 32 | 6-9 | 6.8 | - | | - | | - | | - | | - | Continued |
| Frame | 20 | 5 | 20 | 1 | 200 | 10 | 6-9 | 6.3 | - | | - | | - | | - | | - | Continued |
| Middle Musq. | 20 | 5 | 20 | 17 | 200 | 46 | 6-9 | 7.3 | - | | - | | - | | - | | - | Continued |
| Uplands | 20 | 5 | 20 | 15 | 200 | 23 | 6-9 | 6.7 | - | | - | | - | | - | | - | Continued |
| Aerotech | 5 | 2 | 5 | 1 | 200 | 10 | 6-9 | 7.6 | 5.7 W 1.2 S | 0.1 | 0.13 | 0.06 | - | | 6.5 | 7.8 | Not acutely lethal | Continued |
| North Preston | 10 | 4 | 10 | 3 | 200 | 10 | 6-9 | 6.6 | 3 | 0.1 | 1.5 | 1.0 | - | | - | | - | Continued |
| Lockview | 20 | 7 | 20 | 8 | 200 | 10 | 6.5-9 | 7.0 | 8.0 S | 5.7 | 1.2 S | 0.2 | - | | - | | - | Continued |
| Steeves (Wellington) | 20 | 3 | 20 | 1 | 200 | 10 | 6.5-9 | 7.2 | 14.4 S | 0.1 | 1.0 S | 0.1 | - | | - | | - | Continued |
| BLT | 15 | 5 | 20 | 17 | 200 | 10 | 6-9 | 7.0 | 5 W 3 S | 1 | 3 W 1 S | 1 | 0.02 * | 0.10 | - | | Not acutely lethal | Continued |
| Avg. of all Facilities | 13 | | 12 | | 210 | | 6.9 | | 1.4 | | 0.4 | | 0.10 | | 7.8 | | | |

NOTES & ACRONYMS:

LEGEND

NSE Compliant

NSE Non-Compliant

$CBOD_5$ - Carbonaceous 5-Day Biochemical Oxygen Demand

TSS - Total Suspended Solids

* TRC - Total Residual Chlorine - Maxxam can only measure 0.10 mg/L residual; results of 0.1 mg/L are compliant

BDL - Below Detection Limit

W / S - Winter / Summer compliance limits

NSE requires monthly averages be less than the NSE Compliance Limit for each parameter at Dartmouth, Eastern Passage, Halifax, Herring Cove, Mill Cove

NSE requires quarterly averages be less than the NSE Compliance Limit for each parameter at Aerotech, Lockview, Mid. Musq., Frame, BLT, Uplands, Springfield Lake

NSE requires annual averages be less than the NSE Compliance Limit for each parameter at North Preston and Steeves

Continued - All parameters remain essentially unchanged since the last report

Improved - One or more parameter(s) became compliant since the last report

Declined - One or more parameters(s) became non-compliant since the last report

SEASONAL RULES:

BLT NH3: shall not exceed 3 mg/L between May 1 and October 30; otherwise, shall not exceed 5 mg/L

BLT TP: shall not exceed 1 mg/L between May 1 and October 30; otherwise, shall not exceed 3 mg/L

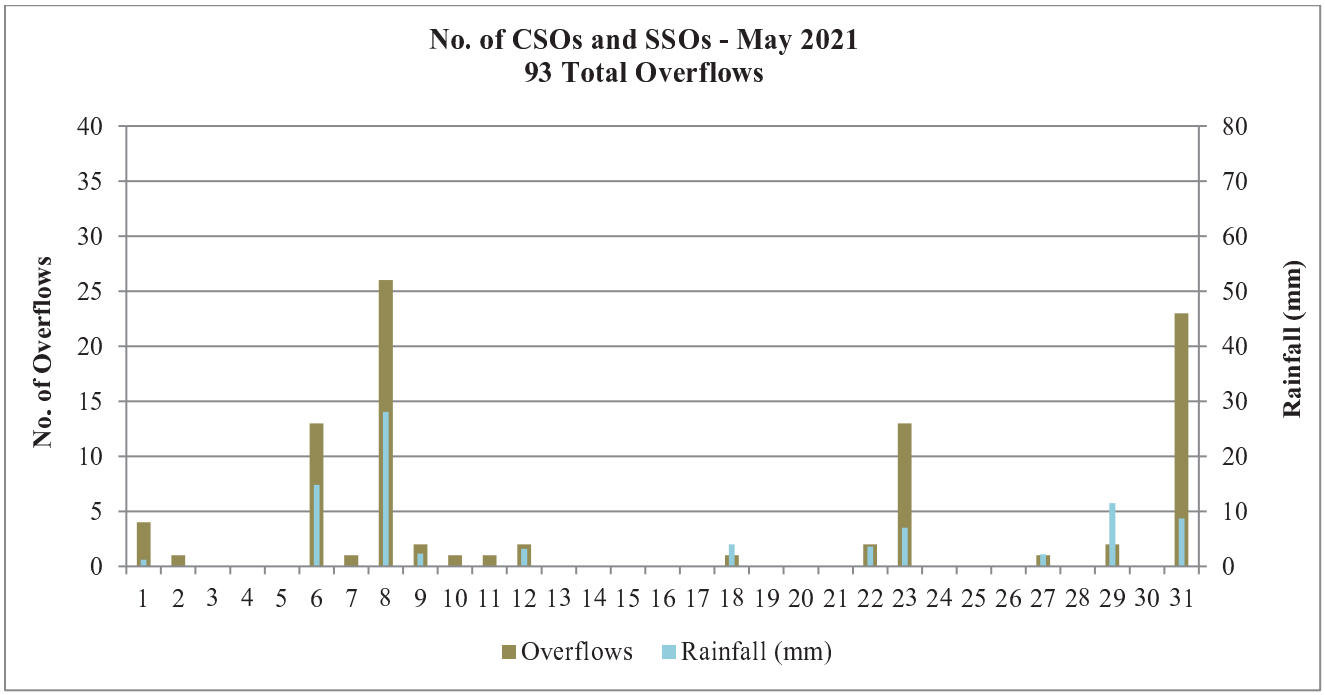
Aerotech NH3: shall not exceed 1.2 mg/L between May 1 and October 30; otherwise, shall not exceed 5.7 mg/L

Lockview NH3: shall not exceed 8 mg/L between May 1 and October 30

Lockview TP: shall not exceed 1.2 mg/L between May 1 and October 30

Wellington NH3: shall not exceed 14.4 mg/L between May 1 and October 30

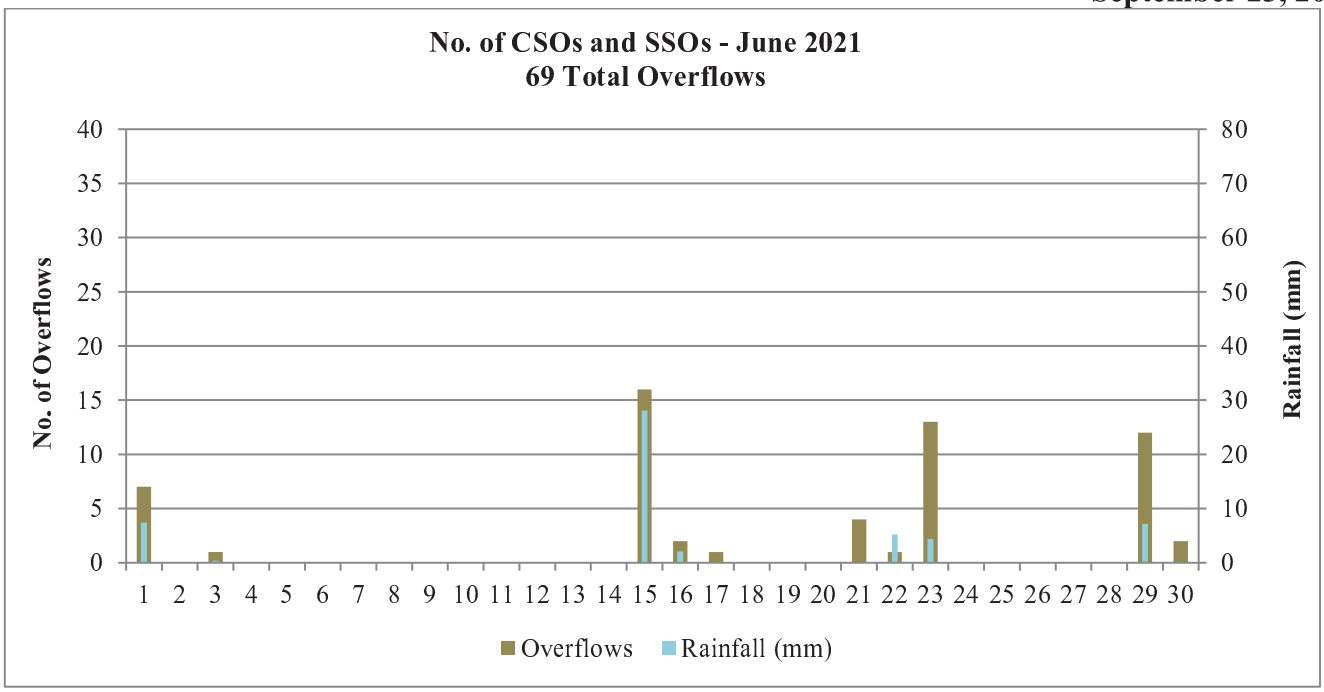
Wellington TP: shall not exceed 1.0 mg/L between May 1 and October 30




NOTES & ACRONYMS: CSO - Combined Sewer Overflow SSO - Sanitary Sewer Overflow

- Rainfall data is from Halifax Water's rain gauge at the Halifax WWTF.
- There were four overflows on days when there was no recorded rainfall, as follows:

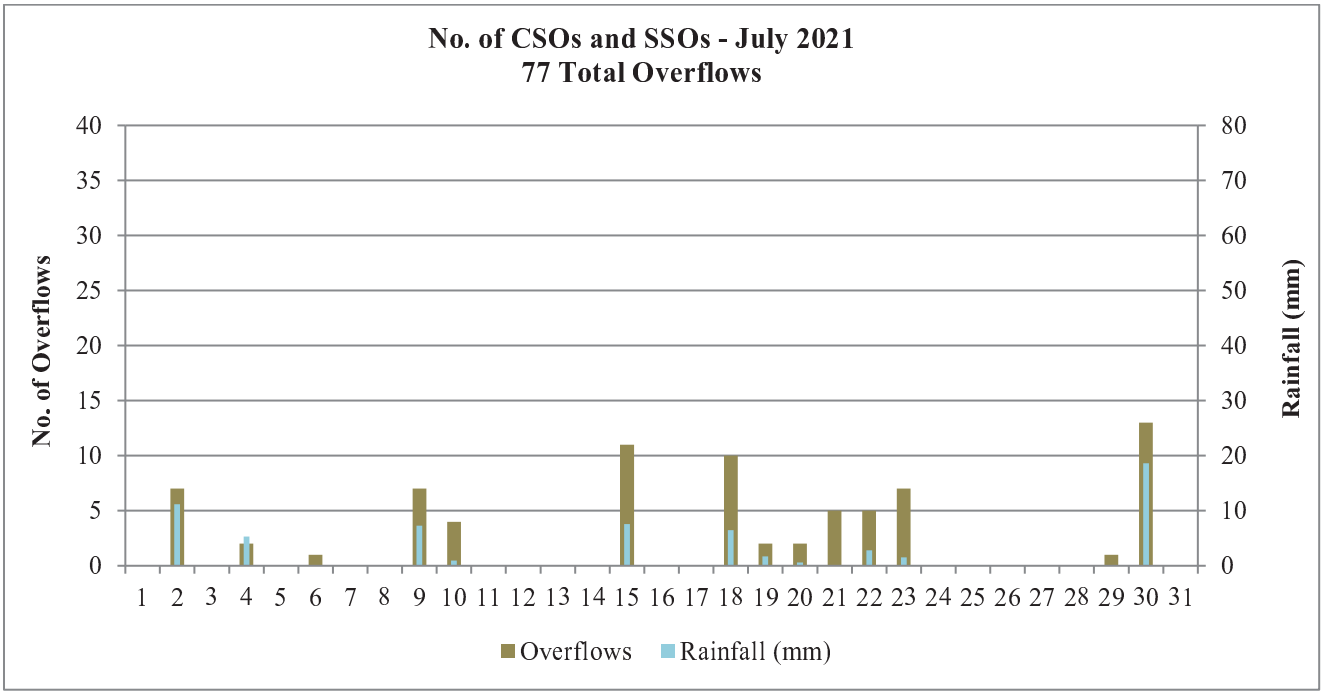
1. May 2: The CSO at Maitland St PS & CSO was due to an automated DWWTF influent gate closure resulting from high flow.
2. May 7: The SSO at Mill Cove Surge Tank was due to rain on the previous day.
3. May 10: The CSO at Cuisack St CSO was due to a blockage caused by debris.
4. May 11: The CSO at Duffus St PS was due to a pump restriction from the Halifax WWTF.




NOTES & ACRONYMS: CSO - Combined Sewer Overflow SSO - Sanitary Sewer Overflow

- Rainfall data is from Halifax Water's rain gauge at the Halifax WWTF.
- There were seven overflows on days when there was no recorded rainfall, as follows:

    1. June 17: The CSO at Upper Water St CSO was due to maintenance.
    2. June 21: The CSOs at Lyle St CSO, Park Ave PS & CSO, Old Ferry Rd PS & CSO and Melva St PS & CSO were due to repair work at the DWWTF. NSE was notified.
    3. June 30: The CSOs at Chain Rock PS & CSO were due to maintenance.



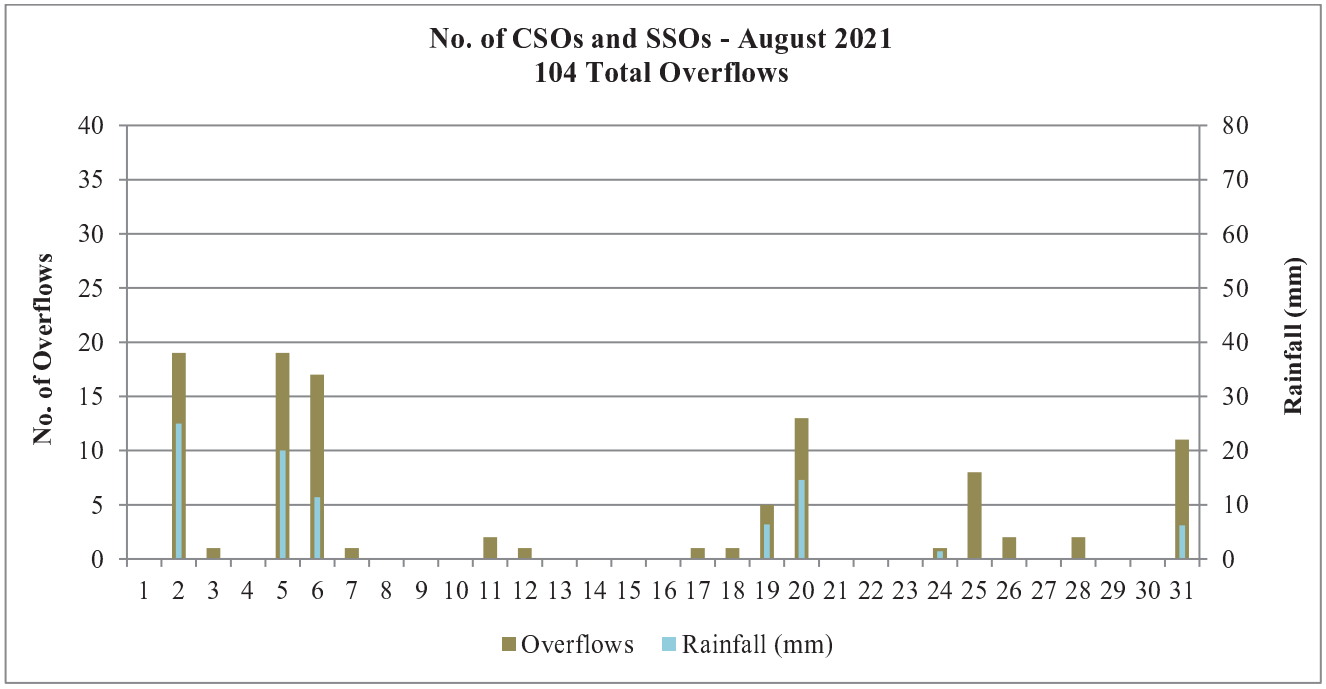

NOTES & ACRONYMS: CSO - Combined Sewer Overflow SSO - Sanitary Sewer Overflow

- Rainfall data is from Halifax Water's rain gauge at the Halifax WWTF.
- There were seven overflows on days when there was no recorded rainfall, as follows:

    1. July 6: The CSO at Sackville St CSO was due to a blockage caused by debris.

    2. July 21: The CSOs at Ferguson Rd CSO, Grove St CSO, Wallace St CSO and Lyle St CSO were due to maintenance at Park Ave PS & CSO. A later CSO at Wallace St CSO was due to a blockage caused by debris.

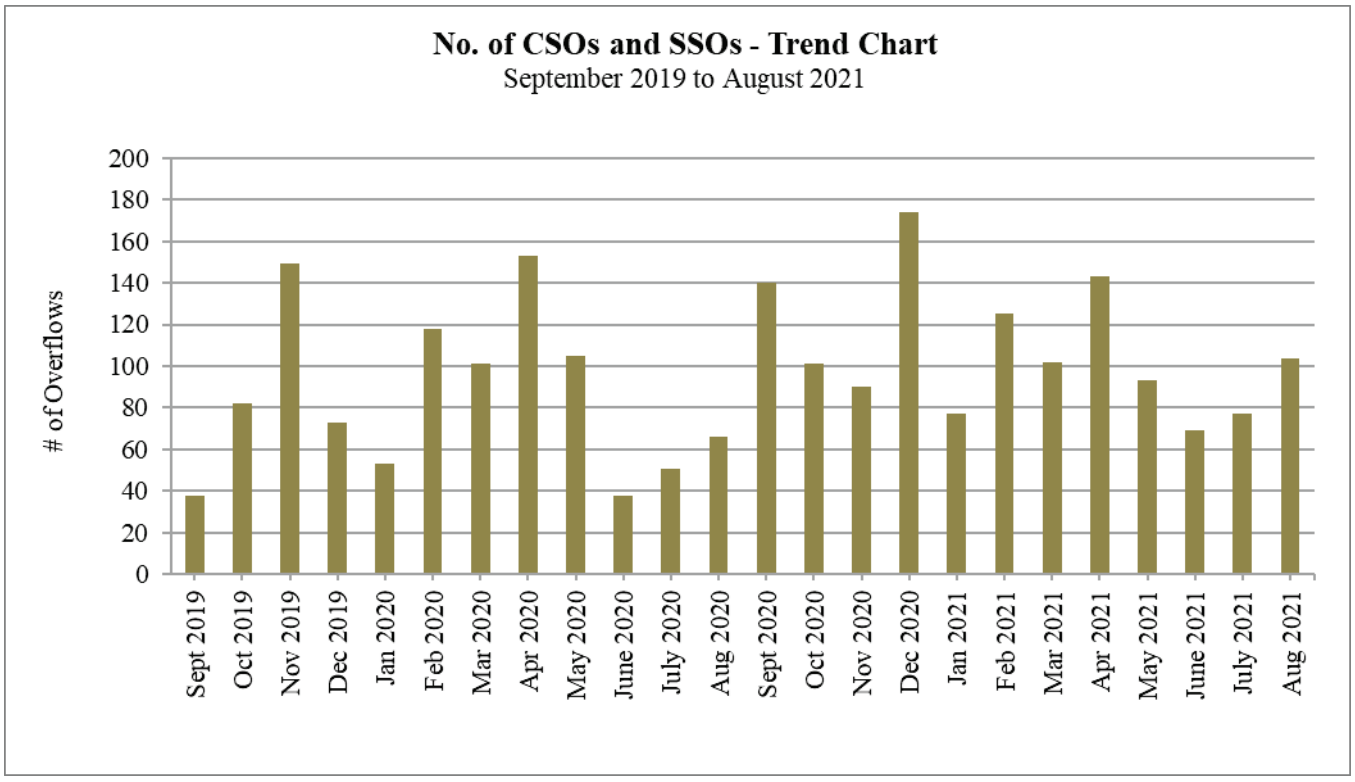
    3. July 29: The CSO at Lyle St CSO was due to a blockage caused by debris.

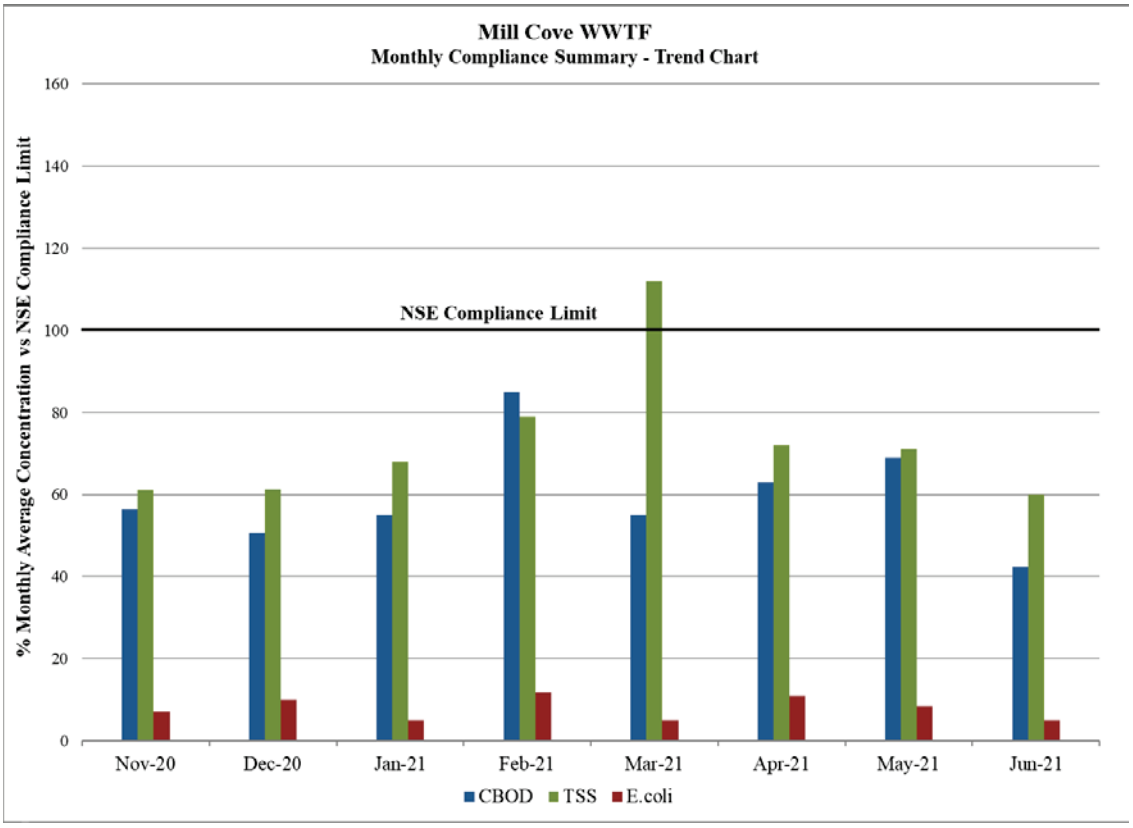



NOTES & ACRONYMS: CSO - Combined Sewer Overflow SSO - Sanitary Sewer Overflow

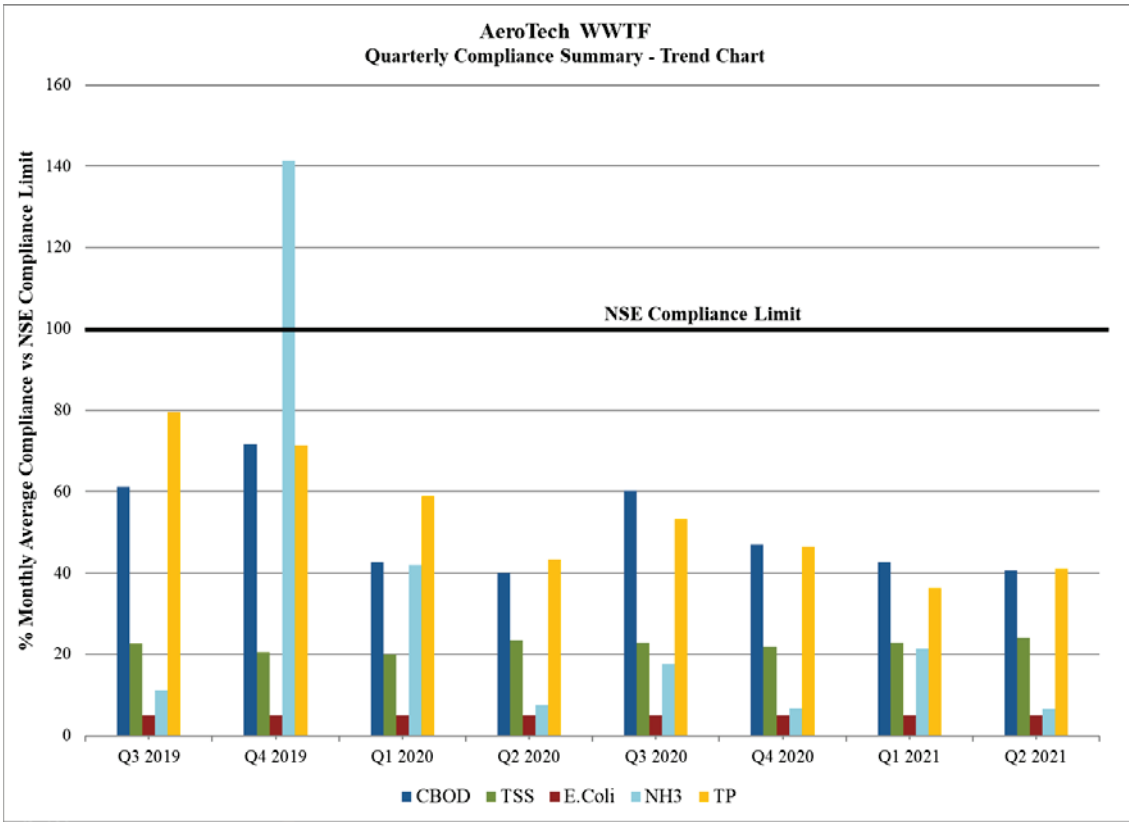
- Rainfall data is from Halifax Water's rain gauge at the Halifax WWTF.
- There were sixteen overflows on days when there was no recorded rainfall, as follows:

1. August 7: The CSO at Duffus St PS was due to a pump restriction from the Halifax WWTF.
2. August 12: The CSO at Park Ave PS & CSO was due to a blockage caused by debris.
3. August 17: The CSO at Maitland St PS & CSO was due to a blockage caused by debris.
4. August 18: The SSO at Mill Cove Surge Tank was due to maintenance.
5. August 25: The CSOs at Grove St CSO, Wallace St CSO, Lyle St CSO, Park Ave PS & CSO, Maitland St PS & CSO, King St PS & CSO, Old Ferry Rd PS & CSO and Jamieson St PS & CSO were due to a localised rain event that did not register on the rain gauge at the Halifax WWTF.
6. August 26: The CSOs at Wallace St CSO were due to blockages caused by debris.
7. August 28: The CSOs at Sackville St CSO were due to blockages caused by debris.

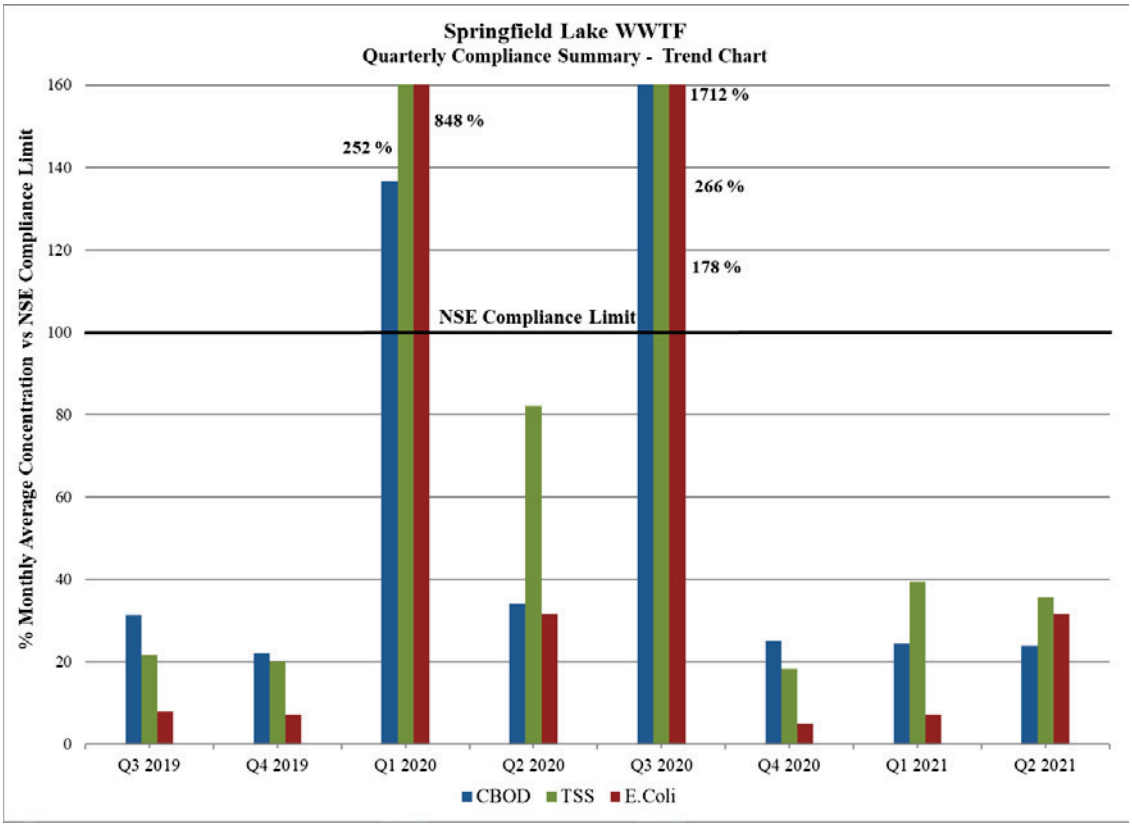


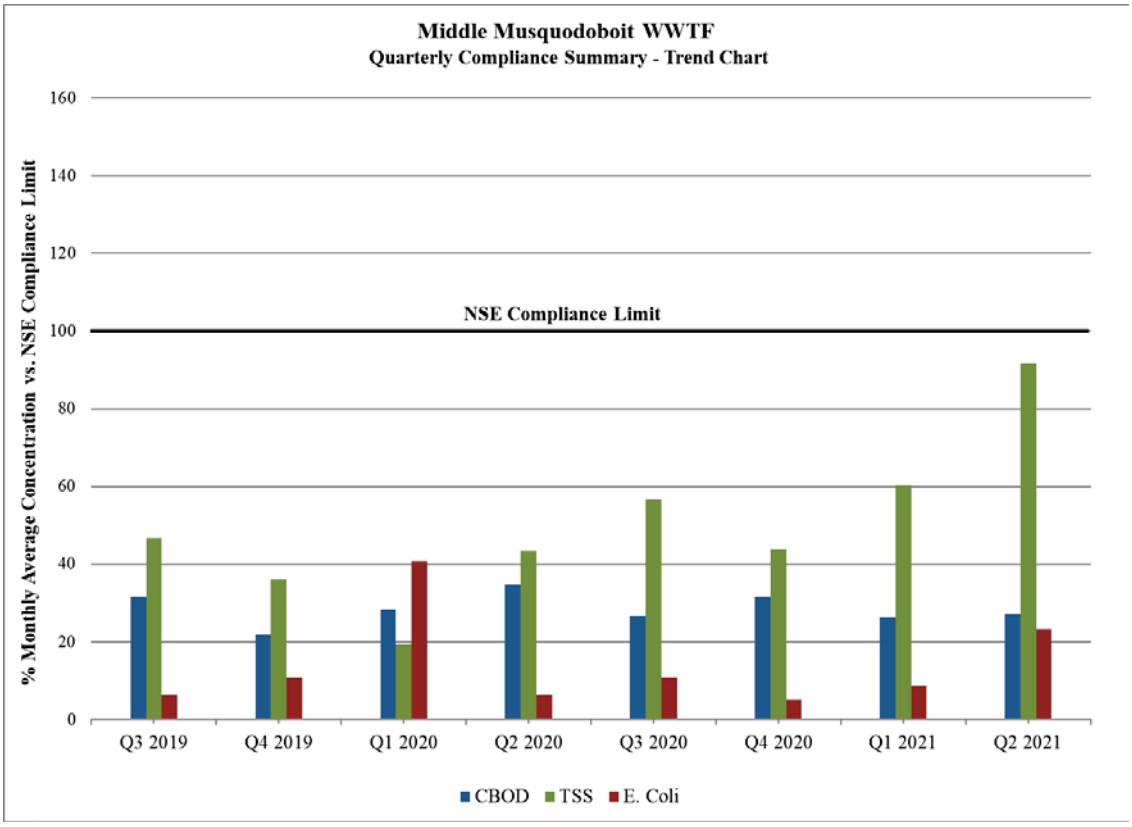

Lower numbers represent better performance.



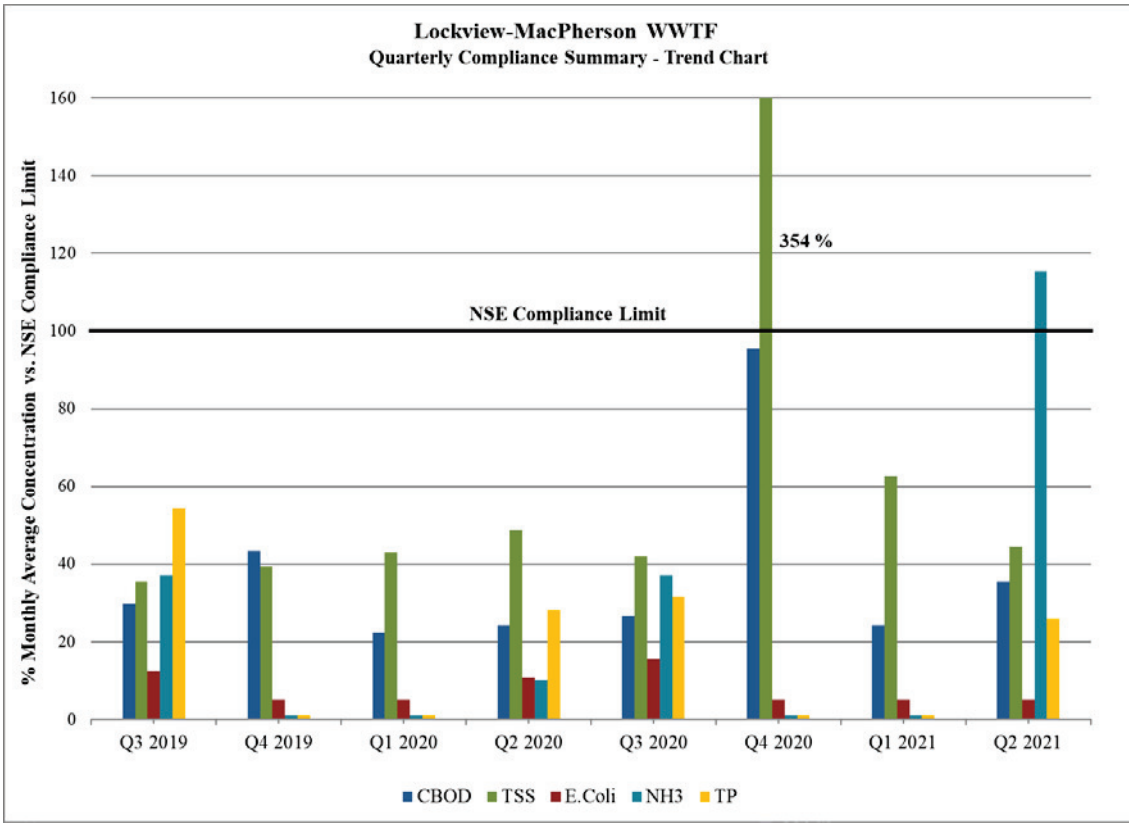

Lower numbers represent better performance.



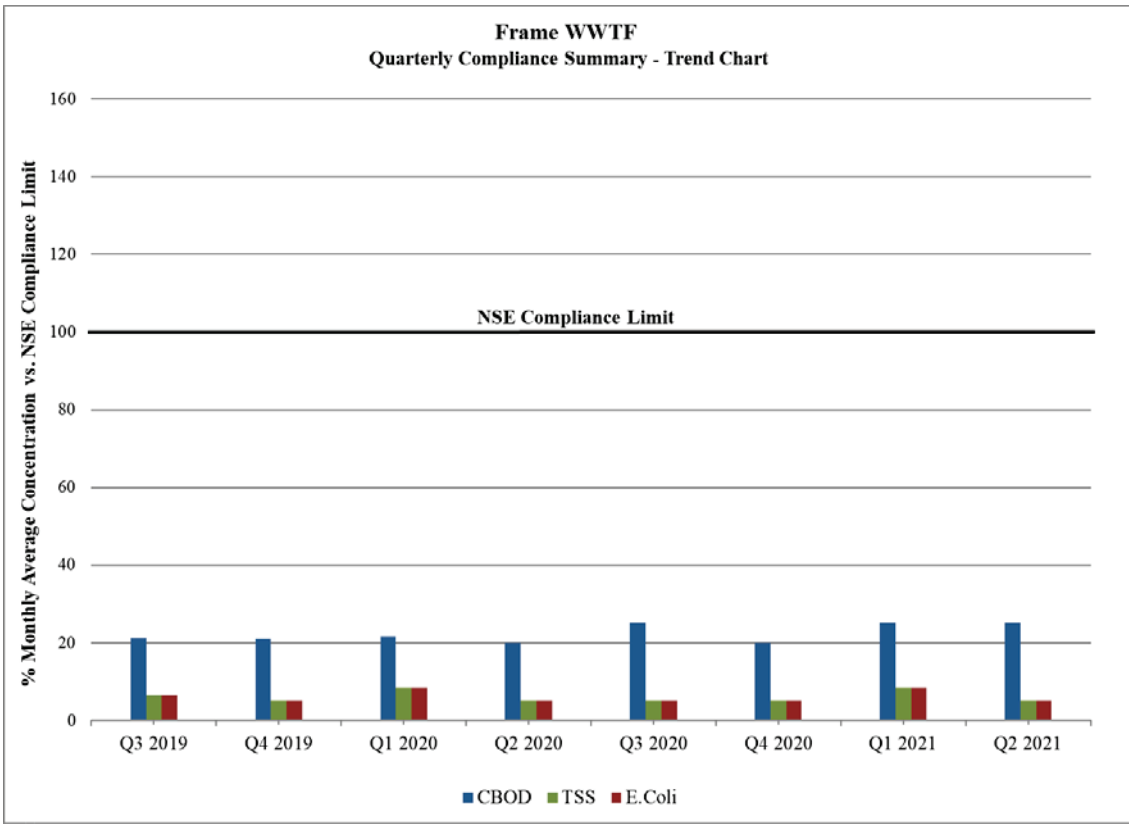

Lower numbers represent better performance.



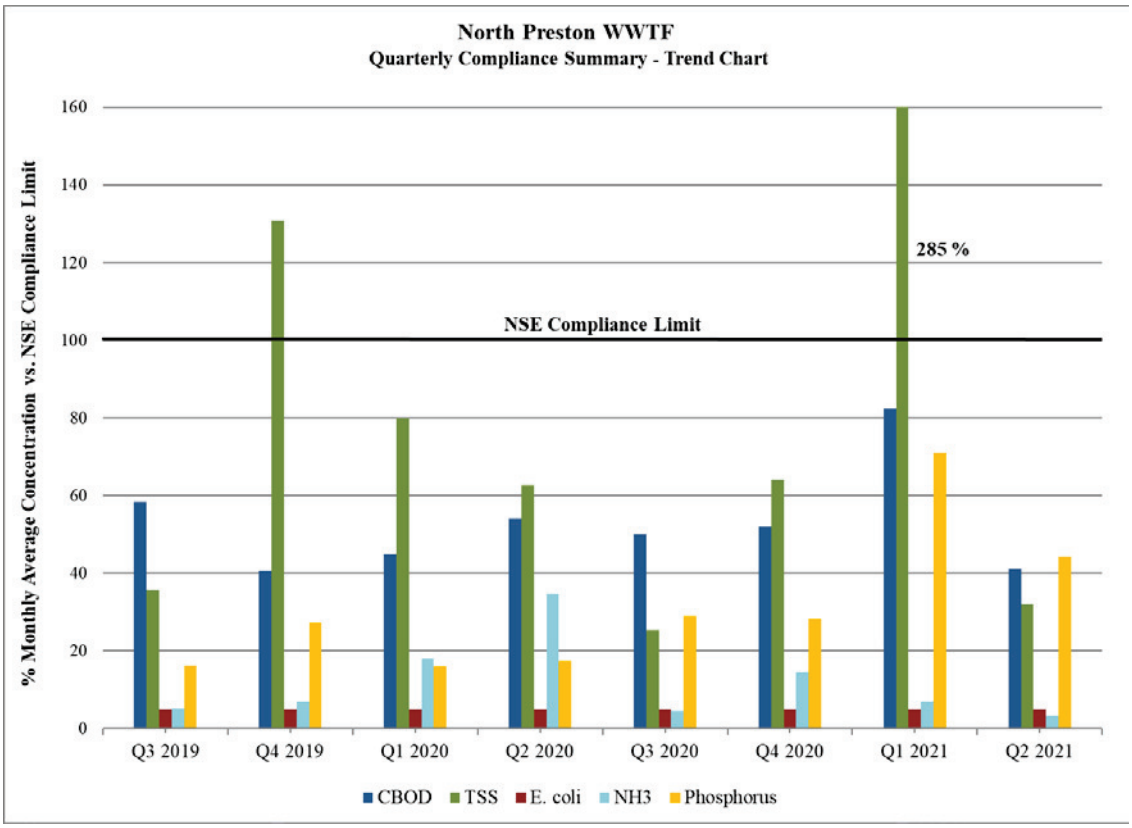

Lower numbers represent better performance.



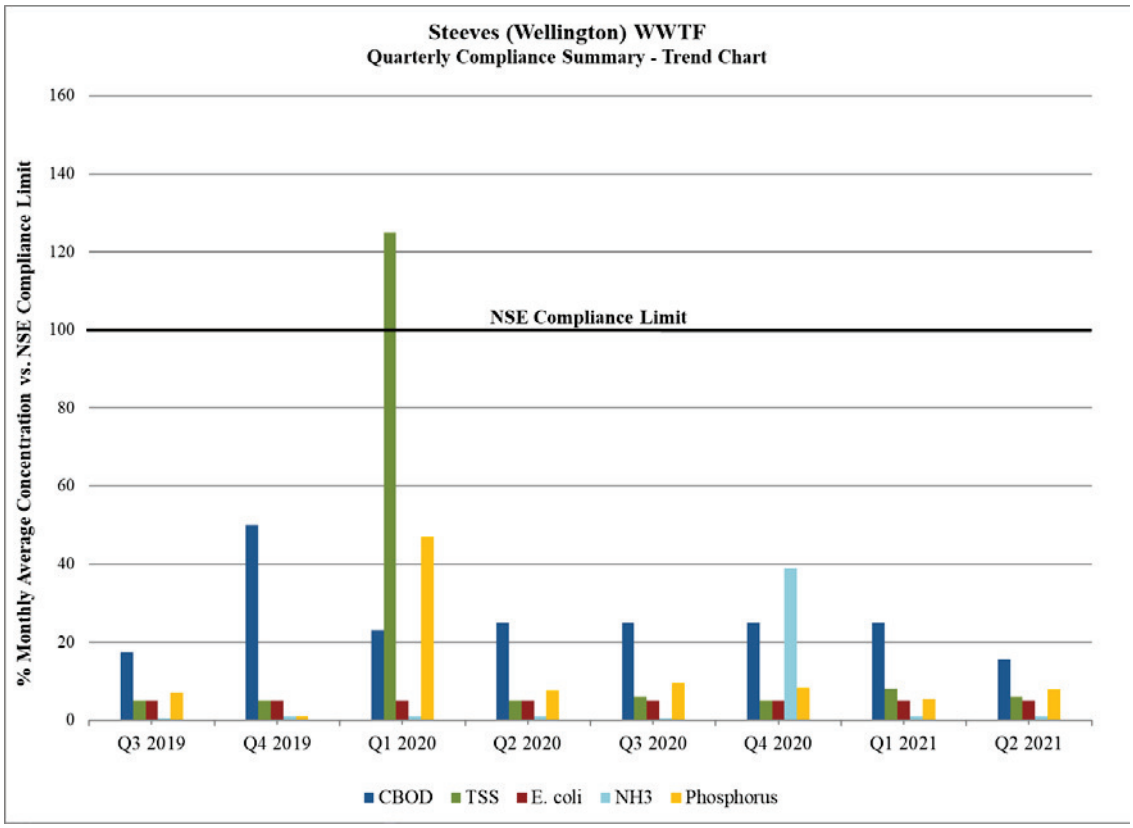

Lower numbers represent better performance.



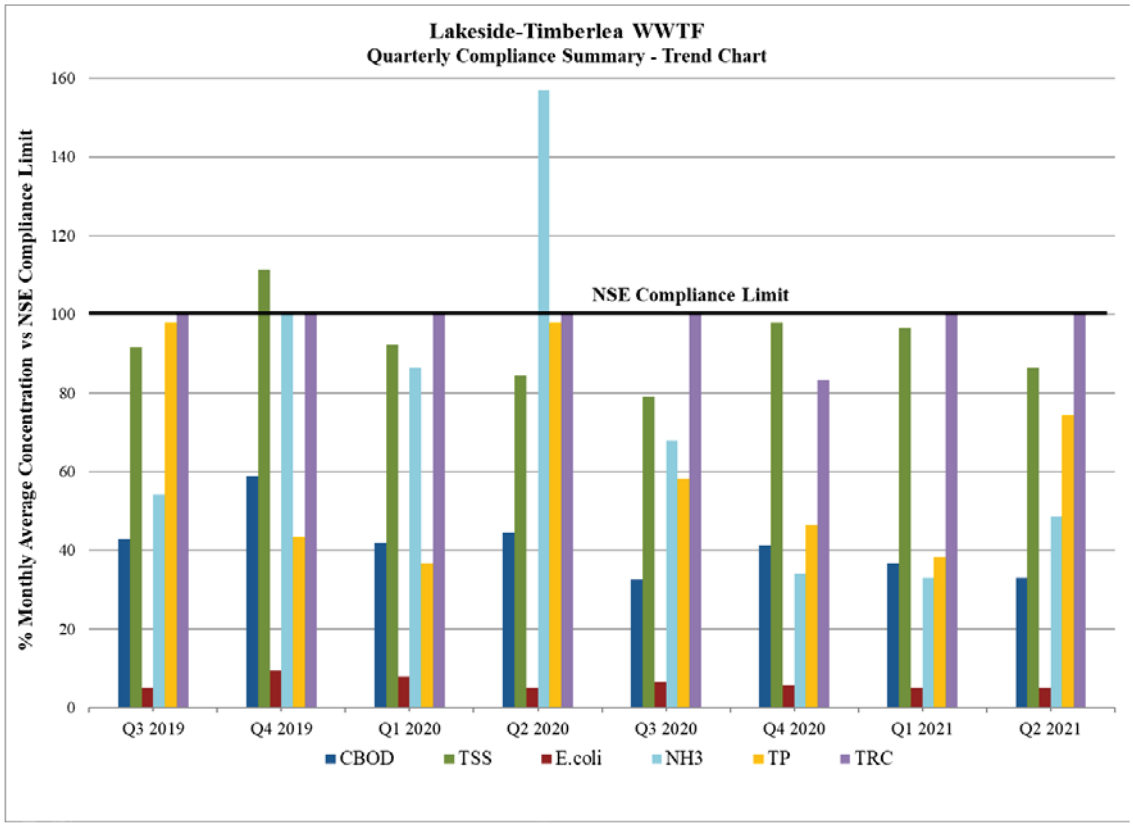

Lower numbers represent better performance.



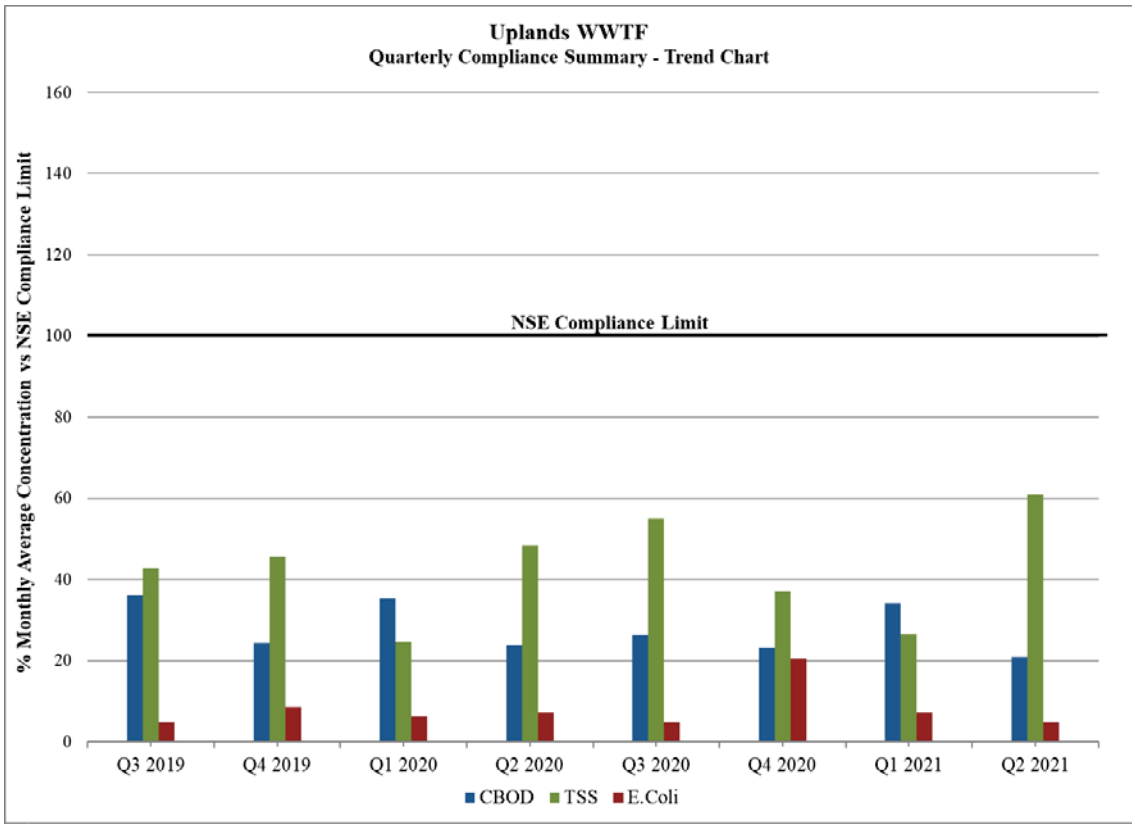

Lower numbers represent better performance.



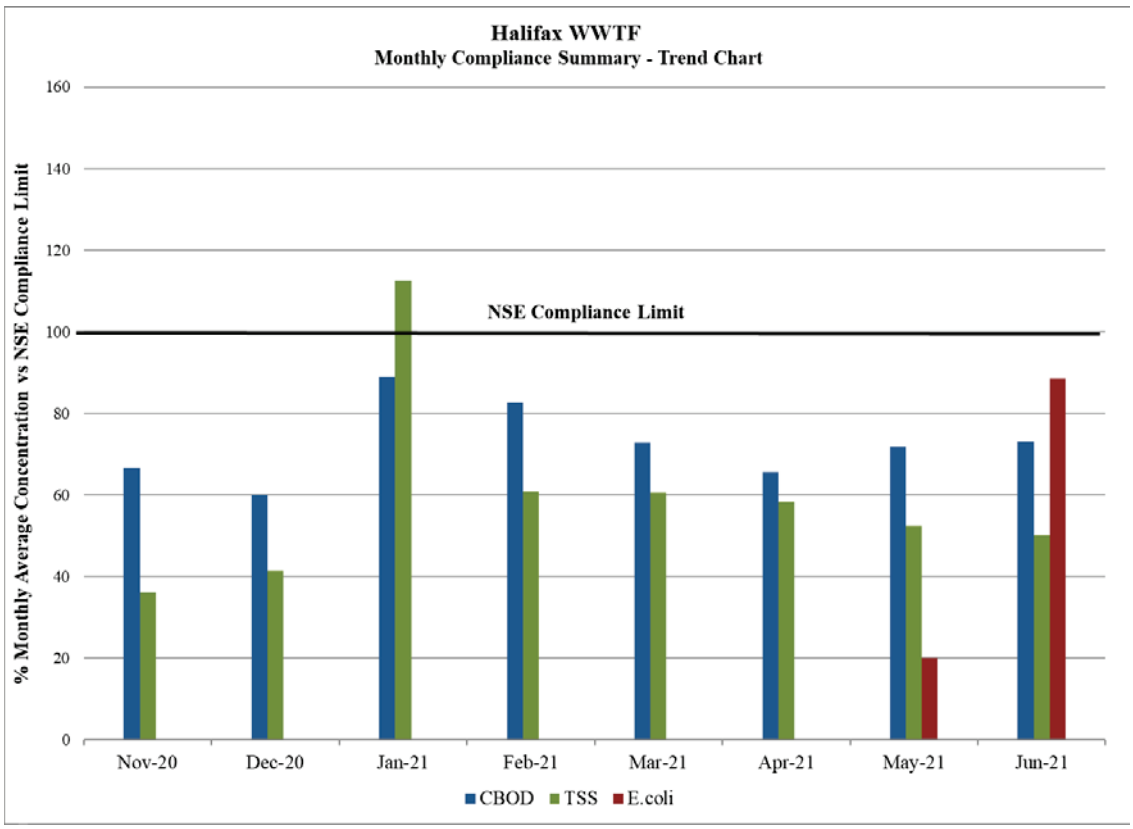

Lower numbers represent better performance.



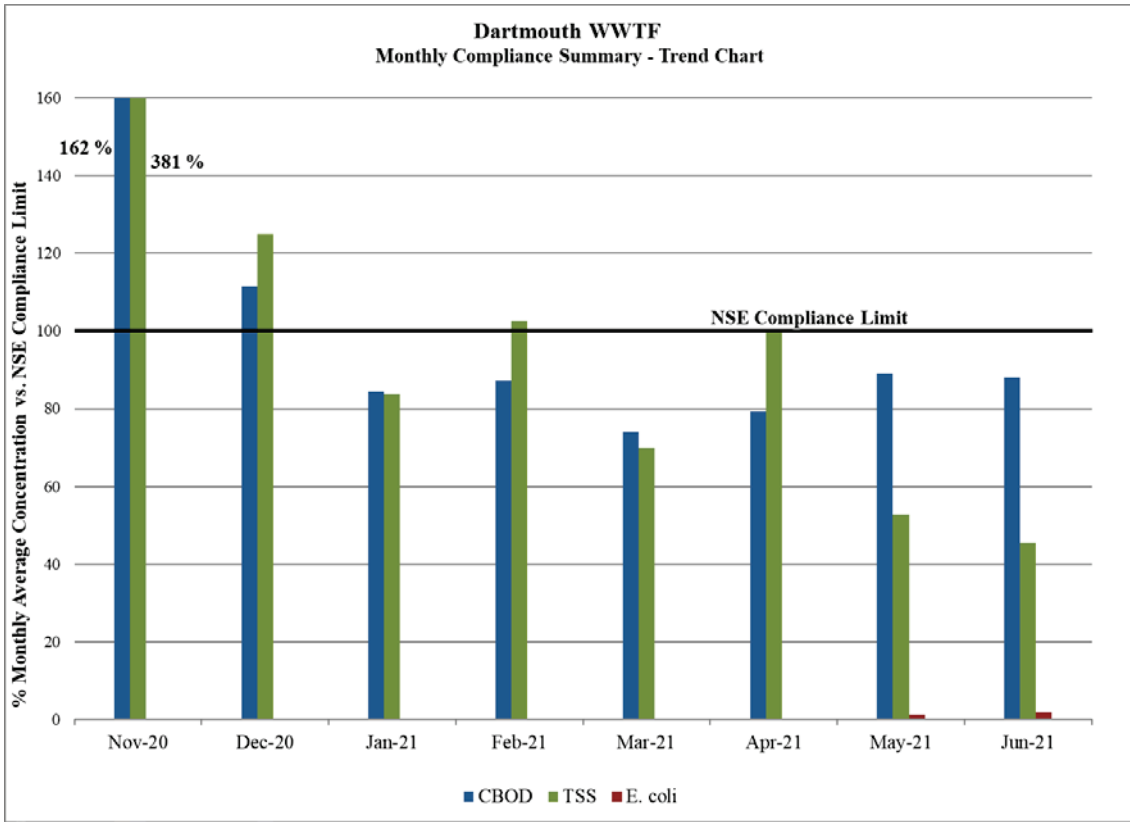

Lower numbers represent better performance.



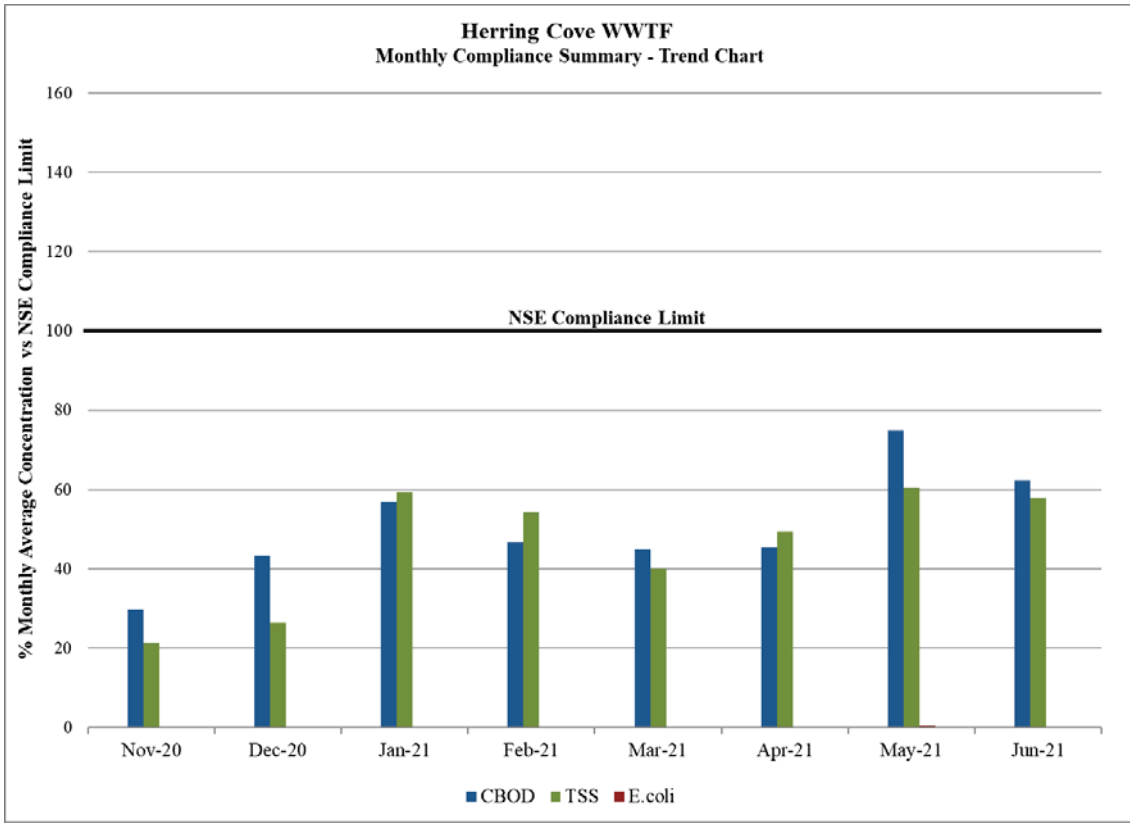

Lower numbers represent better performance.



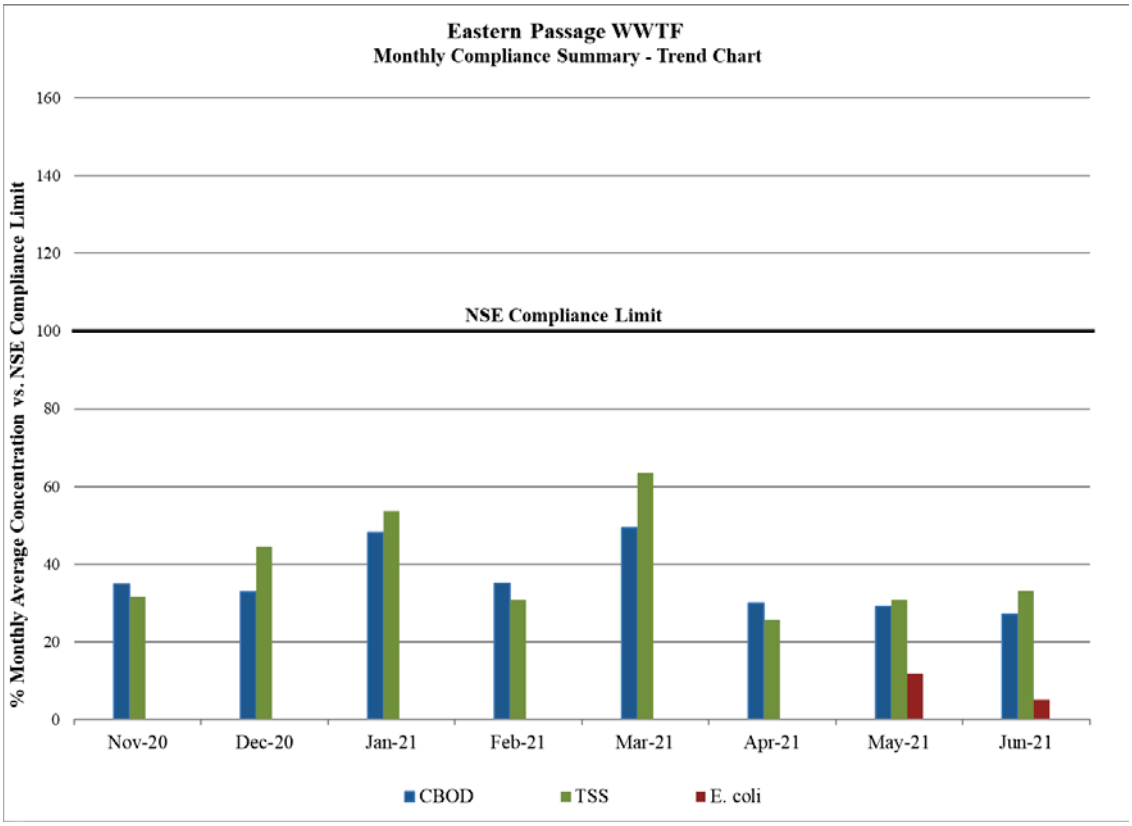

Lower numbers represent better performance.




Lower numbers represent better performance.




Lower numbers represent better performance.




Lower numbers represent better performance.

**ITEM # 2-I**
**Halifax Water Board**
**September 23, 2021**

## Halifax Water Compliance Statement
## Quarterly Certification

**For the period of April 1, 2021 to June 30, 2021**

We hereby certify that the Halifax Regional Water Commission is current in making all statutory remittances for payroll taxes, Harmonized Sales Tax and other remittances as required under the laws of the Government of Canada and its Provinces (the significant remittances are noted in the appendix) and that all significant legal claims have been disclosed.

Cathie O'Toole
Digitally signed by Cathie O'Toole
Date: 2021.09.17 09:44:12 -03'00'

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

Digitally signed by Louis de Montbrun
Date: 2021.09.16 12:44:30 -03'00'

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

Digitally signed by Heidi Schedler
Date: 2021.09.17 09:35:50 -03'00'

Heidi Schedler
General Counsel and Corporate Secretary

Dated:

September 16, 2021

# Halifax Water Compliance Statement
# Quarterly Certification
# Appendix I

Significant statutory remittances for payroll taxes, Harmonized Sales Tax and other remittances as required under the laws of the Government of Canada and its Provinces for the Halifax Regional Water Commission.

## Statutory Payroll Remittances

- **Canada Revenue Agency (CRA) -** Statutory employee payroll deductions and employer related contributions for:
  - Income Tax
  - Canada Pension Plan (CPP)
  - Employment Insurance (EI)

- **Workers' Compensation Board of Nova Scotia (WCB)** – Employer remittance based on employee payroll

## Other Payroll Remittances

- **Northern Trust -** Employee payroll deductions and employer contributions to Halifax Water and HRM defined benefit pension plans

- **Industrial Alliance** – employer and employee contributions to defined contribution pension plan

- **Medavie Blue Cross & SSQ** – employee payroll deductions and employer related contributions for Health & dental, LTD, and Life benefit coverage, and payroll deductions for AD&D

- **Canadian Union of Public Employees** – Employee payroll deductions of union dues
  - CUPE Local 227
  - CUPE Local 1431

## HST and Other Remittances

- **Canada Revenue Agency (CRA) -** Harmonized Sales Tax (HST) is filed online and a refund issued as HST paid is greater than HST collected

- **Workers' Compensation Board of Nova Scotia (WCB)** – Remittance for sub-contractors

**ITEM # 2-I**
**HRWC BOARD**
**September 23, 2021**

# Quarterly Remittance Certification

**Appendix II**

**Period:** Apr to Jun 2021

| Vendor | Vendor # | Items Remitted | Total remitted | Exceptions |
|---|---|---|---|---|
| **Statutory Payroll Remittances** | | | | |
| CRA | 174 | Tax, CPP, EI, WCB | $3,967,711.30 | |
| **Other Payroll** | | | | |
| Northern Trust | 1215 | HW Pension Plan | $ 1,753,755.85 | |
| Northern Trust | 1216 | HRM Pension Plan | $ 275,173.34 | |
| Manulife Financial | 1171 | Bedford Pension Plan | $ 2,104.20 | |
| Industrial Alliance | 2971 | DCPP | $ - | |
| Medavie Blue Cross | 340, 3101 | Health, Dental, Life, LTD | $ 537,384.09 | |
| SSQ Insurance | 429 | AD&D | $ 3,403.15 | |
| CUPE | 160 | Union Dues 1431 | $ 32,299.66 | |
| CUPE | 161 | Union Dues 227 | $ - | |
| **Other payroll not noted** | | | | |
| United Way, Credit Union, Garnishments (WCB, CRA, Family Court, Sherriff's Office), Water for People, Salvation Army, Racially Visible Caucus | | | | |
| **HST and Other** | | | | |
| CRA | N/A | HST (refunds) | $ (2,150,659.11) | |
| Receiver General | 210 | WCB subcontractors | $ 188.40 | |

**Exceptions, errors and/or late remittances**

# ITEM # 3-I
**Halifax Water Board**

**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board as Trustees of the Halifax Regional Water Commission Employees' Pension Plan

**SUBMITTED BY:** Louis de Montbrun
Digitally signed by Louis de Montbrun
Date: 2021.09.14 21:07:21 -03'00'

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

**APPROVED:** Cathie Goole
Digitally signed by Cathie O'Toole
Date: 2021.09.15 12:32:33 -03'00'

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

**DATE:** September 14, 2021

**SUBJECT:** **Halifax Regional Water Commission Employees' Pension Plan Financial Report, Second Quarter, 2021**

---

## INFORMATION REPORT

## ORIGIN

Financial reporting for the Halifax Regional Water Commission Employees' Pension Plan (hereinafter called the "Plan").

## BACKGROUND

The Board is required to review the periodic (quarterly) financial results of the Plan throughout the year.

## DISCUSSION

The attached statement of changes in net assets available for benefits (Appendix A) outlines the annual budget for the Plan and actual financial performance for the Second Quarter (January 1 to June 30, 2021). Favourable or unfavourable variances reported compare actual results to pro-rated budget amounts, for the six (6) month period ending June 30, 2021. Yearend audited results for 2019 and 2020 are shown for comparative purposes.

As shown on the statement of changes in net assets available for benefits, net assets available for benefits have increased by $8.9 million for the six (6) month period ending June 30, 2021. The pro-rated budget for the period forecasted an increase in net assets available of $4.9 million. Actual results for the period of $8.9 million compared to the pro-rated budget of $4.9 million results in a favourable variance of $4.0 million.

The annual budget forecasted revenue of $8.6 million. Revenue for the period totaled $8.4 million, which when compared to the pro-rated budget of $4.3 million results in a favourable variance of $4.1 million. Performance of the HRM Master Trust directly drives the revenue figures reported and the change tends to be more volatile compared to contributions and expenses of the Plan. This variance is attributed directly to the actual increase in the fair value of the investment assets being higher than expected. The increase for the period totaled $6.8 million compared to the budget of $2.6 million, a difference of $4.2 million or 165%. Investment income for the period performed slightly below expectations, showing an unfavorable variance of $0.1 million or -8%.

Contributions of $3.3 million are below the pro-rated budget of $3.4 million by $0.1 million or 3%. The unfavourable variance is attributed to timing of staffing increases connected to new positions approved in the Halifax Water budget.

Expenses of $2.7 million for the period are lower than the pro-rated budget of $2.8 million resulting in a favourable variance of $0.1 million or 2%. The main contributor to this variance is benefit payments which are lower than the pro-rated budget estimate.

## SERVICE STANDARDS

Tracking of Regulatory Filing Requirements, Administrative Reporting Requirements and Service Standards for actuarial calculation requests is ongoing. The reports for Regulatory Filing Requirements and Administrative Reporting Requirements are attached as Appendix B and Appendix C respectively, and document administrative compliance within the various levels of reporting for the period.

Service Standard results for the Second Quarter (April 1 to June 30th, 2021) have been attached as Appendix D. The primary purpose of the service standard report is to report on the administrative compliance with the Pension Benefits Act of Nova Scotia (the "Act") respecting the timing of statements or notifications required under the Act, such as:

- Retirement statement to member;
- Notification of options to retiring member;
- Death benefits statement; and
- Statement on termination.

A secondary purpose of the report is to provide performance reporting respecting the Plan's actuaries, for required deliverables based on pre-determined standards. These standards are internal in nature, and mutually agreed upon by the actuary and Halifax Water.

Second Quarter results reported in Appendix D show, the 1 request submitted for retirement estimates (with options), the retirement package was provided to the member within the prescribed timelines under the Act, 60 days prior to the Member's intended retirement date. There were 6 terminations during the period, with each terminated employee provided a termination package (with options) within the prescribed timelines under the Act, within 60 days after their termination date. In addition, there was 1 pre-retirement death in the second quarter. The death benefit options were provided to the member's spouse within the prescribed timelines under the Act, within 60 days of receiving notice of the member's death.

Performance of the actuary, also reported in Appendix D, shows out of 7 requests in total, the actuary met the pre-determined standard in 6 instances, with average response times for retirement and termination calculation estimates of 6 days and 7 days respectively. The response time of the actuaries is continuously monitored to ensure required service standards are maintained.

## ATTACHMENTS

APPENDIX A – Financial Report:
Statement of changes in net assets available for benefits, for the six (6) month period ended June 30, 2021.

APPENDIX B – Regulatory Filing Requirements – Q2 2021

APPENDIX C – Administrative Reporting Requirements – Q2 2021

APPENDIX D – Service Standards Report – Q2 2021

Report Prepared by: Heather Britten Digitally signed by Heather Britten Date: 2021.09.14 19:30:18 -03'00'

Heather Britten, Quality Assurance Officer 902-490-1895

**Halifax Regional Water Commission Employees' Pension Plan**
**Statement of changes in net assets available for benefits**
**For the six (6) month period ended June 30, 2021**
**Benchmark:** 50%

| | June 30, 2021 | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2021 Budget | Actual | Prorated Budget 50% | Variance Actual versus Prorated Favourable (Unfavourable) $ | Variance Actual versus Prorated Favourable (Unfavourable) % | Actual (Audited) 2020 | Actual (Audited) 2019 |
| **Revenue** | | | | | | | |
| Net investment income: | | | | | | | |
| Total investment income | $ 3,700,000 | $ 1,706,635 | $ 1,850,000 | $ (143,365) | (8%) | $ 3,763,614 | $ 3,644,079 |
| Investment manager fees | (220,000) | (107,820) | (110,000) | 2,180 | (2%) | (194,968) | (202,574) |
| Increase in the fair value of investment assets | 5,100,000 | 6,764,740 | 2,550,000 | 4,214,740 | 165% | 8,630,589 | 10,642,209 |
| | **8,580,000** | **8,363,555** | 4,290,000 | 4,073,555 | 95% | 12,199,235 | 14,083,715 |
| **Contributions** | | | | | | | |
| Participants: | | | | | | | |
| Current service (including additional voluntary contributions) | 3,417,000 | 1,653,397 | 1,708,500 | (55,103) | (3%) | 3,310,113 | 3,463,328 |
| Sponsors: | | | | | | | |
| Current service | 3,332,000 | 1,611,814 | 1,666,000 | (54,186) | (3%) | 3,230,131 | 2,972,138 |
| | **6,749,000** | **3,265,211** | 3,374,500 | (109,289) | (3%) | 6,540,244 | 6,435,466 |
| **Expenses** | | | | | | | |
| Benefit payments: | | | | | | | |
| Benefit payments | 4,866,000 | 2,321,751 | 2,433,000 | 111,249 | 5% | 4,552,474 | 4,226,855 |
| Termination payments | 500,000 | 304,118 | 250,000 | (54,118) | (22%) | 677,237 | 960,187 |
| Administrative: | | | | | | | |
| Actuarial & consulting fees | 55,000 | 7,990 | 27,500 | 19,510 | 71% | 42,143 | 118,659 |
| Audit & accounting fees | 9,000 | - | 4,500 | 4,500 | 100% | 8,648 | 8,530 |
| Bank custodian fees | 30,000 | 14,392 | 15,000 | 608 | 4% | 30,479 | 28,636 |
| Insurance | 9,000 | 9,636 | 4,500 | (5,136) | (114%) | 9,636 | 8,760 |
| Miscellaneous | 20,000 | 12,320 | 10,000 | (2,320) | (23%) | 16,724 | 20,610 |
| Professional fees | 20,000 | 20,260 | 10,000 | (10,260) | (103%) | 23,151 | 23,261 |
| Registration fees | 3,000 | - | 1,500 | 1,500 | 100% | 2,645 | 2,500 |
| Training (Trustees/ Administration/ Pension Committee) | 2,000 | - | 1,000 | 1,000 | 100% | - | |
| | **5,514,000** | **2,690,468** | 2,757,000 | 66,532 | 2% | 5,363,136 | *5,397,997* |
| **Increase in net assets available for benefits** | **$ 9,815,000** | **$ 8,938,298** | $ 4,907,500 | $ 4,030,798 | 82% | $ 13,376,343 | $ 15,121,184 |
| **Net assets available for benefits, beginning of period** | **$ 154,956,156** | **$ 154,956,156** | | | | **$ 141,579,813** | **$ 126,458,630** |
| Increase in net assets available for benefits | 9,815,000 | 8,938,298 | | | | 13,376,343 | 15,121,184 |
| **Net assets available for benefits, end of period** | **$ 164,771,156** | **$ 163,894,454** | | | | **$ 154,956,156** | **$ 141,579,813** |

*For the purposes of this statement, current year expenses are reported on a cash basis. Comparative years are reported on an accrual basis for the purposes of the year-end, audited financial statements.*

**Halifax Regional Water Commission Employees' Pension Plan**
**Regulatory Filing Requirements - 2021**
**as at June 30, 2021**

| | Report | Regulatory Body | Filing Deadline | Date last filed | | Comments |
|---|---|---|---|---|---|---|
| 1 | Annual Form 3 - Summary of Contributions | Superintendent of Pensions | 60 days after the beginning of each fiscal year | January 29, 2021 | DB Plan | Filed directly with the Trustee, Northern Trust, for the DB Plan. |
| | | | | January 29, 2021 | DC Plan | Filed directly with the Trustee, Industrial Alliance, for the DC Plan. |
| 2 | Pension Plan Income Tax Return (T3) | Canada Revenue Agency | March 31st | March 1, 2021 | DB Plan | CRA requires Northern Trust as the custodian to prepare and file T3 Income Tax Returns each year. Information obtained from HRM Pension Plan quarterly report. |
| 3 | Pension Plan Audited Financial Statements | Superintendent of Pensions | 6 months after the Plan's fiscal year end | June 30, 2021 | DB Plan | Audited financial statements were completed and approved by the HW Board on June 17th, 2021 and subsequently forwarded to the regulatory body. |
| | | | | June 15, 2021 | DC Plan | Audited financial statements are not prepared for this pension plan. However, Industrial Alliance provides a Financial Report detailing all pertinent details of the plan. This report is submitted to the regulatory body prior to June 30th each year. |
| 4 | Annual Information Returns (AIR) | Superintendent of Pensions | June 30th | June 30, 2021 | DB Plan | |
| | | | | June 15, 2021 | DC Plan | |
| 5 | Actuarial Valuation* | Superintendent of Pensions<br>Canada Revenue Agency | September 30th | September 27, 2019<br>September 27, 2019 | | Actuarial Valuation was conducted as of January 1, 2019. |
| 6 | Plan Amendments | Superintendent of Pensions | 60 days after the amendment approved by the Board | September 27, 2019 | DB Plan | Amendment #12 approved by the Board June 20, 2019; Submitted to the Superintendent September 27, 2019. The amendment was pursuant to the contribution rate change as dictated by the Actuarial Valuation of January 1, 2019. |
| | | Canada Revenue Agency | | September 27, 2019 | | |
| | | Superintendent of Pensions<br>Canada Revenue Agency | 60 days after the amendment approved by the Board | n/a | DC Plan | All documents relating to the registration of the DC Plan were received by the Superintendent October 6, 2017. |

* Actuarial Valuations are required at a minimum every three (3) years.
** Notional Agreements were implemented during 2017 with an effective date for January 1, 2017. Notional Agreements are not registered therefore not subject to reporting requirements to a regulatory body.

**Halifax Regional Water Commission Employees' Pension Plan**
**Administrative Reporting Requirements - 2021**
**as at June 30, 2021**

| | Report | Filing Deadline/ Recurrence | Date last filed/ Performed | | Comments |
|---|---|---|---|---|---|
| 1 | Pensioners' Payroll | Monthly | September 1, 2021 | | Pensioners are paid the 1st of each month; no exceptions to report for the Second Quarter 2021. |
| 2 | Contributions to the Trustee | Monthly | September 7, 2021 | DB Plan | Remittances due to Northern Trust within 30 days of month end; no exceptions to report for Second Quarter 2021. |
| | | | August 24, 2021 | DC Plan | Remittances due to Industrial Alliance within 30 days of month end; no exceptions to report for Second Quarter 2021. |
| | | | n/a | Notional Agreement* | There are no contributions made to this plan. |
| 3 | Pension Plan Financial Statements | Quarterly | September 23, 2021 | DB Plan | Second Quarter (January - June 2021) |
| | | | n/a | DC Plan | A quarterly financial report is now prepared for the Defined Contribution (DC) Plan. A financial report is prepared by Industrial Alliance and that report is filed with the Annual Information Return (AIR) to the regulator annually. |
| | | | n/a | Notional Agreement* | Financial statements not required. |
| 4 | Investment Performance Review & Compliance with SIP&P | Quarterly | September 23, 2021 | DB Plan | Second Quarter (January - June 2021)<br>Report prepared quarterly by administration staff for the HW Board of Directors, in conjunction with the quarterly HRM Pension Plan Committee meeting documentation. Statement of Investment Policies & Procedures (SIP&P) is reviewed annually and was last reviewed and approved on March 25, 2021. |
| 5 | Annual Pension Statements to Members | June 30th | June 23, 2021 | DB Plan | Statements issued annually by June 30th. |
| | | | June 23, 2021 | DC Plan | Statements issued annually in conjunction with the Defined Benefit (DB) Plan statements. Members also have access to online, real-time reporting. |
| | | | June 23, 2021 | Notional Agreement* | Statements issued annually in conjunction with the DB Plan statements. |
| 6 | Fiduciary Liability Insurance | Annually | November 25, 2020 | DB Plan | Reviewed and renewed annually by administration staff. The policy period expires November 30 each year. |

* Notional Agreements were implemented during 2017 with an effective date for January 1, 2017. Notional Agreements are not registered therefore not subject to reporting requirements to a regulatory body.

**Halifax Regional Water Commission Employees' Pension Plan**
**Service Standards Report - 2021**

**Quarter 2** (as at September 1, 2021)

| | | Actuary | | | | HW Staff | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Transaction** | **Standard** | **Total # Completed** | **# Past Standard** | **% within Standard** | **Average Service Days** | **Total # Completed** | **Average Service Days** | **Total Average Service Days** | **Compliance with PBA** |
| Retirement Estimates | 11 Business Days | 1 | 0 | 100% | 6 | 1 | 29 | 35 | Yes |
| Marriage Breakdown Calculations | 15 Business Days | | | | | | | | |
| Post-Retirement Death Letter | 15 Business Days | | | | | | | | |
| Pre-Retirement Death Benefit | 15 Business Days | 1 | 0 | 100% | 7 | 1 | 12 | 19 | Yes |
| Termination Estimate Calculations - Standard | 11 Business Days | 6 | 1 | 83% | 7 | 6 | 28 | 35 | Yes |
| - Non Standard (Incl RTAs) | 15 Business Days | | | | | | | | |
| | Total for Actuary | 8 | 1 | 88% | | 8 | | | |

# ITEM # 4-I
**Halifax Water Board**
**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board as Trustees of the Halifax Water Employees' Pension Plan

**SUBMITTED BY:** Louis de Montbrun
Digitally signed by Louis de Montbrun
Date: 2021.09.15 09:51:38 -03'00'
Louis de Montbrun, CPA, CA, Director, Corporate Services/CFO

**APPROVED:** Cathie O'Toole
Digitally signed by Cathie O'Toole
Date: 2021.09.15 11:44:25 -03'00'
Cathie O'Toole, MBA, FCPA, FCGA, ICD.D, General Manager

**DATE:** September 15, 2021

**SUBJECT:** **Halifax Regional Municipality Master Trust Investment Performance, Second Quarter, 2021**

---

## INFORMATION REPORT

## ORIGIN

The Halifax Regional Municipality Master Trust (the "Master Trust") investment performance is reported to the Commission periodically throughout the year.

## BACKGROUND

None

## DISCUSSION

The tables below and the attached Investment Report provide a performance update for the Second Quarter of 2021 (April to June) for the Master Trust, of which Halifax Regional Water Commission Employees' Pension Plan (the "Plan") is a part. The fair value of the investment in the Master Trust is determined and updated at year-end, and the Plan's share in the Master Trust at December 31, 2020 was 6.4%, totaling $153.4 million.

The Master Trust returned 3.69% in the Second Quarter, which outperformed the policy benchmark of 2.8% by 0.89%. The return for the 1-year period ended June 30, 2021, is 13.89%,

outperforming the policy benchmark of 10.70% by 3.19%. Other historical returns are provided in Table 1 below.

**Table 1 – Returns**

| | Current Quarter (Apr to Jun) | 1-Year | 3 - Year Annualized | 4 - Year Annualized | Since Inception (Oct 1999) |
|---|---|---|---|---|---|
| Fund Return | 3.69% | 13.89% | 8.26% | 8.25% | 7.29% |
| Policy Benchmark | 2.80% | 10.70% | 6.78% | 6.72% | 5.84% |
| Excess Return | 0.89% | 3.19% | 1.48% | 1.53% | 1.45% |

The total fund returns are subject to investment management fees and plan expenses.

As at June 30th, 2021, the Master Trust is in compliance with the Statement of Investment Policies and Procedures (SIP&P), and a summary of the asset mix is provided in Table 2 below:

**Table 2– Asset Mix, as at June 30, 2021**

| Asset: | Actual | Policy Benchmark |
|---|---|---|
| Cash & Equivalents | 0.5% | 0.0% |
| Canadian Equity | 4.4% | 4.7% |
| Global Equity | 35.8% | 30.1% |
| Fixed Income | 30.0% | 37.2% |
| Minimum Target Return | 29.3% | 28.0% |

**ATTACHMENT**

2021 Second Quarter Halifax Regional Municipality Master Trust Investment Report

Report Prepared by: Heather Britten

Digitally signed by Heather Britten
Date: 2021.09.15 09:46:29 -03'00'

Heather S. Britten, Quality Assurance Officer (902) 490 1895

Consent Agenda Item No. 1

**ITEM # 4-I**

**Halifax Water Board**
**September 23, 2021**
**ATTACHMENT**

HRM PENSION PLAN

# Investment Report

## Q2 2021

# Executive Summary

## Compliance

- As at June 30, 2021, the Master Trust (MT) was in compliance with the SIP&P.

## Funded Status

- As at December 31, 2019, the going concern funded ratio and transfer ratio were 91.8% and 63.4% respectively.*

## Master Trust Performance (net of fees)

- In Q2, the MT earned 3.69%, outperforming the policy benchmark return by 0.89%.
- For the one-year period ending June 30, 2021, the MT earned 13.89% outperforming the policy benchmark by 3.19%.
- The MT earned an annualized return of 8.25% over the 4-year period ending June 30, 2021, outperforming the policy benchmark by 1.53% annualized.
- Since inception (October 1999), the MT earned 7.29% annualized, outperforming the Plan's discount rate of 6.25%. The table on the next slide summarizes the calendar year returns for the MT.

* Eckler to provide final valuation results as at December 31, 2020 during the Committee meeting

# Executive Summary – Cont.

## Calendar Returns (net of fees)




| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fund Return | 10.71% | -0.56% | -5.21% | 12.60% | 10.27% | 12.38% | 12.88% | 2.60% | -14.83% | 14.47% | 10.12% | 2.11% | 12.01% | 10.94% | 9.27% | 10.59% | 5.13% | 10.85% | 3.81% | 10.69% | 7.59% |
| Policy Benchmark | 7.12% | -2.64% | -4.50% | 13.91% | 9.50% | 11.76% | 12.85% | 1.58% | -15.20% | 10.92% | 10.08% | 2.71% | 7.12% | 7.01% | 7.24% | 5.27% | 5.55% | 8.91% | 0.96% | 10.28% | 7.92% |
| Excess Return | 3.59% | 2.08% | -0.71% | -1.31% | 0.77% | 0.62% | 0.03% | 1.02% | 0.37% | 3.55% | 0.04% | -0.60% | 4.89% | 3.93% | 2.03% | 5.32% | -0.42% | 1.94% | 2.85% | 0.41% | -0.33% |

# Executive Summary – Cont.

## Added Value

- In Q2 of 2021, the MT outperformed its policy benchmark by 0.89%.

Attribution: Private Investments +0.63%, US Equity +0.18%, Global Credit +0.10%, Universe Bonds +0.09%, World Equity +0.03%,International Equity -0.01%, EAFE Equity -0.03% and Emerging Equity -0.10%.

## Q2 Updates

- Funded Global Passive Large Cap (CAD 130 mn), Small Cap (US 40 mn), and Global Quantitative Equity portfolio (US 90 mn).
- Funded CAD 78.5mn to an active EAFE and an international equity portfolio.
- Committed USD 15mn to a US middle-market firm focused on generalist private equity opportunities.

# Executive Summary – Cont.

## Q2 Updates

- Invested USD 7.5mn in a GP-led single asset recapitalization of the global market leader in the internet security / certificate management software solutions segment.
- Committed an additional EUR 7.5mn to a global infrastructure fund after investing EUR 15mn in Q4 2020.
- Committed additional CAD 5 mn to an open end global real estate fund of fund. The Plan has been invested in this fund since 2012.
- Committed additional CAD 5 mn to a Canadian grocery anchored retail real estate fund after investing CAD 20 mn in 2020.
- Committed additional CAD 5 mn to a Canadian value add office real estate fund after investing CAD 20 mn in 2020.

# Total Fund Net Returns

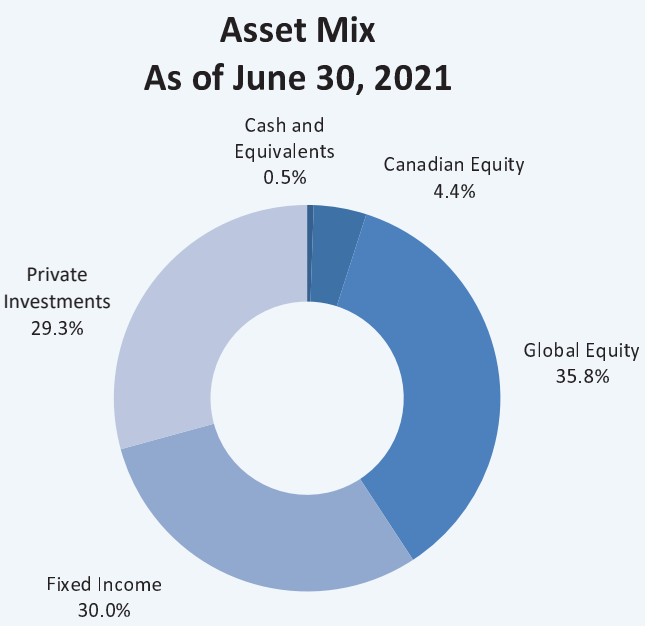
**As of June 30, 2021**

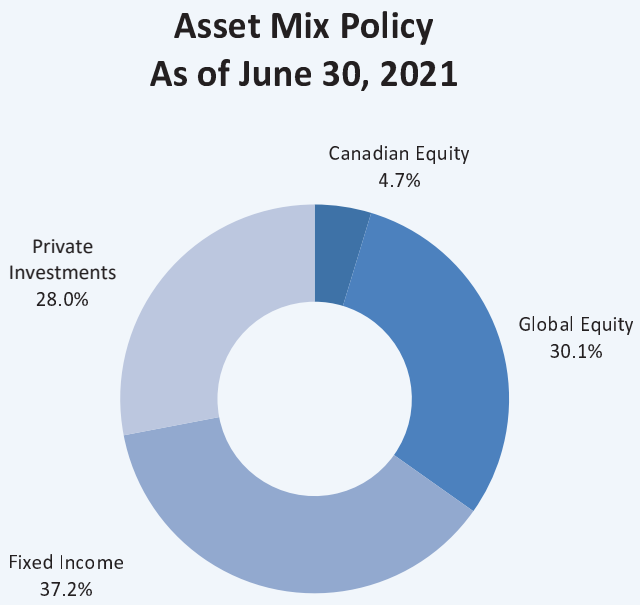
| | Q2 | 1-Year | 3-Year Annualized | 4-Year Annualized | Since Inception (Oct 1999) |
|---|---|---|---|---|---|
| Fund Return | 3.69% | 13.89% | 8.26% | 8.25% | 7.29% |
| Policy Benchmark* | 2.80% | 10.70% | 6.78% | 6.72% | 5.84% |
| Excess Return | 0.89% | 3.19% | 1.48% | 1.53% | 1.45% |

* Effective June 30, 2021, the Policy Benchmark is 4.7% S&P/TSX Index + 5.6% S&P 500 Hedged Index ($CAD) + 2.4% MSCI EAFE Index ($CAN) + 4.4% MSCI Emerging Markets ($CAN) + 8.2% MSCI World ($CAN) + 17.3% FTSE TMX Canada Universe Bond + 19.9% 3 Month Bankers Acceptance + 28.0% Private Investments + 3.2% MSCI ACWI ex USA ($CAD) + 4.4% MSCI ACWI ($CAD) + 1.9% MSCI World Small Cap ($CAD)

Fund returns are shown net of fees and expenses

# Asset Mix




* Effective June 30, 2021, the Policy Benchmark is 4.7% S&P/TSX Index + 5.6% S&P 500 Hedged Index ($CAD) + 2.4% MSCI EAFE Index ($CAN) + 4.4% MSCI Emerging Markets ($CAN) + 8.2% MSCI World ($CAN) + 17.3% FTSE TMX Canada Universe Bond + 19.9% 3 Month Bankers Acceptance + 28.0% Private Investments + 3.2% MSCI ACWI ex USA ($CAD) + 4.4% MSCI ACWI ($CAD) + 1.9% MSCI World Small Cap ($CAD)

# Equity Market Returns

**As of June 30, 2021**

| Index | Q2 | 1-Year | 3-Year Annualized | 4-Year Annualized |
|---|---|---|---|---|
| Canadian Equity (S&P/TSX Composite Index) | 8.54% | 33.85% | 10.80% | 10.70% |
| US Equity (S&P 500 Hedged 100% C$) | 8.47% | 39.49% | 16.97% | 16.04% |
| EAFE Equity (MSCI EAFE C$) | 3.62% | 20.33% | 6.11% | 6.63% |
| Emerging Markets (MSCI EM C$) | 3.50% | 28.11% | 9.05% | 9.19% |
| World Equity (MSCI World C$) | 6.15% | 26.42% | 12.70% | 12.65% |
| International Equity (MSCI ACWI ex US C$) | 3.92% | 23.39% | 7.20% | 7.56% |
| ACWI Equity (MSCI ACWI C$) | 5.81% | 26.62% | 12.28% | 12.25% |
| Global Small Cap Equity (MSCI World Small Cap C$) | 3.43% | 39.00% | 9.90% | 11.46% |

- Global equities advanced in Q2, supported by the accelerating roll-out of COVID-19 vaccines. Growth stocks outperformed value stocks. US equities reached a new all-time high in late June.

*Source: Northern Trust

# Public Equity – Q2 Summary

- The MT's Equity portfolio returned 5.99% during the quarter, underperforming the equity policy benchmark return of 6.11% by 0.12%, primarily due to underperformance of Emerging equities.

**As of June 30, 2021 (C$ returns)**

| | Q2 | | | One year | | |
|---|---|---|---|---|---|---|
| Equity Mandate | Plan | Benchmark | Relative Performance | Plan | Benchmark | Relative Performance |
| Canadian Equity | 8.99% | 8.54% | 0.45% | 33.73% | 33.85% | -0.12% |
| US Equity | 10.04% | 8.47% | 1.57% | 42.03% | 39.49% | 2.54% |
| EAFE Equity | 2.75% | 3.62% | -0.87% | 19.18% | 20.33% | -1.15% |
| Emerging Equity | 1.57% | 3.50% | -1.93% | 18.93% | 28.11% | -9.18% |
| World Equity | 5.69% | 6.15% | -0.46% | 23.31% | 26.42% | -3.11% |
| International Equity** | 3.87% | 3.92% | -0.05% | NA | NA | NA |
| ACWI Equity** | 3.46% | 3.85% | -0.39% | NA | NA | NA |
| Global Small Cap Equity** | 2.77% | 2.71% | 0.06% | NA | NA | NA |
| **Total** | **5.99%** | **6.11%** | **-0.12%** | **26.38%** | **28.49%** | **-2.11%** |

*Source: Northern Trust
**Inception since March 17, 2021 (International Equity), May 25, 2021 (ACWI Equity), and May 19, 2021 (Global Small Cap Equity).

# Bond Market Returns

**As of June 30, 2021**

| Index | Q2 | 1-Year | 3-Year Annualized | 4-Year Annualized |
|---|---|---|---|---|
| Canadian Universe Bonds (FTSE TMX Canada Universe Bond) | 1.66% | -2.43% | 4.16% | 3.30% |
| Canadian Government Bonds (FTSE TMX Canada Universe Government) | 1.80% | -3.59% | 3.91% | 3.08% |
| Canadian Corporate Bonds (FTSE TMX Canada Universe Corporate) | 1.28% | 0.82% | 4.86% | 3.93% |

- Corporate bonds have outperformed Government bonds and the broader Universe over the 1-year periods, 3-year periods and 4-year periods.
- Government bonds have outperformed Corporate bonds and the broader Universe over the Q2 period.

*Source: Northern Trust

# Public Fixed Income – Q2 Summary

- The MT's diversified Fixed Income portfolio earned 1.03%, which outperformed its benchmark return of 0.82% by 0.21%, due to outperformance of Canadian Corporate Bonds.

**As of June 30, 2021 (C$ returns)**

| | Q2 | | | One year | | |
|---|---|---|---|---|---|---|
| | Plan | Benchmark | Relative Performance | Plan | Benchmark | Relative Performance |
| Canadian Corporate Bond | 2.49% | 1.28% | 1.21% | 16.93% | 0.82% | 16.11% |
| Government Bond | 1.64% | 1.80% | -0.16% | -2.78% | -3.59% | 0.81% |
| Global Credit Absolute Return | -0.04% | 0.11% | -0.15% | 1.53% | 0.47% | 1.06% |
| **Total** | **1.03%** | **0.82%** | **0.21%** | **5.13%** | **-0.72%** | **5.85%** |

*Source: Northern Trust

# Private Investments – Q2 Summary

- The Private Investment portfolio returned 3.91% in Q2, versus a benchmark of 1.56%, outperforming by 2.35%.

**As of June 30, 2021 (C$ returns)**

| | Q2 | 1-Year | 3-Year Annualized | 4-Year Annualized | Since Inception (Oct 1999) |
|---|---|---|---|---|---|
| Private Investments Return | 3.91% | 10.47% | 10.14% | 10.65% | 12.19% |
| Policy Benchmark | 1.56% | 6.25% | 6.19% | 6.22% | 6.46% |
| Excess Return | 2.35% | 4.22% | 3.95% | 4.43% | 5.73% |

The policy benchmark for the private investment portfolio is the Going Concern Discount rate. The 2021 rate is 6.25%, 2020 rate is 6.25%, 2019 is 6.1%, 2018 is 6.2%, 2017 is 6.4%, 2016 is 6.5%, 2015 is 6.55%, 2014 is 6.5%, 2013 is 6.25%, 2007-2012 is 6.75% and prior to 2007 is 7.4% respectively.

# Liquidity

| | Estimated 2021 Amounts ($ mln) |
|---|---|
| Contributions** | $ 104.3 |
| Dividend & Distribution Income** | $ 13.0 |
| Interest Income** | $ 11.7 |
| Other Income** | $ 0.3 |
| Benefit Payments** | -$ 123.3 |
| Expenses** | -$ 7.5 |
| **Total Annual Net CF** | **-$ 1.5** |
| Liquid Investments* | $ 1,707.9 |
| Actual Net Distributions | $ 66.0 |
| Projected Net Distributions*** | $ 68.0 |
| Actual Net Capital Calls | -$ 55.0 |
| Projected Net Capital Calls*** | -$ 72.0 |
| **Total CF + Liquid Investments + Private Sales – Capital Calls** | **$ 1,713.4** |

* Liquid investments as at August 30, 2021. Includes all publicly traded equity and fixed income investments
** Contributions, Benefit Payments, Income, and expense estimates based on actual amounts from January to June 2021, annualized for full year
***Forecasted based on 2020 numbers

# ITEM # 5-I
**Halifax Water Board**

**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Susheel Arora
Digitally signed by Susheel Arora
Date: 2021.09.16 13:30:53 -03'00'

Susheel Arora, M.A.Sc., P.Eng. Director of Operations

**APPROVED:** Cathie Toole
Digitally signed by Cathie O'Toole
Date: 2021.09.16 13:26:56 -03'00'

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

**DATE:** September 2, 2021

**SUBJECT:** **Cobequid Road Transmission Main Emergency Replacement**

---

## INFORMATION REPORT

## ORIGIN

On June 28, 2021, the 600mm transmission main along Cobequid Road in Sackville suffered its fourth failure in the past year. The history of breaks, due to external corrosion, along this section of 1977 ductile iron pipe has been documented in a previous report to the Board on September 24, 2020 (Item 10-I) which is attached to this report.

## BACKGROUND

The location of the June 28, 2021 water main break is detailed in Figure 1. The board report from September 24, 2020 includes a history of this section of transmission main as well as details surrounding the July 3, 2020 and subsequent September 7, 2020 failures of this main.

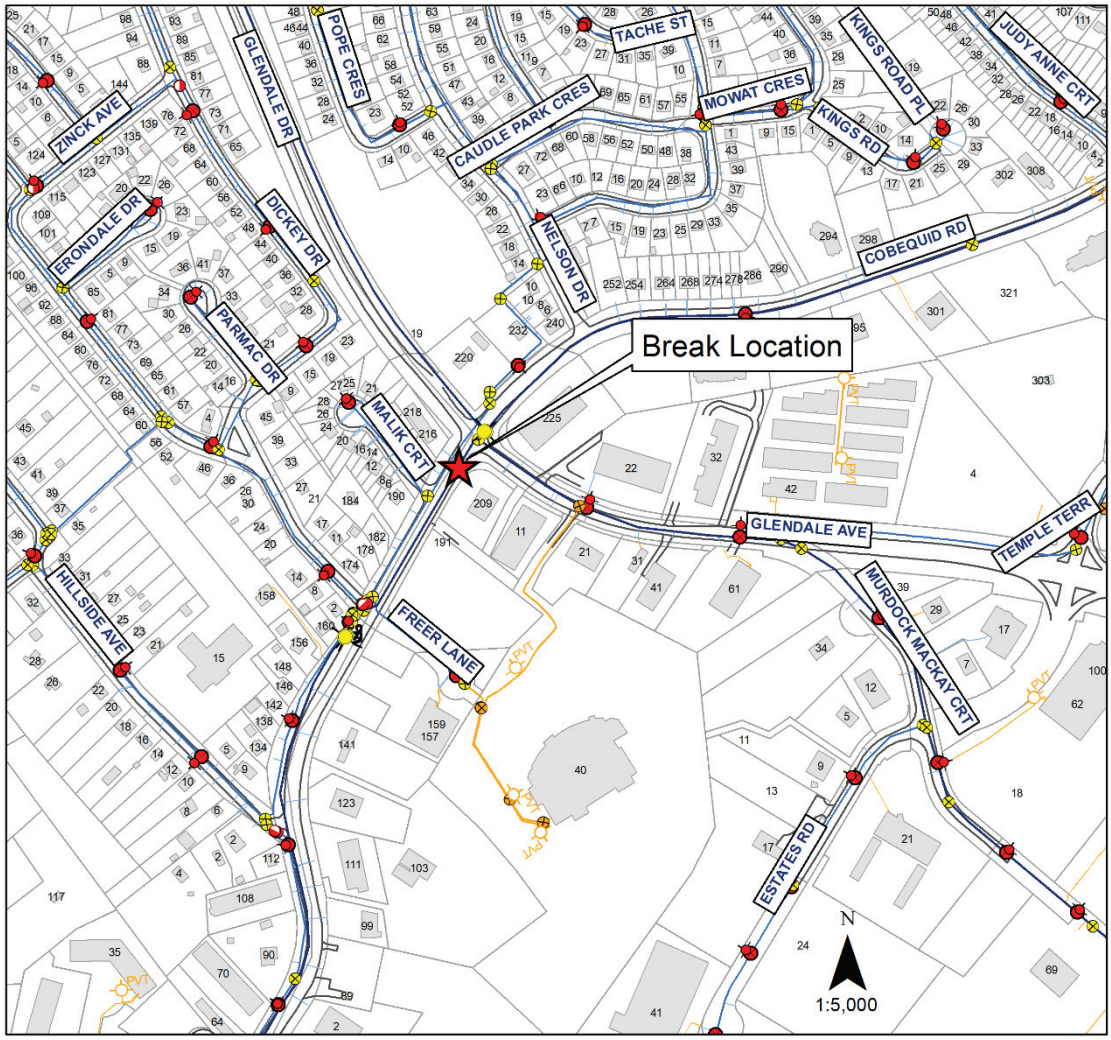



*Figure 1 - Cobequid break location*

## DISCUSSION

Repair

Halifax Water Operations attempted to repair the most recent break, but another leak was found when the repaired section was re-pressurized. Based on the condition of the pipe, the Operations Department recommended that this section of main be replaced immediately in order to reduce the risk of additional failures. In light of the number of customers impacted, the difficulty of the repair and the likelihood of additional failures, this was treated as an emergency response and Halifax Water activated an Incident Command Structure (ICS).

Emergency Transmission Main Replacement

Dexter Construction was retained on a time and materials basis to complete the replacement under emergency circumstances using the Halifax Water Procurement Policy provisions regarding sole source procurement. In July 2021, approximately 180 metre section of 600mm transmission main was replaced on Cobequid Road from Freer Lane to the Glendale Avenue intersection. Figure 2 below details the scope of the replacement project.

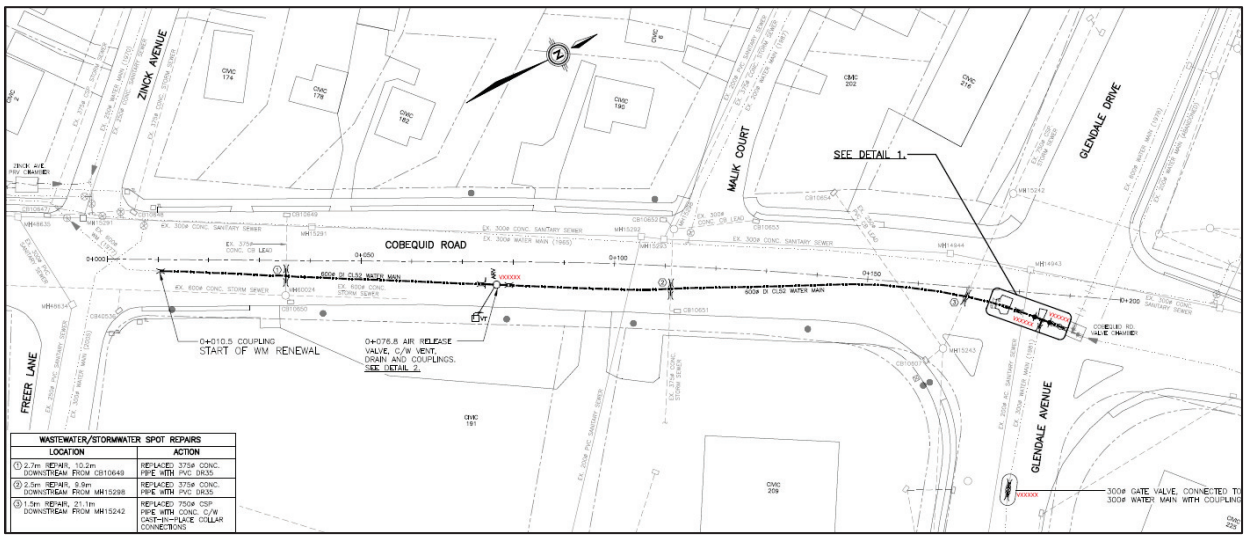



*Figure 2 - Cobequid Road Transmission Main replacement scope.*

In addition to the replaced section of main, three new valves were installed in the Cobequid Road/Glendale Avenue intersection along with an additional valve on the 450mm transmission main north of the intersection in order to facilitate future operation and maintenance activities.

The emergency replacement was approved with an estimated cost of $900,000 and the work was to be completed over 2 weeks, with crews working 24/7, and some impact on other Halifax Water projects being carried out by Dexter. The repair was completed, the final actual cost has yet to be determined as some invoicing is still outstanding but staff estimate it should be in the range of $950,000 as, the work extended to four weeks; partially as a result of mitigating some of the impact to other projects and partially due to the complexity of the repair. Utilizing a contract approach based on time and materials helped ensure value was achieved.

Continuity of Service

During the Cobequid Road replacement work, the normal transmission main feed for the Sackville area from Orchard Control Chamber in Bedford remained off. Lucasville Road was successfully utilized to provide flows to the Sackville area during the replacement work. This alternate supply route was successful in part due to the 2019 installation of a twinned transmission main for approximately 3.6 km of the corridor, increasing the capacity to Sackville.

The Rockmanor Booster Station, which is normally off, but available on standby, was utilized to maintain service to the Rockmanor Pressure Zone, the Bedford Commons, and Sackville Business Park during three planned shutdowns of the Glendale Avenue watermain while the replacement work was underway.

Provisions for temporary water supply were put in place for customers whose service was directly impacted by the project.

Future Risks and Mitigation

The cause of the recent breaks in this area appear to be caused by external corrosion related to the soil conditions in the area. It is not yet clear exactly what the condition of the mains may be beyond the limits of the 180 metre section that was replaced. It is possible that both the upstream and downstream sections of mains on Cobequid Road and Glendale Avenue/Drive could be at risk of similar premature failures due to corrosion.

The following mitigation strategies are being implemented to minimize these risks:

- The new section of 600mm transmission main has been installed with anti-corrosion materials consistent with today's standards of Halifax Water transmission main installations (polywrap, denso, jumper wire).
- The section of main that was replaced was very deep (3-4 metres) which complicated any repair efforts. The new main was installed at normal depth. Areas upstream and downstream of the replaced section are at standard depth, so any future repair activities should be more straight-forward.
- Halifax Water recently awarded a contract to Dexter Construction to complete the Windgate Drive Transmission Main Extension Project. This project includes extending the 400mm transmission main from Windgate Drive to the main on Ashlea Drive. This new connection will provide redundancy to the existing single feed along Cobequid Road by creating a system 'loop' through Windsor Junction, thereby strengthening the overall network.

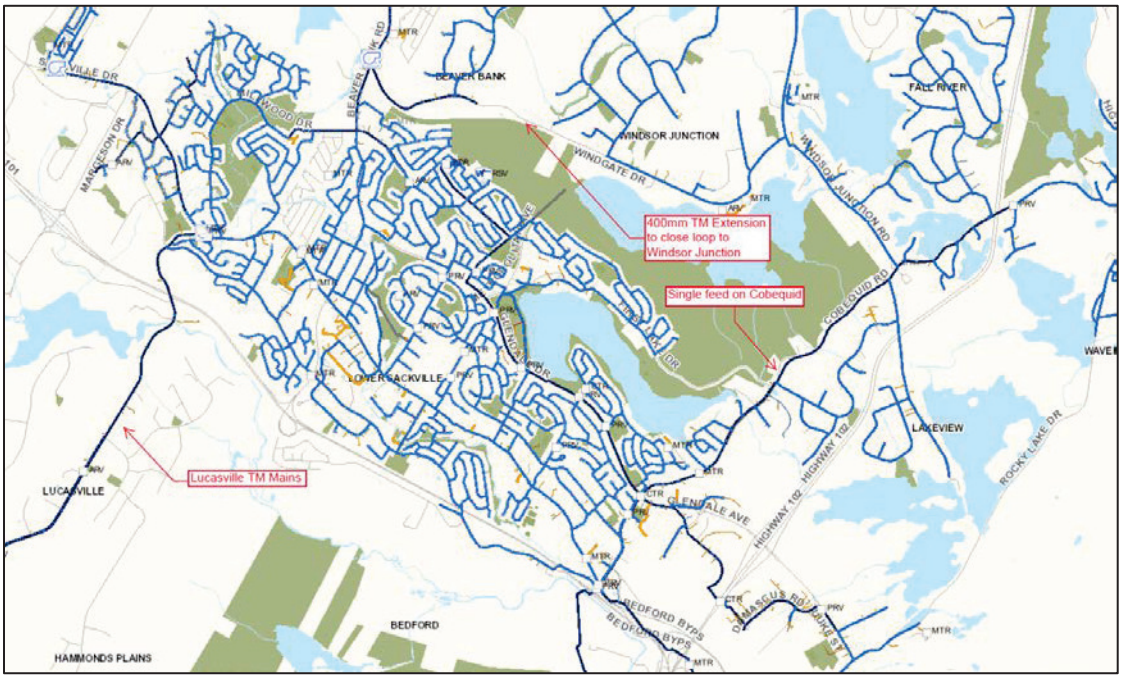



*Figure 3 - Windgate Transmission Main Extension Project*

- The Engineering Department is engaged in discussions with a Pipe Condition Assessment consultant to perform assessments on critical transmission mains throughout the distribution network. This area of Sackville is high on the priority list of mains to be assessed. Once the condition of the existing infrastructure is determined, Halifax Water will be in a better position to make decisions for repair/replacement work on the remaining transmission mains in the area. It is anticipated that staff will have the condition information during the fall/winter of 2021.

## ATTACHMENT

Board Report – Item 10-I – Cobequid Road / Glendale Avenue Water Main Break

Report Prepared by: Kevin Healy, Operations Engineer, 902-490-5911

Halifax Water
Halifax Regional Water Commission

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Reid Campbell — Digitally signed by Reid Campbell Date: 2020.09.17 12:32:41 -03'00'

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

**APPROVED:** Cathie O'Toole — Digitally signed by Cathie O'Toole Date: 2020.09.17 10:06:32 -03'00'

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

**DATE:** September 14, 2020

**SUBJECT:** **Cobequid Road/Glendale Avenue Water Main Break**

---

## INFORMATION REPORT

## ORIGIN

On July 3, 2020, staff in the Central Region Water Distribution group received a report at 6:50 am of a watermain break on Cobequid Road, immediately south of the intersection with Glendale Avenue. This is a 600 mm diameter watermain which is the sole feed to approximately 3500 customers east of the intersection, including Stonemount and Lakeview subdivisions, Windsor Junction, Fall River, Miller Lake and Waverley. The repair took a considerable amount of time and resulted in two service interruptions with the second one of a longer duration, and a precautionary boil water advisory (PWBA). The length of the service outage, complexity of the repair, issuance of a boil water advisory, and configuration of the distribution system in that area made this an unusual event for Halifax Water. This report will update the Halifax Water Board on the event and future activities planned to mitigate the impact of similar future events.

## BACKGROUND

The pipe in question is a 600 mm diameter (24 inch) transmission main. The pipe is the primary supply to the Samson and Stokil reservoirs in Sackville, by way of Glendale Avenue. The section of pipe on the north side if Glendale is the only supply to approximately 3500 customers along that part of Cobequid Road, and in the communities of Stonemount, Lakeview, Windsor Junction, Fall River, Waverley and Miller Lake.

The pipe is a cement lined CL-52 ductile iron pipe installed in 1976. In addition to being an important part of the Sackville system, the repair also took place adjacent to a busy

intersection. Further complicating the repair, this pipe network intersection was lacking a valve on Cobequid, south of Glendale. As a result, it was necessary to isolate the repair north of Glendale which cut off the areas north of Glendale from Sackville reservoirs, thus interrupting service to 3500 customers.

The pipe at this location is approximately 8 feet below grade, compared to Halifax Water's standard of 4.5 to 6 feet. A deeper pipe results in a deeper and wider excavation lengthening the time spent excavating and backfilling, as well as increasing restoration costs.

This is the second break in this location with the previous one occurring in 2017. The cause of the break appears to be external corrosion.

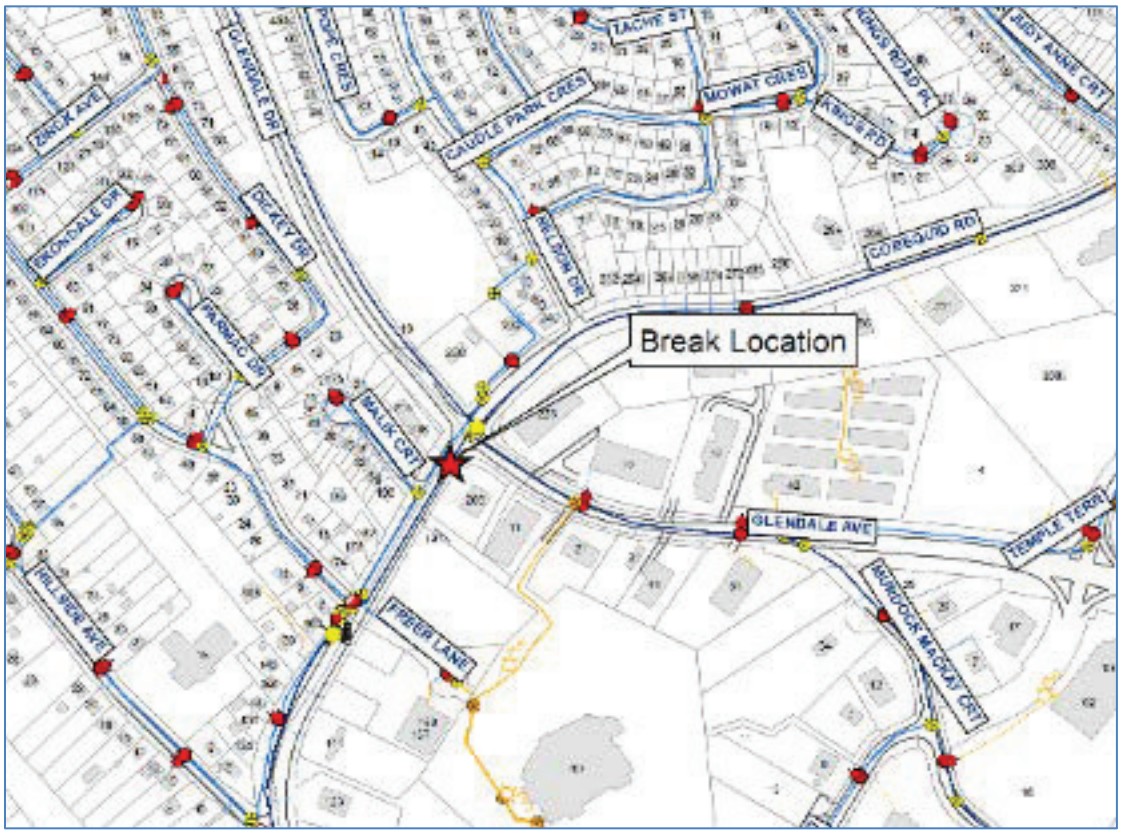



*Fig. 1 – Cobequid Location*

## DISCUSSION

Initial Repair

With this pipe being a transmission main, and due to its location near a busy intersection, preparing for the repair has multiple steps, including requesting locates, arranging traffic control, making public regulatory notifications and configuring the system to send water to customers through alternate routes.

By 9:30 am on Friday July 3, the break was isolated, and the system was reconfigured. Excavation work began by 11:00 am. By 1:00 pm the pipe was uncovered, and three corrosion holes were discovered, all within 300 mm of each other.

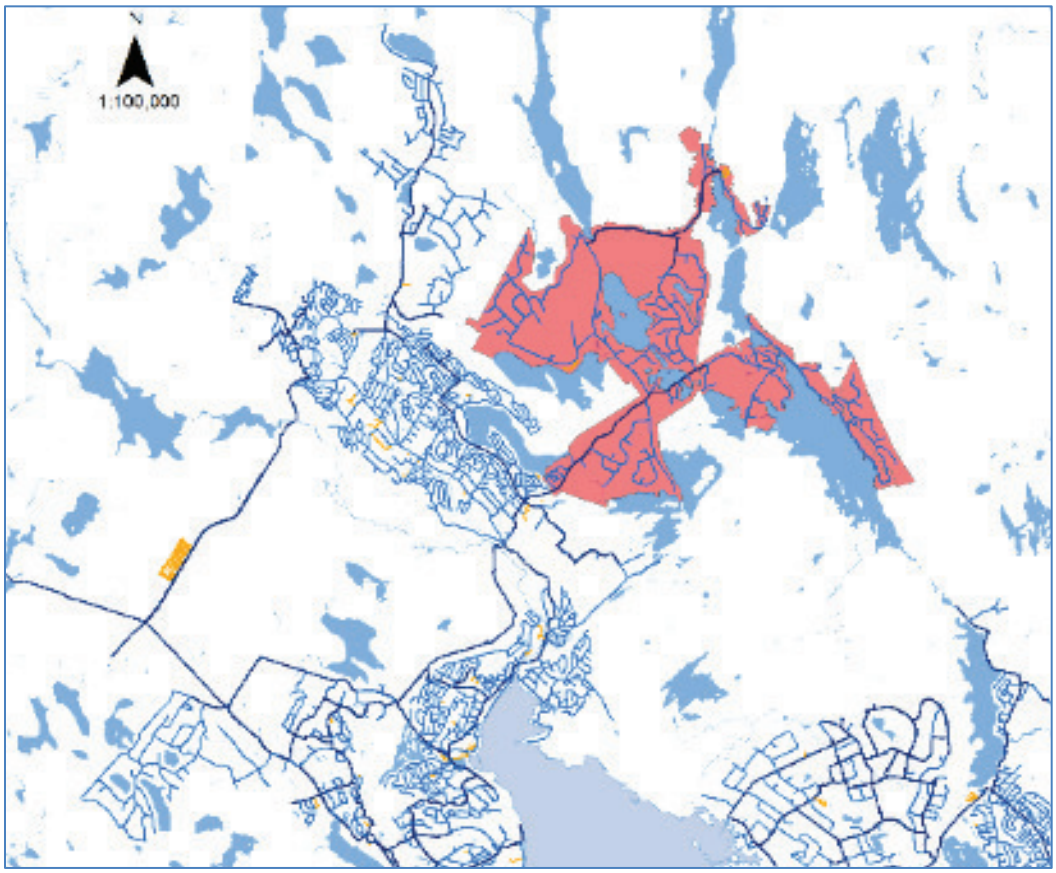



*Fig. 2 – Interruption Area*

There are two common repair methods for repairing a water main leak: installing a repair clamp or dressing in a new section of pipe.

Repair clamps are stainless steel bands lined with a rubber gasket. They are generally used for small holes or circumferential cracks. The clamp is wrapped around the full circumference of the pipe and tightened down, sealing off the leak. Dressing in a section of pipe is a procedure where a length of pipe is cut out and replaced by a section of new pipe, connected to the old pipe by coupling on each end. Dressing in pipe is typically used when the pipe damage exists in more than a localized area of the pipe, longer than the length of a repair clamp.

Installing a repair clamp is a quicker repair in that the size of the excavation is smaller and it is a relatively quick operation to install and tighten the clamp. Repair clamps are, however, dependent on the integrity of the pipe around the clamp. Dressing in pipe produces a more certain outcome but takes considerably longer. The excavation takes longer, and the time taken to cut out the old pipe and to cut the new pipe to length takes time. On larger pipe sizes, such as in this case, the cutting operation itself can take 6- 8 hours.

In this instance, because the pipe leak appeared localized, and because of the number of customers without service, the decision was made to install a repair clamp. The clamp was installed by 7:00 pm and the trench partially backfilled.

Second Leak

At 10:00 pm, while re-pressurizing the pipe, water was detected emerging from the trench wall indicating another leak. The trench was re-excavated and expanded, revealing a second leak and a second repair clamp was installed by 11:00 pm. A second crew was called in to work the overnight hours. Backfilling and pressure testing began at that time and by 3:00 am the crew began refilling the distribution system.
At about 10:45 pm on Friday, July 3, Water Quality staff monitoring the distribution system, noted very low chlorine residuals in Fall River and that the Waverly reservoir was close to being drained. The decision was made for Halifax Water to issue a precautionary boil water advisory (PBWA). Nova Scotia Environment was advised and then issued a formal PBWA at 1:23 am, specifying procedures for monitoring and ending the advisory. Ending a BWA requires two consecutive tests, separated by 24 hours, absent for total coliform, once the problem is resolved. The tests take 18- 24 hour to process meaning the PBWA would extend to at least Monday.

Full-service restoration was achieved by 1 pm on Saturday, July 4.

Saturday Leak Notice

At about 2 pm on Saturday, July 4th, crews flushing for water quality purposes noticed water emerging from the recently backfilled trench, indicating either another leak in the vicinity, or an issue with one of the repair clamps installed the day before. Staff assessed the situation and decided to plan to repair the leak on Sunday morning. This decision was made, recognizing that customers had just endured an extended shut down and that Halifax

Water needed time to allow the system to stabilize and refill reservoirs. Scheduling the shutdown for Sunday morning also provided Halifax Water the opportunity to give advance notice of the Sunday shutdown and to allow customers to prepare for it. There was some risk that the leak could progress suddenly but this was mitigated by partially closing some valves and having a staff member attend the site so the leak could be shut down quickly.

A PSA was issued early Sunday evening advising of a shutdown of service beginning at 7:00 am on Sunday, July 5.

Sunday Repair

Crews began working at 7:00 am on Sunday, July 5 and the shutdown of water service to the affected area was completed by 10:00 am. By noon on Sunday, it was determined that the second clamp installed on Friday was leaking. Repairs were made to this clamp and the process of pressure testing and refilling the system began during the early afternoon.

By late afternoon, the excavation was partially backfilled, and the process of restoring water service had begun. Leak detection staff were brought in to do an acoustic check for leaks prior to completing backfilling and restoration of service. A leak noise was detected and staff on site made the decision to suspend the service restoration process and investigate the leak noise. The leak noise was determined to be in the location of the first clamp installed on Friday and work began to re-excavate in that area. By early evening, the leak was confirmed to be coming from the first clamp installed on Friday. Staff worked for a couple of hours attempting to repair this clamp. When this effort proved unsuccessful a decision was made to install a new larger clamp in this location.

This second clamp at this location was installed by 10:00 pm and pressure testing began. This clamp also leaked, and after some efforts to try to seal this clamp in place, it was determined that it could not be successfully sealed. At approximately midnight on Sunday, it was determined that the only course of action available at this point would be to dress in a new section of pipe.

The necessary decision to dress in pipe at this time had a couple of implications for customers. To complete the repair would take a minimum of an additional 8 hours plus further time to refill and pressurize the water system. This would extend a shut down that had already been in place since 8 am Sunday morning into the next day, past 24 hours. The second implication was that the two storage reservoirs in Sackville had dropped to levels below their normal operating elevation. With flows expected to increase as Monday morning approached, it was important to make efforts to refill the Sackville reservoirs to the degree possible.

To put water into the Sackville reservoirs with the Cobequid main shut down, it was necessary to increase flows through the secondary feed to the Sackville system along Lucasville Road. It was anticipated that this would cause discolored water complaints

which can happen any time a flow direction or velocity is experienced that is outside normal operating ranges.

Work proceeded on the repair and 6 m (20 feet) of pipe was replaced. The superintendent in charge also made the decision to install a new valve as part of this repair. This isolation valve on Cobequid Rd., south of the intersection, did not previously exist. Installing the new valve added a couple of hours to the repair, but now enables Halifax Water to keep more customers in service should a further failure take place in a similar location.

This repair was complete by 10:00 am, at which point, staff began the process of restoring service. By 1:30 pm, the trench was backfilled, and work focused on restoring operation of the distribution system.

Restoration of Service

When Halifax Water started re-filling the system on Monday, July 6 at 1:30 pm, water service had been interrupted to 3,500 customers for approximately 30 hours. During this time, the system was shut down, water drained from the system from the high elevations in Fall River and Waverley to lower elevation near the site of the repair, as customers at lower elevations were able to continue to use water at reduced pressure by drawing on water stored in the pipes. After the system was turned back on, some customers still had to wait a considerable period as the system was re-filled in a controlled manner. As a result, the service interruption and inconvenience to customers varied greatly. Some customers immediately downstream of the repair had water service the entire time, albeit at reduced pressure. Customers located at the extremes of the system at high elevation did not receive water service until late Monday night or early Tuesday morning. All customers had service restored by noon on Tuesday, July 7.

Regulatory Issues

*Boil Water Advisory:*

As indicated above, Water Quality staff monitoring the repair noted that the Waverley reservoir was near empty and there was an absence of chlorine residual in water tests at some hydrants in the extremes of the system. Chlorine residual can dissipate in reservoirs and can stratify with respect to chlorine residual. This is typically only an operational challenge under normal operating conditions as water cycles in and out of the reservoir. With the Waverley reservoir rapidly draining, this resulted in water with no chlorine residual going into the system, which is not permitted by our Approval from NSE and contrary to good water supply practice.

Halifax Water advised Nova Scotia Environment we were declaring a PWBA and a Public Service Advisory was issued at 1:10 am on Saturday, July 4. Shortly thereafter, Nova Scotia Environment issued an order, formalizing the PBWA and setting the terms for its removal. As with most BWA's Halifax Water was required to achieve two consecutive test

results absent for total coliform and was also required to monitor across the system for chlorine residual at various locations.

Once the system was refilled and service was restored on Saturday morning, chlorine residuals were maintained, and all total coliform test results were absent. The PBWA was lifted on schedule at 2:45 PM on Monday, July 6.

*Manganese:*

In 2019, Health Canada changed its guideline for manganese from an aesthetic parameter to a health-related parameter. Halifax Water has always understood that when we have discolored water events, that manganese deposits scoured from pipe interior walls is often a component of the discoloration. With manganese now a health-related parameter, distribution system water quality changes through discolored water is potentially of greater concern.

Understanding the risks of high levels of manganese, Halifax Water began monitoring distribution system water quality in central Sackville and Beaver Bank where we anticipated discolored water from the decision to move more water through Lucasville Road in the overnight hours of Monday morning.

Testing on Monday, July 6 did indicate the presence of manganese at levels above the health-related parameter. Accordingly, consumers in the discolored water areas were advised to let water run until it was clear. Discolored water and manganese levels quickly returned to normal, later Monday.

This was Halifax Water's first experience with high manganese levels in the distribution system since the guideline change. Halifax Water proactively monitored for manganese and responded appropriately; and will review the approach in the near future with Nova Scotia Environment.

*Trench Water:*

Nova Scotia Environment has appropriate controls and restrictions in place for the discharge of sediment laden trench water to water courses. Where this is a concern, Halifax Water can manage trench water disposal by allowing it to flow to the storm sewer system via a catch basin, and through appropriate sedimentation controls such as a filter fabric.

During the repair on Friday, July 3, an inspector from Nova Scotia Environment visited the site and forbade catch basin disposal despite filter fabric being in place and field measurements indicating that sediment levels were not excessive. As a result, Halifax Water had to dispose of trench water to the sanitary sewer system which had the potential to create operational problems at the Mill Cove Wastewater Treatment Plant. Further, it was not possible to string hose to a sanitary manhole due to the busy intersection. As a result, Halifax Water retained a contract vacuum truck to remove and dispose of trench water.

While this had some operational benefits in that it could quickly remove water from a trench, it added an additional cost to the repair, as well as extra time waiting for the truck to dump and return to the site. Halifax Water will be pursuing this issue with Nova Scotia Environment to promote an approach that balances protection of the environment with the need to prevent unnecessary costs and to avoid pro-longing service outages for Halifax Water customers.

Communication

Halifax Water communication staff were an important part of the team that responded to this repair. PSA's were issued regularly, and each PSA was also issued though Halifax Water's social media feeds on Twitter and Facebook. Communications staff also monitored social media, responded to questions and concerns posted through Twitter and Facebook, provided updates to our after-hours answering service, and communicated with councilors and the media. The following PSA's were issued during the event.

1. 8:25 am, Friday, July 3, advising of the watermain repair and disruptions in traffic and service.
2. 1:10 am, Saturday July 4, advising of the PWBA.
3. 6:49 am, Saturday, July 4, advising customers of expected service restoration between 8:00 am and Noon.
4. 1:36 pm, Saturday, July 4, confirming previous messages.
5. 7:38 pm, Saturday July 4, advising of a service interruption the following day.
6. 12:21 am, Monday July 5, advising that service would not be restored until noon on Monday and to expect discolored water.
7. 10:39 am, Monday July 5, advising service restoration expected between 2 and 4 pm.
8. 4:14 pm, Monday July 5, advising watermain repair was complete.
9. 4:33 pm, Monday July 5, advising that the PBWA is lifted.

Halifax Water received some comments directly and through social media that updates were not frequent enough. Frequency and content of updates during water main breaks will be reviewed.

One item that caused confusion for customers was the fact that on Monday, there was a PWBA for the area with reduced or no water service, and a discolored water notice for consumers in Sackville who had full water service. Colour coded maps were issued with the PSA distinguishing the two areas but this message remained confusing for many customers.

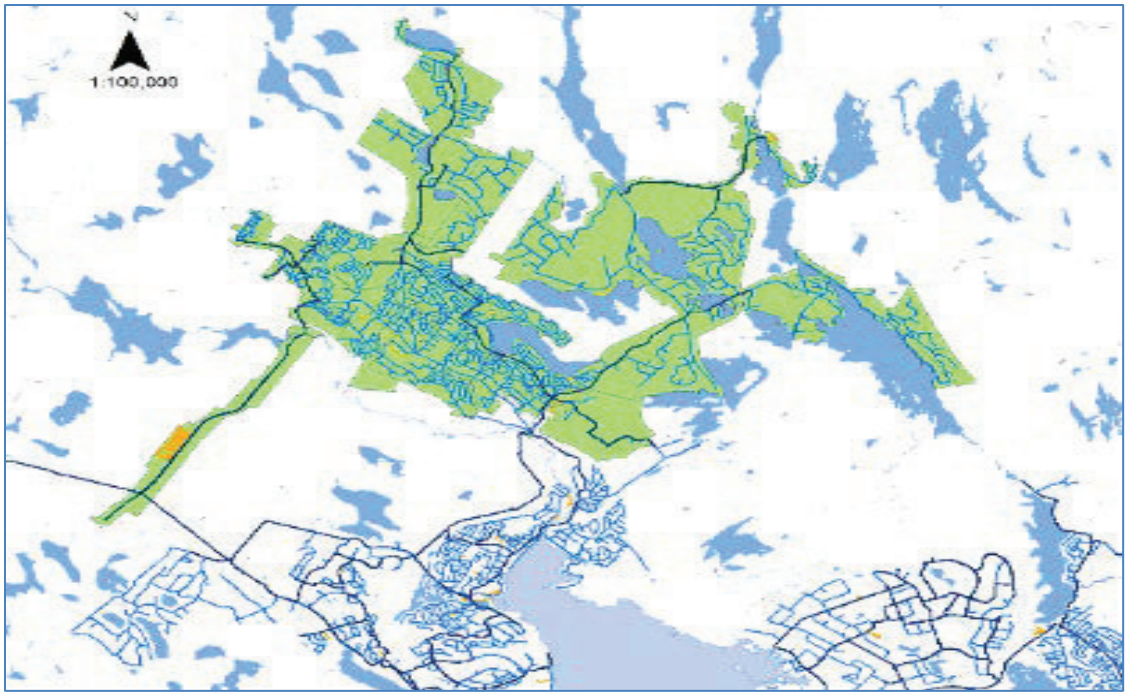



*Fig. 3 – Discolored Water Area*

On Monday, July 6, the customer care centre received 750 calls compared to a typical daily average of 250. The increase was almost entirely due to discolored water in central Sackville. The customer care centre did a very good job of handling the increase in calls.

During the day on Monday, July 6, water quality and customer care staff worked together to develop a system for displaying complaint locations in Halifax Water's geographic information system (GIS), according to time. This was very helpful in giving operations staff the ability to track in close to real time, the spread of discolored water across the system. This was also very helpful in directing resources to system flushing to mitigate discolored water.

Postmortem

Anytime service is interrupted to many customers, or a repair goes on for over four days, is considered a significant event.

Positively, approximately 35 staff from two separate depots, regulatory services, communications, water quality and customer care worked throughout the weekend, in an Incident Command System (ICS) structure, to restore service to customers. In addition, the entire call center dealt with customer calls on Monday. There are several examples of staff who worked two 16-hour shifts, worked multiple overnight shifts, delayed vacation, or came in on vacation to complete the repair.
The main issue contributing to this event is the fact that there is a single transmission main serving approximately 3,500 customers. Any interruption to the service provided by this

main impacts many customers. As well, the fact that it is a large diameter main means that the repair will take longer and the impact on the system is greater.

Good design practice dictates that large areas of the network not be fed by a single supply and typically this principal applies across the distribution system, however, the Fall River – Waverley area is one of a small number where development patterns and physical barriers result in a single supply to a large area.

The second issue of concern regarding this incident, is that there have been three corrosion related failures of this transmission main in the vicinity of this intersection since 2017. These premature failure events are concerning, and it is possible that there will be future events.

There are three strategies that will be employed to mitigate both the possibility of another incident in this location and to reduce the impact as follows:

- Alternate feed: There is an opportunity to complete a loop in our transmission system on Windgate Drive in Windsor Junction. When this 850 m gap in the system is completed there will be an alternate feed to the Fall River and Windsor Junction areas. This gap is identified in Halifax Water's infrastructure master plan for future years; however, the recent leaks justify moving this forward. Design activity on this pipe will begin this Fall with an aim to including construction in the 2021-22 capital budget.

- Capital Replacement of the existing main: Given the premature failure experienced on this pipe, engineering and water services will work together to conduct analysis to try to determine the extent of the corrosion problem and if appropriate, develop a capital project to replace the affected section of pipe.

- Mitigation measures: Several measures are underway or are being considered to reduce or mitigate the on-going corrosion process, and reduce the impact of another leak. The valve installed in the intersection as part of the repair is an important measure. As discussed below, there was another failure on Labour Day in the same location and the installation of this valve was instrumental in being able to limit the shut down to 8 hours at a time chosen to minimize customer disruption Other measures include installing small diameter piping in a chamber to connect two pressure zones which would provide continuous service at reduced pressure and installing anodes to arrest corrosion.

Another issue of concern to customers and public is why the repair took so long. This is attributed to the decision on Friday, July 3, and again on Sunday, July 5 to install a clamp instead of dressing in pipe. This decision, particularly on a large diameter main, in a deep trench is a tradeoff between speed of repair and certainty of a successful repair.

With the benefit of hindsight, had the decision been made to dress in pipe, the repair would have been completed on Saturday, July 4; however, service restoration time would have been approximately 8 hours later on Saturday, and would not have avoided the precautionary boil water advisory.

The decision to use repair clamps was based on an assessment that clamps could be successfully deployed in this circumstance and an appropriate priority being placed on the importance of returning customers and the system to normal service as soon as possible. Staff involved possessed the appropriate knowledge and experience and deployed appropriate judgment in making this decision. Notwithstanding, a number of lessons were learned in the use of repair clamps that will be incorporated in future repairs.

Another factor that has led to customer concern, when combined with the long outage time on July 5 – 6, was the fact that, on a couple of occasions, service restoration time estimates were not met. Estimation of completion time is a difficult proposition at the best of times and there were several complicating factors in this repair that compounded this. One of the most difficult things to estimate is the time required to refill the system on completion. The refill time on Monday, and into Tuesday was considerably longer than what was incorporated into the return to service estimates.

A formal de-briefing session was held with staff involved in this repair to document lessons learned for use in future similar events. Several lessons were learned related to communication with customers throughout the event and related to weekend and overnight staffing of the customer care center to deal with customer concerns.



*Fig. 4a – Hole in Pipe*



*Fig. 4b – Repair Clamps*



*Fig. 4c – New Pipe and Valve*

Labour Day Leak

As a postscript, the Board should be aware that a subsequent leak in this area was reported at 8 am on Labour, Day, Monday, September 7. The failure mechanism was corrosion, similar to the 2017 and July events. Because a valve was installed as part of the July repair, water service was maintained for customers once the leak was valved-off and preparatory work for the repair took place.

Due to some technical details related to the repair, it did become necessary to shut of the Cobequid main to Fall River to complete the actual repair. The shutdown was scheduled for 10:00 pm on Labour Day and a PSA was sent out in advance around 7 pm.

Recognizing that the following day was the first day of school and the anxiety in the community related to this, Halifax Water entered into a discussion with staff from the Halifax Regional Center for Education. The repair time was selected to minimize the impact of the shutdown on customers, provide advance notice of the shutdown and ensure that service was restored early enough on Tuesday morning to meet HRCE deadlines for opening schools in the affected area.

The repair consisted of dressing in a 2 m section of pipe. The repair was completed by 4 am on Tuesday, September 8. Most customers had service restored with reduced pressure by our target time of 6:00 am and full service was restored by 7:00 am.

Report Prepared by: Reid Campbell Digitally signed by Reid Campbell Date: 2020.09.17 12:33:10 -03'00'

Reid Campbell, M.Eng., P.Eng., Director, Water Services
902-490-4877

**ITEM # 6-I**
**HRWC Board**
**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** E. Jeff Myrick Digitally signed by E. Jeff Myrick Date: 2021.09.15 14:45:04 -03'00'
Jeff Myrick, Manager of Public Relations & Communications

**APPROVED:** Cathie Toole Digitally signed by Cathie O'Toole Date: 2021.09.16 11:51:57 -03'00'
Cathie O'Toole, CPA, CGA, MBA, ICD.D, General Manager

**DATE:** September 17, 2021

**SUBJECT:** **2020/2021 Halifax Water Annual Report**

---

## INFORMATION REPORT

## ORIGIN

Ongoing operational requirement.

## DISCUSSION

The Halifax Water team is pleased to present the Annual Report for the 2020/2021 fiscal year.

The theme of this year's report is "Resilience" and recognizes the incredible contributions of Halifax Water employees over the past year. Working during an ongoing Global Pandemic, they faced the challenges of operating a water utility head-on, maintaining essential water, wastewater and stormwater services that allows homes, buildings, hospitals, long term care facilities, and businesses to operate, provide water for fire protection to help protect our environment and public and private property. changing and adapting to the situations around them with a positive can-do attitude.

Over the 2020/2021 fiscal year, Halifax Water saw half of its Board changed, including the Vice-Chair – who served on the Halifax Water Board for more than ten years. In addition, changes were made at the executive level with the retirement of the Director, Engineering & Information Services and the realigning of those responsibilities between the newly created positions of Director of Operations and the Director of Engineering and Technology Services.
The utility continued to successfully operate through the ongoing COVID-19 pandemic, managing a non-toxic algal bloom at Lake Major, and significant water main breaks on Cobequid Road.

From a regulatory perspective, Halifax Water had submitted a rate increase application to the NSUARB in February 2020 - just prior to the outbreak of COVID-19. However, as the pandemic took hold, the utility took 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 always, the Halifax Water team rose to the occasion. In fiscal 2020/21, a new Water Supply Enhancement Program (WSEP) was launched. This 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. The 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.

With more than 500 dedicated employees working to the same goals, the Halifax Water team can look back on 2020/2021 with pride. They've kept critical systems running, while working safely and taking steps to benefit and assist our customers.

Copies of the Twenty-fifth Annual Report will be distributed to Regional Council members as an information report in the near future.

## BUDGET IMPLICATIONS

Annual Report costs are included in the 2020/2021 operations budget.

## ATTACHMENT

2020/2021 Annual Report

Report Prepared by: E. Jeff Myrick Digitally signed by E. Jeff Myrick Date: 2021.09.16 09:00:42 -03'00'

Jeff Myrick, Manager of Public Relations & Communications
902-490-4604


2020-21
Twenty-Fifth
Annual Report
March 31, 2021
STRAIGHT from the SOURCE
Halifax Water

**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.**

# TABLE OF CONTENTS


| | |
|---|---|
| Our Mission, Vision & Values | 4 |
| Our Leaders | 5 |
| Message from the Chair | 6 |
| Message from the General Manager | 7 |
| High Quality Water | 8 |
| Responsible Financial Management | 10 |
| Financial Overview | 16 |
| Service Excellence | 18 |
| Effective Asset Management | 20 |
| Regulatory Compliance | 25 |
| Stewardship of the Environment | 30 |
| Safety & Security | 36 |
| Motivated & Satisfied Employees | 38 |
| Corporate Social Responsibility | 40 |
| Service Area Map | 44 |
| Halifax Water by the Numbers | 46 |
| Typical Water Analysis | 50 |


## Get in touch!

**24-Hour Emergency Line:**
902-420-9287

**Customer Care Centre**
customercare@halifaxwater.ca
902-420-9287

Office Hours:
Monday - Friday
8:30 AM - 4:30 PM
450 Cowie Hill Road
Halifax, NS

**Website**
halifaxwater.ca

**Social Media**
Monitored:
Monday - Friday
8:30 AM - 4:30 PM
Twitter: @HalifaxWater
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 Cuttell,**
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.

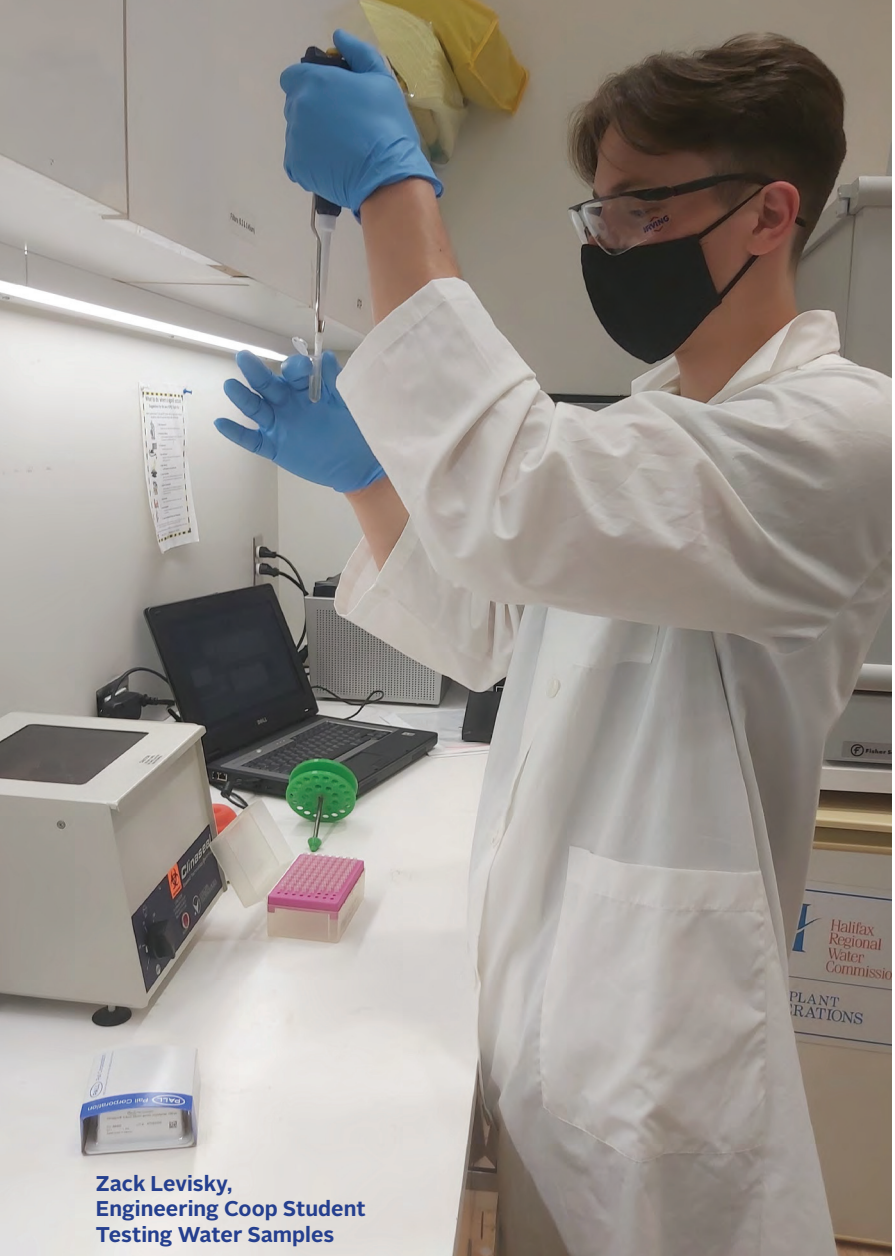
In 2020, Halifax Water received approval from the NSUARB to conduct full public and private lead service line replacements at Halifax Water's expense as part of a larger water main rehabilitation and street reconstruction project. Halifax Water replaced the lead service lines from the water main in the 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**

## 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.

## 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.

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/Electical 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

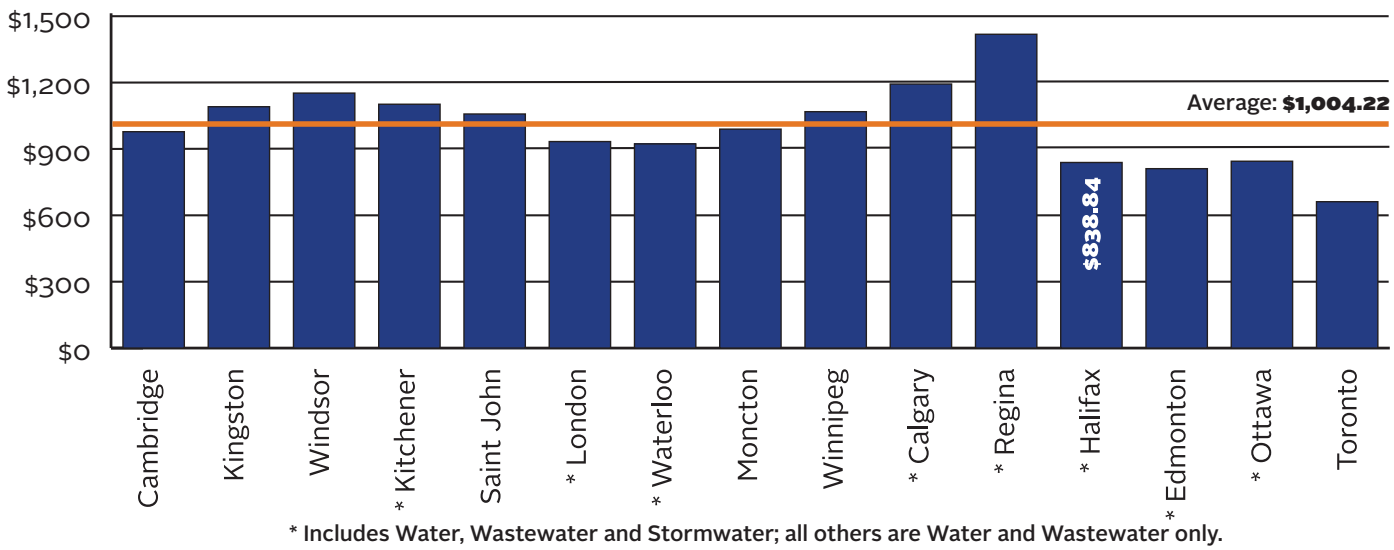
In June 2020, the NSUARB approved Halifax Water's revised rate application. There was no increase in water and wastewater rates for 2019/20, no increase in rates for water services for 2020/21 and an increase in the volumetric rate for wastewater to $2.073 per cubic metre effective April 1, 2021. Increases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




* Includes Water, Wastewater and Stormwater; all others are Water and Wastewater only.

## 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%** |

| | 2021 '000 | 2020 '000 | $ Change | % Change |
|---|---|---|---|---|
| **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.

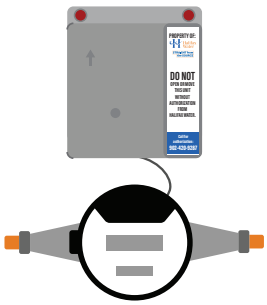
As with previous years, in 2020/21, Halifax Water continued to provide the H2O (Help to Others) Fund to help customers with low incomes pay their bill.

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.

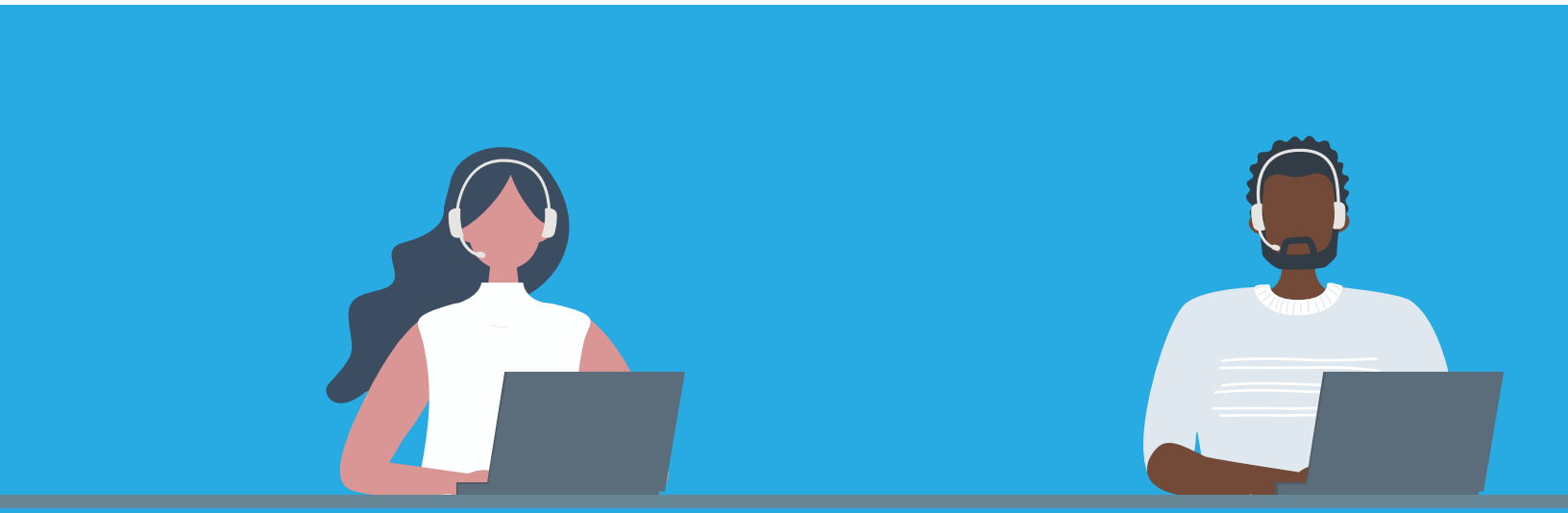
## Customer Connect

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




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.

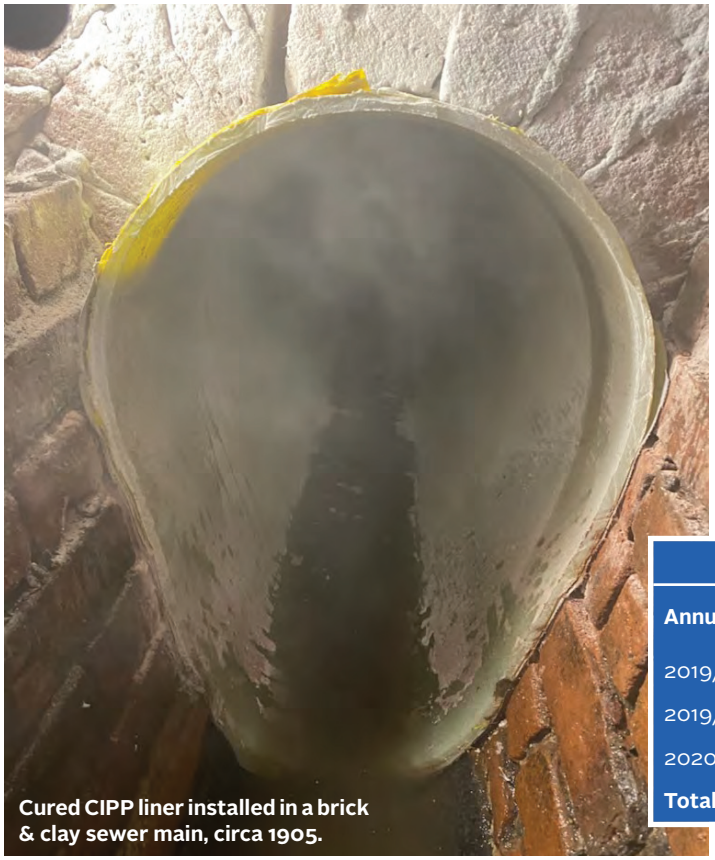


Hemlock Reservoir construction, October 2020

## 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




Work on
Federal Avenue
& Romans Avenue

## 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 (kWhe) in annual energy savings, over $13,000 in cost savings, and over 75 Tonnes carbon dioxide equivalent ($CO_2e$) 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 $CO_2e$, while indirect emissions were 34,445 tonnes $CO_2e$.

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.

**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.



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

## 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.

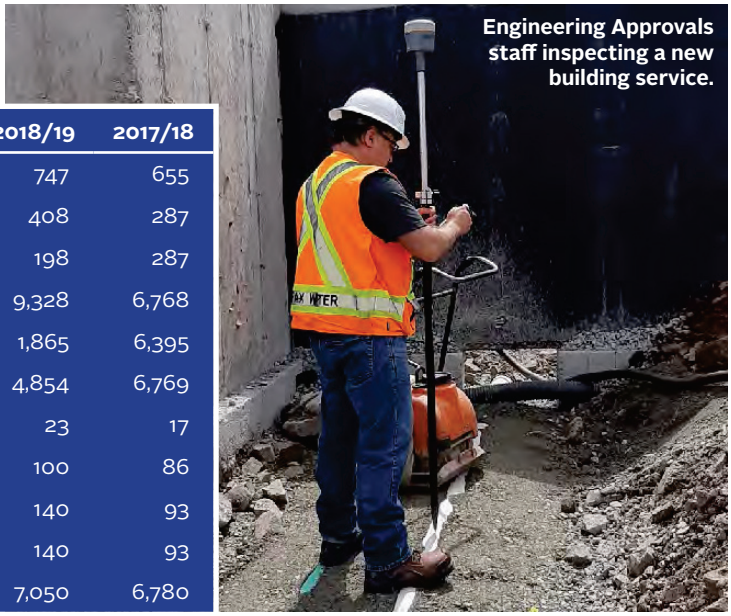
With the recent appointment of the EMS Program Manager, Halifax Water will be expanding the EMS program corporate-wide. All internal services that provide support to the water and wastewater facilities will be included in the system. Once internal services are brought into the system, expansion to water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

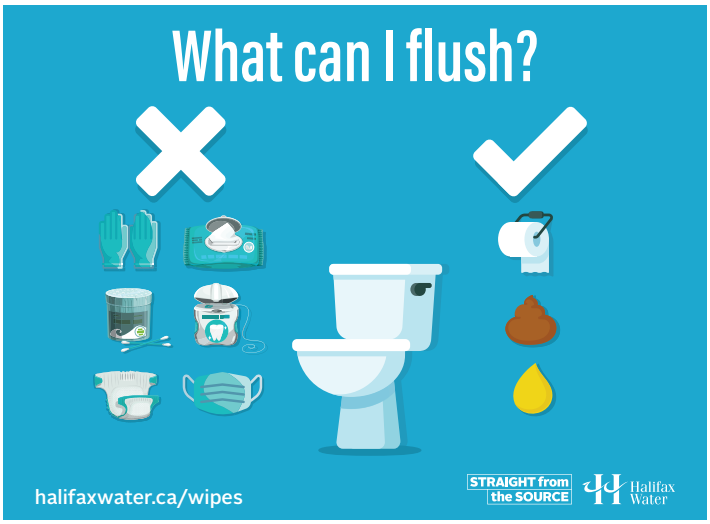
During the year, the Environmental Engineering group (EEG) worked with the Geographic Information System (GIS) and Cityworks implementation team to onboard the Pollution Prevention (P2) and Inflow and Infiltration (I&I) program staff. Cityworks has already become a valuable tool in tracking, managing,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

**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.




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.

**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 | CBOD$_5$ | TSS | E. coli | pH | Toxicity Pass | CBOD$_5$ | TSS | E. coli | pH | Toxicity Pass | CBOD$_5$ | TSS | E. coli | pH | Toxicity Pass |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **April 2020** | | | | | **May 2020** | | | | | **June 2020** | | | | |
| 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 Musquodobit, 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 | CBOD$_5$ | TSS | E. coli | Phosphorus | Ammonia | pH | Dissolved Oxygen | Total Chlorine | Toxicity Pass |
|---|---|---|---|---|---|---|---|---|---|
| **Q1 - April 2020 to June 2020** | | | | | | | | | |
| 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.



Wanda Lane Deep Stormwater Main Installation

## 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.

## 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.

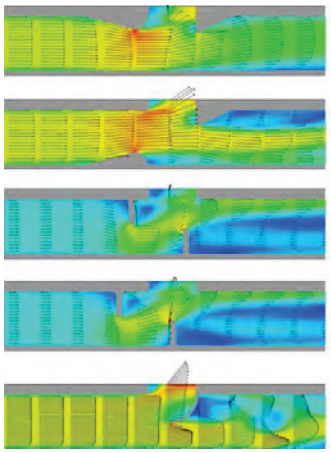
## Wastewater System Process Optimizations

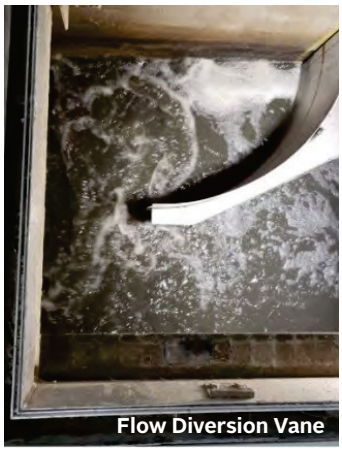
Wastewater treatment processes involve mechanical, biological, chemical, and human elements, all of which must fall within the correct range of values for the treatment system to be effective and reliable. The misalignment of just one of these components can result in a process that is inefficient and 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.





Flow Diversion Vane

## 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.


Air Scour System

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.

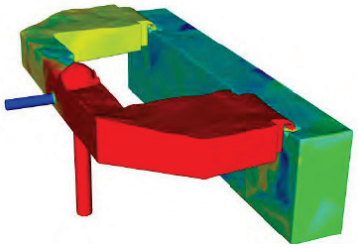

Captured Solids

## 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.


Aerotech WWTF

## 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.



Dalhousie University Wastewater Lab

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


Bench-Scale Jar Tests

### 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 ($H_2S$, FOG, $BOD_5$, 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.



Metering Department Staff Equipped with PPE




As an added measure, to help minimize interactions with the public while employees were in the field, "Thank you for staying back" decals were placed on Halifax Water-owned and operated vehicles.

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-facetted 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 Mediacorp Canada Inc., are evaluated based on criteria in eight key areas:

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

## 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:

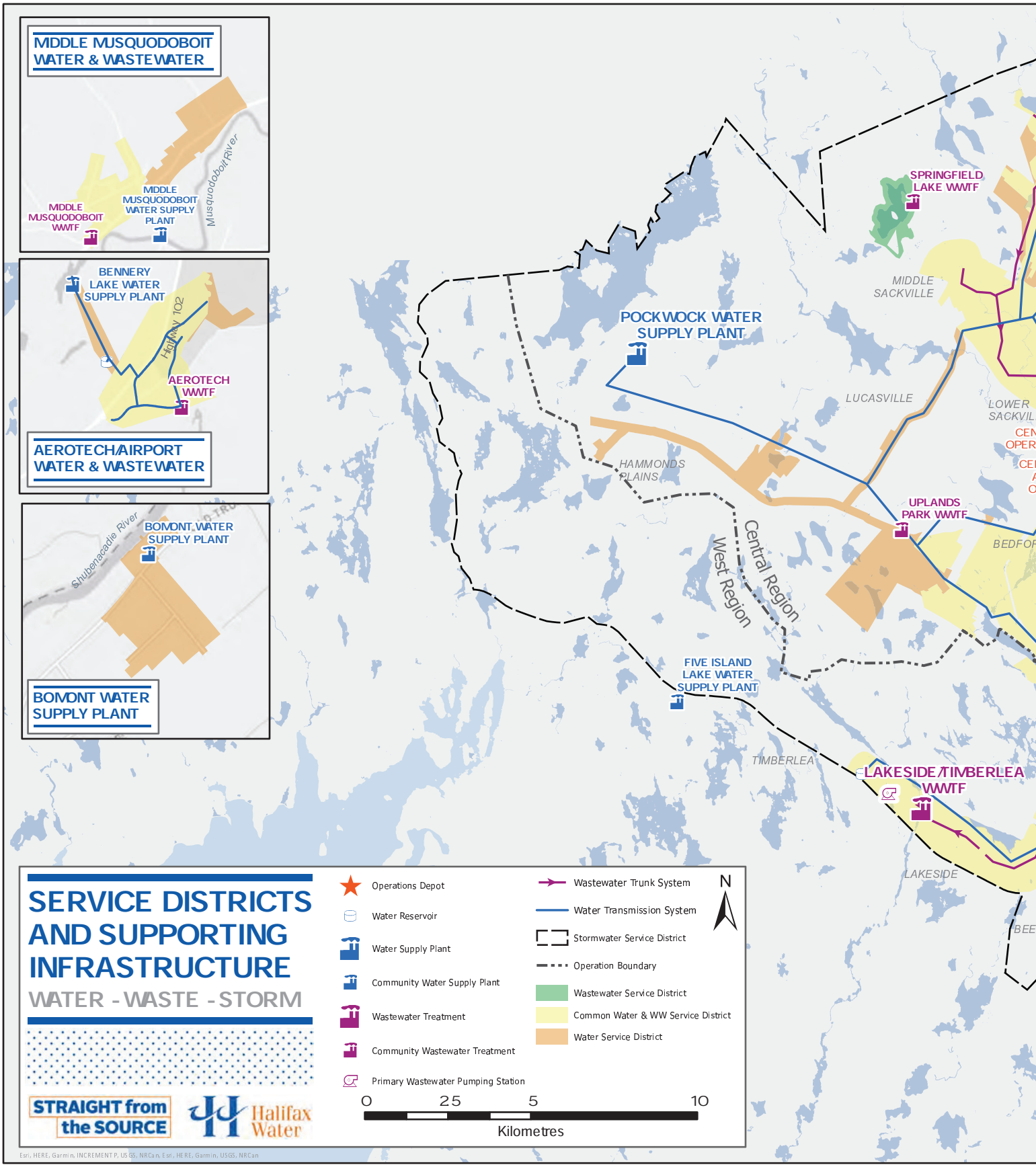
- An updated diversity statement was added to all Halifax Water job postings.
- In an effort to increase the number of diverse job applicants, Halifax Water has developed relationships and started sending postings directly to Immigrant Services Association of Nova Scotia (ISANS), the Mi'kmaq Native Friendship 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.

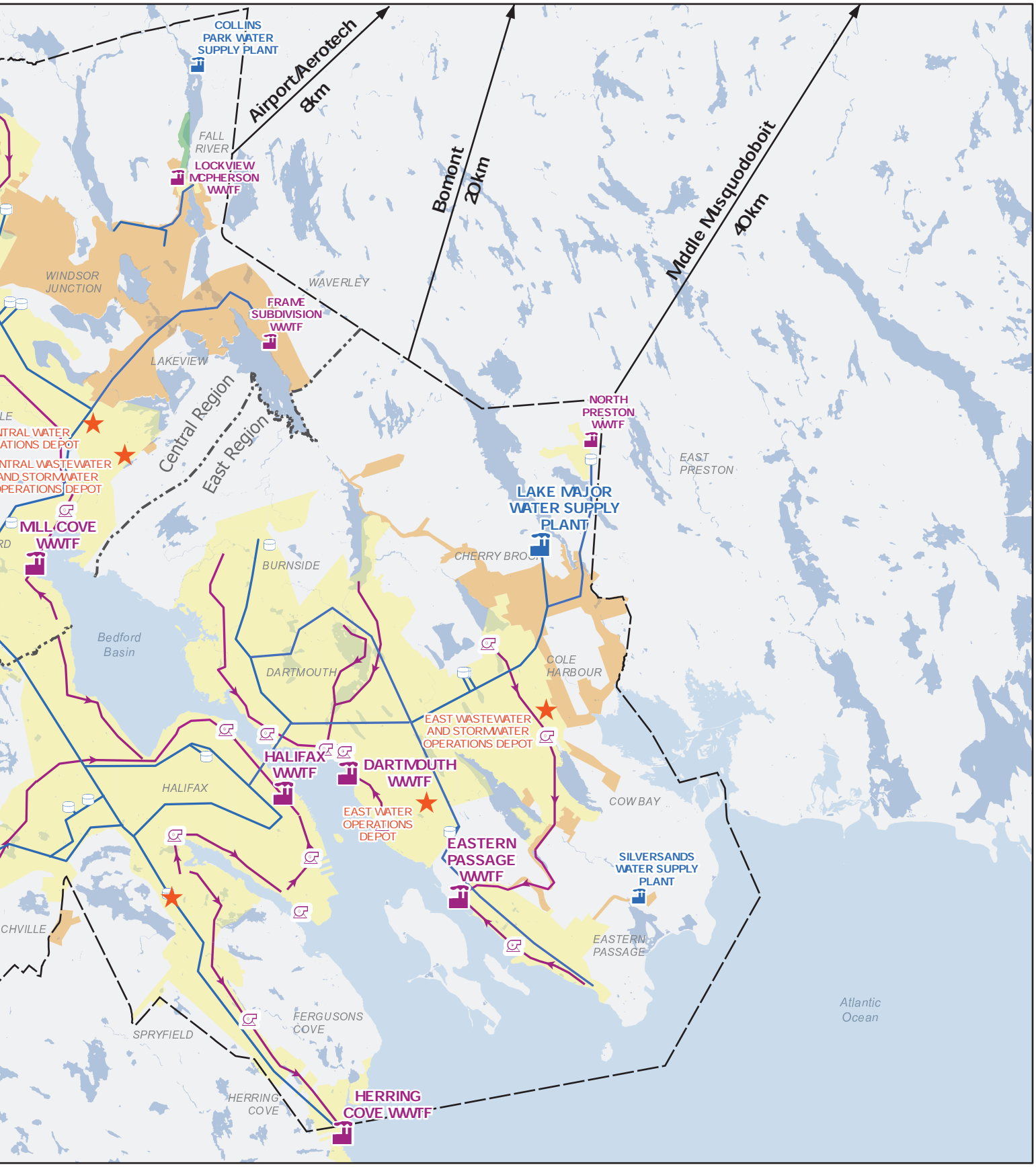


Halifax Regional Municipality has a Diversity and Inclusion Framework, and an office dedicated to Diversity and Inclusion and African Nova Scotian Affairs Integration Office. Halifax Water is a participant in the Diversity and Inclusion Leadership Working Group and is using materials and resources developed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




COLLINS PARK WATER SUPPLY PLANT
Airport/Aerotech 8km
Bomont 20km
Middle Musquodoboit 40km
FALL RIVER
LOCKVIEW MCPHERSON WWTF
WINDSOR JUNCTION
WAVERLEY
FRAME SUBDIVISION WWTF
LAKEVIEW
Central Region
East Region
NORTH PRESTON WWTF
EAST PRESTON
LAKE MAJOR WATER SUPPLY PLANT
CHERRY BROOK
MILL COVE WWTF
BURNSIDE
Bedford Basin
DARTMOUTH
COLE HARBOUR
EAST WASTEWATER AND STORMWATER OPERATIONS DEPOT
HALIFAX WWTF
DARTMOUTH WWTF
HALIFAX
EAST WATER OPERATIONS DEPOT
COW BAY
EASTERN PASSAGE WWTF
SILVERSANDS WATER SUPPLY PLANT
EASTERN PASSAGE
Atlantic Ocean
FERGUSONS COVE
SPRYFIELD
HERRING COVE
HERRING COVE WWTF

# 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 $m^3$** |

| 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 $m^3$** |

| 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

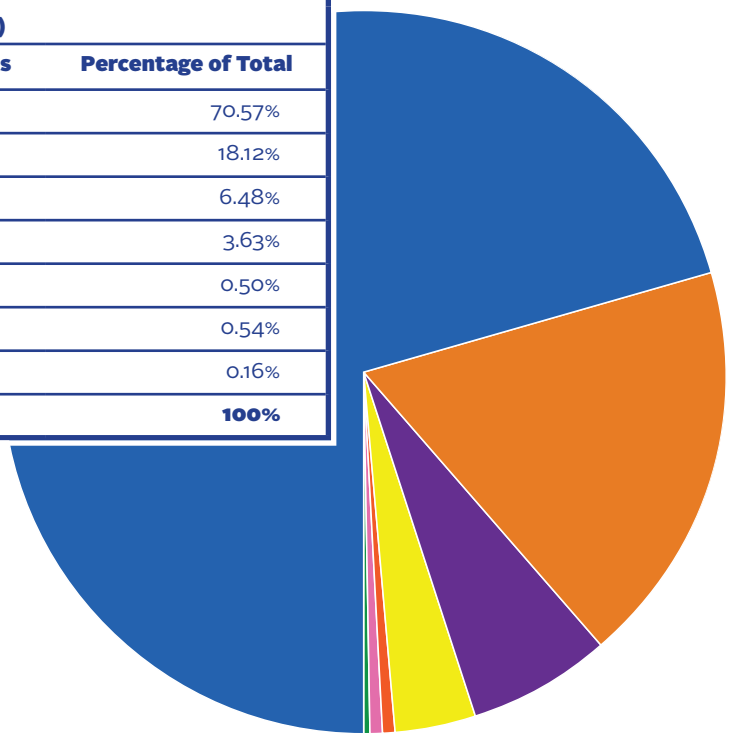
Halifax Water provides one or more of the following to our customers: water, wastewater and/or stormwater services. Those services support an estimated population of 383,000 people, and countless visitors to the region.

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 | - |

[A]Aluminum 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.

[B]Fluoride was not being added to the finished water at the Lake Major WSP approximately 75% of the time due to system maintenance.

[C]The 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 | - |

[A]Raw 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.

[B]The 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.

[C]Filtered trubidity 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 CaCO3) | 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 CaCO3) | 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 | - |

[A]The 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 | - |

[A]Ultra-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

**ITEM # 7-I**
**Halifax Water Board**
**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Louis de Montbrun
Digitally signed by Louis de Montbrun
Date: 2021.09.15 14:40:44 -03'00'
Louis de Montbrun, CPA, CA
Director, Corporate Services/CFO

**APPROVED:**
Digitally signed by Cathie O'Toole
Date: 2021.09.15 12:12:57 -03'00'
Cathie O'Toole, MBA, CPA, CGA, ICD.D
General Manager

**DATE:** September 10, 2021

**SUBJECT:** **2021/22 Cost Containment Initiatives**

---

## INFORMATION REPORT

## ORIGIN

- The Cost Containment Process as approved by the Halifax Regional Water Commission (HRWC) Board, October 3, 2013.
- April 14, 2015, Nova Scotia Utility and Review Board (NSUARB) Decision - HRWC General Rate Application (M06540).

## BACKGROUND

The process for cost containment as approved by the HRWC Board on October 3, 2013, called for the implementation of a number of recommended actions that would assist HRWC in addressing the Nova Scotia Utility and Review Board's (NSUARB) request for a more rigorous approach to cost containment. One key recommendation was the establishment of a reporting structure whereby, "*on a quarterly basis, the monthly financial report of the HRWC Board will also include an update on Cost Containment Initiatives*".

In the Decision on the 2015 Rate Hearing, the NSUARB directed HRWC to file annual reports on its efforts to contain operating costs of the utility, with this report to be filed no later than June 30 of each year.

## DISCUSSION

A Summary Report - Cost Containment Initiatives for 2021/22 is attached, with updated information as at September 10, 2021. This report shows the cost containment initiatives effecting operations for 2021/22 as a result of new initiatives implemented during the year and ongoing initiatives from fiscal years 2013/14 to 2020/21 inclusive. The inclusion of initiatives and amounts from prior years reflects an intentional focus on sustainable results over the long term. Estimated cost savings for 2021/22 are $6.7 million as outlined by category in Figure #1 below:

Figure #1

| | | |
|---|---|---|
| Procurement Strategies | $1,270,352 | 18.9% |
| Human Resource Strategies | $3,173,867 | 47.3% |
| Information Technology Strategies | $108,700 | 1.6% |
| Facilities/Process Strategies | $2,001,197 | 29.8% |
| Reduce Paper and Printing Costs | $38,415 | 0.6% |
| Technology and Business Process Changes | $112,138 | 1.7% |
| | $6,704,669 | 100.0% |

As shown above, cost containment initiatives are impacted most in the areas of Human Resource, and Facilities/Process and Procurement Strategies. Under Human Resource Strategies, the effects of pension plan re-design initiated in 2015/16 is one of the main contributors to cost containment savings in the current year. Annual savings related to pension plan re-design approximates $1.7 million, which represents 54% of the savings within Human Resource Strategies and 25% of the total projected cost savings for 2021/22. In addition, effective January 1, 2019, special payments made by the HRWC to fund the unfunded liability of the pension plan were eliminated resulting in cost savings of $0.8 million annually. Prior to January 1, 2016, special payments to fund the unfunded liability of the pension plan were approximately $3.0 million. The next actuarial valuation is required on or before January 1, 2022.

Facilities/Process Strategies contain initiatives of varying nature, however one of the main contributors in this category is Halifax Water's Energy Efficiency Program. Projects under this Program account for approximately $1.1 million of projected savings for the current year, representing 53% of savings within the category and 16% of the total projected savings for 2021/22. Some prominent initiatives under the program related to energy savings include the annual shutdown of the ultraviolet disinfection systems ($0.2 million), heat recovery processes ($0.1 million) and lighting upgrades at various facilities.

New cost containment initiatives implemented thus far during the 2021/22 fiscal year result in projected cost savings of approximating $0.3 million, and are highlighted for ease of reference on

the Summary Report - Cost Containment Initiatives attached. Cost savings from these initiatives are of an on-going nature, and fall within the following categories:

- Procurement Strategies, and
- Facility/ Process Strategies.

Procurement strategies from a capital perspective have led to much of the cost savings realized in the current year. For example, the 2019 MAG Fleet Use Audit led to a reduction in the Fleet Upgrade Capital Program in 2021/22 of $1.1 million, resulting in cost savings associated with depreciation expense of approximately $0.2 million annually. Adjustments were also made in the Sewer Jet Replacement Program where $0.3 million was trimmed from the capital budget by choosing to replace the chassis and perform modifications to an existing truck rather than purchase a new unit, again resulting in depreciation savings of an estimated $55 thousand.

On July 31, 2021 Halifax Water terminated its lease for office space which housed staff and external consultants, all of whom worked directly on ongoing capital projects of Halifax Water. The annual cost for the premises approximated $130 thousand, and although not directly considered operational savings, it is noteworthy as a cost containment initiative from a capital perspective, as ultimately associated costs would be allocated to depreciable assets through the capital process.

## BUDGET IMPLICATIONS

Available information on cost containment initiatives were taken into consideration in developing the 2021/22. Initiatives that impact future fiscal periods will be incorporated into budget cycles and processes of these future periods.

## ATTACHMENTS

Summary Report – Cost Containment Initiatives

Report Prepared by: Digitally signed by Allan Campbell Date: 2021.09.15 13:03:43 -03'00'

Allan Campbell, B. Comm, CPA, CMA
Manager, Finance, (902) 266-8655

**Halifax Water**
**Summary Report - Cost Containment Initiatives**
**Fiscal Year - 2021/22**

**ITEM # 7-I**
**Halifax Water Board**
**September 23, 2021**
**ATTACHMENT**

| # | Initiative | Comments | Year Initiated | 2021/22 Cost Savings |
|---|---|---|---|---|
| **1** | **General Budget Strategies** | | | |
| | Sub-total | | | $0 |
| **2** | **Procurement Strategies** | | | |
| | Insurance adjustment services - sole source relationship over a 10 year period | Halifax Water (HW) participated in a joint tender with Halifax Regional Municipality(HRM). Costs will be approximately 20% lower. | 2013/14 | $5,460 |
| | Standardized uniforms and clothing | Issuance of a bulk tender; centralization of purchasing and distribution function; possible policy change to "as required" rather than a quota system | 2013/14 | $20,000 |
| | Standardized boots | Issuance of a bulk tender; centralization of purchasing and distribution function; possible policy change to "as required" rather than a quota system | 2013/14 | $5,000 |
| | Customer account collections | Coordination of collection services related to closed customer accounts in conjunction with the Provincial Public Procurement Act, rather than outsourcing to private organizations | 2014/15 | $10,000 |
| | Lab Testing | Savings as a result of contract tendering | 2013/14 | $60,000 |
| | NSPI rate reclassification | Eastern Passage Wastewater Treatment Facility (WWTF) | 2014/15 | $16,000 |
| | NSPI rate reclassification | Duffus Street Pumping Station | 2015/16 | $15,000 |
| | Chemical purchasing | Able to purchase a corrosion inhibitor with a higher concentration of active ingredient, thus foregoing additional costs that would have resulted under current dosage requirements | 2015/16 | $400,000 |
| | Mobile devices - switched supplier and carrier | HW leveraged the mobility contract of the Province of Nova Scotia | 2016/17 | $48,000 |
| | Garbage collection - JD Kline Plant | A request for proposal (RFP) was put out to consolidate the garbage collection, which resulted in a cost savings with respect to internal man-hours and use of HW vehicles. | 2016/17 | $1,370 |
| | Utilizing HW staff to setup excavations sites | Using trained HW staff as TWS for job sites, unless outside traffic control personal are required | 2016/17 | $50,000 |
| | RFP for biosolids transport | As a result of a recent RFP, the is expected to be an approximate 33% cost reduction related to transporting biosolids from the Halifax, Dartmouth, Herring Cove and Eastern Passage WWTF | 2017/18 | $220,000 |
| | Traffic control | Using trained HW staff for the purposes of traffic control while working on HW excavations sites will result in cost savings of $750/day. This is based on an 8 hour day, including setup costs typically paid to the contractor. | 2017/18 | $50,000 |
| | Insourcing (Halifax Water's Annual Report) | The ability to perform in-house graphic design work versus contracting this work outside created savings with respect to the 2018 report of approximately $100/page. Recurring annual savings will fluxuate depending on the size of the report in subsequent years. | 2018/19 | $9,200 |
| | Equipment calibration | Internal staff are now able to calibrate fixed gas detectors instead of outsourcing this to a MSA technician service provider. | 2019/20 | $3,000 |
| | In-house training | Developed in-house method to purge primary sludge discharge line from primary gallery to the sludge holding tank. As a result and external contractor is no longer required to perform this work. | 2019/20 | $0 |
| | Reduction in sampling | Reduced the amount of lab testing over the year as greater reliance and confidence was placed on the new, in-line analyzers. | 2019/20 | $5,000 |
| | Elimination of a customer satisfaction survey | HW performs 2 customer surveys annually, the Forth Quarter Urban Report and the Atlantic Quarterly Survey. Upon review it was determined there was a redundancy in question asked between the 2 surveys therefore, it was decided to consolidate the questioning into the Forth Quarter Urban Report. | 2020/21 | $5,319 |
| | Drain covers | The cost of drain covers at the Mill Cove WWTF seemed excessive. After checking to ensure there were no regulation or design requirements related to the drain covers, a impermeable and flexible gasket material was sourced which enabled the replacement of 13 large (36"x 36") covers. | 2020/21 | $3,250 |
| | Reduction in fleet repair costs | Savings associated with the removal of 16 units from the fleet as a direct result of the Municipal Auditor General's audit of fleet in 2019, and subsequent action taken by Fleet Utilization Management for Halifax Water, for units that did not meet the minimum fleet utilization standards. | 2020/21 | $41,500 |
| | Reduction in depreciation costs related to Fleet | As recommended in the 2019 MAG Fleet Use Audit, the Fleet Upgrade Capital Program was reduced in 2021/22 by $1.1 million resulting in savings associated with depreciation costs over the next 5-years estimated at $0.2 million per year. | 2021/22 | $218,000 |
| | Reduction in depreciation costs related to discounted meter purchase | As the AMI metering project was concluding, an opportunity to purchase AMI meters in bulk became available, to take advantage of significant price savings from a capital perspective. | 2021/22 | $1,254 |
| | Reduction in depreciation costs related to Fleet | An adjustment was made to the Sewer Jet Replacement Program whereby, rather than replace an existing unit, it was decided to replace the truck chassis along with a complete rebuild of the tank, pumps and body assembly. Cost of a new unit would approximate $550 thousand compared to a budgeted cost of $275 thousand for the alternative chosen. | 2021/22 | $55,000 |
| | Operational cost savings related to purchase of a single axle, hydro excavation unit | After an successful pilot with a single axle, hydro excavation unit, it was decided to purchase the rental unit. It is expected the savings as a result of purchasing the unit versus outsourcing the work will be in the range of $28-$42 thousand per year, net of depreciation over a 7-year period. | 2021/22 | $28,000 |

**Halifax Water**
**Summary Report - Cost Containment Initiatives**
**Fiscal Year - 2021/22**

| | | | |
|---|---|---|---|
| Sub-total | | | $1,270,353 |
| **3 Human Resource Strategies** | | | |
| Heavy Truck and Equipment Service | the addition of a new Heavy Equipment Technician provides in-house maintenance service capabilities for the HW fleet. | 2013/14 | $100,000 |
| Beeper Pay | Elimination of an inconsistency between Water and Wastewater Services, as Water Services staff do not receive beeper pay. This involves 10 non-union staff in total. | 2013/14 | $75,000 |
| Accessing on-line training opportunities | More use of on-line training versus the traditional methods, including WHMIS and TDG renewals | 2014/15 | $2,241 |
| Background Checks | Out-sourced background checks to a new contractor. | 2015/16 | $654 |
| Workload, labor force assessment | A reduction in number of staff in Development Approvals. The volume of work did not warrant 6 planning technologists, and as a result this number has been reduced to 4. | 2015/16 | $140,000 |
| Pension plan re-design | Through the collective bargaining process, HW was able to negotiate pension plan re-design to make the plan more sustainable. It is estimated the employer's share contributions will decrease from the current 12.95% to 9.85% effective January 1, 2015. | 2015/16 | $1,700,000 |
| Re-structuring within the organization to create a new "Corporate Services" sector | January 1, 2016 saw the elimination of two (2) full time positions and a re-design of several other jobs. | 2015/16 | $35,000 |
| Workload, labor force assessment | January 1, 2016 saw the elimination the administrative assistant within Regulatory Services. | 2015/16 | $57,000 |
| Workload, labor force assessment | November, 2016 saw the elimination of a Compliance Sampling position as a result of a reduction in sampling requirements. | 2016/17 | $81,966 |
| Overtime reductions | Overtime has been reduced at the Harbour Solutions Plants with respect to sick leaves, vacation, etc. when weather conditions allow and operational needs are met. Also, Halifax WWTF staff are responding to after hours calls at the Dartmouth and Herring Cove facilities in an effort to minimize the need for overtime call-outs. | 2016/17 | $40,000 |
| Actuarial Valuation - January 1, 2019 | The actuarial valuation performed January 1, 2019 reported a surplus for the pension plan. As a result, special payments by Halifax Water to fund the unfunded liability are no longer required for at least 3 years when the next valuation is to be performed.. | 2018/19 | $618,900 |
| Modifications to the Pre-Retirement Leave Program | In June 2019, employees were given the opportunity to withdraw their accrued benefit under the Pre-Retirement Leave Program in the form of a lump-sum payment, rather than continuing to accrue a benefit under a modified program. The Pre-Retirement Leave Program had been closed to new, non-union employees hired after March 31, 2018, and is now effectively closed for all other employees hired after June 7, 2018. | 2019/20 | $260,000 |
| Hiring deferral | Hiring of the Administrative Assistant in Legal Services was deferred for at least two years. The position became vacant in May 2020, and savings of salary and benefits were realized. | 2020/21 | $63,105 |
| Sub-total | | | $3,173,867 |
| **4 Information Technology Strategies** | | | |
| Xerox managed print solutions | Rationalization and replacement of photocopiers and printers | 2013/14 | $20,000 |
| Network | Change in cost model by Eastlink, giving HW the new pricing | 2013/14 | $80,000 |
| Telephone land lines | Rationalization of services and eliminate duplication of resources as required | 2013/14 | $8,700 |
| Sub-total | | | $108,700 |
| **5 Facilities/Process Strategies** | | | |
| Chlorine Utilization - Pockwock | Discontinuation of the pre-chlorination process | 2013/14 | $40,000 |
| Lab Testing | Price benefits from purchasing product from a different source mainly affecting the Harbour Solution Plants | 2013/14 | $105,000 |
| Pumper Truck Utilization | pilot project to be scheduled initially for stormwater customers only as a test | 2013/14 | $130,000 |
| Waste oil boiler system - Herring Cove WWTF | new system to allow the use of waste oil from Metro Transit as an alternative heating source | 2014/15 | $13,250 |
| System sampling for HPC's | sampling was reduced from weekly to monthly | 2014/15 | $8,025 |
| NSE system assessments | Assessment reports are being completed in-house rather that being outsourced | 2014/15 | $25,000 |
| Decommissioning of the Bedford South pumping station | The developer driven system expansion will permit the use of gravity and pressure reduction rather than the pumping station | 2014/15 | $15,000 |
| Lighting upgrades - Bennery Lake WSP | | 2014/15 | $4,793 |
| Insulation upgrades - Bennery Lake WSP | | 2014/15 | $36,000 |
| Lighting upgrades - Eastern Passage WWTF | | 2014/15 | $7,880 |
| Lighting upgrades - Dartmouth WWTF | | 2014/15 | $22,542 |
| Lighting upgrades - Herring Cove WWTF | | 2014/15 | $13,744 |
| Lighting upgrades - Halifax WWTF | | 2014/15 | $29,845 |
| Lighting upgrades - Aerotech BPF | | 2014/15 | $19,109 |
| HVAC upgrades - Eastern Passage WWTF | | 2014/15 | $20,711 |
| HVAC upgrades - Roach's Pond pumping station | | 2014/15 | $13,500 |

**Halifax Water**
**Summary Report - Cost Containment Initiatives**
**Fiscal Year - 2021/22**

| | | | |
|---|---|---|---|
| MCC 190 cooling and heat recovery - Halifax WWTF | | 2014/15 | $13,164 |
| Aeration system upgrades - Eastern Passage WWTF | | 2014/15 | $76,382 |
| Orchard Park in-line turbine project | | 2014/15 | $28,007 |
| Wind farm - Pockwock WSP | | 2014/15 | $130,399 |
| Biogas CHP system - Mill Cove | | 2014/15 | $86,000 |
| Disposal of water treatment plant solid residual material | A new location for the disposal of the residual material was found | 2014/15 | $36,000 |
| Advanced investigative tool for leaks and structural condition of pipes | The current program has been halted as a cost containment initiative and as a result of the information received. | 2014/15 | $150,000 |
| E-delivery | Transitioning from traditional billing methods to e-delivery | 2014/15 | $20,000 |
| Change in Recycling Pickups | By changing the schedule for recycling pickups from bi-weekly to every three (3) weeks, the anticipated annual savings will range from $2,500 to $2,700. | 2015/16 | $2,700 |
| Highway #7 Booster Station Upgrade | Expected energy savings | 2015/16 | $14,300 |
| Dartmouth WWTF - UV Channel Isolation | Expected energy savings | 2015/16 | $59,460 |
| Halifax WWTF - Fixed Compressed Air Leaks | Expected energy savings | 2015/16 | $2,293 |
| Halifax WWTF - UV Channel Isolation | Expected energy savings | 2015/16 | $62,115 |
| Herring Cove WWTF - MCC 190 Cooling/Heat Recovery | Expected energy savings | 2015/16 | $8,496 |
| Sampling | Using internal staff at the Mill Cove facility to perform the required daily sampling at the facility, rather than the compliance staff, limiting their site visits to once a week. | 2015/16 | $4,160 |
| Process alternative | A centrifuge was rented for the Mill Cove WWTF (with the option to purchase) on a trial basis to dewater liquid sludge that typically would be transported to the Aerotech WWTF. The transport of the liquid sludge resulted overtime costs, as well as reducing the time available for HW truck to service other facilities. This process assisted the Aerotech in reaching its compliance goals and reduced overtime costs by an estimated 50%. This equipment will enable HW proceed with a digester clean out project, which would otherwise be sub-contracted at a cost of $200,000. | 2015/16 | $40,000 |
| Process change | It was decided that flanges for meter sizes greater than 2" would be the responsibility of the customer, since when meters are replaced, the flanges are not replaced. | 2015/16 | $4,854 |
| UV disinfection shutdown - HHSP and Eastern Passage WWTFs | Annual shutdown of UV disinfection system resulted in cost savings associated with electrical energy savings, peak demand reduction, | 2016/17 | $222,131 |
| Halifax WWTF - Carbon Scrubber By-Pass | Implemented April, 2016 | 2016/17 | $46,946 |
| Tools developed internally | Tools developed internally to install new operating nuts on buried valves. Previously nuts were lost on buried valves resulting in a need to excavate the valve and install new nuts. Cost savings are achieved regarding excavation and reinstatement. | 2016/17 | $20,000 |
| Spruce Hill transmission main | Two long term leaks were discovered in the transmission main resulting in cost savings from the perspective of water loss control. | 2016/17 | $3,000 |
| Utilization of industrial water | A new filter system was installed at the Eastern Passage WWTF that provides the capability to use the current industrial water system rather than potable water to deliver water to the polymer feed systems. | 2016/17 | $26,000 |
| Cost reductions (material transport) | Modifications to the screening/grit skip eliminated the need to purchase 2 new screening compactors, which also resulted in the amount of material transported of approximately 28 metric tonnes. | 2017/18 | $2,000 |
| Herring Cove WWTF - Carbon Scrubber By-Pass | Implemented April, 2017 | 2017/18 | $8,523 |
| Servicing oxygen monitors in-house | Technical Service staff have been trained by the manufacturer to service the fleet of personal gas monitors in-house, specifically the replacement of the oxygen sensor. These monitors, 165 in total, are used by all operation and treatment departments throughout the organization. | 2018/19 | $30,000 |
| Pumping Station Starters (4160V) | The pumping station starters were upgraded to vacuum starters, thus eliminating the need for annual servicing of the starters to be outsourced. Any maintenance can now be handled by in-house industrial electricians. | 2018/19 | $1,500 |
| Automated Flushing Stations | Automated flushing stations are now used to ensure the proper chorine residuals are achieved in all areas of the transmission and distribution system. Previously this operation was performed manually on a daily basis from approximately June to September. As a result labor and vehicle costs have been reduced accordingly. | 2018/19 | $8,000 |
| Corrosion Sampling | Corrosion sampling in the distribution system was reduced from bi-weekly to monthly in June, 2018, since enough baseline data has been collected and there are no immediate plans to change corrosion control in the near future. | 2018/19 | $12,600 |
| Alternative product | An alternative timing belt was introduced to replace the normal v-belt/sheave configuration, which reduced slippage between the v-belts and sheaves resulting in a reduction in power demand. The product has been installed at both the Halifax and Herring Cove WWTF, with the expectation of implementation at other wastewater and water facilities. | 2018/19 | $40,000 |
| Dosage Optimization | Desiccant filters were fitted to the polymer totes to prevent warm, moist air from contaminating the polymer dosed to thicken centrifuge and drum thickener solids. The polymer no longer reacts early with water before being dosed, thus allowing the optimization of the dose and preventing polymer waste, leading to reduced consumption. | 2019/20 | $20,000 |
| Alternative product | The HP biofilter exhaust fan motor belts will be replaced with syncrodrive timing belts, saving energy (electricity) through the prevention of slippage. Belts and sheaves have been purchased and will be installed in October, 2019. | 2019/20 | $4,500 |

**Halifax Water**
**Summary Report - Cost Containment Initiatives**
**Fiscal Year - 2021/22**

| | | | |
|---|---|---|---|
| Building maintenance | Installed new weather stripping in the overhead door in the truck bay at the AeroTech plant to reduce heating costs | 2019/20 | $1,500 |
| Polymer optimization | Began polymer optimization in an effort to ensure good quality biosolids as well as a good quality centrate without having excess amounts of polymer. Were able to reduce the feed rate from 60% to 21%. | 2019/20 | $15,000 |
| Improvements to aeration train | Installed a curtain in the aeration train to enable better mixing of the microorganisms with the chemical, thereby reducing chemical costs and providing better quality treatment. | 2019/20 | $15,000 |
| Optimization of polymer dosing (Mill Cove) | By implementing daily jar testing to determine the startup dose setpoint, polymer dosing was optimized. | 2019/20 | $14,000 |
| Belt drive change-out (Mill Cove) | Replacing the belt drive with a synchronous chain drive on a 30 horsepower blower resulted in a cost savings associated with energy consumption. | 2019/20 | $1,275 |
| Upgrading equipment (Mill Cove) | Upgrading the water flow meter used in the dilution of polymer resulted in lowering water usage in the process by approximately 20,000 litres per day. | 2019/20 | $12,000 |
| Fan belt/ pulley replacements - Mill Cove WWTF | Expected energy savings - based on 12,750 kWh | 2019/20 | $1,300 |
| Fan belt/ pulley replacements - Dartmouth WWTF | Expected energy savings - based on 177,980 kWh | 2019/20 | $20,000 |
| Preventative maintenance program established | A preventative maintenance program was created in conjunction with HW operations staff to clean centrifuge centrate lines weekly at a cost of $235. Clogging of centrate in the centrate lines were being experienced resulting in a backup in the centrifuge drum and bio-solids bin. Every 2-3 weeks it was costing approximately $1,000 to remove obstructions by an outside contractor, in addition to internal staff time and equipment. | 2020/21 | $10,000 |
| Centrifuge adjustments | Adjustments to the weir plate on both centrifuges at the dewatering facility allows more water to escape during the dewatering process, resulting in a product that is 6% dryer on average. Having a more compacted product results is fewer trucks going to the N-Viro facility saving on tipping fees. In addition, solids in the resulting product is now over 28% which is subject to a reduced rate, a savings of approximately $12/ tonne. | 2020/21 | $15,000 |
| Chemical substitution | Carbon source (Micro C) is a proprietary compound used as a food supply for micro-organisms in the denitrification process at the Aerotech WWTF, which is effective but quite expensive. HW has been able to source beer wort from a local brewery as a substitute for Micro C. Beer wort is a waste product in brewing beer which is high in carbon. | 2020/21 | $85,000 |
| Reduction in heating fuel costs | The installation of a 18,000 BTU heat pump in the admin area of the Leachate Facility, coupled with repairs to an existing unit in the lab area, resulted in heating fuel savings. | 2020/21 | $5,000 |
| Solar PV - COMFIT/ Renewable Energy Generation | Operational at the Halifax WWTF for the period January - March 2021 | 2020/21 | $5,051 |
| Fan belt/ pulley replacements - Eastern Passage WWTF | Expected energy savings - based on 118,348 kWh | 2020/21 | $13,366 |
| Harbour Solution Plants (2020/21) - Ventilation Air Heat Recovery | Expected energy savings for the Halifax, Dartmouth and Herring Cove WWTF | 2015/16 | $91,527 |
| Utilizing alternative assets to perform similar duties | Rather than using vacuum trucks to get loads of digested waste from Mill Cove on days when they are unable to centrifuge, the 2 new dump trucks from AeroTech are used. This will be done initially during long weekends and holidays when no dumping is available through the RE Group, at an estimated daily savings of $750. | 2021/22 | $8,250 |
| | Sub-total | | $2,001,197 |

**6 Reduce Paper and Printing Costs**

| | | | |
|---|---|---|---|
| Electronic HRWC Board Packages | Send Board packages out electronically rather than issuing hard copies | 2013/14 | $7,500 |
| Paperless Office within the HR Department | Creating electronic workflow | 2013/14 | $4,804 |
| Stewardship Report | The Stewardship Report will be published electronically only, with no hard copies | 2013/14 | $3,000 |
| Changes to document archiving | Transitioning file storage from outside contractor to public resources | 2013/14 | $3,175 |
| Changes to document archiving | Transitioning file storage from outside contractor to public resources | 2016/17 | $9,000 |
| Cost reduction associated with off-site storage | There has been an effort to reduce the number of boxes (documents) stored in facilities such as Iron Mountain, by sorting and purging documents in accordance with the document retention policy of the Commission. | 2018/19 | $10,000 |
| Cost reduction associated with the 23rd Annual Report (General Manager's office) | The annual report for the year ended March 31, 2019 saw the number of copies produced drop from 275 copies in the previous year to 150 copies. This represents not only a cost savings but also an environmental benefit associated with paper reduction. | 2019/20 | $936 |
| | Sub-total | | $38,415 |

**Halifax Water**
**Summary Report - Cost Containment Initiatives**
**Fiscal Year - 2021/22**

**7 Technology and Business Process Changes**

| | | | |
|---|---|---|---|
| Workload, labor force assessment | Through the utilization of technology, such as a Customer Relationship Management (CRM) system, a budgeted addition (customer service representative) has been removed. | 2015/16 | $47,605 |
| Workload, labor force assessment | Re-structuring by management within the advanced metering infrastructure (AMI) project as a result of technological efficiencies anticipated. | 2015/16 | $64,533 |
| | Sub-total | | $112,138 |
| | | | **$6,704,669** |

# ITEM 8-I
**Halifax Water Board**

**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board as Administrators for Halifax Water's Supplemental Pension Benefit Plans

**SUBMITTED BY:** Louis de Montbrun Digitally signed by Louis de Montbrun Date: 2021.09.15 10:33:46 -03'00'

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

**APPROVED:** Cathie O'Toole Digitally signed by Cathie O'Toole Date: 2021.09.15 12:14:13 -03'00'

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

**DATE:** September 10, 2021

**SUBJECT:** **Halifax Water Supplemental Pension Plan Report**

---

## INFORMATION REPORT

## ORIGIN

On April 28, 2016, the Halifax Water Board (the "Board") approved the creation of a Supplementary Pension Benefit Framework (Item #2Cb) for non-union staff members, as part of the re-design of the HRWC Employees' Pension Plan to improve financial sustainability of the plan, and to provide a supplementary pension framework that aligns with the Halifax Regional Municipality.

## BACKGROUND

The Halifax Regional Water Commission Employees' Pension Plan (the "DB Plan") is a registered, defined benefit plan providing pension benefits on pensionable earnings capped at $140,950, which represents the Canada Revenue Agency (CRA) maximum annual pensionable earnings for 2015. This cap will remain in place for a period of 8 years, ending in 2022, at which time it will increase at a rate of 1% per annum thereafter.

Pursuant to the framework approved by the Board as noted above, the Halifax Water Employees' Defined Contribution Plan (the "DC Plan") and a Notional Retirement Compensation Arrangement (the "NRCA") were established, effective January 1, 2017, and described below.

1. **DC Plan:**
   A registered, defined contribution plan providing pension benefits on members' pensionable earnings between the DB Plan cap and CRA maximum, annual pensionable earnings threshold. This is a contributory plan with the members contributing at a rate of 9% of pensionable earnings, which is matched by Halifax Water.

2. **NRCA:**
   A non-registered plan consisting of an agreement between Halifax Water and individual members, providing pension benefits on members' earnings exceeding the CRA maximum pensionable earnings threshold each year. The NRCA is a non-contributory arrangement with Halifax Water contributing 9% of a member's eligible earnings annually. Accumulated contributions and interest are held in trust for each member until their retirement, termination or death. Interest applied to members' accounts is based on the annual CANSIM rate.

## DISCUSSION

The Financial Report from Industrial Alliance (Appendix A attached) reports the revenues and disbursements for the DC Plan during the January 1, 2021 to August 31, 2021 period. The balance at the beginning of the period was $33.2 thousand. Revenues for the period consisted of new deposits of $5.7 thousand, and investment revenue of $3.5 thousand. Disbursements totaled $0.3 thousand, leaving a balance at the end of the period of $42.1 thousand. There were 6 active members in the DC Plan as at August 31, 2021, with disbursements pending from the plan related to a June 1, 2021 retirement.

As at December 31, 2020, the liability for Halifax Water associated with the NRCA member accounts was $48.4 thousand, with contributions of $15.6 thousand in 2020, and interest applied totaling $0.3 thousand for the year. There were 6 active members in the NRCA as at December 31, 2020. Further details respecting the NRCA can be found on Appendix B attached.

## ATTACHMENTS

APPENDIX A- Industrial Alliance Financial Group, Financial Report for the Halifax Water Employees' Defined Contribution Plan – January 1, 2021 to August 31, 2021

APPENDIX B - Notional Retirement Compensation Arrangement Dashboard at December 31, 2020

Report Prepared by: Heather Britten
Digitally signed by Heather Britten
Date: 2021.09.15 10:24:07 -03'00'

Heather Britten, Quality Assurance Officer 902-490-1895

Period from January 1, 2021 to August 31, 2021

Contract 42730-001
Summary of transactions

| | Book value | Market value |
|---|---|---|
| **Balance at the beginning of the period** | **$ 33,225.12** | **$ 33,225.12** |
| **Revenues** | | |
| **New deposits** | $ 5,710.50 | $ 5,710.50 |
| **Investment revenues** | $ 3,455.34 | $ 3,455.34 |
| **Total revenues** | **$ 9,165.84** | **$ 9,165.84** |
| **Disbursements** | | |
| **Deaths, withdrawals, other** | $ 0.00 | $ 0.00 |
| **Fees** | $ 221.84 | $ 221.84 |
| **Taxes** | $ 33.22 | $ 33.22 |
| **Total disbursements** | **$ 255.06** | **$ 255.06** |
| **Balance at the end of the period** | **$ 42,135.90** | **$ 42,135.90** |

**Halifax Water**
**Notional Retirement Compensation Arrangement**

| Annual Summary | | | | |
|---|---|---|---|---|
| Year | Opening Balance | Contributions | Interest Earned | Closing Balance |
| 2017 | $0.00 | $10,070.37 | $7.79 | $10,078.16 |
| 2018 | $10,078.16 | $10,149.62 | $121.76 | $20,349.53 |
| 2019 | $20,349.53 | $11,878.05 | $310.44 | $32,538.03 |
| 2020 | $32,538.03 | $15,508.59 | $338.48 | $48,385.10 |

# ITEM # 9-I

**Halifax Water Board**

**September 23, 2021**

**TO:** Craig MacMullin, MBA, CPA, CGA, Chair, and Members of the Halifax Regional Water Commission Board

**SUBMITTED BY:** Susheel Arora Digitally signed by Susheel Arora Date: 2021.09.16 12:57:06 -03'00'

Susheel Arora, M.A.Sc., P.Eng. Director of Operations

**APPROVED:** Cathie Gool Digitally signed by Cathie O'Toole Date: 2021.09.16 13:50:16 -03'00'

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

**DATE:** September 15, 2021

**SUBJECT:** **Transitioning from a Water Quality Master Plan towards a Risk Based Water Safety Plan Process**

---

## INFORMATION REPORT

## ORIGIN

Halifax Water has developed and maintained a Water Quality Master Plan (WQMP) since 2006 to guide research needs and investment in WQ initiatives. The WQMP has been historically renewed every five years with the next renewal scheduled for 2021.

## BACKGROUND

Starting in 2006, Halifax Water has completed a Water Quality Master Plan every five years to address optimization opportunities and research gaps at one or more of Halifax Water's drinking water treatment facilities. 2021 would mark the year for development of Water Quality Master Plan Version 4, and subsequent submission of Dalhousie University's proposal for a fourth term renewal of the National Sciences and Engineering Research Council of Canada (NSERC) / Halifax Water Industrial Research Chair in Water Quality and Treatment.

Over the past few years, several major changes in the research funding approach, Halifax Water's corporate structure and approach, and the industry's shift towards risk based decision making have presented opportunities to re-evaluate the way in which Water Quality Master Planning and determination of research priorities is completed.

In 2018, Halifax Water began developing an Enterprise Risk Management (ERM) program which included the creation of an ERM system and risk register to identify and prioritize risks. This was

partially in response to risk management best practices and recommendations from a 2017 Municipal Auditor General report "Halifax Water – Management of Drinking Water Safety". Phase 2 of this work included the development of Halifax Water's Risk Appetite and Tolerance definitions and measures. The risk appetite helps guide which areas of risk require management oversight and Board reporting, and aids in prioritizing mitigation actions for risk outside of the organization's risk appetite. The goal of the ERM program is to identify, address and assign ownership of corporate risks and tie capital spending to risk reduction and mitigation. In 2020, an Enterprise Risk Manager was hired to lead this program.

There are many jurisdictions in Canada and beyond that have been moving towards a Water Safety Plan (WSP) approach to managing water quality, including Iceland, New Zealand, Australia, Alberta and Ontario. This approach is proactive and focuses on staff engagement at all levels using risk management strategies to identify and address risks associated with water quality, rather than focusing on meeting end-of-pipe requirements reactively, which does not address long term operation, resiliency or systems understanding. Being tied to risk management, the Water Safety Plan approach can be integrated into Halifax Water's ERM program with water quality risks tied to corporate risks to help guide mitigative actions and resource allocation. The Water Safety Plan approach ensures a source to tap, multi-barrier approach, and engages staff at all levels to develop a comprehensive evaluation and action plan to improve water quality in both the short and long term, while it also anticipates and mitigates for scenarios that may impact water quality. Like ERM, the WSP approach involves a cycle of continuous evaluation and improvement to create a living program that identifies operational, capital and knowledge gaps.

Historically, the WQMP has been developed to help guide the NSERC/Halifax Water IRC (Industrial Research Chair) renewal process by identifying research needs to be addressed in the proposal. As a *"One Water"* utility, Halifax Water currently has separate research programs for both drinking water and wastewater. The current term for the drinking water research program (NSERC/Halifax Water Industrial Research Chair) ends in March 2022 and the wastewater research program (NSERC Collaborative Research Development (CRD)) term ends in March 2023. A submission will be made by Dalhousie University for a *"One Water"* NSERC Alliance Grant this fall, tying together both research programs. This proposal is outlined in the board report "Item 9, Support for Dalhousie University's NSERC Alliance Grant Proposal" that is also being presented to the Board in September 2021.

To align with the shift toward risk-based decision making, and industry best practice, Halifax Water will shift away from the WQMP and develop Water Safety Plans for its supplies to guide and prioritize capital investment, operational and research needs. The WSP approach will be developed this year, including development of a steering committee, selection of a framework and process for integration with ERM, and beginning the risk identification processes for all drinking water treatment plants. Unlike the WQMP which was on a 5 year static cycle, the WSP approach will be evaluated on a regular basis (i.e. annually or every other year) to be decided by the steering committee, and research needs based on water quality risks will be identified during each cycle which will then feed into the research renewal proposal cycle at the appropriate time.

While the timing of WSP development at this point in time does not feed into the specific research renewal timeline of this fall for submission, the major risks and research needs for drinking water

quality at this time are all related to supporting the Water Supply Enhancement Program, and moving towards climate-adapted monitoring and technologies, which are the main goals of the Dalhousie NSERC Alliance Grant Proposal. Major areas of research in the proposal on the drinking water side include:

- Enhanced monitoring and data management to identify source water quality trends and future state due to lake recovery and climate change,
- Selection of appropriate technologies to meet a range of future water quality needs to provide system robustness while continuing to meet increasingly stringent regulatory requirements,
- Ensuring transition from existing to future water treatment processes does not lead to unintended consequences downstream in the distribution system and at consumer taps.

## DISCUSSION

### History of the Water Quality Master Plan

The WQMP process started in 2006, and the three versions of the WQMP have been developed and used to support and guide the research objectives of the NSERC/Halifax Water IRC. Over the three versions of the WQMP, it has grown from a document that was primarily focused on optimizing the JD Kline Water Supply Plant (JDKWSP), to a plan to tackle challenges from source to tap for all plants. Implementation of the WQMP has been a combined effort between Halifax Water staff and a research partnership with Dr. Graham Gagnon at Dalhousie University, and ultimately consulting engineers and contractors who implement new design and policy as identified through research outcomes. The NSERC/Halifax Water Industrial Research Chair in Water Quality and Treatment has been an integral part of conducting the research that leads to internal policy and operational changes, treatment optimization opportunities, and ensures that Halifax Water is at the forefront of water quality research and active in the development of best practice for water utilities. A summary of each of the previous WQMPs and associated research and operational outcomes can be found in the appendix at the end of this report.

### Challenges Continuing the Historical WQMP Approach

As Halifax Water transitions to the *"One Water"* approach, the research partnership should mirror this shift as well. In 2020, Center for Water Resources Studies (CWRS) received a 3-year NSERC CRD grant for wastewater research led by Dr. Amina Stoddart. This program will end in March 2024.

Historically, the WQMP has been written by either consultants or the Water Quality Manager, with minimal staff engagement across departments and levels within the organization. Halifax Water is moving towards a more integrated approach, using risk management through Enterprise Risk Management (ERM) to drive resource allocation, and break down silos between departments to ensure strategic priorities and direction are met. Moving the WQMP process towards a more engaged process including operations staff, asset management, engineering and research partners in the process will ensure true risks and needs are identified for both the short and long term, but

will also ensure buy-in and understanding at all levels for resource requirements to address and minimize risks to water quality based on corporate risks and risk tolerances.

**What's Changing – Water Quality Master Plan to a Water Safety Plan and integration with ERM**

Moving away from the historic WQMP structure is an opportunity to improve and take on a risk evaluation-based framework that engages employees throughout the utility. This type of framework is commonly referred to as a Water Safety Plan (WSP) approach and ties in well with the direction that the utility is moving with ERM. Originally developed by The World Health Organization, WSPs are used all over the world in many different climates, utility sizes, and economic situations. WSPs are required for water utilities in Alberta and Ontario (referred to as Water Quality Management Programs in ON) so they are not new in Canada and there are already templates/existing plans, and lessons learned that Halifax Water can draw from. This change in direction to embrace WSPs also aligns with the United Nations Sustainable Development Goal 6 regrading Clean Water and Sanitation.

A WSP can be a plan that identifies areas that require improvement or research just like the WQMP, except it will ensure the focus is on the aspects that present the biggest risks to providing safe drinking water. While the WSP will not be a formal document outlining specific research objectives, it will still integrate well with research planning for our research partners. Because of the iterative nature of a WSP it will be constantly evolving and updated so it will always be a valuable resource to draw current information and priorities from. The WQMP is static, with updates every five years, which means some of the goals/information will not be as pertinent as they were when the WQMP was drafted. This became clear when the lake recovery process was identified as a risk to source water quality changes, as this led to a significant shift in research direction and priorities, and ultimately, significant capital spending through the Water Supply Enhancement Program.

**WSP Process**

A WSP, as outlined by the World Health Organization, is an iterative process (Figure 1) with 11 modules:

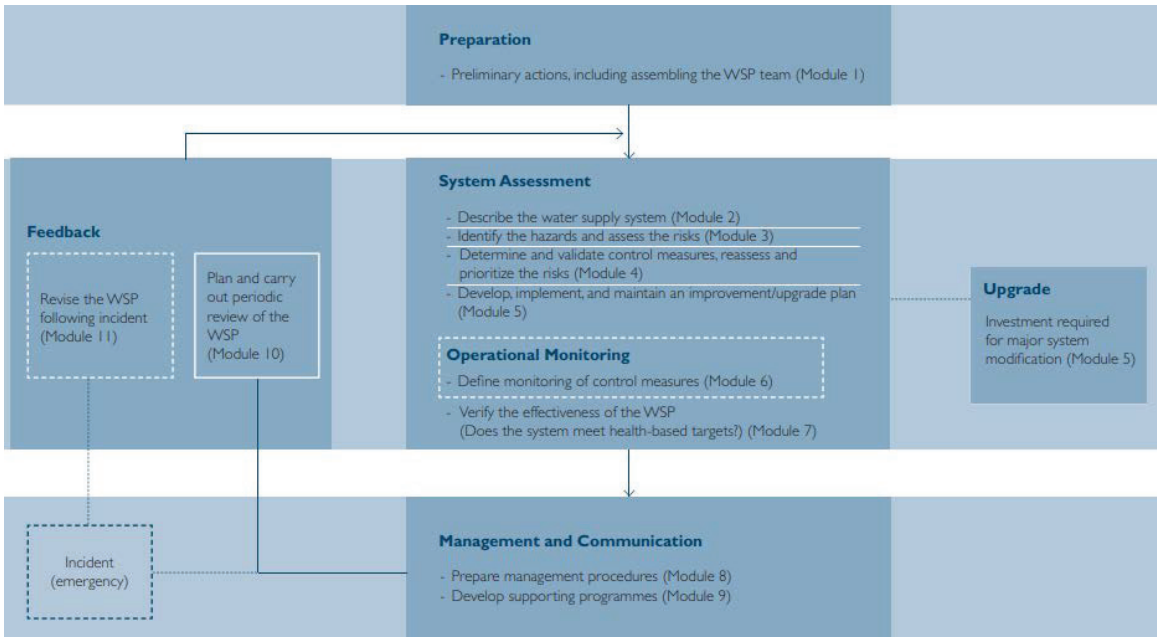



***Figure 1-*** *Iterative Water Safety Plan process as presented by the World Health Organization*

A WSP to some degree is a detailed system assessment with risk evaluation for each component, updated on a regular basis. A WSP arms the utility with information that allows it to make informed decisions to minimize or avoid future events that pose a risk to the utility's ability to supply safe drinking water. A WSP will also provide a foundation from which Halifax Water can draw information to develop system assessment reports as required by Nova Scotia Environment every ten years, with the next cycle due in 2023.

**WSPs in Canada and Around the World**

WSP are required by several countries including Australia, New Zealand and Iceland and are also required by some provinces in Canada; Ontario & Alberta. Many jurisdictions are moving towards this type of approach and it is possible that it will become a regulatory requirement in Nova Scotia in the future. With the rest of the industry continuing to move towards these risk-based frameworks, it would be wise for Halifax Water to adopt this approach as well. Where WSP are not yet regulated by Nova Scotia Environment, there are many examples of successful WSPs that Halifax Water can draw from to develop a WSP that suits our needs.

**WSP & ERM**

A WSP contains many of the same components as an ERM program, specifically in the way risks are identified and quantified. While ERM encompasses risk at a utility wide level, a WSP is much more specific to the threats that directly relate to providing safe drinking water to our customers. Much like an ERM program, a WSP begins by identifying potential risks and then assigns them a score for likelihood and severity. The WSP will be able to provide more information to the ERM program and give more specific threats to the utility with respect to water quality, and since the ERM framework is already being built, much of the WSP in terms of risk analysis will be a mirror to ERM.

Adoption of a WSP will also engage staff across the utility through cross departmental involvement in the Steering Committee and stakeholder engagement in workshops. Because there are so many ways in which drinking water quality can be affected, the WSP team will be comprised of people from many different parts of the organization. Having a process that facilitates the transfer of knowledge and creates a channel for information to travel through and informed decision making will ensure Halifax Water is allocating resources to the greatest value in reducing current and future risk.

**Other benefits of a WSP**

A WSP can be a useful tool for several groups outside of Water Quality including Operations, Asset Management and Engineering. The WSP can supply critical information to Asset Management that will allow the ability to factor risk in a way that is consistent throughout the utility. A WSP will identify the critical control points in the system which can help to ensure assets are managed in a way that is respective of their risk.

With the WSP being a continuous improvement process, Halifax Water will be able to provide justification for resource allocation based on risk, track improvements over time, and identify new and emerging risks that can be scored and prioritized to ensure effective and timely mitigation. Using this process will ensure that the highest risks to water quality are being addressed adequately.

## ATTACHMENTS

See Summary of Highlights - WQMP on Page 7 of this report.

Report Prepared by: Wendy Krkosek Digitally signed by Wendy Krkosek Date: 2021.09.16 13:02:35 -03'00'

Wendy Krkosek, Water Quality Manager, (902) 483-4432

## SUMMARY OF HIGHLIGHTS - WQMP

Below is a summary of highlights from previous versions of the WQMP and the research and operational outcomes associated with each plan.

### 1.1 WQMP 1 (2006)

The inaugural WQMP was developed in 2006 by consultants and was Halifax Water's first effort at strategic water quality planning. The pace at which regulatory change to water supply systems occurred had accelerated tremendously in the five years leading up to the drafting of this report, largely as an outcome of the events in Walkerton Ontario in 2000 and subsequent release of the Nova Scotia Treatment Standards in 2002. The WQMP aimed to allow the utility to anticipate regulatory changes and water quality changes so that long term water quality goals could be developed and that proactive measures could be taken to meet future regulations. Acting proactively would allow the utility to adapt to future regulations in the most cost-effective way and help plan for required future capital expenditures.

WQMP 1 focused on optimizing the processes at JDKWSP, specifically focusing on particulate and organics removal along with achieving adequate chlorine residual throughout the distribution system while minimizing disinfection byproducts (DBPs). The WQMP also acknowledged that process changes could have a large impact on waste treatment costs, so proper consideration of this process was important and meeting the wastewater permit requirements was added as a WQMP goal.

To achieve these goals, the JDK Pilot Plant was created and used as a tool to evaluate the effectiveness of process changes. The Pilot Plant is still operational today and was used in many different projects over the first 5-year WQMP timeframe including coagulant studies, mixing studies, filter media studies, and filter operation studies. The Pilot Plant has proved to be a valuable tool for the utility and many findings from research projects in the Pilot Plant have been scaled up to full scale operations successfully.

Some of the key research outcomes were:

- Flocculation tank computational fluid dynamics (CFD) modeling, which showed there was poor mixing due to dated design and the plant not operating at the design flowrate
- Investigation of alternate coagulation chemicals showed that with existing processes, the existing coagulant was the optimal choice for natural organic matter removal.
- The role that coagulation process changes can have on the distribution system, specifically the role they play in lead release. These findings highlighted the importance of considering downstream impacts from seemingly innocuous coagulation or process chemistry changes.
- Quantitative Microbial Risk Assessment (QMRA) studies revealed that JDKWSP was capable of meeting acceptable risk levels with respect to *Cryptosporidium, Giardia,* and *E. coli* under worst case initial conditions in the watershed.

- Characterization of Natural Organic Matter (NOM) in Pockwock lake and the JDKWSP treated water was completed. This gave an indication of the seasonal changes of NOM and the overall treatment performance for removing certain organic fractions.
- Pilot and full-scale studies showed that filter resting sufficiently reduced risk associated with particulate breakthrough and proved to the regulator that installation of a filter-to-waste system was not necessary.

Several monitoring programs were also adopted as a result of the WQMP:

- EPA Source Water Monitoring for Crypto/Giardia
- Source Ware Monitoring Programs
- International Water Treatment Alliance (IWTA) Program for Filtration Performance
- Chlorine Residual Profiling
- EPA Initial Distribution System Evaluation (IDSE)
- Real Time CT Monitoring

### 1.2 WQMP 2 (2011)

The second iteration of the WQMP was completed by the Water Quality Manager and shared many of the fundamental goals of WQMP 1. There was a shift to move towards supporting treatment plant operations and water quality from a day to day perspective in addition to long term improvements. WQMP 2 also expanded its research goal beyond JDKWSP and addressed several operational challenges present at other treatment facilities. Adapting a more pro-active approach to monitoring and optimizing both treatment operations and water quality, focusing efforts towards monitoring and understanding distribution water quality and performance was also a focus of WQMP 2.

Halifax Water developed global and specific water quality goals as part of the WQMP 2, where the global goals encompassed the overall objective of the specific goals. The global goals were broken into; Compliance, Source Water Quality, Water Quality and Treatment, Distribution System Water Quality, and Customer Expectations. The specific goals were:

- The continued optimizing of the basic treatment process to improve particle removal.
- The continued improvement of the disinfection process while also minimizing disinfection by-products.
- The continued analysis of the impact that treatment processes have on waste streams.

WQMP 2 also noted areas for improvement in the utility as a result of the research done during WQMP 1. For example, WQMP 2 noted the potential for a large reduction in DBPs if JDKWSP could eliminate pre-filter chlorination, which was realized at JDKWSP when piloting and subsequent full-scale conversion to biofiltration was studied and implemented and a reduction of DBPs was realized.

Water quality monitoring programs continued to evolve under WQMP 2, including corrosion control and biological monitoring programs for the distribution system. This data was used to further understand/optimize the utility's systems and give context to future results. Many lessons were learned from these monitoring programs, and they helped shape the monitoring programs that Halifax Water has in place today.

A large focus of WQMP 2 was on understanding and minimizing lead release at customer taps. Several research outcomes have led to changes in policy and practice at Halifax Water, but also across the broader water community in North America. For instance, research showed that partial lead service line replacements could actually lead to higher lead release for months following replacement, which has led to development of industry wide guidance through the American Water Works Association (AWWA) and now the United States Environmental Protection Agency (USEPA), to not conduct partial replacements, a practice adopted by Halifax Water in 2012. Further study on corrosion control chemicals and dose have allowed Halifax Water to move towards a more effective corrosion control regime, minimizing lead release at the tap. Research during this timeframe also brought to light the fact that to truly minimize lead release, Halifax Water would need to establish a robust lead service line replacement program, as corrosion control in and of itself can reduce, but not eliminate lead exposure. From this outcome, the lead service line replacement program approved by the Board in 2016 was born.

### 1.3 WQMP 3 (2016)

The third WQMP continued to build on the fundamental goals of WQMP 1 & 2, while adapting to the new challenges that emerged over this time period. These challenges were listed as follows:

- **Changing Source Water Quality.** Due to lake recovery from reductions in acid rain and the effects of climate change, Halifax Water's primary water sources are undergoing a quality change that will challenge the capabilities of our treatment plants. This has formed the basis of the Water Supply Enhancement Program and significant capital investment in robust and resilient treatment technology to meet future water quality trajectories.

- **Water Treatment**. The effects of aging plants, and source water quality changes require Halifax Water to look at the effectiveness of our treatment processes. WQMP 3 highlighted the need to examine whether current processes are suitable for long term efforts and also to come up with short term solutions to provide effective robust treatment capability while long term solutions are explored. Pilot plant investigations into coagulation regimes (both dose and polymer addition) has shown the importance of monitoring parameters such as zeta potential in ensuring chemical changes provide desired outcomes, and has provided a path forward for the short term to provide optimal finished water quality with existing processes that differ from historical chemical regimes.

- **Lead.** Research has revealed that removing lead service lines from the system, combined with optimal corrosion control, is the best way to protect customers from exposure to lead. Research during WQMP 3 has highlighted the complicated interactions between lead release and other water quality parameters including manganese, iron, aluminum and NOM. The outcome of

this research shows the need to both optimize corrosion control practices but also optimize finished water quality to further minimize lead release. Recent changes to the chemical regime at JDKSWP, guided by outcomes of the pilot plant, will reduce aluminum residuals and finished water NOM in the distribution system and improve distribution system water quality.

- **Data.** Halifax Water has accumulated an immense resource of water quality data which can be used to implement emerging tools including dashboards, modeling, data analytics and machine learning. The Water Research Foundation Tailored Collaboration project with Hazen and Sawyer has led to development of a decision support framework using Power BI that can be used to understand both short term and long term trends in source water, plant performance and distribution system water quality. Through a capital program, Halifax Water is also in the process of moving water quality data from WaterTrax, an online database with limited reporting and analytics capabilities, to a new platform through Klir, which will allow for better planning, data collection and management, quality control and assurance, and use of analytics to visualize and make use of the data for proactive response to water quality changes. Furthermore, in 2021, Halifax Water successfully applied for a 2-year MITACs Accelerate Industrial Post-Doctoral internship with Dalhousie for Dr. Ben Trueman to develop machine learning and modeling approaches to develop long term corrosion control and disinfection byproduct control strategies that are responsive to changing water quality with implementation of the Water Supply Enhancement Program.