

January 19, 2018



Ray Ritcey, Chair
Halifax Water
Halifax, NS

The regular meeting of the Halifax Water Board will be held on Thursday, January 25, 2018 at 9:00 a.m. in the Boardroom at 450 Cowie Hill Road, Halifax.

AGENDA

In Camera Reports

- 1C Approval of Minutes of the In-Camera Meeting held on Thursday, November 30, 2017
- 2C Business Arising from Minutes
 - a) Governance Matter – Verbal
- 3C Personnel Matter
- 4C Land Matter

Regular Reports

- 1. a) Ratification of In-Camera Motions
 - b) Approval of the Order of Business and Approval of Additions and Deletions
- 2. Approval of Minutes of the Regular Meeting held on Thursday, November 30, 2017
- 3. Business Arising from Minutes
 - a) Five Year Business Plan [2018/19 to 2022/23]
- 4. Operating Results for the Nine Months ended December 31, 2017
- 5. Proposed 2018/19 Capital Budget
- 6. Proposed 2018/19 Water, Wastewater and Stormwater Operating Budget
- 7. Proposed 2018/19 Business Plan
- 8. Halifax Regional Water Commission Employees' Pension Plan (the "Pension Plan") 2018 Budget
- 9. Integrated Stormwater Management Policy

Information Reports

- 1-I Operations and Financial Monthly Update
- 2-I Capital Budget Approvals to Date
- 3-I Bank Balance
- 4-I Annual Customer Survey
- 5-I 2017/18 Cost Containment - Quarter 3

Original Signed By:

James G. Spurr
Secretary

**HALIFAX REGIONAL WATER COMMISSION
MINUTES**

November 30, 2017

PRESENT: Commissioner Ray Ritcey, Chair
Commissioner Russell Walker, Vice Chair
Commissioner Darlene Fenton
Commissioner Craig MacMullin
Commissioner Lisa Blackburn
Commissioner Steve Streach

REGRETS: Commissioner Lorelei Nicoll
Commissioner Jacques Dubé

STAFF: Carl Yates, General Manager, HRWC
Cathie O'Toole, Director, Corporate Services, HRWC
James Spurr, Legal Counsel, HRWC
Lorna Skinner, Administrative Assistant, HRWC

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- a) Board Meeting Format**
- b) Unregulated Business Process and Authority Guidelines - Update**
- c) Fall River Water Service Extension - Update**
- d) Financing for Replacement of Private Laterals**

4. OPERATING RESULTS FOR THE SEVEN MONTHS ENDED OCTOBER 31, 2017 4

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CALL TO ORDER

The Chair called the regular meeting to order at 9:02 a.m. in the Board Room of the HRWC, 450 Cowie Hill Road. The Board moved In Camera at 9:02 a.m. and the regular meeting reconvened at 9:25 a.m.

1a. RATIFICATION OF IN-CAMERA MOTIONS

MOVED BY Commissioner Blackburn, seconded by Commissioner Walker that the Halifax Regional Water Commission Board ratify the In-Camera motions.

MOTION PUT AND PASSED.

1b. APPROVAL OF THE ORDER OF BUSINESS AND APPROVAL OF DELETIONS

The Chair requested that Appointments to Committees of the Board be added to the Agenda as Item 10.

MOVED BY Commissioner Fenton, seconded by Commissioner Streach that the Halifax Regional Water Commission Board approve the order of business and approve additions and deletions with the above noted amendment.

MOTION PUT AND PASSED.

2. APPROVAL OF MINUTES – September 28, 2017

MOVED BY Commissioner MacMullin, seconded by Commissioner Fenton that the Halifax Regional Water Commission Board approve the minutes of September 28, 2017.

MOTION PUT AND PASSED.

3. BUSINESS ARISING FROM MINUTES

a) Board Meeting Format

A report dated November 15, 2017, was submitted.

Based on the feedback from Board Members, it was unanimously resolved that the current format for meetings be maintained and a Resolution to that effect was tabled. It was suggested that the Resolution be amended to include the continuation of Annual General Meetings. James Spurr will amend the Resolution.

MOVED BY Commissioner Walker, seconded by Commissioner Streach that the Halifax Regional Water Commission Board maintain the current format for meetings of the Board of Commissioners, as set out in the form of Resolution with the amendment to include an annual general meeting.

MOTION PUT AND PASSED.

b) Unregulated Business Process and Authority Guidelines

Ms. O'Toole stated that there is no new information to offer at this time. Work on this matter will resume in December.

c) Fall River Water Service Extension Update

Mr. Yates stated that HRM will be submitting an additional funding request to the Province to consider extensions to other areas within the serviceable boundary.

d) Financing for Replacement of Private Laterals

Ms. O'Toole stated that the Consumer Advocate is the only Intervenor. Approximately thirty information requests have been received on this matter. The deadline to file responses is December 12, 2017.

4. OPERATING RESULTS FOR THE SEVEN MONTHS ENDED OCTOBER 31, 2017

A report dated November 21, 2017, was submitted.

Cathie O'Toole gave a brief overview of the operating results which show very favourable results with a forecast to build on the existing operating surplus.

5. J.D. KLINE FILTER MEDIA AND UNDERDRAIN REPLACEMENT PROGRAM

A report dated November 21, 2017, was submitted.

Mr. Yates stated that work done on the first filter uncovered asbestos materials that had to be remediated and safely disposed of. As it is likely the remaining 7 filters contain the same materials, the cost estimate has increased and the funding amount for their replacement had to be revised.

MOVED BY Commissioner MacMullin, seconded by Commissioner Blackburn that the Halifax Regional Water Commission Board approve additional funding of \$4,100,000 for the J.D. Kline Water Supply Plant – Filter Media and Underdrain Replacement Program for a revised gross total estimated cost of \$9,847,060.

MOTION PUT AND PASSED.

6. PRELIMINARY FIVE YEAR BUSINESS PLAN (2018/19 – 2022/23)

A report dated November 24, 2017, was submitted.

Carl Yates gave a presentation on the five-year Business Plan and answered all questions to the satisfaction of Commissioners. He stated that the final version will include a revised capital budget for 2018/19 based on the revised funding approval for the Filter Underdrain

project at the J.D. Kline water supply plant. The final version will be brought back to the Board for approval at the January 25, 2018 meeting.

7. REVISED HALIFAX WATER PROCUREMENT POLICY

A report dated November 24, 2017, was submitted.

Cathie O'Toole gave an overview of the revised Procurement Policy. Ms. O'Toole stated that this policy is as closely aligned as possible with the procurement policies of both the Province and HRM and was updated to ensure compliance with the Canadian European Trade Agreement [CETA].

MOVED BY Commissioner Streach, seconded by Commissioner Fenton that the Halifax Regional Water Commission Board approve and adopt the revisions to the Halifax Regional Water Commission Procurement policy, effective January 1, 2018.

MOTION PUT AND PASSED.

8. FUTURE BOARD MEETINGS

A report dated November 28, 2017, was submitted.

The Chair asked that the date of November 8th be added to the recommendation for the annual budget/strategic planning process workshop.

MOVED BY Commissioner Walker, seconded by Commissioner Blackburn that the Halifax Regional Water Commission Board approve the meeting dates for the Board of Commissioners for the period commencing January 2018 and ending March 2019, such meetings to be held on the last Thursday of each month as noted below:
2018: January 25, March 29, June 21, September 27, November 8 (workshop) and November 29
2019: January 31 and March 28

MOTION PUT AND PASSED.

9. HALIFAX REGIONAL WATER COMMISSION REGULATIONS - AMENDMENT

A report dated November 28, 2017, was submitted.

MOVED BY Commissioner Streach, seconded by Commissioner Walker that the Halifax Regional Water Commission Board approve an application to the NSUARB to amend the Regulations, as set out in the form of Resolution attached hereto, to provide Halifax Water with authority to suspend service to a Customer who refuses to permit access to their premises for the installation, replacement, repair or service of Halifax Water's AMI water meter.

MOTION PUT AND PASSED.

10. **APPOINTMENTS TO THE COMMITTEES OF THE BOARD**

There are four Committees of the Board that require the representation of one or more Commissioners. A discussion ensued relative to respective appointments.

MOVED BY Commissioner Streach, seconded by Commissioner Fenton that Halifax Regional Water Commission Board approve the following appointments:

Executive Committee: Commissioners Ritcey and Walker

Audit and Finance Committee: Commissioners Walker, MacMullin and Ritcey

Environment, Health and Safety Committee: Commissioners Fenton, Blackburn and Nicoll

Pension and Benefits Committee: Commissioner MacMullin

MOTION PUT AND PASSED.

The next regular Board Meeting will be held on January 25, 2018.

The meeting was adjourned at 11:10 a.m.

James G. Spurr
Secretary

Commissioner Ray Ritcey
Chair

The following Information Items were submitted:

- 1-I Operations and Financial Monthly Update
- 2-I Capital Budget Approvals to Date
- 3-I Bank Balance
- 4-I 2017/18 Cost Containment
- 5-I HRWC Employees' Pension Plan Financial Report – 3rd Quarter, 2017
- 6-I HRM Pension Plan Investment Performance – 3rd Quarter, 2017

TO: Ray Ritcey, Chair, and Members of the Halifax Regional Water Commission Board

SUBMITTED BY: *Original Signed By:*

Carl D. Yates, M.A.Sc., P.Eng., General Manager

DATE: January 17, 2018

SUBJECT: **Five Year Business Plan [2018/19 to 2022/23]**

ORIGIN

Corporate business planning process. Halifax Water Board workshop of November 16, 2017 and Board meeting of November 30, 2017.

BACKGROUND

This past August saw the completion of 10 years of operation for Halifax Water as an integrated water, wastewater and stormwater utility after the transfer of wastewater and stormwater assets from HRM in 2007. The 2017/18 fiscal year also marks the third year of the previous five year business plan approved by the Halifax Water Board in October, 2014. This fall also saw the completion of the IT Strategic Plan to guide investments over the next 5 years. With this context, a workshop was held on November 16, 2017 with the Board and senior management to recalibrate business plans for current strategic drivers. With feedback from the workshop, staff presented a preliminary five-year Business Plan to the Board at the meeting of November 30, 2017. Based on the discussion and direction from the Board, staff have compiled the attached final draft of the Business Plan to serve as a guidance document for the implementation of programs and strategies over the next five years. The Business Plan is compiled in advance of the next iteration of the Integrated Resource Plan, scheduled for completion in spring, 2019, and well in advance of the next Rate Application that is anticipated to be filed with the Nova Scotia Utility and Review Board (NSUARB) in the fall of 2019.

DISCUSSION

The Five-Year Business Plan provides an overview of the framework and strategic drivers that impact the delivery of water, wastewater and stormwater services over the long term. The framework reflects a mature Cost of Service/Rate Design Manual, planned updates to the Integrated Resource Plan, and the approved Debt Strategy, all of which comply with directives

from the NSUARB. As previously disclosed to the Board at the workshop of November 16, 2017, operating and capital budgets will be impacted significantly by the pressing need to replace aging water, wastewater and stormwater infrastructure. The Business Plan presents the capital program and projected operating budgets for the next five years, and includes many major capital projects such as implementation of advanced metering infrastructure [AMI] in relation to the Customer Connect program. Along with many other customer focused projects, AMI will help transform Halifax Water into the utility of the future. The document also recognizes the increased importance of formal asset management, research, energy management and wet weather management programs to optimize service delivery and demonstrate value for our customers.

The attached document describes many of the risks and mitigation strategies that the Utility will face and adopt, respectively, in the short to long term. The Business Plan culminates with the main recommendation to submit a Rate Application to the NSUARB in the fall of 2019 to cover operational and capital programs for the test years of 2020/21 and 2021/22. In addition to this Rate Application, it is recognized that rate increases will be a theme over the long term and, as such, our communication strategy needs to be well presented to ensure customers recognize the value of public health and environmental protection embedded in the Utility's mission. In particular, it will be crucial to educate the public to realize that environmental protection has moved to a new level and infrastructure renewal supports our local economy and quality of life.

Senior Management developed the Business Plan with support from many employees in all departments. It is therefore important that information related to the Business Plan be shared with all employees to ensure our strategic direction is well understood and embraced. Accordingly, staff are requesting approval for the Five Year Business Plan in the substantive form attached.

BUDGET IMPLICATIONS

The financial implications are outlined in the projected Operating Statements included as Appendix G. The projected Operating Statements were developed to demonstrate the need for increased revenues in support of the proposed Rate Application in 2019.

ATTACHMENT

Five-Year Business Plan for 2018/19 to 2022/23 fiscal years.

Report Prepared by:	<u>Original Signed By:</u> Carl D. Yates, M.A.Sc., P.Eng., General Manager, 902-490-4840
Financial Reviewed by:	<u>Original Signed By:</u> Cathie O'Toole, CGA, MBA, Director, Finance & Customer Service, 902-490-3572



**STRAIGHT from
the SOURCE**

2018/19 to 2022/23 Five-Year Business Plan



Presented to HRWC Board
For Final Approval
January 25, 2018



HALIFAX WATER
Five-Year Business Plan
2018/19 to 2022/23

Glossary

AM	Asset Management
AMI	Advanced Metering Infrastructure
AWWA	American Water Works Association
BMPs	Best Management Practices
BOD5	Biochemical Oxygen Demand (5 Day Period)
BPF	Biosolids Processing Facility
CBOD	Carbonaceous Biochemical Oxygen Demand
CCC	Capital Cost Contribution
CCME	Canadian Council of Ministers of the Environment
CCTV	Closed Circuit Television
CIP	Capital Infrastructure Program
COSM	Cost of Service Manual
CSO	Combined Sewer Overflow
CUPE	Canadian Union of Public Employees
DIA.	Diameter
EM	Environmental Management
EMO	Energy Management Opportunities
EP	Environmental Protection
ERA	Environmental Risk Assessment
HHSP	Halifax Harbour Solutions Project
I&I	Inflow & Infiltration
ICI	Industrial, Commercial & Institutional
IFRS	International Financial Reporting Standards
IRS	Internal Responsibility System
IS	Information Systems
JOHSC	Joint Occupation Health & Safety Committee
LSL	Lead Service Line
m ³	Cubic Metre
NSE	Nova Scotia Environment
NSERC	Natural Sciences and Engineering Research Council
NSUARB	Nova Scotia Utility and Review Board
P2	Pollution Prevention
RWWFP	Regional Wastewater Functional Plan.
SSO	Sanitary Sewer Overflow
TRC	Total Residual Chlorine
TSS	Total Suspended Solids
UV	Ultraviolet
WEF	Water Environment Federation
WSER	Wastewater Systems Effluent Regulations
WWM	Wet Weather Management
WWTF	Wastewater Treatment Facility
WQMP	Water Quality Master Plan

HALIFAX WATER
Five-Year Business Plan
2018/19 to 2022/23

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- C. Water, Wastewater & Stormwater Service Districts and Supporting Infrastructure
- D. Approved Capital Budget – 2017/18
- E. Projected Capital Budgets for 2018/19 to 2022/23
- F. IT Strategy – Five Year Roadmap
- G. Projected Operating Statements – Consolidated
- H. Water Quality Master Plan – Version 3.0

HALIFAX WATER
Five-Year Business Plan
2018/19 to 2022/23

1. EXECUTIVE SUMMARY

With the completion of ten years of operation as an integrated water, wastewater and stormwater utility, Halifax Water is well positioned to continue its mission of stewardship. This responsibility extends to existing and future customers in the spirit of intergenerational equity, a key tenet of the Public Utilities Act. In that regard the utility intends to update the Integrated Resource Plan during the next fiscal year to take a long view of the investments required to deliver on the strategic drivers of asset renewal, growth and regulatory compliance. The IRP is foundational to the business plans of the utility along with the Cost of Service Manual (COSM) and Debt Strategy, which are both at a high level of maturation. Changes to the cost of service were approved by the Nova Scotia Utility and Review Board (NSUARB) in 2017 after the utility revised its rate structure for stormwater service. Of particular note, in accordance with industry best practice and feedback from customers, stormwater charges include an incentive for non-residential customers to reduce peak runoff and rates for residential customers include a tiered approach.

The Debt Strategy adopted by the utility for an efficient capital funding structure recommends a maximum debt service ratio of 35% and a debt to equity ratio of 40 to 60 %. As the sole shareholder, the Halifax Regional Municipality previously approved a blanket guarantee of Halifax Water debt as long as the debt service ratio is less than 35%, and a Dividend Agreement that expires in 2020.

It is acknowledged that the IRP developed in 2012 is not at a mature state and will benefit greatly from additional information collected since then and master plans that will be completed this coming year. Of the three strategic drivers included in the IRP, asset renewal will present the greatest challenge recognizing the backlog of investments in relation to the replacement of aging infrastructure.

The Business Plan for the five year period from 2018/19 to 2022/23 is being developed in recognition that the previous five year Business Plan is three years old and can benefit from revised projections based on current information. Several challenges and opportunities, of an operational and capital nature, will garner the attention of the utility over the next five years, namely:

- **Impact of Significant Current and Imminent Capital Projects** – There is a need to accommodate new debt payments and depreciation for the Aerotech Wastewater Treatment Facility expansion, the new main on the MacDonald Bridge, the Northwest Arm sewer rehabilitation, the Halifax peninsula transmission main renewal, Sullivan’s Pond storm sewer upgrade, Lake Major dam renewal, water treatment plant upgrades and the implementation of Advanced Metering Infrastructure.

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- **Future Capital Demands** – The current water, wastewater and stormwater rates are insufficient to meet the capital needs for sustainable infrastructure as identified in the IRP. The IRP acknowledges that wastewater and stormwater assets have been grossly underfunded historically. Institutional capacity will have to increase over the term of this Business Plan in order to deliver the expected capital projects.
- **Enhanced Customer Service** – The expectation of customers is increasing rapidly and the adoption of new technologies and business process is paramount to provide the best in customer service. Halifax Water has and will continue to invest in computerized maintenance management systems, new meter technology and a new telephony system that will enhance the customer experience through its Customer Care Centre.
- **Increasing Energy and Chemical Costs** – electricity and chemical costs will continue to increase at a rate higher than inflation.
- **Wastewater Research** – building on the success of the current drinking water research program with Dalhousie University, the utility is in the process of expanding the program to include wastewater to ensure that treatment plants are optimized and upgraded to meet the current federal wastewater regulations at the lowest cost.
- **Wet Weather Management** - the level of service offered by the utility can be increased if innovative business processes and technology are embedded in day to day operations for the ultimate protection of the environment.
- **Lead Line Replacement Program** – the utility will be ramping up its program to replace all lead service lines on the Halifax peninsula and downtown Dartmouth areas. This is based on industry best practice and recent research conducted in partnership with Dalhousie University. As Halifax Water is in the health protection business, complete lead service line renewal will be pursued for public health outcomes.

Although the previous business plan indicated a need to increase capital spending to match the requirements of the 2012 IRP, which stipulated average annual investments of \$131 million, this business plan presents a more gradual increase. This is to ensure customers do not experience rate shock and rates remain affordable. A rate smoothing strategy will be employed to keep annual increases in the single digit range. Capital budgets are anticipated to range from a low of \$72.5 million in 2018/19 to a high of \$109.4 million in 2020/21. As capital budgets increase, the utility will see related increases in debt and depreciation expense, the key drivers for revenue requirements.

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Over the course of the Business Plan, most operating expenses (excluding depreciation, energy and chemical costs) are projected to be stable with annual increases tracking at or below the Halifax Consumer Price Index [CPI. To mitigate cost increases associated with energy and chemicals, Halifax Water has a formal energy management program more fully described in this document.

Over the next five years, Halifax Water will likely file one rate application in the fall of 2019, for rate increases beginning in the 2020/21 fiscal year. Overall annual revenues will need to increase approximately 25% over the five-year period with the primary focus on the capital needs of wastewater and stormwater assets. Halifax Water is not alone in its quest for more sustainable funding. Unfortunately, wastewater and stormwater assets have been underfunded throughout North America, and other municipalities/utilities have made, or are making plans to increase rates. The projected rate increases associated with this business plan have been viewed in the context of customer affordability, with proposed rates less than 1% of median household income. The utility is proposing to continue with the H2O (Help to Others) program to support low income customers, with funding from unregulated activities.

Inherent in the business activities for Halifax Water is an obligation to provide value for customers as stewards of essential services. To that end, the business plan highlights very formal programs to deliver efficient and effective service through Asset Management, Energy Management, and Wet Weather Management programs. The Wet Weather Management program, in particular, presents an opportunity to improve service delivery at a lower cost and has already shown positive results. A structured approach is in place, similar to the process used by the utility for water loss control. Halifax Water is recognized as a world leader in water loss control and the corporate goal is to put wet weather management in the same category.

2. INTRODUCTION

In August of 2017, Halifax Water completed ten years as a “One Water” utility after the transfer of wastewater and stormwater assets from the Halifax Regional Municipality in 2007. The transfer was carried out in recognition that wastewater and stormwater assets were underfunded and only two of fifteen wastewater treatment facilities were in compliance with regulations. This was further documented in 2012 when the utility completed its first Integrated Resource Plan [IRP] to identify investments over a thirty year period under the strategic drivers of asset renewal, regulatory compliance and growth. As outlined in its last Five Year Business Plan for the 2015/16 to 2019/20 period, plans were put in place to make progress on all three strategic drivers. Over the last three years, Halifax Water made significant progress on wastewater treatment facility compliance and after the upgrade to the Aerotech plant is completed in early 2018, all wastewater treatment facilities will be compliant with the new federal wastewater system effluent regulations or operate under approved transitional authorizations. The utility has also kept pace with growth

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within the municipality and helped facilitate development while ensuring cost neutrality to the existing rate base, consistent with the Public Utilities Act. With respect to asset renewal, there has been steady progress to increase capital investments as contemplated in the IRP, although at a more moderate pace. These capital investments continue to benefit from better information and data collected over the last ten years.

The last five years were particularly rewarding for Halifax Water with the integration of water, wastewater, and stormwater service delivery. In conjunction with the established sustainability framework, key projects were advanced to take advantage of federal infrastructure programs, namely, the Building Canada Fund and the recent Clean Water and Wastewater Fund [CWWF]. Of particular note, \$20 million in funding was secured for the Aerotech WWTF upgrade from the Building Canada Fund and \$40 million was secured through the CWWF. The CWWF program was targeted towards infrastructure renewal projects and included; the replacement of old transmission water mains on the Halifax peninsula; the rehabilitation of the Northwest Arm trunk sewer by trenchless technology; replacement of the Lake Major dam; renewal of filter underdrains and media at the J.D. Kline water supply plant; and the upgrade and replacement of a deteriorated storm system downstream of Sullivan's Pond.

In order to close the gap on asset renewal funding, future rate increases are inevitable. These rate increases must follow the principle of gradualism to balance rate shock and affordability to customers. Accordingly, Halifax Water will attempt to implement its infrastructure investments with a smoothing strategy in mind. In conformance with the Public Utilities Act, all of these collective investments and associated funding must be based on cost causation principles and occur within the context of intergenerational equity. It is anticipated that additional funding from federal programs will be available to mitigate the impact on Halifax Water's rate base and thus temper otherwise higher rate increases.

At the start of the next five year business cycle, Halifax Water will complete the next iteration of the IRP for maturation of its strategic focus to not only upgrade deteriorating infrastructure and achieve compliance with regulations, but mitigate and adapt to climate change. Recent research indicates that climate change is accelerating, as evidenced by projections of sea level rise, more intense storm events, and changing precipitation patterns.

The next five years will see a renewed focus on customer service recognizing that the customer of today is not the customer of tomorrow. In keeping with this theme, Halifax Water has embarked on a transformational path to engage the customer through its Customer Connect project which will see the implementation of Advanced Metering Infrastructure across the entire service area. This project will complement the roll out of the operations maintenance management system [City Works] to ensure timely and accurate information for the Customer Care Centre to respond to the needs of the customer.

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3. CURRENT RATE STRUCTURES

Halifax Water has a Cost of Service based rate structure for water, wastewater and stormwater service, as approved by the Nova Scotia Utility and Review Board [NSUARB]. Rates are adjusted periodically when the cost of providing the service is out of line with the revenue generated by the existing rates. When an adjustment is required, Halifax Water makes an application to the NSUARB, and a formal public hearing process is held to ensure proposed rates are thoroughly reviewed in an open, objective and transparent manner.

Halifax Water has programs in place to contain costs, monitor rate affordability, and project and smooth future revenue requirements to ensure that customers are not shocked by sudden or dramatic rate increases.

3.1 Water Service

The existing charges for water service have been in place since April 1, 2016 and consist of two components – a base charge, and a charge that varies according to consumption of water. Water base rates vary by meter size and range from \$13.00 per month for a 15 mm (5/8”) diameter meter to \$1,575.00 per month for a 250 mm (10”) diameter meter. The consumption charge for water service is \$0.976 per m³. The water-rate structure also provides for a public fire-protection charge to the municipality based on a formula approved by the NSUARB.

3.2 Wastewater Service

The existing charges for wastewater service have been in place since April 1, 2016 and consist of two components – a base charge, and a discharge rate that varies in relation to water consumption. Wastewater base rates vary by meter size and range from \$14.00 per month for a 15 mm (5/8”) diameter meter to \$1,923.00 per month for a 250 mm (10”) diameter meter. The wastewater discharge rate is based on metered water consumption, and is \$1.753 per m³.

Halifax Water has a wastewater rebate program that is available to customers who use more than 1,000 m³ of water in a 12 month period and can demonstrate the volume of wastewater they discharge is less than the volume of water they use. This is covered by Section 22 of Halifax Water’s Rules and Regulations. As an example, large buildings or complexes with cooling towers may qualify for this rebate.

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3.3 Stormwater Service

Stormwater rates are established based on impervious area. The current rates for stormwater service have been in place since July 1, 2017. There are two stormwater rates – one billed to all customers to recoup the cost of collecting and managing stormwater from private property (Site Related Flow Charge) and one billed to the Halifax Regional Municipality (HRM) for collecting and managing stormwater from the street right of way (HRM ROW Charge). HRM, in turn, charges properties within the stormwater serviceable boundary to cover their portion of the ROW Charge, and Halifax Water collects and administers this charge on HRM’s behalf.

The Site Related Flow Charge for non-residential customers is \$0.135 per m² of impervious area. The Site Related Flow Charge for residential customers is based on the same rate per m² but residential customers are billed according to a flat rate per tier. There are five tiers and properties are grouped according to the amount of impervious area. The lowest tier is comprised of properties with less than 50 m² of impervious area – and they are exempt from the charge. The largest properties – those with 810 m² or more of impervious area, are charge \$81 a year. Most residential properties fall in Tier 2 or 3 and are charged \$14 or \$27 per year respectively

Effective October 1, 2017 Halifax Water is collecting the ROW charge on behalf of HRM, and the charge is currently set at \$39 per year, per property.

Properties that do not receive stormwater service are exempt from both the Site Related Flow Charge and the ROW Charge.

A stormwater credit program was implemented for Non-residential (Institutional, Commercial, Industrial) customers effective July 1, 2017. Non-residential properties with stormwater Best Management Practices (BMPs) like retention ponds that help manage peak flows may be eligible for a credit. Non-residential properties include multi-unit dwellings of four or more units.

3.4 Regional Development Charge

The Halifax Water Regional Development Charge (RDC) is a fee payable at the building permit stage of a new development to fund regional water and wastewater infrastructure expansion requirements related to growth. The RDC replaced the HRM Sewer Redevelopment and Trunk Sewer Charges and provides fairness across the rate base ensuring current customers do not subsidize new growth and development.

The Application for the Regional Development Charge (RDC) was presented to the Nova Scotia Utility and Review Board (NSUARB) on July 26, 2013. A Hearing in support of the Application was held December 2 to 5, 2013. On July 9, 2014, the NSUARB approved the first

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RDC rates, which included separate rates for the Urban Core and Satellite systems and the Airport/Aerotech system. These rates were subsequently consolidated when the two systems were combined for the purpose of cost recovery. The current rates for RDC have been in place since April 1, 2015 and there are separate rates for water and wastewater, which vary according to type of development – Single Unit Development, Multi-Unit Development, or Institutional Commercial Industrial [ICI] Development.

Money collected from the RDC funds upgrades and improvements to the regional wastewater and water systems that are required to accommodate growth anticipated within the municipality's Regional Plan. The infrastructure requirements were identified through the Regional Wastewater Functional Plan with growth related costs estimated at \$521 million, based on a 30 year growth horizon. Through the application process with the NSUARB, and input from Interveners, the growth horizon, and subsequently the infrastructure components were reduced to a 20 year growth horizon. The approved RDC reflected that change.

When the RDC rates were approved, Halifax Water committed to update the RDC on a 5 year cycle, or mid-cycle if any of the assumptions used in determining the RDC impact the value of the charge by +/- 15%. Since approving the RDC, Halifax Water has completed a more detailed Infrastructure Plan for the West Region of Halifax refining a portion of the overall plan to service projected growth. Halifax Water is presently securing consulting services to complete Infrastructure Plans for the East and Central regions. The completion of this study will enable an update to the RDC in 2018/2019.

In the interim, Halifax Water will be filing the updated infrastructure list with the NSUARB for the West Region in early 2018 to allow for on-going implementation of the infrastructure plan and uninterrupted growth. Prior to this application, Halifax Water will be conducting formalized stakeholder consultation.

With the next RDC update, Halifax Water will seek approval from the NSUARB to ensure the infrastructure plan and cost recovery are accurate and fair to the existing rate base and the development community.

4. COST OF SERVICE/RATE DESIGN

Halifax Water has Cost of Service based rates developed using industry best practice. There is a Cost of Service (COS) Manual which clearly guides how rates are calculated for water, wastewater and stormwater service. The Cost of Service Manual was based on American Water Works Association (AWWA) and Water Environment Federation (WEF) methodologies for cost of service/rate design.

The COS Manual was developed through a process of engagement with interested parties, including prior rate case interveners and the NSUARB. The COS Manual is a living document

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which is periodically updated to reflect current data and new information, to support any proposed changes in rates. All changes to the COS Manual must be approved by the NSUARB.

The current rates are in line with the COS Manual, and are a true reflection of the cost of providing service in all respects except for one aspect. Halifax Water has not included depreciation as an expense on contributed water and wastewater assets, and most stormwater assets.

5. WASTEWATER SYSTEM EFFLUENT REGULATIONS

The final Wastewater System Effluent Regulations [WSER] were enacted in June 2012. These regulations, made under the Fisheries Act, implement those aspects of the Canadian Council of the Ministers of the Environment [CCME] Strategy for the Management of Municipal Wastewater Effluent which fall under federal jurisdiction, namely the discharge of deleterious substances to fish habitat. The WSER defines the following as deleterious substances, and sets national standards for their discharge:

- Carbonaceous Biochemical Oxygen Demand [CBOD]; 25 mg/L
- Total Suspended Solids [TSS]; 25 mg/L
- Total Residual Chlorine [TRC – for facilities using chlorine disinfection]; 0.02 mg/L
- Un-ionized Ammonia; 1.25 mg/L as Nitrogen, at 15⁰C ± 1⁰C.

Wastewater treatment facilities [WWTFs] are authorized to discharge these substances at levels below the defined limits, provided that the effluent is not acutely lethal to trout as determined by standard toxicity testing. Facilities not in compliance with the limits were required to apply for a Transitional Authorization [TA] to deposit effluent exceeding those limits. The Authorization is valid for a period of 10, 20 or 30 years, depending on the risk level associated with the effluent, as determined by a defined risk-ranking system in the WSER.

Halifax Water obtained TAs effective January 1, 2015, for the Halifax and Dartmouth WWTFs, which remain in effect until December 31 of 2040. Both Halifax and Dartmouth WWTFs are medium risk, and would normally have 20 years to achieve compliance. However, both of these systems have Combined Sewer Overflows [CSOs] which are higher risk than the WWTFs. The WSER provides that for systems having at least one CSO which is higher risk than the WWTF, the compliance period for high or medium risk WWTFs may be extended from 10 or 20 years respectively, to 30 years (from 2010). CSO discharges must also be reduced beginning in 2041, after the TA has expired. Although there are no further details in the WSER regarding the reduction, such as extent and timing, Environment Canada staff have indicated by email that “*a significant reduction ... must be achieved immediately after the TA’s expiry date*”.

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Well before 2040, Halifax Water will need to begin planning and design, with associated funding, to reduce CSO discharges. This will require early identification of reduction mechanisms, and construction of such mechanisms, so that they will be in place prior to 2040. Upgrades to the Halifax and Dartmouth WWTFs will also be required, to comply with the WSER discharge limits by 2040 when the TAs expire.

All other WWTFs must remain in compliance with the WSER discharge limits. Any WWTF which begins to exceed these limits will require an appropriate upgrade to ensure continued compliance.

Wastewater treatment facilities having effluent which is acutely lethal due to Un-ionized Ammonia must apply for a Temporary Authorization to Deposit Un-ionized Ammonia. Such Authorizations are valid for three years, and may be renewed. Effluent which is acutely lethal due to substances other than Un-ionized Ammonia is not authorized under the WSER, and is in contravention of the Fisheries Act. No Halifax Water facility has had toxicity due to un-ionized ammonia levels in the treated effluent. Instances of detected toxicity have been due to chlorine levels (where chlorine is used as a disinfectant), or are of unknown cause, and under continuing investigation. It is recognized that pH drift during the tests can be a factor, and a pH-stabilized version of the toxicity test is in use for the Mill Cove and Eastern Passage WWTFs. The Lakeside-Timberlea WWTF is the only remaining WWTF using chlorine for disinfection (all others use Ultra Violet systems), and includes a de-chlorination process prior to discharge to meet the WSER chlorine limit.

As required under the WSER, an Identification Report was submitted by May 15, 2013 for each WWTF, documenting various data and information including the location of all overflow points. In addition, for those systems which include CSOs, a CSO report is submitted by February 15 of each calendar year for the prior year. The report documents the occurrence, duration and measured or estimated volume of each CSO overflow event. Halifax Water is able to calculate overflow event volumes for most CSO locations using data from in-situ water level sensors. Volumes for older CSOs on the North-West Arm without such sensors may be estimated using modeling. Environment Canada has confirmed that hydraulic modeling results are acceptable as CSO volume estimates.

Recently, Halifax Water had 3-D scans completed for the CSOs in Dartmouth and will be completing scans for Halifax CSOs this coming year. This enables staff to calibrate the model, ensuring the estimated overflows are accurate.

The WSER also requires annual or quarterly Monitoring Reports for each WWTF [depending on size], documenting the daily effluent volume and the concentrations of CBOD, TSS, and Un-ionized Ammonia. These reports have all been submitted as required by the WSER, since 2013.

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6. DRINKING WATER REGULATIONS

Drinking Water regulations have gone through several years of stability compared to the post-Walkerton years of 2002-2012. That being said, there are a few business regulatory issues related to drinking water which Halifax Water will need to monitor closely.

Manganese

Manganese is a metal which is ubiquitous in most Nova Scotia groundwater and surface water sources. The most common effects of manganese have been black staining on plumbing fixtures and laundry and has to date been regulated as an aesthetic objective (AO) in the Guidelines for Canadian Drinking Water Quality. In Nova Scotia, AO parameters serve only as a guidepost to utilities that problems will ensue if the AO value is exceeded. They are not a regulatory compliance issue.

In June, 2016, Health Canada proposed a new manganese guideline for public consultation. The new guideline decreases the AO value from 0.05 to 0.02 ug/L, but more importantly creates a health related value or maximum acceptable concentration (MAC) of 0.1 ug/L. Health Canada has created the MAC because they believe that manganese can have effects similar to lead in drinking water. Health Canada is still reviewing public comments, including comments from Halifax Water. A new final guideline may be published in late 2017 or the spring of 2018.

While manganese exists in most of our water sources to some degree, the level is such that it is easily removed. Two of our systems, Bennery Lake and Silver Sands have more challenging manganese issues. Both supplies have appropriate treatment systems to keep manganese below the MAC level continuously. Manganese treatment systems, however, are easily upset and it is foreseeable that an MAC value for manganese may create the occasional need for a water use advisory based on treatment plant upset. There is no practical effect in lowering the AO value as we currently provide treatment that is aesthetically acceptable to customers the vast majority of the time.

Halifax Water is concerned about how manganese will be regulated in Nova Scotia. Compared to other MAC parameters, manganese is difficult to measure in a treatment plant. On line manganese instruments are not readily available so knowing that the treatment process is always running optimally may be challenging.

Manganese may also be a concern as it relates to distribution system water quality. When Halifax Water has a discoloured water event, Halifax Water has been able to assure its customers that the water remains safe based on routine and follow up bacteriological monitoring. Due to the ubiquity of manganese in Nova Scotia water, manganese deposits build up in distribution pipes. Halifax Water has confirmed, that when a discoloured water event does occur, some component of the colour in the water is manganese. What measures

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Halifax Water will need to take will depend on the final guideline from Health Canada. Depending on the approach by Nova Scotia Environment, public advisories may need to change in response to water main breaks and other events which cause discoloured water.

Lead

In January of 2017, Health Canada issued a new guideline for lead. Health Canada's previous guideline was outdated, not based on the most recent science, and did not serve to protect public health. The proposed guideline, however, will likely create widespread non-compliance in Canada particularly among utilities that have not carried out characterization studies to understand lead occurrence. Halifax Water participated in a coordinated utility response to the proposed lead guideline.

If the guideline is implemented as proposed, and provinces adopt the guideline, there exists a possibility for widespread utility non-compliance with regulations. Halifax Water has done more than most utilities in Canada and America, and is better prepared to address customer concerns regarding lead. Lead in drinking water in Halifax is an artifact of lead service lines. With approval from the Halifax Water Board on actions to address lead, there are ample programs in place to incent customers to replace their lead service line.

Depending on how NSE implements a new Health Canada guideline, there may be increased early demands on our lead service line replacement program, beyond what was anticipated. Also, depending on the final guideline and how it's adopted, there may be a need for additional sampling and monitoring resources.

Nova Scotia Environment Operating Approvals

Approvals for operating all water systems expire on March 31, 2018. Halifax Water staff are currently working on the application process for renewal.

In the immediate period after Walkerton, Nova Scotia was a leading province in adopting more progressive drinking water regulation. This was a large step change in Nova Scotia and was appropriate at the time and demanded significant resources from utilities and NSE.

Nova Scotia is now at a point where utilities are largely compliant with new drinking water standards. As a result, NSE efforts have moved from standard adoption to operational monitoring. Halifax Water staff have observed a trend to a more prescriptive approach to drinking water regulation and anticipate increased requirements for reporting and verification in conjunction with operating permit renewals.

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7. FINANCIAL PROGRAMS & PRO FORMA BUDGETS

7.1 Capital Program

7.1.1 Asset Management Program

The Asset Management division of the Engineering & IS Department provides services related to Infrastructure Planning (master planning, hydraulic system modelling, and flow monitoring), Asset Management Plans, and Capital Budget Development.

Priorities for the Asset Management group have focused on gathering data on asset attributes (size, material, age, and condition information as a minimum), and preparing a formal Asset Management Plan (AMP). Data refinements benefited from the completion of the Wastewater Treatment Facility Condition Assessment project, the Wastewater Pumping Station Condition Assessment project, the Stormwater Culvert Inventory and Condition Assessment, and sewer condition assessments. The formal condition assessments provided data needed to complete the AMPs for those asset classes. For the remaining asset classes, staff relied on best available information with the understanding that future AMPs will be refined as better information is collected.

With the sewer inspection program moving to the Asset Management portfolio, staff have worked with contractors for both manhole inspection (zoom camera technology) and conventional closed circuit television (CCTV) inspection of mainlines and laterals as well as with the inspection software provider.. Staff have explored using widely available tools such as ArcGIS Online to make results simpler to view.

Staff prepare the capital budget annually through a defined process. The process includes using the capital project planning database and generating summary reports to support items in the capital budget.

The Infrastructure Planning group have leveraged the Regional Wastewater Functional Plan (RWWFP) and the first Integrated Resource Plan (IRP) to complete the West Region Wastewater Infrastructure Plan (WRWIP), assuming responsibility for the corporate flow monitoring program, and completing the hydraulic modelling tools assessment and strategy.

The WRWIP identified and confirmed the wastewater infrastructure servicing plan for the west region over the next 30 years. The project also included developing conceptual designs for projects falling within the first 10 years and developing the Cost Estimating Framework and the Long-Term Planning Framework (LTPF). The LTPF provides a process for streamlining long-term infrastructure planning needs for Halifax Water and integrating with Halifax Regional Municipality's regional planning process. Halifax Water has also decided to consolidate the infrastructure planning studies to migrate to a single water and wastewater infrastructure plan over time. The inclusion of water infrastructure for all regions and the remaining wastewater infrastructure for east and central regions into the upcoming

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Regional Infrastructure Plan allows an interim step to achieving a single infrastructure plan in the future and will enable an update to the IRP in 2018.

The migration of the corporate flow monitoring program to the Asset Management division has allowed staff to implement a comprehensive network of flow monitors (77) and rain gauges (14) with a heavy focus on data accuracy and reliability. Similar to the data collection effort undertaken with the sewer inspection program, emphasis has been placed on usability and accessibility of the data collected. Staff have worked with the service provider to create tools to simplify data extraction and display of monitoring and gauging results.

Staff completed a hydraulic modelling tools assessment and strategy to confirm hydraulic modelling software needs for Halifax Water and lay out the proposed approach to modelling of the infrastructure systems. The assessment resulted in a recommendation to move to more advanced software to model the characteristics and challenges of all systems. Migration to the new software will be immediate for the wastewater system and be part of the Regional Infrastructure Plan. Migration to the new water modelling software will be phased in to allow for improved demand loading from the ongoing Advanced Metering Infrastructure (AMI) project.

A number of previous initiatives identified in the Asset Management Roadmap Implementation (AMRI) have been reprioritized to be compatible with the AMP recommendations, to allow for an in-house approach by asset management staff, or due to resourcing constraints. Anticipated projects and programs for the Asset Management division are outlined below and within Table 1.

Update Asset Management Plan (Annual)

Building on the first Asset Management Plan (AMP), staff will continue to fill data gaps by asset class and update the AMP annually with a March publication.

Asset Management Program Development

Priorities are based on direction from the Executive Team in concert with other corporate priorities. There is a need to balance the number of corporate implementation programs as often they require resources from multiple departments and these same resources are involved in other corporate programs (Cityworks implementation, Advanced Metering Infrastructure implementation, SharePoint roll-out, etc.). Elements of the program may include:

- Expand Prioritization Methodology
- Develop Strategic Maintenance Management Program
- Review Levels of Service and Enhance Performance Measurement
- Enhance Capital Budget Supporting Tools
- Develop Asset Management Resource Library
- Assess Suitability of Current Data Management Tools

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Condition Assessments by Asset Class

With priorities established from the Asset Management Plan and direction from the Executive Team, staff will continue to develop condition assessments for each asset class. Initial focus is to be on developing factors influencing condition and performance of pressure pipe networks (water transmission/distribution and wastewater forcemains). Additional asset classes will be considered based on resource availability in both the Asset Management division and the respective Engineering and Operations departments.

Sewer Inspection Program (Annual)

This is the key program for determining condition information about the sewer systems. The program involves both manhole inspection using zoom camera technology, and conventional CCTV inspection for the mainline sewers and laterals. The advantage of using the zoom technology is it allows an initial look at the pipes connected to each manhole with sufficient information to determine if mainline cleaning is needed or if full CCTV inspection is warranted. Zoom inspection is considerably less expensive than CCTV inspection. However while zoom camera technology provides excellent information of the structures, it cannot capture detail on locations of defects in the mainline sewers. This program is an annual program that may grow in size as Halifax Water and its service providers fine-tune the inspection processes. These inspections are critical for decision making related to near term integrated project priorities and the wet weather program.

IT Strategy Projects

Some projects identified in the IT Strategy will require involvement of Asset Management division staff during implementation. Early projects that will involve AM resources are expected to include:

- Asset Registry
- Data Governance
- Analytics Dashboard
- Electronic Data Warehouse
- Portfolio and Project Lifecycle
- Enterprise Forms, Collaboration and Content Management

Regional Infrastructure Plan

The Regional Infrastructure Plan will build on the work completed during the WRWIP and incorporate the remaining infrastructure studies to develop a comprehensive preferred water and wastewater servicing strategy for regional infrastructure. The Regional Infrastructure Plan will meet the growth, asset renewal, and regulatory compliance drivers for the next 30 years. Additionally, the servicing strategy will consider optimizing system operability, efficiency, reliability, and resiliency. Similar to the WRWIP, the Regional Infrastructure Plan will include conceptual designs for projects in the first 10 years. Also added into the project is the wastewater model build in the new software, the water model

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build for the Bennery Lake system, and development of a work plan for how to adapt to future climate change.

Corporate Flow Monitoring Program (Annual)

Staff will continue to manage the corporate flow monitoring program including ongoing data management of the network of monitors currently in the field as well as the anticipate growth of the network in 2018/19. Efforts to improve how data is shared will continue.

Review Flow Monitoring and Rain Gauge Strategy

Staff will also review the flow monitoring and rain gauge network for adequacy in overall system understanding and use for calibrating the hydraulic models. The review will include an assessment of the current monitoring/gauging locations, recommended adjustments, and a report on the effectiveness of the program as a whole.

Implement Hydraulic Models

Building on the modelling tools assessment and strategy, and as part of the Regional Infrastructure Plan, staff will begin to implement the new hydraulic models. For the wastewater infrastructure, this will be a complete all-pipes model re-build. For the water infrastructure, the new software will be used to develop the Bennery Lake water model as a pilot. Full build out of the water infrastructure model in the new software will be phased to enable consumption/demand loading to be leveraged from the current Advanced Metering Infrastructure project.

Integrated Resource Plan Update

Based on information and recommendations from the Regional Infrastructure Plan, the Asset Management Plan, and the Compliance Plans (being undertaken by others), Halifax Water will compile an update to the 2012 Integrated Resource Plan (IRP) in 2018. The update is predicated on an ambitious schedule for the Regional Infrastructure Plan, however staff feel sufficient recommendations will be available to inform the IRP update.

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Table 1: Asset Management and Infrastructure Planning Initiatives

Initiative or Program	Implementation Year (2018/19 to 2022/23)				
	2018/19	2019/20	2020/21	2021/22	2022/23
Update Asset Management Plan (Annual)					
Asset Management Program Development					
Condition Assessments by Asset Class					
Sewer Inspection Program (Annual)					
IT Strategy Projects					
Regional Infrastructure Plan					
Corporate Flow Monitoring Program (Annual)					
Review Flow Monitoring & Rain Gauge Strategy					
Implement Hydraulic Models					
Integrated Resource Plan Update					

Projects led by AM Team
 Projects with AM Team participation

7.1.2 Five-Year Capital Budget – General Overview

As part of the utility’s overall mission, the annual capital budget provides funds for the acquisition, replacement, or rehabilitation of capital assets. Capital assets include all equipment; facilities; and linear infrastructures that have an asset value that exceeds \$5,000 and a useful life that exceeds one year. The capital budget funding and subsequent project delivery help ensure that services are provided in a cost-effective and efficient manner with a focus on long-term integrity of systems.

As discussed in Section 7.1.1, the development of the annual and long-term capital budget has its foundation with the Engineering & IS department’s core Asset Management program. This program organizes, evaluates, and prioritizes all infrastructures by individual asset class. The core asset-class priorities are reviewed and coordinated with staff from Engineering & IS and Operations departments to identify the highest-priority projects. These projects are further reviewed with technical staff from the municipality’s Transportation and Public Works group to review integration opportunities with the proposed Streets Program. A detailed overview of the major projects within the proposed five-year capital budget is provided in Section 7.1.3.

In addition to the core infrastructure projects within the capital budget, employees from all departments define annual capital-equipment requirements to meet their operational mandates. These include equipment classes such as fleet, large tools, computer equipment, and consumption meters.

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The capital budget is funded from a variety of sources. The core funding is from capital-asset depreciation accounts and long-term debt. This core funding is enhanced with regional development charges, external grants, and operating surplus, when available. The base funding amount for capital projects from depreciation increases on an annual basis as the underlying capital-asset value increases.

The historical overall level of capital funding is well below requirements relative to current infrastructure deficiencies and projected long-term sustainable requirements. The required increase in capital infrastructure investments is defined in detail within the Integrated Resource Plan (IRP) that was filed with the NSUARB in October 2012. The proposed five year capital budget shows a transition from historical spending levels towards the level recommended within the IRP. A transitional period allows for the development of institutional capacity to deliver the increased volume of projects, increased funding, and enhanced Asset Management protocols to identify and prioritize specific projects.

The formal infrastructure projects within the capital budget are delivered by the Project Management Team within Engineering & IS. The group of project managers and their technical staff utilize a standard project management approach to consistently deliver the planning, design, construction, and commissioning phases of each project.

The full five-year capital budget is shown in Appendix E. The year-one (2018/2019) budget has a total project value of \$25,033,500 for water, \$39,818,800 for wastewater, and \$8,595,700 for stormwater, with a five-year total project value of \$148,277,000 for water, \$264,626,000 for wastewater, and \$57,168,000 for stormwater.

In the context of the five year capital plan, the Municipality is currently proceeding with the design phase of the Cogswell Redevelopment Project. The municipality's Cogswell redevelopment team is completing the 60 percent design development to incorporate the higher level detailing of the approved design elements as well as major infrastructure requirements. The project timeline propose the completion of the 60 percent design and a presentation to Regional Council for a project go/no-go decision within the second quarter of 2018. Pending Council approval, the project may proceed to construction in 2019 with an approximate three year construction phase. Should the project proceed, there will be many impacts to the utility's water, wastewater and stormwater infrastructure. All net new infrastructure required to provide service to new buildings would be part of the municipal project cost. However, the relocation of existing infrastructure, required due to road alignment changes would be the responsibility of Halifax Water, based on the Municipal Streets By-law. The review of the order of magnitude of the required infrastructure relocations is in progress as the 60 percent design is developed. Should the project proceed, there would be no costs incurred in the 2018/19 fiscal year, however, the following three years may see several million dollars in infrastructure relocations. These estimates have not been included within the current five year plan due to project uncertainty, however, the next version of the capital budget for 2019/20 would include specific project costs, as required.

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7.1.3 Major Projects

Integrated Capital Projects:

Project: Halifax Water Infrastructure Renewal Integrated with Halifax Municipal Street Renewal Program

Asset Class: Water Distribution, Wastewater and Stormwater Collection

Description: This program involves the renewal of water distribution, wastewater collection and stormwater collection infrastructure in an integrated approach with the municipality's annual Street renewal program. Water, wastewater and stormwater pipes and appurtenances are replaced or rehabilitated when approaching or exceeding their useful life cost effectively while the host municipal street is being renewed. The integrated program reduces the total project cost and minimizes the overall disturbance on community neighbourhoods. Halifax Water's planned expenditures on this program are approximately \$6M per year.

Water Capital Projects:

Project: Lucasville Road Transmission Main

Asset Class: Water – Transmission Main

Description: Halifax Water is working to construct a new 600 mm diameter transmission main from the Pockwock Transmission Main to the Sackville-Beaver Bank area to help address emergency back-up water supply capacity/redundancy issues. This new main would run parallel to the existing 400 mm diameter main along the Lucasville Road and would eventually extend to the Beaver Bank Road near the railway crossing. Some sections of the transmission main have already been installed through cost sharing/oversizing of mains in recently developed areas of Middle Sackville. The overall cost estimate for this project is approximately \$11,000,000. The design work for the next phase of the project, the section along the Lucasville Road, is slated for 2019/20 with construction to be completed in 2020/21. The full project is expected to extend over approximately 8-10 years as opportunities progress.

Project: Cowie Hill Reservoir Rehabilitation

Asset Class: Water – Structures

Description: The Cowie Hill Reservoir is a 2.4 MG gunite water storage reservoir that was constructed in 1972. The reservoir underwent a significant rehabilitation from 1990 to 1996. The recent Gunite Reservoir Inspection program identified the Cowie Reservoir as a priority for rehabilitation work in order to stabilize the condition of the reservoir and in order to extend its expected life. The internal and external inspection found numerous locations where the gunite covering had spalled off leaving the underlying steel reinforcing

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wires exposed and rusting. There are numerous locations on the wall that show evidence of cracks and leakage through the wall of the reservoir.

The project will involve retaining a consulting engineer to design and prepare a rehabilitation plan. It is anticipated that the design work be undertaken in 2018 and the work will then be tendered and constructed in the summer of 2019.

Project: J.D. Kline Water Supply Plant

Asset Class: Water – Treatment Facilities

Description: The J.D. Kline Water Supply Plant was commissioned in 1977 to service the City of Halifax, Town of Bedford, and parts of Halifax County. Due to the age of the facility, process equipment is nearing the end of its useful life. As well, certain treatment technologies from 30 years ago no longer meet current standards.

Raw Water Intake Traveling Screen Replacement: There are three vertical traveling screens at the Raw Water Pumping Station at Pockwock Lake that have reached their useful life expectancy. Recent assessments of the screen system by Plant Operations found that one of the traveling screens is non-operational due to severe corrosion. The screens and the supports have rusted and the individual screen panels have pulled apart. In addition, structural concrete supports for the screens have some cracking and are showing signs of distress. The other two traveling screen systems are functional but showing similar signs of corrosion.

It is recommended that all three traveling screens be replaced as part of a programmed replacement. A detailed assessment of all components of the traveling screen system has not been completed yet but it is likely that the full system will need to be replaced for all three screens. This would begin with retaining an engineering specialist to assess the existing components and to help develop the plan for replacement. It is assumed that the controls for the operation of the screens will be upgraded as part of the project.

Replace the CO₂ Feeders: The existing Carbon Dioxide (CO₂) feeders are original to the plant and hence are over 37 years old. The performance of these CO₂ feeders is deteriorating and replacement parts are getting harder to find due to the age of the equipment. The current feeders are not automatically paced according to the raw water flow and the feeders cannot provide information back to the computer human machine interface (HMI). The project will include carrying out a preliminary and final design by a consultant. The new feeders will be flow- paced for dosing and will also provide feedback to the HMI of the plant. This will result in better process optimization. The estimated cost for this work is approximately \$660,000 and it is projected to be completed in 2019/20.

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Wastewater Capital Projects:

Project: Weybridge Lane Pump Station, Kearney Lake Road Forcemain Extension, and Trunk Sewer Upgrade

Asset Class: Wastewater – Structure, Forcemain and Trunk Sewer

Description: The initial core wastewater infrastructure for the Bedford West Subdivision was completed in 2015. Growth within the development is such that it is anticipated that the final phase of the wastewater infrastructure will be required by 2019. This infrastructure will include the permanent Weybridge Pump Station, which will replace a temporary pump station activated in 2015, a 625m extension of the forcemain system on Kearney Lake Road, and an upgrade of the 1.1km trunk sewer on Kearney Lake Road. The design of this infrastructure has commenced and it is expected that construction will be undertaken in 2018 and 2019.

The \$10M cost of the Weybridge Lane Pumping Station has three sources of capital funding. These include an allocation to Halifax Water for the new benefit to existing customers, an allocation to a future Sandy Lake development area and the Bedford West Capital Cost Contribution Charge. The \$4.4M cost of the Forcemain Extension and Sewer Upgrade will be funded by the Regional Development Charge.

Project: New Timberlea Pump Station and Forcemain System

Asset Class: Wastewater – Structures and Forcemains

Description: The Beechville-Lakeside-Timberlea [BLT] WWTF was commissioned in 1982, with a capacity of one million gallons per day [MGD] and the original intent was to increase the facility's capacity as required to provide service to the ultimate flow generated from the lands within the prescribed boundary. The BLT WWTF Environmental Risk Assessment and the BLT Area Wastewater Servicing Options – Concept Development Studies were completed in 2011 and 2012 respectively. Based on the results of these studies and the Regional Wastewater Functional Plan, it was determined that the phased diversion of wastewater from the BLT sewershed toward the Halifax system was the preferred approach for addressing the wastewater capacity issue in this sewershed.

In 2015 the first phase of this diversion was completed when the Lakeside PS Diversion project was undertaken. In 2017 the West Region Wastewater Infrastructure Plan was completed and it reconfirmed that the best approach was full diversion of the BLT sewershed to Halifax and that to complete this diversion a new Timberlea PS and related forcemain system is required for an estimated cost of \$21M. The project will result in the decommissioning of the BLT WWTF.

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Project: Bedford to Halifax Trunk Sewer Upgrade

Asset Class: Wastewater – Trunk Sewers

Description: There is existing constraint within the trunk sewer which conveys wastewater along the Bedford Highway from Kearney Lake Road to the Duffus Street Pump Station. A section of this trunk sewer is a 1050mm dia. pipe and is located near Fairview Cove. The upstream sewer is a 2100mm x 1650mm pipe and the downstream sewer is an 1800mm dia. pipe. During major wet weather events, the Kempt Road CSO is activated resulting in discharge to the Fairview Cove Basin. There is observed flooding upstream along the Bedford Highway during mid-size events (< 1 in 2 year events) and the highway has been closed in the past due to flooding as a result of this constraint.

The concept is to twin the 1050mm dia. pipe with a new 1200mm sewer using micro tunneling and access shafts. The total length of the new tunnel will be approximately 900 metres and is estimated to cost \$20M. It is anticipated that the design will commence in 2018 and construction will be completed by 2020.

Project: Autoport Pump Station Replacement

Asset Class: Wastewater – Structures

Description: The Autoport Pump Station was constructed in the mid 70's and requires replacement due to a number of concerns which include: the equipment has reached the end of its useful life; the pump station is located within the public right-of-way such that specific measures are required in order for staff to safely access the facility; the upstream wastewater collection system was reconfigured as a result of the EPWWTF project resulting in an increased hydraulic demand on the pump station; and capacity is exceeded in some wet weather events which results in the deployment of vacuum trucks.

In order for this project to proceed there will be the need to purchase land. Assuming that the land can be secured in 2018 then the new pump station would be constructed in 2019 for an estimated cost of \$3,000,000.

Project: Russell Lake Pump Station Upgrade

Asset Class: Wastewater – Structures

Description: This capital works project is being funded through the CCC program for the Russell Lake West area of Dartmouth. The existing pumping station building is at the end of its service life and needs to be replaced. Included in the work scope is the installation of a back-up power system and associated mechanical and electrical equipment. Construction is expected to take place in 2019/20 at an estimated cost of \$2 M.

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Project: Wanda Lane Sanitary Sewer Replacement

Asset Class: Wastewater – Collection System

Description: This capital works project is an integrated project involving HRM, local residents, and Halifax Water. The proposed work scope includes street reconstruction, new sidewalk, bridge replacement on Tobin Drive, walkway bridge replacement, Ellenvale Run channel upgrades, new sanitary sewer, conversion of the old sanitary sewer to a clear water or deep storm sewer, and water main renewal. Construction is expected to take place in 2019/20 for an estimated cost of \$2.2 M.

Stormwater Capital Projects:

Project: Sullivan’s Pond Storm Sewer System Replacement (Phase 2)

Asset Class: Stormwater – Pipes

Description: The Sullivan’s Pond storm sewer system is the outlet for Sullivan’s Pond/Lake Banook watershed which is approximately 1500 hectares in size. The system was constructed in the early 1970s and is at the end of its service life. The system is designed for the major flood event (runoff resulting from a 1 in 100 yr. rainfall event). In 2017/18 the first phase and upper section of the system was constructed between Sullivan’s Pond and Irish Town Road. This project involves the lower downstream section from Irish Town Road all of the way to Halifax Harbour. Construction of the second phase will be challenging considering the congested urbanized environment in which the system is located. Construction of this second phase is expected to proceed in 2021/22 at a cost in the order of \$11 M.

Project: Ellenvale Run Retaining Wall Replacement Program

Asset Class: Stormwater – Structures

Description: The Ellenvale Run is a highly urbanized watercourse that runs from Lake Lemont to Morris Lake in Dartmouth. The approximately 3.5 km long watercourse has been rerouted and encroached upon as a result of adjacent development. This has resulted in the stream being contained within culverts and channels made of retaining walls. The majority of the retaining walls are at the end of their service life and need to be replaced. The system is designed for the major flood event (runoff resulting from a 1 in 100 yr. rainfall event). This program involves the systematic replacement of the retaining walls over the period of 2018 – 2022. The estimated cost of the program is \$10 M.

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Project: Cross Culvert Replacement Program

Asset Class: Stormwater – Culverts/Ditches

Description: Halifax Water owns and maintains approximately 1700 cross road culverts. This infrastructure is a distinct asset class in addition to driveway culverts. They convey stormwater under roads and are less than three metres in diameter. Approximately five percent of the inventory of cross road culverts are in critical condition and another seven percent in poor condition. This program involves the systematic replacement of cross road culverts at the end of their service life. The estimated annual cost of this program is \$2 M.

Project: Halifax Water Sewer Separation Program

Asset Class: Wastewater and Stormwater Collection

Description: This program involves the separation of existing combined sewers in key areas of the Halifax peninsula to divert storm flows from the wastewater system as a key component to providing increased wastewater capacity for proposed growth within the Halifax WWTF sewershed. The sewer separation program will generally involve the installation of a new storm sewer on local streets for the collection of surface drainage and select building connections. The program will be focused on the Young Street, Kempt Road and Spring Garden Road areas. This program is primarily funded from the Regional Development Charge program. Halifax Water's planned expenditures on this program are approximately \$6M per year.

Corporate Projects:

Project: Information Technology Strategic Plan Implementation

Asset Class: Water, Wastewater and Stormwater

Description: Halifax Water completed an IT Strategic Plan in 2017. The Plan provides a five year program and investment roadmap consisting of a series of defined initiatives, each supporting a key strategic theme and each contributing to the continuous improvement of one or more facets of the IT environment: organization, applications and infrastructure. Halifax Water's planned expenditures on this program are approximately \$8M per year.

7.1.4 IT Strategic Plan

Halifax Water last developed an IT Strategic Plan in 2001. Since then, the utility has been very progressive in using technology to improve organizational efficiency, effectiveness and customer service. Key Investments include SAP, GIS, Cityworks, and recently Advanced Metering Infrastructure.

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With this success in place, a new and enhanced IT Strategic Plan was developed in 2017 to guide the next 5 years of investments.

The following Strategic Business Drivers shape the information technology environment:

- Provide world class services to our customers and our environment
- Retain leadership position as an integrated water, wastewater and stormwater utility
- Retain position as a top utility in all Lines of Business focused on:
 - Public and Employee Safety
 - Water Quality
 - Sustainable Infrastructure and Asset Renewal
 - Regulatory Compliance and Growth
 - Environmental Stewardship
- Integrated Resource Plan (IRP) Framework

Halifax Water wants to ensure that IT investments meet the future needs of the utility, supporting the efficient and safe delivery of world class end-to-end service in all its lines of business (Water, Wastewater, Stormwater), while being an innovative user of established technology to enhance customer experience, improve performance, engage employees, and manage the inherent risk of providing an essential public service in a safe and cost effective manner.

The development of the Plan is centered on six **Strategic Themes** that characterize the focus for the next five years of IT investment:

- **Customer Experience** – Providing customers with the ability to access most services using the online site or smartphone.
- **Information Integration with Location** - Having all necessary data linked together and also tracked through a geographic lens.
- **Analytics Driven Decision Making** - Able to model using all customer usage, financial, environmental, and infrastructure data across the Water, Wastewater and Stormwater systems. Able to tie data together into business intelligence.
- **Managed Knowledge and Workflow** - Key content is captured and stored logically and easily accessible by those that require it.
- **Enable Employees Anywhere** - Employees can access, capture and update the information they need to effectively do their job and support others, wherever they may be working.

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- **Secure IT Foundation** - Infrastructure is resilient, cost effective, well supported, and recoverable within clearly defined requirements. The IT function (Planning, Delivery and Operations) is effectively managed.

The specific project details and implementation framework are provided in a comprehensive five year IT Strategic Plan Roadmap (See Appendix F). The Strategic IT Roadmap is a high level snapshot of the sequence of programs and investments to deliver on the approved technology vision and recommended architecture. The five year plan has an estimated total cost of \$40,000,000.

A summary of some of the key IT initiatives within the new five year plan include:

- New Website Development with Customer Portal
- Enhanced Customer Relationship Management (CRM) Application
- Corporate Data Analytics and Enterprise Data Warehouse functionality
- Expansion of Computerized Maintenance Management System (CMMS)
- AMI Completion
- Document/Content Management
- Permit Approval application
- Asset Management applications
- Continued growth of corporate SAP and GIS application/functionality
- Improved IT System Resiliency and Redundancy

7.1.5 Integrated Resource Plan

Halifax Water completed its first formal Integrated Resource Plan (IRP) in October 2012 with the intention that it would be updated periodically. The IRP was done in collaboration with the NSUARB's consultant who initially recommended an IRP update in three years. However, the consultant also acknowledged the data limitations encountered during the completion of the IRP and recommended that Halifax Water work to fill the data gaps before the IRP was next updated.

Several important initiatives aimed at filling the data gaps have been underway since the completion of the first IRP. These included:

- Implementing the Wet Weather Management Program (with inflow and infiltration pilot projects);

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- Continuing the implementation of the Asset Management Program (foundational elements from the Roadmap);
- Resolving asset attribute information in GIS, and specific inventory and condition assessment projects);
- Developing plans by asset class;
- Implementing the Corporate Flow Monitoring Program;
- Implementing the Sewer Inspection Program (conventional CCTV and zoom camera inspections);
- Completing the Hydraulic Modelling Assessment and Strategy;
- Completing the West Region Wastewater Infrastructure Plan (WRWIP).

The Regional Infrastructure Plan project currently underway will cover the balance of the wastewater infrastructure planning for east and central regions, be inclusive of the program developed in the WRWIP, and include a water infrastructure plan for all regions. The project also includes a climate change assessment and policy component to develop a climate change adaptation plan and a systems optimization plan. Its completion will streamline a number of prior and long-term planning initiatives to facilitate regular Regional Infrastructure Plan updates on a five-year cycle for water and wastewater infrastructure.

The IRP update will incorporate findings from work completed or planned to support the drivers of regulatory compliance, asset renewal, and growth.

The goal is to develop an updated IRP that recalibrates the \$2.6 billion long-term investment identified in the first IRP (2012), and positions the utility for future updating on a five-year cycle.

Halifax Water expects to build on the key initiatives already underway to provide a revised IRP in late 2018.

7.2 Five-Year Operating Budgets

Budgets have been developed to cover the period from 2018/19 to 2022/23, as shown in Appendix G. The operating budgets reveal that rate increases will be required to maintain current levels of service, deliver projects already in progress or approved, meet changing environmental requirements, and generate more funding to meet infrastructure investment demands.

Halifax Water has a goal to keep rates for combined services below 2% of median household income; which is well below the rate affordability threshold of 4% for combined services recommended in several industry studies which are referred to as best practice. The cost of

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annual combined services for an average household is currently estimated as 0.92% of median household income in 2017/18.

Halifax Water completed a review of rate affordability in 2017/18 and in September 2017, the Halifax Water Board approved expansion of the existing customer assistance program - Help to Others (H2O) program. The H2O program provides dedicated funding for low income households to offset water bills, administered through the Salvation Army, similar to other heating fuel or electricity bill assistance programs. Funds for the program are derived from unregulated activities of the utility. In 2018/19 it is anticipated that due to the program expansion, more customer with low incomes will be able to participate in the assistance program.

Some of the primary operating budget drivers and assumptions are:

Revenues

- Consumption will continue to decline related to water and wastewater service. Consumption is projected to decrease 2.5% per annum.

Halifax Water has experienced net metered consumption decreases of 2.2% per year on average, over the past fifteen years, as indicated in Figure 1. The total decrease since 2001/02 is a staggering 22% reduction, which has been managed predominantly through changing rate structures to align fixed and variables costs, diversifying rate structures (stormwater with a different billing determinant), increasing rates, increasing unregulated revenue and controlling costs.

For short term planning purposes, in relation to setting rates, we previously used a rolling historic 4 year average (net reduction) – which is currently 3.4%. Consumption is impacted by timing of development, form of development and new customer growth. The net decrease in consumption last year, and so far in 2017/18 is less than recent previous years and less than the historic average.

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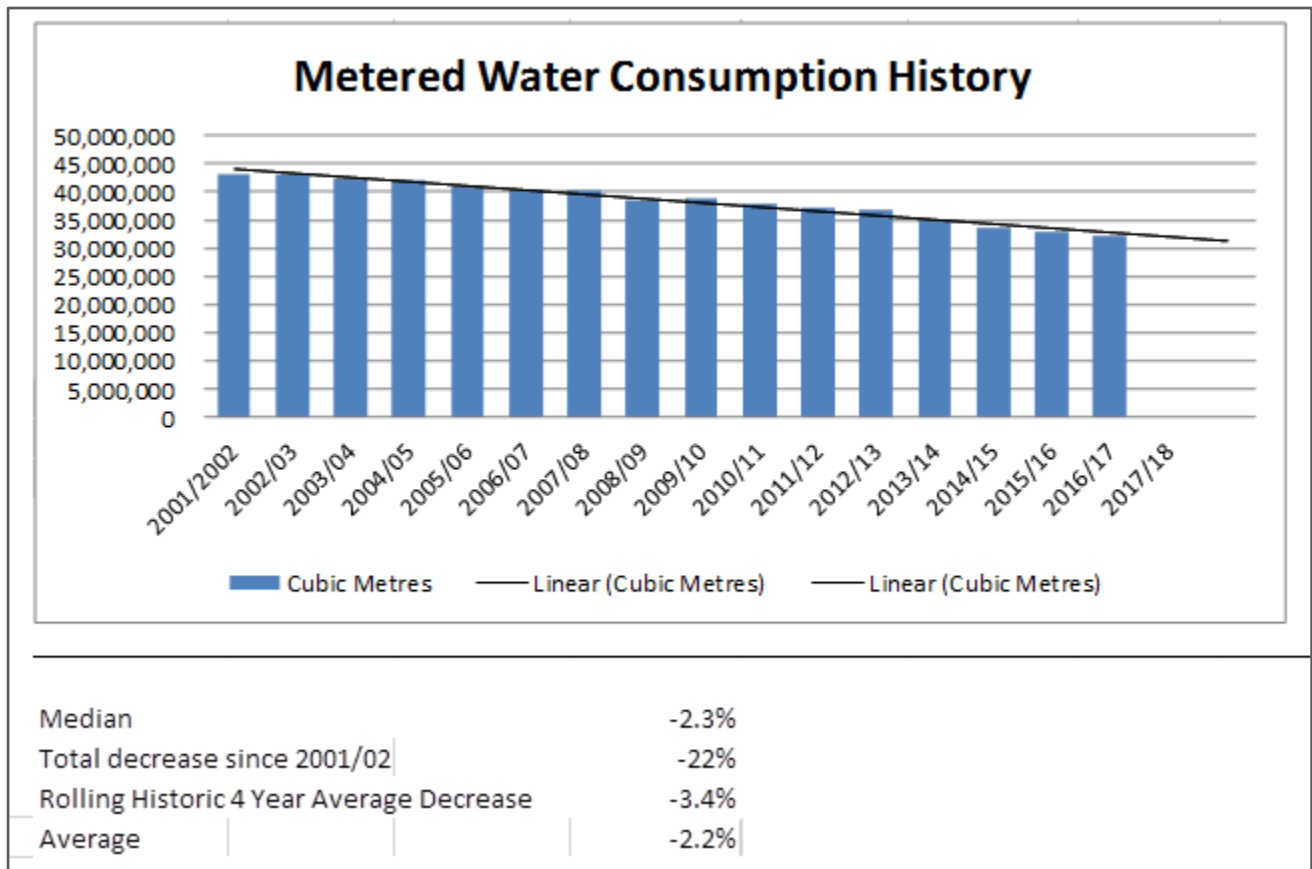


Figure 1: Metered Water Consumption History

- The amount of impervious area and number of properties receiving stormwater services is projected to increase gradually over the course of the next five years.
- 700 or roughly 0.8% new customer connections are projected each year, based on the 4 year historic average (2011/12 -2014/15), and the actual customer growth in the last two fiscal years (2015/16 and 2016/17).
- Revenues from unregulated business activities are increasingly important to mitigate future revenue requirements from rates. These are described in more detail in Section 7.4. Unregulated revenues will be used to fund unregulated expenses and generate additional unregulated revenues for the benefit of the rate base.

Expenses

Halifax Water’s Five Year Operating Budget is completed on an accrual basis to provide better information for decision making and be reflective of best practice for budgeting. Accrued amounts include a liability for future employee benefits (pension) as calculated under the International Financial Reporting Standards (IFRS).

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The NSUARB Accounting and Reporting Handbook for Water Utilities is used in determining the revenue requirements for rate making purposes. If accrued pension expenses were omitted, projected net losses would be less as shown in Table 2. There is sufficient accumulated operating surplus to offset the budgeted operating loss in 2018/19, however, rate adjustments will likely be required following losses in 2019/20.

The largest components of Halifax Water's consolidated operating budgets are salaries & benefits, electricity, furnace oil and natural gas, debt financing, depreciation, dividend and chemical costs.

Salaries and Benefits - The annual salary increase allowance is 2%, with an additional allowance made to address the impact of step increases within salary bands or reclassification of positions; and increases in benefits. Any planned new hires are reflected within the budgets.

Electricity – 1.5% in year 1, 2% each year thereafter. The impact of these increases is expected to be partially offset by the formal Energy Management Program.

Furnace Oil and Natural Gas – 5% in years 1 and 2, and 2% (~CPI) in years 3, 4 and 5;

Debt Financing – New debt payments are budgeted to support the five-year capital projects. Over the course of the next five years, debt payments are projected to increase significantly. The amount and timing of the increases will be determined by timing of the completion of the projects and the financing rates and options available. Halifax Water's capital financing strategy is designed to maintain a debt service ratio of 35% or less; and to use a mixture of infrastructure funding, development related charges (reserves), depreciation; and debt. It is assumed new debt issuances are serial bond debentures with 20 year amortization and 10 year terms with balloon payments refinanced, or straight 20 year term debentures. The cost of borrowing is based on the weighted average cost of capital of 3.64%.

Depreciation - As Halifax Water's assets and future capital budgets increase so do depreciation expenses. Depreciation is an integral funding source to support rehabilitation of the existing infrastructure as well as new infrastructure and upgrades to meet future capital requirements necessitated by both servicing demands and changing environmental regulation. The depreciation expenses shown in the five year business plan are net of depreciation on contributed assets for contributed water and wastewater assets. In the next rate application, Halifax Water will be requesting permission to phase in depreciation on contributed water and wastewater assets.

Dividend to Halifax Regional Municipality - The water dividend agreement was renewed in September, 2014 for a 5 year term (April 1, 2015 - March, 2020). The dividend is projected to grow from \$5.1 M in 2018/19 to \$6.0 M by 2022/23.

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Chemical Costs – Chemicals are tendered annually in January for optimal pricing. Chemical cost increases of 5% are anticipated for years 1 and 2, with a 2% increase for years 3, 4 and 5. Long range chemical prices are difficult to predict due to the volatility of the market which is closely linked with energy prices and fluctuations in supply and demand.

Energy and electricity cost assumptions are described in Table 7 within Section 13.11 of the Business Plan.

On a consolidated basis, the projected five-year operating budgets are shown in Table 2. Over the next five years, operating expenses are projected to increase from \$111.7 million in 2018/19 to \$124.4 million in 2022/23, or 11.3%, while operating revenues are projected to decrease by \$6.5 million or 4.8% due to declining consumption. Non-operating revenues are projected to decrease by \$2 million due to the end of a Provincial grant related to debt servicing for the Halifax Harbour Solutions Project. Non-operating expenses will increase by 8.8% or \$3.4million over 2017/18 levels due to increased debt-servicing costs based on current projections.

Table 2: Pro-Forma Income Summary 2018/19 to 2022/23

Pro Forma Income Summary							
	Actual 2016/17	Approved Budget 2017/18	Proposed Budget 2018/19	Business Plan			
				Year 2 2019/20	Year 3 2020/21	Year 4 2021/22	Year 5 2022/23
Operating Revenues	\$137,997	\$135,587	\$135,182	\$133,526	\$131,878	\$130,279	\$128,729
Operating Expenditures	\$97,839	\$106,241	\$111,710	\$115,020	\$117,845	\$121,273	\$124,367
Operating Profit	\$40,158	\$29,346	\$23,472	\$18,507	\$14,033	\$9,006	\$4,362
Non-Operating Revenues	\$3,322	\$2,787	\$1,006	\$1,013	\$1,032	\$964	\$966
Non-Operating Expenditures	\$34,622	\$38,882	\$36,564	\$37,953	\$39,380	\$41,137	\$42,318
Net Surplus (Deficit)	\$8,858	(\$6,750)	(\$12,086)	(\$18,434)	(\$24,316)	(\$31,167)	(\$36,990)
<i>Note:</i>							
<i>Consolidated numbers reported above include regulated and unregulated activities of the Urban Core, Satellite and Airport/AeroTech Systems.</i>							
<i>The net surplus (deficit) reported for the 2018/19 Proposed Budget and years 2 through 5 of the Business Plan are reported on the accrual basis. Under the NSUARB Accounting and Reporting Handbook some accrued future employment expense liabilities are excluded for the purposes of rate making.</i>							

Rate increases will be required to maintain or enhance the existing level of service and invest in the renewal of aging infrastructure. Based on figures presented in Table 2, revenue increases are required over the next five years. Halifax Water will not be able to deliver the requirements for growth, asset renewal and compliance identified in the IRP without revenue increases. Halifax Water has a rate smoothing strategy that promotes gradual rate increases to avoid rate shock and maintain affordability.

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As of March 31, 2017, Halifax Water had an accumulated operating surplus of \$16.7 M, based on audited financial statements. This coupled with a forecasted future operating surplus in 2017/18 means that the utility can likely defer an application to increase rates until fall of 2019. Results for the year to date have been reviewed by budget managers in conjunction with plans for the remainder of the year. Halifax Water is forecasting a profit for the 2017/18 fiscal year of \$4.7 million of which \$2.5 million is net profit from operations and \$2.2 is Other Comprehensive Income.

Projections for 2018/19 and beyond are based on expected normal weather patterns. Should weather patterns deviate from the norm, operating results could be impacted accordingly as significant rain events, prolonged periods of deep cold, or droughts, impact operating costs for the utility.

As new and more current information becomes available, five-year projections will change. The five year plan is sensitive to changes in consumption, weather, interest rates, availability of external infrastructure funding, level of development activity and operating results.

7.3 Debt Strategy

Halifax Water has an efficient capital financing structure which has been reviewed and accepted by the NSUARB and was developed based on the policies of other utilities, its longer-term capital needs, and consideration of fairness to present and future ratepayers. Utilization of debt is a key component of the capital financing structure. Debt impacts the operating budget and, therefore, the future rate requirements in several ways:

1. Increased debt payments need to be accommodated through rates.
2. Increased depreciation related to growth in the capital program needs to be accommodated through rates.
3. Operating costs of new capital assets need to be accommodated through rates.
4. Capital requirements not funded by debt will increase the requirement of capital from operating funding through rates.

Different financing alternatives were considered taking into account rate stability and affordability, Halifax Water long term financial sustainability, and intergenerational equity.

The debt strategy approved for Halifax Water concludes that appropriate financial ratios for Halifax Water to utilize are:

1. Target Maximum Debt Service Ratio of 35%
2. Target Debt/Equity Ratio of 40%/60%

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In essence, the two targets serve as a framework for Halifax Water's utilization of debt. Long-term debt is projected to increase from \$224.9 million at March 31, 2017¹, to \$283.6 by March 31, 2023. It is estimated that additional debt servicing will increase from \$31.4 million in 2018/19 to \$36.3 million in 2022/23, and the debt service ratio will increase from 23.0% to 28.0% during this five year period.

The amount of timing of issuance of debt is dependent on the timing of capital projects and also on availability of infrastructure funding from other levels of government. Any changes in capital plans or availability of other funding sources will impact the requirement for new debt.

7.4 Alternative Revenue

Revenues from unregulated business activities are increasingly important to mitigate future revenue requirements from rates. Unregulated revenues help to pay for some expenses which would otherwise be funded by rate-regulated activities, and are also used to fund unregulated expenses. Halifax Water has had success generating alternative revenues aside from user fees on both the regulated and unregulated side of the business. On the regulated side, Halifax Water has entered into agreements for the sale of land deemed to be no longer used or useful for utility purposes. With NSUARB approval, revenue from land sales can be used as a source of funds for capital projects related to the delivery of water services in recognition that the land was originally purchased with water-rate base funds. As much of the surplus land has been sold, this will not be a significant source of funds in the future.

Notwithstanding limitations for generating revenue from the regulated side of the business, there has and will continue to be opportunities from the unregulated side. Currently, Halifax Water generates revenue from third-party contracts for water and wastewater treatment operations, septage tipping fees, and treatment of airline effluent.

Halifax Water also generates revenue for the lease of land for telecommunications facilities throughout the municipality in recognition that reservoir and watershed sites are located on higher elevations that afford more direct line of site for telemetry. In conjunction with these leases, Halifax Water installs telecommunications equipment on these facilities for its own needs for the ultimate benefit of the water, wastewater, and stormwater rate base. As Halifax Water continues to expand the Supervisory Control and Data Acquisition (SCADA) system in accordance with its master plan, further opportunities for leases and hosting of Halifax Water equipment will be realized.

In recognition of Halifax Water's expertise in water-loss control, the utility offers a wide range of related services to generate revenue. These range from leak-detection services for Halifax Water customers and other municipalities to consulting services under contract to

¹ March 31, 2017 Audited Financial Statements

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municipalities and First Nation communities. There is great potential to expand these services to generate additional revenue and, at the same time, provide professional development opportunities for staff.

Halifax Water also recognizes that its assets can be leveraged to bring in revenue from energy generation. This includes projects to generate electricity from wind turbines and control chambers where water pressure is reduced. Both of these opportunities have been developed for interface with the Nova Scotia Department of Energy's Community Feed-In Tariff (COMFIT) program, which provides preferential rates to feed electricity into Nova Scotia Power Incorporated (NSPI) distribution grid. Through efforts of Halifax Water staff, a Ministerial Directive was issued through the Department of Energy (DOE) in 2012 to approve the recovery of renewable energy within water distribution systems at "run-of-the-river" rates. To that end, Halifax Water has completed the installation of a hydrokinetic turbine in the Orchard control chamber in Bedford. The Orchard installation went into commercial operation in October, 2014. The projected net revenues are in the current business plan. These projects are structured to ensure they are compliant with the Public Utilities Act with the recognition that regulated activities cannot subsidize the unregulated side of the business.

In partnership with Halifax Regional Municipality, Halifax Water has also studied the potential for a green thermal utility whereby energy can be extracted from the heat in sewage and delivered through a local distribution system in the vicinity of treatment facilities. The planned redevelopment of the Cogswell interchange in Halifax will provide an opportunity to advance this concept since the Halifax WWTF is adjacent to the Cogswell interchange. This project is currently being pursued as a regulated activity subject to the approval of the NSUARB.

In an effort to be open and transparent to stakeholders including the NSUARB, Halifax Water discloses revenue and expenses associated with unregulated business separately within the financial statements and budgets. Net gains from these activities ultimately go to the benefit of the rate base as they are closed out to accumulated operating surplus/(deficit) each fiscal year.

Rates for some the main sources of unregulated revenue – septage tipping fees and treatment of airline effluent will increase effective April 1, 2018. Halifax Water periodically reviews and adjusts these rates. The rates have not been increased since April 1, 2015.

Unregulated revenues are projected to be \$1.7 million in 2018/19 and will grow to \$1.8 by 2022/23.

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8. CORPORATE CUSTOMER SERVICE STRATEGY

Over the past two years, Halifax Water has enhanced customer service by centralizing all water, wastewater and stormwater calls with the Halifax Water Customer Care Centre. A corporate communications strategy was developed in 2017/18, a new phone number was launched (H2O-WATR) and a new Customer Complaint/Dispute Resolution Process was implemented.

There will be continued enhancement of customer care with improvements to the website, development of a Customer Portal in conjunction with the Customer Connect (AMI) project, and installation of a new telephony system. One of the next steps in improving service to customers will be approving service standards to respond to customer issues and implementation of monitoring and reporting mechanisms to ensure all departments are meeting agreed upon service levels.

Halifax Water's Five-Year Information Technology (IT) Strategic Plan (Section 7.1.4) includes significant investment in systems and tools to modernize how customer service is provided. By 2022/23, customers will be able to request many services on line, the Halifax Water website will be easier for customers to use and navigate, and there will be increased functionality for customers to receive information about their account, water consumption, property characteristics used to bill for stormwater, and receive and pay bills electronically.

Halifax Regional Municipality completed a Corporate Customer Service Strategy in April 2017 and upgraded their telephony system in 2017. Halifax Water is now in position to follow suit, and are working on a corporate customer service strategy for Halifax Water that will ensure alignment with HRM and partnership wherever possible.

With all water, wastewater, and stormwater calls directed to the Customer Care Centre, the utility is well positioned to implement a corporate customer service strategy and utilize information received through AMI and the computerized maintenance management system (CMMS) to track resolution of customer requests.

9. ENERGY MANAGEMENT

9.1 Energy Management Program

Through its Energy Management Program, Halifax Water is committed to creating and ensuring an ongoing focus on sustainability and energy efficiency throughout all operating areas. This program defines the goals, objectives, accountabilities, and structure for activities related to sustainability and responsible energy use.

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In support of this program, Halifax Water's Energy Management Policy defines longer-term goals and commits Halifax Water to the principles of responsible energy management. This includes reducing dependence on fossil fuels through energy conservation and best practices; identifying and implementing cost-effective energy-reduction initiatives; developing alternative and renewable forms of energy from utility assets; and reducing pollution by increasing the usage of energy supplied from sources that are less greenhouse gas intensive.

Program Structure

The Energy Management Program is coordinated through the Manager of Energy Efficiency reporting to the Energy Management Steering Committee (EMSC). The EMSC comprises the Directors of Engineering & IS, Water Operations and Wastewater/Stormwater Operations, and the Manager, Energy Efficiency.

Reporting to the EMSC on a bi-monthly basis, the Manager of Energy Efficiency is responsible for the creation and implementation of the corporate Energy Management Action Plan (EMAP) and any other activities defined by the EMSC. Reporting typically consists of progress reports on the energy-related activities of Halifax Water including details of energy consumption, key performance indicators, and progress on energy projects and other related activities.

Energy Management Action Plan

The EMAP includes details of energy-management activities that will be developed and undertaken by Halifax Water each year. Key activities contained in the action plan include:

- Delegation of the responsibility for achieving energy goals;
- Assignment of team members as required to meet goals;
- Development of an employee-awareness strategy to facilitate energy savings at work and home;
- Establishment of an energy accounting system that allows for collection, monitoring, and reporting of all data on energy-consuming assets, energy consumption, energy costs, energy savings, and key performance indicators;
- Preparation of energy audits on all facilities on a priority basis;
- Implementation of identified energy projects based on sound financial principles;
- Benchmarking of Halifax Water's facilities and establishment of annual energy-reduction targets;
- Identification of funding requirements and external funding sources for the EMAP;
- Refinement of contract and purchasing policies to incorporate energy-efficient practices; and
- Development of renewable energy generation projects.

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Greenhouse Gas (GHG) Emissions

Following on its recent endorsement of the Pan-Canadian Framework on Clean Growth and Climate Change, the government of Nova Scotia intends to implement a carbon “Cap & Trade” program in 2018 to comply with the federal government’s carbon pricing regulations. This new program is expected to apply only to very large industrial GHG emitters (> 100,000 tonnes CO₂e per year), electric utilities, petroleum product suppliers and natural gas distributors. Halifax Water’s GHG emissions at source are currently very low, and do not currently meet the industrial threshold expected to be implemented. As such, Halifax Water will continue to monitor the provincial Cap & Trade program, and will continue to track energy usage, GHG emissions, and energy savings achieved through energy efficiency projects.

9.2 Renewable-Energy Generation

Halifax Water has identified renewable energy as an important way of offsetting energy costs and increasing revenue that will help the utility to significantly reduce energy use and greenhouse gas emissions in the region.

To date, two key project areas have been identified: renewable energy and energy recovery from both water and wastewater systems.

9.2.1 Wind Energy

The Pockwock watershed comprises 5,661 hectares of land surrounding Pockwock Lake and has a significant wind profile. Through a land lease arrangement with Pockwock Wind GP, Ltd., five 2.0 MW wind turbines were installed in 2014 under the provincial COMFIT program, and began commercial operation in early 2015. On average, the wind farm is forecasted to produce approx. 34,000 MWh of energy each year (an amount equivalent to approx. 3,800 NS households) and reduce provincial GHG emissions by approx. 24,000 tonnes CO₂e. The wind farm will continue to contribute significant revenues to Halifax Water, and revenues and GHG savings to the community at large over the 20 to 25 year life of the wind farm.

Other opportunities may be explored for additional small wind developments on Halifax Water owned lands, and will be pursued based on technical and financial viability.

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9.2.2 Hydrokinetic Turbines

An opportunity has been identified to use inline turbines to recover energy from the water supply system in place of pressure-reducing valves (PRVs), widely used by water utilities to reduce pressure more suitable for downstream distribution systems. While PRVs release energy to reduce pressure, they do not perform any useful work with that energy. Inline hydrokinetic turbines can be used to reduce line pressure, and recover energy and convert it to electrical energy.

Halifax Water has investigated a number of potential projects for the installation of inline hydrokinetic turbines. Of the projects identified, the one located at the Orchard Control Chamber in Bedford was completed in the fall of 2014 under the provincial COMFIT program. The Orchard Energy Recovery Turbine has, on average, recovered over 235,000 kWh of energy each year, an amount equivalent to approx. 26 NS households, and reduced provincial GHG emissions by approx. 165 tonnes CO₂e.

Halifax Water may explore other opportunities for additional energy recovery projects in the future, based on technical and financial viability.

9.3 Resource Recovery

Energy recovery from process or waste streams is recognized as one of the biggest opportunities available to society. Recoverable energy is everywhere – in solid municipal/residential waste streams, industrial by-products, and water and wastewater streams. Halifax Water has significant recoverable energy resources available in both its water and wastewater streams. Specifically, as noted in the previous section, inline hydrokinetic turbines can be used in place of pressure reducing valves (PRVs) to recover energy from water distribution systems. In the wastewater system, energy can be recovered from the waste sludge produced by wastewater treatment facilities, heat exchangers and highly efficient industrial heat pumps can be used to transfer energy from one system to another, energy can be supplied for heating or removed for cooling, and bio-gas can be produced to fuel a combined heat and power (CHP) system to generate electrical energy and heat from the combustion process that can then be used for treatment process or building heat.

Reducing the cost of wastewater collection and treatment has been an important issue and has been on the radar of most utilities. Over the years, the field of wastewater has seen a gradual progression with a focus changing from sewage treatment to water reclamation to resource recovery. Following best practices in the industry, utilities currently view wastewater as a valuable resource with several European utilities leading the industry. The four components of resource are being termed as BNEW; biosolids, nutrients, energy and water. From this resource, water can be reused to minimize impacts of exploiting new sources of supply. Nutrients, such as phosphorus, can be recovered in various forms for use

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in agricultural fertilizers. Energy from wastewater and biosolids, in the form of heat and electricity, can be extracted from organics to offset power demands of the facility. Halifax Water has been progressing several initiatives over the years on all four forms of resources available from wastewater. These efforts will continue in the future.

9.3.1 Biosolids Strategy

Halifax Water currently supplies over 35,000 tonnes per year of partially de-watered sewage sludge to its Aerotech Bio-Solids Processing Facility (BPF). Currently, this sludge is turned into a soil amendment that can be used as fertilizer for topsoil manufacturing, sod growing, horticulture, and land reclamation.

Energy recovery from biosolids is one of the most developed opportunities for treatment plants. This is commonly achieved through anaerobic digestion of wastewater sludge. Halifax Water's Mill Cove WWTF and Lakeside Timberlea WWTF are equipped with anaerobic digesters and the gas generated is utilized for digester operation and excess gas is used for space heating in the plants. The Mill Cove WWTF digesters were cleaned and refurbished in 2017; it is expected that the gas yield will increase as a result. The HHSP facilities and other small facilities have sludge dewatering equipment on site such that the biosolids are utilized as soil amendment for beneficial use. Halifax Water expects to continue this practice in the near future considering that the agricultural soil amendment program is very successful. There are several emerging technologies in the industry that show promise for alternative uses of biosolids for energy production; Halifax Water staff have been reviewing these technologies to exploit opportunities; however, it must be developed cognizant of the risk that are associated with the complex issue of biosolids management.

9.3.2 Wastewater Effluent Heat Recovery

The volume of wastewater effluent flowing out of wastewater treatment facilities is immense. The capacity of water to store energy in the form of heat is also immense, as noted in the table below. This combination presents a real and readily available resource for an efficient, cost-effective heat sync that can be used, at a minimum, to provide or remove energy to and from wastewater treatment facilities, or to the local community at large.

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Table 3: Wastewater Effluent Heat-Recovery Potential

Facility	Annual Flow (m³/yr.)	Available Power Capacity⁽¹⁾ (MW)
Halifax WWTF	36,825,000	59.7
Dartmouth WWTF	22,100,000	35.3
Herring Cove WWTF	4,630,000	7.4
Totals	63,555,000	102.4

Notes: Total available power based on an average effluent temperature of 12°C.
Based on 2013/14 usage and cost data.

Halifax Water has completed studies at the three Harbour Solutions plants to determine and understand the technical and financial challenges associated with these types of energy-recovery systems, and then implement the projects that make sense from an energy efficiency and financial perspective.

Cogswell District Energy System

A study was completed in 2016 to determine the feasibility and preliminary business case for an Ambient Temperature District Energy System [ATDES] within the Cogswell Redevelopment Area of downtown Halifax. The feasibility of the DES is predicated on the assumption that connection to the DES will be mandatory within the redevelopment area. To that end, HRM is pursuing amendments to its Charter through the Legislature in spring 2018 to facilitate this authorization. Work on the Cogswell ATDES continues with stakeholder consultation, and preliminary and detailed design work slated to be completed in early 2018, in conjunction with HRM’s effort to advance the Cogswell Redevelopment project.

9.3.3 Bio-Gas Energy Optimization

Halifax Water’s Mill Cove WWTF is a secondary treatment plant that utilizes a mesophilic anaerobic digestion process. Anaerobic digestion reduces sludge volumes and generates a significant amount of bio-gas in the form of methane that is burned to provide process heat to support the digestion process and space heating for facility buildings, thereby offsetting the use of conventional heating oil and the associated GHG emissions.

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9.3.4 Water Reuse

The treated effluent in some of the wastewater treatment facilities has been used for internal plant use for several years primarily for the purposes of cleaning tanks, channels and equipment. On occasions, Halifax Water has been trying to maximize use of the treated effluent by using it for chemical and polymer mixing. With plant optimizations and effluent quality enhancements over the years, the use of effluent water has been increasing in the facilities and will continue into the future. Water reuse is given due consideration during the design of any upgrades or replacement of Halifax Water's WWTFs

10. CONTINUOUS IMPROVEMENT

10.1 Organizational Cultural Change

Halifax Water has approximately 470 employees, 3/4 of which are unionized under CUPE Locals 227 and 1431. Changing culture within a large organization takes time, but is often accelerated by new technology or societal events. Halifax Water will go through an accelerated period of change during the next five years, prompted by new technology, new business processes, new policies and turnover in key positions as a result of demographics and retirement. One advantage Halifax Water has as employer implementing change, is that turnover is low relative to other public sector organizations, and employee satisfaction is generally high.

In 2016 Halifax Water participated in a Workforce Management Planning Survey led by the Municipal Auditor General's Office. The survey results found that 87% surveyed believe the organization is a good place to work, and 94% feel engaged. The survey also identified some challenges from the perspective of employees.

Halifax Water has a succession plan in place for key positions, and has an approach to total compensation that supports attraction and retention of employees. Many initiatives are underway, or planned that will help maintain a positive culture within the organization and build resilience to respond to new challenges such as:

- Promoting a workplace that is respectful and civil for all employees, Civility and Respect in the Workplace training was carried out for all employees in 2016. A report was received in 2017 and a committee has been struck to develop and implement an action plan.
- Additional training for supervisors with respect to their responsibilities around safety, and their role in orienting new employees, return to work initiatives and the duty to accommodate.

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- Continued roll out of a Health and Wellness program introduced in 2017 and adoption of the Canadian Psychological Health and Safety Standards and initiatives to support mental health awareness.

10.2 Cost Containment

Halifax Water reports semi-annually to the HRWC Board, and annually to the NSUARB on the results of cost containment activities. The next cost containment report will be filed with the NSUARB by June 30, 2018. Some of these are on-going, and some are one time in nature. The containment initiatives from last year (2016/17) along with amounts of an ongoing nature from 2013/14 to 2015/16 inclusive reflect cost savings of \$5.1 million. The inclusion of initiatives and amounts from prior years reflects an intentional focus on sustainable results over the long term.

Halifax Water continues to promote and develop a cost containment culture. As salaries and benefits are the largest element in the operating budget, the most significant opportunity identified is to improve workforce planning and the staffing process. Another area of opportunity is focusing on productivity through enhanced business processes and technology, performance management, and improving time and attendance tracking.

10.3 Advanced Metering Infrastructure (AMI)

Halifax Water began looking at the feasibility of Advanced metering Infrastructure (AMI) in 2012. AMI is a system whereby, in lieu of meter readers walking routes, or driving routes to read meters with radio devices (AMR) a network of radio devices is established over the service area to read meters on a much more frequent basis (typically hourly). Based on an initial positive business case, Halifax Water went to market in October, 2015 to purchase an AMI technology system. The Halifax Water Board approved adoption of AMI in principle subject to concluding a negotiation with an AMI vendor that results in a positive business case. Upon approval by the NSUARB in the fall of 2016, Halifax Water launched the Customer Connect project in December 2016.

Since the project was launched, AMI software was configured and installed, the AMI network design was completed and the network mostly installed, a stakeholder engagement program was launched, pilot deployments were successfully completed and the mass deployment phase was initiated in August of 2017. Mass deployment, whereby all premise meters are replaced or upgraded will continue until the fall of 2019. While mass deployment is ongoing, several other initiatives which are part of Customer Connect will continue including network installation, staff training, business process conversion and software installation.

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In addition to streamlining the meter reading process and reducing its cost, Customer Connect promises many features that will improve the level of service Halifax Water can offer its customers. These include:

- The ability to offer monthly billing to residential and small commercial customers thus making it easier to for customers to manage cash flow and automated payments.
- Billing errors and estimated meter readings will be reduced.
- Capability to alert customers to high consumption due to plumbing leaks [almost as they happen], reducing billing disputes and high bill amounts.
- Customers will have the ability, through a web portal, to manage their water consumption in near real time and see the effect of any conservation measures they take. The web portal will provide access to information about their account and billing for all three services – water, wastewater and stormwater; and eventually customers will be able to receive and pay their bills on-line through this portal.

Development of the customer web portal will be an important indicator of the success of Customer Connect. The promise of the ability for customers to monitor their water usage online, has been an important part of maintaining customer support for the project. Web portal development is scheduled to be complete in 2019, based on the recently completed IT strategic plan.

Customer Connect will provide much more data about customer consumption and distribution system operations. This will enable more refinement of business processes for earlier identification of distribution system leaks. Overall it will improve the customer focus of the organization by providing the ability to identify and rectify customer issues proactively rather than after the fact upon the customer's receipt of a high bill. This will result in reduced costs for billing and collection and reduce the need for the high cost activity of sending technicians to customer homes.

10.4 Computerized Maintenance Management System (CMMS)

Halifax Water has successfully implemented a corporate CMMS utilizing the Cityworks software within Water Distribution and Wastewater/Stormwater Collections as well as within a select number of Treatment Facilities.

The next steps of the CMMS program will include both a continual improvement of the existing deployments and an expansion of Cityworks to additional business units.

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The proposed continual improvement of Cityworks CMMS application will include:

- Review / assessment of current implementation of Cityworks, including assessment of Work Order Types, and Work Order Life Cycle looking for process inconsistencies, improvement opportunities.
- Analysis of information / reporting requirements to best communicate operational effectiveness statistics from Cityworks to Management.
- Enhanced integration with – Procurement, Skilled/Resources, Fleet Management, Non Moving Assets, Finance, GIS, Asset Management, Customer Experience, Work order/Resource routing through system interfaces or business process improvements.

The expansion of Cityworks CMMS to additional business units will include:

- Implementation of Cityworks for the Technical Services group to enhance their maintenance management practices and interactions with other areas already using Cityworks
- Continue Cityworks roll-out across all Water Supply Plant or Wastewater Treatment Facilities not completed in Deployment 3.
- Implement Cityworks Storeroom functionality for Facilities needing tighter control of consumables

10.5 Water Quality Master Plan

Halifax Water began developing its first Water Quality Master Plan [WQMP] in 2005 to assess its water quality program and to keep in front of the rapidly changing drinking water regulations. The initial WQMP established a road map towards more effective water quality management and staff determined at the time that a water quality research program was the most effective way to achieve the plan goals.

In 2006, Halifax Water executed a research agreement with Dr. Graham Gagnon of Dalhousie to execute the WQMP research. Subsequently, Dr. Gagnon applied to the Natural Sciences and Engineering Research Council [NSERC] for an Industrial Research Chair (IRC). Under the research chair, NSERC matches all funds provided to Dr. Gagnon by research chair partners, effectively doubling Halifax Water's investment.

In April 2017, Dr. Gagnon was awarded a third, five year research chair term and the chair has grown to include other partners including Cape Breton Regional Municipality, CBCL Limited consulting engineers and several water analysis technology companies, further multiplying the value of Halifax Water's investment.

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Since its beginning in 2007, the IRC has created many benefits. Through our collective efforts, Dr. Gagnon and Halifax Water have emerged as leaders in North America on drinking water quality. Dr. Gagnon has trained many graduate students who have found employment, in some cases, at Halifax Water, and also in prominent roles in the drinking water sector.

Direct benefits of this Chair to Halifax Water include:

- Documentation for NSE that there was no public health benefit to install filter-to-waste at the JD Kline water supply plant, thus avoiding a \$5 million capital cost and ongoing organizational risk. Halifax Water did improve public health as part of this process by adopting new filter washing practices at minimal cost.
- Halifax Water chose not to adopt chloramines as a secondary disinfectant, which was a preferred strategy for disinfection byproduct removal when research showed that chloramines would have adverse effects for lead levels in drinking water.
- Identifying the need to increase corrosion control levels, reducing lead levels in drinking water by 35%.
- Adoption of biofiltration at the JD Kline plant saving \$40,000 per year in chlorine costs and reducing disinfection by-product levels by 40%. Longer term plans are in place to convert Lake Major to biofiltration.
- Determination that partial replacement of lead service lines was not protective of public health and possibly harmful. Halifax Water was one of the first utilities to take this stand in 2012, a position that is now commonly held in the water industry.
- Identified the phenomenon of lake recovery. This is a process where lakes are experiencing increasing pH as a result of the reduction of sulfur oxide emissions into the atmosphere. This process has negative consequences for water treatment and early discovery has led to a head start on planning treatment upgrades.

Halifax Water published its third WQMP in September 2017 and it was subsequently approved by the Halifax Water Board. The WQMP guides Halifax Water's WQ work and also guides the research chair. There are four themes in the current WQMP as follows:

- 1. Understanding Lake Recovery:** As indicated above, lake recovery is a process whereby improved air quality and the reduction on acid rain is allowing lakes to recover to their previous state. Unfortunately, this process has resulted in increasing levels of total organic carbon (TOC) which is a critical treatment parameter and increasing levels of biotic activity in the lakes. The increasing levels of biotic activity are an explanation for the geosmin episodes experienced since 2012. Increasing levels of biotic activity are also a potential precursor to other taste and odour causing compounds as well as potentially harmful algal toxins such as microcystin-LR. As well, the increasing levels of TOC are challenging the ability of the water supply plants

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to operate efficiently and may eventually reach levels beyond what the plants were designed to deal with. Plant improvements will be required in the medium term and understanding how far the process of lake recovery will go is necessary to design the plant processes of the future.

2. **Adapting to Lake Recovery:** As indicated above, lake recovery is already impacting the treatment plants. While treated water quality still meets Halifax Water goals, the plants are more difficult and more expensive to operate. Short and medium term strategies and operating approaches are necessary to continue to produce high quality drinking water. This includes planning for a new intake for Lake Major to get access to more treatable and more consistent water quality as well as maximizing the utilization of biofiltration.
3. **Maintaining Distribution System Water Quality:** Maintaining water quality between the water treatment plant and the customer's tap is an important part of the multiple barrier approach to providing safe drinking water. Continuing our research into lead occurrence and corrosion control chemistry will remain a focal point. This theme will also explore maintaining water quality during emergencies such as water main breaks and continuing to optimize disinfection in the distribution system to maintain chlorine residuals while reducing disinfection by-products.
4. **Water Quality Data Mining:** Ten years of research and source water protection work has resulted in an immense resource of water quality data. New resources recruited as part of the Lead Service Line Program include a data analyst whose long term responsibility will be to work with water quality data sets to gain new insights into water quality issues and employ data analytics techniques for processes like distribution system water quality modelling.

Lead Service Line Replacement Program

One significant new program that has grown out of water quality master planning has been the adoption of a formal lead service line replacement program. Halifax Water has approximately 2,500 lead service lines remaining in the public right of way and up to 15,000 remaining on private property. Halifax Water has adopted a program intended to remove all lead service lines by 2050, consistent with the recommendation made to the USEPA by the National Drinking Water Advisory Council [NDWAC]. The program has the following five pillars:

1. **Replace all lead service lines by 2050,** both those owned by the utility and those owned by customers. A key part of this is working in partnership with customers to get the private side work done. It will also require a 3-4 times increase in our current level of lead service line replacements.

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2. **Inventory:** Getting an accurate inventory of where lead service lines are, both public and private is key to working with customers and executing an effective program. Resources and new business process will be dedicated to building an accurate inventory of lead service lines.
3. **Customer communication:** The NDWAC recommendations require direct communication with customers who have a lead service line, a minimum of once every three years until the LSL is removed. Further, to encourage customers to replace LSL's, it will be necessary to provide more information on our web site and interactive tools to see what type of service they have. It will also be necessary to provide them more frequent and better information on the replacement process, how to access funding programs, how to hire a contractor and the health risks associated with LSL's.
4. Continuation of **customer sampling programs.** Sampling properly for lead detection is expensive and intrusive for the customer. It is important that Halifax Water continue to offer free lead sampling for at risk homeowners in order to engage them in the issue and provide public health information. Through our partnership with Dalhousie University we have been able to provide very cost effective lead sampling.
5. **Corrosion control:** Providing corrosion control treatment at the treatment plant is an important part of a comprehensive lead strategy. Effective corrosion control reduces lead levels where service lines exist and will continue to protect customers from lead found in solder and brass fixtures well after lead service lines are removed.

Halifax Water launched its new lead program on April 1, 2017. In August 2017, the NSUARB approved a program to enable Halifax Water to provide a 25% rebate for customers replacing a lead service line and to replace lead service lines that are disturbed during emergency repairs, at the utilities expense. This makes Halifax Water one of the first utilities in North America to take this step. Approximately 90% of customers who have had the public LSL removed will not remove the private service on their own initiative. To get customers to come along when we replace the public portion, it will be necessary to identify the barriers to lead service line replacement and assist customers who are stopped by those barriers. The ability for the utility to help customers overcome the financial barrier is important. To that end, Halifax Water has applied to the NSUARB to allow Halifax Water to offer customers a financing program for the balance of the replacement cost.

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10.6 Wastewater Quality Master Plan

Halifax Water has consistently worked towards achieving the goals of the Compliance Plan that was developed in 2014. Building on the success and continuous improvement opportunities identified in the Water Quality Master Plan, it is prudent to develop a similar Wastewater Quality Master Plan [WWQMP]. The primary difference between a Compliance Plan and a WWQMP is that the former address the current issues and stays in compliance with the current legislation, while the latter is a forward thinking plan that addresses the utilities vision and considers future legislation that might impact the utility. Since the introduction of the Wastewater System Effluent Regulations, NS Environment has been reviewing and renewing Halifax Water's operating permits with steady increase in the compliance and reporting requirements. It is anticipated the wastewater regulations will continue to emerge rapidly over the next several years.

Halifax Water has been in active discussions with Dalhousie University to create a research partnership for the utility's wastewater initiatives. The Industrial Research Chair program is well established at Dalhousie University as a partnership with Halifax Water to support its water quality and treatment initiatives. Halifax Water anticipates entering into a formal agreement with Dalhousie in 2018/19 and begin the development of a WWQMP. At a very conceptual level, this plan will focus on current wastewater treatment and collection challenges, the defined issues of the future and emerging issues. The plan will focus on optimization of the HHSP WWTFs to be compliant with WSER well before the 2040 compliance timeline, biosolids management and resource recovery.

10.7 Wastewater Treatment Facilities Compliance Plan

The Regulatory Compliance division of Regulatory Services has established a tracking system to monitor trends of non-compliance and associated sources for all of the wastewater treatment facilities (WWTF). A working group has been established between Asset Management, Operations and Design Services staff to track and plan for the upgrades to maintain compliance with Provincial and Federal regulations. As of next year, all treatment facilities will be in compliance with WSER or have approval for operational variances consistent with the CCME Municipal Wastewater Effluent Strategy.

10.8 Environmental Management System Expansion

Halifax Water has an extensive history with an environmental management system [EMS] since certifying its first water supply plant at Pockwock Lake, in 2003, to ISO 14001, an international standard for environmental management systems. The benefit of implementing an EMS is that it drives a process of continual improvement towards meeting defined environmental goals and objectives. Minimizing environmental impacts becomes

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one of the defined primary goals, and standard processes are put in place to identify issues and direct improvements through documented standard operating procedures. The standard pertaining to Environmental Management Systems (EMS) is 14001- 2004 and requires an organization to:

1. Establish an environmental policy.
2. Identify environmental aspects that can impact the environment.
3. Identify our applicable legal requirements.
4. Set appropriate environmental objectives and targets.
5. Establish programs to implement our policy, achieve objectives and meet targets.
6. Periodically audit and review activities to ensure that the policy is complied with and the environmental management system remains appropriate.
7. Be capable of adapting to changing circumstances.

In 2016, Halifax Water obtained the ISO 14001-2004 Designation for the Herring Cove Wastewater Treatment facility expanding the previous scope of the Bennery, Pockwock and Lake Major water treatment facilities. The certification of the Herring Cove WWTF marked the first wastewater facility to obtain certification in Atlantic Canada.

In September 2015, ISO issued a new ISO 14001-2015 Standard and the EMS must be upgraded to be compliant with the new Standard by September 2018. The near term goal is to ensure the currently designated facilities meets the new standard by the specified date. To achieve this, EMS Awareness sessions on the new standard will be completed in November 2017 and an internal audit is scheduled for February 2018.

With the completion of this exercise, Halifax Water will work towards getting the remaining wastewater facilities certified, starting with Dartmouth in 2018. It is anticipated that all the major WWTFs will achieve the ISO Designation by 2020.

10.9 Wet Weather Management

Like many municipalities and utilities across North America, Halifax Water's sanitary sewer system is subject to dramatic flow increases in response to precipitation events. Wet weather flows can lead to sanitary sewer releases, sewer backups/basement flooding, increased operation and maintenance cost, treatment process upsets, and treatment facility effluent quality & capacity issues. Recognizing the impacts of wet weather generated flows on the system, Halifax Water developed a proactive program to systematically address the negative impacts of wet weather on the collection system and wastewater treatment processes. The Halifax Water wet weather management program (WWMP) developed a strategy to efficiently manage the impacts of wet weather generated flows within the

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sanitary sewer system, while monitoring and separating the combined sewer systems when practical to do so. The program is long term in nature and follows a phased implementation to meet the strategy.

Halifax Water maintains approximately 1,000 km of wastewater sewers, 300 km of combined sewers, 14 wastewater treatment facilities, and 172 wastewater pumping stations. Based on age, historical construction practices, maintenance, number of connections as well as other factors, there is significant opportunity for infiltration/inflow (I/I) to enter the wastewater system. The WWMP intends to systematically identify opportunities to employ wet weather management strategies to:

1. Volumetrically reduce the quantity of sanitary sewer that is collected, pumped, and treated.
2. Store the flow during the wet weather period and then treat this flow post when the system has capacity.

The WWMP intends to apply the most cost effective strategy to successfully manage the wet weather flow generated in each sewershed. At the macro level, wet weather management can be divided into three main categories:

1. Peak flow reduction
2. Peak flow attenuation, and
3. Capacity increase

For each sewershed, the WWMP implements the most cost effective strategy to manage the wet weather generated flows. Where possible, all three strategies are employed based on cost benefit analysis and the primary driver for flow reduction with regulatory compliance being the high priority.

I/I sources can be grouped into two contributing areas: Public Infrastructure (Mains, manholes, laterals up to the property line, etc.) and Private Infrastructure (laterals from property line up to and including connections within buildings). There are a number of challenges when dealing with either of the primary contributing areas and specific strategies must be employed. The program employs a variety of strategies to reduce wet weather impacts such as pipe condition assessments, cured in place pipe (CIPP) rehabilitation, sewer separation, flow monitoring, illegal connection investigations, public communications, and modeling. To effectively address all the issues that contribute to the wet weather problem within the sewershed, resources from multiple business units within Halifax Water are required to work together to satisfy the goals of the program. Figure 2 indicates the working relationships between the contributing business activities.

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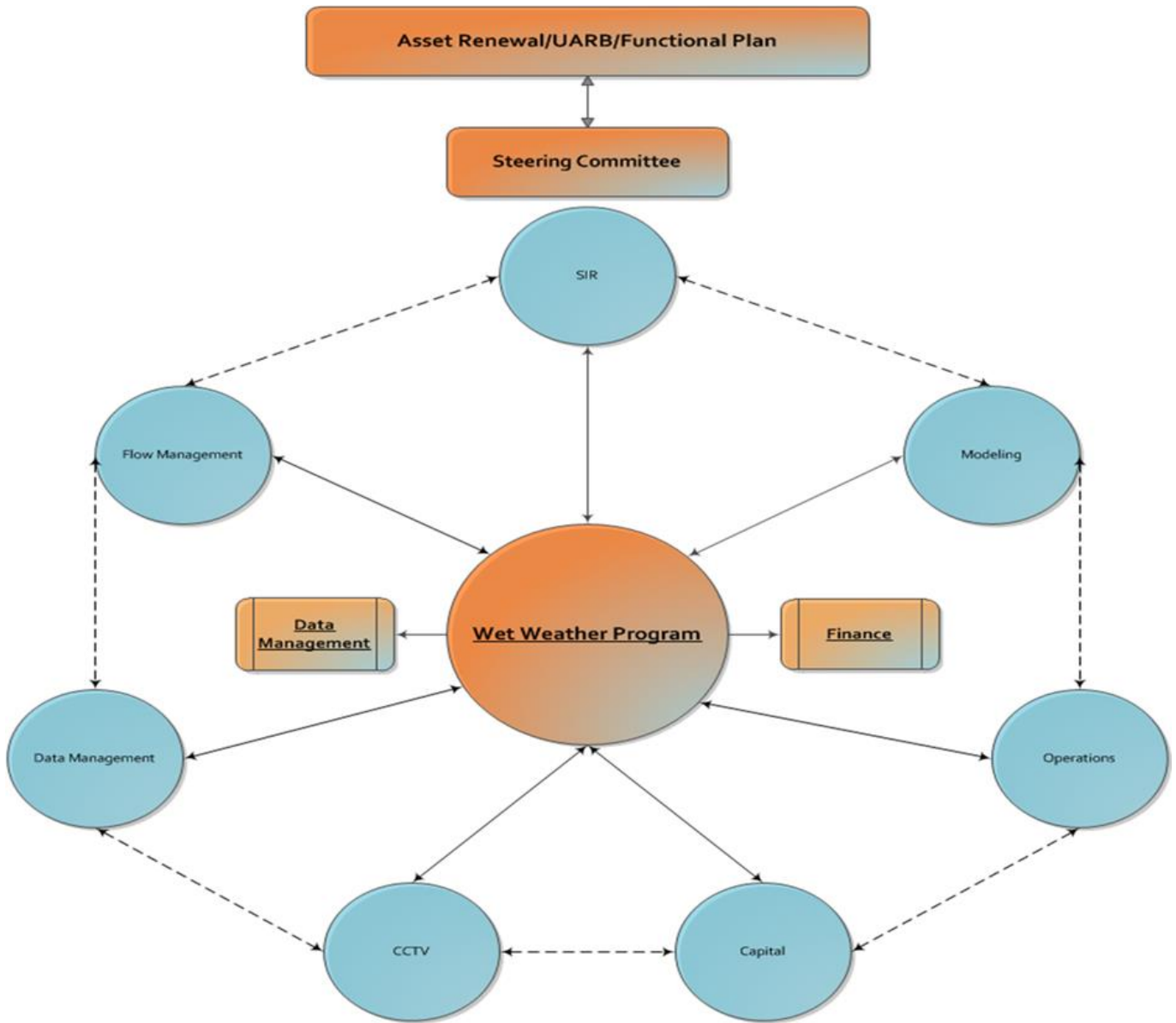


Figure 2: Contributing Business Activities of Wet Weather Management

The benefits of reducing the volumetric wet weather flow include a reduction in untreated discharges to the environment, reduction of effluent excursions at WWTFs, reduction in O&M costs, and an increase in available system capacity.

Halifax Water’s WWMP is structured to gain location specific information with respect to various wet weather management techniques. Once sufficient data has been collected and analyzed, staff apply that knowledge to make the most cost effective recommendation to

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manage wet weather flows for each sewershed. A phased approach is being followed to implement this strategy. While the program phasing is prescriptive; it is important to revisit the objectives of the program periodically and adjust where necessary.

- **Phase I:** The initial phase of the WWMP involved initiation of the program and its structure. It was realized early that there is no “one size fits all” solution to wet weather management and the program needed to reflect this when implementing strategies. The initial program organizational structure was comprised of a wet weather steering committee and a wet weather action committee. This structure has been revisited in the last year to ensure that key contributors to the program are engaged.
- **Phase II:** Phase II of the program required identifying individual sewersheds that demonstrated a need for wet weather management. There was limited flow information available to make informed prioritization decisions within the service boundary. In the absence of measured flow information, pump station run time information was used as a surrogate for flow data. The entire service boundary was characterized using existing flow information and pump run time data.
- **Phase III:** Pilot sewersheds were identified from the prioritization matrix from phase II. The pilots were selected strategically so that specific wet weather management techniques could be assessed. Pre and post project flows are being analyzed and compared in the individual sewersheds and a cost benefit analysis will be conducted on the projects with respect to wet weather flow reductions. This pilot program is intended to gather sound information on the costs of various wet weather management techniques and the possible impact they can have on the flow response to wet weather.
- **Phase IV:** As information from phase III is matured it will be applied to the service boundary to recommend and implement wet weather management projects in specific sewersheds. This will allow Halifax Water to implement the most cost effective strategies to manage Halifax Waters wet weather flows. Since the initiation of the program; 205 sewersheds have been identified with varying degrees of impacts from wet weather events.

In the absence of historical flow data for individual sewersheds, the WWMP utilized the available SCADA records for operation of the 172 sanitary pumping stations within the service boundary. This approach enabled a comprehensive review of all pumping station and wastewater treatment facility sewersheds based primarily on Rainfall Derived Inflow and Infiltration (RDII) analysis. RDII directly represents the extraneous flows entering a collection system resulting from wet weather events.

Recognizing the importance of flow monitoring and infrastructure condition assessment, Halifax Water enhanced service delivery of the flow monitoring and CCTV programs. Both programs have performance based contracts to ensure accurate, defensible, and dependable data delivery to the industry standard.

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The methodology used to systematically prioritize Halifax Water's 172 pumping station areas as they respond to RDII was to compare a station's average day to its wet days and calculate its peaking factor. The peaking factor used for this level of evaluation is the ratio of the maximum flow rate to the average daily flow rate. This concept has long been used as an indicator of the magnitude of response to rainfall inflow and groundwater infiltration entering the wastewater collection system. A high peaking factor indicates severe wet weather influences while a low peaking factor would indicate minimal wet weather impacts.

This effort reviewed all existing data to support objective ranking of all sewersheds, regardless of whether separated or combined system, and removed any anecdotal evaluations of rainfall response. To accomplish this, a single spreadsheet, listing all facility sewershed areas, was developed with quantitative data populated per area. Gathering all data into a single tabular format allows for flexible data analysis to aid in strategic decision making.

While RDII evaluation was the primary ranking factor, three other indicators were used to further refine the ranking:

1. Regulatory constrained sites: either an identified overflow site or a wastewater treatment facility with non-compliant effluent discharge or both.
2. Known wet weather sites that require significant operations effort to maintain regulatory compliance.
3. Separated & combined systems: separated ranked higher than combined sites since combined sites are designed to carry wet weather flows and provide primary level of treatment prior to discharge into a marine environment per the operating permit.

The result is a prioritized list with separated systems that experience regulatory challenges due to wet weather impacts. Figure 3 below indicates the sewershed priorities within the service boundary as indicated by the heat map.

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Priority Map
Wet Weather Management Program

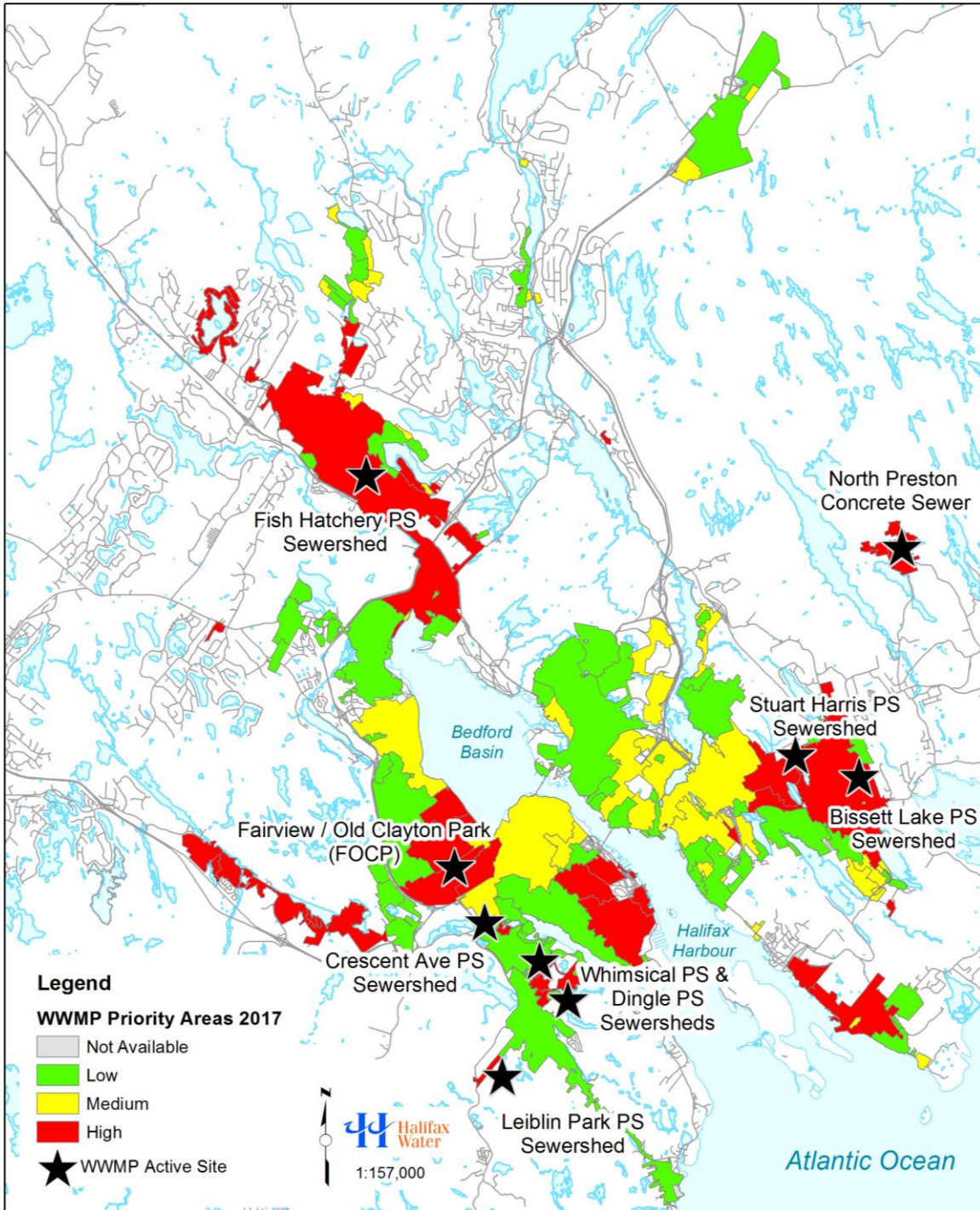


Figure 3: WWMP Sewershed Priority Map

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In most cases, more information was required to support strategic decision making. The WWMP considered more evaluation criteria to differentiate sites based on more detailed wet weather indicators. Data subcategories allow for further refinement to the prioritization matrix and generally include:

1. Age of install, pipe diameter, pipe material,
2. Availability of deep storm connection,
3. # of SSOs per year,
4. Anecdotal wet weather commentary from operations, and
5. Near-term planned development.

In the absence of flow data for each pumping station, as mentioned above, it was determined that pump runtimes could be used as a surrogate for flow data to calculate each station's peaking factor.

The pumping stations' runtime graph effectively shows how the station responds and operates during normal daily flow conditions. Analysis during rain events showed a very different response for stations impacted by RDII.

Halifax Water's WWMP is currently running 5 pilot projects: Stuart Harris Sewershed, Cow Bay Rd, Leiblin Park, North Preston, and Crescent Ave. These pilot basins were chosen strategically to enable Halifax Water to validate what RDII reduction can be accomplished via various I/I reduction strategies. Industry indicates that approximately 50% of RDII is generated from public infrastructure and 50% is generated from private infrastructure. Specific strategies must be employed to each portion of the sewershed to address RDII globally in the catchment. Halifax Water intends to validate these statements through review of the flow data from the pilot projects. It is expected that the pilots will support the notion that comprehensive rehabilitation on both the public and private portion will be required to significantly reduce I/I, however in some cases public side pipe rehabilitation may be sufficient to achieve the desired targets.

RDII analysis has been conducted on pre and post activity for each pilot. Figure 4 below illustrates the reduction in RDII peak flow rate for the Crescent Ave pilot project. This particular pilot underwent a three phase rehabilitation:

1. Mainline renewal;
2. Lateral Renewal; and
3. Manhole Renewal.

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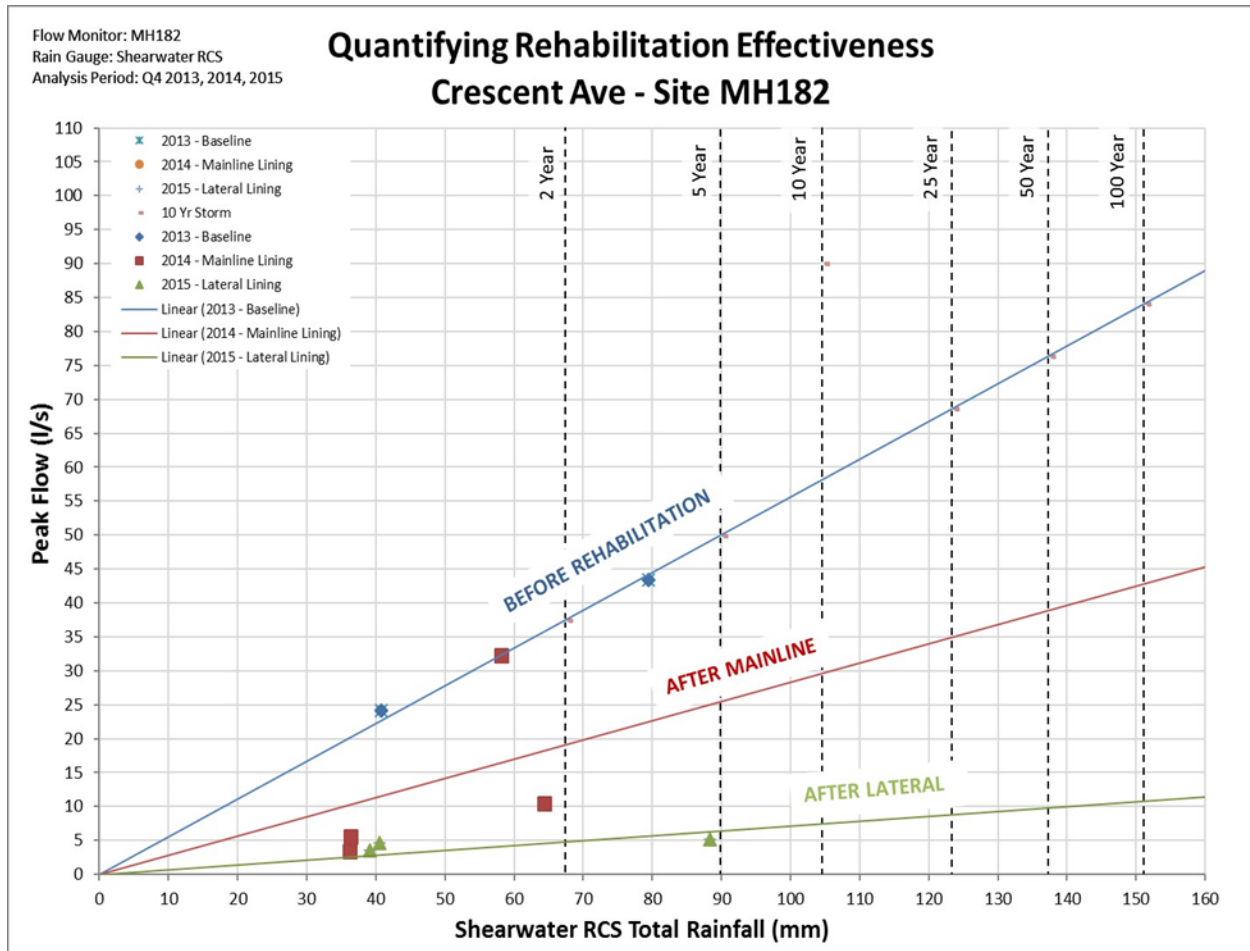


Figure 4: Crescent Ave Pilot Project RDII Peak Flow Reduction by Rehabilitation Phase

Phase IV of the WWMP involves applying a cost benefit analysis of the various strategies to manage Halifax Water’s wet weather flows throughout the entire service boundary. As expected, the pilot sewersheds are demonstrating a measured reduction in RDII as the various wet weather management strategies are implemented. The financial cost of the RDII reduction will be normalized so that the information can be applied to the entire service boundary and compared to more traditional approaches to wet weather management such as capacity increase and storage. In order to complete the cost benefit analysis, it is important that the correct information is collected and assessed during the pilot stage. Information to support the cost benefit analysis will be assessed for each pilot as information becomes available. This information was assessed for all pilot programs to date and is presented in Table 4 below.

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Table 4: Pilot Program Summary of Flow Reduction and Costs

	Quarter		24 hr - 10 Yr Storm Return		Unit Reduction		Costs		
	ADF Reduction m ³ /day	ADF Reduction (%)	Peak Flow Reduction l/s	Peak Reduction (%)	m ³ of ADF Reduced per m of pipe	l/s of Peak Flow Reduced per m of pipe	Capital Expenditure (\$)	Cost / ADF Reduction	Cost / Peak Reduction
Projects (CIPP Renew)									
Crescent Ave Pumping Station									
2014 Mainline (MH182 Crescent)	129	-30%	29	-49%	0.37	0.08	\$ 275,385	\$ 2,135	\$ 9,647
2014 Mainline (MH174 Alderwood)	141	-75%	39	-86%	0.70	0.19	\$ 159,251	\$ 1,129	\$ 4,136
2015 Laterals (MH182 Crescent)	29	-10%	20	-69%	1.04	0.73	\$ 438,767	\$ 15,130	\$ 21,478
2015 Laterals (MH174 Alderwood)	24	-52%	-2	34%	1.85	-0.16	\$ 203,713	\$ 8,460	\$ (97,867)
Comprehensive Rehab (MH182)	158	-37%	49	-84%			\$ 714,151	\$ 4,520	\$ 14,582
Comprehensive Rehab (MH174)	165	-88%	36	-82%			\$ 362,964	\$ 2,198	\$ 9,966
Stuart Harris PS Pilot Project									
2015 Mainline	19	-20%	21	-61%	0.02	0.02	\$ 286,482	\$ 15,078	\$ 13,763
Leiblin Dr PS Pilot Project									
2016 Mainline	65	-15%	40	-23%	0.03	0.02	\$ 507,228	\$ 7,858	\$ 12,668
North Preston - concrete sewer									
2016 Mainline	13	-2%	27	-24%	0.02	0.04	\$ 177,113	\$ 13,767	\$ 6,512
Rosebank Ave - combined system									
2016 Mainline	-68	56%	-4	5%	-0.19	-0.01	\$ 98,402	\$ (1,441)	\$ (25,396)

The information in this table has been compiled over the first three years of the formalized WWMP at Halifax Water. The program is structured to evaluate all wet weather activities using the same methodology. This effectively builds the knowledge base of wet weather management to enable Halifax Water to employ the most cost effective strategy to each sub area of the service boundary.

Practical application of this dataset is the goal of the program. To that end, information on expected I/I removal and reduction rates can be made on future projects using the knowledge gained from previous projects.

The West Region Wastewater infrastructure Plan (WRWIP - finalized 2017) identified a number of predefined projects that are essential to the regional infrastructure plan. One of the identified projects was a wet weather management project in the Fairview/Old Clayton Park (FOCP) area. The project scope includes the removal of approximately 200 liters per second of wet weather generated flow. This project was formally initiated by the WWMP in the summer of 2017 with a 10 year implementation deadline to support the regional infrastructure plan. In year one, the WWMP has installed the flow monitoring required to measure the impact of the project which will be used to validate success. CCTV inspection of half of the project area is complete. Future years will see the completion of the sanitary sewershed evaluation study that will finalize the detailed execution of the project. The near term project objectives include strategy evaluation, selection and implementation of preferred solution, and execution by 2022. Flow monitoring and wet weather analysis will continue for the duration of the project to validate efforts. This timeline will allow for

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alternative strategies in the event that the program objective of 200 LPS peak flow is not realized in the first field execution.

The Asset Management team will be completing a Wastewater Regional Infrastructure Plan in the East and Central regions with expected completion in 2018. The WWMP will work with the project team in strategy selection for management of wet weather flows. It is anticipated that wet weather flow management will be a part of the overall wastewater strategy for the region.

In addition to supporting the asset management program, the WWMP is methodically working through the prioritization matrix and identifying areas that can be improved in the most cost effective manner. This effort will expand over the next five years and will identify and implement projects as well as increase the base dataset that is used in decision making for wet weather management at Halifax Water.

The planned WWMP activities for the next five years are listed in Table 2 (WWMP Preliminary 5 Year Plan) below. Note that year 1 and 2 activities are firm plans and are unlikely to change without significant unpredicted influences. The activities identified in years 3-5 are subject to change as information is gathered and reviewed.

Table 5: WWMP Preliminary 5 Year Plan

2018/19	Refresh Prioritization Matrix
	SSES Activity (CCTV & Flow Monitoring)
	<i>Central Region: Fish Hatchery Park PS Sewershed - SSES</i>
	<i>East Region: Bissett Lake PS Sewershed - SSES</i>
	<i>West Region: Dingle PS & Whimsical PS Sewersheds - SSES</i>
	Rehabilitation: Capital Projects
	<i>West Region: FOCP - Mainline</i> <i>Pilot Project: Stuart Harris PS - Lateral</i>
2019/20	Refresh Prioritization Matrix
	SSES Activity (CCTV & Flow Monitoring)
	<i>Central Region: Fish Hatchery Park PS Sewershed - SSES cont'd</i>
	<i>East Region: Bissett Lake PS Sewershed - SSES cont'd</i>
	<i>West Region: Dingle PS & Whimsical PS Sewershed - SSES cont'd</i>
	Rehabilitation: Capital Projects
	<i>West Region: FOCP - Mainline Cont'd</i> <i>West Region: Crescent Ave PS Sewershed - Mainline</i> <i>Pilot Project: Leiblin Park PS Sewershed - Lateral</i>

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2020/21*	Refresh Prioritization Matrix
	SSES Activity (CCTV & Flow Monitoring)
	<i>Central Region: Fish Hatchery Park PS Sewershed- SSES cont'd</i>
	<i>Central & East Regional Infrastructure Plan - SSES</i>
	<i>West Region: Pending Prioritization Matrix Refresh</i>
	Rehabilitation: Capital Projects
	<i>West Region: FOCP - Mainline Cont'd</i>
	<i>Pilot Project: North Preston Concrete Sewer - Lateral</i>
<i>Mainline: Pending SSES outcomes</i>	

2021/22*	Refresh Prioritization Matrix
	SSES Activity (CCTV & Flow Monitoring)
	<i>Central & East Regional Infrastructure Plan - SSES cont'd</i>
	<i>West Region: Pending Prioritization Matrix Refresh</i>
	Rehabilitation: Capital Projects
	<i>West Region: FOCP - Mainline Cont'd</i>
<i>Mainline: Pending SSES outcomes</i>	

2022/23*	Refresh Prioritization Matrix
	SSES Activity (CCTV & Flow Monitoring)
	<i>Central & East Regional Infrastructure Plan - SSES cont'd</i>
	<i>West Region: Pending Prioritization Matrix Refresh</i>
	Rehabilitation: Capital Projects
	<i>West Region: FOCP - Mainline Cont'd</i>
	<i>West Region: FOCP - Lateral</i>
<i>Mainline: Pending SSES outcomes</i>	

**Subject to change due to data review supporting refresh of prioritization matrix*

10.10 National Water and Wastewater Benchmarking Initiative (NWWBI)

The Nova Scotia Utility and Review Board approved Halifax Water participation in the Canadian National Water and Wastewater Benchmarking Initiative (NWWBI) as a recommendation from a previous rate review process. The Canadian NWWBI was started in 1998 and has since grown to 55 member municipalities and utilities participating in water, wastewater and stormwater benchmarking. The participating group is comprised largely of

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progressive utilities and municipalities that leverage benchmarking to assist decision making in business processes.

The success of the initiative comes from how data is collected to ensure quality. To guarantee that data is collected on a like-for-like basis between utilities, significant effort is placed on the definition of each performance measure and the data items that are collected. Halifax Water has participated in the initiative since 2014 and has been refining the data collection process in that time.

Initial data collection efforts in the first three years of participation were challenging and NWWBI consultants cautioned Halifax Water that initial years would require extra effort around data collection. The effort was front loaded and entering the fourth year of data collection, Halifax Water has a more streamlined approach to data collection.

Halifax Water's operations departments are divided amongst three sub geographical areas: East Region, Central Region, and West Region. Involvement in NWWBI was strategically arranged to collect data across the three sub service areas as discrete datasets. This approach permits benchmarking at the national level as well as across service regions. As the datasets mature, optimization across service boundaries can increase efficiencies at the local level.

While Halifax Water participation in NWWBI is relatively new, internal data collection procedures have matured quickly and will continue to streamline as Cityworks is implemented across the service areas. The results of the annual surveys reveal industry trends and identify individual diversions from normal. Halifax Water then dissects the trends and diversions to identify areas of improvement within the business. Initial results of Halifax Water's participation in NWWBI indicate that Halifax Water is not an outlier in any particular business area that data is collected and compared.

10.11 Succession Planning

Halifax Water has a succession plan for key positions, and in 2017, commenced a review of the existing succession planning process to tailor it for demographic and technological changes. It is going to become increasingly important since, as at last count, 100 employees could retire in the next 5 years, representing 22% of the workforce. The next phase of succession planning will cascade plans to deeper levels within the organization and will involve more interaction with employees. Succession planning, if done badly, can damage morale and employee engagement. If done well, it can positively impact employee engagement. By the end of the period covered by the Five Year Business Plan, individual professional development plans and training programs will be tailored to support succession planning.

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11. CLIMATE CHANGE

Climate change has been a documented global phenomenon for a number of years. Climate data indicate a warming progression since the beginning of the industrial era. The Intergovernmental Panel on Climate Change forecasts continued warming with global increases of between 2-4 degrees Celsius or more by the end of this century. Changes will be gradual, progressive, and will impact communities and natural systems well before the end of the century. Climate change may have a number of effects on the water cycle and natural water systems, with resulting impacts on water, wastewater and stormwater operations and infrastructure.

Climate change effects may include greater weather variability (more extreme wet-weather events and more dry-weather periods), greater intensity of precipitation during extreme events, greater risk of hurricanes in the Maritimes, increased stormwater runoff, increased risk of flooding and sea level rise up to 1 metre by 2100, decreased water supplies during dry weather, and ecological changes from nuisance or disease-causing organisms. As a consequence, the impact to utilities may include increased stormwater flows during extreme events, increased risk of erosion, increased flows during snow melt events, increased flows within combined systems during extreme events (increased risk of inflow/infiltration and overflows for wastewater systems), increased water demand and storage requirements during dry summer weather, increased uncertainty regarding water supply, reservoir replenishment and groundwater recharge due to uncertainty of local annual precipitation patterns, increased risk of power failures during extreme weather events, and infrastructure impacts due to sea-level rise.

These effects and impacts of climate change will require that water/wastewater/stormwater utilities be proactive in planning for contingencies and emergencies. The Regional Infrastructure Plan, referenced in Section 7 includes a task on Climate Change Assessment and Policy. This task involves developing a work plan for Halifax Water to identify how to adapt to future climate change. The first part of the assignment will be to conduct an industry scan of what other municipalities and water/wastewater/stormwater utilities are doing in this area.

Using the findings of the industry scan, a work plan is to be developed for a “Vulnerability to Climate Change” asset assessment framework. The work plan (to be developed in consultation with Halifax Water staff through workshops) will include identifying the priority for assessing assets within each infrastructure area (water/wastewater/stormwater), and the critical factors to be used for assessing each asset class.

The “Vulnerability to Climate Change” framework will also develop a simple rating system to rank the sensitivity and severity of climate change impacts relative to the individual asset. The framework will also suggest a workflow for how an assessed asset progresses from the assessment stage to the stage where an adaption plan has been implemented for that asset.

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This component of the Regional Infrastructure Plan will require the development of a separate policy paper addressing climate change as it relates to Design Standards and Long Term Planning. It will review the current “Design Specification for Water, Wastewater & Stormwater Systems” and suggest changes to address future climate change. The policy paper task will also include a review of Halifax Water’s Long Term Planning Framework and make suggestions to how Halifax Water should account for future climate change in the development of this and future Regional Infrastructure Plans. In the meantime, Halifax Water’s infrastructure design protocol gives consideration for best available information on future sea level rise (including surge) and rainfall intensity/duration/frequency for the design of assets impacted by rainfall and/or sea level issues.

12. SAFETY & SECURITY

12.1 Occupational Health & Safety Programs

Halifax Water’s Occupational Health and Safety Program is based on the Internal Responsibility System (IRS), which is the foundation of the Nova Scotia Occupational Health and Safety Act. The IRS is an internal system that provides for direct responsibility for health and safety for all staff in an organization.

The Safety and Security Division of Regulatory Services has principal duties and responsibilities as part of the IRS as follows:

- Assist in formulating and supervising the execution of the utility’s Occupational Health and Safety Program, and assist management to fulfill, to the greatest degree possible, its responsibilities for safety.
- Co-ordinate and/or provide safety training to staff in an effort to prevent accidents, minimize losses, increase productivity and efficiency, and ensure compliance with safety legislation and policies.
- Conduct safety audits in the workplace to identify safety hazards and recommend control measures.
- Assist in the development and maintenance of a system of accident investigation, reporting, and follow-up.
- Provide program education for job safety.
- Act as a resource to the Joint Occupational Health and Safety Committee (JOHSC).
- Maintain liaison with federal, provincial, and local safety organizations by taking part in the activities and services of these groups.

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Halifax Water has established and maintains an Occupational Health and Safety Program in consultation with the Joint Occupational Health and Safety Committees.

In November 2015, Halifax Water engaged in the ***Preventing Workplace Injury (PWI)*** Program with the Workers Compensation Board. An initial survey was conducted, with 247 employees participating. The survey was designed to gauge individual's perceptions on the current safety culture at Halifax Water and the awareness and understanding of safety policies and practices.

After the completion of the survey a committee known as the Team of Doers was established in February of 2016.

The Team of Doers met monthly for 18 months to review the outcomes of the survey and develop strategies to enhance the safety culture and awareness throughout Halifax Water. One of the first objectives of the team was to establish a Vision to provide direction on the activities for the Team.

Working together for an injury free and healthy workplace through empowering employees for positive change, so we will all return home safely.

The Team proceeded to review the results of the November 2015 survey to get a sense of some of the issues and perceptions surrounding Halifax Water's safety culture. Some of the common themes related to communications of safety issues, lack of formalized follow ups and understanding of safety and the related human resource policies.

The follow-up survey will be completed in November 2017. The outcomes from the survey will assist in planning future initiatives improve the safety culture at Halifax Water.

Technical Services has taken the lead in developing an ***Electrical Safety Plan (ESP)*** to enhance the current OH&S Manual. The ESP will provide staff with the tools for establishing safe operating and maintenance practices and procedures for working with energized electrical equipment and systems that are low or high voltage. Using the ESP, staff can develop risk and hazard assessment forms to complete when undertaking work around energized equipment. As well, the appropriate job-specific training requirements can be created and the existing training matrix, managed by Human Resources, can be updated. The Plan will be completed and rolled out in 2018.

The updates to the ***Safety Site*** will be completed by the end of 2017 with suggested enhancements to the electronic forms. Feedback will continue to be received from staff and updates will be made to the OH&S manual and associated forms as required.

In 2019, to assist with the management of the safety program, it is proposed to implement an ***ISO 45001***, International Standard that specifies requirements for an occupational health and safety (OH&S) management system, with guidance for its use, to enable an organization to proactively improve its OH&S performance in preventing injury and ill-health.

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12.2 Corporate Security Program

Halifax Water's Security Program is based on enterprise assets protection and is designed to protect three types of assets: people, property, and information. It also considers intangible assets such as the organization's reputation, relationships, and creditworthiness. The program has been developed to take an all-hazards approach, be it from natural, intentional, or accidental hazards, when reviewing risks to the organization.

Halifax Water uses the three basic elements of a physical security system to protect its assets.

Protection: The protection element is the physical barrier that delays the determined adversary and the opportunist in accomplishing their goals. Halifax Water uses barriers such as building fabric, fences, doors, door hardware, and containers to protect its assets.

Detection: The detection element indicates and may also verify an actual or attempted overt or covert penetration. Halifax Water uses intrusion alarms, access control systems, CCTV, and patrols to protect its assets.

Response: This element is the reaction to an attempted or actual penetration. Halifax Water works closely with local and national police and security agencies to ensure a rapid response to events.

Emergency Management Planning

Safe and reliable drinking water, sanitation and environmental protection are vital to the sustainability of communities within Halifax Regional Municipality. In recognition of this, Halifax Water maintains an Emergency Management Plan (EMP), as required by the provincial Emergency Management Act.

The purpose of the EMP is to establish an organizational structure and procedures for response to water and wastewater/stormwater incidents. It assigns roles and responsibilities for the activation and implementation of the plan during an emergency, using the Incident Command System (ICS). The preparation and exercising of an EMP can save lives, reduce risk to public health, enhance system security, minimize property damage, and lessen liability.

Starting in 2017, HRM will be developing a response plan to extreme flooding events. Halifax Water will assist in the development of the plan, providing information on critical infrastructure, known drainage restrictions and flood prone areas.

13. BUSINESS RISKS & MITIGATION STRATEGIES

13.1 Declining Water Consumption

HRWC has experienced net metered consumption decreases of 2.2% per year on average, over the past fifteen years, as indicated in Figure 1 in Section 7.2. The total decrease since 2001/02 is a 22% reduction, which has been managed through changing rate structures, diversifying revenues (stormwater with a different billing determinant), controlling costs, and increasing rates. Timing of development, form of development and new customer growth is difficult to predict, and the net decrease in consumption last fiscal year (2016/17), and so far in 2017/18 is less than recent previous years and less than the historic average. Water consumption is sensitive to a combination of factors including development activity, customer growth, weather, and economic pricing signals. The Five Year Business Plan assumes reductions in consumption of 2.5% per year, which is less than the yearly reduction assumed in the last rate hearing, and less than the Rolling Historic 4 Year Average Decrease of 3.4%. Halifax Water manages the risk of decreasing consumption by making prudent assumptions when preparing budgets and financial models.

13.2 Nova Scotia Environment (NSE) Regulatory Compliance

Wastewater

Since the last Five Year Business Plan was completed, a number of upgrades, optimizations, system enhancements and one decommissioning has occurred to achieve compliance with the WSER for all WTTFs.

Halifax Water meets and communicates regularly with NSE staff, with the objective of achieving consensus on priorities. Regulatory compliance plans are being updated on a continual basis through consultation with NSE.

Funding of capital improvements for a number of the wastewater treatment facilities has already been approved, or are in process in the Five-Year Capital Budget, namely:

- Aerotech upgrade and expansion will be commissioning in early 2018,
- Belmont decommissioning has been completed in 2017,
- Beechville-Lakeside-Timberlea is piloting improvements to disinfection and is undergoing further optimization.
- Springfield Lake, recently converted from Chlorine disinfection to UV disinfection and is subject to wet weather influences. The WWMP and I/I reduction Program are targeting this system to reduce the wet weather influences.

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- Uplands, is undergoing further optimizations and is subject to wet weather influences. The WWMP and I/I reduction Program are targeting this system to reduce the wet weather influences.

Given the success for the two seasonal disinfection pilot programs, applications were submitted in August 2017 to modify the permits for Eastern Passage, Dartmouth, Halifax and Herring Cove WWTF to allow for permanent seasonal disinfection at each facility. Halifax Water received approval from NS Environment for these facilities in late November, 2017.

Amendment requests have also been approved to allow for flexibility in the management of sludge and septage within the systems listed above, and at Mill Cove and Aerotech. This request will enable operators to direct the sludge or septage to the facility that can better manage it on that particular day.

Water

The Approvals for the water treatment facilities expire in March of 2018. Renewal applications have been submitted to NSE at the end of 2017.

The Bennery Lake withdrawal permit requires options for the continued supply of water to the Airport and Aerotech areas be established. A master plan will be completed in 2018 to review alternatives to the continued use of Bennery Lake.

Halifax Water staff have also been engaged in the review of proposed changes to Health Canada Guidelines relating to Lead and Manganese.

System Assessments

Halifax Water is committed to supplying safe and clean water, and effective wastewater collection and treatment. In support of these goals, Halifax Water undertakes assessments of all water and wastewater systems, in conformance with NSE regulations.

It is a regulatory requirement that Water System Assessments be completed every ten years with the latest reports for all water systems submitted to NSE in 2013, except for Bomont, which was prepared in 2015. Assessments of municipal drinking water systems are conducted to evaluate the capability of the system to consistently and reliably deliver an adequate quantity of safe drinking water; to verify compliance with regulatory requirements; and provide preliminary costs and timelines to address any identified deficiencies and/or concerns. Corrective Action Plans are in place where required by NSE, as follow-up to the Water System Assessments.

Wastewater System Assessments (similar to water system assessments) are currently not a regulatory requirement. However, Halifax Water regularly reports to NSE on the performance of some components of the wastewater system for conformance with regulatory requirements. Additionally, Halifax Water conducts wet weather flow studies on

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parts of the wastewater system. These studies are similar to system assessments, but are not as comprehensive.

13.3 WSER Regulations

On February 14, 2009, the Canadian Council of Ministers of the Environment (CCME) adopted a national strategy for the management of municipal wastewater. The strategy advocates a risk-based approach to management of wastewater effluent whereby requirements are based on environmental and health-risk assessments that are to be carried out for all treatment facilities. However, the strategy also includes a prescriptive approach with a requirement for a uniform minimum standard for all effluent equivalent to secondary treatment. Halifax Water's inland treatment facilities that discharge to fresh water already provide secondary or better treatment, as does the Mill Cove facility in Bedford and the Eastern Passage facility. However, the three Halifax Harbour Solutions Project (HHSP) facilities are advanced-primary. Upgrading to secondary level is required for the HHSP facilities under the WSER, with estimated capital costs in the order of \$425 M. As outlined in Section 5 of this Business Plan (Wastewater System Effluent Regulations), the upgrade deadlines could be up to 30 years for Halifax and Dartmouth WWTFs under Transitional Authorizations sought under the WSER, due to high-risk CSOs. The Herring Cove WWTF currently is able to meet the WSER discharge limits since it is well under capacity, although it was designed as an advanced-primary facility. As growth in the Herring Cove sewershed brings the facility closer to its rated capacity, effluent quality may come closer to exceeding WSER limits. In this case, advance planning for an upgrade will be required so that the facility remains compliant.

A more immediate operational/regulatory issue with Halifax Water's wastewater system is wet weather flow and resultant overflows into the environment as detailed in Section 8.5. Many of the sewers in the municipality are combined, built many decades ago with many greater than 100 years in age. Combined sewers have not been permitted since the early sixties, but even the older, separate sanitary sewers experience significant I&I problems.

Of the approximately 170 wastewater pumping stations owned by Halifax Water, some 30-40 experience regular overflows. Many of these overflows go to inland receiving waters and, as such, represent higher environmental and health risks than marine discharge of primary treated effluent. As an initial step, a program is underway to provide sensors to detect overflow conditions and estimate volumes for the sanitary sewer overflows. Eighteen such installations are complete. Halifax Water staff are utilizing a combination of flow monitoring and estimating of overflows to provide the additional flow volumes.

Much of the capital and operating budgets have been allocated to mitigate these wet weather flow problems based on a priority-ranking process. It is preferred that resources be allocated based on risk and assessed priority, rather than on the basis of a national standard (the CCME/WSER) that does not consider local conditions. Identification of funding

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mechanisms and cost-sharing arrangements with senior levels of government will be critical now that the WSER regulations are in force.

13.4 Pension Plan

Halifax Water has a defined benefit pension plan (Halifax Water Employees' Pension Plan) which was redesigned effective January 1, 2016 to make the plan more affordable and sustainable for current and future Halifax Water employees. Pension plan re-design was achieved through collective bargaining. Employer contributions in 2016 on pensionable earnings decreased from 12.95% to 9.85%, with employees experiencing a similar decrease from 12.95% to 10.65%. A savings of \$20.2 million for the employer is projected over the next 14 years, with a 50% likelihood the plan will be fully funded within 10 years.

The financial position of the plan, based on the most recent audited financial statements, is shown in Table 6 below. As at December 31, 2016 there were \$107 million in assets, and \$114 million in pension obligations, for a deficiency of \$7 million. Assets of the Plan are invested as part of the Halifax Regional Municipality Master Trust, and represent 6.0% (2015, 5.9%) of the Master Trust's assets. An actuarial evaluation of the Pension Plan will be completed in early 2019 for an effective date of January 1, 2019.

Table 6: Statement of Financial Position as of December 31st

Statement of financial position December 31				
	2016	2015	Change	
			\$	%
Net assets available for benefits (note 4)	\$107,067,996	\$100,434,444	\$6,633,552	6.6%
Pension obligations (note 5)	\$114,046,900	\$108,055,300	\$5,991,600	5.5%
Deficiency	(\$6,978,904)	(\$7,620,856)	\$641,952	-8.4%

Halifax Water also has almost 100 employees that joined the utility as part of the 2007 Wastewater/Stormwater Transfer, that are members of the HRM Pension Plan.

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13.5 Development Pressures and Obligations

As growth is a strategic driver of the Integrated Resource Plan, Halifax Water continues to work closely with the development community to facilitate infrastructure necessary for a rapidly growing municipality. HRM completed the last Regional Plan update in 2014 with a current focus on the completion of the Centre Plan. In that regard, Halifax Water project managed the Local Wastewater Collection System Assessment for HRM in support of the potential growth within the city centre.

With the initiation of the Regional Wastewater Infrastructure Plan (East and Central), HRM staff will be requested to provide population estimates for growth within those two areas.

Staff are currently updating the Bedford West Capital Cost Contribution plan to reflect the modifications to the wastewater and water servicing scenarios. Stakeholder Consultation will commence in 2017, with an Application to the Nova Scotia Utility and Review Board (NSUARB) by spring 2018.

The land owners of the Port Wallace Master Plan area are currently seeking secondary planning approvals and Halifax Water has been providing technical support to the Master Infrastructure Plan. With the completion of the plan, Halifax Water will be able to evaluate whether the Port Wallace area will include a new capital cost contribution charge.

This past year saw the implementation of an interim solution to the Service Approval Module, using SharePoint, to replace the legacy HP3000. Halifax Water is currently engaged with HRM to support their replacement of the permitting software, HANSEN and move to a digital platform for development approvals.

13.6 Biosolids

The plant upgrades at Eastern Passage and installation of dewatering equipment at Mill Cove WWTF has strengthened Halifax Water's capacity to dewater sludge from its facilities. The Aerotech facility, after its upgrade is completed in early 2018, will further enhance this capability. These initiatives have reduced the risk of a dewatering facility malfunction and as a result the overall plant operational risk has reduced.

The Biosolids Processing Facility [BPF] is operated by Walker Environment Group with overall responsibility for operating the facility to produce a soil amendment in conformance with Canadian Food Inspection Agency (CFIA) regulations and marketing the product for beneficial reuse. The BPF is a highly mechanized facility that operates in very tough environmental conditions with high concentrations of dust, humidity and ammonia. The contractor has been operating the facility efficiently for approximately 11 years. The current asset management plan developed in cooperation with the contractor addresses the parts replacement/upgrade needs of the facility. With the improvement in performance of

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treatment plants, the WWTFs are producing an increased quantity of sludge. The contract agreements with Walker Environmental expires at the end of March 2019. The BPF is also approaching its design capacity, therefore, staff will be reviewing the overall operation over the next year, while simultaneously working on the requirements of the new operating contract. The future BPF could utilize completely different technology with a different operating contractor. Since this will potentially be a long term contract, there is a medium level risk with potential changes, considering the complexities associated with the management of biosolids.

Transportation Contract

The transportation contract with Seaboard expired on October 31, 2017. Through a public tendering process, Halifax Water has recently hired Elmsdale Landscaping to provide the biosolids transportation service. There are minimal business risks with this contract since the procedures are mature. The specialty trailers which are owned by Halifax Water are over 10 years old and are approaching the end of their service life. This equipment may need upgrades or suffer breakdowns, which introduces some risk in the transportation services. Halifax Water has mitigated this risk by purchasing a new trailer and the current business plan anticipates replacing a trailer every 2 to 3 years. The contractor has also been instructed to purchase critical spare parts in advance and have them available at a short notice.

13.7 Leachate Treatment

Halifax Water continues to treat leachate from the Mirror Group facility at Otter Lake under a contract with the municipality. The new UV disinfection system recently installed at Mill Cove as reduced the risk associated with these extraneous loads. Notwithstanding the current situation, HRM is also exploring the potential to install piped infrastructure to transfer effluent from the Otter Lake facility direct to the collection system and ultimately for treatment at the Halifax WWTF.

13.8 Halifax Harbour Solutions Project (HHSP) Facilities

The HHSP facilities' operations have been optimized over the years to meet the requirements of the NSE permits and the compliance plan. Since the facilities are highly mechanized, the facilities have ever increasing demand of highly skilled technicians Halifax Water has been mitigating this risk through effective planning and optimizing its resources. The operating costs of these facilities are on the rise because of increased maintenance, repair and replacement of the equipment. The recently completed asset condition assessment and asset management plans help mitigate this risk to some degree. There facilities have experienced low flows over the past two summer seasons. As a result of the septic inflow to the plants, the odour control systems have required extra replacement of some consumable chemicals.

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The dry weather and low flows are potentially an impact of climate change; if the pattern continues, the utility may have to implement further odour control measures in the collection systems. However, the odour controls systems at the WWTFs are currently meeting the requirements with very few odour complaints from customers. On a related note, Halifax Water has upgraded odour control systems at Mill Cove WWTF and in the collection system near the Bissett Lake area of Dartmouth. There are other areas in the system where the monitoring of odour causing compounds have been enhanced.

13.9 Small to Medium Wastewater Treatment Facilities

Halifax Water has seven community based WWTFs in the communities of Springfield Lake, Frame Subdivision, Middle Musquodoboit, Uplands Park, North Preston, Fall River and Wellington. Besides these facilities, there are other medium sized facilities located in the Aerotech Business Park and at Beechville-Lakeside-Timberlea. Since the 2015-16 Business Plan, all of these facilities have undergone operational and capital upgrades. The Aerotech facility is being expanded and upgraded with “state of the art” membrane technology.

These facilities are generally compliant with their NSE permits with a few exceptions of non-compliances in nutrient removal; although the nutrient removal performance has improved over the years. These sewersheds suffer from impacts of wet weather issues leading to high flows in the system. These issues are being addressed as a part of the Wet Weather Management Program. There are minimal risks in operating these facilities, however, further optimization and asset management investments must continue to maintain and improve compliance. As regional development encroaches on these systems, there are opportunities to connect them to the larger core systems.

Although regulatory requirements are being met, small systems are challenging to operate because of the inherent low resilience to changing conditions of the sewershed and the upsets of the treatment process.

13.10 Energy Costs

Through its Energy Management Program, Halifax Water has committed to an ongoing focus on sustainability and energy efficiency throughout the utility, including water and wastewater operations. This program serves to define the goals, objectives, accountabilities, and structure for activities related to responsible energy use.

The Water and Wastewater/Stormwater departments operating budgets are significantly impacted by energy costs that are expected to increase over the life of this business plan and beyond. Table 7 provides projected energy cost impacts over the next five years:

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Table 7: Projected Energy Cost Increases and Budget Impacts

Year	Electricity	Fuel Oil	Natural Gas	Water Budget Impact	Wastewater Budget Impact	Total Budget Impact
2018/19	2%	5%	10%	\$48,000	\$127,000	\$175,000
2019/20	2%	5%	10%	\$49,000	\$131,000	\$180,000
2020/21	2%	2%	2%	\$47,000	\$112,000	\$159,000
2021/22	2%	2%	2%	\$48,000	\$114,000	\$162,000
2022/23	2%	2%	2%	\$49,000	\$116,000	\$165,000

The Energy Management Action Plan identifies energy reduction targets for Water and Wastewater Operations over a five-year planning period. Targets will be reviewed each year and adjusted for future years based on the previous year’s performance, operating and capital budget allocations, and anticipated energy price increases.

Water and Wastewater Operation’s energy-reduction targets over the next five years are outlined in Table 8:

Table 8: Energy Reduction Targets

Year	Water Operations Projected Savings		Wastewater Operations Projected Savings	
	Energy Reduction Target	Energy Savings (kWhe)	Energy Reduction Target	Energy Savings (kWhe)
2018/19	2.0%	383,000	2.0%	831,000
2019/20	2.0%	375,000	2.0%	814,000
2020/21	2.0%	367,000	2.0%	798,000
2021/22	2.0%	360,000	2.0%	782,000
2022/23	2.0%	353,000	2.0%	766,000

As a result of Halifax Water’s Energy Management Action Plan, presented with the last general rate application, Halifax Water was able to reduce revenue requirements associated with energy by 2%. Presently the Five-Year Business Plan operating budgets do not incorporate the energy reduction targets outlined in Table 8. As future electricity rates become known with greater certainty and the energy savings of various initiatives are measured, budgets will be adjusted on an annual basis. The projected savings shown above are also contingent on the availability of human and capital resources as approved in the annual operating and capital budgets. As capital budgets are approved or amended, actual energy savings may need to be adjusted on an annual basis.

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To date, a number of potential energy-management opportunities (EMOs) have been identified through low to mid-level energy audits in a number of facilities.

For Water Operations, EMOs include HVAC system upgrades, retro-commissioning of PRV-station HVAC systems, lighting retrofits; reactive power correction, variable frequency drive upgrades, pumping system performance upgrades, and new construction design review for energy efficiency.

For Wastewater Operations, EMOs include effluent stream and ventilation system heat recovery, retro-commissioning of WWTF and pumping station HVAC systems, UV disinfection system upgrades, UV system channel isolation, odour control system upgrades, lighting retrofits, reactive power correction, variable frequency drive upgrades, and new construction design review for energy efficiency.

A number of these EMOs have been successfully implemented, and some have been partially funded through Efficiency Nova Scotia's various programs.

As new or existing facility construction projects occur, those projects are also evaluated for energy efficiency improvements. Recently completed projects include the new Aerotech Wastewater Treatment Facility, the Eastern Passage WWTF upgrade, the Bedford West Trunk Sewer and Pumping Station Upgrade, the Lakeside/Bayer's Lake PS Upgrade, the Bedford pump station upgrade, and the Herring Cove sanitary pump station. Energy efficiency is now an integral part of the overall project evaluation and design process ensuring improvements are incorporated prior to the construction phase of a given project.

A number of Halifax Water's standard design specifications have also been reviewed to ensure energy efficiency is taken into account in any future new construction activities (e.g., wastewater pumping stations, booster stations, treatment plants).

13.11 Chemical Costs

Water treatment chemicals represent 30% of the cost of running our large water treatment facilities, totally approximately \$2,000,000 per year.

Chemicals for water treatment are a secondary markets for many chemical manufactures. For example, chlorine and caustic soda markets are driven by the demand for PVC plastic in the construction and home building industries. Phosphates for corrosion control, and fluoride are secondary markets to the agriculture industry. As a result, demand created by these primary industries can put cost pressure on chemicals consumed by water utilities.

The last five years have been ones of relatively low and stable prices for drinking water chemicals. It is inevitable that, at some time in the next five years, some of the products we purchase will see significant price pressure beyond normal annual increases. Caustic Soda

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pricing is currently running 30% greater than the fall of 2016 due to consolidation of production capacity in China. At the height of the last economic boom, it was not unusual to experience temporary increases of 30-40% in a year for several chemicals. Should this situation reoccur, it is possible to see increases in total chemical cost to of 30-40% in a given year.

Other factors which may increase costs for drinking water chemicals include:

- Increased, or decreased costs for corrosion control chemicals as we continue our research to optimize corrosion control chemistry.
- Atlantic Canada is a monopoly market for chlorine used for disinfection.
- Coagulants. Halifax Water uses aluminum sulfate (alum) as a coagulant. Alum is a commodity product and the least expensive coagulant available. As we continue to build strategies to deal with lake recovery we may be required to adopt more specialized coagulants which have a slightly higher cost.

Wastewater and Stormwater Services uses chemicals for wastewater treatment, sludge processing, and odour control. The chemicals represent 13% of the cost of running our WWTFs, at approximately \$2,750,000 per year.

All of the WWTFs use UV systems for disinfection with the exception of one community plant in Timberlea which uses chlorine based products. The cost fluctuation risk is mitigated by the very small quantities that is required. Halifax Water has seen stable prices for wastewater treatment chemicals over the last 5 years. Alum and polymers are the largest share of the cost and quantity. The recent contract for polymers is a 3 year term and the price per kilogram is 6% lower than the 2017-18 pricing. As mentioned above, alum is a commodity product. Halifax Water has experienced stable pricing over the years, and it is expected to remain stable over the 5 year period.

Wastewater Collection Services use Bioxide for odour control in the collection system. This proprietary product is proven in the industry to be most effective. Currently, this product is used in Dartmouth at an approximate cost of \$300,000 per year. The utility will continue to explore other opportunities or make system enhancements in order to reduce this cost. However, it is expected that the chemical price will remain stable in the near future.

13.12 Lake Recovery

Lake recovery will ultimately require modifications or upgrades to the Pockwock and Lake Major plants. It is also possible that the Bennery lake plant will require upgrades, however that plant is just completing a multi-year optimization program that should equip it well enough to deal with water quality challenges for the next several years.

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A three pronged approach has been implemented to deal with lake recovery as follows:

Immediate: Operational improvements have been made at all three treatment plants to make them more robust and better equipped to deal with treatment challenges. This includes upgrading and adding instrumentation to provide better information for operators, upgrading chemical delivery systems, and instituting a filter surveillance program so that operators have the best available information about filter performance.

Short term: Several short term plant improvements are underway which will improve plant performance. This includes upgrading filter media and underdrains and installing air scour at Pockwock, and continuing through a ten year upgrade program at Lake Major which will make the plant more flexible and provide better quality water. Lake Major projects include replacing clarifier plates and tubes, and planning for construction of a new intake and pumping station.

Medium term: Preparation for plant upgrades have begun on a number of fronts. As mentioned above, understanding the impact of lake recovery and studying the impact on the plants makes up two of three research themes through the NSERC Industrial Research Chair with Dalhousie University. Staff also pursuing a Tailored Collaboration Project through the Water Research Foundation which will provide guidance on designing a new plant process while water quality is changing. All of these activities will position the utility to begin a plant upgrade process for Pockwock in the next 3-5 years, while achieving significant process improvements at Lake Major as the upgrade program is executed there.

13.13 External Funding

The five-year business plan was developed with assumptions with respect to external funding – grants from provincial or federal government partners. The five year business plan assumes \$47,732,000 in external funding broken down as follows:

- Wastewater - \$15,798,000
- Stormwater - \$8,298,000
- Water - \$23,636,000

It is anticipated that the federal government will announce another round of infrastructure funding in 2018 for implementation beginning in 2019/20.

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13.14 Flood Plain Delineation

HRM has completed an exercise to re-map the flood plain limits in the Sackville River area and is completing a LIDAR project to map the coast line in Halifax and Dartmouth. This information will assist HRM in the planning exercises relating to the placement for new development projects. As well, it will allow for risk assessments and emergency planning to occur relating to existing critical infrastructure and transportation routes.

Halifax Water cost shared this exercise with HRM in relation to the National Disaster Mitigation plan to prioritize known drainage issues and flood prone areas. It looked at stormwater impacts on life safety, transportation, private property damage and use of property. With input from Halifax Water, HRM has selected 10 candidate projects to begin planning, design and /or construction to mitigate impacts from flooding. It is anticipated that in the coming years a financial plan will be developed to deliver programmed projects to address the high to medium priority flooding and drainage issues. Halifax Water will provide technical support for this program and where applicable cost share or initiate relevant projects.

13.15 Extraneous Connections

In managing the wastewater and stormwater systems, Halifax Water monitors influences from Customer connections through the Pollution Prevention (P2) and Infiltration/Inflow (I/I) programs within Environmental Engineering. Chemical or biological contaminants, not naturally occurring in wastewater or with increased concentrations may have a negative impacts on the treatment system. As well, physical contaminant such as rags, wipes, fats and grease may clog the collection system resulting in increased operational cleaning or pump failures.

In some areas where there is no deep storm sewer, customers may connect sump pumps, roof leader or footing drains to the wastewater system causing undue loading on the wastewater collection and treatment systems.

The Halifax Water Rules and Regulations provide acceptable limits and parameter to promote efficient and compliant operations of our systems.

Over the next two years, the P2 and I/I programs will identify high to medium risk customers and develop a business process for tracking and inspecting their connections to our systems. It is anticipated in 2020, the groups will be able to use Cityworks in assigning work orders relating to programmed inspections and complaint driven inquiries.

As well, in delivering these programs, a focus will be placed on changing customer behaviors through education and awareness. Halifax Water has also recently applied to the NSUARB

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to seek approval of a financing program to support customers who want to install new laterals or replace defective ones.

14. FUTURE RATE APPLICATION

Halifax Water maintains a long range financial model that projects future impacts on revenue requirements, but not rates. It is not possible to accurately project rates, as updated demand analyses and rate studies would have to be conducted for each service prior to an application.

The projected five year financial model indicates that rate increases will be required after the 2019/20 fiscal year. Halifax Water is tentatively planning to prepare an application to increase rates for water and wastewater service in the fall of 2019, for rate increases over a two year test period. No increases or changes in stormwater rates are contemplated at this time.



Appendix A

Mission, Vision, Values

&

Corporate Balanced Scorecard

STRAIGHT from
the SOURCE





Our Mission:

*“To provide world class services
for our customers and our environment”*

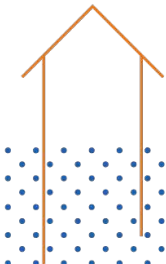
Our Vision:

- *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:

Halifax Water promotes a culture that:

- *Engages employees, partners and stakeholders in achieving success;*
- *Encourages openness and transparency;*
- *Demonstrates individual and corporate accountability for results;*
- *Fosters innovation and progressive thinking;*
- *Respects diverse ideas, opinions and people;*
- *Is committed to service excellence; and*
- *Nurtures leadership at all levels.*





▶ Critical Success Factors

- **High Quality Drinking Water**
- **Service Excellence**
- **Responsible Financial Management**
- **Effective Asset Management**
- **Workplace Safety and Security**
- **Regulatory Compliance**
- **Environmental Stewardship**
- **Motivated and Satisfied Employees**

▶ Organizational Indicators

- **Organizational Indicators (OI's) are the measures of our performance within each CSF and provide the definition and detail to best understand them. The OI's are organizational, not individual measures.**
- **The OI's provide both a detailed clarification of the CSF and allow a target or goal for performance to be established and tracked.**

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▶ Organizational Performance Award Program

- **Based on a subset [12] of our strategic OI's which are the most objective.**
- **Program pays for itself by meeting operating expense to revenue ratio target; ratio is reduced from approved budget to accommodate the award program potential.**
- **It is not a given; a threshold of 7.0 in scoring must be reached in a given year.**
- **To be eligible for the award, employees must work a minimum of nine months during the fiscal year [April 1st to March 31st]**

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The CBS Targets for 2016/17 Fiscal Year

- Organizational Indicators with a star * are tied to the Award Program

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CSF: High Quality Drinking Water

Organizational Indicator:



- Adherence with 5 objectives from the Water Quality Master Plan for all water systems; we must own system for one year to include results.

Objective	Total Sites	Result to March 31/17 (% of Sites Achieving Target)	Target	Distrib. Pts.
Disinfection – Chlorine Residual	65	98.5%	80 – 100%	19/20
Disinfection By-products (THMs)	24	100%	< 80 ug/l	20/20
Disinfection By-products (HAAs)	25	95%	< 60 ug/l	15/20
Particle Removal	5	100%	<0.2 &< 1.0 NTU	20/20
Corrosion Control	n/a	6.1 ug/L	Lead; <15 ug/l	20/20
Summary Total				94/100

Disinfection – Achieve 0.2 mg/L at all sites (100% of sites achieving residual of 0.2 on 95% of tests)
 THMs – Annual Avg. of < 80 ug/L at all THM sampling sites
 HAAs - Annual Avg. of < 60 ug/L at all HAA sampling sites
 Particle removal – Surface water plant achieves turbidity of <0.2 NTU 95% of the time and <1.0 100% of the time
 Corrosion Control – Achieve 90th percentile standing lead sample of <15 ug/L for all sample sites

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CSF: High Quality Drinking Water

Organizational Indicator:

- Bacteriological tests [monthly target of 99.3% free of Total Coliform]

	% Samples Free of Coliform	Target
2016/17	99.9%	99.3%

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CSF: High Quality Drinking Water


Organizational Indicator: *

- Customer satisfaction about water quality [Target of 85% rating water quality as good to excellent]

	Survey Results (actual)	Target
From Fall 2016 Survey	88%	75% - 85%

**New target approved by Board March 30/17*

2017/18 Target
80% - 85%

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CSF: Service Excellence


Organizational Indicator: *

- Customer satisfaction with service [Target of 90% satisfied or very satisfied]

	Survey Result (actual)	Target
From Fall 2016 Survey	95%	80% - 90%

**New target approved by Board March 30/17*

2017/18 Target
85% - 90%


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CSF: Service Excellence

Organizational Indicator:

- Service outages of water [# connection hours / 1000 customers]

	Hours (actual)	Target
2016/17	149	200


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CSF: Service Excellence

Organizational Indicator:

- Service outages of wastewater [# connection hours / 1000 customers]. (N.B. the clock starts after we know it is our problem)

	Hours (actual)	Target
2016/17	4.6	8

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CSF: Service Excellence


Organizational Indicator:

- Average call wait time over the year

	Seconds	Target
2016/17	51	90

**New target approved by Board March 30/17*

2017/18 Target
80

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CSF: Responsible Financial Management


Organizational Indicator: *

- Operating Expense/Revenue Ratio [based on annual operating budget]

	Exp/Rev ratio (actual)	Target
2016/17	0.669	0.732

**New target approved by Board March 30/17*

2017/18 Target
0.748

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CSF: Responsible Financial Management


Organizational Indicator:

- Annual Cost per Customer Connection [Water]

	Cost/connection	Target
2016/17	\$407	\$439

**New target approved by Board March 30/17*

2017/18 Target
\$458

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CSF: Responsible Financial Management


Organizational Indicator:

- Annual Cost per Customer Connection [Wastewater]

	Cost/connection	Target
2016/17	\$625	\$664

**New target approved by Board March 30/17*

2017/18 Target
\$667

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CSF: Effective Asset Management

Organizational Indicator: *

- Water Loss Control; target leakage allowance of 190 Litres/Service Connection/Day

	Leakage Actual	Target
2016/17	227	180 - 190

Note: Target adjusted in 2015/16 to be consistent with the latest IWA/AWWA methodology.

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CSF: Effective Asset Management


Organizational Indicator: *

- Inflow and Infiltration [I&I] Reduction; # of inspections on private property in relation to discharge of stormwater into the wastewater system.

	I&I Inspections	Target
2016/17	904	500

**New target approved by Board March 30/17*

2017/18 Target
600

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CSF: Effective Asset Management


Organizational Indicator: *

- % of Water, Wastewater and Stormwater Network Available on GIS

	% Available	Target
2016/17	96.9 %	92% - 93%

**New target approved by Board March 30/17*

2017/18 Target
98.0% - 99.0%

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▶ **CSF: Effective Asset Management**

Organizational Indicator

- Capital Budget Expenditures – Maximize annual funds approved by NS Utility and Review Board by March 31, 2017

	Maximize Annual Capital Budget Expenditures	Target
2016/17	46.0 %	85% to 95% approved

**New target approved by Board March 30/17*

2017/18 Target
80% - 90% spent

▶ **CSF: Workplace Safety & Security**

Organizational Indicator:

- # of Incidents with written Compliance Orders received from NS Labour and Advanced Education

	Labour Infractions	Target
2016/17	1	0 - 2 (max.)

CSF: Workplace Safety & Security

Organizational Indicator: *

- Lost Time Accidents [# of accidents resulting in lost time per 100 employee (FTE pro-rated)]

	Lost time accidents	Target
2016/17	3.4	3.0 – 4.0 per 100 employees (with a maximum of 4.5)

Note: This is a gateway indicator with an award program contingent on results of <4.5 lost time accidents per 100 employees

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CSF: Workplace Safety & Security

Organizational Indicator: *

- # of Traffic Accidents per 1,000,000 km

	Traffic Accidents / 1,000,000 Kms	Target
2016/17	4.84	4.0 per 1,000,000 km (maximum of 5)

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CSF: Workplace Safety & Security

Organizational Indicator:

- Employees are retrained or recertified before due date

	% of Employees Retrained or Recertified Before Due Date	Target
2016/17	81%	80% - 90%


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CSF: Workplace Safety & Security

Organizational Indicator:

- Supervisors complete weekly or bi-weekly safety talks

	% of Completed Safety Talks	Target
2016/17	80%	80% - 90%

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CSF: Regulatory Compliance

Organizational Indicator:

- # of public health and environmental regulatory infractions resulting in an Environmental Warning Report, Summary Offence Ticket, Ministerial Order or prosecution.

	Public Health & Env. Infract.	Target
2016/17	0	0 - 2 (max.)

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CSF: Regulatory Compliance

Organizational Indicator:



- % of WWTFs complying with NSE approval permits.

	% of WWTF samples meeting NSE discharge limits	Target
2016/17	91.4%	85% - 90%

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CSF: Environmental Stewardship

Organizational Indicator:

- # of ICI properties in HRM inspected by Pollution Prevention [P2] Section each year

	Actual Inspected	Target
2016/17	528	400


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CSF: Environmental Stewardship

Organizational Indicator: *

- Energy Management [kwh/m3] ; % energy reduction associated with capital projects

	% Energy Reduction	Target
2016/17	3.8 %	2%

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CSF: Environmental Stewardship

Organizational Indicator:



- Bio-solid Residuals Handling; % of sludge meeting solids concentration target - 96% of samples meet a minimum solids concentration of:
 - ✓ 25% from HHSP plants
 - ✓ 18% from Aerotech Dewatering Facility

	% Meet Solids Concentration Target	Target
2016/17	99.4%	97 %

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CSF: Motivated and Satisfied Employees

Organizational Indicator:

- # of arbitrations divided by total # of grievances.

	Arbitrations/Grievances	Target
2016/17	0/18	0 Arbitrations

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CSF: Motivated and Satisfied Employees

Organizational Indicator:

- % of jobs filled from within Halifax Water [excluding entry level jobs].

	% Jobs filled within	Target
2016/17	71%	80%

CSF: Motivated and Satisfied Employees

Organizational Indicator:

- Employee satisfaction survey. [2009 was the benchmark year with a B result].

	Survey Result (actual)	Target
Survey in 2016	B	A-

▶ CSF: Motivated and Satisfied Employees

Organizational Indicator:

- Average number of days of absenteeism

	Avg. No. of days absenteeism	Target
2016/17	7.51	< 7 days

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▶ Based on a subset of 12 OIs which are the most objective:

Organizational Indicator	Max. Score
Water Quality Master Plan Objectives	1.0
Customer Water Quality Survey Results	1.0
Customer Service Survey Results	1.0
Operating Expense/Revenue Ratio <i>[Gateway Indicator]</i>	1.0
Water Loss Control Reduction	1.0
Inflow & Infiltration Reduction	1.0
Percentage of Network on GIS	1.0
# of Lost Time Accidents per 100 Employees <i>[Gateway Indicator]</i>	1.0
# of Traffic Accidents per 1,000,000 km	1.0
Percentage of WWTFs Compliant with NS Environment Permits	1.0
Energy Management – Water & Wastewater	1.0
Biosolids Residual Handling	1.0
TOTAL MAXIMUM SCORE	12.0

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▶ 2016/17 Organizational Award (Actual Results)

Organizational Indicator	2015/16 Results
Water Quality Master Plan Objectives	0.94
Customer Water Quality Survey Results	1.00
Customer Service Survey Results	1.00
Operating Expense/Revenue Ratio <i>[Gateway Indicator]</i>	1.00
Water Loss Control Reduction	0.00
Inflow & Infiltration Reduction	1.00
Percentage of Network on GIS	1.00
Energy Management – Water & Wastewater	1.00
Biosolids Residual Handling	1.00
# of Lost Time Accidents per 100 Employees <i>[Gateway Indicator]</i>	0.6
# of Traffic Accidents per 1,000,000 km	0.2
Percentage of WWTFs Compliant with NS Environment Permits	1.0
TOTAL SCORE	9.74

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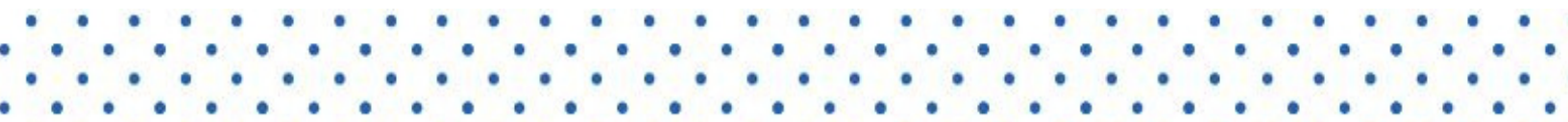




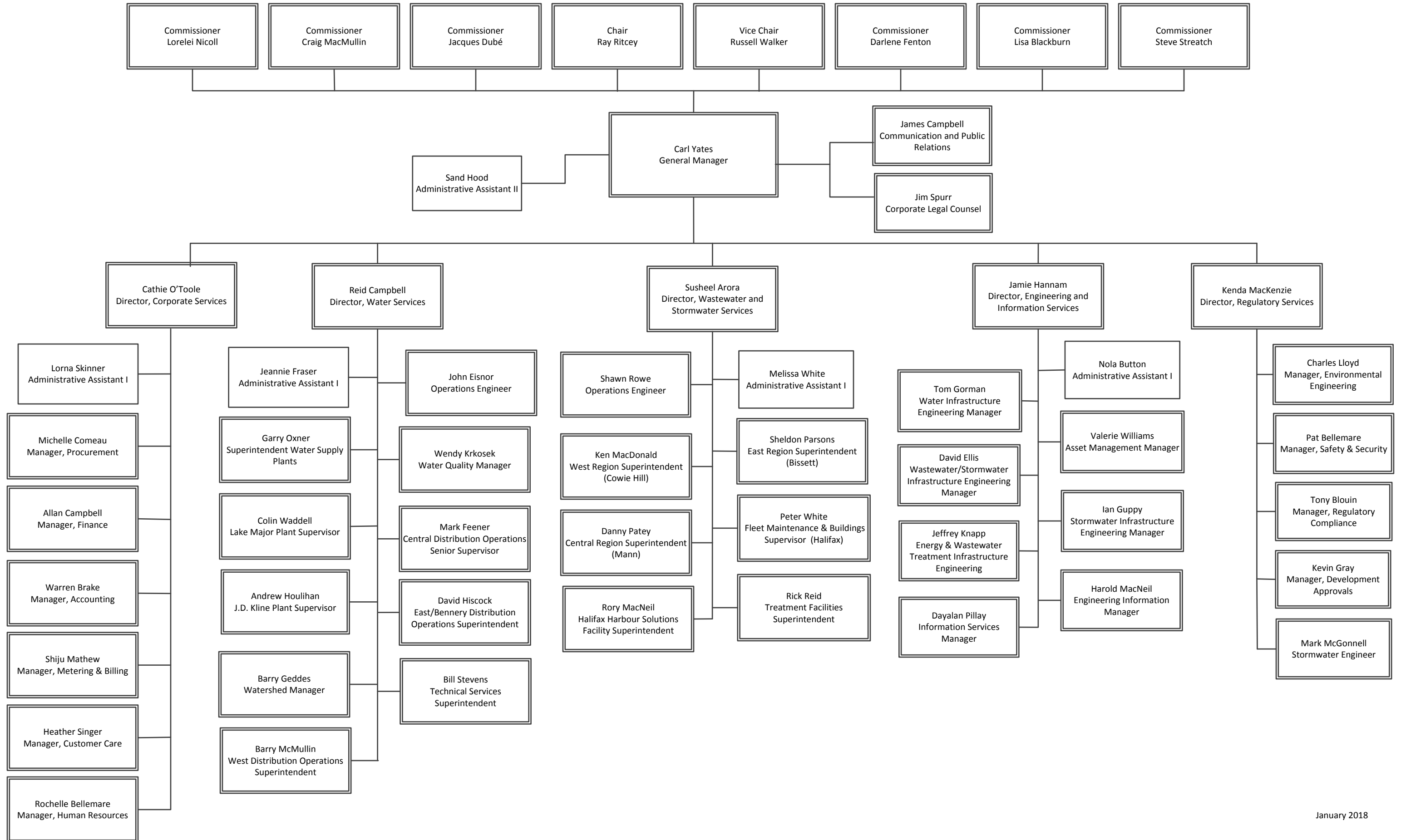
Appendix B

Organizational Chart

**STRAIGHT from
the SOURCE**



HALIFAX WATER ORGANIZATIONAL STRUCTURE



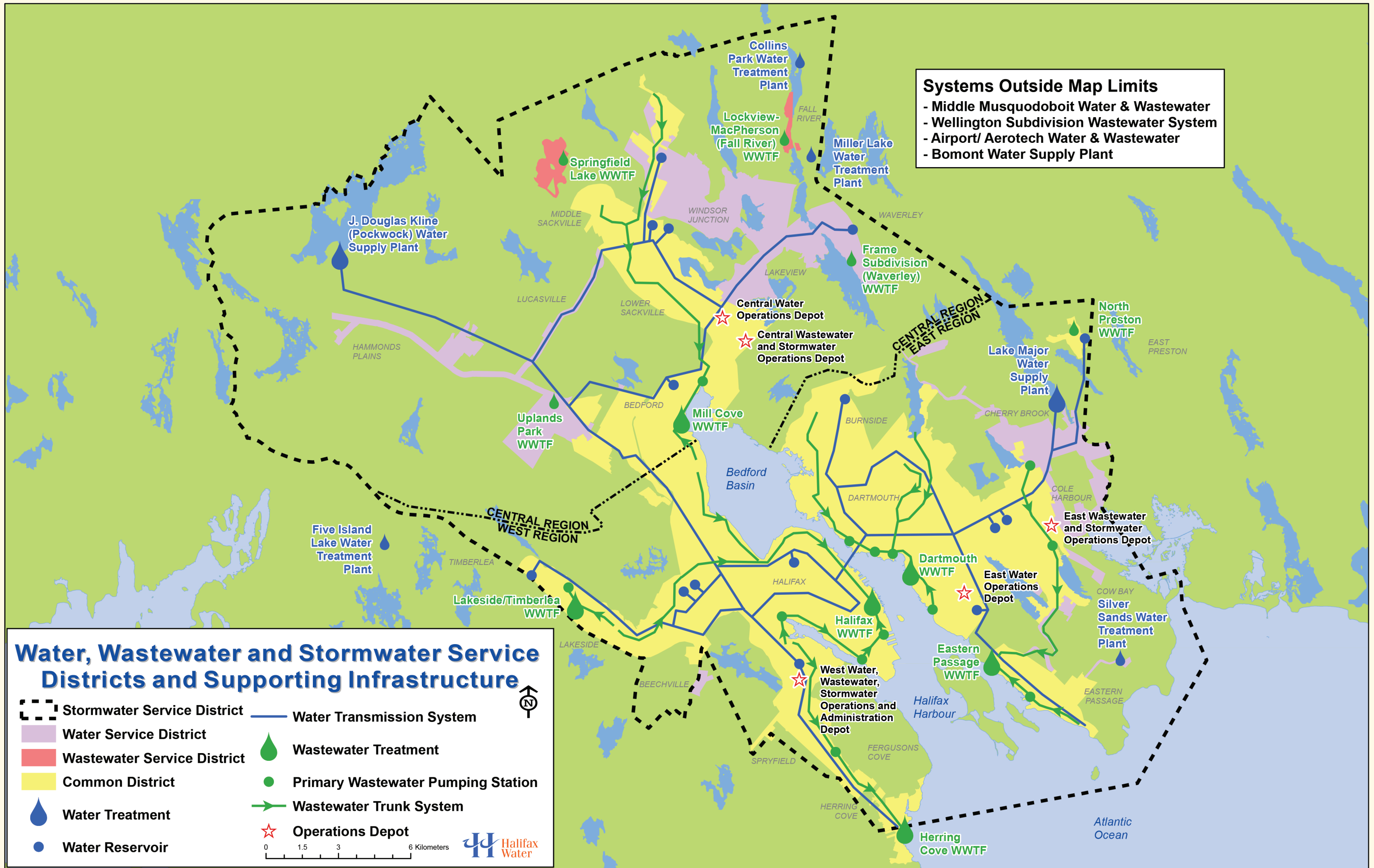


Appendix C

Water, Wastewater and Stormwater Service Districts and Supporting Infrastructure

**STRAIGHT from
the SOURCE**







Appendix D
Approved Capital Budget
2017/18

STRAIGHT from
the SOURCE



HALIFAX WATER
Capital Budget 2017/18
Summary

Asset Category	Project Costs
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<i>Water - Land -- T O T A L</i>	\$760,000
<i>Water - Transmission -- T O T A L</i>	\$13,150,717
<i>Water - Distribution -- T O T A L</i>	\$2,890,000
<i>Water - Structures -- T O T A L</i>	\$10,029,391
<i>Water - Treatment Facilities -- T O T A L</i>	\$10,405,060
<i>Water - Energy -- T O T A L</i>	\$656,352
<i>Water - Security -- T O T A L</i>	\$150,000
<i>Water - Equipment -- T O T A L</i>	\$50,000
<i>Water - Corporate Projects - T O T A L</i>	\$9,671,000
TOTAL - Water	\$47,762,520

<i>Wastewater - Trunk Sewers -- T O T A L</i>	\$19,843,168
<i>Wastewater - Collection System -- T O T A L</i>	\$9,144,000
<i>Wastewater - Forcemains -- T O T A L</i>	\$260,000
<i>Wastewater Structures -- T O T A L</i>	\$2,440,000
<i>Wastewater - Treatment Facility -- T O T A L</i>	\$2,528,000
<i>Wastewater - Energy -- T O T A L</i>	\$2,455,813
<i>Wastewater - Security -- T O T A L</i>	\$200,000
<i>Wastewater - Equipment -- T O T A L</i>	\$95,000
<i>Wastewater - Corporate Projects -- T O T A L</i>	\$9,694,800
TOTAL - Wastewater	\$46,660,781

HALIFAX WATER

Capital Budget 2017/18

Summary

Asset Category	Project Costs
----------------	---------------

<i>Stormwater - Pipes -- T O T A L</i>	\$9,942,000
<i>Stormwater - Culverts -- T O T A L</i>	\$2,736,000
<i>Stormwater - Structures -- T O T A L</i>	\$1,535,000
<i>Stormwater - Corporate Projects -- T O T A L</i>	\$871,200
TOTAL - Stormwater	\$15,084,200

<i>GRANDTOTAL</i>	\$109,507,501
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HALIFAX WATER

Capital Budget 2017/18

Water

Project Number	Project Name	Project Cost
<u>Water - Land</u>		
3.36	Bennery Lake Watershed Land Purchase	\$210,000
3.383	Bennery Lake Watershed Land Purchase	\$330,000
3.384	Tomahawk Lake Watershed Land Purchase	\$220,000
<i>Water - Land -- T O T A L</i>		\$760,000
<u>Water - Transmission</u>		
3.293	Peninsula Low North Transmission Main Replacement (Windsor at Young)	\$435,000
3.006	Bedford Connector 750mm Replacement - Phase 3	\$4,569,717
3.234	Windsor Junction Transmission Main Oversizing	\$330,000
3.011	Peninsula Low South Transmission Main Rehabilitation	\$7,505,000
3.045	Bedford West Capital Cost Contribution - Various Phases	\$11,000
3.343	Northgate Oversizing	\$135,000
3.232	MacIntosh Estates Phase 1 Oversizing	\$115,000
3.373	Regional Development Charge Studies	\$50,000
<i>Water - Transmission -- T O T A L</i>		\$13,150,717
<u>Water - Distribution</u>		
3.022	Water Distribution - Main Renewal Program	\$1,900,000
3.067	Valve Renewals	\$125,000
3.068	Hydrant Renewals	\$75,000
3.069	Service Line Renewals	\$100,000
3.390	Lead Service Line Replacement Program	\$400,000
3.294	Automated Flushing Program	\$20,000
3.346	Bulk Fill Stations - Site Work Improvements	\$110,000
3.296	Water Sampling Station Relocation Program	\$30,000
3.375	Re-Chlorination Stations - Sampson and Stokil Reservoirs	\$30,000
	Distribution System Chlorine Residual Analyzer Upgrade Program	\$100,000
<i>Water - Distribution -- T O T A L</i>		\$2,890,000

HALIFAX WATER

Capital Budget 2017/18

Water

Project Number	Project Name	Project Cost
----------------	--------------	--------------

Water - Structures

3.387	Geizer 158 Reservoir Floor Replacement	\$2,750,000
3.173	Lake Major Dam Replacement	\$7,089,391
3.342	Crestview Booster Station PRV Conversion	\$57,000
3.357	Silverside Booster Station - Control Panel Replacement	\$50,000
3.358	Blue Mountain Meter Replacement	\$20,000
3.381	Geizer 158 Reservoir Drainage Improvements	\$53,000
3.382	Pratt & Whitney PRV Communications Upgrade	\$10,000

Water - Structures -- T O T A L

\$10,029,391

Water - Treatment Facilities

3.211	Chlorine Analyzer Replacement Program	\$23,000
3.276	Inline Zeta Potential Meters for Water Plants	\$100,000
3.377	450 Cowie - New DR7000 for Lab	\$14,000
3.376	Chlorine Analyzer Relocation - Geizer 158 Reservoir	\$33,000

J D Kline Water Supply Plant:

3.157	Filter Media and Underdrain Replacement Program	\$4,447,060
3.353	Effluent Valve Actuator Replacement Program	\$50,000
3.352	New Mixers in Pre-Mix Chamber	\$277,000
3.319	Lime Feed and Delivery System Replacement	\$300,000
3.361	Turbidity Meters	\$50,000
3.236	Ampgard III to Vacuum Contactor Conversion	\$40,000
3.363	Chlorine Storage Room - System Modifications	\$70,000
3.351	Westinghouse Electrical Panels Replacement	\$5,000
3.368	pH Meter Replacements	\$10,000
3.369	Raw Water Pumping Station Ladder Extension and Fall Protection Equipment	\$9,000
3.370	VTS Alarm System Upgrade	\$7,000

HALIFAX WATER

Capital Budget 2017/18

Water

Project Number	Project Name	Project Cost
3.372	Bench-top Turbidimeter	\$6,000
3.386	Slide Gate Actuators to Lagoons	\$44,000
3.280	Roof Replacement	\$220,000
Lake Major Water Supply Plant:		
3.159	MCC Contactors Replacement	\$34,000
3.162	Butterfly valve replacement program	\$100,000
3.207	Treatment Train Isolation	\$222,000
3.195	Filter Media Replacement	\$200,000
3.161	Lime Feed and Delivery System Replacement	\$380,000
3.278	Clarifier Upgrades	\$285,000
3.160	PLC Upgrade	\$420,000
3.320	New Raw Water Low Lift Pump	\$500,000
3.304	Dry Polymer Feed System Replacement	\$380,000
3.300	Dedicated Service Water Pumping Station	\$285,000
3.325	Basin Mixing Enhancements	\$800,000
3.193	Carbon Dioxide Feed System	\$215,000
3.366	Bench Top Turbidimeter	\$6,000
3.315	Blower Vent	\$35,000
Bennery Lake Water Supply Plant:		
3.272	Low Lift VFD Pump Replacement Program	\$110,000
3.347	Plant MCC Replacement	\$530,000
3.348	Post Filter Chemical Addition Optimization	\$62,000
3.274	Power Monitoring	\$20,000
3.359	Culvert Replacement	\$20,000
3.349	New Magnetic Flow Meters	\$29,000
3.350	New Chlorine Analyzer	\$14,000
3.378	Sludge Pumps and Valves Replacement	\$53,000
Water - Treatment Facilities -- T O T A L		\$10,405,060

HALIFAX WATER

Capital Budget 2017/18

Water

Project Number	Project Name	Project Cost
<u>Water - Energy</u>		
3.107	Chamber HVAC Retro-Commissioning Program	\$100,000
3.367	Lake Major WSP - HVAC Upgrades	\$556,352
<i>Water - Energy -- T O T A L</i>		\$656,352
<u>Water - Security</u>		
4.009	Security Upgrade Program	\$150,000
<i>Water - Security -- T O T A L</i>		\$150,000
<u>Water - Equipment</u>		
3.101	Miscellaneous Equipment Replacement	\$50,000
<i>Water - Equipment -- T O T A L</i>		\$50,000
<i>Water - Corporate Projects - T O T A L</i>		\$9,671,000
<i>GRAND TOTAL - WATER</i>		\$47,762,520

HALIFAX WATER

Capital Budget 2017/18

Wastewater

Project Number	Project Name	Project Cost
<u>Wastewater - Trunk Sewers</u>		
2.067	Northwest Arm Sewer Rehabilitation	\$19,493,168
2.467	Kearney Lake Road Wastewater Sewer Upgrades	\$350,000
<i>Wastewater - Trunk Sewers -- T O T A L</i>		\$19,843,168
<u>Wastewater - Collection System</u>		
2.052	Integrated Wastewater Projects - Program	\$1,000,000
2.460	Leiblin Pumping Station Gravity Sewer	\$3,495,000
2.437	Hines Road Rider Sewer Extension	\$50,000
2.462	Wastewater Conveyance System Upgrade - Dingle PS to Roach's PS via William's Lake PS	\$145,000
2.547	Balsam/Monroe Subdivision Sewer Upgrade	\$165,000
2.357	Manhole Renewals	\$29,000
2.358	Lateral Replacements (non-tree roots)	\$1,300,000
2.563	Lateral Replacements (tree roots)	\$600,000
2.223	Wet Weather Management Program	\$100,000
2.523	Sewer Condition Assessment	\$300,000
2.043	Corporate Flow Monitoring Program	\$1,000,000
2.558	East and Central Region Infrastructure Plan	\$600,000
2.559	West Region Infrastructure Plan - Ph.2	\$250,000
2.074	Bedford West Collection System CCC	\$60,000
2.548	Regional Development Charge Studies	\$50,000
<i>Wastewater - Collection System -- T O T A L</i>		\$9,144,000
<u>Wastewater - Forcemains</u>		
2.543	Kearney Lake Road Forcemain Extension	\$260,000
<i>Wastewater - Forcemains -- T O T A L</i>		\$260,000

HALIFAX WATER

Capital Budget 2017/18

Wastewater

Project Number	Project Name	Project Cost
<u>Wastewater - Structures</u>		
2.42	Emergency Pumping Station Pump replacements	\$250,000
2.442	Wastewater Pumping Station Component Replacement Program - West Region	\$200,000
2.443	Wastewater Pumping Station Component Replacement Program - East Region	\$200,000
2.444	Wastewater Pumping Station Component Replacement Program - Central Region	\$200,000
2.512	Hines Road Sewer - Odour Management	\$100,000
2.466	Weybridge Lane Pumping Station CCC	\$540,000
2.005	Autoport Pleasant Street Pumping Station Replacement	\$750,000
2.366	Shipyards Road Pumping Station Upgrade	\$175,000
2.561	Outfall Location Inventory	\$25,000
<i>Wastewater Structures -- T O T A L</i>		\$2,440,000
<u>Wastewater - Treatment Facility</u>		
2.056	Plant Optimization Audit Program	\$125,000
2.522	Emergency Wastewater Treatment Facility equipment replacements	\$400,000
2.564	HSP Plants - Carbon replacement	\$400,000
Halifax Wastewater Treatment Facility:		
2.535	Screenings Compactor Replacement	\$200,000
2.532	Duct Work Replacement	\$150,000
Dartmouth Wastewater Treatment Facility:		
2.502	Duct Work Replacement	\$150,000
2.565	Odour Control Study	\$50,000
Herring Cove Wastewater Treatment Facility:		
2.539	Densadeg Inlet Penstocks Actuator Installation	\$50,000
2.55	Window Installation for Natural Light	\$20,000
2.566	Overhead Door	\$20,000
Mill Cove Wastewater Treatment Facility:		
2.531	Admin Building HVAC Renewal Preliminary Engineering	\$25,000
2.546	Odour Control Upgrade	\$530,000
2.567	Process Upgrade Options	\$50,000

HALIFAX WATER

Capital Budget 2017/18

Wastewater

Project Number	Project Name	Project Cost
Eastern Passage Wastewater Treatment Facility:		
2.551	Control Building HVAC Upgrade	\$8,000
Biosolids Processing Facility:		
2.126	Asset Renewal Program	\$250,000
2.568	Biosolids Management Plan	\$100,000
<i>Wastewater - Treatment Facility -- T O T A L</i>		\$2,528,000
<u>Wastewater - Energy</u>		
2.491	Pump Station HVAC Retro-Commissioning Program	\$100,000
2.554	Wastewater Pumping Station Performance Testing	\$250,000
Dartmouth Wastewater Treatment Facility:		
2.235	Ventilation Air Heat Recovery	\$250,000
2.553	MCC Ventilation Upgrades	\$100,000
Halifax Wastewater Treatment Facility:		
2.555	Effluent Heat Recovery	\$25,000
2.552	MCC Ventilation Upgrades	\$130,813
	Cogswell Area District Energy System	\$1,600,000
<i>Wastewater - Energy -- T O T A L</i>		\$2,455,813
<u>Wastewater - Security</u>		
4.008	Security Upgrade Program	\$200,000
<i>Wastewater - Security -- T O T A L</i>		\$200,000
<u>Wastewater - Equipment</u>		
2.161	I&I Reduction (SIR) Program Flow Meters and Related Equipment	\$25,000
2.451	Miscellaneous Equipment Replacement	\$70,000
<i>Wastewater - Equipment -- T O T A L</i>		\$95,000
<i>Wastewater - Corporate Projects -- T O T A L</i>		\$9,694,800
<i>GRAND TOTAL - WASTEWATER</i>		\$46,660,781

HALIFAX WATER

Capital Budget 2017/18

Stormwater

Project Number	Project Name	Project Cost
<u>Stormwater - Pipes</u>		
1.038	Integrated Stormwater Projects - Program	\$1,060,000
1.043	Sullivan's Pond Storm Sewer System Replacement - Phase 1	\$8,632,000
1.156	Storm Sewer Condition Assessment	\$150,000
1.102	Manhole Renewals	\$24,000
1.103	Catchbasin Renewals	\$36,000
1.135	Lateral Replacements	\$15,000
1.019	Drainage Remediation Program Surveys/Studies	\$25,000
<i>Stormwater - Pipes -- T O T A L</i>		\$9,942,000
<u>Stormwater - Culverts/Ditches</u>		
1.104	Driveway Culvert Replacements	\$700,000
Street Specific Culvert Replacements:		
1.146	John Cross Drive (near #40)	\$200,000
1.147	Cole Harbour Road (near #1560)	\$210,000
1.148	Montague Road (near #1044)	\$155,000
1.15	Fletcher Drive (near #52)	\$270,000
1.151	Softwind Lane (near #31)	\$105,000
1.152	Yankeetown Road (near #16)	\$205,000
1.153	Terradore Lane (near #7)	\$96,000
1.154	Waverley Road (near #4132)	\$115,000
1.136	Blue Hill Road (near #77)	\$130,000
1.01	Kipawa Crescent (near #14)	\$220,000
1.012	Lucasville Road (near #1419)	\$170,000
1.023	Cobequid Road (near #510)	\$160,000
<i>Stormwater - Culverts/Ditches -- T O T A L</i>		\$2,736,000
<u>Stormwater - Structures</u>		
1.133	Ellenvale Run Retaining Wall System - Replacement	\$1,535,000
<i>Stormwater - Structures -- T O T A L</i>		\$1,535,000
<i>Stormwater - Corporate Projects -- T O T A L</i>		\$871,200
<i>GRAND TOTAL - STORMWATER</i>		\$15,084,200

HALIFAX WATER

Capital Budget 2017/18

Corporate Projects

Project Number	Project Name	Project Cost
<u>Corporate - Information Technology</u>		
4.011	Desktop Computer Replacement Program	\$290,000
4.012	Network Infrastructure Upgrades	\$220,000
4.013	Document Management Program	\$100,000
4.070	Computerized Maintenance Management System Phase 2	\$2,000,000
4.024	Sharepoint Implementation	\$100,000
4.043	AMI Meter System Upgrades (50 Water / 50 Wastewater)	\$11,685,000
4.014	IT Disaster Recovery Site	\$300,000
4.048	SAP Rate Structure Support	\$220,000
4.074	Asset Registry Build	\$600,000
<i>Corporate - Information Technology -- T O T A L</i>		\$15,515,000
<u>Corporate - GIS</u>		
4.040	GIS Data Program	\$1,000,000
4.038	GIS Hardware/Software Program	\$100,000
4.039	GIS Application Support Program	\$250,000
<i>Corporate - GIS -- T O T A L</i>		\$1,350,000
<u>Corporate - Asset Management</u>		
4.079	Climate Change Assessment and Policy	\$150,000
4.020	Asset Management Program Development	\$150,000
4.052	Long Term Planning Coordination Strategy (50 Water / 50 Wastewater)	\$75,000
4.049	Expand Prioritization Methodology	\$125,000
4.054	Assess AM Software and Tools	\$100,000
<i>Corporate - Asset Management -- T O T A L</i>		\$600,000
<u>Corporate - Facility</u>		
4.076	Heating / Ventilation Upgrades in New Phase 450 Cowie Hill Building	\$100,000
4.078	450 Cowie Renovation	\$75,000
<i>Corporate - Facility -- T O T A L</i>		\$175,000

HALIFAX WATER

Capital Budget 2017/18

Corporate Projects

Project Number	Project Name	Project Cost
<u>Corporate - SCADA & Other Equipment</u>		
3.38	Total Station Survey Prisms	\$32,000
4.004	SCADA Control System Enhancements (50 Water / 50 Wastewater)	\$200,000
4.080	Large and New Customer Meters (50 Water / 50 Wastewater)	\$460,000
<i>Corporate - SCADA & Other Equipment -- T O T A L</i>		\$692,000
<u>Corporate - Fleet</u>		
4.006	Fleet Upgrade Program Stormwater	\$280,000
4.006	Fleet Upgrade Program Wastewater	\$1,120,000
4.007	Fleet Upgrade Program Water	\$505,000
<i>Corporate - Fleet -- T O T A L</i>		\$1,905,000
<i>GRAND TOTAL - Corporate Projects</i>		\$20,237,000

ALLOCATION BREAKDOWN:

Water - Corporate Projects - T O T A L	\$9,671,000
Wastewater - Corporate Projects -- T O T A L	\$9,694,800
Stormwater - Corporate Projects -- T O T A L	\$871,200

GRAND TOTAL - Corporate Projects

\$20,237,000

Note: All corporate projects are allocated as follows:

50% Water

40% Wastewater

10% Stormwater

(unless otherwise noted)



Appendix E

Projected Capital Budgets for 2018/19 to 2022/23

**STRAIGHT from
the SOURCE**



2018 - 19 to 2022 - 23 Capital Expenditure Program	TOTALS					
	All \$ in 000's					
	Y1	Y2	Y3	Y4	Y5	Y1 to Y5
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Totals
Water / Wastewater / Stormwater Budget Summary						
Water - Land	\$100	\$100	\$100	\$100	\$100	\$500
Water - Transmission	\$382	\$7,088	\$8,675	\$404	\$15,634	\$32,183
Water - Distribution	\$4,647	\$3,850	\$4,920	\$4,820	\$4,820	\$23,057
Water - Structures	\$1,954	\$8,645	\$350	\$3,310	\$3,190	\$17,449
Water - Treatment Facilities	\$7,653	\$4,360	\$5,291	\$13,358	\$6,198	\$36,860
Water - Energy	\$175	\$1,525	\$500	\$500	\$500	\$3,200
Water - Security	\$50	\$50	\$50	\$50	\$50	\$250
Water - Equipment	\$50	\$50	\$50	\$50	\$50	\$250
Water - Corporate Projects	\$10,023	\$6,439	\$9,545	\$6,065	\$2,456	\$34,528
Sub Total - Water	\$25,034	\$32,107	\$29,481	\$28,657	\$32,998	\$148,277
Wastewater - Trunk Sewers	\$1,700	\$10,330	\$9,690	\$2,000	\$2,000	\$25,720
Wastewater - Collection System	\$12,120	\$19,691	\$13,981	\$16,515	\$18,800	\$81,107
Wastewater - Forcemains	\$1,253	\$1,365	\$15,600	\$1,100	\$1,300	\$20,618
Wastewater - Structures	\$9,750	\$10,170	\$14,570	\$11,950	\$24,750	\$71,190
Wastewater - Treatment Facilities	\$2,878	\$3,690	\$3,515	\$3,700	\$3,430	\$17,213
Wastewater - Energy	\$475	\$1,230	\$650	\$600	\$600	\$3,555
Wastewater - Security	\$200	\$200	\$200	\$200	\$200	\$1,000
Wastewater - Equipment	\$95	\$95	\$95	\$95	\$95	\$475
Wastewater - Corporate Projects	\$11,347	\$8,844	\$10,670	\$7,787	\$5,100	\$43,748
Sub Total - Wastewater	\$39,818	\$55,615	\$68,971	\$43,947	\$56,275	\$264,626
Stormwater - Pipes	\$1,861	\$1,913	\$3,388	\$12,041	\$6,037	\$25,240
Stormwater - Culverts/Ditches	\$2,725	\$2,812	\$2,828	\$2,848	\$2,866	\$14,079
Stormwater - Structures	\$2,525	\$2,525	\$2,525	\$2,525	\$0	\$10,100
Stormwater - Security	\$0	\$0	\$0	\$0	\$0	\$0
Stormwater - Equipment	\$0	\$0	\$0	\$0	\$0	\$0
Stormwater - Corporate Projects	\$1,486	\$1,660	\$2,235	\$1,518	\$850	\$7,749
Sub Total - Stormwater	\$8,597	\$8,910	\$10,976	\$18,932	\$9,753	\$57,168
TOTALS - Water/Wastewater/Stormwater						
	\$73,449	\$96,632	\$109,428	\$91,536	\$99,026	\$470,071

Five Year Capital Budget - Water									
Project ID	Project Name	Region	All \$ in 000's						
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023		
Water - Land									
3.033	Watershed Land Acquisition	HRM	\$100	\$100	\$100	\$100	\$100	\$500	\$0
Water - Land -- T O T A L S			\$100	\$100	\$100	\$100	\$100	\$500	\$0
Water - Transmission									
3.042	Critical Valve Replacement Program	HRM	\$0	\$300	\$300	\$300	\$300	\$1,200	\$0
3.250	Critical Valve Replacement Program - Gottingen Street	West	\$210					\$210	\$0
3.291	Port Wallace Transmission Main - Caledonia Section	East	\$120	\$6,270				\$6,390	\$0
3.397	Willow Tree Transmission Main Improvements	West					\$4,050	\$4,050	\$0
3.395	Peninsula Low Transmission Main Quinpool Road Beech to Robie	West					\$6,320	\$6,320	\$0
3.396	Peninsula Low Transmission Main Replacement Crown to Parkwood	West							\$8,850
3.436	Pockwock Transmission Main Twinning - WSP to Hammonds Plain Road	West					\$200	\$200	\$53,650
3.292	Lucasville Road Transmission Main - Beaverbank Connection	Central							\$6,170
3.013	Windmill Road Transmission Main Replacement - Ph 1 (Wright to Princess Marg)	East							\$4,500
3.014	Windmill Road Transmission Main Replacement - Ph 2 (Princess Marg to Albro Lake Rd)	East					\$4,350	\$4,350	\$0
3.019	Lucasville Road Transmission Main - Phase 1	Central		\$150	\$7,610			\$7,760	\$0
3.020	Lucasville Road Transmission Main - Phase 2 (C3 - North of Hwy 101)	Central							\$8,110
3.021	Burnside - Bedford Connector Transmission Main	East			\$750			\$750	\$12,250
3.010	North End Feeder Tunnel 36" Transmission Main Rehab (W3)	West				\$100	\$300	\$400	\$9,400
3.326	Robie Street Intermediate Transmission Main Structural Liner	West							\$5,950
3.018	Port Wallace Transmission Main - Phase 1 (E3)	East							\$5,930
3.108	Herring Cove Road Transmission Main Replacement Sussex Drive to Princeton Avenue	West							\$4,700
3.045	Bedford West CCC - Various Phases	Central	\$2	\$83	\$13	\$2	\$114	\$214	\$0
3.260	Morris (Russell) Lake Estates CCC	East		\$15				\$15	\$0
3.261	Lakeside Timberlea CCC	West			\$2	\$2		\$4	\$0
3.343	Northgate Oversizing	Central		\$145				\$145	\$0
3.232	MacIntosh Estates Phase 1 Oversizing	West		\$125				\$125	\$0
3.373	Regional Development Charge Studies	HRM	\$50					\$50	\$0
Water - Transmission -- T O T A L S			\$382	\$7,088	\$8,675	\$404	\$15,634	\$32,183	\$119,510
Water - Distribution									
3.022	Water Distribution - Main Renewal Program	HRM	\$3,500	\$2,500	\$3,500	\$3,500	\$3,500	\$16,500	\$0
3.067	Valves Renewals	HRM	\$125	\$125	\$125	\$125	\$125	\$625	\$0
3.068	Hydrants Renewals	HRM	\$75	\$75	\$75	\$75	\$75	\$375	\$0
3.069	Service Lines Renewals	HRM	\$100	\$100	\$100	\$100	\$100	\$500	\$0
3.390	Lead Service Line Replacement Program	HRM	\$600	\$1,000	\$1,000	\$1,000	\$1,000	\$4,600	\$0
3.294	Automated Flushing Program	HRM	\$20	\$20	\$20	\$20	\$20	\$100	\$0
3.296	Water Sampling Station Relocation Program	HRM	\$30	\$30				\$60	\$0
3.333	Quinpool Road Bridge Watermain Replacement	West	\$197					\$197	\$0
3.334	Coburg Road Bridge Watermain Replacement	West			\$100			\$100	\$0
Water - Distribution -- T O T A L S			\$4,647	\$3,850	\$4,920	\$4,820	\$4,820	\$23,057	\$0

Five Year Capital Budget - Water

Project ID	Project Name	Region	All \$ in 000's						
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023		

Water - Structures

3.262	Chambers, Pumping Stations and Distribution Monitoring Asset Renewal Program	HRM	\$0	\$350	\$350	\$750	\$750	\$2,200	\$0
3.391	Lake Major Dam Monitoring Program	East		\$245				\$245	\$0
3.403	Cowie Hill Reservoir Rehabilitaton	West	\$100	\$2,000				\$2,100	\$0
3.411	Sampson and Stokil Reservoirs Rechlorination System	Central	\$390					\$390	\$0
3.404	Bluewater PRV Chamber CSE Retorfit	Central	\$76					\$76	\$0
3.408	Beaver Bank Reservoir Meter Upgrade	Central	\$35					\$35	\$0
3.407	Brunello Booster Station - Pump Control Modifications	West	\$27					\$27	\$0
3.400	Ritcey Crescent PRV - New Meter	East	\$11					\$11	\$0
3.401	Golf View Drive PRV Chamber Rehabilitation	East	\$18					\$18	\$0
3.405	Eaglewood Pumping Station - Upgrades	Central	\$9					\$9	
3.406	Parkdale Booster Station Decommissioning	West	\$22					\$22	
3.426	Robie 2 Emergency Pump - Pump Control Review and Optimization	West	\$105					\$105	
3.427	Lyle Street Pumping Station Upgrades	East	\$235					\$235	
3.440	Bulk Fill Service connection for the Cowie Hill Operations Depot	West	\$51					\$51	
3.441	Main Control Chamber Annubar Meter Replacement	West	\$55					\$55	\$0
3.402	Steel Reservoir Inspection and Assessment Study	HRM	\$175					\$175	\$0
3.414	Dam Safety Review	HRM		\$300				\$300	\$0
3.116	Bedford South (Hemlock) Reservoir CCC	West	\$250	\$5,750				\$6,000	
3.288	Akerley Reservoir Rehabilitation	East				\$2,560		\$2,560	
3.115	Herring Cove Reservoir CCC	West						\$0	\$2,990
3.344	Leiblin Drive Booster Station - Replacement of Diesel Fire Pump	West	\$395					\$395	
3.379	Aerotech Reservoir Twinning	Aerotech					\$2,440	\$2,440	
3.110	Mount Edward Reservoir Replacement	East						\$0	\$7,910
3.309	Cowie Hill Reservoir Replacement	West						\$0	\$4,570
Water - Structures -- T O T A L S			\$1,954	\$8,645	\$350	\$3,310	\$3,190	\$17,449	\$15,470

Water - Treatment Facilities

	JD Kline Water Supply Plant:								
3.264	JD Kline WSP Upgrade Program	W/C	\$0	\$0	\$0	\$300	\$300	\$600	\$0
3.417	JD Kline WSP - Process Review Study	W/C		\$235				\$235	\$0
3.393	JD Kline WSP - Process Upgrade/Replacement Program	W/C	\$0	\$0	\$0	\$500	\$500	\$1,000	\$0
3.157	JD Kline WSP - Underdrains and Filter Media Replacement Program	W/C	\$4,100					\$4,100	\$0
3.415	JD Kline WSP - Raw Water Intake Traveling Screen Replacement Program	W/C	\$905	\$905	\$905			\$2,715	\$0
3.374	JD Kline WSP - Replace Filter Isolation Gates	W/C	\$50		\$590			\$640	\$0
3.413	JD Kline WSP - Storage Building Improvements	W/C	\$76					\$76	\$0
3.409	JD Kline WSP - Purchase New Boat for Lake Sampling	W/C	\$32					\$32	\$0
3.424	JD Kline WSP - Replace Existing 4160 Transformer in Low Lift Station	W/C	\$26					\$26	\$0
3.423	JD Kline WSP - New Grounding Bar for Crane	W/C	\$17					\$17	\$0
3.428	JD Kline WSP - Caustic Tank Liner Replacements	W/C	\$13	\$13				\$26	\$0

Five Year Capital Budget - Water

Project ID	Project Name	Region	All \$ in 000's						
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023		
3.353	J D Kline WSP - Effluent Valve Actuator Replacement Program	W/C	\$100	\$100	\$100			\$300	\$0
3.242	JD Kline WSP - Replace CO2 Feeders	W/C	\$70	\$590				\$660	\$0
3.338	J D Kline WSP - Upgrades to the Process Wastewater Lagoons	W/C	\$50	\$540				\$590	\$0
3.361	JD Kline WSP - Replace Turbidity Meters	W/C	\$50					\$50	\$0
3.236	JD Kline WSP - Ampgard III to Vacuum Contactor Conversion	W/C	\$40					\$40	\$0
3.439	JD Kline WSP - Filter Gallery Electrical Wiring Upgrades	W/C	\$55					\$55	\$0
3.443	JD Kline WSP - Pilot Plant PLC Upgrade	W/C	\$19					\$19	\$0
3.352	JD Kline WSP - New Mixers in Pre-Mix Chamber	W/C			\$580			\$580	\$0
3.354	JD Kline WSP - Upgrade the PLC	W/C		\$420				\$420	\$0
3.341	JD Kline WSP - Roof Replacement	W/C		\$270				\$270	\$0
3.431	JD Kline WSP - Fluoride Tank Liner Replacement	W/C			\$13			\$13	\$0
3.365	JD Kline WSP - Raw Water Transmission Main Replacement	W/C				\$200	\$4,500	\$4,700	\$0
3.351	JD Kline WSP - Replace Westinghouse Electrical Panels	W/C	\$5	\$5	\$5	\$5		\$20	\$0
3.388	JD Kline WSP - Access Road & Low Lift Parking Lot Asphalt Rehabilitation	W/C				\$925		\$925	\$0
3.134	J D Kline WSP - Removal of Aluminium in the process wastewater	W/C						\$0	\$2,710
3.137	JD Kline WSP - Flow Splitting Improvements in the Pre-Mix	W/C						\$0	\$1,300
3.136	JD Kline WSP - Lobby Upgrades	W/C						\$0	\$180
3.138	J D Kline WSP - Replace Pump Motors #1 and #3	W/C						\$0	\$280
3.142	JD Kline WSP - Mechanical Mixers in the Mixing Tanks	W/C						\$0	\$1,000
	Lake Major Water Supply Plant:								
3.265	Lake Major WSP Upgrade program	East	\$0	\$0	\$0	\$100	\$100	\$200	\$0
3.279	Lake Major WSP - Replace Raw Water Pumping Station - Design	East	\$250					\$250	\$0
3.392	Lake Major WSP - Replace Raw Water Pumping Station - Construction	East				\$8,580		\$8,580	\$0
3.159	Lake Major WSP - Replace Contactors in the MCC	East	\$34	\$17				\$51	\$0
3.162	Lake Major WSP - Butterfly valve replacement program	East	\$100	\$100	\$100	\$100	\$100	\$500	\$0
3.278	Lake Major WSP - Clarifier Repair	East	\$285					\$285	\$0
3.422	Lake Major WSP - New Alum and Fluoride Tanks	East	\$145					\$145	\$0
3.421	Lake Major WSP - Improved access to Pipe Gallery	East	\$50					\$50	\$0
3.429	Lake Major WSP - Purchase H-Frame for Fall Arrest System	East	\$9					\$9	\$0
3.430	Lake Major WSP - Pre-Oxidation Strategy Study	East	\$120	\$320				\$440	\$0
3.420	Lake Major WSP - Yard Drainage and Parking Area Improvements	East	\$160					\$160	\$0
3.314	Lake Major WSP - East Lake Dam Repairs	East	\$65		\$600			\$665	\$0
3.302	Lake Major WSP - Dechlorination System Design	East	\$75					\$75	\$0
3.444	Lake Major WSP - Motor Protection Relays	East	\$60					\$60	\$0
3.195	Lake Major WSP - Filtration System Replacement	East			\$2,000	\$2,000		\$4,000	\$0
3.161	Lake Major WSP - Replace the Lime Feed and Delivery System	East		\$380				\$380	\$0
3.313	Lake Major WSP - Optimize Post Filter Chemical Injection Points	East		\$60				\$60	\$0
3.318	Lake Major WSP - Waste Residuals Management - Construction	East				\$250		\$250	\$7,790
3.323	Lake Major WSP - Purchase/Install a Pilot Plant Process Optimization	East					\$300	\$300	\$0

Five Year Capital Budget - Water										
Project ID	Project Name	Region	All \$ in 000's							
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years	
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023			
3.312	Lake Major WSP - Install Air Gaps on Filter to Waste Piping	East							\$0	\$200
	Bennery Lake Water Supply Plant:									
3.267	Bennery Lake WSP - Upgrade Program	Bennery		\$225	\$225	\$225	\$225	\$900	\$0	
3.41	Bennery Lake WSP - Access Road Improvements Study Phase Only	Bennery	\$130					\$130	\$0	
3.418	Bennery Lake WSP - Sludge Valve Replacement Program	Bennery	\$7	\$7				\$14	\$0	
3.433	Bennery Lake WSP - Actuator for Backwash Control Valve	Bennery	\$13					\$13	\$0	
3.272	Bennery Lake WSP - New Low Lift VFD Pump Replacement Program	Bennery	\$110					\$110	\$0	
3.434	Bennery Lake WSP - Manganese Removal Strategy Study	Bennery	\$60					\$60	\$0	
3.275	Bennery Lake WSP - Filter Media Replacement	Bennery						\$0	\$925	
3.192	Bennery Lake WSP - Oxygenation	Bennery						\$0	\$435	
	Non - Urban Core Water Supply Plant:									
3.266	Non-Urban Core WSP Upgrade program	HRM	\$0	\$150	\$150	\$150	\$150	\$600	\$0	
3.412	Miller Lake Small System - Supply Treatment Improvements	Central	\$235					\$235	\$0	
3.425	Miller Lake Small System - Water Storage Tank	Central	\$16					\$16	\$0	
3.445	Collins Park WSP - Air Exchange System	Central	\$26					\$26	\$0	
3.435	Lake Lamont - Replace Suction Piping and Chlorine Injection	East	\$72					\$72	\$0	
3.211	Chlorine Analyzer Replacement Program	HRM	\$23	\$23	\$23	\$23	\$23	\$115	\$0	
Water - Treatment Facilities -- T O T A L S			\$7,653	\$4,360	\$5,291	\$13,358	\$6,198	\$36,860	\$14,820	
Water - Energy										
3.221	Energy Management Capital Program (Water)	HRM	\$0	\$0	\$150	\$400	\$400	\$950	\$0	
3.107	Chamber HVAC Retro-Commissioning Program	HRM	\$0	\$100	\$100	\$100	\$100	\$400	\$0	
3.438	JD Kiline WSP - 2nd Boiler Replacement	W/C	\$100					\$100	\$0	
3.437	Lake Major WSP - Process Area HVAC Upgrades	East	\$75	\$675				\$750	\$0	
3.254	Bennery Lake WSP - MCC Replacement	Bennery		\$750				\$750	\$0	
3.269	Bennery - HVAC Upgrades	East			\$250			\$250	\$0	
Water - Energy -- T O T A L S			\$175	\$1,525	\$500	\$500	\$500	\$3,200	\$0	
Water - Security										
4.009	Security Upgrade Program	HRM	\$50	\$50	\$50	\$50	\$50	\$250	\$0	
Water - Security -- T O T A L S			\$50	\$50	\$50	\$50	\$50	\$250	\$0	
Water - Equipment										
3.101	Miscellaneous Equipment Replacement	HRM	\$50	\$50	\$50	\$50	\$50	\$250	\$0	
Water - Equipment -- T O T A L S			\$50	\$50	\$50	\$50	\$50	\$250	\$0	
TOTALS - Water			\$15,011	\$25,668	\$19,936	\$22,592	\$30,542	\$113,749	\$149,800	

Five Year Capital Budget - Wastewater

Project ID	Project Name	Region	All \$ in 000's						
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023		
Wastewater - Trunk Sewers									
2.526	Wastewater Trunk Sewer Asset Renewal Program	HRM				\$2,000	\$2,000	\$4,000	\$0
2.467	Kearney Lake Road Wastewater Sewer Upgrades	West	\$1,200	\$640				\$1,840	\$0
2.384	RWWFP Project MC4 - Localized Upgrade to Sackville Trunk Sewer	Central						\$0	\$16,740
2.070	Bedford Sackville Trunk Sewer - Maintenance Access Routes	Central						\$0	\$1,500
2.584	Bedford to Halifax Trunk Sewer Upgrade	West	\$500	\$9,690	\$9,690			\$19,880	\$0
Wastewater - Trunk Sewers -- T O T A L S			\$1,700	\$10,330	\$9,690	\$2,000	\$2,000	\$25,720	\$18,240
Wastewater - Collection System									
2.052	Integrated Wastewater Projects - Program	HRM	\$1,915	\$1,500	\$1,500	\$1,500	\$1,500	\$7,915	\$0
2.168	Wastewater System - Trenchless Rehabilitation Program	HRM	\$1,490	\$3,000	\$3,000	\$3,000	\$3,000	\$13,490	\$0
2.504	Collection System Asset Renewal Program	HRM			\$2,000	\$2,000	\$2,000	\$6,000	\$0
2.658	Wastewater Lateral Lining	HRM	\$2,100					\$2,100	\$0
2.659	Fairview Clayton Park Bridgeview I/I Reduction	HRM	\$2,880					\$2,880	\$0
2.649	Inglis Street Sewer / Pier A PS - Ventilation/Odour Control Modifications	West	\$80					\$80	\$0
2.013	Wanda Lane Sanitary Sewer Replacement	East	\$50	\$2,150				\$2,200	\$0
2.356	Auburn Avenue Sanitary Sewer	West	\$25	\$525				\$550	\$0
2.657	Glendale Drive to Sackville Trunk Sewer - System Upgrade	Central	\$400					\$400	\$0
2.557	Punch Bowl PS Elimination	West			\$35	\$2,365		\$2,400	\$0
2.437	Hines Road Rider Sewer Extension	East		\$405				\$405	\$0
2.195	Gravity sewer from Little Albro Lake to Jamieson St PS (DA1) from RWWFP	East						\$0	\$4,200
2.196	Sewer Improvements from Fenwick Street to Old Ferry Rd Pumping Station with the addition of Maynard Street	East						\$0	\$3,120
2.390	RWWFP Project DA3 - Sewer Twinning Albro Lake/Slayter Street to Old Ferry Road	East				\$150	\$300	\$450	\$8,750
2.163	Barrington Street Combined Sewer Upgrade	West						\$0	\$900
2.439	RWWFP Project SP3 - Gravity Sewer for Connection of Springfield Lake to Sackville System	Central						\$0	\$1,090
2.357	Manhole Renewals WW	HRM	\$25	\$25	\$25	\$28	\$28	\$131	\$0
2.358	Lateral Replacements WW (non-tree roots)	HRM	\$1,650	\$1,685	\$1,720	\$1,750	\$1,785	\$8,590	\$0
2.563	Lateral Replacements WW (tree roots)	HRM	\$520	\$526	\$541	\$552	\$567	\$2,706	\$0
2.223	Wet Weather Management Program	HRM	\$225	\$250	\$250	\$250	\$250	\$1,225	\$0
2.548	Regional Development Charge Studies	HRM	\$50					\$50	\$0
2.074	Bedford West Collection System CCC	West	\$15	\$50				\$65	\$0
2.009	North Preston Sewershed - Wastewater Collection System Replacement Program	East						\$0	\$3,200
2.086	Ellenvale Holding Tank Sewershed	East						\$0	\$7,000
2.011	Eastern Passage Sewage Collection System Upgrades	East						\$0	\$54,500
2.145	Dorothea Drive Sanitary Sewer Upgrade	East						\$0	\$300
2.075	Beaver Crescent Collection System Replacement	East						\$0	\$4,100
	- WRWIP PROJECTS							\$0	\$0
	Young Street - Sewer Separation	West	\$100	\$1,430				\$1,530	\$0
	Kempt Road Phase 1 - Sewer Separation	West	\$200	\$2,780				\$2,980	\$0
	South Park Street - Sewer Separation	West			\$1,780			\$1,780	\$0
	Bayers Road Phase 1 - Sewer Separation	West	\$75	\$1,045				\$1,120	\$0
	Joseph Howe Drive - Sewer Separation	West	\$100	\$1,375				\$1,475	\$0

Five Year Capital Budget - Wastewater										
Project ID	Project Name	Region	All \$ in 000's							
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years	
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023			
	Romans - Federal Avenues - Sewer Separation	West	\$170	\$2,435					\$2,605	\$0
	Robie Street - Sewer Separation	West			\$2,610				\$2,610	\$0
	College Street - Sewer Separation	West				\$3,530			\$3,530	\$0
	Bayers Road Phase 2 - Sewer Separation	West				\$1,390			\$1,390	\$0
	Kempt Road Phase 2 - Sewer Separation	West						\$9,370	\$9,370	\$0
	Windsor - Almon - Sewer Separation	West							\$0	\$2,285
	Spring Garden Road Phase 1 - Sewer Separation	West							\$0	\$885
	Young Street Pocket - Sewer Separation - Side Streets	West							\$0	\$1,760
	Spring Garden Road Phase 2 - Sewer Separation	West							\$0	\$550
	Conaught - Windsor Pocket - Sewer Separation	West							\$0	\$3,505
	Conaught Avenue - Sewer Separation	West							\$0	\$2,810
	Bayers Road Phase 3 - Sewer Separation	West							\$0	\$1,675
	- WRWIP PROJECTS								\$0	\$0
2.610	Combined Sewer Upgrade - Quinpool from Preston to Oxford	West		\$35	\$345				\$380	\$0
2.636	Gottingen/North Flow Split -Alteration to Combined Sewer	West	\$50	\$450					\$500	\$0
2.586	Combined Sewer Upgrade - Portland Place & Brunswick Street	West		\$25	\$175				\$200	\$0
2.581	WRWIP_CrownDrive: BLT Flow Diversion to Herring Cove - New Gravity Sewer Connection (Crown G Connection)	West							\$0	\$3,290
2.582	WRWIP_CrownDrive: BLT Flow Diversion to Herring Cove - New Gravity Sewer_Crown_G(Crown_G)	West							\$0	\$3,920
2.587	WRWIP_HerringCove: Herring Cove Road - Gravity Sewer Upgrades_HCR_G	West							\$0	\$6,810
2.588	WRWIP_Kearney: Linear Upgrade - Donaldson Avenue_KLR_G1	West							\$0	\$660
Wastewater - Collection System -- T O T A L S			\$12,120	\$19,691	\$13,981	\$16,515	\$18,800	\$81,107	\$115,310	
Wastewater - Forcemains										
2.080	Forcemain Replacement Program	HRM	\$0	\$500	\$500	\$1,000	\$1,000	\$3,000	\$0	
2.543	Kearney Lake Road Forcemain Extension	West	\$1,253	\$665				\$1,918	\$0	
2.40	RWWFP Project DA7 - Forcemain for Old Ferry Road Pumping Station	East				\$100	\$300	\$400	\$2,460	
2.494	RWWFP Project SP1 - Springfield Forcemain	Central						\$0	\$2,380	
2.079	North Preston #3 - Johnson Rd Forcemain - Capacity Upgrade	East						\$0	\$800	
	- WRWIP PROJECTS							\$0		
2.58	Armdale Pumping Station Forcemain Replacement	West						\$0	\$3,040	
2.608	New Timberlea Pump Station Forcemain System	West		\$200	\$15,100			\$15,300	\$0	
2.62	WRWIP_YoungStreet: Upgrade Young Pumping Station Capacity - Forcemain_TYNG_FM	West						\$0	\$115	
2.579	WRWIP_CrownDrive: BLT Flow Diversion to Herring Cove - New Crown Drive Forcemain_Crown_FM(Crown_FM)	West						\$0	\$8,150	
Wastewater - Forcemains -- T O T A L S			\$1,253	\$1,365	\$15,600	\$1,100	\$1,300	\$20,618	\$16,945	
Wastewater - Structures										
2.420	Emergency Pumping Station Pump replacements	HRM	\$250	\$250	\$250	\$250	\$250	\$1,250	\$0	
2.442	Wastewater Pumping Station Component Replacement Program - West Region		\$0	\$200	\$200	\$200	\$200	\$800	\$0	
2.443	Wastewater Pumping Station Component Replacement Program - East Region		\$200	\$200	\$200	\$200	\$200	\$1,000	\$0	
2.444	Wastewater Pumping Station Component Replacement Program - Central Region		\$150	\$100	\$100	\$100	\$100	\$550	\$0	
2.476	Wastewater Pumping Station Asset Renewal Program	HRM				\$2,500	\$5,000	\$7,500	\$0	
	Wastewater Pumping Station Asset Renewal Program (CWWF)	HRM					\$10,000	\$10,000	\$10,000	

Five Year Capital Budget - Wastewater

Project ID	Project Name	Region	All \$ in 000's						
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023		
2.466	Weybridge Lane Pump Station CCC	West	\$5,060	\$4,140				\$9,200	\$0
2.005	Autoport Pleasant Street PS Replacement	East		\$3,000				\$3,000	\$0
2.66	Bissett PS Component Upgrade	East	\$50	\$1,200				\$1,250	\$0
2.655	Roach's Pond PS Component Upgrade	West	\$275		\$400			\$675	\$0
2.366	Shipyard Road PS	Central	\$915					\$915	\$0
2.088	Russell Lake PS Upgrade	East		\$100	\$2,400			\$2,500	\$0
2.093	Windmill Road PS Replacement	East	\$1,455					\$1,455	\$0
2.654	PS Control Panel / Electrical Replacement	HRM	\$1,050					\$1,050	\$0
2.665	CSO Upgrade Program	HRM	\$300	\$300	\$300	\$300	\$300	\$1,500	\$8,710
2.459	William's Lake PS Rehabilitation	West		\$150	\$2,660			\$2,810	\$8,180
2.661	Bayers Lake Phase V Pumping Station	West		\$130				\$130	\$22,400
2.669	Halifax CSO Surveying	West	\$45					\$45	\$0
2.081	Main Street, Memorial Drive, O'Dell Drive, Humber Park PS Upgrades	East						\$0	\$5,000
2.008	Gaston Rd PS Upgrade	East						\$0	\$900
2.405	RWWFP Project DA6 - Upgrade Old Ferry Pumping Station	East				\$200	\$500	\$700	\$8,710
2.447	RWWFP Projects MC2, MC3 - Wastewater Storage	Central			\$2,500	\$8,200	\$8,200	\$18,900	\$21,255
2.493	RWWFP Project SP2 - Springfield Lake PS	Central						\$0	\$1,460
2.089	Fairfield Holding Tank Rehabilitation	West						\$0	\$6,050
2.006	Valleyford Holding Tank	East						\$0	\$1,100
2.111	Armdale Roundabout CSO screening	West						\$0	\$3,000
2.112	Quinpool Road CSO screening	West						\$0	\$3,000
2.113	Coburg Road CSO screening	West						\$0	\$3,000
2.114	South Street CSO screening	West						\$0	\$3,000
2.115	Beaufort Avenue CSO screening	West						\$0	\$3,000
2.450	Quigley's Corner Pump Replacement and PS Upgrade	East						\$0	\$5,500
2.583	* DUPLICATE WITH EXISTING PROJECT?*	West						\$0	\$12,470
	WRWIP_Fairfield: New Fairfield Holding Tank_FLD_HT								
2.609	New Timberlea Pumping Station	West		\$400	\$5,560			\$5,960	\$0
2.617	WRWIP_YoungeStreet: Upgrade Young Pumping Station Capacity - Pumps YNG PS	West						\$0	\$2,110
2.580	WRWIP_CrownDrive: BLT Flow Diversion to Herring Cove - New Crown Drive Pumping Station Crown PS (Crown PS)	West						\$0	\$8,110
Wastewater Structures -- T O T A L S			\$9,750	\$10,170	\$14,570	\$11,950	\$24,750	\$71,190	\$136,955
Wastewater - Treatment Facility									
2.056	Plant Optimization Program	HRM	\$125	\$125	\$125	\$125	\$125	\$625	\$0
2.522	Emergency Wastewater Treatment Facility equipment replacements	HRM	\$400	\$400	\$400	\$400	\$400	\$2,000	\$0
2.668	Wastewater Treatment Research Program	HRM		\$200				\$200	\$0
2.044	Wastewater Treatment Facilities - Backup Power Upgrade Program (Various Locations)	HRM						\$0	\$1,889

Five Year Capital Budget - Wastewater

Project ID	Project Name	Region	All \$ in 000's						
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023		
	Halifax Wastewater Treatment Facility:								
2.506	Halifax WWTF - Asset Renewal Program	West	\$0	\$350	\$350	\$750	\$750	\$2,200	\$0
2.532	Halifax WWTF - Duct Work Replacement	West	\$50	\$50	\$50	\$25	\$25	\$200	\$0
2.653	Halifax WWTF - New Raw Water Pumps	West	\$350	\$350	\$350			\$1,050	\$0
2.536	Halifax WWTF - Sludge Dewatering Equipment Renewal	West						\$0	\$3,000
	Dartmouth Wastewater Treatment Facility:								
2.507	Dartmouth WWTF - Asset Renewal Program	East	\$0	\$500	\$500	\$500	\$500	\$2,000	\$0
2.502	Dartmouth WWTF - Duct Work Replacement	East	\$25	\$25	\$25	\$15	\$15	\$105	\$0
2.499	Dartmouth WWTF - Sludge Dewatering Equipment Renewal	East						\$0	\$3,000
2.416	Dartmouth WWTF Upgrade (DA8) (Was project ID 2.822 in IRP)	East						\$0	\$39,200
	Herring Cove Wastewater Treatment Facility:								
2.508	Herring Cove WWTF - Asset Renewal Program	West	\$0	\$250	\$250	\$250	\$250	\$1,000	\$0
2.639	Herring Cove WWTF - Duct Work Replacement Program	West	\$25	\$25	\$25	\$15	\$15	\$105	\$0
2.652	Herring Cove WWTF - Densadeg Flow Meters	West	\$75					\$75	\$0
	Mill Cove Wastewater Treatment Facility:								
2.505	Mill Cove WWTF - Asset Renewal Program	Central	\$0	\$250	\$350	\$350	\$350	\$1,300	\$0
2.644	Mill Cove WWTF - Civil Asset Condition Assessment	Central	\$75					\$75	\$0
2.645	Mill Cove WWTF - Compactor/Conveyor Replacement	Central	\$300					\$300	\$0
2.662	Mill Cove WWTF - RAS Piping Replacement	Central	\$200					\$200	\$0
2.642	Mill Cove WWTF - South Secondary Splitter Box Rehabilitation	Central		\$30		\$270		\$300	\$0
2.643	Mill Cove WWTF - RAS Pump Upgrade	Central		\$85				\$85	\$0
2.567	Mill Cove WWTF - Process Upgrade - Conceptual Design	Central	\$50					\$50	\$0
2.640	Mill Cove WWTF - MBR Process Upgrades - Preliminary + Detailed Design	Central		\$150				\$150	\$0
2.021	Mill Cove WWTF Upgrade	Central						\$0	\$50,000
	Eastern Passage Wastewater Treatment Facility:								
2.666	Asset Renewal Program	East	\$0	\$0	\$100	\$150	\$150	\$400	\$0
2.468	Process Upgrade Program	East	\$50	\$50	\$50	\$50	\$50	\$250	\$0
2.646	Secondary Launder Covers	East	\$150					\$150	\$0
	Aerotech Wastewater Treatment Facility:								
2.667	Asset Renewal Program	Aerotech	\$0	\$100	\$100	\$150	\$150	\$500	\$0
2.510	Process Upgrade Program	Aerotech	\$50	\$50	\$50	\$100	\$100	\$350	\$0
	Timberlea Wastewater Treatment Facility:								
2.509	Asset Renewal Program	West	\$50	\$50	\$50	\$50	\$50	\$250	\$0
2.647	Decommissioning	West						\$0	\$500
	Community Wastewater Treatment Facility:								
2.050	Community WWTFs - Asset Renewal Program	HRM	\$0	\$250	\$250	\$250	\$250	\$1,000	\$0
2.648	Uplands WWTF - New Screening Facility	HRM	\$290					\$290	\$0
2.663	Fall River/Lockview WWTF - Waterline Replacement	HRM	\$25					\$25	\$0
2.664	Fall River/Lockview WWTF - Driveway Replacement	HRM	\$38					\$38	\$0

Five Year Capital Budget - Wastewater									
Project ID	Project Name	Region	All \$ in 000's						
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023		
	Biosolids Processing Facility:								
2.126	Biosolids Processing Facility -	HRM	\$250	\$400	\$400	\$250	\$250	\$1,550	\$0
2.656	Dryer Bypass Conveyor	HRM	\$300					\$300	\$0
2.513	Silo Painting	HRM			\$90			\$90	\$0
Wastewater - Treatment Facility -- T O T A L S			\$2,878	\$3,690	\$3,515	\$3,700	\$3,430	\$17,213	\$97,589
Wastewater - Energy									
2.362	Energy Management Capital Program (Wastewater)	HRM	\$0	\$500	\$500	\$500	\$500	\$2,000	\$0
2.491	Pump Station HVAC Retro-Commissioning Program	HRM	\$100	\$100	\$100	\$100	\$100	\$500	\$0
2.650	HHSP - BAS + HVAC Recommissioning	HRM	\$50	\$50	\$50			\$150	\$0
2.651	Wastewater Pump Stations - NSPI Meter Relocations	HRM	\$50					\$50	\$0
2.637	Halifax WWTF - UV Channel/Densadeg Gate Actuators	East	\$120					\$120	\$0
2.638	Dartmouth WWTF - UV Channel/Densadeg Gate Actuators	East	\$155					\$155	\$0
2.488	Mill Cove WWTF - Admin Building HVAC Renewal	Central		\$330				\$330	\$0
2.554	Wastewater Pumping Station Performance Testing	HRM	\$0	\$250				\$250	\$0
	Dartmouth WWTF - Waste Heat Recovery	East						\$0	\$750
	Halifax WWTF - Waste Heat Recovery	Central						\$0	\$750
Wastewater - Energy -- T O T A L S			\$475	\$1,230	\$650	\$600	\$600	\$3,555	\$1,500
Wastewater - Security									
4.008	Security Upgrade Program	HRM	\$200	\$200	\$200	\$200	\$200	\$1,000	\$0
Wastewater - Security -- T O T A L S			\$200	\$200	\$200	\$200	\$200	\$1,000	
Wastewater - Equipment									
2.161	I&I Reduction (SIR) Program Flow Meters and Related Equipment	HRM	\$25	\$25	\$25	\$25	\$25	\$125	\$0
2.451	Miscellaneous Equipment Replacement	HRM	\$70	\$70	\$70	\$70	\$70	\$350	\$0
Wastewater - Equipment -- T O T A L S			\$95	\$95	\$95	\$95	\$95	\$475	\$0
TOTALS - Wastewater			\$28,471	\$46,771	\$58,301	\$36,160	\$51,175	\$220,878	\$386,539

Five Year Capital Budget - Stormwater

Project ID	Project Name	Region	All \$ in 000's						
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023		
Stormwater - Pipes									
1.108	Stormwater Pipe Asset Renewal Program	HRM		\$450	\$1,000	\$0	\$1,500	\$2,950	\$0
1.163	Doyle Street Storm Sewer	Central	\$250					\$250	\$0
1.140	Stormwater Main Sewer Lining	HRM	\$0	\$100	\$100	\$100	\$100	\$400	\$0
1.038	Integrated Stormwater Projects - Program	HRM	\$1,500	\$750	\$750	\$750	\$750	\$4,500	\$0
1.042	Deep Storm Sewer Installation Program	HRM		\$500	\$1,000	\$0	\$1,500	\$3,000	\$0
1.145	Sullivan's Pond Storm Sewer System Replacement - Phase 2 Irishtown Rd to Harbour	East			\$350	\$11,000		\$11,350	\$0
1.034	Raymond Street, Phase 2 - Storm Sewer Rehabilitation	East					\$1,990	\$1,990	\$0
1.102	Manhole Renewals SW	HRM	\$21	\$21	\$21	\$21	\$24	\$108	\$0
1.103	Catchbasin Renewals SW	HRM	\$50	\$52	\$52	\$55	\$55	\$264	\$0
1.135	Lateral Replacements SW	HRM	\$15	\$15	\$15	\$15	\$18	\$78	\$0
1.019	Drainage Remediation Program Surveys/Studies	HRM	\$25	\$25	\$25	\$25	\$25	\$125	\$0
1.134	Stormwater Quality Compliance Needs Assessment from IRP	HRM			\$75	\$75	\$75	\$225	\$0
1.025	Pinehill Drive Embankment Protection	Central						\$0	\$166
1.050	Alder - Piper Park Stormwater System Replacement	East						\$0	\$1,000
1.066	Winston Drive Stormwater Cross-Connection - Churchill Estates, Herring Cove	West						\$0	\$100
1.071	Kempt Road Stormwater Sewer	West						\$0	\$500
1.129	Separation/resewerage - New storm sewers for Springfield Lake Stormwater Collection System (SP5 in RWWFP)	Central						\$0	\$10,742
1.014	Perth Street, Wardour Street, Fort Sackville Road - Deep Storm Sewer Installation	Central						\$0	\$1,205
1.028	Cavalier Drive Storm Sewer Outfall - Erosion Remediation	Central						\$0	\$200
1.053	Barrington Street Storm Sewer Separation	West						\$0	\$300
1.070	Lake Drive Stormwater Sewer	West						\$0	\$11
								\$0	\$75
Stormwater - Pipes -- T O T A L S			\$1,861	\$1,913	\$3,388	\$12,041	\$6,037	\$25,240	\$14,299
Stormwater - Culverts/Ditches									
1.104	Driveway Culvert Replacements	HRM	\$795	\$812	\$828	\$848	\$866	\$4,149	\$0
1.109	Cross Culvert Renewal Program	HRM	\$0	\$2,000	\$2,000	\$2,000	\$2,000	\$8,000	\$0
	Street Specific Culvert Replacement:								
	ST MARGARETS BAY RD, 2797		\$82					\$82	\$0
	LAKE MAJOR RD, near civic 190		\$77					\$77	\$0
	CLARENCE ST, near civic 4		\$80					\$80	\$0
	WINDGATE DR, near civic 107		\$80					\$80	\$0
	ORCHARD DR, near civic 32		\$88					\$88	\$0
	NOTTINGHAM DR, near civic 53		\$90					\$90	\$0
	PENNY LANE AT WINDSOR DR		\$90					\$90	\$0
	KNIGHT BRIDGE DR at BUCKINGHAM DR		\$81					\$81	\$0
	ALLENBY DR, near civic 34		\$83					\$83	\$0
	ALLENBY DR, near civic 2		\$83					\$83	\$0
	MINNA DR, near civic 6		\$85					\$85	\$0
	ST MARGARETS BAY RD, near civic 2916		\$91					\$91	\$0
	STELLA CRT, near civic 1		\$76					\$76	\$0

Five Year Capital Budget - Stormwater

Project ID	Project Name	Region	All \$ in 000's							
			Y1	Y2	Y3	Y4	Y5	Total Y1 to Y5	Future Years	
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023			
	RAMAR DR, near civic 6		\$93						\$93	\$0
	ST MARGARETS BAY RD, near Second Chain Lake		\$91						\$91	\$0
	ROSS RD, near civic 241		\$74						\$74	\$0
	CLARENCE AVE, AT HOWARD AVE		\$76						\$76	\$0
	CLARENCE AVE, NEAR MORRIS AVE		\$69						\$69	\$0
	BRAESIDE AVE, near civic 2		\$105						\$105	\$0
	COW BAY RD, near civic 1174		\$76						\$76	\$0
	SHORE RD, near civic 1796		\$88						\$88	\$0
	HINES RD, near civic 195		\$82						\$82	\$0
	RITCEY CRES, near civic 1		\$90						\$90	\$0
1.125	Coronet Avenue Driveway Culvert Replacement Project	West							\$0	\$586
1.015	Hammonds Plains Road & Bluewater Road Intersection - Drainage Improvements	Central							\$0	\$475
1.064	Culvert replacement - Civic # 215 Village Rd, Herring Cove	West							\$0	\$75
1.060	Civic #150 Kaye Street, Lower Sackville - Cross Culvert replacement	Central							\$0	\$100
Stormwater - Culverts/Ditches -- T O T A L S			\$2,725	\$2,812	\$2,828	\$2,848	\$2,866	\$14,079	\$1,236	
Stormwater - Structures										
1.133	Ellenvale Run Retaining Wall System - Replacement	East	\$2,525	\$2,525	\$2,525	\$2,525	\$0	\$10,100	\$0	
Stormwater - Structures -- T O T A L S			\$2,525	\$2,525	\$2,525	\$2,525	\$0	\$10,100	\$0	
TOTALS - Stormwater			\$7,111	\$7,250	\$8,741	\$17,414	\$8,903	\$49,419	\$15,535	

Five Year Capital Budget - Corporate Projects

Project ID	Project Name	Region	All \$ in 000's							Total Y1 to Y5	Future Years
			Y1	Y2	Y3	Y4	Y5				
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023				
Corporate - Information Technology											
4.011	Desktop Computer Replacement Program	HRM	\$290	\$290	\$290	\$290	\$290	\$1,450	\$0		
4.012	Network Infrastructure Upgrades	HRM	\$220	\$220	\$220	\$220	\$220	\$1,100	\$0		
4.013	Document Management Program	HRM	\$100					\$100	\$0		
4.083	Computerized Maintenance Management System Enhancements	HRM	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$5,000	\$0		
4.024	Sharepoint Implementation	HRM	\$100					\$100	\$0		
4.043	AMI/AMR Meter System Upgrades	HRM	\$9,730	\$1,667	\$0			\$11,397	\$0		
4.048	SAP Rate Structure Support	HRM	\$220		\$220			\$440	\$0		
4.074	Asset Registry Build	HRM	\$100	\$200				\$300	\$0		
4.084	Halifax Water Website	HRM	\$500					\$500	\$0		
4.085	Portfolio and Project Lifecycle	HRM	\$380					\$380	\$0		
4.086	IT Foundations	HRM	\$2,000	\$90				\$2,090	\$0		
4.087	Wi-Fi Design and Build	HRM	\$700					\$700	\$0		
4.088	Cayenta Optimization	HRM	\$240					\$240	\$0		
4.089	Telephony	HRM	\$120	\$90				\$210	\$0		
4.09	Intranet	HRM	\$110					\$110	\$0		
4.091	Permit Approvals	HRM	\$75	\$770				\$845	\$0		
1.161	Stormwater Billing Support	HRM	\$200	\$225				\$425	\$0		
4.092	Customer Self Service	HRM		\$500	\$600	\$200		\$1,300	\$0		
	Contact Centre Management	HRM			\$1,300	\$300		\$1,600	\$0		
	Asset Management	HRM		\$1,000	\$1,000	\$1,000		\$3,000	\$0		
	Analytics and Dashboards	HRM	\$240		\$500	\$500	\$1,000	\$2,240	\$0		
	Water Consumption	HRM		\$150				\$150	\$0		
	Regulatory Reporting	HRM		\$400				\$400	\$0		
	Finance and Admin	HRM			\$1,400			\$1,400	\$0		
	Enterprise Forms, Collaboration & Content Management	HRM		\$800	\$600			\$1,400	\$0		
	Mobile Devices and Applications	HRM			\$800			\$800	\$0		
	SAP S4 Upgrade	HRM		\$2,000	\$2,000			\$4,000	\$0		
Corporate - Information Technology -- T O T A L S			\$16,325	\$9,402	\$9,930	\$3,510	\$2,510	\$41,677	\$0		
Corporate - GIS											
4.040	GIS Data Program	HRM		\$250	\$250	\$250	\$250	\$1,000	\$0		
4.038	GIS Hardware/Software Program	HRM		\$100		\$100		\$200	\$0		
4.039	GIS Application Support Program	HRM	\$50	\$250	\$250	\$150	\$150	\$850	\$0		
4.059	Water Database Model	HRM		\$50	\$250	\$50		\$350	\$0		
	Dashboard Replacement	HRM	\$200					\$200	\$0		
	Data Governance	HRM	\$50	\$150				\$200	\$0		
	GIS Upgrade/Cityworks upgrade	HRM	\$350		\$200		\$200	\$750	\$0		
	Desktop Progression Plan	HRM	\$100		\$100		\$100	\$300	\$0		
	GIS Data Build - Services	HRM	\$250	\$250	\$150		\$150	\$800	\$0		

Five Year Capital Budget - Corporate Projects											
Project ID	Project Name	Region	All \$ in 000's							Total Y1 to Y5	Future Years
			Y1	Y2	Y3	Y4	Y5				
			2018-2019	2019-2020	2020-2021	2021-2022	2022-2023				
	CAD Drawing Database	HRM	\$100	\$200					\$300	\$0	
	Asset Condition Integration	HRM			\$200	\$250			\$450	\$0	
Corporate - GIS -- T O T A L S			\$1,100	\$1,250	\$1,400	\$800	\$850	\$5,400	\$0		
Corporate - Asset Management											
4.020	Asset Management Program Development	HRM	\$0	\$100	\$100	\$100	\$100	\$400	\$0		
4.021	Integrated Resource Plan Update	HRM	\$500					\$500	\$2,500		
2.523	Sewer Condition Assessment	HRM	\$170	\$175	\$180	\$185	\$190	\$900	\$0		
1.156	Storm Sewer Condition Assessment	HRM	\$110	\$115	\$120	\$125	\$130	\$600	\$0		
1.162	Driveway Culvert Data Collection Program	HRM	\$80					\$80	\$0		
2.043	Corporate Flow Monitoring Program	HRM	\$1,700	\$1,700	\$1,700	\$1,700	\$1,700	\$8,500	\$0		
2.560	Regional Infrastructure Plan - Ph.2 (ITFV)	HRM		\$200				\$200	\$2,500		
2.562	Outfall Assessment Project	HRM		\$250				\$250	\$0		
3.398	Hydraulic Water Model Build	HRM	\$50	\$190				\$240	\$0		
Corporate - Asset Management -- T O T A L S			\$2,610	\$2,730	\$2,100	\$2,110	\$2,120	\$11,670	\$5,000		
Corporate - Facility											
2.176	East/Central Regional Operational Facility	East	\$100	\$500	\$6,000	\$6,000		\$12,600	\$0		
4.077	Building Capital Improvements	West	\$100	\$100	\$100	\$100	\$100	\$500	\$0		
Corporate - Facility -- T O T A L S			\$200	\$600	\$6,100	\$6,100	\$100	\$13,100	\$0		
Corporate - SCADA & Other Equipment											
4.093	GPS Units - Replacement	HRM	\$42					\$42	\$0		
4.082	GNSS Receiver for Asset Management Data Collection	HRM	\$8					\$8	\$0		
4.004	SCADA Control System Enhancements	HRM	\$0	\$200	\$200	\$200	\$200	\$800	\$0		
4.08	Large and New Customer Meters	HRM	\$460	\$460	\$460	\$460	\$460	\$2,300	\$0		
Corporate - SCADA & Other Equipment -- T O T A L S			\$510	\$660	\$660	\$660	\$660	\$3,150	\$0		
Corporate - Fleet											
4.006	Fleet Upgrade Program - Stormwater	HRM	\$271	\$389	\$362	\$342	\$364	\$1,728	\$0		
4.006	Fleet Upgrade Program - Wastewater	HRM	\$1,084	\$1,556	\$1,448	\$1,368	\$1,456	\$6,912	\$0		
4.007	Fleet Upgrade Program - Water	HRM	\$755	\$355	\$450	\$480	\$346	\$2,386	\$0		
Corporate - Fleet -- T O T A L S			\$2,110	\$2,300	\$2,260	\$2,190	\$2,166	\$11,026	\$0		
TOTALS - Corporate Projects			\$22,855	\$16,942	\$22,450	\$15,370	\$8,406	\$86,023	\$5,000		



Appendix F

IT Strategy – Five Year Roadmap

**STRAIGHT from
the SOURCE**





Appendix G

Projected Operating Statements - Consolidated

**STRAIGHT from
the SOURCE**



HALIFAX WATER
CONSOLIDATED SUMMARY OF ESTIMATED REVENUES & EXPENDITURES
PROPOSED OPERATING BUDGET
APRIL 1, 2018 to MARCH 31, 2023
(in thousands)

DESCRIPTION	BUSINESS PLAN						
	ACTUAL	APPROVED	PROPOSED	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	APR 1/16 MAR 31/17	BUDGET * APR 1/17 MAR 31/18	BUDGET APR 1/18 MAR 31/19	APR 1/19 MAR 31/20	APR 1/20 MAR 31/21	APR 1/21 MAR 31/22	APR 1/22 MAR 31/23
OPERATING REVENUES	\$137,997	\$135,587	\$135,182	\$133,526	\$131,878	\$130,279	\$128,729
OPERATING EXPENDITURES	\$97,839	\$106,241	\$111,710	\$115,020	\$117,845	\$121,273	\$124,367
OPERATING PROFIT	\$40,158	\$29,346	\$23,472	\$18,507	\$14,033	\$9,006	\$4,362
FINANCIAL REVENUES (NON-OPERATING)							
INVESTMENT INCOME	\$780	\$346	\$480	\$480	\$480	\$480	\$480
PNS FUNDING HHSP DEBT	\$2,000	\$2,000	\$0	\$0	\$0	\$0	\$0
MISCELLANEOUS	\$542	\$441	\$526	\$533	\$552	\$484	\$486
	\$3,322	\$2,787	\$1,006	\$1,013	\$1,032	\$964	\$966
FINANCIAL EXPENDITURES (NON-OPERATING)							
LONG TERM DEBT INTEREST	\$8,475	\$9,532	\$8,560	\$9,928	\$10,115	\$10,397	\$10,039
LONG TERM DEBT PRINCIPAL	\$21,320	\$24,291	\$22,601	\$22,372	\$23,382	\$24,631	\$25,947
AMORTIZATION DEBT DISCOUNT	\$199	\$217	\$245	\$251	\$280	\$306	\$329
DIVIDEND/GRANT IN LIEU OF TAXES	\$4,578	\$4,827	\$5,142	\$5,383	\$5,583	\$5,783	\$5,983
MISCELLANEOUS	\$49	\$15	\$16	\$21	\$21	\$20	\$20
	\$34,622	\$38,882	\$36,564	\$37,953	\$39,380	\$41,137	\$42,318
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	\$8,858	(\$6,750)	(\$12,086)	(\$18,434)	(\$24,316)	(\$31,167)	(\$36,990)
<i>Adjustments:</i>							
<i>Pension accrual</i>	\$5,006	\$4,358	\$2,940	\$3,087	\$3,241	\$3,403	\$3,574
Net Profit (Loss) on a Cash Basis	\$13,864	(\$2,392)	(\$9,146)	(\$15,347)	(\$21,074)	(\$27,764)	(\$33,416)

* 2017/18 Operating Budget approved by the Board of Directors, February 2, 2017.

HALIFAX WATER
ESTIMATED REVENUES AND EXPENDITURES - WATER OPERATIONS
PROPOSED OPERATING BUDGET
APRIL 1, 2018 to MARCH 31, 2023
(in thousands)

DESCRIPTION	BUSINESS PLAN						
	ACTUAL	APPROVED	PROPOSED	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	APR 1/16 MAR 31/17	BUDGET * APR 1/17 MAR 31/18	BUDGET APR 1/18 MAR 31/19	APR 1/19 MAR 31/20	APR 1/20 MAR 31/21	APR 1/21 MAR 31/22	APR 1/22 MAR 31/23
REVENUES							
METERED SALES	\$47,183	\$46,600	\$46,141	\$45,546	\$44,969	\$44,411	\$43,870
FIRE PROTECTION	\$7,074	\$7,074	\$7,074	\$7,074	\$7,074	\$7,074	\$7,074
PRIVATE FIRE PROTECTION SERVICES	\$831	\$857	\$860	\$869	\$879	\$888	\$897
BULK WATER STATIONS	\$330	\$314	\$329	\$329	\$329	\$329	\$329
CUSTOMER LATE PAY./COLLECTION FEES	\$282	\$212	\$233	\$231	\$229	\$227	\$225
MISCELLANEOUS	\$153	\$149	\$166	\$166	\$167	\$167	\$168
	<u>\$55,853</u>	<u>\$55,207</u>	<u>\$54,803</u>	<u>\$54,216</u>	<u>\$53,647</u>	<u>\$53,097</u>	<u>\$52,564</u>
EXPENDITURES							
WATER SUPPLY & TREATMENT	\$7,028	\$8,565	\$8,750	\$8,946	\$9,116	\$9,298	\$9,484
TRANSMISSION & DISTRIBUTION	\$8,223	\$8,969	\$10,323	\$10,515	\$9,858	\$10,055	\$10,256
SMALL SYSTEMS (incl. Contract Systems)	\$1,022	\$1,073	\$1,194	\$1,209	\$1,233	\$1,258	\$1,283
TECHNICAL SERVICES (SCADA)	\$774	\$873	\$965	\$1,051	\$1,072	\$1,094	\$1,116
ENGINEERING & INFORMATION SERVICES	\$3,828	\$3,515	\$3,681	\$3,750	\$3,825	\$3,901	\$3,980
REGULATORY SERVICES	\$493	\$1,034	\$997	\$974	\$994	\$1,014	\$1,034
CUSTOMER SERVICE	\$2,290	\$2,357	\$2,813	\$2,816	\$2,872	\$2,930	\$2,988
ADMINISTRATION & PENSION	\$5,966	\$5,836	\$5,538	\$5,579	\$5,691	\$5,804	\$5,921
DEPRECIATION	\$7,756	\$9,218	\$9,229	\$9,836	\$10,511	\$11,066	\$11,468
	<u>\$37,379</u>	<u>\$41,441</u>	<u>\$43,489</u>	<u>\$44,676</u>	<u>\$45,171</u>	<u>\$46,419</u>	<u>\$47,529</u>
OPERATING PROFIT	<u>\$18,474</u>	<u>\$13,766</u>	<u>\$11,314</u>	<u>\$9,540</u>	<u>\$8,476</u>	<u>\$6,678</u>	<u>\$5,035</u>
FINANCIAL REVENUES (NON-OPERATING)							
INVESTMENT INCOME	\$351	\$156	\$216	\$216	\$216	\$216	\$216
MISCELLANEOUS	\$375	\$428	\$428	\$435	\$453	\$385	\$387
	<u>\$725</u>	<u>\$583</u>	<u>\$644</u>	<u>\$651</u>	<u>\$669</u>	<u>\$601</u>	<u>\$603</u>
FINANCIAL EXPENDITURES (NON-OPERATING)							
LONG TERM DEBT INTEREST	\$2,378	\$2,685	\$2,363	\$3,008	\$3,259	\$3,410	\$3,474
LONG TERM DEBT PRINCIPAL	\$8,400	\$9,014	\$8,227	\$6,272	\$6,705	\$7,017	\$7,346
AMORTIZATION DEBT DISCOUNT	\$95	\$98	\$108	\$91	\$100	\$107	\$114
DIVIDEND/GRANT IN LIEU OF TAXES	\$4,578	\$4,827	\$5,142	\$5,383	\$5,583	\$5,783	\$5,983
MISCELLANEOUS	\$17	\$15	\$11	\$16	\$16	\$15	\$15
	<u>\$15,468</u>	<u>\$16,639</u>	<u>\$15,850</u>	<u>\$14,770</u>	<u>\$15,662</u>	<u>\$16,331</u>	<u>\$16,931</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	<u>\$3,731</u>	<u>(\$2,291)</u>	<u>(\$3,892)</u>	<u>(\$4,579)</u>	<u>(\$6,517)</u>	<u>(\$9,053)</u>	<u>(\$11,294)</u>

* 2017/18 Operating Budget approved by the Board of Directors, February 2, 2017.

HALIFAX WATER
ESTIMATED REVENUES AND EXPENDITURES - WASTEWATER OPERATIONS
PROPOSED OPERATING BUDGET
APRIL 1, 2018 to MARCH 31, 2023
(in thousands)

DESCRIPTION	BUSINESS PLAN						
	ACTUAL	APPROVED	PROPOSED	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	APR 1/16 MAR 31/17	BUDGET * APR 1/17 MAR 31/18	BUDGET APR 1/18 MAR 31/19	APR 1/19 MAR 31/20	APR 1/20 MAR 31/21	APR 1/21 MAR 31/22	APR 1/22 MAR 31/23
REVENUES							
METERED SALES	\$69,475	\$67,756	\$67,601	\$66,485	\$65,401	\$64,349	\$63,326
WASTEWATER OVERSTRENGTH AGREEMENTS	\$23	\$0	\$0	\$0	\$0	\$0	\$0
LEACHATE	\$357	\$389	\$387	\$395	\$403	\$411	\$419
CONTRACT REVENUE	\$83	\$86	\$86	\$86	\$86	\$86	\$86
SEPTAGE TIPPING FEES	\$909	\$775	\$915	\$959	\$959	\$959	\$959
DEWATERING FACILITY/ SLUDGE LAGOON	\$210	\$210	\$210	\$210	\$210	\$210	\$210
AIRLINE EFFLUENT	\$89	\$86	\$118	\$118	\$118	\$118	\$118
CUSTOMER LATE PAY./COLLECTION FEES	\$189	\$240	\$237	\$233	\$230	\$226	\$223
MISCELLANEOUS	\$129	\$129	\$128	\$128	\$128	\$128	\$128
	<u>\$71,463</u>	<u>\$69,670</u>	<u>\$69,682</u>	<u>\$68,614</u>	<u>\$67,534</u>	<u>\$66,486</u>	<u>\$65,469</u>
EXPENDITURES							
WASTEWATER COLLECTION	\$10,347	\$9,653	\$10,622	\$10,889	\$11,106	\$11,328	\$11,555
WASTEWATER TREATMENT PLANTS	\$17,797	\$19,251	\$19,160	\$19,400	\$19,788	\$20,184	\$20,588
SMALL SYSTEMS	\$1,182	\$1,276	\$1,323	\$1,324	\$1,351	\$1,378	\$1,405
DEWATERING FACILITY/ SLUDGE MGMT	\$434	\$380	\$331	\$318	\$324	\$330	\$337
BIOSOLIDS TREATMENT	\$71	\$101	\$101	\$101	\$103	\$105	\$107
LEACHATE CONTRACT	\$309	\$341	\$337	\$343	\$350	\$357	\$364
TECHNICAL SERVICES (SCADA)	\$1,292	\$1,306	\$1,563	\$1,809	\$1,845	\$1,882	\$1,920
ENGINEERING & INFORMATION SERVICES	\$3,223	\$3,431	\$3,400	\$3,484	\$3,553	\$3,624	\$3,697
REGULATORY SERVICES	\$1,095	\$1,434	\$1,465	\$1,462	\$1,491	\$1,521	\$1,552
CUSTOMER SERVICE	\$1,842	\$2,064	\$2,455	\$2,439	\$2,487	\$2,537	\$2,588
ADMINISTRATION & PENSION	\$5,017	\$4,833	\$4,585	\$4,620	\$4,712	\$4,806	\$4,902
DEPRECIATION	\$10,669	\$12,465	\$13,251	\$14,217	\$15,233	\$16,091	\$16,774
	<u>\$53,278</u>	<u>\$56,534</u>	<u>\$58,594</u>	<u>\$60,405</u>	<u>\$62,345</u>	<u>\$64,144</u>	<u>\$65,789</u>
OPERATING PROFIT	<u>\$18,185</u>	<u>\$13,136</u>	<u>\$11,088</u>	<u>\$8,209</u>	<u>\$5,189</u>	<u>\$2,342</u>	<u>(\$320)</u>
FINANCIAL REVENUES (NON-OPERATING)							
INVESTMENT INCOME	\$351	\$156	\$216	\$216	\$216	\$216	\$216
PNS FUNDING HHSP DEBT	\$2,000	\$2,000	\$0	\$0	\$0	\$0	\$0
MISCELLANEOUS	\$168	\$14	\$97	\$98	\$98	\$99	\$99
	<u>\$2,519</u>	<u>\$2,169</u>	<u>\$313</u>	<u>\$314</u>	<u>\$314</u>	<u>\$315</u>	<u>\$315</u>
FINANCIAL EXPENDITURES (NON-OPERATING)							
LONG TERM DEBT INTEREST	\$5,509	\$6,022	\$5,427	\$5,853	\$5,592	\$5,490	\$4,874
LONG TERM DEBT PRINCIPAL	\$11,699	\$13,699	\$12,783	\$14,023	\$14,226	\$14,713	\$15,284
AMORTIZATION DEBT DISCOUNT	\$95	\$107	\$119	\$135	\$150	\$161	\$171
MISCELLANEOUS	\$32	\$0	\$5	\$5	\$5	\$5	\$5
	<u>\$17,335</u>	<u>\$19,828</u>	<u>\$18,334</u>	<u>\$20,016</u>	<u>\$19,973</u>	<u>\$20,369</u>	<u>\$20,334</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	<u>\$3,369</u>	<u>(\$4,523)</u>	<u>(\$6,933)</u>	<u>(\$11,493)</u>	<u>(\$14,469)</u>	<u>(\$17,713)</u>	<u>(\$20,339)</u>

* 2017/18 Operating Budget approved by the Board of Directors, February 2, 2017.

HALIFAX WATER
ESTIMATED REVENUES AND EXPENDITURES - STORMWATER OPERATIONS
PROPOSED OPERATING BUDGET
APRIL 1, 2018 to MARCH 31, 2023
(in thousands)

DESCRIPTION	BUSINESS PLAN						
	ACTUAL	APPROVED	PROPOSED	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	APR 1/16 MAR 31/17	BUDGET * APR 1/17 MAR 31/18	BUDGET APR 1/18 MAR 31/19	APR 1/19 MAR 31/20	APR 1/20 MAR 31/21	APR 1/21 MAR 31/22	APR 1/22 MAR 31/23
REVENUES							
STORMWATER SITE RELATED SERVICE	\$6,661	\$6,700	\$6,752	\$6,752	\$6,752	\$6,752	\$6,752
STORMWATER RIGHT-OF-WAY SERVICE	\$3,881	\$3,881	\$3,835	\$3,835	\$3,835	\$3,835	\$3,835
CUSTOMER LATE PAY./COLLECTION FEES	\$51	\$39	\$21	\$21	\$21	\$21	\$21
MISCELLANEOUS	\$88	\$89	\$89	\$89	\$89	\$89	\$89
	<u>\$10,681</u>	<u>\$10,710</u>	<u>\$10,696</u>	<u>\$10,696</u>	<u>\$10,696</u>	<u>\$10,696</u>	<u>\$10,696</u>
EXPENDITURES							
STORMWATER COLLECTION	\$4,053	\$4,589	\$5,239	\$5,308	\$5,414	\$5,522	\$5,633
TECHNICAL SERVICES (SCADA)	\$43	\$31	\$37	\$41	\$41	\$42	\$43
ENGINEERING & INFORMATION SERVICES	\$525	\$558	\$1,095	\$1,110	\$1,132	\$1,155	\$1,178
REGULATORY SERVICES	\$768	\$1,242	\$1,302	\$1,316	\$1,342	\$1,369	\$1,396
CUSTOMER SERVICE	\$300	\$205	\$253	\$272	\$278	\$283	\$289
ADMINISTRATION & PENSION	\$816	\$786	\$746	\$751	\$766	\$782	\$797
DEPRECIATION	\$677	\$855	\$954	\$1,141	\$1,355	\$1,556	\$1,713
	<u>\$7,182</u>	<u>\$8,266</u>	<u>\$9,626</u>	<u>\$9,939</u>	<u>\$10,329</u>	<u>\$10,710</u>	<u>\$11,049</u>
OPERATING PROFIT	<u>\$3,499</u>	<u>\$2,444</u>	<u>\$1,070</u>	<u>\$758</u>	<u>\$368</u>	<u>(\$13)</u>	<u>(\$353)</u>
FINANCIAL REVENUES (NON-OPERATING)							
INVESTMENT INCOME	\$78	\$35	\$48	\$48	\$48	\$48	\$48
MISCELLANEOUS	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	<u>\$78</u>	<u>\$35</u>	<u>\$48</u>	<u>\$48</u>	<u>\$48</u>	<u>\$48</u>	<u>\$48</u>
FINANCIAL EXPENDITURES (NON-OPERATING)							
LONG TERM DEBT INTEREST	\$588	\$825	\$770	\$1,067	\$1,263	\$1,498	\$1,690
LONG TERM DEBT PRINCIPAL	\$1,221	\$1,577	\$1,591	\$2,077	\$2,452	\$2,901	\$3,317
AMORTIZATION DEBT DISCOUNT	\$9	\$12	\$18	\$24	\$30	\$38	\$45
MISCELLANEOUS	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	<u>\$1,818</u>	<u>\$2,414</u>	<u>\$2,379</u>	<u>\$3,168</u>	<u>\$3,745</u>	<u>\$4,436</u>	<u>\$5,053</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	<u>\$1,759</u>	<u>\$64</u>	<u>(\$1,261)</u>	<u>(\$2,362)</u>	<u>(\$3,330)</u>	<u>(\$4,402)</u>	<u>(\$5,357)</u>

* 2017/18 Operating Budget approved by the Board of Directors, February 2, 2017.

HALIFAX WATER
ESTIMATED REVENUES & EXPENDITURES, SEGREGATED BY REGULATED AND UNREGULATED ACTIVITIES
PROPOSED OPERATING BUDGET
APRIL 1, 2018 to MARCH 31, 2023
(in thousands)

DESCRIPTION	BUSINESS PLAN						
	ACTUAL	APPROVED BUDGET *	PROPOSED BUDGET	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	APR 1/16 MAR 31/17	APR 1/17 MAR 31/18	APR 1/18 MAR 31/19	APR 1/19 MAR 31/20	APR 1/20 MAR 31/21	APR 1/21 MAR 31/22	APR 1/22 MAR 31/23
REGULATED ACTIVITIES							
REVENUES							
METERED SALES	\$116,658	\$114,356	\$113,742	\$112,031	\$110,371	\$108,760	\$107,197
FIRE PROTECTION	\$7,074	\$7,074	\$7,074	\$7,074	\$7,074	\$7,074	\$7,074
PRIVATE FIRE PROTECTION	\$831	\$857	\$860	\$869	\$879	\$888	\$897
STORMWATER SITE RELATED SERVICE	\$6,661	\$6,700	\$6,752	\$6,752	\$6,752	\$6,752	\$6,752
STORMWATER RIGHT-OF-WAY SERVICE	\$3,881	\$3,881	\$3,835	\$3,835	\$3,835	\$3,835	\$3,835
OTHER OPERATING REVENUE	\$1,207	\$1,151	\$1,165	\$1,159	\$1,154	\$1,148	\$1,143
	<u>\$136,312</u>	<u>\$134,020</u>	<u>\$133,429</u>	<u>\$131,721</u>	<u>\$130,064</u>	<u>\$128,457</u>	<u>\$126,898</u>
EXPENDITURES							
WATER SUPPLY & TREATMENT	\$7,028	\$8,559	\$8,744	\$8,940	\$9,109	\$9,292	\$9,478
TRANSMISSION & DISTRIBUTION	\$8,223	\$8,969	\$10,323	\$10,515	\$9,858	\$10,055	\$10,256
WASTEWATER COLLECTION	\$10,332	\$9,640	\$10,501	\$10,733	\$10,947	\$11,166	\$11,390
STORMWATER COLLECTION	\$4,053	\$4,589	\$5,239	\$5,308	\$5,414	\$5,522	\$5,633
WASTEWATER TREATMENT PLANTS	\$17,797	\$19,251	\$19,160	\$19,400	\$19,788	\$20,184	\$20,588
SMALL SYSTEMS	\$2,188	\$2,324	\$2,492	\$2,507	\$2,557	\$2,608	\$2,661
SCADA, CONTROL & PUMPING	\$2,109	\$2,209	\$2,564	\$2,900	\$2,958	\$3,017	\$3,078
ENGINEERING & INFORMATION SERVICES	\$7,576	\$7,495	\$8,171	\$8,338	\$8,504	\$8,674	\$8,848
REGULATORY SERVICES	\$2,356	\$3,710	\$3,763	\$3,752	\$3,827	\$3,904	\$3,982
CUSTOMER SERVICE	\$4,396	\$4,591	\$5,487	\$5,492	\$5,602	\$5,714	\$5,828
ADMINISTRATION & PENSION	\$11,768	\$11,363	\$10,569	\$10,654	\$10,867	\$11,085	\$11,307
DEPRECIATION	\$19,095	\$22,538	\$23,302	\$24,975	\$26,806	\$28,366	\$29,579
	<u>\$96,922</u>	<u>\$105,238</u>	<u>\$110,315</u>	<u>\$113,514</u>	<u>\$116,239</u>	<u>\$119,587</u>	<u>\$122,625</u>
OPERATING PROFIT	<u>\$39,391</u>	<u>\$28,782</u>	<u>\$23,114</u>	<u>\$18,207</u>	<u>\$13,825</u>	<u>\$8,869</u>	<u>\$4,273</u>
FINANCIAL REVENUES (NON-OPERATING)							
INVESTMENT INCOME	\$780	\$346	\$480	\$480	\$480	\$480	\$480
MISCELLANEOUS	\$2,289	\$1,948	\$110	\$110	\$110	\$40	\$40
	<u>\$3,069</u>	<u>\$2,293</u>	<u>\$590</u>	<u>\$590</u>	<u>\$590</u>	<u>\$520</u>	<u>\$520</u>
FINANCIAL EXPENDITURES (NON-OPERATING)							
LONG TERM DEBT INTEREST	\$8,475	\$9,474	\$8,540	\$9,869	\$10,036	\$10,319	\$9,960
LONG TERM DEBT PRINCIPAL	\$21,320	\$24,212	\$22,576	\$22,297	\$23,307	\$24,556	\$25,872
AMORTIZATION DEBT DISCOUNT	\$199	\$217	\$245	\$250	\$279	\$304	\$327
DIVIDEND/GRANT IN LIEU OF TAXES	\$4,578	\$4,827	\$5,142	\$5,383	\$5,583	\$5,783	\$5,983
MISCELLANEOUS	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	<u>\$34,573</u>	<u>\$38,730</u>	<u>\$36,503</u>	<u>\$37,798</u>	<u>\$39,205</u>	<u>\$40,961</u>	<u>\$42,142</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES - REGULATED ACTIVITIES	<u>\$7,887</u>	<u>(\$7,655)</u>	<u>(\$12,799)</u>	<u>(\$19,001)</u>	<u>(\$24,790)</u>	<u>(\$31,572)</u>	<u>(\$37,350)</u>
UNREGULATED ACTIVITIES							
REVENUES							
AEROTECH SEPTAGE TIPPING FEES	\$909	\$775	\$915	\$959	\$959	\$959	\$959
LEACHATE	\$357	\$389	\$387	\$395	\$403	\$411	\$419
CONTRACT REVENUE	\$83	\$86	\$86	\$86	\$86	\$86	\$86
DEWATERING FACILITY/ SLUDGE LAGOON	\$210	\$210	\$210	\$210	\$210	\$210	\$210
AIRLINE EFFLUENT	\$89	\$86	\$118	\$118	\$118	\$118	\$118
MISCELLANEOUS	\$37	\$22	\$37	\$38	\$38	\$39	\$39
	<u>\$1,685</u>	<u>\$1,566</u>	<u>\$1,753</u>	<u>\$1,805</u>	<u>\$1,814</u>	<u>\$1,822</u>	<u>\$1,831</u>
EXPENDITURES							
- DIRECT							
WATER SUPPLY & TREATMENT	\$16	\$25	\$25	\$26	\$26	\$27	\$27
WASTEWATER COLLECTION	\$16	\$0	\$108	\$142	\$145	\$148	\$151
WASTEWATER TREATMENT	\$814	\$821	\$769	\$762	\$777	\$792	\$808
SPONSORSHIPS & DONATIONS	\$66	\$66	\$266	\$260	\$265	\$270	\$275
DEPRECIATION	\$6	\$0	\$132	\$218	\$292	\$346	\$375
	<u>\$917</u>	<u>\$912</u>	<u>\$1,300</u>	<u>\$1,408</u>	<u>\$1,506</u>	<u>\$1,584</u>	<u>\$1,638</u>
- INDIRECT (ADMINISTRATION)	\$0	\$91	\$95	\$98	\$100	\$102	\$104
	<u>\$917</u>	<u>\$1,003</u>	<u>\$1,395</u>	<u>\$1,506</u>	<u>\$1,605</u>	<u>\$1,686</u>	<u>\$1,741</u>
OPERATING PROFIT	<u>\$767</u>	<u>\$564</u>	<u>\$358</u>	<u>\$300</u>	<u>\$208</u>	<u>\$137</u>	<u>\$90</u>
FINANCIAL REVENUES (NON-OPERATING)							
MISCELLANEOUS	\$298	\$494	\$416	\$423	\$442	\$444	\$446
FINANCIAL EXPENDITURES (NON-OPERATING)							
LONG TERM DEBT INTEREST	\$0	\$58	\$23	\$65	\$85	\$85	\$85
LONG TERM DEBT PRINCIPAL	\$0	\$79	\$27	\$79	\$79	\$79	\$79
AMORTIZATION DEBT DISCOUNT	\$0	\$0	\$0	\$1	\$1	\$2	\$2
MISCELLANEOUS	\$94	\$15	\$10	\$10	\$10	\$10	\$10
	<u>\$94</u>	<u>\$152</u>	<u>\$61</u>	<u>\$155</u>	<u>\$175</u>	<u>\$176</u>	<u>\$175</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES - UNREGULATED ACTIVITIES	<u>\$971</u>	<u>\$905</u>	<u>\$713</u>	<u>\$567</u>	<u>\$475</u>	<u>\$405</u>	<u>\$360</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES - COMBINED ACTIVITIES	<u>\$8,858</u>	<u>(\$6,750)</u>	<u>(\$12,086)</u>	<u>(\$18,434)</u>	<u>(\$24,316)</u>	<u>(\$31,167)</u>	<u>(\$36,990)</u>

* 2017/18 Operating Budget approved by the Board of Directors, February 2, 2017.



Appendix H

Water Quality Master Plan – Version 3.0

**STRAIGHT from
the SOURCE**





Water Quality Master Plan

V3.0

September 2016

Reid Campbell and Wendy Krkosek

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1 Introduction

Halifax Water has consistently produced drinking water that has safeguarded public health and achieved regulatory compliance, despite the challenges that occur as regulations become more stringent, infrastructure ages and once current technologies are eclipsed by more modern designs to meet the new regulatory environment. One important tool Halifax Water uses is water quality strategic planning which is formally executed through a Water Quality Master Plan (WQMP). Water quality master planning describes the process whereby a water utility assesses the public's expectations for water quality and the direction of water quality regulations and trends, sets corresponding water quality goals and then plans for necessary capital or operational improvements.

In 2006, Halifax Water completed its first formal WQMP. This plan was designed to set goals for water quality that exceed regulatory requirements and to set a path for Halifax Water to achieve those goals while treating water at an optimal cost. In 2011, the WQMP Version 2.0 was created and focused mainly on upgrades and investigations concerning the JD Kline Water Treatment Plant; Halifax Water's most mature treatment facility.

WQMP Version 3.0 has a shift in focus away from one plant in particular and focuses more on source water quality and its impact on treatment processes and distribution system water quality as a whole. There are two main drivers for this change in focus. Firstly, recent research indicates that lakes in Nova Scotia may be experiencing a recovery from acid rain, as sulphur emissions have drastically decreased over the past few years. Recovery results in higher pH, increased productivity, and increased total organic carbon. Both the Lake Major and J.D. Kline plants have been dealing with recent changing source water quality which has been challenging the treatment process at both plants, resulting in higher chemical usage and increased stress on treatment processes. WQMP V3.0 will focus efforts on identification of lake recovery processes, what this means for future source water quality, and also how to provide effective and robust treatment with existing infrastructure in the short term, while developing a plan for capital upgrades to address changing source water quality and aging infrastructure in the long term. Secondly, with the recent events in Flint Michigan around lead exposure in homes, outcomes of research with Dalhousie University, and a shift in the industry approach (via American Water Works Association policy) towards managing lead in the distribution system, WQMP V3.0 will focus on developing a plan for removal of both public and private lead service lines by 2050, while concurrently optimizing corrosion control treatment. It is likely that a Canadian regulatory requirement will be adopted in the coming years in this direction and Halifax Water wants to ensure they are at the forefront of this change in industry approach. Lead is a shared responsibility between the utility and the homeowner, and as such, the focus will be a shift away from sampling and towards public engagement and policy as new ways of engaging the public in uptake of replacement programs will need to be identified and pursued.

Implementation of the WQMP is 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 design and construct identified necessary changes. The NSERC/Halifax Water Industrial Research Chair in Water Quality and Treatment is 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.

2 Research Accomplishments

Numerous research accomplishments since inception of the IRC program have led to both public health benefits and cost savings for Halifax Water. The following table provides an overview of some of the major discoveries and their associated impacts to Halifax Water of water quality research with the Dalhousie Research Chair. Many of these discoveries form the basis of the direction of WQMP V3.0.

Discovery	Impact to Halifax Water
<p>A) Identification of Lake Recovery. Discovered through assessment of plant data over a 20-year period that both Pockwock and Lake Major are experiencing increased pH, color and TOC due to decreases in sulphur deposition.</p>	<ul style="list-style-type: none"> • Increased dosing of coagulant at both Lake Major and J.D. Kline but J.D. Kline is pushing the limits of a direct filtration plant • Decreased filter run times • Potential explanation for algal occurrence and geosmin
<p>B) Development of NOM Monitoring Tools. Developed a new method for oxygen demand in water industry: peCOD. Developed a new model for Fluorescence excitation-emission matrix (FEEM) analysis.</p>	<ul style="list-style-type: none"> • peCOD is a new tool for assessing NOM that has ideal applications for oxidation processes, and shows promise for detecting subtle changes in organic profiles over traditional TOC/DOC techniques. • FEEM models will lead to online tools for improved treatment operation
<p>C) Coagulant Mixing. Demonstrated that coagulation mixing energy can be reduced by 4-5 times without compromising NOM removal</p>	<ul style="list-style-type: none"> • Outside of pumping, mixing represents the highest energy costs to water plants • Applied new particle analysis technology to demonstrate discovery
<p>D) Biological Removal of NOM in Direct Filtration. Successfully demonstrated that biofiltration can be applied in a direct filtration plant without pre-oxidation</p>	<ul style="list-style-type: none"> • Biofiltration reduced THM concentrations by 40% for Halifax Water • Bio filtration was reliable under broad temperature range (4-25°C) • Reduced chlorine costs by \$30,000 per year
<p>E) Monitoring Biological Filtration. Demonstrated that biomass measurements of ATP evolve operationally and within filter cycles</p>	<ul style="list-style-type: none"> • Applied ATP as an emerging monitoring technology for biofiltration • Developed protocols to demonstrate appropriate ATP range and application to be used as performance monitoring tools moving forward
<p>F) Partial Lead Service Lines. Demonstrated that PLSLs are an inappropriate solution for Halifax Water</p>	<ul style="list-style-type: none"> • Research based on 5-years of water sample analysis by Dalhousie students • Led to policy change at Halifax Water in 2012, partials are no longer conducted unless part of an existing disruption. • Neither PVC or copper provide decreased lead concentrations post PLSLs
<p>G) Lead Exposure. Demonstrated that current</p>	<ul style="list-style-type: none"> • Halifax Water now uses a 4L profile sampling to

Health Canada guideline for sampling does not give true indication of lead exposure	monitor lead concentrations rather than a first draw sample.
H) Impact of Iron on Lead. Developed a fundamental understanding of the relationship between iron particles and lead	<ul style="list-style-type: none"> Established that cast iron water mains interact with lead materials Developed new analytical method for quantifying colloidal lead in water and a new procedure to evaluate iron mineral and lead interaction Allows Halifax Water to target specific areas of the distribution for future LSL replacement programs
I) Role of Phosphate in Distribution System. Demonstrated that phosphate has a significant role in stabilizing iron particles and controlling lead release	<ul style="list-style-type: none"> Halifax Water increased phosphate dose to reduce lead in water and continues to study the impact of this increase in customers' homes
J) Lead Release in Large Buildings Showed how localized lead release can be in large buildings and demonstrated long-term risks of fountains to children with researchers from École Polytechnique	<ul style="list-style-type: none"> Halifax Water has developed sampling protocols for large buildings Halifax Water was part of a national survey of lead management in Canada
K) Avoided Unintended Consequences of Disinfectant Changeover. Demonstrated that conversion from free chlorine to chloramines would lead to increased lead exposure	<ul style="list-style-type: none"> Halifax Water was able to avoid negative consequences of lead exposure by avoiding a planned disinfectant changeover
L) Filter-to-Waste. Demonstrated that there was no public health benefit to implementing filter-to-waste at J.D. Kline.	<ul style="list-style-type: none"> NSE accepted evaluation, which saved Halifax Water from a \$5 Million capital investment. Led to changes in NSE Treatment Standard Implemented zero cost filter resting procedures in place of filter-to-waste

In addition to these major discoveries, the IRC has published a total of 45 peer reviewed publications since 2006 that are directly related to Halifax Water operations or research questions. Of these publications, 5 have been in the Journal of the American Water Works Association, which is the most widely read journal by utilities in North America. The two figures below show the publications by year and also by topic area. Research through the IRC has generated 111 conference posters or presentations provided by IRC staff and students since 2006. Dr. Gagnon has trained 20 PhDs, 50 MASC students, 6 Post Doctoral students and numerous undergrad students. Four of these graduate students are now employed with Halifax Water, several more are working as consultants for key local firms, and a few are employed in government, at both the provincial and federal levels. Bi-annual symposia are held twice per year where research findings and current issues are transferred to Halifax Water Engineering and Water Services staff. Furthermore, treatment plant operators are trained by Dalhousie twice per year on specific relevant operational issues. This knowledge transfer between the Chair and Halifax Water staff ensures the utility is at the forefront of water research discovery and engages and elevates staff to be able to address complex operational issues with a solid knowledge base.

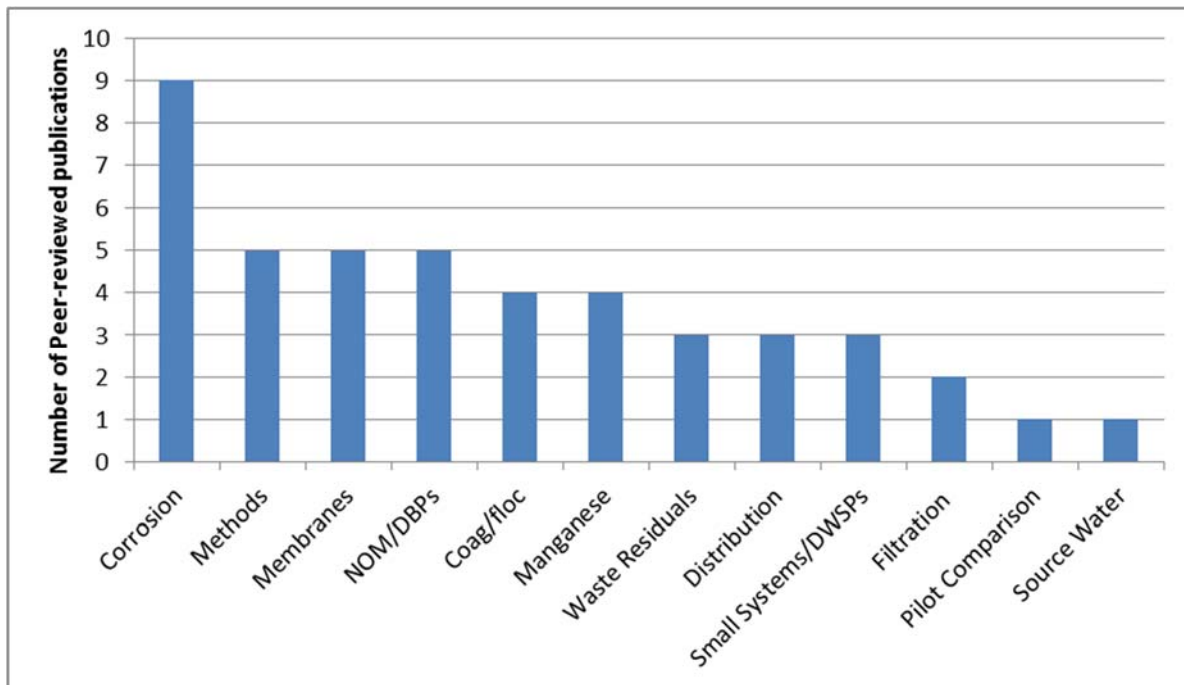


Figure 1 – Number of peer-reviewed publications by the IRC since 2006, by topic area.

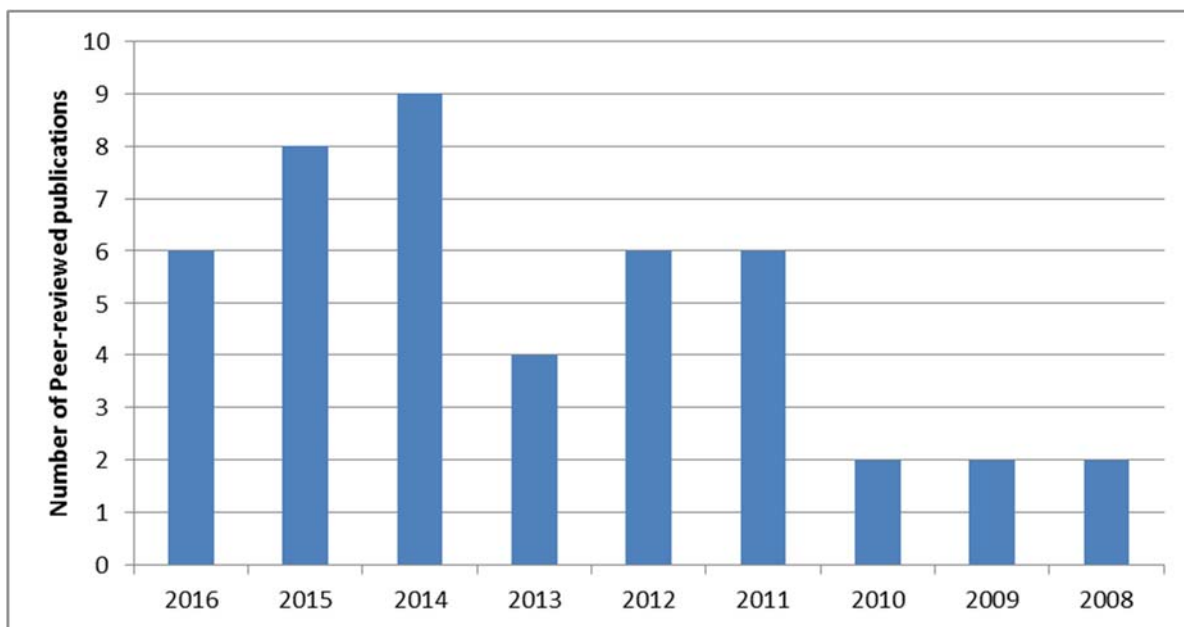


Figure 2 – Number of peer-reviewed publications by the IRC by year since 2006.

3 WQMP Direction

The overall water quality goals identified in the original WQMP remain on the priority list of Halifax Water. There are also other water quality objectives that the utility has identified as being significant to improving or strengthening water quality management and performance within the utility. Efforts will also be placed on shifting the focus of Halifax Water's strategic planning partially away from long term WQ goals and more towards what can be done to support treatment plant operations and improve water quality from a day to day perspective.

Over the course of the last five years, several water quality challenges have emerged that will challenge Halifax Water's ability to meet its water quality goals on an ongoing basis. These challenges are 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.
- Water Treatment. The effects of aging plants, and source water quality changes are requiring Halifax Water to look at the effectiveness of our treatment processes. There is a need to determine if the current processes are suitable for long term efforts and also to come up with short term solution to provide effective robust treatment capability while long term solutions are explored.
- 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.
- Data. Halifax Water has accumulated an immense resource of water quality data. The appropriate tools and business processes need to be brought to bear to ensure that water quality is well managed and that the investments in water quality and treatment are sound.

The research and operations plan (Appendix A) is organized according to four themes aligning with these identified challenges.

3.1 Source Water: Lake Recovery and Changing Source Water Quality

Source Water quality is changing as a result of the effects of lake recovery from acid rain and possibly climate change. This is being realized through increased difficulty in operating both the JD Kline and Lake Major water supply plants. It manifests itself in increased chemical costs at Lake Major and in high head loss and shorter filter runs at JD Kline. JD Kline is now operating near the margins of its design capability. The major emphasis of this theme will include:

- Identification of Changing Source Water Quality. Existing water and air quality data will be mined and analyzed to better understand how the phenomenon affects water quality from both a biological and physical/chemical point of view. Paleolimnological work will be continued to better understand the effects of industrialization on water quality and what the natural or post recovery water quality might be.
- Lake Recovery Monitoring. The water quality response to lake recovery will be evaluated and characterized. This will include evaluation of the effects of lake recovery on algal activity and the

occurrence of taste and odour causing compounds. Existing programs to sample and monitor lakes will be evaluated to ensure that the appropriate monitoring is being undertaken. Also a program to monitor algae throughout the growing season will be developed to understand its occurrence and plan an appropriate response.

- Assessment of Intake Structure Locations. The Lake Major Water Supply Plant optimization study identified diurnally changing source water quality as a limitation on plant performance. A new intake that draws a more consistent water quality is predicted to improve plant performance. Evaluating intake location and design at other facilities, including JD Kline, is also seen as a way to mitigate impacts of changing source water quality broadly and issues like geosmin occurrence more specifically.

3.2 Treatment

Treatment processes are being challenged due to the lake recovery phenomenon. It is necessary to develop both long term strategies and short term mitigation approaches to dealing with the effects of changing source water. Additionally, the recently completed Lake Major Water Supply Plant Optimization Study identified over one hundred plant improvements to address process deficiencies and component obsolescence. Further investigation is required to ensure that plant improvements consider other treatment factors and the changing source water. This theme will also include provision for shorter term research that is intended to assist plant operations staff with specific short term treatment challenges that may arise. Major components, listed by plant, include:

- JD. Kline Water Supply Plant. Previous research has identified deficiencies in pre-treatment and flocculation processes. Work will be conducted to further evaluate improvement opportunities and identify physical improvement projects and treatment strategies. Flocculation will be evaluated to consider whether the proposed investment in mechanical flocculation is worthwhile, or whether improved flocculation can be realized with changes to existing hydraulic flocculator operation. Filter performance will be evaluated through a formalized filter surveillance program. Further research will be conducted on passive biofiltration to see if it can be enhanced through changes to pre-oxidation strategies or nutrient addition and through a greater understanding of biofiltration processes. Further work will be conducted on coagulant optimization to improve filter headloss performance and to ensure that the plant can source coagulants that perform optimally and consistently. Further work will be conducted to optimize backwash and air scour cycles and monitoring the effects of new media, underdrains and air scour capability on treatment performance .
- Lake Major Water Supply Plant. A ten year capital program was developed as an output of the Lake Major Optimization Study. Research will be aimed at supporting and enhancing the ten year capital improvement plan and will include research to support determination of a new intake location, premix optimization, coagulant selection, clarification process optimization, possible consideration of biofiltration, manganese optimization, and all aspects of filter operation and filter performance. This theme will also support improvements in the process waste system.

- Bennery Lake Water Supply Plant. This plant is nearing the end of an optimization cycle. Remaining significant improvements include installation of plate settlers, the establishment of filter surveillance, and continued optimization of manganese optimization.

3.3 Distribution System Water Quality

Historically, within Halifax Water and the water industry as a whole, distribution system water quality has received less attention than treatment process operations and performance. Recently, there has been an increased focus on possible risk factors to public health associated with distribution systems, a good example of this is the recent attention being focused on the health risks associated with lead pipe in the distribution system and the lack of understanding of the appropriate methods to replace such materials without presenting additional health risks to people directly affected by replacement efforts. In light of the increasingly stringent regulations surrounding distribution water quality, and to remain loyal to the multi-barrier approach to water quality management, Halifax Water will direct efforts towards actively monitoring and assessing both distribution system water quality and physical integrity, and understanding the interrelationships between the two. Establishing a baseline of distribution water quality, hydraulic and integrity information will allow the utility to integrate water quality and hydraulic goals into the operation of the distribution system and focus attention on identifying and mitigating areas that are a high risk for contamination or sensitive to significant water quality fluctuations. The results of the monitoring program will be used to improve distribution system practices and implement another layer of protection to public health. The main components of this theme include:

- Lead. Based on operational experience and previous research, Halifax Water has determined that the removal of lead service lines and optimized corrosion control treatment are required to protect customers from exposure to lead. This will be realized through operationally adopting the 2015 recommendations of the National Drinking Water Advisory Council (NDWAC). The program will support this transformational initiative while continuing to grow the understanding of the occurrence of lead in our local systems in order to continue to optimize corrosion control practices.
- Distribution System Water Quality and Integrity Monitoring. Programs to monitor the integrity of distribution system water quality will be continued. This will include incorporation of the Partnership for Safe Water distribution program. Success of a recent fluoride tracer study in the Lake Major system conducted to understand water age will be translated to other systems. This will provide staff with an understanding of hydraulics and impacts on water quality throughout the distribution system. Programs to monitor biological water quality will be evaluated and operational strategies to optimize disinfection residuals will be identified and implemented. Development of water quality integrity protocols through distribution systems events will also be developed to ensure continuous safe water delivery.
- Disinfection Efficiency and Minimizing Disinfection By Product Formation. Significant work has been done in monitoring and minimizing DBP formation. However, there is further opportunity for improvement in this area, including work on chlorine age in water storage facilities and optimal chlorine dosing.

3.4 Data Management

Better tools and processes are required to use and integrate the large quantity of water quality data that exists. Enhanced data management tools will allow for better monitoring, day to day operational decisions and sound investment in process improvements. Data management tools and business processes will be explored and integrated.

4 Water Quality Goals

Water Quality Goals are based on the outcomes of previous terms of the WQMP combined with what has been achieved by other “best in class” utilities that have adopted similar programs. These goals are intended to ensure that Halifax Water not only meets current regulatory requirements, but will be well positioned to meet predicted regulatory changes and maintain water quality that well exceeds the current regulatory requirements. Though many of these goals remain the same, there are some additional goals being added to this version of the WQMP to reflect overall direction and focus of the WQMP and to set a standard for the associated research tasks. Many of these goals are a product of the utility’s commitment to adapting a more proactive approach to water quality management, monitoring and optimization.

Halifax Water has developed both global and specific water quality goals. The global goals are very general and are intended to describe the overall objectives of the specific water quality goals. The specific goals clearly define measurable objectives associated with priority water quality targets identified by Halifax Water.

4.1 Overall Objectives:

4.1.1 Compliance

- Full compliance with Guidelines for Canadian Drinking Water Quality.
- Full permit compliance

4.1.2 Source Water Quality

- Proactively protect our source water quality.
- Monitor source water quality to provide early warning of potential problems.

4.1.3 Water Quality and Treatment

- Adapt a pro-active approach to water quality monitoring and operations.
- Develop indicators of pending non-compliance events.
- Provide required training to improve operator knowledge of operational, treatment and water quality objectives.
- Actively optimize treatment processes through monitoring and assessing the relationships between treatment operations and finished water quality.
- Develop facility specific water quality and operational goals.

4.1.4 Distribution System Water Quality

- Integrate water quality goals into the operation of the distribution system.
- Actively monitor and understand water quality and physical integrity in the distribution system.

- Identify distribution system contamination vulnerabilities and clearly identify communication plans, responsibilities and accountabilities.

4.1.5 Customer Expectations

- Maintain customer perception of water quality that exceeds corporate strategic objectives.
- Incorporate our understanding of customer perspectives when developing overall water quality goals.

4.2 Specific Goals:

4.2.1 Particle/Precursor Removal Goals

These goals describe HW's efforts to optimize the basic treatment process to improve particle removal, which is the fundamental pathogen barrier, while at the same time also optimizing for TOC removal.

- 2 to 3 log removal of giardia by filtration
- 3/4/4 log removal for giardia/viruses/cryptosporidium
- Individual filter turbidity values <0.1NTU: 95%, 0.3 NTU: 100%

DBP Goals: *These goals describe how HW will improve disinfection which is one of the primary barriers to protect public health, while at the same time also lowering disinfection by-products such as THM's and HAA's.*

- THM's < 80 ug/L (LRAA)
- HAA's < 60 ug/L (LRAA)

4.2.2 Distribution Water Quality Goals

These goals recognize that water quality is managed not only at the treatment plant but also to the customers tap. They also recognize that the distribution system and water quality can positively or negatively affect each other.

- Minimum distribution chlorine residual of 0.2 mg/L at all locations
- Develop and achieve distribution system HPC targets
- Maintain 90th percentile residential lead levels below 15-µg/L
- Removal of 100 public lead service lines per year
- Removal of all public and private lead service lines by 2050

4.2.3 Waste Treatment Goals

These goals recognize that plant waste processing is a significant operating cost and that waste management costs can be impacted by process changes. While secondary to public health issues, plant process improvements must also consider the impact on waste treatment.

- Optimize residual disposal costs
- Achieve wastewater permit requirements

5 Overall Strategy to Achieve Goals

Based on the research findings to date and an overview of industry best practices, Halifax Water has identified a number of tasks to be carried out to achieve the goals outlined above and to address facility specific and system wide operational and treatment challenges that have been identified since the initial WQMP was completed. Some tasks will serve to achieve multiple goals and others are focused on very specific research tasks pertaining to the optimization of a specific treatment process. These tasks take the form of several different types of activities such as the following:

- Pilot scale research studies.
- Consultant studies.
- Data collection and surveillance techniques.
- Development/evaluation of long-term monitoring programs.
- Best practice adoption.
- Operational changes.
- Training programs.

Some tasks will be completed by means of a well-defined research project over a relatively short period of time and others, specifically treatment and distribution monitoring and optimization programs, will require a significantly larger time commitment. Such programs encompass multiple planning, development and implementation stages which may include identifying and setting achievable and realistic goals, the development and implementation of monitoring programs, baseline performance assessments, operator training programs, and the development of optimization plans, to name a few.

All of the tasks have been organized into the WQMP research and operations plan (Appendix A). Justification and description of the themes in this plan were provided in section 3. As tasks are completed, process changes, some resulting in capital projects, will be identified. These modifications will be scheduled as resources and financing allow.

6 Research Plan and Execution

The overall program will be governed by a steering committee consisting of staff from Halifax Water and Dalhousie University. The steering committee will periodically review research projects and progress. The steering committee will meet quarterly to review research proposals for upcoming research and the results of previous and ongoing research. At this time, Dalhousie will present detailed research results in a seminar format to the steering committee and Halifax Water staff that are directly impacted by the particular research tasks. Technical reports will be submitted as requested for specific research tasks. Bi-annual symposia will be held to update a broader group of Halifax Water Operations and Water Services staff on relevant research.

Depending on the specific research and expertise requirements, individual research tasks will be executed either internally by Halifax Water staff or externally by the Dalhousie University research team or external consultants, as required. An outline of parties responsible for each task is provided in Appendix B.

6.1 Halifax Water Research Team

Tasks that involve the optimization of day-to-day process operations or monitoring programs will be completed internally using in-house staff and resources. The Water Quality Manager has been assigned a leadership role in the provision of high quality drinking water; specifically related to treatment, water quality and distribution operations optimization, monitoring and research. This person will play a lead role in conducting water quality research, solving water quality, treatment and distribution problems, pro-actively monitoring and improving treatment and distribution operations and methodologies, and developing, implementing and monitoring water quality plans.

The Water Quality Manager has the role of advocate for the development and implementation of water quality strategic plans and research programs. However, implementation of these programs will require cooperation and commitment of several other stakeholders within the utility structure including the general management, plant managers and operations superintendents, distribution superintendents, and all directly impacted operations staff.

As Halifax Water undertakes the transformational lead service line replacement program, a new lead team will be developed at Halifax Water to ensure that adequate resources are put towards the program to achieve goals. The team will report to the Water Quality Manager, and will consist of a Lead Program coordinator, a Data Analyst and a Water Quality Inspector specific to lead. These three staff will work with staff in a variety of other departments, including Operations, GIS, Customer Service, metering, and Water Services to implement new initiatives.



Water Quality Master Plan

V3.0

Appendix A – Research and Operating Plan

September 2016

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Water Quality Manager

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Theme 1: Source Water: Lake Recovery and Variable Source Water Quality

As a result of successful air emissions control, a number of studies have shown evidence of lake recovery from acidification, mainly in parts of Europe and the UK. The impact of recovery is healthier ecosystems as measured by changes in natural organic matter, pH and changes in biological activity and species.

In the fall of 2016, through both an analysis of basic historical data, and noticeable operational changes at both J.D. Kline and Lake Major, it became apparent that there has been a change in source water quality resulting in higher colour, TOC and pH. At J.D. Kline, the source water quality is approaching the upper limits of design for a direct filtration plant, including a TOC of 3.5 mg/L and colour of 20 TCU. At Lake Major, colour has gone from 20 to 45 TCU since commissioning of the plant, and as a result, the alum dose to remove the increased organics has gone from 15 to 50 mg/L over this time frame. These observed changes challenge earlier thinking of scientists studying the recovery from acidification in Atlantic Canada but are consistent with the observations of drinking water operators in the UK and Scandinavia. The Atlantic Canadian studies were published in 2007 and 2011, and many of the changes described have occurred within the past five years, so it is possible that water quality has recently hit a threshold that has allowed for recovery.

Very recent changes to sulphur emissions from marine fuels and continuing conversion of coal plants to natural gas in the Northeastern United States will continue to result in lower sulphur deposition, thus it can be expected that source waters will continue to change, which is expected to produce more challenges for Halifax Water treatment plants.

A large component of the research activities associated with this Water Quality Master Plan involve issues related to lake recovery, including:

- Identifying changes to source water quality,
- Developing appropriate monitoring strategies for changing source water quality,
- Developing operational tools to assist with plant operations in the short term, and
- Developing long term capital plans for robust design or retrofit of existing treatment plants to deal with a moving target of source water quality.

Task 1.1 Identification of Changing Source Water Quality

The major objective of this task is to develop an understanding of possible lake recovery and changing source water quality in Halifax Water's source waters after years of acidification caused by sulphur deposition, and to understand how this phenomenon impacts water chemistry from a drinking water quality standpoint. This research activity will:

- Mine currently available source water and air quality data to understand changing water quality both biologically and chemical/physical including changes to organic matter, pH, sulphate, nutrients, and biological species and richness.
- Expand and update currently available paleolimnological sediment analyses to include key source waters to estimate pre-industrial lake chemistry, and response of lakes to changes in land management practices.

- Determine which source waters and tributaries are susceptible to experiencing algal blooms in the future, and where these blooms may occur.

Task 1.2 Lake Recovery Monitoring

The overall research objective of this task is to identify responses to lake recovery in source water through a comprehensive monitoring program. Building on data mining and related activity conducted in Task 1.1, this research activity will look for changes in water chemistry and biology in response to trends found in task 1.1. Specifically, the objectives are to:

1. Evaluate the effect of lake recovery on algal activity, including algal organic matter (AOM) and the occurrence of commonly affiliated taste and odour compounds, including determination of which source water and tributaries are susceptible to experiencing algal blooms in the future, and potential management options to reduce bloom occurrence.
2. Monitor for trends in organic matter concentration and characterization in response to lake recovery.
3. Review existing watershed and deep lake sampling programs to ensure that parameters of interest are being collected with an appropriate frequency at appropriate locations.
4. Additionally, a program to monitor presence and composition of algae throughout the growing season will be developed for Pockwock, Major and Bennery, to understand areas that are vulnerable to blue/green algae, taste and odour presence and potential algal toxins.

Task 1.3 Assessment of Intake Locations and Structures

Optimizing the location of the intake structures and depth of intakes have been discussed for Lake Major, Bennery Lake, Pockwock Lake and The Shubenacadie River for Bomont. Pockwock and Lake Major both have fixed depth intakes that are susceptible to large daily fluctuations in water temperature which can pose downstream treatment challenges, and the intake at Bennery is susceptible to seasonal fluctuations in manganese concentrations.

1.3.1 Lake Major Intake Structure

The current intake for LMWSP is susceptible to significant diurnal temperature changes that pose operational challenges downstream, particularly with the sludge blanket in the UltraPulsators. A new-multi-level intake would allow for control of incoming water quality, thus reducing the operational burden downstream. In order to determine a suitable location, a research program will be initiated that involves monthly sampling year round at different depths at several locations within 200 m of the existing intake to identify an optimum location for a future intake. A bathymetric map will be developed to help in assessment of future intake locations. While conducting the bathymetric assessment, temperature profiling will also be conducted to provide an indication of areas of upwelling which could also provide a more consistent water quality.

A detailed raw water quality investigation of the existing raw water source will be used to understand water quality in terms of NOM, algal activity, and AOM in Lake Major, and to determine whether specific fractions of NOM are more pronounced compared to previous studies. Initially, this research will utilize conventional online water quality measurements in addition to novel online NOM characterization tools

in order to understand the potential changes in NOM composition. Grab samples will be collected from the raw water intake in order to confirm measurements from online instruments. A new at-line system to measure photoelectrochemical oxygen has been installed at Lake Major as part of this initiative.

If the existing transmission main will be used with the new intake, an evaluation of the manganese coating should be undertaken to ensure no negative impacts on raw water quality will occur with a change in intake location.

1.3.2 Pockwock Lake Intake Structure

For Pockwock, there is some discussion as to the impact of the berm location and structure on influent water quality, particularly because high geosmin concentrations are often found at the boat launch next to the berm. A research program will utilize paleolimnological assessment to evaluate the impact of construction of the berm on organic loading in the intake area. Further characterization of geosmin in the area will also be done to provide indication of its impact on raw water quality and whether there are control measures that could mitigate the situation. A bathymetric map will be developed to help in assessment of future intake locations. While conducting the bathymetric assessment, temperature profiling will also be conducted to provide an indication of areas of upwelling which could also provide a more consistent water quality.

1.3.3 Bennery Lake Intake Structure

At Bennery Lake, the stratification in the summer creates an anoxic zone in the hypolimnion which leads to increases in dissolved manganese at the depth of the current drinking water intake. Concentrations increase significantly which poses downstream treatment challenges. There are two potential solutions to this seasonal problem. The first is to install a hypolimnic aeration system to prevent the formation of dissolved manganese at the intake, or to install a multi-level intake, which would allow plant staff to change the intake level to eliminate the elevated manganese levels in raw water and focus on plant removal of TOC. The current plan is to collect background information (bathymetry) and develop a design for an aeration system to submit to Nova Scotia Environment for approval.

Upon installation of the aeration system, a rigorous raw water monitoring program will be developed for 1-2 years to provide baseline water quality data to aid plant staff in understanding seasonal treatment requirements.

1.3.4 Bomont Community Water Supply Plant

Following precipitation events, there is runoff from neighbouring fields which increases turbidity in the Shubenacadie River, resulting in deteriorated water quality, which forces shutdown of the plant. While the plant is offline, water is trucked into the facility, increasing the cost of providing drinking water to customers. The possibility of installing riverbank filtration will be explored as a way to mitigate the fluctuations in raw water quality, thus eliminating the need for plant shutdown and expense of trucked water.

Theme 2: Treatment

Task 2.1 Roadmap for Robust Treatment Plant Design for a Changing Source Water Quality

Historically, treatment plants have been designed for a specific and narrow range of source water quality, leading to specific unit processes, often with limitations, such as those posed by direct filtration at J.D. Kline. The challenges with treating a moving target of source water quality due to lake recovery, combined with the occurrence of more extreme weather events due to climate change, is leading to a paradigm shift in treatment plant design. The need for more robust and adaptable unit processes for a wider range of water qualities is becoming increasingly important for water utilities. Halifax Water has undertaken a consultant study to look at unit treatment processes for the removal of geosmin, but in looking at geosmin occurrence through the larger lens of lake recovery and changing source water quality, it has become clear that a more holistic approach to design is necessary.

To address this larger design question, Halifax Water will pursue a Tailored Collaboration project with the Water Research Foundation to bring together leading consultants and utilities in North America to develop a roadmap for robust water treatment plant design in a climate of changing source water quality. The outcome of this project will provide a path forward specifically for the J.D. Kline Water Supply Plant, but will also provide value for future considerations at all other Halifax Water surface water treatment plants.

Task 2.2 J.D. Kline Water Supply Plant

The following section describes shorter term operational tasks for optimizing existing treatment strategies to manage changing source water quality as water quality reaches the threshold for direct filtration design parameters, while longer term measures for capital improvements to treatment plant design are explored through the Tailored Collaboration in Task 2.1.

2.2.1 Improvement of pre-mix and pre-oxidation processes

With an increased TOC load in the raw water and potential changes to iron and manganese cycling, it is possible that a different pre-oxidation step (either higher permanganate dose or alternative oxidant) could provide manganese oxidation as well as provide some pre-oxidation of organics so that organics are in a more assimilable form for biofiltration.

A study conducted in 2016 identified several locations within the pre-mix that could be optimized in terms of chemical addition points, and mixing speeds. Specifically, experiments will be conducted in modified jar tests and at pilot scale to evaluate point of application of polymer to optimize floc formation. Evaluation of the pre-mix process will be conducted to determine whether the point of CO₂ addition can be moved towards the head of the plant and away from concurrent addition with Alum to increase coagulant performance.

2.2.2 Flocculation optimization

Previous research by the Dalhousie Industrial Research Chair has shown that the conversion to mechanical mixers would provide significant benefit to the existing hydraulic mixing process. However,

this comes at an increased capital cost. Another alternative is to only run 2 of 4 floc trains at one time. As the plant is running under 50% capacity at this time, it is conceivable that running all four 4 floc trains does not provide adequate velocity for collisions and mixing and that speeding the water up by taking two trains offline might enhance mixing and eliminate the need for an increased alum dose and subsequent aluminum breakthrough.

2.2.3 Improved filter performance

2.2.3.1 Filter Surveillance

The objective of this task is to Implement a filter surveillance program to monitor existing filter performance and backwash routines, and to help identify deficiencies or opportunities for optimization. Samples will be analyzed for typical filter surveillance target parameters (i.e., turbidity and aluminum). However, the investigation will also include measurement of other inorganic and organic potential foulants by performing acid digestion and scans for additional metals (i.e., iron and manganese) and measuring NOM surrogates (i.e., TOC, DOC, PeCOD, UV₂₅₄, FEEM). Analysis of different FEEM regions will provide an indication of the relative fulvic, humic and protein content of NOM. To understand the fouling contribution of biological material, biomass will be quantified using ATP and cell counting, and extracellular polymeric substances (EPS) will be quantified as glucose and as proteins.

Implementation of a filter surveillance program would involve development of a filter surveillance team and data collection templates and procedures so that data is accessible and can be compiled and used by plant and water quality staff.

2.2.3.2 Biofiltration optimization

Currently the filters at J.D. Kline are running as passive biofilters as there are no chemical or nutrient enhancements to the process. Research using the pilot plant can provide insight on whether addition of pre-oxidants and/or nutrients could provide enhanced organics removal through biofiltration processes. Additionally, monitoring tools and operational controls to measure biofilter performance and health need to be developed and added to operational monitoring programs.

Extracellular polymeric substances (EPS) can contribute to headloss in biofilters. The direct biofiltration process at the JD Kline WTP does not incorporate sedimentation prior to filtration. The purpose of this investigation will be to understand the interaction between floc material and biomass and determine the extent to which alum floc competes with biomass for space in the filter bed and if alum toxicity limits biomass concentration (as measured by ATP), potentially reducing the capability of the filter to perform biodegradation of substrate, or impacts the formation of EPS, potentially contributing to filter clogging.

2.2.3.3 Coagulant optimization

Research conducted by Knowles in 2011 showed that coagulation with alum as currently practiced provided the longest filter run times combined with minimal downstream unintended consequences. With the change in source water quality, these studies should be revisited. Additionally, the chemical supplier recently changed the supplier and process for alum production from bauxite to trihydrate, which has had an impact on plant performance. Bauxite is being phased out as a type of alum and thus

it is important to determine an appropriate coagulant for the new source water quality which maximizes filter run times while minimizing downstream unintended consequences.

Research at the pilot scale will be conducted to determine whether increasing alum doses or using alternative coagulants can overcome increasing NOM concentrations, while given the constraints of current treatment process design (i.e. particle loads for direct filtration, downstream water quality impacts).

2.2.3.4 Backwash optimization

Following conversion of the JD Kline WTP filters to biofilters, operational strategies (e.g., backwash, loading rate) have remained fundamentally unchanged. Results following the conversion showed that the biofilters could be operated in the same manner as before and still meet effluent turbidity requirements and previous benchmarks for initial and terminal headloss, loading rate and unit filter run volume. However, recent filter surveillance shows that there is significant material remaining in the lower third of the biofilters, post backwash. Adjustments to the backwash protocol, loading rate and empty bed contact time could potentially optimize this process and increase biofiltration hydraulic performance.

2.2.3.5 Filter media replacement and addition of air scour

The existing filter media is original to the plant and recent filter assessment by consultants has indicated that both filter media and underdrains require replacement. A capital project is underway to replace both filter media and underdrains in all filters, with a completion date of March 2018. Air scour equipment will be installed at the same time to provide enhanced backwash performance. The filter media design has been altered slightly (slightly larger effective size) to be more compatible with biofiltration processes. New backwash routines for air scour will be developed post installation, and filter health will be monitored using filter surveillance techniques.

Task 2.3 Lake Major Water Supply Plant (LMWSP)

In 2015/16 a Lake Major Water Supply Plant Process Optimization Study was completed by CBCL Limited and HDR Engineering Inc. The report provides an implementation strategy based on recommendations, and research requirements. Halifax Water staff have developed a 10 year Capital Improvement Plan based on this report, which includes both capital upgrades and research requirements. The research requirements over the next five years are highlighted in the following sections.

As described in Theme 1, Lake Major has seen recent changes in source water quality which have resulted in increases in chemical dosage to remove increased organic loads. The LMWSP has been able to adapt to an increased alum dosage of approximately 50 mg/L due to the presence of upflow clarifiers prior to filtration, however the plant is experiencing challenges with coagulant performance, disinfection byproducts and residuals handling. The research and operational tasks presented below detail improvements that can be made to existing operations with enhanced monitoring of process change outcomes and bench-scale testing. The longer term research plan, beyond the scope of this 5 year WQMP, would be to install and operate a pilot plant at Lake Major to further optimize treatment processes once initial improvements have been made.

2.3.1 Premix optimization

There is a need for optimization of pre-mix chemical types and injection location as well as mixing speeds. The impact of increasing mixing intensity will be evaluated as the current mixing speed is below that of rapid mix but above a floc mixing intensity. The current lime system is in need of an overhaul, and prior to this occurring, investigation of the use of soda ash instead of lime for pH/alkalinity control should be explored in more detail at the bench scale.

2.3.2 Coagulant changeover

LMWSP has experienced the same challenges as J.D. Kline with respect to the type of alum used (bauxite versus trihydrate). With the current increased cost of bauxite and eventual discontinuation of the product, it is prudent to perform coagulant changeover studies to develop a suitable process moving forward. This research task will incorporate bench-scale jar testing to evaluate different coagulant types. However, due to the plant configuration as upflow clarification, jar tests can provide good initial insight, but results may not be representative of full-scale operation. Therefore, a way to simulate upflow clarification at the bench scale will be explored to provide more replicable data for comparison to full-scale operation. Further pilot scale testing would then be conducted upon installation of a pilot plant, beyond year 2022. In addition to evaluating filter performance and organics removal with alternative coagulants, impacts on corrosion downstream need to be evaluated to ensure that changing the chloride:sulphate mass ratio does not lead to increased corrosion in the distribution system.

2.3.3 Clarification

The UltraPulsator technology is not seen as ideal for the application of clarification at LMWSP. The current tubes and plates are in need of replacement so a capital inspection and replacement project will be initiated. With installation of a new intake with consistent daily temperatures and water quality, improvements in pre-mix chemistry and injection, optimization of coagulants and replacement of tubes and plates within the UltraPulsators, it is possible that improvements in operation and finished water quality will provide an extended life for the existing units. Enhanced water quality monitoring post tube and plate replacement will be conducted to help with optimizing performance.

2.3.4 Manganese oxidation

LMWSP was originally designed to use potassium permanganate for manganese oxidation. Shortly after plant commissioning, potassium permanganate was shutoff and manganese was oxidized with pre-filtration chlorination. This has allowed the filter media to become coated with manganese dioxide over time which acts as a catalyst for manganese oxidation. Although effective for oxidizing manganese, pre-filter chlorination can lead to increased disinfection byproduct formation through reactions between remaining organics and chlorine prior to filtration. With the anticipation of replacement of filter media, it is a good time to remove the pre-filter chlorination step and provide manganese oxidation at the head of the plant. The filter media has been operating with pre-chlorination for so long that it is likely that manganese from the filter media could leach into finished water if the pre-chlorine is turned off while existing media is still in place. Different manganese oxidation strategies will be tested to determine a suitable process moving forward for post filter media replacement.

2.3.5 Improved filter performance

2.3.5.1 Filter Surveillance

LMWSP has implemented a filter surveillance program to monitor existing filter performance and backwash routines, and to help identify deficiencies or opportunities for optimization. As mentioned for J.D. Kline, a team and consistent data collection procedures and templates will be developed so that data is accessible and can be compiled and used by plant and water quality staff. In addition to the regular filter surveillance program, additional parameters may be measured periodically to provide a more detailed picture of filter performance. This will be important once new filter media is installed and pre-chlorine is shut off to monitor the conversion to passive biofiltration. In order to monitor the performance of the biofilters, the investigation will also include measurement of other inorganic and organic potential foulants by performing acid digestion and scans for additional metals (i.e., iron and manganese) and measuring NOM surrogates (i.e., TOC, DOC, PeCOD, UV₂₅₄, FEEM). Analysis of different FEEM regions will provide an indication of the relative fulvic, humic and protein content of NOM. To understand the fouling contribution of biological material, biomass will be quantified using ATP and cell counting, and EPS will be quantified as glucose and as proteins.

2.3.5.1 Filter media replacement

Filter excavation box tests indicate that there is poor stratification of filter media, and that garnet layers are mismatched with sand and anthracite. Additionally, as previously described, there is a likelihood that manganese dioxide has built up on the media due to pre-filter chlorination. Further sieve analysis and characterization of organics and metals through filter surveillance will be conducted to determine whether media should be replaced, or whether washing media to remove manganese dioxide could be adequate to restore filter integrity. Following a conversion in manganese oxidation strategy and media wash or replacement, the filters will then begin to operate as passive biofilters like those at Pockwock. Monitoring of performance and establishment of biofilm will be conducted through filter surveillance.

2.3.5.2 Backwash optimization

Existing filter surveillance data suggests that media particularly between 18-24 inches is not being sufficiently cleaned, and thus optimizing backwash rates and times to achieve enhanced particle removal would be beneficial. Extended subfluidization terminal wash (ETSW) procedures could also be investigated to determine whether ETSW would reduce filter ripening times. Additionally, upon conversion to passive biofiltration, buildup of EPS and biofilm could lead to changes in filter operation and performance as well as a requirement for different backwash procedures.

2.3.6 Waste residuals management study

The current waste residuals process does not meet the water quality discharge guidelines for aluminum. There are two options moving forward to address this issue. The existing residuals management process could be modified in order to meet the existing water quality discharge guidelines and maximize treatment efficiency, reliability and capacity. Alternatively, the residuals could be discharged to a new sanitary sewer without treatment. Both of these options will be explored in detail from a cost/benefit perspective.

Task 2.4 Bennery Lake Water Supply Plant (BLWSP)

2.4.1 Installation of plate settlers

The sedimentation basins were originally designed to contain plate settlers, but the plates were never installed. The basins currently operate under a high overflow rate and particles are travelling through the sedimentation basin and being deposited in the filters, compromising filter integrity. Plate settlers will be installed in 2016-2017. Upon installation, detailed water quality investigations throughout the treatment train will be conducted to help with process optimization. Installation of the plate settlers will likely improve filter turbidity and runtime and will also require optimization of the backwash process with the new water quality reaching the filters.

2.4.2 Filter Surveillance

The 2013 optimization study completed by Stantec suggests that the media should be evaluated due to its age. Similar to JD Kline, and LMWSP, BLWSP will implement a filter surveillance program to monitor filter performance, health and backwash routines, and to help identify deficiencies or opportunities for optimization, as well as to determine whether media needs to be replaced. The same suite of biotic and abiotic parameters will be evaluated as part of filter surveillance to provide the same breadth of analysis as mentioned for J.D. Kline and LMWSP.

Theme 3: Distribution System Water Quality

Task 3.1 Lead – Implementing NDWAC Recommendations

In 2015, the USEPA convened the National Drinking Water Advisory Council (NDWAC) to advise the USEPA on how to change the way lead in drinking water is regulated. The NDWAC recommended to the USEPA that the only truly effective solution is for utilities to commit to replacing all lead service lines (public and private) by 2050. To accomplish this, utilities must: develop an accurate inventory of lead service lines, reach out to customers who have lead service lines, work with customers to find a way for them to replace the private portion, and do much more sampling for customers. The NDWAC recommendations were endorsed by the American Water Works Association in March 2016.

Halifax Water has an estimated 2500 public lead service lines, most of which are in Halifax. The number of private lead service lines is unknown but expected to be much higher. Developing strategies for both public and private renewals is a major culture shift, as historically utilities have not taken responsibility for private lead service lines from an ownership, or inventory perspective.

Halifax Water's new approach to manage its customer's exposure to lead is designed to be consistent with the NDWAC recommendations, to the degree they can be applied in Canada and do not conflict with local regulatory requirements. The following five sections describe the research and operational approach that will be taken to address each of the main NDWAC themes:

1. Development of an inventory of lead service lines – both public and private
2. Development of a LSL replacement strategy to meet complete LSL removal by 2050
3. Enhanced public outreach on risks, shared responsibility, results, programs

4. Enhanced customer based sampling, using a variety of types of sampling, chosen from a menu to reflect certain uses. All customer sampling will be used to develop a 3-year continuous 90th percentile that must be below a specified system action level.
5. Enhanced water quality parameter monitoring and evaluation of corrosion control treatment.

3.1.1 Lead Service Line Inventory

The NDWAC recommendations require that utilities inventory the amount and location of LSL's and further take the approach that in areas developed before the cessation of LSL's that the service should be assumed to be made of lead unless proven otherwise. This makes development of an inventory complex but is crucial to other programs and ensuring all of the lead service lines are removed by the target date.

For public services, the existing inventory is fairly reliable but is still populated with a number of "unknown" services. The private inventory is much less reliable. This is due to the fact that there is no positive mechanism that requires a customer to contact us upon renewal of a service but also due to the fact that the pre-existing utilities exercised varying and inconsistent levels of attention to the private service lateral database.

As a first step, areas of the distribution system that would have been serviced by a central water system and potentially had lead service lines installed prior to 1960 has been developed. This is a baseline map that can be used to narrow down the presence of lead on a house by house basis. Some techniques that will be used to update the inventory include:

- Analysis of existing records for anything that contains lead or unknown on the public or private portion of the service lines.
- When new meters are being installed as part of the Advanced Metering Infrastructure (AMI) program, all staff that will be in homes will be trained to identify lead service lines, and will report information back to be included in service cards.
- Gathering and recording information anytime there is work done on a sewer line or a service box in the area with potential lead service lines.
- Participation in industry research to explore and test methodologies for non-intrusive identification of LSL material.
- Conducting a pilot trial for successful identification using more invasive techniques (i.e. hydro-vac excavation at the service box) to determine composition of both public and private portions.

3.1.2 Lead service line replacement strategy

HW will develop a strategy for replacing all public and private lead service lines by 2050. The current rate of 20-30- replacements per year will need to be tripled to about 100 per year in order to replace all of the public portions of the lead service line within this timeframe. The number of private renewals requiring replacement per year is expected to be much higher as there are significantly more private than public lead service lines.

Up until 2012, Halifax Water proactively replaced lead service lines in the distribution system in conjunction with municipal street-paving and sidewalk renewal projects, water main replacement

projects and other distribution system infrastructure upgrades. In light of recent national and internal research initiatives, including research with Dalhousie University, which demonstrate the increase in lead concentrations at the tap following partial service line replacements, Halifax Water has changed its policy regarding service line replacements to minimize the occurrence of partial lead service lines in the distribution system. This practice is expected to continue even with the increased replacement goals. Following are some strategies that will be used to increase the number of lead service lines replaced each year, while continuing to avoid partial replacements to protect public health.

- Halifax Water will explore options with the UARB to allow access to private property to replace the full service line during emergency events when Halifax Water replaces the public portion due to a leak or work on the main.
- Halifax Water will develop a business case to present to UARB that will identify potential cost savings of doing full LSL replacement (private and public) in coordination with HRM paving and sidewalk renewal projects. Cost savings on the public portion would include only one mobilization for multiple services, and a significant reduction in reinstatement costs as this would be covered by the HRM paving project. Being able to coordinate with HRM paving projects would allow for a significant increase in the numbers of renewals per year.
- Halifax Water will continue to provide a program where there is a standing contract with several contractors to replace the public portion of the service line in conjunction with the private portion. This program was initiated in 2016, and provides the option to minimize any potential time with a partial replacement between coordination of the private and public renewals, and also streamlines the process for customers.
- Following any disturbance or replacement of a lead service line, home owners will be provided with instructions for appropriate flushing procedures to carry out immediately following disturbance and protocols to follow to minimize lead exposure for a defined period of time following a LSL replacement. Homeowners will also be provided with a pitcher style water filter and cartridges for one year following disturbance. Different pitcher style filters will be tested for removal of high concentrations of lead post-disturbance to ensure filters provided are adequate for the conditions expected.
- A significant barrier to private uptake of lead service line replacement is expected to be financial challenges. HW will develop a financial enabling program for residents to pay for private LSL replacement. HW will work to ensure that financial enabling strategies are accessible to all customers, to ensure that all demographics have access and ability to replace lead service lines. It is expected that challenges will exist with low-income households, long-time homeowners and also rental units.

3.1.3 Communications

Communications and outreach will be critical components to the success of the lead service line replacement program. Customers must have access to transparent, easy to understand information on the risks associated with lead, and programs available to help with getting lead out of the system. Contact with customers will need to occur through the website, through mail-outs and targeted campaigns in areas that may have lead service lines and vulnerable populations. Significant efforts will be placed on meeting with realtor groups, building inspectors and plumbers to disseminate information

about lead service lines. A real estate transaction is a great opportunity to renew service lines. As such, customer service staff will flag any new customers in the lead hot spot areas so that appropriate information can be mailed out to them when they open an account.

A research program will be initiated to determine effective means of customer communications, so that programs put into place will be an effective use of resources and will provide positive outcomes for private side LSL replacement.

3.1.4 Corrosion Control Treatment

Halifax Water maintains an effective corrosion control program to minimize the corrosion of lead and other materials in the distribution system by controlling pH and using zinc ortho-phosphate for corrosion control.

Recent changes have been made to the corrosion control product and the dose. In 2015, poly phosphate was removed from the product due to research showing it can negatively impact lead release, and in April 2016, the dose was doubled from 0.5 to 1.0 mg/L as PO₄ for both J.D. Kline and Lake Major based on recommendations from consultant reviews of Halifax Water's programs, and research conducted by Dalhousie that shows a decrease in lead concentrations after an increased dose of orthophosphate.

There is a need to further understand the influence of general water chemistry, presence of other metals (i.e. iron, manganese and aluminum) and seasonality on lead release. Research is also required to understand lead phosphate deposition rates following adjustment of orthophosphate dose or changes to source chemicals (i.e. zinc orthophosphate, orthophosphate and phosphoric acid to optimize corrosion control), while balancing costs, minimizing lead release and minimizing unintended consequences.

3.1.5 Water Quality Monitoring

Currently, the effectiveness of the corrosion inhibitor is monitored by Water Quality Inspectors through:

- biweekly distribution system sampling at 25 sites for pH, orthophosphate, zinc, iron, manganese, alkalinity, chloride, sulphate, aluminum and turbidity
- quarterly monitoring of metal coupons (copper, lead and steel placed at 10 locations in the distribution system; and
- bench and pilot scale research conducted in coordination with Dalhousie University,

Additionally, samples are taken from residential homes through three different programs:

- Annual Health Canada lead and copper residential program
 - 100 homes, half lead and half copper, 4 L profile and a flush sample, in August
- Customer initiated sampling
 - Year-round, 4 L profile and a flush sample, any time of year
- LSL replacement sampling program
 - Pre and 72 hrs, 1 month, 3 months and 6 months post construction samples, 4 L profile and flush sample.

Although this is a robust monitoring program, there is room for improvement through evaluation of the program. There is some question as to the value of the coupon monitoring, which will be explored. Additionally, the corrosion sampling sites should be reviewed to ensure their representation of the system. Finally, customer sampling is the only way to provide an indication of lead concentrations in homes, however it relies on the customer to take the sample, which can lead to sample integrity issues. Furthermore it is difficult to compare data from year to year because customers often opt to replace their service line once they find out their lead concentrations. To provide a more robust and stable way to monitor lead concentrations at the tap, Halifax Water will install permanent lead pipe racks in at least 4 places in the distribution system (one in Dartmouth and three in Halifax) to mimic lead levels at the tap. These pipe racks would be similar to those used by Dalhousie University at J.D. Kline previously but would be located in Halifax Water infrastructure in the distribution system to be more representative of at the tap concentrations. This would allow for routine lead sampling to monitor corrosion control, and would also allow for exploration of different stagnation time sample regimes. Pipe racks would also allow monitoring of changes to corrosion control chemistry and impacts from seasonal variations in water quality, including metals, temperature, etc.

Task 3.2 Distribution System Water Quality and Integrity Monitoring

Halifax Water has a comprehensive program to actively monitor and assess both distribution system water quality and physical integrity, through programs such as HPC monitoring, reservoir water quality monitoring, and corrosion monitoring. Data is currently compiled into technical memos and distributed to appropriate staff for review. The monitoring programs are constantly being reviewed for relevance and completeness and this should continue, to ensure that there is appropriate data collection but also interpretation to help understand and predict water quality in the distribution system. One example would be the use of ATP to monitor biological growth in correlation with HPCs. ATP is a rapid test that can be done within minutes versus 7 days for an HPC test. Therefore, understanding the correlation between ATP and HPCs would be very useful for monitoring biological health when low chlorine residuals are present in the warmer months. ATP data collection has started, but should continue to develop a database that provides relationships between ATP and other water quality parameters in the distribution system.

A fluoride tracer study for LMWSP distribution system showed that water age depends on a number of factors including distance from the plant, time of day and reservoir operation. A fluoride tracer study will be repeated on targeted areas within the LMWSP to determine whether there are operational changes that can be made (operation of valves) to decrease water age to some regions of the distribution system. A fluoride tracer study will also be completed for the JDKWSP to provide an overview of water age within the distribution system. Having an indication of water age, particularly at extents of the system and around reservoirs provides valuable information and insight for optimizing water quality, maintaining chlorine residuals and minimizing DBP formation.

As part of the Partnership for Safe Water program, conducting a review of existing chlorine residual monitoring sites and ensuring that sites are representative of the distribution system, including extents, is an important part of understanding distribution system integrity. The fluoride tracer studies will also provide valuable information for assessing the relevance of existing monitoring locations.

Task 3.3 Disinfection efficiency and minimizing disinfection byproduct formation

Although significant work has been done on minimizing distribution system disinfection byproducts both through treatment process changes (removal of pre-chlorine at JDKWSP) and installation of chlorine booster stations on reservoir outflows (North Preston), there is still work that can be done to both reduce DBP formation and also manage reservoir operation to ensure adequate chlorine residuals in all extents of the distribution system, throughout all seasons. Targeted chlorine investigations and review of reservoir monitoring data will provide insight on changes to reservoir operation processes such as installing rechlorination stations, changes in reservoir cycling (volume and timing), installation of mixers, or point of use treatment for removal of disinfection by products that can be implemented to increase disinfection efficiency while minimizing DBP formation.

Theme 4: Theme 4: Data Management

Task 4.1 Adoption of a Data Management Tool

Water Quality Data collected by Halifax Water staff currently gets stored in several different places. Some is entered into WaterTrax, some exists in Pi, and some is stored in spreadsheets at various locations on the K Drive. There is no central place to store, extract and analyze data. Similarly, all water quality data generated by consultants, IRC students and staff is generally contained within reports, student theses, and on personal computers. As this dataset grows, it is becoming clear that there needs to be a mechanism to manage and store all of these data sources, so that data is not lost and both staff and students have access to historical data. This is also becoming increasingly important in the context of Lake Recovery and changing source water quality.

This task will aim to identify, compare, select and integrate a data management approach for water quality data. There exist commercial solutions, provided by companies such as Kisters, EarthFX, Locus Technologies, Aquatic Informatics, Etc. that provide geocoded solutions to water quality data management and analysis. Other options could include development of a Laboratory Information Management System (LIMS), or design of a custom solution. This data management tool will be used to pull all data sources into one central system.

The primary objective of this exercise is to ensure that the valuable resource of water quality data is utilized both as an operational tool to make sound day to day operating decisions and also to ensure that sound investment decisions are made when considering capital improvements to treatment plants and other water quality investments.

Appendix B - Research and Operations Approach

Theme and Task	Halifax Water Role	Dalhousie Role	Comments
Theme 1: Source Water: Lake Recovery and Variable Source Water Quality			
Task 1.1: Identification of Changing Source Water Quality	Sampling	Research lead	
Task 1.2: Lake Recovery Monitoring	Program Evaluation	Research lead	
Task 1.3: Assessment of Intake Locations and Structures			
Task 1.3.1: Lake Major	Bathymetry	Research lead	
Task 1.3.2: Pockwock Lake	Bathymetry	Research lead	Paleolimnological studies
Task 1.3.3: Bennery Lake	Bathymetry and equipment installation	Research lead	HW and Dal to develop raw water monitoring program
Task 1.3.4: Bomont	Lead investigation		
Theme 2: Treatment			
Task 2.1: Roadmap for Robust Treatment Plant Design for a Changing Source Water Quality	Lead tailored collaboration through WRF	Act as in-kind partner	
Task 2.2: J.D. Kline Water Supply Plant			
Task 2.2.1: Improvement of pre-mix and pre-oxidation processes	Capital improvements	Pilot research lead	
Task 2.2.2: Flocculation Optimization	Implement process changes	Monitoring lead	
Task 2.2.3: Improved Filter Performance			
Task 2.2.3.1: Filter Surveillance	Develop and lead Filter Surveillance Team	Lead filter WQ analysis	
Task 2.2.3.2: Biofiltration Optimization		Lead pilot research	
Task 2.2.3.3: Coagulant Optimization		Lead pilot research	
Task 2.2.3.4: Backwash Optimization	Full-scale testing	Lead pilot research	
Task 2.2.3.5: Filter media replacement and addition of air scour	Capital improvements and filter surveillance	Lead filter WQ analysis	
Task 2.3: Lake Major Water Supply Plant			
Task 2.3.1: Premix Optimization	Capital improvements	Lead bench-scale testing	Bench-scale testing for pH/alkalinity control
Task 2.3.2: Coagulant Changeover		Research Lead	
Task 2.3.3: Clarification	Capital improvements and optimization	Monitoring lead	
Task 2.3.4: Manganese Oxidation		Research Lead	
Task 2.3.5: Improved Filter Performance			
Task 2.3.5.1: Filter Surveillance	Develop and lead Filter Surveillance Team	Lead filter WQ analysis	
Task 2.3.5.2: Filter Media Replacement	Capital improvements	Lead filter WQ analysis	
Task 2.3.5.3: Backwash Optimization	Make process changes	Lead filter WQ analysis	
Task 2.3.6: Waste Residuals Management Study	Lead study		Will utilize previous Dal research
Task 2.4: Bennery Lake Water Supply Plant			
Task 2.4.1: Installation of Plate Settlers	Capital improvements and optimization		
Task 2.4.2: Filter Surveillance	Develop and lead Filter Surveillance Team	Lead filter WQ analysis	
Theme 3: Distribution System Water Quality			
Task 3.1: Lead - Implementing NDWAC Recommendations			
Task 3.1.1: Lead Service Line Inventory	Initiate and manage program, participate in WRF projects		
Task 3.1.2: Lead Service Line Replacement Strategy	Initiate and manage program	Provide technical guidance	
Task 3.1.3: Communications and Outreach	Initiate and manage program	Lead research on customer buy-in	
Task 3.1.4: Corrosion Control Treatment		Research lead	
Task 3.1.5: Water Quality Monitoring	Evaluate and update program		
Task 3.2: Distribution System Water Quality and Integrity Monitoring	Conduct review and research		
Task 3.3: Disinfection Efficiency and Minimizing Disinfection Byproduct Formation	Monitoring lead	Research Lead	
Theme 4: Data Management			
Task 4.1: Adoption of a Data Management Tool	Research, procurement and adoption	Partner as appropriate	Dal to develop integrative data tools

TO: Ray Ritcey, Chair and Members of the Halifax Regional Water Commission Board

SUBMITTED BY: Original Signed By:
Cathie O'Toole, MBA, CPA/CGA, Director, Corporate Services

APPROVED: Original Signed By:
Carl Yates, M.A.Sc., P.Eng., General Manager

DATE: January 15, 2018

SUBJECT: **Operating Results for the Nine Months Ended December 31, 2017**

INFORMATION REPORT

ORIGIN

Financial Statements

BACKGROUND

The Board is required to review periodic financial information throughout the year.

DISCUSSION

Attached are the operating results for the first nine (9) months of the 2017/18 fiscal year, period ending December 31, 2017. The statements reflect direct operating costs by department and allocations among water, wastewater and stormwater for common costs shared across all the services provided by Halifax Regional Water Commission (HRWC).

HRWC is a fully regulated government business enterprise, falling under the jurisdiction of the Nova Scotia Utility and Review Board (NSUARB). The NSUARB requires that HRWC file Financial Statements and rate applications with the Board based on the NSUARB Handbook for Accounting and Reporting for Water Utilities. The Accounting Standards Board (AcSB) requires rate regulated entities to conform to International Financial Reporting Standards (IFRS). The Commission has converted the SAP financial records to IFRS for the purposes of the annual audit and consolidation of the financial statements with those of Halifax Regional Municipality (HRM). The budget for the 2017/18 fiscal year was prepared using the NSUARB format and financial results will continue to be provided in NSUARB format.

Summary information is provided for the Balance Sheet on Page 1 and the Income Statement on Page 2. A detailed presentation of the Balance Sheet and Income Statement is provided on Pages 3 and 4. Pages 5 through 8 provide Income Statements by Service and for Regulated and Un-Regulated Services. Pages 9 and 10 provide the Balance Sheet and Income Statement in IFRS format.

Consolidated Income Statement - Page 2

Consolidated operating revenue of \$105.3 million is on par with revenue reported for the same time last year. Consolidated operating expenses of \$71.9 million are \$5.3 million higher than last year.

Summarized Consolidated Operating Results				
	Actual YTD 2017/18 '000	Actual YTD 2016/17 '000	\$ Change	% Change
Operating Revenue	\$105,304	\$105,259	\$45	0.0%
Operating Expenses	\$71,866	\$66,475	\$5,390	8.1%
Operating Profit (Loss)	\$33,438	\$38,783	(\$5,346)	-13.8%
Non Operating Revenue	\$3,571	\$2,486	\$1,085	43.6%
Non Operating Expenditure	\$25,868	\$26,101	(\$233)	-0.9%
Net Surplus before OCI	\$11,140	\$15,169	(\$4,029)	-26.6%
Pension Plan Expense	(\$3,752)	(\$2,315)	(\$1,437)	62.1%
OCI	\$1,653	\$0	\$1,653	0.0%
Net Surplus (Deficit)	\$9,042	\$12,854	(\$3,812)	-29.7%

Figures used in the various tables throughout the report may contain differences due to Excel rounding.

The Net Surplus for the year is \$9.0 million, a decline of \$3.8 million from the prior year. The Net Surplus includes Pension Plan Expense of \$3.8 million and Other Comprehensive Income (OCI) of \$1.7 million. The Other Comprehensive Income is primarily the unrealized gains on employee benefit programs, such as investment returns on Pension Plan investments. Excluding OCI and Pension Plan Expense, the Net Surplus for the year is \$11.1 million, a decline of \$4.0 million as compared to the prior year.

Budget managers provided updated expense projections as of the end of the third quarter that are now reflected in the Forecast. The net change was a \$4.2 million decrease in expenses. The approved budget was for a loss of \$6.7 million. The Forecast is now for a profit of \$8.9 million, an improvement of \$15.6 million.

Balance Sheet - Page 3

The Cash balance of \$38.7 million is down \$23.5 million from the prior year. The decline is attributable to substantial expenditures associated with the current capital projects.

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The total Accounts Receivable balance of \$38.4 million is up \$4.7 million. The addition of the HRM Stormwater Right of Way charge on customer bills has increased the normal Customer Receivables balance. As requested by HRM Council, Stormwater customers are billed for this service and the proceeds are remitted to HRM. The liquidity on the balance sheet (ratio of current assets divided by current liabilities) is 1.78, down from the ratio of 2.09 at the same time last year.

Accounts Receivable		
	2017/18	2016/17
Customer Receivables	\$16,899	\$12,428
Unbilled Services	\$18,564	\$18,495
Halifax Regional Mun.	\$2,967	\$2,775
Total	\$38,430	\$33,698

Balance Sheet Liquidity (Current Ratio)		
	2017/18	2016/17
Current Assets ('000)	\$78,746	\$97,485
Current Liabilities ('000)	\$44,139	\$46,726
Current Ratio	1.78	2.09

Plant in Service assets, net of Accumulated Depreciation, is \$1.14 billion and is \$3.3 million higher than at this time last year. Capital Assets Under Construction is up \$34.7 million to \$87.4 million, net of external funding received under the Build Canada and Clean Water and Wastewater Fund programs. The following table highlights the major projects underway:

Capital Assets Under Construction	
	Cumulative '000
Northwest Arm Sewer Rehab	\$18,022
Aerotech Wastewater Treatment Facility	\$16,470
Sullivan's Pond Storm Sewer Replacemnt	\$7,656
MacDonald Bridge Transmission Main	\$6,423
All other projects	\$52,192
Total Capital Expenditures	\$100,763
External Funding Received	(\$13,409)
Net Assets Under Construction	\$87,354

Current liabilities of \$44.1 million are down \$2.6 million from the prior year. Trade Payables increased \$1.9 million as several large capital project progress claims were in process. Balances payable to HRM are down \$2.4 million.

The Accrued Post Retirement Benefits, Accrued Long Service Award, Deferred Pension Liability and Supplementary Employee Retirement Plan (SERP) are on par with expected amounts. The balance of the reserve for Regional Development Charges has increased from \$10.4 million to \$21.3 million, which is attributable to development activity in the Halifax area.

Long Term Debt is down \$9.1 million from last year, which is a net of new debt of \$10.0 million, repayments of \$21.4 million, and a decrease in the Current Portion of Long Term Debt of \$2.3 million. The debt service ratio of 21.1% is well below the maximum 35% ratio allowed under the blanket guarantee agreement with HRM.

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Long Term Debt by Service		
	2017/18	2016/17
	'000	'000
Water	\$58,868	\$61,323
Wastewater	\$127,043	\$133,370
Stormwater	\$11,043	\$11,369
Combined	\$196,954	\$206,062

Debt Servicing Ratio by Service		
	YTD Debt Servicing Cost Ratio	
	2017/18	2016/17
Water	18.9%	19.2%
Wastewater	23.3%	24.7%
Stormwater	17.3%	11.4%
Combined	21.1%	21.5%

The cumulative Operating Surplus of \$16.7 million at the beginning of the fiscal year has grown to \$24.1 million with the year-to-date net profit before other comprehensive income of \$7.4 million.

Income Statement – All Services - Page 4

The following tables compare the results with the nine month pro-rated budget and forecasts for the year. Year to date results are \$12.9 million better than the pro-rated budget and \$2.9 million ahead of the pro-rated current forecast with Revenue higher than budget and forecast and Expenses lower than budget and forecast.

Summarized Consolidated Operating Results			
	Actual YTD	Nine Month	
	2017/18	Budget	
	'000	2017/18	\$ Variance
Operating Revenue	\$105,304	\$101,690	\$3,613
Operating Expenses	\$71,866	\$76,412	(\$4,546)
Operating Profit (Loss)	\$33,438	\$25,278	\$8,160
Non Operating Revenue	\$3,571	\$2,090	\$1,480
Non Operating Expenditure	\$25,868	\$29,162	(\$3,294)
Net Surplus (Deficit)	\$11,140	(\$1,794)	\$12,934

Summarized Consolidated Operating Results			
	Actual YTD	Nine Month	
	2017/18	Forecast	
	'000	2017/18	\$ Variance
Operating Revenue	\$105,304	\$102,887	\$2,417
Operating Expenses	\$71,866	\$72,106	(\$240)
Operating Profit (Loss)	\$33,438	\$30,781	\$2,657
Non Operating Revenue	\$3,571	\$3,282	\$288
Non Operating Expenditure	\$25,868	\$25,783	\$85
Net Surplus (Deficit)	\$11,140	\$8,280	\$2,861

Customer Rates

Rates for Water and Wastewater service did not change this fiscal year, having last been adjusted on April 1, 2016. A new rate structure for Stormwater Service took effect July 1, 2017. This reset the rates, but did not increase revenues. The rate for many customers decreased, as shown in the Summary of Rate Change – Stormwater table below:

Summary of Rates				
	Effective	Effective		
	April 1/16	May 1/15	\$ Change	% Change
<u>Volumetric Charges (per m3)</u>				
Water	0.976	0.845	0.131	15.5%
Wastewater	1.753	1.638	0.115	7.0%
Combined	2.729	2.483	0.246	9.9%
<u>Base Charges (per year)</u>				
Water	Varies by meter size		No Change	0.0%
Wastewater	Varies by meter size		Varies	1.1%-7.7%

Summary of Rate Change - Stormwater				
	Effective	Effective		
	July 1/17	April 1/14	\$ Change	% Change
<u>Residential - Impervious Area</u>				
Less than 50 m2	-	33.39	- 33.390	-100.0%
50 to 200 m2	14.00	33.39	- 19.390	-58.1%
210 to 400 m2	27.00	33.39	- 6.390	-19.1%
410 to 800 m2	54.00	33.39	20.610	61.7%
Greater than 810 m2	81.00	33.39	47.610	142.6%
Culvert only service	14.00	Varied	Varies	Varies
ICI Rate per m2	0.135	0.149	- 0.014	-9.4%

Operating Revenue

Operating Revenue is on par with the previous year and \$3.6 million ahead of the pro-rated budget with Metered Sales accounting for the difference.

Metered Sales revenue is down \$0.2 million (0.5%) for Water Service and up \$0.3 million (0.5%) for Wastewater Service as compared to the prior year. Metered Sales consist of base and volumetric charges. Base charges are on par with budget expectations. Volumetric revenue budgets for 2017/18 were based on a 3% decrease in metered consumption. Billed water consumption is down only 0.3% compared to the prior year to date period. The positive results to date provide a buffer for the reduced consumption that typically occurs in the winter months.

Wastewater Metered Sales also consists of a volumetric discharge component and a base charge component. For most customers, the discharge component is based on the metered water consumption, and the volumes reflect the decline in water consumption. The actual billed discharge volume decreased by 0.2%. Wastewater Rebates are available to large customers whose metered water does not enter the Wastewater system. Rebates are \$0.7 million less than budget, which benefits Wastewater Revenue. The forecast for Wastewater Metered Sales was increased by \$1.5 million to reflect the results to date.

Stormwater Site Generated revenue is slightly below budget and the prior year. Other revenue categories are comparable with budget and forecasted amounts.

Operating Expenses

Operating Expenses of \$71.9 million are \$5.4 million higher than the prior year, \$4.5 million below the pro-rated budget for the year and on par with the updated forecast. Compared to the prior year, expense categories with the largest increases in costs to date are Wastewater Collection, Wastewater Treatment, Stormwater Collection and Depreciation.

Updates to the Forecast identified reduced expenditures that total \$4.2 million including Water Supply & Treatment, \$1.2 million; Transmission & Distribution, \$0.9 million; Wastewater Treatment, \$0.9 million; Engineering & Information Services, \$0.5 million; among others.

Financial Revenue

Investment income was budgeted to decrease this year as a result of Accounting changes. Previously, investment income was earned in part through charges on Capital Assets Under Construction. This practice was eliminated for the current fiscal year but higher than anticipated cash balances and rising interest rates have mitigated the impact on revenue. Miscellaneous revenue is up \$1.2 million including the receipt in December of a payment of \$0.9 million in relation to total completion of the Harbour Solutions project. Miscellaneous Revenue also includes various un-regulated activities such as tower leases, energy generation, consulting activities and some contracted services.

Financial Expenses

Long Term Debt costs have decreased \$0.4 million from the prior year. Debt servicing savings are a result of new debt issues having lower interest rates than older, maturing issues. New debt was issued in the Municipal Finance Corporation's Fall Debenture in the amount of \$10.0 million. The Dividend/Grant In Lieu of Taxes is paid annually to HRM. The amount is based on the net asset value of water assets and will increase this year to \$4.8 million.

The following table shows operating results for each service.

Year to Date Operating Results by Service		
	2017/18	2016/17
	'000	'000
Water	\$2,343	\$4,862
Wastewater	\$5,134	\$5,965
Stormwater	(\$88)	\$2,027
Net Surplus (Deficit)	\$7,389	\$12,854

Water Operations - Page 5

Water Operations show a profit of \$2.3 million, compared to a profit of \$4.9 million for the previous year at this time. Water revenue is up \$0.2 million. Operating Expenses are up \$2.3 million with Administration & Pension showing the largest increase at \$1.1 million.

Wastewater Operations - Page 6

Wastewater Operations show a profit of \$5.1 million, down from a profit of \$6.0 million in the prior year. Wastewater revenue has increased \$0.4 million from the prior year, with Metered Sales and Overstrength Agreements accounting for the increase. Operating expenses have increased by \$3.0 million from the previous year. Expenses in Wastewater Collection are \$1.6 million higher. Higher costs are also seen in Wastewater Treatment, Administration & Pension, and Depreciation.

Stormwater Operations - Page 7

Stormwater Operations show a loss of \$0.1 million, a decline from the profit of \$2.0 million for the same period last year.

Revenue is down \$0.1 million, with slight declines in each Revenue category. Expenses are higher for Stormwater Collection by \$0.8 million and for Regulatory Services by \$0.6 million. Financial Expenses are up \$0.5 million, reflecting the growing capital expenditures and associated debt servicing costs for Stormwater.

Regulated and Unregulated Operations - Page 8

Activities regulated by the NSUARB show a profit of \$5.9 million, a decline from the \$11.8 million profit for the same period last year.

Unregulated activities show a profit of \$1.5 million, ahead of the profit of \$1.0 million for the prior year. The profit increase is a result of the contract to treat wastewater from the aircraft carrier that visited Halifax in the summer and lower costs associated with de-watering and bio-solids treatment.

Results by Activity		
	2017/18	2016/17
	'000	'000
Regulated Activities	\$5,876	\$11,833
Unregulated Activities	\$1,513	\$1,021
Net Surplus (Deficit)	\$7,389	\$12,854

Results under International Financial Reporting Standards - Pages 9 & 10

As noted previously, the AcSB requires HRWC, as a rate regulated utility, to report financial results using International Financial Reporting Standards (IFRS).

On the IFRS Balance Sheet, Accumulated Depreciation is higher producing a lower value for assets, Contributed Capital is treated as a long term liability and amortized rather than being treated as a contribution to equity, and the Operating Surplus is much higher due to changes in the Income Statement.

On the IFRS Income Statement, Operating Revenue is the same. Depreciation Expense is higher as contributed assets are depreciated and some assets are depreciated more quickly. Financial Revenue is higher as the amortization of contributed capital is treated as revenue. The most significant change is Financial Expenses are lower as there is no expense for the Long Term Debt Principal appropriation – a difference of \$21.4 million for the full year.

The IFRS Net Profit for the year to date is \$20.6 million.

ATTACHMENTS

Unaudited Operating Results for the nine (9) months ended December 31, 2017

Report prepared by: Original Signed By:
 Warren Brake, Manager, Accounting, B.Comm, CPA, CGA
 902-490-4814

HALIFAX WATER
UNAUDITED BALANCE SHEET - CONSOLIDATED
AS OF DECEMBER 31, 2017

	2017	2016
	'000	'000
ASSETS		
Cash	\$38,666	\$62,164
Accounts Receivable	\$38,430	\$33,698
Materials & Supplies	\$1,638	\$1,599
Prepaid Expenses	\$12	\$24
	<u>\$78,746</u>	<u>\$97,485</u>
Regulatory Asset	\$3,245	\$3,436
Plant in Service	\$1,137,825	\$1,134,314
Assets Under Construction	\$87,354	\$52,665
	<u>\$1,228,424</u>	<u>\$1,190,416</u>
Unamortized Debt Discount & Issue Expense	\$961	\$1,082
	<u>\$1,308,131</u>	<u>\$1,288,983</u>
LIABILITIES & CAPITAL		
Trade Payables & Accrued Liabilities	\$21,028	\$21,752
Deposits & Unearned Revenue	\$2,195	\$1,780
Current Portion of Long Term Debt	\$20,916	\$23,195
	<u>\$44,139</u>	<u>\$46,726</u>
Pension & Accrued Retirement Benefits	\$64,963	\$60,781
RDC & Special Purpose Reserves	\$22,538	\$12,217
Long Term Debt	\$196,954	\$206,062
Total Liabilities	<u>\$328,594</u>	<u>\$325,786</u>
Capital Surplus, Committed Reserves, & Accumulated OCI	\$955,471	\$942,523
Operating Surplus	\$16,677	\$7,819
Excess (Deficiency) of Revenue over Expenditure - Consolidated	\$7,389	\$12,854
Total Capital & Surplus	<u>\$979,538</u>	<u>\$963,197</u>
	<u>\$1,308,131</u>	<u>\$1,288,983</u>

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HALIFAX WATER
UNAUDITED INCOME STATEMENT - CONSOLIDATED
APRIL 1/17 - DECEMBER 31/17 (9 MONTHS)
75.00%

ACTUAL (CURRENT MONTH)		DESCRIPTION	ACTUAL (YEAR TO DATE)		APR 1/17	APR 1/17	% of FORECAST
THIS YEAR '000	LAST YEAR '000		THIS YEAR '000	LAST YEAR '000	MAR 31/18 BUDGET*	MAR 31/18 FORECAST	
\$11,092	\$11,482	OPERATING REVENUE	\$105,304	\$105,259	\$135,587	\$137,182	76.76%
\$7,353	\$8,714	OPERATING EXPENSES	\$71,866	\$66,475	\$101,883	\$96,141	74.75%
\$3,739	\$2,769	OPERATING PROFIT	\$33,438	\$38,783	\$33,704	\$41,041	81.47%
		FINANCIAL REVENUE					
\$55	\$85	INVESTMENT INCOME	\$481	\$597	\$346	\$571	84.30%
\$167	\$167	PNS FUNDING HHSP DEBT	\$1,500	\$1,500	\$2,000	\$2,000	75.00%
\$910	\$49	MISCELLANEOUS	\$1,590	\$389	\$441	\$1,805	88.04%
\$1,132	\$301		\$3,571	\$2,486	\$2,787	\$4,376	81.59%
		FINANCIAL EXPENSES					
\$669	\$714	LONG TERM DEBT INTEREST	\$5,995	\$6,447	\$9,530	\$7,819	76.68%
\$1,777	\$1,822	LONG TERM DEBT PRINCIPAL	\$16,037	\$16,010	\$24,289	\$21,426	74.85%
\$17	\$17	AMORTIZATION DEBT DISCOUNT	\$152	\$149	\$217	\$200	75.65%
\$398	\$382	DIVIDEND/GRANT IN LIEU OF TAXES	\$3,580	\$3,455	\$4,827	\$4,774	75.00%
\$1	\$2	MISCELLANEOUS	\$104	\$40	\$19	\$158	65.59%
\$2,862	\$2,937		\$25,868	\$26,101	\$38,882	\$34,377	75.25%
\$2,009	\$133	NET PROFIT (LOSS) BEFORE OTHER COMPREHENSIVE INCOME	\$11,140	\$15,169	(\$2,392)	\$11,040	100.91%
		NON NSUARB ITEMS					
(\$417)	(\$257)	PENSION PLAN EXPENSE	(\$3,752)	(\$2,315)	(\$4,358)	(\$4,358)	86.08%
\$184	\$0	OTHER COMPREHENSIVE INCOME	\$1,653	\$0	\$0	\$2,204	75.00%
(\$233)	(\$257)		(\$2,098)	(\$2,315)	(\$4,358)	(\$2,154)	97.42%
\$1,776	(\$124)	NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	\$9,042	\$12,854	(\$6,750)	\$8,886	101.76%

HALIFAX WATER
UNAUDITED BALANCE SHEET
AS OF DECEMBER 31, 2017

	2017 '000	2016 '000
ASSETS		
Cash	\$38,666	\$62,164
Accounts Receivable		
Customers & Contractual	\$16,899	\$12,428
Customers & Contractual - Unbilled Services	\$18,564	\$18,495
Halifax Regional Municipality	\$2,967	\$2,775
Materials & Supplies	\$1,638	\$1,599
Prepaid Expenses	\$12	\$24
	<u>\$78,746</u>	<u>\$97,485</u>
Regulatory Asset	\$3,245	\$3,436
Plant in Service - Water	\$600,023	\$584,609
Plant in Service - Wastewater	\$714,188	\$695,811
Plant in Service - Stormwater	\$245,193	\$234,169
Less: Accumulated Depreciation - Water	(\$178,307)	(\$168,790)
Accumulated Depreciation - Wastewater	(\$199,456)	(\$177,172)
Accumulated Depreciation - Stormwater	(\$43,816)	(\$34,313)
	<u>\$1,141,070</u>	<u>\$1,137,751</u>
Assets Under Construction	\$87,354	\$52,665
	<u>\$1,228,424</u>	<u>\$1,190,416</u>
Unamortized Debt Discount & Issue Expense	\$961	\$1,082
	<u>\$1,308,131</u>	<u>\$1,288,983</u>
LIABILITIES & CAPITAL		
Trade	\$15,194	\$13,281
Interest on Long Term Debt	\$1,858	\$2,060
Halifax Regional Municipality	\$3,977	\$6,411
Contractor & Customer Deposits	\$191	\$188
Unearned Revenue	\$2,004	\$1,592
Current Portion of Long Term Debt	\$20,916	\$23,195
	<u>\$44,139</u>	<u>\$46,726</u>
Accrued Post-Retirement Benefits	\$341	\$466
Accrued Pre-Retirement Benefit	\$4,044	\$3,736
Deferred Pension Liability	\$60,578	\$56,580
Special Purpose Reserves not allocated to projects	\$1,222	\$1,822
Regional Development Charge	\$21,317	\$10,394
Long Term Debt-Water	\$58,868	\$61,323
Long Term Debt-Wastewater	\$127,043	\$133,370
Long Term Debt-Stormwater	\$11,043	\$11,369
Total Liabilities	<u>\$328,594</u>	<u>\$325,786</u>
Capital Surplus	\$982,241	\$971,689
Committed Reserves	\$2,391	\$2,391
Accumulated Other Comprehensive Income	(\$41,540)	(\$43,936)
Operating Surplus used to Fund Capital	\$12,380	\$12,380
Operating Surplus	\$16,677	\$7,819
Excess (Deficiency) of Revenue over Expenditure - Consolidated	\$7,389	\$12,854
Total Capital & Surplus	<u>\$979,538</u>	<u>\$963,197</u>
	<u>\$1,308,131</u>	<u>\$1,288,983</u>

HALIFAX WATER
UNAUDITED INCOME STATEMENT - ALL SERVICES
APRIL 1/17 - DECEMBER 31/17 (9 MONTHS)
75.00%

ACTUAL (CURRENT MONTH)		DESCRIPTION	ACTUAL (YEAR TO DATE)		APR 1/17	APR 1/17	% of BUDGET*	% of FORECAST
THIS YEAR	LAST YEAR		THIS YEAR	LAST YEAR	MAR 31/18 BUDGET*	MAR 31/18 FORECAST		
'000	'000		'000	'000	'000	'000		
REVENUE								
\$3,790	\$3,924	METERED SALES - WATER	\$35,861	\$36,048	\$46,610	\$46,610	76.94%	76.94%
\$5,577	\$5,787	METERED SALES - WASTEWATER	\$53,275	\$52,993	\$67,756	\$69,256	78.63%	76.92%
\$551	\$570	STORMWATER SITE GENERATED SERVICE	\$4,999	\$5,038	\$6,700	\$6,700	74.62%	74.62%
\$590	\$590	FIRE PROTECTION	\$5,306	\$5,306	\$7,074	\$7,074	75.00%	75.00%
\$321	\$323	STORMWATER RIGHT OF WAY SERVICE	\$2,885	\$2,911	\$3,881	\$3,847	74.33%	75.00%
\$211	\$235	OTHER SERVICES AND FEES	\$2,372	\$2,289	\$2,716	\$2,926	87.32%	81.05%
\$31	\$33	CUSTOMER LATE PAY./COLLECTION FEES	\$278	\$378	\$491	\$401	56.60%	69.31%
\$22	\$21	MISCELLANEOUS	\$329	\$297	\$358	\$368	92.04%	89.54%
\$11,092	\$11,482		\$105,304	\$105,259	\$135,587	\$137,182	77.67%	76.76%
EXPENSES								
\$648	\$701	WATER SUPPLY & TREATMENT	\$5,456	\$5,215	\$8,565	\$7,338	63.70%	74.36%
\$580	\$809	TRANSMISSION & DISTRIBUTION	\$6,430	\$6,221	\$8,969	\$8,108	71.70%	79.31%
\$793	\$946	WASTEWATER COLLECTION	\$8,251	\$6,643	\$9,653	\$9,702	85.48%	85.05%
\$1,264	\$1,661	WASTEWATER TREATMENT PLANTS	\$13,412	\$12,841	\$19,251	\$18,161	69.67%	73.85%
\$395	\$464	STORMWATER COLLECTION	\$3,823	\$3,061	\$4,589	\$4,437	83.31%	86.17%
\$197	\$305	SMALL SYSTEMS AND OTHER SERVICES	\$1,975	\$2,256	\$3,170	\$2,834	62.29%	69.67%
\$159	\$234	SCADA, CONTROL & PUMPING	\$1,613	\$1,578	\$2,210	\$2,080	73.00%	77.57%
\$700	\$753	ENGINEERING & INFORMATION SERVICES	\$5,418	\$4,942	\$7,504	\$7,064	72.20%	76.70%
\$234	\$317	REGULATORY SERVICES	\$2,496	\$2,335	\$3,710	\$3,327	67.28%	75.03%
\$349	\$442	CUSTOMER SERVICE	\$3,510	\$3,251	\$4,626	\$4,626	75.88%	75.88%
\$386	\$569	ADMINISTRATION & PENSION	\$4,539	\$4,405	\$7,096	\$6,896	63.96%	65.82%
\$1,648	\$1,513	DEPRECIATION	\$14,941	\$13,729	\$22,538	\$21,568	66.29%	69.27%
\$7,353	\$8,714		\$71,866	\$66,475	\$101,883	\$96,141	70.54%	74.75%
\$3,739	\$2,769	OPERATING PROFIT	\$33,438	\$38,783	\$33,704	\$41,041	99.21%	81.47%
FINANCIAL REVENUE								
\$55	\$85	INVESTMENT INCOME	\$481	\$597	\$346	\$571	139.19%	84.30%
\$167	\$167	PNS FUNDING HHSP DEBT	\$1,500	\$1,500	\$2,000	\$2,000	75.00%	75.00%
\$910	\$49	MISCELLANEOUS	\$1,590	\$389	\$441	\$1,805	360.25%	88.04%
\$1,132	\$301		\$3,571	\$2,486	\$2,787	\$4,376	128.12%	81.59%
FINANCIAL EXPENSES								
\$669	\$714	LONG TERM DEBT INTEREST	\$5,995	\$6,447	\$9,530	\$7,819	62.91%	76.68%
\$1,777	\$1,822	LONG TERM DEBT PRINCIPAL	\$16,037	\$16,010	\$24,289	\$21,426	66.03%	74.85%
\$17	\$17	AMORTIZATION DEBT DISCOUNT	\$152	\$149	\$217	\$200	69.73%	75.65%
\$398	\$382	DIVIDEND/GRANT IN LIEU OF TAXES	\$3,580	\$3,455	\$4,827	\$4,774	74.18%	75.00%
\$1	\$2	MISCELLANEOUS	\$104	\$40	\$19	\$158	539.77%	65.59%
\$2,862	\$2,937		\$25,868	\$26,101	\$38,882	\$34,377	66.53%	75.25%
\$2,009	\$133	NET PROFIT (LOSS) BEFORE OTHER COMPREHENSIVE INCOME	\$11,140	\$15,169	(\$2,392)	\$11,040	565.83%	100.91%
NON NSUARB ITEMS								
(\$417)	(\$257)	PENSION PLAN EXPENSE	(\$3,752)	(\$2,315)	(\$4,358)	(\$4,358)	86.08%	86.08%
\$184	\$0	OTHER COMPREHENSIVE INCOME	\$1,653	\$0	\$0	\$2,204	0.00%	75.00%
(\$233)	(\$257)		(\$2,098)	(\$2,315)	(\$4,358)	(\$2,154)	48.14%	97.42%
\$1,776	(\$124)	NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	\$9,042	\$12,854	(\$6,750)	\$8,886	233.96%	101.76%

HALIFAX WATER
UNAUDITED INCOME STATEMENT - WATER OPERATIONS
APRIL 1/17 - DECEMBER 31/17 (9 MONTHS)
75.00%

ACTUAL (CURRENT MONTH)		DESCRIPTION	ACTUAL (YEAR TO DATE)		APR 1/17	APR 1/17	% of FORECAST
THIS YEAR	LAST YEAR		THIS YEAR	LAST YEAR	MAR 31/18 BUDGET*	MAR 31/18 FORECAST	
'000	'000		'000	'000	'000	'000	
REVENUE							
\$3,790	\$3,924	METERED SALES	\$35,861	\$36,048	\$46,610	\$46,610	76.94%
\$590	\$590	FIRE PROTECTION	\$5,306	\$5,306	\$7,074	\$7,074	75.00%
\$74	\$74	PRIVATE FIRE PROTECTION SERVICES	\$641	\$621	\$857	\$857	74.74%
\$18	\$17	BULK WATER STATIONS	\$270	\$293	\$314	\$289	93.32%
\$15	\$19	CUSTOMER LATE PAY./COLLECTION FEES	\$161	\$203	\$212	\$212	76.03%
\$10	\$9	MISCELLANEOUS	\$133	\$122	\$139	\$139	95.73%
\$4,496	\$4,631		\$42,371	\$42,593	\$55,207	\$55,182	76.78%
EXPENSES							
\$648	\$701	WATER SUPPLY & TREATMENT	\$5,456	\$5,215	\$8,565	\$7,338	74.36%
\$580	\$809	TRANSMISSION & DISTRIBUTION	\$6,430	\$6,221	\$8,969	\$8,108	79.31%
\$78	\$87	SMALL SYSTEMS (inc. Contract Systems)	\$825	\$778	\$1,073	\$997	82.78%
\$59	\$81	SCADA, CONTROL & PUMPING	\$582	\$586	\$873	\$838	69.53%
\$295	\$311	ENGINEERING & INFORMATION SERVICES	\$2,488	\$2,174	\$3,515	\$3,350	74.29%
\$52	\$136	REGULATORY SERVICES	\$614	\$1,011	\$1,374	\$1,005	61.13%
\$178	\$225	CUSTOMER SERVICE	\$1,877	\$1,656	\$2,357	\$2,357	79.62%
\$409	\$425	ADMINISTRATION & PENSION	\$4,565	\$3,435	\$5,836	\$5,734	79.61%
\$672	\$614	DEPRECIATION	\$6,093	\$5,549	\$9,218	\$8,728	69.81%
\$2,970	\$3,390		\$28,932	\$26,625	\$41,781	\$38,455	75.24%
\$1,525	\$1,242	OPERATING PROFIT	\$13,438	\$15,968	\$13,426	\$16,727	80.34%
FINANCIAL REVENUE							
\$25	\$38	INVESTMENT INCOME	\$216	\$269	\$156	\$256	84.71%
\$27	\$39	MISCELLANEOUS	\$356	\$276	\$428	\$547	65.06%
\$52	\$77		\$572	\$545	\$583	\$802	71.32%
FINANCIAL EXPENSES							
\$185	\$205	LONG TERM DEBT INTEREST	\$1,639	\$1,826	\$2,683	\$2,043	80.24%
\$659	\$724	LONG TERM DEBT PRINCIPAL	\$6,282	\$6,290	\$9,012	\$8,292	75.76%
\$8	\$8	AMORTIZATION DEBT DISCOUNT	\$71	\$71	\$98	\$93	76.22%
\$398	\$382	DIVIDEND/GRANT IN LIEU OF TAXES	\$3,580	\$3,455	\$4,827	\$4,774	75.00%
(\$1)	\$0	MISCELLANEOUS	\$95	\$9	\$19	\$158	59.99%
\$1,248	\$1,319		\$11,667	\$11,650	\$16,639	\$15,360	75.96%
\$329	(\$0)	NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	\$2,343	\$4,862	(\$2,630)	\$2,169	108.05%

HALIFAX WATER
UNAUDITED INCOME STATEMENT - WASTEWATER OPERATIONS
APRIL 1/17 - DECEMBER 31/17 (9 MONTHS)
75.00%

ACTUAL (CURRENT MONTH)		DESCRIPTION	ACTUAL (YEAR TO DATE)		APR 1/17	APR 1/17	% of FORECAST
THIS YEAR	LAST YEAR		THIS YEAR	LAST YEAR	MAR 31/18	MAR 31/18	
'000	'000		'000	'000	BUDGET*	FORECAST	
REVENUE							
\$5,577	\$5,787	METERED SALES	\$53,275	\$52,993	\$67,756	\$69,256	76.92%
\$4	\$0	WASTEWATER OVERSTRENGTH AGREEMENTS	\$185	\$23	\$0	\$180	102.52%
\$24	\$42	LEACHATE CONTRACT	\$227	\$255	\$389	\$389	58.38%
\$12	\$8	CONTRACT REVENUE	\$64	\$57	\$86	\$86	74.91%
\$17	\$17	DEWATERING FACILITY/SLUDGE LAGOON	\$157	\$157	\$210	\$210	74.99%
\$30	\$12	AIRLINE EFFLUENT	\$98	\$66	\$86	\$86	113.95%
\$33	\$65	SEPTAGE TIPPING FEES	\$731	\$817	\$775	\$830	88.02%
\$15	\$13	CUSTOMER LATE PAY./COLLECTION FEES	\$122	\$142	\$240	\$180	67.90%
\$8	\$8	MISCELLANEOUS	\$110	\$103	\$129	\$129	85.12%
\$5,720	\$5,953		\$54,968	\$54,614	\$69,670	\$71,345	77.05%
EXPENSES							
\$793	\$946	WASTEWATER COLLECTION	\$8,251	\$6,643	\$9,653	\$9,702	85.05%
\$1,264	\$1,661	WASTEWATER TREATMENT PLANTS	\$13,412	\$12,841	\$19,251	\$18,161	73.85%
\$88	\$109	SMALL SYSTEMS	\$861	\$865	\$1,276	\$1,235	69.72%
\$11	\$70	DEWATERING FACILITY/ SLUDGE MGM'T	\$91	\$322	\$380	\$160	56.63%
\$0	\$2	BIOSOLIDS TREATMENT	\$1	\$70	\$101	\$101	0.74%
\$21	\$37	LEACHATE CONTRACT	\$197	\$220	\$341	\$341	57.70%
\$98	\$148	SCADA, CONTROL & PUMPING	\$997	\$960	\$1,306	\$1,215	82.11%
\$348	\$380	ENGINEERING & INFORMATION SERVICES	\$2,520	\$2,380	\$3,431	\$3,195	78.88%
\$75	\$96	REGULATORY SERVICES	\$713	\$766	\$1,094	\$1,251	57.02%
\$147	\$186	CUSTOMER SERVICE	\$1,405	\$1,371	\$2,064	\$2,064	68.09%
\$339	\$345	ADMINISTRATION & PENSION	\$3,204	\$2,825	\$4,833	\$4,748	67.49%
\$917	\$850	DEPRECIATION	\$8,310	\$7,738	\$12,465	\$12,045	68.99%
\$4,098	\$4,830		\$39,963	\$37,002	\$56,194	\$54,217	73.71%
\$1,622	\$1,123	OPERATING PROFIT	\$15,005	\$17,612	\$13,476	\$17,128	87.60%
FINANCIAL REVENUE							
\$25	\$38	INVESTMENT INCOME	\$216	\$269	\$156	\$256	84.71%
\$167	\$167	PNS FUNDING HHSP DEBT	\$1,500	\$1,500	\$2,000	\$2,000	75.00%
\$883	\$10	MISCELLANEOUS	\$1,234	\$114	\$14	\$1,259	98.02%
\$1,075	\$215		\$2,950	\$1,883	\$2,169	\$3,514	83.95%
FINANCIAL EXPENSES							
\$437	\$459	LONG TERM DEBT INTEREST	\$3,926	\$4,178	\$6,022	\$5,206	75.41%
\$1,010	\$1,041	LONG TERM DEBT PRINCIPAL	\$8,814	\$9,249	\$13,699	\$11,881	74.19%
\$8	\$8	AMORTIZATION DEBT DISCOUNT	\$73	\$71	\$107	\$97	75.14%
\$2	\$2	MISCELLANEOUS	\$9	\$31	\$0	\$0	0.00%
\$1,458	\$1,510		\$12,821	\$13,529	\$19,828	\$17,183	74.62%
\$1,238	(\$172)	NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	\$5,134	\$5,965	(\$4,183)	\$3,459	148.42%

HALIFAX WATER
UNAUDITED INCOME STATEMENT - STORMWATER OPERATIONS
APRIL 1/17 - DECEMBER 31/17 (9 MONTHS)
75.00%

ACTUAL (CURRENT MONTH)		DESCRIPTION	ACTUAL (YEAR TO DATE)		APR 1/17	APR 1/17	% of FORECAST
THIS YEAR	LAST YEAR		THIS YEAR	LAST YEAR	MAR 31/18 BUDGET*	MAR 31/18 FORECAST	
'000	'000		'000	'000	'000	'000	
REVENUE							
\$551	\$570	STORMWATER SITE GENERATED SERVICE	\$4,999	\$5,038	\$6,700	\$6,700	74.62%
\$321	\$323	STORMWATER RIGHT OF WAY SERVICE	\$2,885	\$2,911	\$3,881	\$3,847	75.00%
\$1	\$1	CUSTOMER LATE PAY./COLLECTION FEES	(\$5)	\$32	\$39	\$9	-57.27%
\$4	\$4	MISCELLANEOUS	\$86	\$71	\$89	\$99	86.62%
\$876	\$898		\$7,965	\$8,052	\$10,710	\$10,655	74.75%
EXPENSES							
\$395	\$464	STORMWATER COLLECTION	\$3,823	\$3,061	\$4,589	\$4,437	86.17%
\$3	\$5	SCADA, CONTROL & PUMPING	\$33	\$32	\$31	\$27	121.63%
\$57	\$62	ENGINEERING & INFORMATION SERVICES	\$410	\$388	\$558	\$520	78.88%
\$108	\$85	REGULATORY SERVICES	\$1,169	\$558	\$1,242	\$1,071	109.09%
\$24	\$30	CUSTOMER SERVICE	\$229	\$223	\$205	\$205	111.21%
\$55	\$56	ADMINISTRATION & PENSION	\$521	\$459	\$786	\$772	67.49%
\$59	\$49	DEPRECIATION	\$537	\$442	\$855	\$795	67.62%
\$701	\$752		\$6,722	\$5,163	\$8,266	\$7,828	85.88%
\$175	\$147	OPERATING PROFIT	\$1,243	\$2,889	\$2,444	\$2,827	43.95%
FINANCIAL REVENUE							
\$6	\$9	INVESTMENT INCOME	\$48	\$59	\$35	\$60	80.76%
\$0	\$0	MISCELLANEOUS	\$0	\$0	\$0	\$0	0.00%
\$6	\$9		\$48	\$59	\$35	\$60	80.76%
FINANCIAL EXPENSES							
\$48	\$50	LONG TERM DEBT INTEREST	\$430	\$443	\$825	\$570	75.49%
\$107	\$56	LONG TERM DEBT PRINCIPAL	\$941	\$471	\$1,577	\$1,253	75.11%
\$1	\$1	AMORTIZATION DEBT DISCOUNT	\$7	\$7	\$12	\$10	75.23%
\$156	\$107		\$1,379	\$921	\$2,414	\$1,833	75.23%
\$25	\$48	NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	(\$88)	\$2,027	\$64	\$1,054	108.40%

HALIFAX WATER
UNAUDITED INCOME STATEMENT - REGULATED AND UNREGULATED OPERATIONS
APRIL 1/17 - DECEMBER 31/17 (9 MONTHS)
75.00%

DESCRIPTION	ACTUAL (YEAR TO DATE)		APR 1/17 MAR 31/18 BUDGET*	APR 1/17 MAR 31/18 FORECAST	% of FORECAST
	THIS YEAR	LAST YEAR			
REGULATED ACTIVITIES					
REVENUE					
METERED SALES	\$94,134	\$94,078	\$121,067	\$122,567	76.80%
FIRE PROTECTION	\$5,306	\$5,306	\$7,074	\$7,074	75.00%
PRIVATE FIRE PROTECTION	\$641	\$621	\$857	\$857	74.74%
STORMWATER SERVICE	\$2,885	\$2,911	\$3,881	\$3,847	75.00%
OTHER OPERATING REVENUE	\$1,033	\$962	\$1,141	\$1,216	84.98%
	\$103,999	\$103,878	\$134,020	\$135,561	76.72%
EXPENSES					
WATER SUPPLY & TREATMENT	\$5,456	\$5,215	\$8,565	\$7,338	74.36%
TRANSMISSION & DISTRIBUTION	\$6,430	\$6,221	\$8,969	\$8,108	79.31%
WASTEWATER & STORMWATER COLLECTION	\$12,071	\$9,689	\$14,241	\$14,139	85.37%
WASTEWATER TREATMENT PLANTS	\$13,412	\$12,841	\$19,251	\$18,161	73.85%
SMALL SYSTEMS	\$1,673	\$1,631	\$2,324	\$2,208	75.80%
SCADA, CONTROL & PUMPING	\$1,613	\$1,578	\$2,210	\$2,080	77.57%
ENGINEERING & INFORMATION SERVICES	\$5,418	\$4,942	\$7,504	\$7,064	76.70%
REGULATORY SERVICES	\$2,496	\$2,335	\$3,710	\$3,327	75.03%
CUSTOMER SERVICE	\$3,484	\$3,224	\$4,591	\$4,591	75.88%
ADMINISTRATION & PENSION	\$8,261	\$6,703	\$11,424	\$11,233	73.54%
DEPRECIATION	\$14,925	\$13,725	\$22,538	\$21,568	69.20%
	\$75,241	\$68,104	\$105,330	\$99,817	75.38%
FINANCIAL REVENUE					
INVESTMENT INCOME	\$481	\$597	\$346	\$571	84.30%
MISCELLANEOUS	\$2,401	\$1,523	\$2,083	\$3,327	72.16%
	\$2,882	\$2,120	\$2,429	\$3,898	73.94%
FINANCIAL EXPENSES					
LONG TERM DEBT INTEREST	\$5,995	\$6,447	\$9,530	\$7,819	76.68%
LONG TERM DEBT PRINCIPAL	\$16,037	\$16,010	\$24,289	\$21,426	74.85%
AMORTIZATION DEBT DISCOUNT	\$152	\$149	\$217	\$200	75.65%
DIVIDEND/GRANT IN LIEU OF TAXES	\$3,580	\$3,455	\$4,827	\$4,774	75.00%
	\$25,764	\$26,060	\$38,863	\$34,219	75.29%
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	\$5,876	\$11,833	(\$7,744)	\$5,422	108.36%
UNREGULATED ACTIVITIES					
REVENUE					
SEPTAGE TIPPING FEES	\$731	\$817	\$775	\$830	88.02%
LEACHATE CONTRACT	\$227	\$255	\$389	\$389	58.38%
CONTRACT REVENUE	\$64	\$57	\$86	\$86	74.91%
DEWATERING	\$157	\$157	\$210	\$210	74.99%
AIRLINE EFFLUENT	\$98	\$66	\$86	\$86	113.95%
ENERGY PROJECTS	\$116	\$122	\$184	\$184	62.91%
MISCELLANEOUS	\$28	\$28	\$22	\$22	129.53%
	\$1,420	\$1,503	\$1,750	\$1,805	78.67%
EXPENSES					
WATER SUPPLY & TREATMENT	\$13	\$12	\$25	\$25	53.91%
WASTEWATER TREATMENT	\$292	\$627	\$821	\$602	48.42%
SPONSORSHIPS & DONATIONS	\$55	\$42	\$66	\$56	99.58%
DEPRECIATION	\$16	\$4	\$0	\$0	0.00%
	\$376	\$686	\$912	\$682	55.16%
FINANCIAL REVENUE					
MISCELLANEOUS	\$573	\$244	\$174	\$295	194.54%
	\$573	\$244	\$174	\$295	194.54%
FINANCIAL EXPENSES					
MISCELLANEOUS	\$104	\$40	\$19	\$158	65.59%
	\$104	\$40	\$19	\$158	65.59%
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	\$1,513	\$1,021	\$994	\$1,259	120.16%
NET PROFIT (LOSS) AVAILABLE FOR TOTAL CAPITAL EXPENDITURES (REG & UNREG)	\$7,389	\$12,854	(\$6,750)	\$6,682	110.59%

HALIFAX WATER
UNAUDITED BALANCE SHEET - IFRS FORMAT
AS OF DECEMBER 31, 2017

	2017 '000	2016 '000
ASSETS		
Cash	\$38,666	\$62,164
Accounts Receivable		
Customers & Contractual	\$16,899	\$12,428
Customers & Contractual - Unbilled Services	\$18,564	\$18,495
Halifax Regional Municipality	\$2,967	\$2,775
Materials & Supplies	\$1,638	\$1,599
Prepaid Expenses	\$12	\$24
	<u>\$78,746</u>	<u>\$97,485</u>
Regulatory Asset	\$3,245	\$3,436
Plant in Service - Water	\$600,023	\$584,609
Plant in Service - Wastewater	\$714,188	\$695,811
Plant in Service - Stormwater	\$245,193	\$234,169
Less: Accumulated Depreciation - Water	(\$183,853)	(\$173,845)
Accumulated Depreciation - Wastewater	(\$205,612)	(\$182,080)
Accumulated Depreciation - Stormwater	(\$43,814)	(\$34,313)
	<u>\$1,129,370</u>	<u>\$1,127,789</u>
Assets Under Construction	\$87,354	\$52,665
	<u>\$1,216,724</u>	<u>\$1,180,454</u>
Unamortized Debt Discount & Issue Expense	\$961	\$1,082
	<u><u>\$1,296,431</u></u>	<u><u>\$1,279,021</u></u>
LIABILITIES		
Trade	\$15,194	\$13,281
Interest on Long Term Debt	\$1,858	\$2,060
Halifax Regional Municipality	\$3,977	\$6,411
Contractor & Customer Deposits	\$191	\$188
Unearned Revenue	\$2,004	\$1,592
Current Portion of Deferred Contributed Capital	\$12,889	\$12,526
Current Portion of Long Term Debt	\$20,916	\$23,195
	<u>\$57,027</u>	<u>\$59,252</u>
Accrued Post-Retirement Benefits	\$341	\$466
Accrued Pre-Retirement Benefit	\$4,044	\$3,736
Deferred Pension Liability	\$60,578	\$56,580
Deferred Contributed Capital	\$809,304	\$803,854
Long Term Debt-Water	\$58,868	\$61,323
Long Term Debt-Wastewater	\$127,043	\$133,370
Long Term Debt-Stormwater	\$11,043	\$11,369
Total Liabilities	<u>\$1,128,248</u>	<u>\$1,129,950</u>
EQUITY		
Accumulated Other Comprehensive Income	(\$41,540)	(\$43,936)
Accumulated Surplus	\$190,822	\$167,606
Excess (Deficiency) of Revenue over Expenditure	\$18,901	\$25,401
Total Equity	<u>\$168,183</u>	<u>\$149,071</u>
	<u><u>\$1,296,431</u></u>	<u><u>\$1,279,021</u></u>

HALIFAX WATER
UNAUDITED INCOME STATEMENT - IFRS FORMAT - ALL SERVICES
APRIL 1/17 - DECEMBER 31/17 (9 MONTHS)
75.00%

ACTUAL (CURRENT MONTH)		DESCRIPTION	ACTUAL (YEAR TO DATE)		APR 1/17	APR 1/17	% of BUDGET*	% of FORECAST
THIS YEAR	LAST YEAR		THIS YEAR	LAST YEAR	MAR 31/18	MAR 31/18		
'000	'000		'000	'000	BUDGET*	FORECAST		
REVENUE								
\$3,790	\$3,924	METERED SALES - WATER	\$35,861	\$36,048	\$46,610	\$46,610	76.94%	76.94%
\$5,577	\$5,787	METERED SALES - WASTEWATER	\$53,275	\$52,993	\$67,756	\$69,256	78.63%	76.92%
\$551	\$570	STORMWATER SITE GENERATED SERVICE	\$4,999	\$5,038	\$6,700	\$6,700	74.62%	74.62%
\$590	\$590	FIRE PROTECTION	\$5,306	\$5,306	\$7,074	\$7,074	75.00%	75.00%
\$321	\$323	STORMWATER RIGHT OF WAY SERVICE	\$2,885	\$2,911	\$3,881	\$3,847	74.33%	75.00%
\$211	\$235	OTHER SERVICES AND FEES	\$2,372	\$2,289	\$2,716	\$2,926	87.32%	81.05%
\$31	\$33	CUSTOMER LATE PAY./COLLECTION FEES	\$278	\$378	\$491	\$401	56.60%	69.31%
\$22	\$21	MISCELLANEOUS	\$329	\$297	\$358	\$368	92.04%	89.54%
\$11,092	\$11,482		\$105,304	\$105,259	\$135,587	\$137,182	77.67%	76.76%
EXPENSES								
\$648	\$701	WATER SUPPLY & TREATMENT	\$5,456	\$5,215	\$8,565	\$7,338	63.70%	74.36%
\$580	\$809	TRANSMISSION & DISTRIBUTION	\$6,430	\$6,221	\$8,969	\$8,108	71.70%	79.31%
\$793	\$946	WASTEWATER COLLECTION	\$8,251	\$6,643	\$9,653	\$9,702	85.48%	85.05%
\$1,264	\$1,661	WASTEWATER TREATMENT PLANTS	\$13,412	\$12,841	\$19,251	\$18,161	69.67%	73.85%
\$395	\$464	STORMWATER COLLECTION	\$3,823	\$3,061	\$4,589	\$4,437	83.31%	86.17%
\$197	\$305	SMALL SYSTEMS AND OTHER SERVICES	\$1,975	\$2,256	\$3,170	\$2,834	62.29%	69.67%
\$159	\$234	SCADA, CONTROL & PUMPING	\$1,613	\$1,578	\$2,210	\$2,080	73.00%	77.57%
\$700	\$753	ENGINEERING & INFORMATION SERVICES	\$5,418	\$4,942	\$7,504	\$7,064	72.20%	76.70%
\$234	\$317	REGULATORY SERVICES	\$2,496	\$2,335	\$3,710	\$3,327	67.28%	75.03%
\$349	\$442	CUSTOMER SERVICE	\$3,510	\$3,251	\$4,626	\$4,626	75.88%	75.88%
\$802	\$826	ADMINISTRATION & PENSION	\$8,290	\$6,719	\$11,455	\$11,254	72.37%	73.66%
\$3,634	\$5,056	DEPRECIATION	\$33,219	\$27,185	\$22,538	\$35,063	147.39%	94.74%
\$9,756	\$12,514		\$93,896	\$82,246	\$106,241	\$113,995	88.38%	82.37%
\$1,336	(\$1,031)	OPERATING PROFIT	\$11,408	\$23,013	\$29,346	\$23,187	38.87%	49.20%
FINANCIAL REVENUE								
\$55	\$85	INVESTMENT INCOME	\$481	\$597	\$346	\$571	139.19%	84.30%
\$167	\$167	PNS FUNDING HHSP DEBT	\$1,500	\$1,500	\$2,000	\$2,000	75.00%	75.00%
\$2,427	\$1,647	MISCELLANEOUS	\$15,241	\$10,382	\$441	\$13,086	3454.26%	116.47%
\$2,649	\$1,899		\$17,222	\$12,478	\$2,787	\$15,657	617.99%	110.00%
FINANCIAL EXPENSES								
\$669	\$714	LONG TERM DEBT INTEREST	\$5,995	\$6,447	\$9,530	\$7,819	62.91%	76.68%
\$17	\$17	AMORTIZATION DEBT DISCOUNT	\$152	\$149	\$217	\$200	69.73%	75.65%
\$398	\$382	DIVIDEND/GRANT IN LIEU OF TAXES	\$3,580	\$3,455	\$4,827	\$4,774	74.18%	75.00%
(\$7)	\$2	MISCELLANEOUS	\$2	\$40	\$19	\$158	10.79%	1.31%
\$1,078	\$1,115		\$9,729	\$10,090	\$14,594	\$12,951	66.67%	75.12%
\$2,907	(\$247)	NET PROFIT (LOSS) BEFORE OTHER COMPREHENSIVE INCOME	\$18,901	\$25,401	\$17,539	\$25,893	107.76%	72.99%
\$184	\$0	OTHER COMPREHENSIVE INCOME	\$1,653	\$0	\$0	\$2,204	0.00%	75.00%
\$3,091	(\$247)	NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	\$20,554	\$25,401	\$17,539	\$28,098	117.19%	73.15%

TO: Mr. Ray Ritcey, Chair and Members of the Halifax Regional Water Commission Board

SUBMITTED BY: *Original Signed By:*

Russell Walker, Chair, Audit & Finance Committee

DATE: January 17, 2018

SUBJECT: **Proposed 2018/19 Capital Budget**

ORIGIN

Presentation at the Audit and Finance Committee meeting of January 8, 2018.

RECOMMENDATION

The Audit and Finance Committee, with the advice and recommendation of the General Manager, recommends that Halifax Water Board approve the:

1. The 2018/19 Capital Budget at a total value of \$73,448,000, as detailed in the attached Schedule 1.
2. List of routine capital expenditure items required for on-going departmental operation, at a total value of \$6,456,000 as indicated in Schedule 1.

BACKGROUND

Halifax Water's 2012 *Integrated Resource Plan* (IRP) identified a 30-year capital investment plan valued at \$2.6 Billion. In relation to the IRP, the capital budget program focuses on providing required infrastructure for asset renewal, regulatory compliance and growth. The capital program helps ensure that we continue to provide services in a cost effective and efficient manner with a focus on long-term sustainability.

DISCUSSION

Attached, in Schedule 1, is the proposed Capital Budget for Halifax Water for the fiscal year April 1, 2018 to March 31, 2019. It includes projects for Water, Wastewater, and Stormwater service delivery with a total value of \$73,448,000.

The proposed budget includes a series of routine capital expenditures, not related to major projects that are required for ongoing operations. These items total \$6,456,000.

The Capital Budget document reflects the Integrated Resource Plan (IRP) completed in 2012. This 30-year plan provides a strong vision for the infrastructure requirements needed to ensure the long-term integrity of the utility's assets. The 2018/19 Capital Budget includes many early projects from the IRP that will begin to shape the overall direction of the capital plan for years to come.

The Capital Budget funds traditional capital requirements for utility operation, along with a focus on several key strategic initiatives. The following sections provide highlighted details of the Capital Budget by asset category.

Water: Major Water capital projects include:

- Distribution System Main Renewal Program in conjunction with the Municipality's Streets program;
- Lead Service Line Replacement Program;
- J.D. Kline Water Supply Plant Filter Media & Underdrain Replacement – with **CWWF Funding**; and
- Asset Renewal Program at J.D. Kline and Lake Major WSP

Wastewater: Major Wastewater capital projects include:

- Kearney Lake Road Trunk Sewer Upgrades;
- Collection System Renewal Projects integrated with the Municipality's Streets Program;
- Collection System Trenchless Rehabilitation Program; and
- Shipyard Road and Windmill Road Pumping Station Replacements

Stormwater: Major Stormwater capital projects include:

- Stormwater System Renewal Projects integrated with the Municipality's Streets Program;
- Cross Culvert Renewal Program – 22 locations; and
- Ellenvale Run Retaining Wall System Replacement

Corporate Projects: Major Corporate Projects include:

- IT Strategic Plan Foundation Projects;
- Computerized Maintenance Management System Enhancements;
- Corporate Fleet;
- Continuation of AMI Meter System Upgrade; and
- Asset Management Program

On January 8, 2018, the proposed 2018/19 Capital Budget was presented to the Halifax Water Audit & Finance Committee. Subsequent to the presentation, the Committee passed a motion for approval of the 2018/19 Capital Budget. The budget presented in this report is consistent with the Committee approval version with a 0.2% variance on the initial budget total.

BUDGET IMPLICATIONS

The funds for the overall Capital Budget will be generated from a combination of sources as detailed below:

Water:	Depreciation	\$9,631,878
	Debt	\$15,084,122
	RDC	\$10,000
	External Funding Building Canada & CWWF	\$78,000
	Capital Cost Contributions	<u>\$230,000</u>
	TOTAL	\$25,034,000
Wastewater:	Depreciation	\$14,035,907
	Debt	\$15,048,093
	RDC	\$6,146,000
	External Funding HRM	\$24,000
	Capital Cost Contributions	\$4,554,000
	Energy Rebates	<u>\$10,000</u>
TOTAL	\$39,818,000	
Stormwater:	Depreciation	\$1,492,323
	Debt	<u>\$7,104,677</u>
	TOTAL	\$8,597,000

The Capital Budget presented and the projected funding matches the projected capital expenditure within the current 5-Year Capital Budget.

ATTACHMENTS

Schedule 1 – Halifax Water Capital Budget Project 2018/19.

Report Prepared by:	<u>Original Signed By:</u> Jamie Hannam, MBA, P. Eng. Director Engineering & IS Department
Financial Reviewed by:	<u>Original Signed By:</u> Cathie O'Toole, MBA, CPA, CGA, Director, Corporate Services (902) 490-3685
Approved by:	<u>Original Signed By:</u> Carl D. Yates, M.A.Sc., P. Eng. General Manager 902-490-4804

HALIFAX WATER

Capital Budget 2018/19

Summary

Asset Category	Project Costs
<i>Water - Land -- T O T A L</i>	\$100,000
<i>Water - Transmission -- T O T A L</i>	\$382,000
<i>Water - Distribution -- T O T A L</i>	\$4,647,000
<i>Water - Structures -- T O T A L</i>	\$1,954,000
<i>Water - Treatment Facilities -- T O T A L</i>	\$7,653,000
<i>Water - Energy -- T O T A L</i>	\$175,000
<i>Water - Security -- T O T A L</i>	\$50,000
<i>Water - Equipment -- T O T A L</i>	\$50,000
<i>Water - Corporate Projects - T O T A L</i>	\$10,022,500
TOTAL - Water	\$25,033,500
<i>Wastewater - Trunk Sewers -- T O T A L</i>	\$1,700,000
<i>Wastewater - Collection System -- T O T A L</i>	\$12,120,000
<i>Wastewater - Forcemains -- T O T A L</i>	\$1,253,000
<i>Wastewater Structures -- T O T A L</i>	\$9,750,000
<i>Wastewater - Treatment Facility -- T O T A L</i>	\$2,878,000
<i>Wastewater - Energy -- T O T A L</i>	\$475,000
<i>Wastewater - Security -- T O T A L</i>	\$200,000
<i>Wastewater - Equipment -- T O T A L</i>	\$95,000
<i>Wastewater - Corporate Projects -- T O T A L</i>	\$11,347,800
TOTAL - Wastewater	\$39,818,800
<i>Stormwater - Pipes -- T O T A L</i>	\$1,861,000
<i>Stormwater - Culverts -- T O T A L</i>	\$2,725,000
<i>Stormwater - Structures -- T O T A L</i>	\$2,525,000
<i>Stormwater - Corporate Projects -- T O T A L</i>	\$1,484,700
TOTAL - Stormwater	\$8,595,700
GRAND TOTAL	\$73,448,000

HALIFAX WATER

Capital Budget 2018/19

Water

Project Number	Project Name	Project Cost
<u>Water - Land</u>		
3.033	Watershed Land Acquisition	\$100,000
<i>Water - Land -- T O T A L</i>		\$100,000
<u>Water - Transmission</u>		
3.250	Critical Valve Replacement Program - Gottingen Street	\$210,000
3.291	Port Wallace Transmission Main - Caledonia Section	\$120,000
3.045	Bedford West CCC - Various Phases	\$2,000
3.373	Regional Development Charge Studies	\$50,000
<i>Water - Transmission -- T O T A L</i>		\$382,000
<u>Water - Distribution</u>		
3.022	Water Distribution - Main Renewal Program	\$3,500,000
3.067	~ Valves Renewals	\$125,000
3.068	~ Hydrants Renewals	\$75,000
3.069	~ Service Lines Renewals	\$100,000
3.390	Lead Service Line Replacement Program	\$600,000
3.294	Automated Flushing Program	\$20,000
3.296	Water Sampling Station Relocation Program	\$30,000
3.333	Quinpool Road Bridge Watermain Replacement	\$197,000
<i>Water - Distribution -- T O T A L</i>		\$4,647,000
<u>Water - Structures</u>		
3.403	Cowie Hill Reservoir Rehabilitaton	\$100,000
3.411	Sampson and Stokil Reservoirs Rechlorination System	\$390,000
3.404	Bluewater PRV Chamber CSE Retrofit	\$76,000
3.408	Beaver Bank Reservoir Meter Upgrade	\$35,000
3.407	Brunello Booster Station - Pump Control Modifications	\$27,000
3.400	Ritcey Crescent PRV - New Meter	\$11,000
3.401	Golf View Drive PRV Chamber Rehabilitation	\$18,000
3.405	Eaglewood Pumping Station - Upgrades	\$9,000
3.406	Parkdale Booster Station Decommissioning	\$22,000
3.426	Robie 2 Emergency Pump - Pump Control Review and Optimization	\$105,000
3.427	Lyle Street Pumping Station Upgrades	\$235,000
3.440	Bulk Fill Service connection for the Cowie Hill Operations Depot	\$51,000
3.441	Main Control Chamber Annubar Meter Replacement	\$55,000
3.402	Steel Reservoir Inspection and Assessment Study	\$175,000
3.116	Bedford South (Hemlock) Reservoir CCC	\$250,000
3.344	Leiblin Drive Booster Station - Replacement of Diesel Fire Pump	\$395,000
<i>Water - Structures -- T O T A L</i>		\$1,954,000

HALIFAX WATER

Capital Budget 2018/19

Water

Project Number	Project Name	Project Cost
<u>Water - Treatment Facilities</u>		
J D Kline Water Supply Plant:		
3.157	JD Kline WSP - Underdrains and Filter Media Replacement Program	\$4,100,000
3.415	JD Kline WSP - Raw Water Intake Traveling Screen Replacement Program	\$905,000
3.374	JD Kline WSP - Replace Filter Isolation Gates	\$50,000
3.413	JD Kline WSP - Storage Building Improvements	\$76,000
3.409	JD Kline WSP - Purchase New Boat for Lake Sampling	\$32,000
3.424	JD Kline WSP - Replace Existing 4160 Transformer in Low Lift Station	\$26,000
3.423	JD Kline WSP - New Grounding Bar for Crane	\$17,000
3.428	JD Kline WSP - Caustic Tank Liner Replacements	\$13,000
3.353	J D Kline WSP - Effluent Valve Actuator Replacement Program	\$100,000
3.242	JD Kline WSP - Replace CO2 Feeders	\$70,000
3.338	J D Kline WSP - Upgrades to the Process Wastewater Lagoons	\$50,000
3.361	JD Kline WSP - Replace Turbidity Meters	\$50,000
3.236	JD Kline WSP - Ampgard III to Vacuum Contactor Conversion	\$40,000
3.439	JD Kline WSP - Filter Gallery Electrical Wiring Upgrades	\$55,000
3.443	JD Kline WSP - Pilot Plant PLC Upgrade	\$19,000
3.351	JD Kline WSP - Replace Westinghouse Electrical Panels	\$5,000
Lake Major Water Supply Plant:		
3.279	Lake Major WSP - Replace Raw Water Pumping Station - Design	\$250,000
3.159	Lake Major WSP - Replace Contactors in the MCC	\$34,000
3.162	Lake Major WSP - Butterfly valve replacement program	\$100,000
3.278	Lake Major WSP - Clarifier Repair	\$285,000
3.422	Lake Major WSP - New Alum and Fluoride Tanks	\$145,000
3.421	Lake Major WSP - Improved access to Pipe Gallery	\$50,000
3.429	Lake Major WSP - Purchase H-Frame for Fall Arrest System	\$9,000
3.430	Lake Major WSP - Pre-Oxidation Strategy Study	\$120,000
3.420	Lake Major WSP - Yard Drainage and Parking Area Improvements	\$160,000
3.314	Lake Major WSP - East Lake Dam Repairs	\$65,000
3.302	Lake Major WSP - Dechlorination System Design	\$75,000
3.444	Lake Major WSP - Motor Protection Relays	\$60,000
Bennery Lake Water Supply Plant:		
3.410	Bennery Lake WSP - Access Road Improvements Study Phase Only	\$130,000
3.418	Bennery Lake WSP - Sludge Valve Replacement Program	\$7,000
3.433	Bennery Lake WSP - Actuator for Backwash Control Valve	\$13,000
3.272	Bennery Lake WSP - New Low Lift VFD Pump Replacement Program	\$110,000
3.434	Bennery Lake WSP - Manganese Removal Strategy Study	\$60,000
Non-Urban Core WSP		
3.412	Miller Lake Small System - Supply Treatment Improvements	\$235,000
3.425	Miller Lake Small System - Water Storage Tank	\$16,000
3.445	Collins Park WSP - Air Exchange System	\$26,000
3.435	Lake Lamont - Replace Suction Piping and Chlorine Injection	\$72,000
3.211	Chlorine Analyzer Replacement Program	\$23,000
Water - Treatment Facilities -- T O T A L		\$7,653,000

HALIFAX WATER

Capital Budget 2018/19

Water

Project Number	Project Name	Project Cost
<u>Water - Energy</u>		
3.438	JD Kiline WSP - 2nd Boiler Replacement	\$100,000
3.437	Lake Major WSP - Process Area HVAC Upgrades	\$75,000
Water - Energy -- T O T A L		\$175,000
<u>Water - Security</u>		
4.009	Security Upgrade Program	\$50,000
Water - Security -- T O T A L		\$50,000
<u>Water - Equipment</u>		
3.101	Miscellaneous Equipment Replacement	\$50,000
Water - Equipment -- T O T A L		\$50,000
Water - Corporate Projects - T O T A L		\$10,022,500
GRAND TOTAL - WATER		\$25,033,500

HALIFAX WATER

Capital Budget 2018/19

Wastewater

Project Number	Project Name	Project Cost
<u>Wastewater - Trunk Sewers</u>		
2.467	Kearney Lake Road Wastewater Sewer Upgrades	\$1,200,000
2.584	Bedford to Halifax Trunk Sewer Upgrade	\$500,000
<i>Wastewater - Trunk Sewers -- T O T A L</i>		\$1,700,000
<u>Wastewater - Collection System</u>		
2.052	Integrated Wastewater Projects - Program	\$1,915,000
2.168	Wastewater System - Trenchless Rehabilitation Program	\$1,490,000
2.658	Wastewater Lateral Lining	\$2,100,000
2.659	Fairview Clayton Park Bridgeview I/I Reduction	\$2,880,000
2.649	Inglis Street Sewer / Pier A PS - Ventilation/Odour Control Modifications	\$80,000
2.013	Wanda Lane Sanitary Sewer Replacement	\$50,000
2.356	Auburn Avenue Sanitary Sewer	\$25,000
2.657	Glendale Drive to Sackville Trunk Sewer - System Upgrade	\$400,000
2.357	Manhole Renewals WW	\$25,000
2.358	Lateral Replacements WW (non-tree roots)	\$1,650,000
2.563	Lateral Replacements WW (tree roots)	\$520,000
2.223	Wet Weather Management Program	\$225,000
2.548	Regional Development Charge Studies	\$50,000
2.074	Bedford West Collection System CCC	\$15,000
- WRWIP PROJECTS		
	Young St - Sewer Separation	\$100,000
	Kempt Rd Phase 1 - Sewer Separation	\$200,000
	Bayers Rd Phase 1 - Sewer Separation	\$75,000
	Joseph Howe Dr - Sewer Separation	\$100,000
	Romans - Federal Avenues - Sewer Separation	\$170,000
2.636	Gottingen/North Flow Split -Alteration to Combined Sewer	\$50,000
<i>Wastewater - Collection System -- T O T A L</i>		\$12,120,000
<u>Wastewater - Forcemains</u>		
2.543	Kearney Lake Road Forcemain Extension	\$1,253,000
<i>Wastewater - Forcemains -- T O T A L</i>		\$1,253,000

HALIFAX WATER

Capital Budget 2018/19

Wastewater

Project Number	Project Name	Project Cost
<u>Wastewater - Structures</u>		
2.420	Emergency Pumping Station Pump replacements	\$250,000
2.443	Wastewater Pumping Station Component Replacement Program - East Region	\$200,000
2.444	Wastewater Pumping Station Component Replacement Program - Central Region	\$150,000
2.466	Weybridge Lane Pump Station CCC	\$5,060,000
2.66	Bissett PS Component Upgrade	\$50,000
2.655	Roach's Pond PS Component Upgrade	\$275,000
2.366	Shipyards Road PS	\$915,000
2.093	Windmill Road PS Replacement	\$1,455,000
2.654	PS Control Panel / Electrical Replacement	\$1,050,000
2.665	CSO Upgrade Program	\$300,000
2.669	Halifax CSO Surveying	\$45,000
<i>Wastewater Structures -- T O T A L</i>		\$9,750,000
<u>Wastewater - Treatment Facility</u>		
2.056	Plant Optimization Audit Program	\$125,000
2.522	Emergency Wastewater Treatment Facility equipment replacements	\$400,000
Halifax Wastewater Treatment Facility:		
2.532	Duct Work Replacement	\$50,000
2.653	New Raw Water Pumps	\$350,000
Dartmouth Wastewater Treatment Facility:		
2.502	Dartmouth WWTF - Duct Work Replacement	\$25,000
Herring Cove Wastewater Treatment Facility:		
2.639	Duct Work Replacement Program	\$25,000
2.652	Densadeg Flow Meters	\$75,000
Mill Cove Wastewater Treatment Facility:		
2.644	Civil Asset Condition Assessment	\$75,000
2.645	Compactor/Conveyor Replacement	\$300,000
2.662	RAS Piping Replacement	\$200,000
2.567	Process Upgrade - Conceptual Design	\$50,000

HALIFAX WATER

Capital Budget 2018/19

Wastewater

Project Number	Project Name	Project Cost
Eastern Passage Wastewater Treatment Facility:		
2.468	Process Upgrade Program	\$50,000
2.646	Secondary Launder Covers	\$150,000
Aerotech Wastewater Treatment Facility:		
2.510	Process Upgrade Program	\$50,000
Timberlea Wastewater Treatment Facility:		
2.509	Asset Renewal Program	\$50,000
Community Wastewater Treatment Facilities:		
2.648	Uplands WWTF - New Screening Facility	\$290,000
2.663	Fall River/Lockview WWTF - Waterline Replacement	\$25,000
2.664	Fall River/Lockview WWTF - Driveway Replacement	\$38,000
Biosolids Processing Facility:		
2.126	Asset Renewal Program	\$250,000
2.656	Dryer Bypass Conveyor	\$300,000
Wastewater - Treatment Facility -- T O T A L		\$2,878,000
<u>Wastewater - Energy</u>		
2.491	Pump Station HVAC Retro-Commissioning Program	\$100,000
2.65	HHSP - BAS + HVAC Recommissioning	\$50,000
2.651	Wastewater Pump Stations - NSPI Meter Relocations	\$50,000
2.637	Halifax WWTF - UV Channel/Densadeg Gate Actuators	\$120,000
2.638	Dartmouth WWTF - UV Channel/Densadeg Gate Actuators	\$155,000
Wastewater - Energy -- T O T A L		\$475,000
<u>Wastewater - Security</u>		
4.008	Security Upgrade Program	\$200,000
Wastewater - Security -- T O T A L		\$200,000
<u>Wastewater - Equipment</u>		
2.161	I&I Reduction (SIR) Program Flow Meters and Related Equipment	\$25,000
2.451	Miscellaneous Equipment Replacement	\$70,000
Wastewater - Equipment -- T O T A L		\$95,000
Wastewater - Corporate Projects -- T O T A L		\$11,347,800
GRAND TOTAL - WASTEWATER		\$39,818,800

HALIFAX WATER

Capital Budget 2018/19

Stormwater

Project Number	Project Name	Project Cost
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Stormwater - Pipes

1.163	Doyle Street Storm Sewer	\$250,000
1.038	Integrated Stormwater Projects - Program	\$1,500,000
1.102	Manhole Renewals SW	\$21,000
1.103	Catchbasin Renewals SW	\$50,000
1.135	Lateral Replacements SW	\$15,000
1.019	Drainage Remediation Program Surveys/Studies	\$25,000

Stormwater - Pipes -- T O T A L

\$1,861,000

Stormwater - Culverts/Ditches

1.104	Driveway Culvert Replacements	\$795,000
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Street Specific Culvert Replacements:

ST MARGARETS BAY RD, 2797	\$82,000
LAKE MAJOR RD, near civic 190	\$77,000
CLARENCE ST, near civic 4	\$80,000
WINDGATE DR, near civic 107	\$80,000
ORCHARD DR, near civic 32	\$88,000
NOTTINGHAM DR, near civic 53	\$90,000
PENNY LANE AT WINDSOR DR	\$90,000
KNIGHT BRIDGE DR at BUCKINGHAM DR	\$81,000
ALLENBY DR, near civic 34	\$83,000
ALLENBY DR, near civic 2	\$83,000
MINNA DR, near civic 6	\$85,000
ST MARGARETS BAY RD, near civic 2916	\$91,000
STELLA CRT, near civic 1	\$76,000
RAMAR DR, near civic 6	\$93,000
ST MARGARETS BAY RD, near Second Chain Lake	\$91,000
ROSS RD, near civic 241	\$74,000
CLARENCE AVE, AT HOWARD AVE	\$76,000
CLARENCE AVE, NEAR MORRIS AVE	\$69,000
BRAESIDE AVE, near civic 2	\$105,000
COW BAY RD, near civic 1174	\$76,000

HALIFAX WATER

Capital Budget 2018/19

Stormwater

Project Number	Project Name	Project Cost
	SHORE RD, near civic 1796	\$88,000
	HINES RD, near civic 195	\$82,000
	RITCEY CRES, near civic 1	\$90,000
Stormwater - Culverts/Ditches -- T O T A L		\$2,725,000
<u>Stormwater - Structures</u>		
1.133	Ellenvale Run Retaining Wall System - Replacement	\$2,525,000
Stormwater - Structures -- T O T A L		\$2,525,000
Stormwater - Corporate Projects -- T O T A L		\$1,484,700
GRAND TOTAL - STORMWATER		\$8,595,700

HALIFAX WATER

Capital Budget 2018/19

Corporate Projects

Project Number	Project Name	Project Cost
<u>Corporate - Information Technology</u>		
4.011	Desktop Computer Replacement Program	\$290,000
4.012	Network Infrastructure Upgrades	\$220,000
4.013	Document Management Program	\$100,000
4.083	Computerized Maintenance Management System Enhancements	\$1,000,000
4.024	Sharepoint Implementation	\$100,000
4.043	AMI/AMR Meter System Upgrades	\$9,730,000
4.048	SAP Rate Structure Support	\$220,000
4.074	Asset Registry Build	\$100,000
4.084	Halifax Water Website	\$500,000
4.085	Portfolio and Project Lifecycle	\$380,000
4.086	IT Foundations	\$2,000,000
4.087	Wi-Fi Design and Build	\$700,000
4.088	Cayenta Optimization	\$240,000
4.089	Telephony	\$120,000
4.09	Intranet	\$110,000
4.091	Permit Approvals	\$75,000
1.161	Stormwater Billing Support	\$200,000
	Analytics and Dashboards	\$240,000
Corporate - Information Technology -- T O T A L		\$16,325,000
<u>Corporate - GIS</u>		
4.039	GIS Application Support Program	\$50,000
	Dashboard Replacement	\$200,000
	Data Governance	\$50,000
	GIS Upgrade/Cityworks upgrade	\$350,000
	Desktop Progression Plan	\$100,000
	GIS Data Build - Services	\$250,000
	CAD Drawing Database	\$100,000
Corporate - GIS -- T O T A L		\$1,100,000

HALIFAX WATER

Capital Budget 2018/19

Corporate Projects

Project Number	Project Name	Project Cost
<u>Corporate - Asset Management</u>		
4.021	Integrated Resource Plan Update	\$500,000
2.523	Sewer Condition Assessment	\$170,000
1.156	Storm Sewer Condition Assessment	\$110,000
1.162	Driveway Culvert Data Collection Program	\$80,000
2.043	Corporate Flow Monitoring Program	\$1,700,000
3.398	Hydraulic Water Model Build	\$50,000
<i>Corporate - Asset Management -- T O T A L</i>		\$2,610,000
<u>Corporate - Facility</u>		
2.176	East/Central Regional Operational Facility	\$100,000
4.077	Building Capital Improvements	\$100,000
<i>Corporate - Facility -- T O T A L</i>		\$200,000
<u>Corporate - SCADA & Other Equipment</u>		
4.093	GPS Units - Replacement	\$42,000
4.082	GNSS Receiver for Asset Management Data Collection	\$8,000
4.080	Large and New Customer Meters	\$460,000
<i>Corporate - SCADA & Other Equipment -- T O T A L</i>		\$510,000
<u>Corporate - Fleet</u>		
4.006	Fleet Upgrade Program Stormwater	\$271,000
4.006	Fleet Upgrade Program Wastewater	\$1,084,000
4.007	Fleet Upgrade Program Water	\$755,000
<i>Corporate - Fleet -- T O T A L</i>		\$2,110,000
<i>GRAND TOTAL - Corporate Projects</i>		\$22,855,000

HALIFAX WATER

Capital Budget 2018/19

Corporate Projects

Project Number	Project Name	Project Cost
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ALLOCATION BREAKDOWN:

Water - Corporate Projects - T O T A L	\$10,022,500
Wastewater - Corporate Projects -- T O T A L	\$11,347,800
Stormwater - Corporate Projects -- T O T A L	\$1,484,700

GRAND TOTAL - Corporate Projects	\$22,855,000
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Note: All corporate projects are allocated as follows:

50% Water

40% Wastewater

10% Stormwater

(unless otherwise noted)

HALIFAX WATER

Capital Budget 2018/19

Summary of Routine Capital Expenditures included within Capital Budget

Project Number	Project Name	Project Cost
3.067	Valves Renewals	\$125,000
3.068	Hydrants Renewals	\$75,000
3.069	Service Lines Renewals	\$100,000
3.390	Lead Service Line Replacement Program	\$600,000
3.101	Miscellaneous Equipment Replacement	\$50,000
4.007	Fleet Upgrade Program Water	\$755,000
2.357	Manhole Renewals WW	\$25,000
2.358	Lateral Replacements WW (non-tree roots)	\$1,650,000
2.563	Lateral Replacements WW (tree roots)	\$520,000
2.161	I&I Reduction (SIR) Program Flow Meters and Related Equipment	\$25,000
2.451	Miscellaneous Equipment Replacement	\$70,000
4.006	Fleet Upgrade Program Wastewater	\$1,084,000
1.102	Manhole Renewals SW	\$21,000
1.103	Catchbasin Renewals SW	\$50,000
1.135	Lateral Replacements SW	\$15,000
4.006	Fleet Upgrade Program Stormwater	\$271,000
4.011	Desktop Computer Replacement Program	\$290,000
4.012	Network Infrastructure Upgrades	\$220,000
4.093	GPS Units - Replacement	\$42,000
4.082	GNSS Receiver for Asset Management Data Collection	\$8,000
4.080	Large and New Customer Meters	\$460,000
GRAND TOTAL - Routine Capital Projects		\$6,456,000

Summary
Water
Wastewater
Stormwater

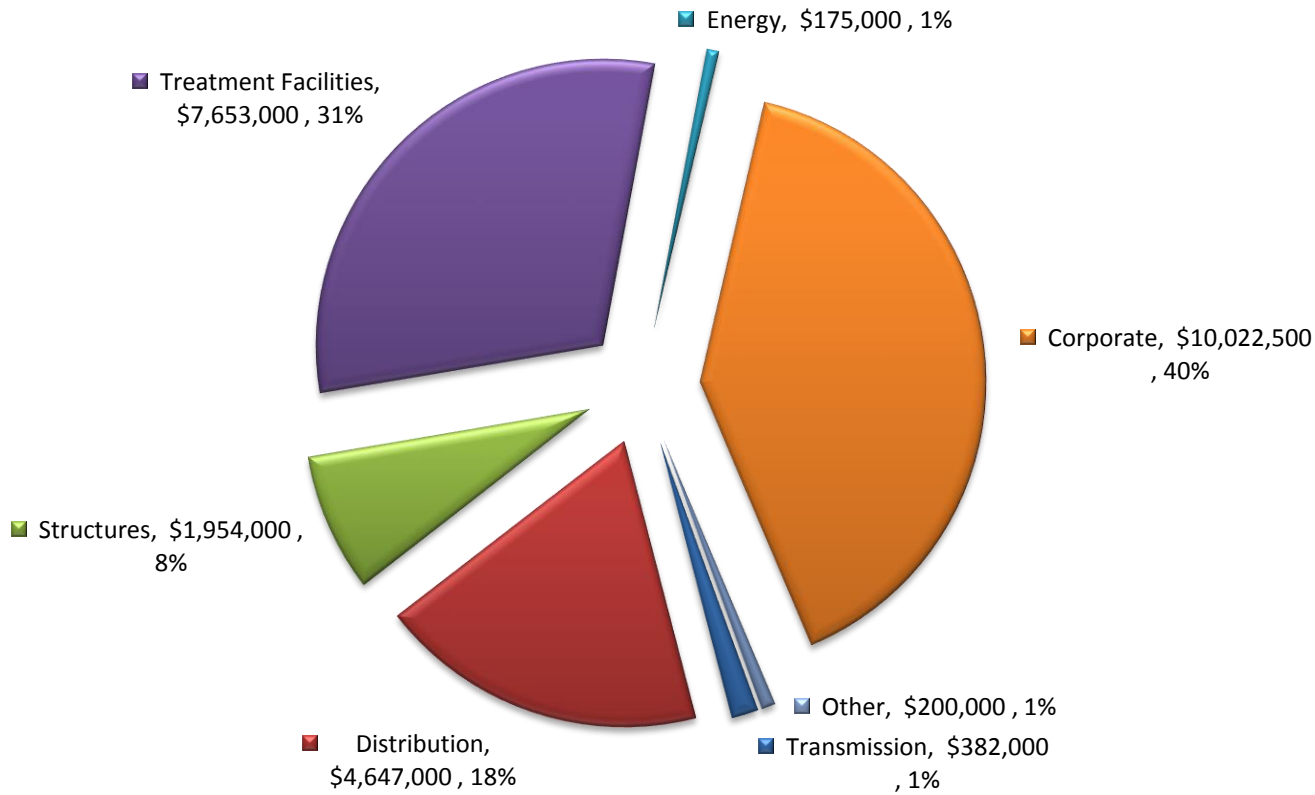
Values
\$ 25,033,500
\$ 39,818,800
\$ 8,595,700

2018/2019 Capital Budget by Asset Class - All Divisions



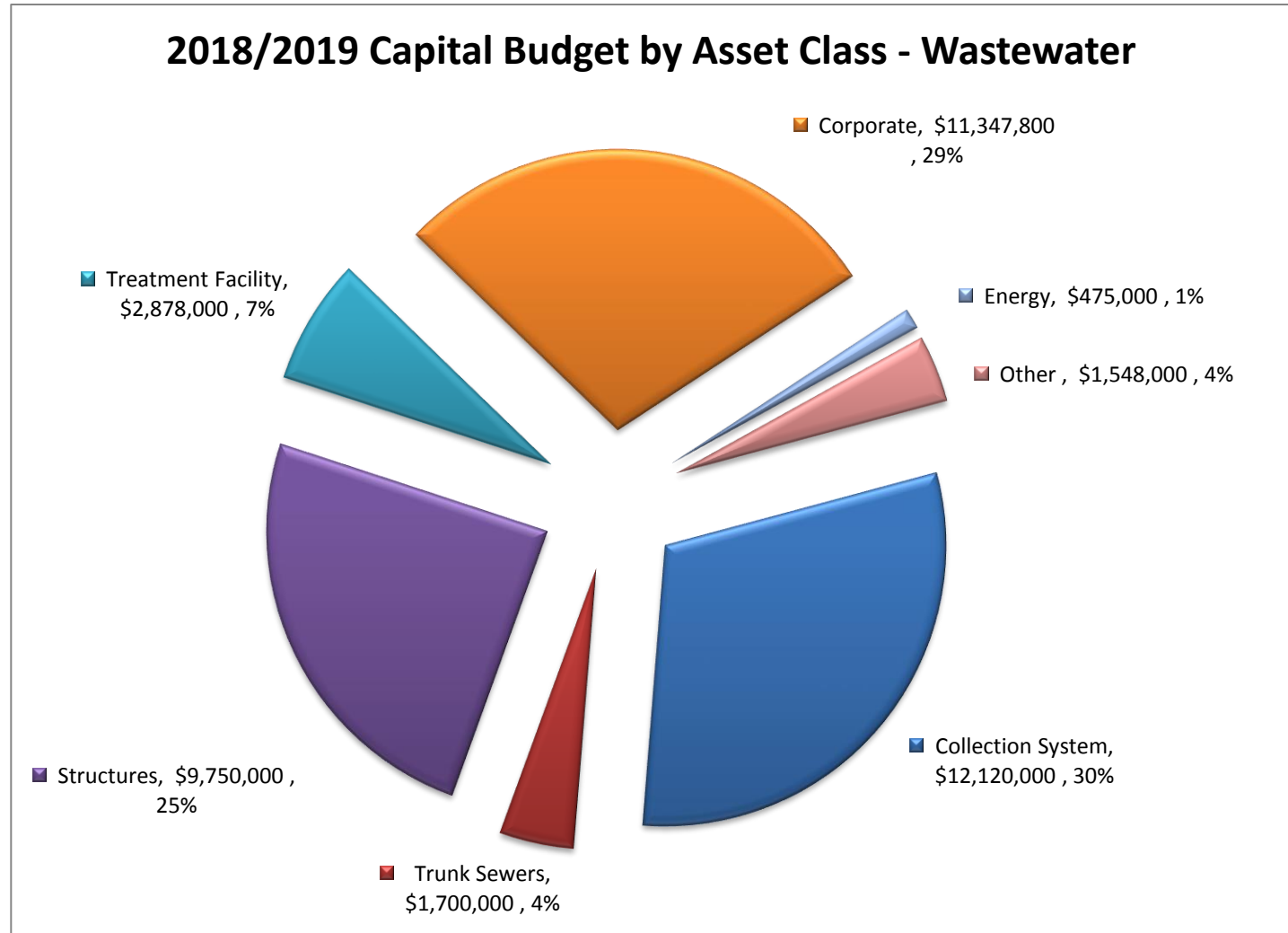
WATER	Values
Transmission	\$ 382,000
Distribution	\$ 4,647,000
Structures	\$ 1,954,000
Treatment Facilities	\$ 7,653,000
Energy	\$ 175,000
Corporate	\$ 10,022,500
Other	\$ 200,000
TOTAL - Water	\$ 25,033,500
IT	
Land	\$ 100,000
Security	\$ 50,000
Equipment	\$ 50,000

2018/2019 Capital Budget by Asset Class - Water



Wastewater	Values
Collection System	\$ 12,120,000
Trunk Sewers	\$ 1,700,000
Structures	\$ 9,750,000
Treatment Facility	\$ 2,878,000
Corporate	\$ 11,347,800
Energy	\$ 475,000
Other	\$ 1,548,000
TOTAL - Wastewater	\$ 39,818,800
Forcemains	\$ 1,253,000
Security	\$ 200,000
Equipment	\$ 95,000

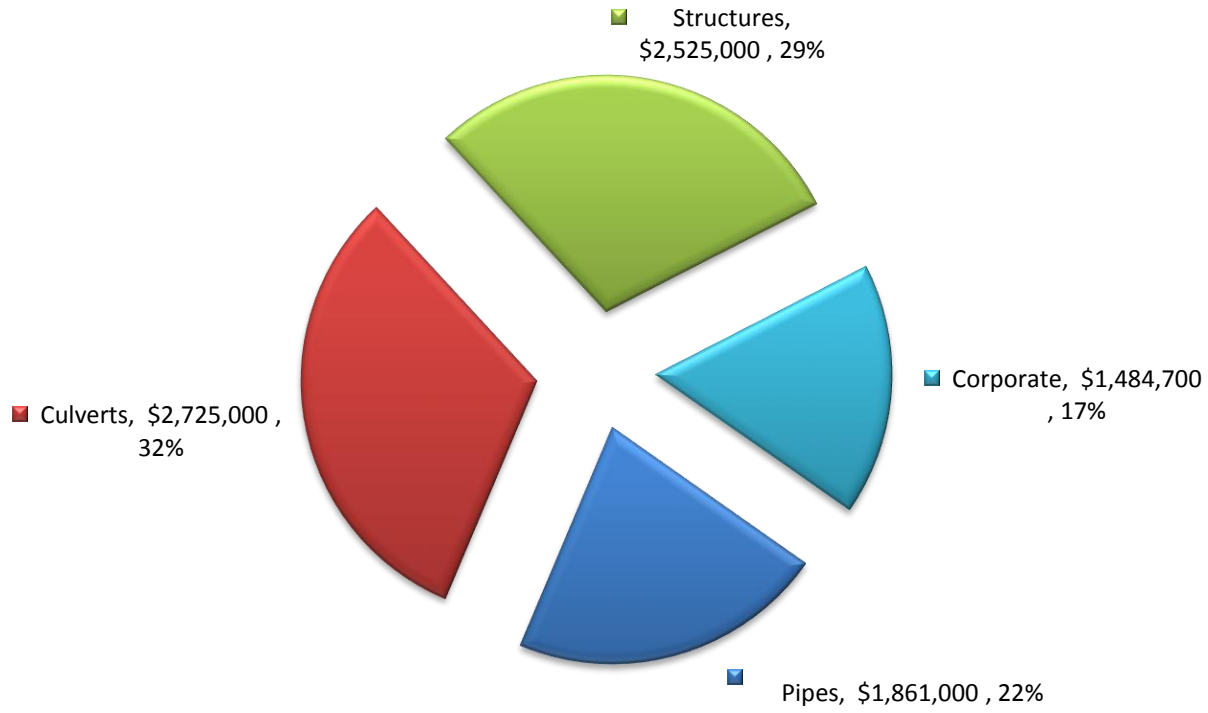
2018/2019 Capital Budget by Asset Class - Wastewater



Stormwater
Pipes
Culverts
Structures

Values
\$ 1,861,000
\$ 2,725,000
\$ 2,525,000

2018/2019 Capital Budget by Asset Class - Stormwater



TO: Ray Ritcey, Chair, and Members of the Halifax Regional Water Commission Board

SUBMITTED BY: *Original Signed By:*

Russell Walker, Chair, Audit & Finance Committee

DATE: January 13, 2018

SUBJECT: **Proposed 2018/19 Water, Wastewater and Stormwater Operating Budget**

ORIGIN

Presentation at the Audit and Finance Committee meeting, January 8, 2018.

RECOMMENDATION

It is recommended that the HRWC Board:

Approve the attached 2018/19 Water, Wastewater and Stormwater Operating Budget, including the proposed 2018/19 budget for un-regulated activities.

BACKGROUND

The Operating Budget prepared for 2018/19 is based on the new Five (5) Year Business Plan currently before the HRWC Board for approval. The last rate increase for water and wastewater became effective April 1, 2016, and the last changes in stormwater rates occurred July 1, 2017. There are no rate applications planned for 2018/19; however, it is anticipated that a water and wastewater rate application will be required in 2019/20.

The purpose of the 2018/19 Operating Budget is to detail the services provided by Halifax Water (HW) and to outline the costs and revenue required to provide these services. Managers will continue to monitor actual performance relative to the budget and provide periodic updates to the Board.

DISCUSSION

Table 1 below outlines the Operating Budget for 2018/19 which shows a projected net loss of \$12.1 million. This reflects the efforts required by the organization to maintain current levels of service, deliver projects already in progress or approved, address changing environmental regulatory requirements, and generate more funding to meet infrastructure investment demands.

Table 1:

Pro Forma Income Summary (IFRS Basis)				
	Actual 2016/17	Approved Budget 2017/18	Proposed Budget 2018/19	Variance Favourable (Unfavourable)
Operating Revenues	\$137,997	\$135,587	\$135,182	(\$405)
Operating Expenditures	\$97,839	\$106,241	\$111,710	(\$5,468)
Operating Profit	\$40,158	\$29,346	\$23,472	(\$5,874)
Non-Operating Revenues	\$3,322	\$2,787	\$1,006	(\$1,781)
Non-Operating Expenditures	\$34,622	\$38,882	\$36,564	\$2,319
Net Surplus (Deficit)	\$8,858	(\$6,750)	(\$12,086)	(\$5,336)

Note:
Consolidated numbers reported above include regulated and unregulated activities of the Urban Core, Satellite and Airport/AeroTech Systems.
The net surplus (deficit) reported for the 2018/19 Proposed Budget and years 2 through 5 of the Business Plan are reported on the accrual basis. Under the NSUARB Accounting and Reporting Handbook some accrued future employment expense liabilities are excluded for the purposes of rate making.

The 2018/19 Operating Budget is prepared on an accrual basis (similar to previous years) to provide broader information for decision making and to be reflective of best practice for budgeting. Accrued amounts for 2018/19 include a liability for future employee benefits (pension) as calculated under the International Financial Reporting Standards (IFRS). The Nova Scotia Utility and Review Board (NSUARB) Accounting and Reporting Handbook for Water Utilities is currently used in determining the revenue requirements for rate making purposes. If accrued pension expenses were omitted in 2018/19, there would be a projected net loss on a NSUARB Handbook basis of \$9.1 million. There is sufficient accumulated operating surplus to offset the budgeted operating loss in 2018/19.

The utility faces pressure associated with asset renewal, growth, and compliance with regulatory requirements, as described in the Integrated Resource Plan. Additions to Utility Plant in Service result in increased depreciation, debt servicing, an increased dividend to Halifax Regional Municipality (HRM), and in some cases increased operating costs.

Building capacity to deliver the Integrated Resource Plan is also an infrastructure related budget driver, and requires new employees in some departments.

As reported in Table 2 below, operating expenses are budgeted to increase \$5.5 million or 5.1% compared to the 2017/18 Operating Budget. The 5.1% increase in operating expenses is due to several factors, namely:

- Anticipated 2.7% growth in the labour force at Halifax Water, which accounts for \$1.1 million in additional projected operating expense.
- Additional Fleet costs of \$1.2 million compared to the previous year as fleet rates were adjusted for the first time since 2012/13 to better reflect current conditions.
- Materials, Supplies and Services increased \$0.8 million driven by higher computer software and licensing costs, and equipment repairs and maintenance.
- Professional Services increased \$0.6 million with higher costs projected for consulting and additional projects and initiatives.
- Depreciation is budgeted to increase by \$1.0 million or 4.0%.

Under non-operating expense, debt servicing cost shows a favourable decrease of \$2.6 million or 7.7% compared to the 2017/18 Operating Budget.

Table 2:

Expense Summary				
	Actual 2016/17	Approved Budget 2017/18	Proposed Budget 2018/19	Variance Favourable (Unfavourable)
Operating Expenditures	\$97,839	\$106,241	\$111,710	(\$5,468)
Debt Servicing	\$29,994	\$34,040	\$31,406	\$2,635

The complete 2018/19 Operating Budget, appearing as Attachment One, provides a statement of revenues and expenditures on a consolidated basis, as well as separate statements for Water, Wastewater and Stormwater Services. A budget for un-regulated activities is also included. The 2018/19 Operating Budget is based on rates currently approved by the NSUARB, effective April 1, 2016 for water and wastewater, and July 1, 2017 for stormwater.

Regulated Operating Revenues

Regulated operating revenues are based upon currently approved rates and include a projected decline in consumption of 2.5% for the 2018/19 fiscal year. Approximately 700 new customer connections, or 0.8%, are projected in the budget year. This is based on the four year historic average for the period 2011-2014, and actual customer growth for the past two fiscal years, 2015/16 and 2016/17.

The majority of HRWC's revenues come from rate-regulated activities, with approximately 64% of water, wastewater and stormwater revenues coming from volumetric rates and 36% from base charges. HRWC does have a small amount of revenue from miscellaneous fees and financial revenue from interest income.

Regulated Operating Expenses

The largest components of Halifax Water's consolidated operating budgets are salaries & benefits, energy, debt servicing, depreciation, and chemical costs. Some of the key assumptions are outlined below:

Salaries and Benefits – The annual increase allowance ranges between 2.5% and 2.75%, which includes an additional 0.5% to allow for the impact of step increases within salary bands or reclassification of positions, and increases in benefits. The budget for 2018/19 includes filling 17 full-time equivalent positions (FTEs), most of which are new positions, but some of which were positions previously approved but vacant during 2017/18. This is inclusive of two (2) term positions within Customer Service, which have been created in support of the AMI project. If all positions are filled, this would equate to a 2.7% growth in the labour force.

Depreciation – As Halifax Water's assets and future capital budgets increase so do depreciation expenses. Depreciation is an integral funding source to support renewal of existing infrastructure, as well as new infrastructure and upgrades to meet future servicing demands and changing environmental regulations. Depreciation is projected to increase from \$22.5 million in 2017/18 to \$23.4 million in 2018/19, an increase of 4.0%. Depreciation expense is net of depreciation on contributed water and wastewater assets. In the next rate application, Halifax Water will be requesting permission to phase in depreciation on contributed water and wastewater assets. The NSUARB approved the phase in of depreciation on contributed stormwater assets on July 1, 2017.

Debt Servicing – New debt payments are budgeted to support the 2018/19 additions to utility plant in service. The amount and timing of any increases in debt servicing are contingent upon the completion of projects, financing rates and options available. It is estimated that total debt servicing will decrease to \$31.4 million from \$34.0 million in 2018/19, reflecting a 7.7% favourable change. Halifax Water's capital financing strategy is designed to maintain a debt service ratio of 35% or less; and to use a mixture of

infrastructure funding, development related charges (reserves), depreciation, and debt. The debt service ratio based on the proposed 2018/19 Operating Budget is 23.2%.

Energy – Budgets were established based on an assumption of electricity, fuel, oil and natural gas rate increases as noted below. The impact of these increases is expected to be partially offset by the formal Energy Management Program.

- Electricity 1.5%
- Furnace Oil 5.0%
- Natural Gas 5.0%

Chemical Costs – Chemicals are tendered annually in January for optimal pricing. Chemical cost increases of 5% are anticipated for 2018/19.

Expenses such as electricity and chemicals, which are subject to greater volatility when considering rates, have been afforded special attention due to the dependence placed on these commodities. In other expense categories that carry high dollar amounts, such as contract services and materials/supplies, where there may be a certain discretionary component, these expenses are contingent upon other factors such as:

- ✓ Service expectations
- ✓ Regulatory requirements and compliance
- ✓ Maintenance and renewal of infrastructure.

This would be relevant across all services; water, wastewater and stormwater.

Consolidated Revenues and Expenditures

The statement of consolidated revenues and expenditures compiled on an accrual basis, as detailed on page 1 of Attachment One, shows a budgeted net loss of \$12.1 million for 2018/19. The projected operating surplus as at March 31, 2018 is estimated to be \$21.4 million, which includes the operating surplus for the 2016/17 fiscal year, the projected results for 2017/18 based on forecasts as at November 30, 2017, and other comprehensive income. With a budgeted loss in 2018/19 of \$12.1 million, the budgeted operating surplus as at March 31, 2019 is estimated at \$9.3 million. Halifax Water is targeting to maintain an accumulated operating surplus of 3% of total expenses to mitigate risk. Based on the proposed operating budget for 2018/19 the accumulated surplus would be approximately 4.1% of total expenses in 2018/19. Accumulated operating surplus can be used to offset operating losses, or it can be used to fund future additions to utility plant in service, subject to NSUARB approval.

Water Service

Water operations are detailed on page 2 of Attachment One and are projected to have a net loss for 2018/19 of \$3.9 million.

Revenues are projected to be \$0.4 million lower in 2018/19 compared to the 2017/18 budget. The small decrease is primarily due to the fact there are no rate increases budgeted in 2018/19, with the last rate increases effective April 1, 2016.

Operating expenditures are projected at \$43.5 million, which is an overall increase compared to the 2017/18 Operating Budget of \$2.0 million or 5%. The largest increases reported are in the categories of Transmission and Distribution and Customer Service, in the amount of \$1.4 and \$0.5 million, respectively. Reductions are noted under Administration and Pension, in the amount of \$0.3 million.

Non-Operating revenues increase slightly as a result of higher anticipated investment income. Non-Operating expenses are projected to decrease by \$0.8 million or 5%, with the majority being a result of a decrease in total debt servicing, consisting of interest, principal and discounting. The dividend payable to HRM increased from \$4.8 million to \$5.1 million, as a result of the projected water rate base increasing in relation to utility plant in service. The dividend is calculated as 1.56% of the water rate base for the previous year.

Wastewater Service

Wastewater operations are detailed on page 3 of Attachment One and are budgeted to have a net loss of \$6.9 million for 2018/19.

Budgeted operating revenues for 2018/19 in the amount of \$69.7 million are in line with those reported in the 2017/18 budget. A small decrease appears related to Metered Sales, primarily due to the fact there are no rate increases budgeted in 2018/19, with the last rate increases effective April 1, 2016. This decrease is offset by an increase in unregulated revenue from Septage Tipping Fees.

Budgeted operating expenditures in 2018/19 have increased by \$2.1 million or 4% to \$58.6 million compared to the 2017/18 budget of \$56.5 million. The largest increases are reported in Wastewater Collection and Depreciation, in the amount of \$1.0 million and \$0.8 million respectively. These increases are offset somewhat by reductions under Administration and Pension in the amount of \$0.2 million.

Non-Operating revenues decrease by approximate \$2.0 million, due to a fifteen (15) year funding agreement with the Province regarding the Halifax Harbour Solutions project coming to an end. Non-operating expenses decrease by \$1.5 million or 8% due to lower debt servicing costs.

Stormwater Service

Stormwater operations are detailed on page 4 of Attachment One and have a budgeted net loss of \$1.3 million for 2018/19.

Sponsorships

Halifax Chamber event	\$5,000.00
FCM	\$5,000.00
NSCC Scholarships First Nations	\$4,000.00
NSCC Scholarships RT Peacock	\$2,000.00
NSCC Scholarships HRWC Achievement	\$2,000.00
NSCC Scholarships Arnold Johnston	\$3,600.00
Special Olympics	\$1,000.00
Bluenose Marathon	\$2,000.00
Private Lateral Replacement Reserve Funding	\$200,000.00
Biosolids Conference	\$5,000.00
Dalhousie Capstone Engineering Conference	\$1,000.00
	<u>\$230,600.00</u>

Expenses under the Help to Others (H2O) Program are budgeted at \$35,000 in 2018/19, which is consistent with the 2017/18 Operating Budget.

Sponsorships and Donations are relatively small value items, however the Board is requested to approve the amounts noted above as part of the overall budget.

BUDGET IMPLICATIONS

The combined operations for the 2018/19 budget project a net loss of \$12.1 million.

ALTERNATIVES

The HRWC Board could direct staff to revise the proposed 2018/19 Operating Budget.

ATTACHMENT

Attachment - Proposed 2018/19 Operating Budget

Report Prepared by: Original Signed By:
Allan Campbell, B.Comm, CPA, CMA, Manager, Finance 902-490-4288

Financial Reviewed by: Original Signed By:
Cathie O'Toole, MBA, CPA, CGA, Director, Corporate Services, 902-490-3685

Approved by: Original Signed By:
Carl D. Yates, M.A.Sc., P. Eng. General Manager, 902-490-4804

HALIFAX WATER
CONSOLIDATED SUMMARY OF ESTIMATED REVENUES & EXPENDITURES
PROPOSED OPERATING BUDGET
APRIL 1, 2018 to MARCH 31, 2019
 (in thousands)

DESCRIPTION	ACTUAL APR 1/16 MAR 31/17	APPROVED BUDGET * APR 1/17 MAR 31/18	PROPOSED BUDGET APR 1/18 MAR 31/19
OPERATING REVENUES	\$137,997	\$135,587	\$135,182
OPERATING EXPENDITURES	<u>\$97,839</u>	<u>\$106,241</u>	<u>\$111,710</u>
OPERATING PROFIT	<u>\$40,158</u>	<u>\$29,346</u>	<u>\$23,472</u>
FINANCIAL REVENUES (NON-OPERATING)			
INVESTMENT INCOME	\$780	\$346	\$480
PNS FUNDING HHSP DEBT	\$2,000	\$2,000	\$0
MISCELLANEOUS	<u>\$542</u>	<u>\$441</u>	<u>\$526</u>
	<u>\$3,322</u>	<u>\$2,787</u>	<u>\$1,006</u>
FINANCIAL EXPENDITURES (NON-OPERATING)			
LONG TERM DEBT INTEREST	\$8,475	\$9,532	\$8,560
LONG TERM DEBT PRINCIPAL	\$21,320	\$24,291	\$22,601
AMORTIZATION DEBT DISCOUNT	\$199	\$217	\$245
DIVIDEND/GRANT IN LIEU OF TAXES	\$4,578	\$4,827	\$5,142
MISCELLANEOUS	<u>\$49</u>	<u>\$15</u>	<u>\$16</u>
	<u>\$34,622</u>	<u>\$38,882</u>	<u>\$36,564</u>
 NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	 <u><u>\$8,858</u></u>	 <u><u>(\$6,750)</u></u>	 <u><u>(\$12,086)</u></u>

<i>Adjustments:</i>			
Pension accrual	<u>\$5,006</u>	<u>\$4,358</u>	<u>\$2,940</u>
Net Profit (Loss) on a Cash Basis	<u><u>\$13,864</u></u>	<u><u>(\$2,392)</u></u>	<u><u>(\$9,146)</u></u>

* 2017/18 Operating Budget approved by the Board of Directors, February 2, 2017.

HALIFAX WATER
ESTIMATED REVENUES AND EXPENDITURES - WATER OPERATIONS
PROPOSED OPERATING BUDGET
APRIL 1, 2018 to MARCH 31, 2019
(in thousands)

DESCRIPTION	ACTUAL APR 1/16 MAR 31/17	APPROVED BUDGET * APR 1/17 MAR 31/18	PROPOSED BUDGET APR 1/18 MAR 31/19
REVENUES			
METERED SALES	\$47,183	\$46,600	\$46,141
FIRE PROTECTION	\$7,074	\$7,074	\$7,074
PRIVATE FIRE PROTECTION SERVICES	\$831	\$857	\$860
BULK WATER STATIONS	\$330	\$314	\$329
CUSTOMER LATE PAY./COLLECTION FEES	\$282	\$212	\$233
MISCELLANEOUS	\$153	\$149	\$166
	<u>\$55,853</u>	<u>\$55,207</u>	<u>\$54,803</u>
EXPENDITURES			
WATER SUPPLY & TREATMENT	\$7,028	\$8,565	\$8,750
TRANSMISSION & DISTRIBUTION	\$8,223	\$8,969	\$10,323
SMALL SYSTEMS (incl. Contract Systems)	\$1,022	\$1,073	\$1,194
TECHNICAL SERVICES (SCADA)	\$774	\$873	\$965
ENGINEERING & INFORMATION SERVICES	\$3,828	\$3,515	\$3,681
REGULATORY SERVICES	\$493	\$1,034	\$997
CUSTOMER SERVICE	\$2,290	\$2,357	\$2,813
ADMINISTRATION & PENSION	\$5,966	\$5,836	\$5,538
DEPRECIATION	\$7,756	\$9,218	\$9,229
	<u>\$37,379</u>	<u>\$41,441</u>	<u>\$43,489</u>
OPERATING PROFIT	<u>\$18,474</u>	<u>\$13,766</u>	<u>\$11,314</u>
FINANCIAL REVENUES (NON-OPERATING)			
INVESTMENT INCOME	\$351	\$156	\$216
MISCELLANEOUS	\$375	\$428	\$428
	<u>\$725</u>	<u>\$583</u>	<u>\$644</u>
FINANCIAL EXPENDITURES (NON-OPERATING)			
LONG TERM DEBT INTEREST	\$2,378	\$2,685	\$2,363
LONG TERM DEBT PRINCIPAL	\$8,400	\$9,014	\$8,227
AMORTIZATION DEBT DISCOUNT	\$95	\$98	\$108
DIVIDEND/GRANT IN LIEU OF TAXES	\$4,578	\$4,827	\$5,142
MISCELLANEOUS	\$17	\$15	\$11
	<u>\$15,468</u>	<u>\$16,639</u>	<u>\$15,850</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	<u>\$3,731</u>	<u>(\$2,291)</u>	<u>(\$3,892)</u>

* 2017/18 Operating Budget approved by the Board of Directors, February 2, 2017.

HALIFAX WATER
ESTIMATED REVENUES AND EXPENDITURES - WASTEWATER OPERATIONS
PROPOSED OPERATING BUDGET
APRIL 1, 2018 to MARCH 31, 2019
(in thousands)

DESCRIPTION	ACTUAL APR 1/16 MAR 31/17	APPROVED BUDGET * APR 1/17 MAR 31/18	PROPOSED BUDGET APR 1/18 MAR 31/19
REVENUES			
METERED SALES	\$69,475	\$67,756	\$67,601
WASTEWATER OVERSTRENGTH AGREEMENTS	\$23	\$0	\$0
LEACHATE	\$357	\$389	\$387
CONTRACT REVENUE	\$83	\$86	\$86
SEPTAGE TIPPING FEES	\$909	\$775	\$915
DEWATERING FACILITY/ SLUDGE LAGOON	\$210	\$210	\$210
AIRLINE EFFLUENT	\$89	\$86	\$118
CUSTOMER LATE PAY./COLLECTION FEES	\$189	\$240	\$237
MISCELLANEOUS	\$129	\$129	\$128
	<u>\$71,463</u>	<u>\$69,670</u>	<u>\$69,682</u>
EXPENDITURES			
WASTEWATER COLLECTION	\$10,347	\$9,653	\$10,622
WASTEWATER TREATMENT PLANTS	\$17,797	\$19,251	\$19,160
SMALL SYSTEMS	\$1,182	\$1,276	\$1,323
DEWATERING FACILITY/ SLUDGE MGM'T	\$434	\$380	\$331
BIOSOLIDS TREATMENT	\$71	\$101	\$101
LEACHATE CONTRACT	\$309	\$341	\$337
TECHNICAL SERVICES (SCADA)	\$1,292	\$1,306	\$1,563
ENGINEERING & INFORMATION SERVICES	\$3,223	\$3,431	\$3,400
REGULATORY SERVICES	\$1,095	\$1,434	\$1,465
CUSTOMER SERVICE	\$1,842	\$2,064	\$2,455
ADMINISTRATION & PENSION	\$5,017	\$4,833	\$4,585
DEPRECIATION	\$10,669	\$12,465	\$13,251
	<u>\$53,278</u>	<u>\$56,534</u>	<u>\$58,594</u>
OPERATING PROFIT	<u>\$18,185</u>	<u>\$13,136</u>	<u>\$11,088</u>
FINANCIAL REVENUES (NON-OPERATING)			
INVESTMENT INCOME	\$351	\$156	\$216
PNS FUNDING HHSP DEBT	\$2,000	\$2,000	\$0
MISCELLANEOUS	\$168	\$14	\$97
	<u>\$2,519</u>	<u>\$2,169</u>	<u>\$313</u>
FINANCIAL EXPENDITURES (NON-OPERATING)			
LONG TERM DEBT INTEREST	\$5,509	\$6,022	\$5,427
LONG TERM DEBT PRINCIPAL	\$11,699	\$13,699	\$12,783
AMORTIZATION DEBT DISCOUNT	\$95	\$107	\$119
MISCELLANEOUS	\$32	\$0	\$5
	<u>\$17,335</u>	<u>\$19,828</u>	<u>\$18,334</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	<u>\$3,369</u>	<u>(\$4,523)</u>	<u>(\$6,933)</u>

* 2017/18 Operating Budget approved by the Board of Directors, February 2, 2017.

HALIFAX WATER
ESTIMATED REVENUES AND EXPENDITURES - STORMWATER OPERATIONS
PROPOSED OPERATING BUDGET
APRIL 1, 2018 to MARCH 31, 2019
(in thousands)

DESCRIPTION	ACTUAL APR 1/16 MAR 31/17	APPROVED BUDGET * APR 1/17 MAR 31/18	PROPOSED BUDGET APR 1/18 MAR 31/19
REVENUES			
STORMWATER SITE RELATED SERVICE	\$6,661	\$6,700	\$6,752
STORMWATER RIGHT-OF-WAY SERVICE	\$3,881	\$3,881	\$3,835
CUSTOMER LATE PAY./COLLECTION FEES	\$51	\$39	\$21
MISCELLANEOUS	\$88	\$89	\$89
	<u>\$10,681</u>	<u>\$10,710</u>	<u>\$10,696</u>
EXPENDITURES			
STORMWATER COLLECTION	\$4,053	\$4,589	\$5,239
TECHNICAL SERVICES (SCADA)	\$43	\$31	\$37
ENGINEERING & INFORMATION SERVICES	\$525	\$558	\$1,095
REGULATORY SERVICES	\$768	\$1,242	\$1,302
CUSTOMER SERVICE	\$300	\$205	\$253
ADMINISTRATION & PENSION	\$816	\$786	\$746
DEPRECIATION	\$677	\$855	\$954
	<u>\$7,182</u>	<u>\$8,266</u>	<u>\$9,626</u>
OPERATING PROFIT	<u>\$3,499</u>	<u>\$2,444</u>	<u>\$1,070</u>
FINANCIAL REVENUES (NON-OPERATING)			
INVESTMENT INCOME	\$78	\$35	\$48
MISCELLANEOUS	\$0	\$0	\$0
	<u>\$78</u>	<u>\$35</u>	<u>\$48</u>
FINANCIAL EXPENDITURES (NON-OPERATING)			
LONG TERM DEBT INTEREST	\$588	\$825	\$770
LONG TERM DEBT PRINCIPAL	\$1,221	\$1,577	\$1,591
AMORTIZATION DEBT DISCOUNT	\$9	\$12	\$18
MISCELLANEOUS	\$0	\$0	\$0
	<u>\$1,818</u>	<u>\$2,414</u>	<u>\$2,379</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	<u>\$1,759</u>	<u>\$64</u>	<u>(\$1,261)</u>

* 2017/18 Operating Budget approved by the Board of Directors, February 2, 2017.

HALIFAX WATER
ESTIMATED REVENUES & EXPENDITURES, SEGREGATED BY REGULATED AND UNREGULATED ACTIVITIES
PROPOSED OPERATING BUDGET
APRIL 1, 2018 to MARCH 31, 2019
(in thousands)

DESCRIPTION	ACTUAL	APPROVED	PROPOSED
	APR 1/16 MAR 31/17	BUDGET * APR 1/17 MAR 31/18	BUDGET APR 1/18 MAR 31/19
REGULATED ACTIVITIES			
REVENUES			
METERED SALES	\$116,658	\$114,356	\$113,742
FIRE PROTECTION	\$7,074	\$7,074	\$7,074
PRIVATE FIRE PROTECTION	\$831	\$857	\$860
STORMWATER SITE RELATED SERVICE	\$6,661	\$6,700	\$6,752
STORMWATER RIGHT-OF-WAY SERVICE	\$3,881	\$3,881	\$3,835
OTHER OPERATING REVENUE	\$1,207	\$1,151	\$1,165
	<u>\$136,312</u>	<u>\$134,020</u>	<u>\$133,429</u>
EXPENDITURES			
WATER SUPPLY & TREATMENT	\$7,028	\$8,559	\$8,744
TRANSMISSION & DISTRIBUTION	\$8,223	\$8,969	\$10,323
WASTEWATER COLLECTION	\$10,332	\$9,640	\$10,501
STORMWATER COLLECTION	\$4,053	\$4,589	\$5,239
WASTEWATER TREATMENT PLANTS	\$17,797	\$19,251	\$19,160
SMALL SYSTEMS	\$2,188	\$2,324	\$2,492
SCADA, CONTROL & PUMPING	\$2,109	\$2,209	\$2,564
ENGINEERING & INFORMATION SERVICES	\$7,576	\$7,495	\$8,171
REGULATORY SERVICES	\$2,356	\$3,710	\$3,763
CUSTOMER SERVICE	\$4,396	\$4,591	\$5,487
ADMINISTRATION & PENSION	\$11,768	\$11,363	\$10,569
DEPRECIATION	\$19,095	\$22,538	\$23,302
	<u>\$96,922</u>	<u>\$105,238</u>	<u>\$110,315</u>
OPERATING PROFIT	<u>\$39,391</u>	<u>\$28,782</u>	<u>\$23,114</u>
FINANCIAL REVENUES (NON-OPERATING)			
INVESTMENT INCOME	\$780	\$346	\$480
MISCELLANEOUS	\$2,289	\$1,948	\$110
	<u>\$3,069</u>	<u>\$2,293</u>	<u>\$590</u>
FINANCIAL EXPENDITURES (NON-OPERATING)			
LONG TERM DEBT INTEREST	\$8,475	\$9,474	\$8,540
LONG TERM DEBT PRINCIPAL	\$21,320	\$24,212	\$22,576
AMORTIZATION DEBT DISCOUNT	\$199	\$217	\$245
DIVIDEND/GRANT IN LIEU OF TAXES	\$4,578	\$4,827	\$5,142
MISCELLANEOUS	\$0	\$0	\$0
	<u>\$34,573</u>	<u>\$38,730</u>	<u>\$36,503</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES - REGULATED ACTIVITIES	<u>\$7,887</u>	<u>(\$7,655)</u>	<u>(\$12,799)</u>
UNREGULATED ACTIVITIES			
REVENUES			
AEROTECH SEPTAGE TIPPING FEES	\$909	\$775	\$915
LEACHATE	\$357	\$389	\$387
CONTRACT REVENUE	\$83	\$86	\$86
DEWATERING FACILITY/ SLUDGE LAGOON	\$210	\$210	\$210
AIRLINE EFFLUENT	\$89	\$86	\$118
MISCELLANEOUS	\$37	\$22	\$37
	<u>\$1,685</u>	<u>\$1,566</u>	<u>\$1,753</u>
EXPENDITURES			
- DIRECT			
WATER SUPPLY & TREATMENT	\$16	\$25	\$25
WASTEWATER COLLECTION	\$16	\$0	\$108
WASTEWATER TREATMENT	\$814	\$821	\$769
SPONSORSHIPS & DONATIONS	\$66	\$66	\$266
DEPRECIATION	\$6	\$0	\$132
	<u>\$917</u>	<u>\$912</u>	<u>\$1,300</u>
- INDIRECT (ADMINISTRATION)	\$0	\$91	\$95
	<u>\$917</u>	<u>\$1,003</u>	<u>\$1,395</u>
OPERATING PROFIT	<u>\$767</u>	<u>\$564</u>	<u>\$358</u>
FINANCIAL REVENUES (NON-OPERATING)			
MISCELLANEOUS	\$298	\$494	\$416
	<u>\$298</u>	<u>\$494</u>	<u>\$416</u>
FINANCIAL EXPENDITURES (NON-OPERATING)			
LONG TERM DEBT INTEREST	\$0	\$58	\$23
LONG TERM DEBT PRINCIPAL	\$0	\$79	\$27
AMORTIZATION DEBT DISCOUNT	\$0	\$0	\$0
MISCELLANEOUS	\$94	\$15	\$10
	<u>\$94</u>	<u>\$152</u>	<u>\$61</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES - UNREGULATED ACTIVITIES	<u>\$971</u>	<u>\$905</u>	<u>\$713</u>
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES - COMBINED ACTIVITIES	<u>\$8,858</u>	<u>(\$6,750)</u>	<u>(\$12,086)</u>

* 2017/18 Operating Budget approved by the Board of Directors, February 2, 2017.

TO: Ray Ritcey, Chair and Members of the Halifax Regional Water Commission Board

SUBMITTED BY: *Original Signed By:*

Carl Yates M.A.Sc., P.Eng., General Manager

DATE: January 17, 2018

SUBJECT: **Proposed 2018/19 Business Plan**

ORIGIN

Annual operational requirement in accordance with HRWC Act

RECOMMENDATION

The Board approve the 2018/19 Business Plan in the substantive form attached and direct the General Manager to submit the 2018/19 Business Plan to Halifax Council for approval.

BACKGROUND/DISCUSSION

In accordance with best practice, Halifax Water management develops long-term and short-term business plans for the approval of the Commission Board. The 2018/19 Annual Business Plan reflects the strategic direction envisioned in the 5-Year Business Plan presented to the Board in November, 2017, and is consistent with the Integrated Resource Plan [IRP] approved by the Board in September, 2012.

The coming year will see installation of Advanced Metering Infrastructure [AMI] through the Customer Connect program, continued focus on sustainable infrastructure investments, an enhanced research program with Dalhousie University, and adoption of best practices for wet weather management and lead service lines, all while maintaining or increasing current levels of service to customers.

With recent federal and provincial approval of infrastructure projects under the Clean Water and Wastewater Fund [CWWF], Halifax Water will continue to pursue opportunities to accelerate its capital program to align with the IRP. As can be seen from the attached document, the financial position of the utility has improved over the last three

years, such that a general rate application is not planned for 2018/19. Accordingly, management are requesting the Board approve the 2018/19 Business Plan in the substantive form attached.

As a result of the direction from the Halifax Water Board and Halifax Regional Council, it is also recommended that the business plan be forwarded to Council for their approval, consistent with legislative amendments that came into effect on April 1, 2017.

ALTERNATIVES

None

ATTACHMENT

2018/19 Annual Business Plan (electronic copy only)

2018/19 Annual Business Plan



**Presented to the Halifax Water Board
January 25, 2018**

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Glossary

AMI	Advanced Meter Infrastructure
AM	Asset Management
AMP	Asset Management Plan
DOE	Department of Energy
E&IS	Engineering & Information Services
EMAP	Energy Management Action Plan
GIS	Geographic Information System
H2O	Help to Others [Program]
HW	Halifax Water
IFRS	International Financial Reporting Standards
IRP	Integrated Resource Plan
NSE	Nova Scotia Environment
NSERC	Natural Sciences and Engineering Research Council
NSPI	Nova Scotia Power Incorporated
NSUARB	Nova Scotia Utility and Review Board
RDC	Regional Development Charge
RDII	Rain Derived Inflow and Infiltration
SCADA	Supervisory Control and Data Acquisition
UV	Ultraviolet
WRWIP	West Region Wastewater Infrastructure Plan
WWTF	Wastewater Treatment Facility

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APPENDIX

A. Organizational Structure

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1. INTRODUCTION

After completing a decade of operations as an integrated water, wastewater and stormwater utility, Halifax Water is well positioned to continue its tradition of stewardship. Since 2007, Halifax Water has established a framework for sustainable service delivery with a focus on infrastructure renewal, regulatory compliance, growth and customer service. This strategic framework is paramount to attaining a high level of service for over 95,000 customers and remaining committed to environmental stewardship. Halifax Water delivers service through five departments; Water Services; Wastewater and Stormwater Services; Corporate Services, Engineering and Information Services; and Regulatory Services as described within this document and illustrated in Appendix A.

The 2018/19 fiscal year marks the first year of the Five Year Business Plan presented to the Halifax Water Board in November, 2017. With the wastewater system coming into regulatory compliance and a mature rate structure established for all services, Halifax Water will be paying particular attention to asset renewal and enhanced customer service over the next year. The utility took advantage of provincial and federal funding for infrastructure investments through the Clean Water and Wastewater Fund [CWWF] last year and expects that this program will continue for implementation of projects in coming years.

Asset renewal will continue to be supported by a formal asset management plan and benefit from an expanded research program in partnership with Dalhousie University. The 2018/19 fiscal year will see the inclusion of wastewater in the Natural Sciences and Engineering Research Council [NSERC] Research Chair to build on the last ten years of research in water treatment and quality. The delivery of services will be complemented by adoption of industry best practices including an innovative approach to wet weather management and lead service line replacements.

The 2017/18 fiscal year also saw the initiation of Customer Connect, to install the next generation of meter technology to position Halifax Water as the utility of the future. The Nova Scotia Utility and Review Board [NSUAR] approved a \$25.4 capital expenditure for the implementation of Advanced Metering Infrastructure [AMI] which will see the replacement or upgrade of over 83,000 customer meters and establish a smart network throughout the service area. The project has an anticipated completion in the 2019/20 fiscal year to enhance both customer service and operational efficiency.

2. EXECUTIVE SUMMARY

Although the five year business plan is a touchstone for the 2018/19 business plan, it is also influenced by the Integrated Resource Plan [IRP] which is a 30 year framework for the strategic direction of the utility. The IRP projected expenditures of \$2.6 billion [net present value] over a 30 year period commencing in 2013/14 for; asset renewal [\$1,385 million]; regulatory compliance [\$598 million]; and growth [\$595 million]. The 2018/19 fiscal year

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will see continued investment in these areas all while ensuring a high level of service for the customers of Halifax Water.

The 2018/19 Business Plan provides an overview of the services provided by Halifax Water [HW] and an overview of the operating and capital budgets to support the delivery of these services. The Business Plan projects a deficit, as indicated in the pro forma income summary below, and reflects the rates approved by the NSUARB in their 2015 and 2017 Decisions. The current water and wastewater rates became effective on April 1, 2016 and the stormwater rate structure came into effect on July 1, 2017. Although the pro forma income summary indicates a loss for the fiscal year, the utility has accumulated an operating surplus over the last three years to defray this deficit position.

Table 1

Pro Forma Income Summary (IFRS Basis)				
	Actual 2016/17	Approved Budget 2017/18	Proposed Budget 2018/19	Variance
Operating Revenues	\$137,997	\$135,587	\$135,182	(\$405)
Operating Expenditures	\$97,839	\$106,241	\$111,710	(\$5,468)
Operating Profit	\$40,158	\$29,346	\$23,472	(\$5,874)
Non-Operating Revenues	\$3,322	\$2,787	\$1,006	(\$1,781)
Non-Operating Expenditures	\$34,622	\$38,882	\$36,564	\$2,319
Net Surplus (Deficit)	\$8,858	(\$6,750)	(\$12,086)	(\$5,336)

Note:
 Consolidated numbers reported above include regulated and unregulated activities of the Urban Core, Satellite and Airport/AeroTech Systems.
 The net surplus (deficit) reported for the 2018/19 Proposed Budget are reported on the accrual basis. Under the NSUARB Accounting and Reporting Handbook some accrued future employment expense liabilities are excluded for the purposes of rate making.

The 2018/19 Operating Budget is prepared on an accrual basis [similar to last year] to provide broader information for decision making and to be reflective of best practice for budgeting. Accrued amounts for 2018/19 include a liability for future employee benefits [pension] as calculated under the International Financial Reporting Standards [IFRS]. Accrued amounts for the comparative years are calculated under the Canadian Institute of Chartered Accountants [CICA] Handbook Section 3461. The NSUARB Accounting and Reporting Handbook for Water Utilities is currently used in determining the revenue requirements for rate making purposes. If accrued pension expenses were omitted in 2018/19, there would be a projected net loss on a NSUARB Handbook basis of \$9.1 million.

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There is sufficient accumulated operating surplus to offset the budgeted operating loss in 2018/19.

As outlined in the table below, operating expenses are budgeted to increase \$5.5 million or 5.1% compared to the 2017/18 Operating Budget. Depreciation expense will increase by \$1.0 million or 4.0%. Debt Servicing will decrease by \$2.6 million or 7.7% when compared to the 2016/17 Operating Budget.

Table 2

Expense Summary			
	Actual 2016/17	Approved Budget 2017/18	Proposed Budget 2018/19
Operating Revenues	\$137,997	\$135,587 <i>-1.7%</i>	\$135,182 <i>-0.3%</i>
Operating Expenditures	\$97,839	\$106,241 <i>8.6%</i>	\$111,710 <i>5.1%</i>
Non-Operating Revenues	\$3,322	\$2,787 <i>-16.1%</i>	\$1,006 <i>-63.9%</i>
Non-Operating Expenditures	\$34,622	\$38,882 <i>12.3%</i>	\$36,564 <i>-6.0%</i>
Depreciation	\$19,101	\$22,538 <i>18.0%</i>	\$23,434 <i>4.0%</i>
Debt Servicing	\$29,994	\$34,040 <i>13.5%</i>	\$31,406 <i>-7.7%</i>

**Amounts are stated in \$ Thousands*

The utility faces pressures associated with asset renewal, growth, and compliance with regulatory requirements, as described in the IRP. In recognition that these pressures require capital investment, Halifax Water pursued external funding programs to mitigate impacts to the rate base. To that end, the utility, in partnership with the Halifax Regional Municipality, was successful in securing \$31 million in funding from the Clean Water and Wastewater Fund [CWWF]. Three of the five CWWF projects were completed in 2017/18 with the remaining two scheduled for 2018/19. The 2018/19 Capital Budget is impacted by

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these infrastructure programs and calls for expenditures of just over \$ 74 million as outlined in the graphs below.

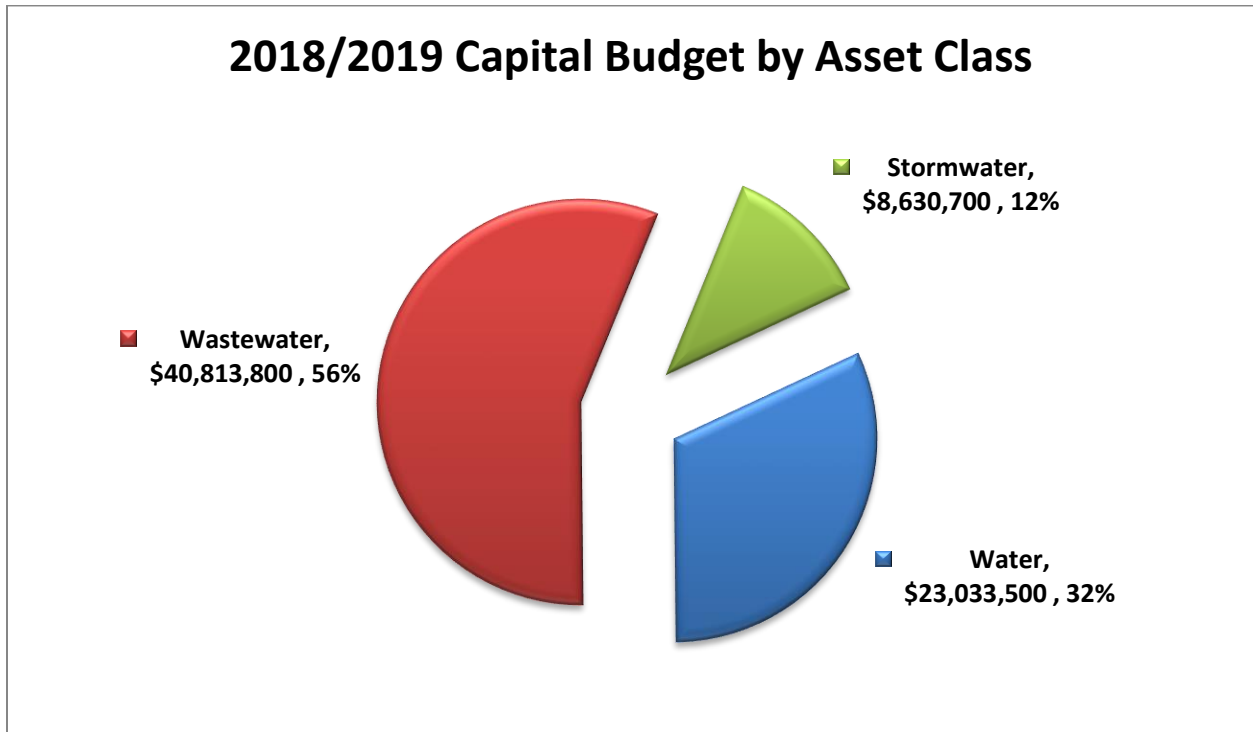


Figure 1 - Capital Budget by Asset Class

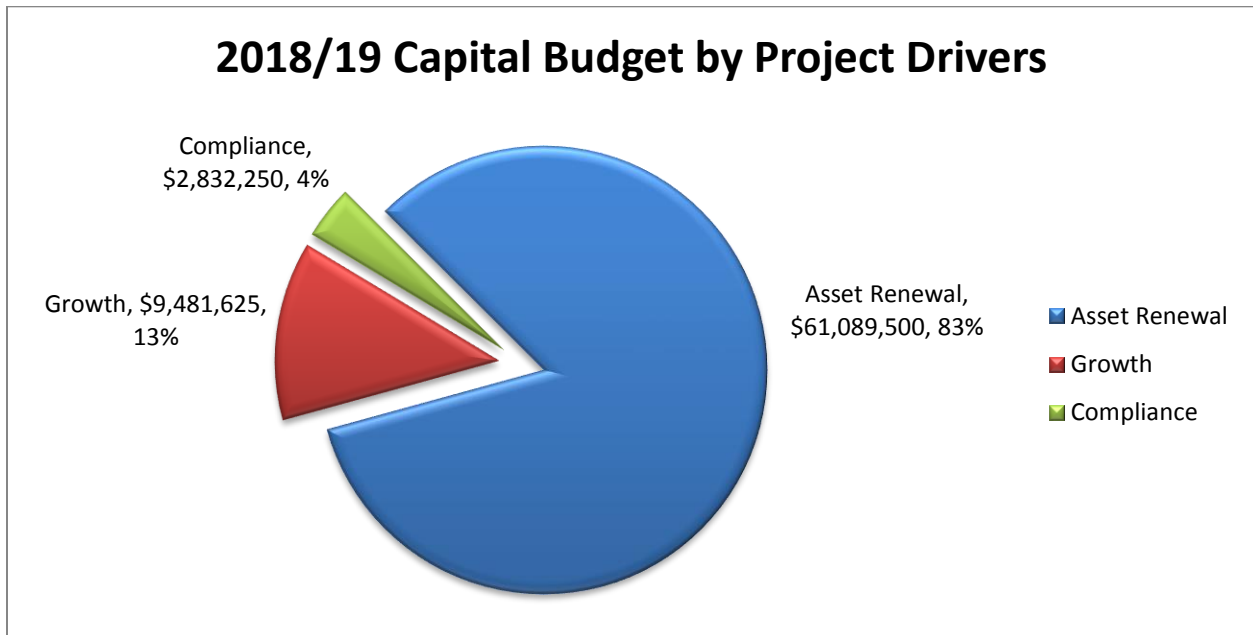


Figure 2 – Capital Budget by Strategic Driver

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Although a general rate application is not planned for this fiscal year, 2018/19 will see the implementation of revised stormwater rates as approved by the NSUARB, effective July 1, 2017. In relation to the approved Cost of Service Manual, adjustments to the stormwater rate structure were approved to ensure fair and equitable treatment of all customers. The approved stormwater rate structure, amongst other things, will implement a tiered rate structure for residential customers and bring in a credit system for non-residential customers to promote detention of peak stormwater flow. The rate structure, as more fully described in this document, does not increase revenues but better aligns costs with those customers who derive the benefits of service, consistent with the Public Utilities Act.

Other major initiatives envisioned for 2018/19 include the installation of AMI throughout the service area, implementation of a revised lead service replacement program, continued focus on wet weather management, consideration of a district energy system with the Cogswell Interchange redevelopment and a renewed focus on water and wastewater research. The latter initiative will benefit from the recent renewal of the NSERC Industrial Research Chair with Dalhousie University for a five year period commencing April 1, 2017 with the inclusion of wastewater as a research theme in 2018/19.

3. SERVICE OVERVIEW

3.1 Water Services

The Water Services Department is responsible for operating and maintaining the municipal water system “from source to tap”. The Water Services Department also provides SCADA [Supervisory Control and Data Acquisition] and process control services for all of Halifax Water. The department is organized to both maintain and operate the water system as a holistic system, with managers assigned accountability for clearly defined parts of the system. The Water Services Department provides the following services:

- **Source Water Protection:** Managing and protecting watershed land, developing and maintaining source water plans, enforcement of Protected Water Area and other relevant source water regulations, source water community relations including working with and developing watershed advisory boards, real property maintenance of source water lands, and forestry management of watershed lands.
- **Water Quality Management:** Water quality planning, water quality monitoring, process support to treatment plants, customer inquiries and investigations, water quality support to capital projects, policy development, research and management of the Halifax Water – Natural Sciences and Engineering Research Council [NSERC] Industrial research chair at Dalhousie University.

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- **Water Supply Plant Operations:** Operation and maintenance of 3 large water supply plants [Pockwock, Lake Major and Bennery Lake], 6 small systems, 6 dams, 2 emergency water supplies and 22 chlorine monitoring devices and rechlorination stations.
- **Distribution System Operations:** Operation and maintenance of the water distribution and transmission systems. The system is managed according to three geographic regions with responsibility for over 1500 km of transmission and distribution mains, 8,300 fire hydrants, 88,000 service connections, 140 pressure control/flow metering facilities, 22 pumping stations, 23,000 valves and 15 water storage facilities. This also includes responding to third party requests for buried infrastructure locates.
- **Technical Services:** Operation and maintenance of the SCADA system and the process communications network; implementation of the SCADA Master Plan, process control cyber security, instrumentation maintenance, electrical maintenance, maintenance of water pumping stations, and operation and development of the process data warehouse.

Water Services is also working with Corporate Services in the planning and implementation of Customer Connect, our project to convert to Advanced Metering Infrastructure [AMI]. Further, embedded within the department, Water Services is responsible for the following major programs.

- **Water Loss Control:** Halifax Water was the first utility in North America to adopt the International Water Association [IWA] methodology for managing leakage in the distribution system. Efforts save \$650,000 per year in treatment chemical and electricity costs and have reduced water main breaks by 20%, saving \$500,000 in repair costs annually. The program has won several national awards and Halifax Water staff are in demand to share expertise with industry and other utilities.
- **NSERC-Halifax Water Industrial Research Chair in Water Quality and Treatment:** This program, carried out in partnership with Dalhousie University over the last ten years has realized significant operational savings, improved water quality and influenced Halifax Water policy. The Research Chair has produced 112 peer reviewed research papers in world recognized scientific journals over the last ten years and has allowed Halifax Water to become industry recognized leaders in areas such as lead service line replacement and biofilm control in distribution systems. Several Halifax Water employees were trained as students under the Research Chair. Halifax Water and Dalhousie were awarded a third five-year term for the Research Chair, effective April 1, 2017.
- **Lead Service Line Replacement Program:** In September 2016, the Halifax Water Board approved an initiative which will see all lead service lines replaced by 2050. This program is discussed in more detail in section 5.8 and is being developed and implemented by the Water Quality division in the Water Services Department.

3.2 Wastewater/Stormwater Services

The Wastewater and Stormwater Services Department is responsible for operating and maintaining municipal systems from “drains back to the source again”. In this regard, the Wastewater and Stormwater Services Department has a mandate to protect the environment while providing world class collection and treatment services to its customers. The department also provides corporate Fleet and Building Services. These essential services are delivered through 6 managers who are responsible for both stormwater and wastewater activities in three regions. The supervisors and the field crews carry out both wastewater and stormwater related duties. The department is also supported by an Operations Engineer position.

3.2.1 Wastewater Services

The Wastewater Services department strives to provide uninterrupted delivery of the following services:

- **Wastewater Treatment Plant Operations:** Operation and maintenance of 14 wastewater treatment facilities [WWTFs] and associated infrastructure, regulatory reporting, and implementing and coordinating capital upgrades with other Halifax Water departments. As per new federal regulations; 2 plants are classified as very large, 3 are large, 2 are medium and 9 are small capacity. The department also operates 4 additional small treatment facilities under contract from Halifax Regional Municipality and the province.
- **Biosolids Processing:** Liquid transport, dewatering and processing of sludge, operation and maintenance of various dewatering equipment at WWTFs, administering trucking contracts for dewatered biosolids and biosolids processing facility [BPF] operations contract, and processing of biosolids from on-site septic systems. The BPF, located at the Aerotech Industrial Park, produces a soil amendment for beneficial use in agriculture. Staff from Treatment Plant Operations carry out these related activities.
- **Collection System Operations:** Operation, repair and maintenance of the wastewater collection and trunk sewer system. The system is managed according to three geographic regions with responsibility for over 1700 km of collection pipes, 172 Pump Stations, 21 Combined Sewer Overflow facilities and 85,000 service connections.

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- **Septage Treatment Services:** This is an unregulated activity for HW but it provides an essential service to our customers who do not have a centralized wastewater service. The septage from septic hauling companies who service these users is accepted at strategic locations within the core sewer service area and at the Aerotech WWTF. The septage is treated at the respective WWTFs.
- **Fleet and Building Maintenance Services:** Maintenance and repair of approximately 200 vehicles ranging from smaller utility vehicles to large excavation equipment, replacement of vehicles on a life cycle costing basis, and records management. This section of the department is also responsible for maintenance and physical security of corporate buildings and any other logistical support required for efficient operation of the department.

3.2.2 Stormwater Services

The Stormwater Services is responsible for operation and maintenance of stormwater infrastructure within the public right of way or within easements. This service has undergone significant changes over the past two years and continues to progress to achieve a higher level of service.

- **Collection System Operations:** Operation, repair and maintenance of the stormwater collection and trunk sewer system. The system is managed by shared crews with Wastewater Services within the three geographic regions with responsibility for over 850 km of stormwater collection pipes, 28 stormwater retention facilities and over 600 km of ditches and associated cross culverts and driveway culverts.
- **Service Review:** With the creation of the Stormwater Engineer position, resources are allocated to drainage investigations, stormwater billing exemption requests, and operations support. Drainage investigations may be triggered by a customer inquiry on private property or an operational issue on an HRWC owned infrastructure. The Stormwater Engineer reviews the drainage issues and renders a position which may involve an operational fix or a capital improvement if required. Complaints stemming from stormwater billing are vetted through the Stormwater Engineer and a decision is provided to the Customer. As per the direction of the NSUARB, HRWC has engaged the services of a Dispute Resolution Officer [DRO] to independently review appeals and render an independent Decision on any decisions provided by staff.

3.3 Engineering and Information Services

The Engineering & Information Services [E&IS] Department is responsible for the provision of engineering and technical services relating to the planning, design, construction, and maintenance of water, wastewater and stormwater infrastructure and related asset information. E&IS also provide and support the hardware, software and related services for the electronic business applications required to support the utility. All E&IS staff work out of 450 Cowie Hill Road.

The E&IS Department has four core areas of responsibility and 7 specific sections delivering programs.

- ASSET MANAGEMENT
- INFRASTRUCTURE
 - Water
 - Wastewater
 - Stormwater
 - Wastewater Treatment Facilities
- ENERGY EFFICIENCY
- INFORMATION MANAGEMENT
 - Engineering Information
 - Information Services

The **Asset Management** section focuses on the development of the Asset Management program [including the overall strategy, inventories, condition and performance assessments], and the development and delivery of annual Asset Management Plans [AMP]. The section is also responsible for modelling and flow monitoring, long term infrastructure master planning [including implementation of the Integrated Resource Plan [IRP], and the development of the 5 Year and 1 Year Capital Budget.

The **Infrastructure** sections are responsible for the design, construction and project management for water, wastewater and stormwater capital projects. These three sections also provide support for capital project prioritization, master planning and asset management relating to the core infrastructure.

The **Energy Efficiency** section is responsible for the provision of engineering services related to energy management and energy efficiency of water, wastewater and stormwater infrastructure.

The **Engineering Information** section is responsible for the corporate Geographic Information System [GIS] including the maintenance and distribution of all record information. The section is also responsible for on-going GIS development including both

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desktop and mobile GIS applications. This section also supports capital projects and other initiatives through Computer Aided Drafting [CAD] and map production.

The **Information Services** section provides administration of services relating to network resources [storage, servers, printers, etc.], users, access control and network security, server hardware and operating systems. All computer equipment is managed by the IS section. This includes desktops, laptops, monitors, printers and servers. The IS section is the first line of support for all IT related problems or requirements. Corporate desktop software is administered by the IS section. Provides business analysis and project management as required for IT projects.

3.4 Regulatory Services

The Regulatory Services Department continues to provide support the corporation through the delivery of programs such as Environmental Engineering, Development Approvals, Regulatory Compliance, Safety and Security, Stormwater Engineering and Environmental Management System [EMS].

The **Environmental Engineering Group** delivers two key programs, Pollution Prevention [P2] and Inflow and Infiltration [I/I] reduction.

The Pollution Prevention group has coordinated the repairs of four cross connections this past year and identified a new one in the last quarter of 2017/18 to remedy. The group has developed a list of medium to high risk customers that, by the nature of their use, that may generate wastes that are harmful to our wastewater collection systems. Through education and inspections, the team is promoting compliance of waste discharges with our Rules and Regulations. In support of the education efforts, the launch of the two YouTube videos have assisted in delivering the messages the Fat Oil and Grease [FOG] can be harmful to both a customer's plumbing and Halifax Water's collection system [Bacon Responsibly] and "Flushable Wipes" are not "flushable" in a video titled "Toilet Paper – the only flushable wipe".

The I/I group continues to assist the Wet Weather Management Program in locating private side sources of inflow and infiltration of stormwater into the wastewater systems. Two of Halifax Water's small wastewater treatment facilities, Springfield Lake and Uplands Park are subject to wet weather flows that can impact compliance with our Operating Permits. The group has commenced investigations in both areas and has hosting a public information open house in Springfield in November. The investigations and required follow ups will continue in to the coming year.

Engineering Approvals continues to be engaged with Halifax Regional Municipality as they continue to implement their Regional Plan, updated in 2014 and as they focus on the completion of the Centre Plan in providing technical support as it relates to central services for new development. Halifax Water project managed the Local Wastewater collection

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System Assessment for the municipality in support of the potential growth within the city centre and has delivered the final report for their use.

Engineering Approvals, are currently updating the Bedford West Capital Cost Contribution plan to reflect the modifications to the wastewater and water servicing scenarios. Stakeholder Consultation will commence in 2018, with an Application to the Nova Scotia Utility and Review Board [NSUARB] by summer 2018.

The land owners of the Port Wallace Master Plan area are currently seeking secondary planning approvals and Halifax Water has been providing technical support to the Master Infrastructure Plan. With the completion of the plan, Halifax Water will be able to evaluate whether the Port Wallace area can be considered as a new Capital Cost Contribution area.

Last year saw the implementation of an interim solution to the Service Approval Module, using SharePoint, to replace HP3000. In keeping with the IT Strategic Plan, Halifax Water is engaged in the process Halifax Regional Municipality commenced to replace their permitting software, HANSEN. The goal over the next two years will be to evaluate the efficiency of utilizing the same permitting software and adopting it at Halifax Water. It is anticipated the implementation of the new software will be 2019/20.

The **Safety and Security Group** provides support for the entire organization with respect to the safety training program, including documentation of safety training requirements to ensure employees have the appropriate training to safely conduct their daily activities and manage risk to the utility.

The Safety and Security division is also responsible for the development and update of the corporate Emergency Response Plan including emergency response training. As well, Halifax Water continues to participate in Public Safety Canada's Regional Resilience Assessment Program for treatment facilities. Facilities are evaluated using the Critical Infrastructure Resilience Tool, identifying areas where security and protection of critical assets can be improved or enhanced. Over the coming year, capital improvements will be undertaken and staff will develop a safety plan to improve the security scores at our facilities.

The **Regulatory Compliance Group** conducts sampling of the water treatment and distribution systems for bacteria and residual chlorine, ensuring compliance with Canadian Drinking Water Guidelines and Operational permits issued by Nova Scotia Environment [NSE]. Similarly, sampling is completed for wastewater effluent parameters for compliance with permits issued by NSE, consistent with new federal regulations. The group is also tasked with compiling and submitting reports associated with the sampling results to NSE. Regulatory Compliance also ensures that operating permits are renewed prior to their expiry. The group continues to support Engineering & IS, and Wastewater Operations staff on changes to regulatory permits including the Wastewater System Effluent Regulations [WSER] and assists in developing an implementation plan for required upgrades.

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A technologist has been hired to assist the Stormwater Engineer in process stormwater billing appeals, provide technical support to Operations in investigating drainage complaints and liaising with Halifax Regional Municipality on joint stormwater issues.

The **Environmental Management System [EMS]** oversees the adherence to the ISO 14001 – 2004 standard for our certified facilities, Pockwock, Lake Major, Bennery Lake, and Herring Cove. As discussed in Section 5.7, the standard has changed [14001-2015] and in June 2018, the facilities will be audited against the new standard.

3.5 Corporate Services

Corporate Services consists of 6 divisions, with service to internal and external customers through Finance, Accounting, Procurement, Human Resources, Customer Service, and Metering and Billing.

The **Finance Group** is responsible for development of operating budgets, funding plans for the capital budget, rate applications and financial modeling for business plans. This group assists Engineering in the preparation of capital budgets and confirms availability of funding sources. The group is responsible for forecasting revenues and expenditures, including associated trend analysis, responsible for pension plan administration, internal control testing, and quality assurance activities around financial transactions including payroll.

The **Accounting Group** is responsible for timely and accurate financial reporting, financial accounting, financial statements, revenue and cash flow, development and implementation of accounting procedures and internal controls, fixed asset accounting, financial analyses and annual audit.

Procurement directs the planning and delivery of Procurement services to the organization ensuring compliance with corporate policies and Provincial legislation. This group develops and implements monitoring and reporting of systems, programs, procedures for inventory and procurement to support acquisition of goods and services to enable delivery of the business plan, operating and capital budget objectives.

Human Resources is responsible for the effective delivery of all Human Resource initiatives including; effective workforce planning, organizational change and development, recruitment functions, disability management, health and wellness initiatives, labour/employee relations, compensation and benefit functions, pension administration, and employment equity.

Customer Services is responsible for customer service delivery to external and internal customers through the Customer Care Centre, and manages all customer contacts, establishes corporate customer service standards, goals and objectives, and coordinates business processes in the area of customer service with a focus on service and process improvement.

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Metering and Billing is responsible for end to end functions of meter installation, maintenance, reading, sampling, testing, establishment of standards, and billing customers in a timely and accurate manner.

The most significant objectives for Corporate Services in the 2018/19 year are:

- Continuation of the Advanced Meter Infrastructure [AMI] project. This item is discussed in greater detail in section 5.2. The project was approved by the NSUARB on October 6, 2016 and the first AMI meters were installed in 2017.
- Development and implementation of a Corporate Customer Service Strategy that aligns with HRM's Corporate Customer Service Strategy.
- Initiation of a telephony upgrade project, to continue enhancement of Customer Service. An RFP for new call centre telephony will be issued in 2018/19.
- Halifax Water will be developing a customer portal in three phases, with the first phase being development and implementation of a new internet site in 2018/19. In the following year [2019/20] a customer portal will enable customers to access information about their water consumption, account and customer characteristics. The final phase of customer portal development will occur in 2020/21 with additional on-line transactional functionality such as on-line service requests, bill presentment and bill payment.
- Halifax Water will be optimizing the current Customer Relationship Management system [Cayenta] in 2018/19 to improve reporting, knowledge base and scripts for customer service representatives, and workflow and integration with the Computerized Maintenance Management System [CMMS].
- The business case and process to implement monthly billing for customer that are currently billed on a quarterly basis will be finalized in 2018/19, with a view to implementing monthly billing in conjunction with the next rate application and resulting rate changes.
- Continued rollout and training for all staff on Halifax Water's Procurement Policy, which was revised effective January 1, 2018.
- A review of the non-union compensation strategy in conjunction with HRM, and work will commence on collective bargaining for contracts with CUPE Locals 227 and 1431.
- Continuing work on Civility and Respect in the Workplace, the Health and Wellness program introduced last year, and implementation of some new organizational supports and programs regarding Mental Health.
- Completing a consolidation of the Pension Plan text and Amendments to reflect changes to the NS Pension & Benefit Act which came into effect June 1, 2015.
- Conduct an Actuarial Valuation for the Halifax Water Employees' Pension Plan, January 1, 2019.

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4. BUDGET SUMMARY

4.1 Capital

Halifax Water’s 2012 IRP identified a 30 year capital investment plan valued at \$2.6 Billion [net present value]. As part of the utility’s overall mission, the capital budget program focuses on three main strategic drivers; asset renewal; regulatory compliance; and growth. The capital program helps ensure that Halifax Water continues to provide world class services in a cost effective and efficient manner with a focus on long term sustainability.

The Capital Budget includes an annual 1 year and 5 year capital plan. Capital projects are defined as newly acquired or constructed item with a value greater than \$5000 and a life expectancy beyond one year. The Capital Budget document includes four general asset categories: Water, Wastewater, Stormwater and Corporate Projects.

The summary totals for the four asset classes for the 1 Year and 5 Year capital budget are as follows:

Asset Class	Year 1 2018/2019	Year 1 – 5 2018/2019 – 2022/2023
Water	\$25,033,500	\$148,277,000
Wastewater	\$39,818,800	\$264,626,000
Stormwater	\$ 8,595,700	\$ 57,168,000
TOTAL	\$73,448,000	\$ 470,071,000

The capital program balances near-term needs with long-term investments across all asset classes.

The following chart shows the current proposed 5 year capital expenditure plotted against the IRP capital expenditure recommendation. The chart indicates a continued general increase in capital expenditures towards the target level.

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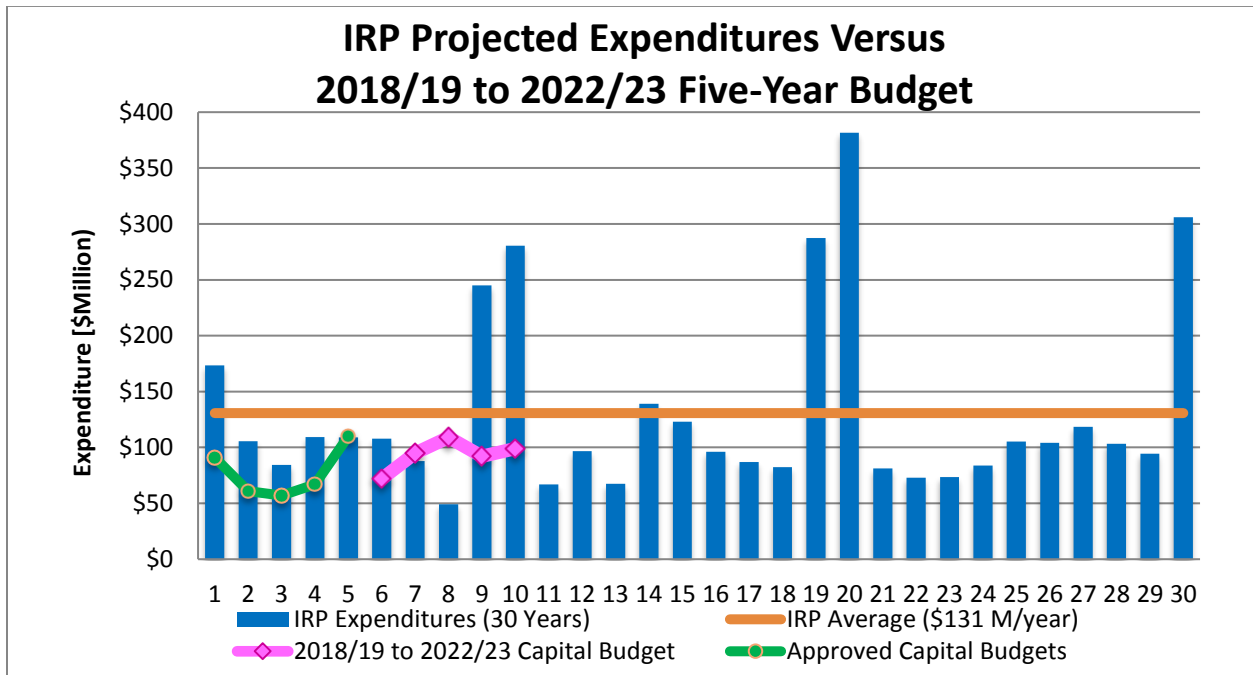


Figure 3 – IRP Projected Expenditures vs Proposed Five Year Capital Budget

The following provides highlights of the 2018/19 Capital Budget:

Water: Major Water capital projects include:

- Distribution System Main Renewal Program in conjunction with the Municipality’s Streets program;
- Lead Service Line Replacement Program;
- Lake Major Dam Replacement;
- J.D. Kline Water Supply Plant Filter Media & Underdrain Replacement – with CWWF Funding; and
- Asset Renewal Program at J.D. Kline and Lake Major WSP

Wastewater: Major Wastewater capital projects include:

- Kearney Lake Road Trunk Sewer Upgrades;
- Collection System Renewal Projects integrated with the Municipality’s Streets Program;
- Collection System Trenchless Rehabilitation Program; and
- Shipyard Road and Windmill Road Pumping Station Replacements

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Stormwater: Major Stormwater capital projects include:

- Stormwater System Renewal Projects integrated with the Municipality's Streets Program;
- Cross Culvert Renewal Program – 22 locations; and
- Ellenvale Run Retaining Wall System Replacement

Corporate Projects: Major Corporate Projects include:

- IT Strategic Plan Foundation Projects;
- Computerized Maintenance Management System Enhancements;
- Corporate Fleet;
- Continuation of AMI Meter System Upgrade; and
- Asset Management Program

The Capital Budget is funded from a variety of sources including asset depreciation accounts, debt, reserves, capital cost contributions and external cost sharing.

Capital funding sources:

- Depreciation [funded within the rates]
- Debt
- Development charge reserves
- External cost sharing

The Debt Strategy as approved by the Halifax Water Board, and accepted by the NSUARB, provides a funding strategy that is fair, equitable and cost effective. The debt strategy sets limits for the debt service ratio [DSR] at 35% and a target debt to equity ratio of 40%/60%.

The funds for the overall Capital Budget will be generated from a combination of sources, as detailed below. The planned utilization of debt is consistent with the Debt Strategy. HRWC will manage risk around projected Regional Development Charges through reprioritization of growth projects or additional utilization of debt if required.

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2018/19 Capital Budget Funding Sources

Water:	Depreciation	\$9,631,878
	Debt	\$15,084,122
	RDC	\$10,000
	External Funding Building Canada & CWWF	\$78,000
	Capital Cost Contributions	\$230,000
	TOTAL	\$25,034,000
Wastewater:	Depreciation	\$14,035,907
	Debt	\$15,048,093
	RDC	\$6,146,000
	External Funding HRM	\$24,000
	Capital Cost Contributions	\$4,554,000
	Energy Rebates	\$10,000
	TOTAL	\$39,818,000
Stormwater:	Depreciation	\$1,492,323
	Debt	\$7,104,677
	TOTAL	\$8,597,000
TOTAL CAPITAL FUNDING:		\$ 73,448,000

4.2 Operations

The operating budget prepared for 2018/19 is based on year one of the Five Year Business Plan presented to the HRWC Board in November, 2017. There will be no rate increases for water, wastewater and stormwater in 2018/19. The operating budget shows a loss of \$12.1 million on an accrual basis, and \$9.1 million on a cash basis. The cash basis reflects the requirements of the NSUARB Accounting and Reporting Handbook for Water Utilities which is used for rate making purposes. HRWC's operations have resulted in surpluses in recent fiscal years and HRWC is planning to delay increasing rates by utilizing accumulated operating surplus from previous years.

Some of the primary operating budget drivers and assumptions are:

REVENUES

Operating revenues are projected to be \$0.4 million lower than last year, based on the following assumptions:

- Consumption will continue to decline related to water and wastewater. Consumption is projected to decrease 2.5%.

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- 700 or roughly 0.8% new customer connections are projected based on the 4 year historic average [2011-2014].
- A 10% increase for fees for un-regulated activities such as septage tipping and the treatment of effluent from airplanes is planned in 2018/19, as rates were last adjusted in 2016/17.

Alternative Revenue - Revenues from unregulated business activities are increasingly important to mitigate future revenue requirements from rates. Unregulated revenues help to pay for some expenses which would otherwise be funded by rate-regulated activities, and are also used to fund unregulated expenses. Halifax Water has had success generating alternative revenues aside from user fees on both the regulated and unregulated side of the business. On the regulated side, Halifax Water has entered into agreements for the sale of land deemed to be no longer used or useful for utility purposes. With NSUARB approval, revenue from land sales can be used as a source of funds for capital projects related to the delivery of water services in recognition that the land was originally purchased with water-rate base funds. As much of the surplus land has been sold, this will not be a significant source of funds in the future.

Notwithstanding limitations for generating revenue from the regulated side of the business, there has and will continue to be opportunities from the unregulated side. Currently, Halifax Water generates revenue from third-party contracts for water and wastewater treatment operations.

Halifax Water also generates revenue from the lease of land for telecommunications facilities throughout the municipality, in recognition that reservoir sites are located on higher elevations that afford more direct line of site for telemetry. In conjunction with these leases, Halifax Water installs telecommunications equipment on these facilities for its own needs for the ultimate benefit of the water, wastewater, and stormwater rate base. As Halifax Water continues to expand the Supervisory Control and Data Acquisition [SCADA] system in accordance with its master plan, further opportunities for leases and hosting of Halifax Water equipment will be realized.

In recognition of Halifax Water's expertise in utility management and water-loss control, the utility offers a wide range of related services to generate revenue. These range from leak-detection services for Halifax Water customers and other municipalities to consulting services under contract to First Nations and municipalities. There is great potential to expand these services to generate additional revenue and, at the same time, provide professional development opportunities for staff.

Halifax Water also recognizes that its assets can be leveraged to bring in revenue from energy generation. This includes projects to generate electricity from wind turbines on watershed lands and distribution control chambers where water pressure is reduced. Both of these opportunities have been developed for interface with the Nova Scotia Department of Energy's Community Feed-In Tariff [COMFIT] program, which provides preferential rates to feed electricity into the Nova Scotia Power Incorporated [NSPI] distribution grid.

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Through efforts of Halifax Water staff, a Ministerial Directive was issued through the Department of Energy [DOE] in 2012 to approve the recovery of renewable energy within water distribution systems at “run-of-the-river” rates. To that end, Halifax Water has received two COMFIT certificates for the installation of hydrokinetic turbines in the Orchard and Lucasville control chambers. The Orchard installation went into commercial operation in October, 2014. The projected net revenues are in the current business plan. These projects are structured to ensure they are compliant with the Public Utilities Act with the recognition that regulated activities cannot subsidize the unregulated side of the business.

In partnership with the Halifax Regional Municipality, Halifax Water has also studied the potential for a green thermal utility whereby energy can be extracted from the heat in sewage and delivered through a local pipe distribution system in the vicinity of treatment facilities. The planned redevelopment of the Cogswell interchange in Halifax will provide an opportunity to advance this concept since the Halifax WWTF is adjacent to the Cogswell interchange. This project is currently being pursued as a regulated activity subject to the approval of the NSUARB. In an effort to be open and transparent to stakeholders including the NSUARB, Halifax Water discloses revenue and expenses associated with unregulated business separately within the financial statements and budgets. Net gains from these activities ultimately go to the benefit of the rate base as they are closed out to accumulated operating surplus/[deficit] each fiscal year.

Unregulated revenues are projected to be \$1.7 million in 2018/19, an increase of \$187 thousand or 11.9% from the budget of \$1.6 million in 2017/18. In a span of six years, unregulated revenues have almost doubled.

EXPENSES

Halifax Water’s Operating Budget is compiled on an accrual basis for 2018/19 to provide better information for decision making and be reflective of best practice for budgeting. There is an accrued amount regarding the liability for future employee benefits [pension] as calculated under IFRS that, for rate making purposes, is not currently included in the revenue requirements. There are also differences between the treatment of debt servicing expense and calculation of depreciation.

The utility faces pressure associated with growth, asset renewal, and compliance with regulatory requirements, as described in the Integrated Resource Plan. Halifax Water has taken significant steps to reduce risks in these areas with the development of the regional development charge, an asset management framework and capital projects to upgrade wastewater treatment facilities.

The largest components of Halifax Water’s consolidated operating budgets are salaries & benefits, electricity, debt servicing, depreciation, dividend to HRM, and chemical costs.

Salaries and Benefits - The budget for 2018/19 includes filling 17 full-time equivalent positions [FTEs], most of which are new positions, but also include previously approved

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positions that were vacant in 2017/18. Additionally, two term positions are being filled within Customer Service to support the AMI project.

The annual increase included in the operating budget for existing employees is 2% with an additional 0.5% to allow for the impact of step increases within salary bands, reclassification of positions, and increases in benefits.

Electricity – Budgets were established based on an assumption of electricity, fuel, oil and natural gas rate increases. The impact of these increases is expected to be partially offset by the formal Energy Management Program.

- Electricity – 1.5%
- Furnace Oil – 5.0%
- Natural Gas – 5.0%

Debt Financing – Debt payments are budgeted to support the new debentures planned for the 2018/19 additions to utility plant in service. The amount and timing of the increases will be determined by the completion of the projects and the financing rates and options available. It is estimated total debt servicing will decrease to \$31.4 million; a 7.7% decrease from the 2017/18 budget. The capital financing strategy is designed to maintain a debt service ratio of 35% or less; and to use a mixture of infrastructure funding, development related charges [reserves], depreciation, and debt.

Depreciation - As Halifax Water's assets and future capital budgets increase so do depreciation expenses. Depreciation is an integral funding source to support rehabilitation of the existing infrastructure as well as new infrastructure and upgrades to meet future requirements related to servicing demands and changing environmental regulations. Depreciation is projected to increase to \$23.4 million in 2018/19 from \$22.5 million in the 2017/18 budget, which is an increase of 4.0%.

Dividend to the Halifax Regional Municipality - The water dividend agreement with the municipality was renewed in September, 2014 for a 5 year term [April 1, 2015 - March, 2020]. The dividend is calculated as 1.56% of the water system rate base and is projected to grow from \$4.8 million in 2017/18 to \$5.1 million in 2018/19.

Chemical Costs – Chemicals are tendered annually in January for optimal pricing. Chemical cost increases of 5% are anticipated for next year.

On a consolidated basis, operating expenses are projected to increase by \$5.5 million [5.1%] to \$111.7 million from \$106.2 million. Water Service expenses are projected to increase by \$2.0 million, Wastewater Service by \$2.1 million, and Stormwater Services by \$1.4 million. Many categories of expense are increasing at a rate greater than CPI, particularly depreciation which is 20.1% of total operating expenses and is increasing at 4.0 % as a result of increasing capital investments.

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Operating revenues are projected to decrease by \$0.4 million, or 0.3% to \$135.2 million. Non-Operating revenues are projected to decrease by \$1.8 million, to \$1.0 million due to a fifteen [15] year funding agreement with the Province regarding the Halifax Harbour Solutions project coming to an end. Non-operating expenses are projected to decrease by \$2.3 million [6.0%] to \$36.6 million due to decreases in debt-servicing associated with the capital program.

Pro-Forma Income Summary

Table 3

Pro Forma Income Summary (IFRS Basis)				
	Actual 2016/17	Approved Budget 2017/18	Proposed Budget 2018/19	Variance
Operating Revenues	\$137,997	\$135,587	\$135,182	(\$405)
Operating Expenditures	\$97,839	\$106,241	\$111,710	(\$5,468)
Operating Profit	\$40,158	\$29,346	\$23,472	(\$5,874)
Non-Operating Revenues	\$3,322	\$2,787	\$1,006	(\$1,781)
Non-Operating Expenditures	\$34,622	\$38,882	\$36,564	\$2,319
Net Surplus (Deficit)	\$8,858	(\$6,750)	(\$12,086)	(\$5,336)

Note:
Consolidated numbers reported above include regulated and unregulated activities of the Urban Core, Satellite and Airport/AeroTech Systems.
The net surplus (deficit) reported for the 2018/19 Proposed Budget are reported on the accrual basis.
Under the NSUARB Accounting and Reporting Handbook some accrued future employment expense liabilities are excluded for the purposes of rate making.

*Amounts are stated in \$ Thousands

As of March 31, 2017, Halifax Water had an accumulated operating surplus of \$16.7 million. The projected operating surplus at March 31, 2018 is \$21.4 million [based on the November 2017 projections]. It is important to note that favourable operating results are projected for the 2017/18 fiscal year and would increase the surplus at March 31, 2018. Halifax Water is targeting maintaining an accumulated operating surplus of 3% of expenses [operating and non-operating] to mitigate risk. Accumulated operating surplus can be used to offset operating losses, or can be used to fund future additions to utility plant in service, subject to NSUARB approval. Based on the projected financial position of the utility at March 31, 2018 and the proposed operating budget for 2018/19 the accumulated operating surplus is

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projected to be \$9.3 million as of March 31, 2019, or 4.1% of total expenses, as noted in the table below.

Table 4 - Accumulated Operating Surplus

	Operating Surplus (Deficit)					
	Total	Water	Wastewater	Stormwater	Aerotech Water	Aerotech Wastewater
2016/17 Fiscal Year						
Surplus (Deficit) per Audited Financial Statements	\$8,859,000	\$3,731,000	\$3,369,000	\$1,759,000		
Year end balance March 31, 2017	\$16,689,629	\$5,082,522	\$11,519,785	\$1,570,446	(\$675,249)	(\$795,375)
2017/18 Fiscal Year						
Projected Operating Surplus (Deficit) for 2017/18	\$2,473,000	(\$258,000)	\$1,886,000	\$845,000		
Plus Other Comprehensive Income	\$2,204,000					
Projected Year end balance March 31, 2018	\$21,366,629	\$4,824,522	\$13,405,785	\$2,415,446	(\$675,249)	(\$795,375)
2018/19 Fiscal Year						
Projected Operating Surplus (Deficit) for 2018/19	(\$12,086,000)	(\$3,892,000)	(\$6,933,000)	(\$1,261,000)		
Plus Other Comprehensive Income						
Projected Year end balance March 31, 2019	\$9,280,629	\$932,522	\$6,472,785	\$1,154,446	(\$675,249)	(\$795,375)

Halifax Water has an efficient capital structure which has been reviewed and accepted by the NSUARB and was developed based on the policies of other utilities, its longer-term capital needs, and consideration of fairness to present and future ratepayers. Utilization of debt is a key component of the capital financing structure. Debt impacts the operating budget and, therefore, the future rate requirements in several ways:

1. Increased debt payments need to be accommodated through rates.
2. Increased depreciation as the capital program grows needs to be accommodated through rates.
3. Operating costs of new capital needs to be accommodated through rates.
4. Capital requirements not funded by debt will increase the requirement of capital from operating funding through rates.

Different financing alternatives were considered, taking into account rate stability and affordability, Halifax Water long term financial sustainability, and intergenerational equity. The debt strategy approved for Halifax Water concludes that appropriate ratios for Halifax Water to utilize are:

1. Maximum Debt Service Ratio of 35%
2. Target Debt/Equity Ratio of 40%/60%

In essence, the two targets serve as a framework for Halifax Water's utilization of debt. Long-term debt is projected to be \$229.1 million as at March 31, 2019. It is estimated total debt servicing will decrease from \$34.0 million in 2017/18 to \$31.4 million in 2018/19, with a debt service ratio of 23.1%.

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Halifax Water has a goal to keep rates for combined services below 2% of median household income, well below the rate affordability threshold recommended in several industry best practice studies. The cost of annual combined services for an average household is projected to be approximately 0.92% of median household income in 2017/18.

Halifax Water completed a review of rate affordability in 2017/18 and in September 2017, the Halifax Water Board approved expansion of the existing customer assistance program – Help to Others [H2O] program. The H2O program provides dedicated funding for low income households to offset water bills, administered through the Salvation Army, similar to other heating fuel or electricity bill assistance programs. Funds for the program are derived from unregulated activities of the utility with annual base funding of \$35,000, with additional utility funds to match employee donations. Due to the program expansion, it is anticipated that more customers with low incomes will be able to participate in the assistance program in 2018/19.

4.3 Cost Containment

Halifax Water reports semi-annually to the HRWC Board, and annually to the NSUARB the results of cost containment activities. The next cost containment report will be filed with the NSUARB by June 30, 2018. Some of these initiatives are on-going, and others are one time in nature. The cost containment initiatives from last year [2017/18], along with amounts of an ongoing nature from 2013/14 to 2016/17 inclusive, reflected cost savings of approximately \$5.1 million. The inclusion of initiatives from prior years reflects an intentional focus on sustainable results over the long term.

Halifax Water continues to develop a cost containment culture. As salaries and benefits are the largest element in the operating budget, the most significant opportunity identified in 2017/18 is to improve workforce planning and the staffing process. Another area of opportunity is focusing on productivity through enhanced business processes and technology, performance management, and improving time and attendance tracking.

5. STRATEGIC INITIATIVES

5.1 Customer Service Enhancements

The 2017 Customer Service [Quality of Service] Survey indicated that Halifax Water continues to perform admirably in with most respondents offering positive ratings about the service. Many initiatives are underway that ultimately will help us continue to enhance service to customers.

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Dispute Resolution – The process to escalate and resolve customer issues changed in 2017/18, to reflect the addition of an independent Dispute Resolution Officer. As part of its on-going commitment to best-in-class customer service, Halifax Water, with the approval of the NSUARB, has established the position of Dispute Resolution Officer, a part-time independent mediator who will investigate and adjudicate service or billing complaints from customers who wish to pursue grievances beyond Halifax Water’s customer service channels.

The Dispute Resolution Officer will analyze the details and merits of customer complaints and concerns, as well as the position of Halifax Water, consult and interpret relevant regulations and standards, determine appropriate outcomes based upon an impartial examination of the issues, and provide clear and concise explanations of the decisions rendered.

Customer Care Centre – This year will see continued enhancement of customer service with improvements to the website, development of a Customer Portal in conjunction with the AMI project, and investigation of new telephony systems. With all water, wastewater, and stormwater calls directed to the Customer Care Centre in 2016/17, the utility is well positioned to take advantage of information received through AMI and the ongoing maintenance management system to track Operations activities. A corporate communications strategy has been developed that will facilitate website improvements and a new phone number H2O-WATR is in place to make it easier for customers to access customer service.

Stormwater Education - HRWC has been working on communications and education around stormwater, and will continue to work on this in 2018/19. A stormwater video was developed that explains what stormwater service is, how a customer receives it, and how they are billed. The video, along with a portal for customers to get some information about their property and stormwater service, was launched on October 31, 2016. At the same time, HRWC also prepared six static sketches showing typical configurations of how properties receive stormwater service. Stormwater Operations and Regulatory Services staff are now leaving “door-hangers” at properties when they visit, so customers know Halifax Water personnel visited their property and what follow up may occur. Also, there has been a lot more active tweeting of photos of stormwater work when maintenance and culvert installs are being done.

The most significant initiative underway that will enhance Customer Service is the AMI project, which is discussed separately in Section 5.2

Halifax Water is also participating on the municipality’s Corporate Customer Service Steering Committee to ensure the customer service approaches are aligned where possible.

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5.2 Advanced Metering Infrastructure

Halifax Water began looking at the feasibility of Advanced Metering Infrastructure [AMI] in 2012. AMI is a system whereby, in lieu of meter readers walking routes, or driving routes to read meters with radio devices, a fixed network of telemetry devices is established over the service area to read meters on a much more frequent basis [typically hourly].

On October 6, 2016, the NSUARB approved a \$25.4 million dollar multi-year project to complete the AMI project. This is a significant project that will touch all customers and will change how the utility provides service. The Decision to approve the AMI Project, also included some changes to Halifax Water's regulations to enable AMI. Also in 2016, contracts were successfully negotiated with two vendors for three AMI components [network technology, supply of meters, and installation of meters]. Itron was selected for the network technology component with Neptune Technologies selected for the supply and installation of meters. The project was formally launched in November 2016.

Up until the spring of 2017, AMI activity consisted of system design, software configuration, and development of business process to operate with the AMI system. In late spring 2017, Halifax Water installed approximately 300 meters in customers' homes as a pilot in the Beaverbank area. This pilot enabled refinement of meter reading and billing processes prior to the larger deployment.

As of the end of the 2017/18 fiscal year, much of the system software was configured, tested and installed, initial deployment of AMI meters was completed in the Tucker lake area of Beaver Bank, and the north end of the Halifax peninsula. Mass deployment on an area by area basis began in the summer of 2017 with 13,000 meters being installed by the end of the fiscal year. The AMI communication network was also installed.

Throughout the 2018/19 and 2019/20 fiscal year, meters will be installed in another 72,000 customer premises. This will continue on an area by area basis until the fall of 2019. The AMI project is scheduled to be complete by the end of the 2019/20 fiscal year.

In addition to streamlining the meter reading process and reducing its cost, AMI promises many features that will improve the level of service Halifax Water can offer its customers. These include:

- The ability to offer monthly billing to residential and small commercial customers thus making it easier to for customers to manage cash flow and automated payments. Large institutional, commercial and industrial customers are currently billed on a monthly basis.

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- Billing errors will be reduced and estimated meter readings will be eliminated.
- Halifax Water will be able to alert customers to high consumption due to things like plumbing leaks, almost as they happen, reducing billing disputes and high bill amounts.

Customers will have the ability, through a web portal, to manage their water consumption in real time and see the effect of any conservation measures they take. The portal is planned to be available to customers in the fall of 2019.

AMI will provide much more data about customer consumption and distribution system operations. This will enable earlier identification of distribution system leaks. Overall it will improve the customer focus of the organization by providing the ability to identify and rectify customer issues proactively, rather than after the fact upon the customers' receipt of a high bill. This will result in reduced costs for billing and collection, and reduce the need for the high cost activity of sending technicians to customer homes.

This upgrade to AMI will enable two-way digital communication between the utility and its customers. This technology forms the backbone of the utility of the future, which means more customer-focused and efficient service. Over time, Halifax Water will be more responsive to customer inquiries based on better data, provide enhanced leak detection services, and move to monthly billing which allows customers to manage their budgets more effectively.

The decision to install AMI technology is part of Halifax Water's broader goal of continuously improving the overall water infrastructure and customer service experience. This will allow for more effective system operations and cost savings. From an environmental standpoint, Halifax Water will reduce its environmental footprint due to reductions in vehicle travel to read meters and perform other basic services, which will be completed remotely once the meters are installed.

5.3 Computerized Maintenance Management

Halifax Water has successfully implemented a corporate CMMS utilizing the Cityworks software within Water Distribution and Wastewater/Stormwater Collections as well as within a select number of Treatment Facilities.

The next steps of the CMMS program will include both a continual improvement of the existing deployments and an expansion of Cityworks to additional business units.

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The proposed continual improvement of Cityworks CMMS application will include:

- Review / assessment of current implementation of Cityworks, including assessment of Work Order Types, and Work Order Life Cycle looking for process inconsistencies, improvement opportunities.
- Analysis of information / reporting requirements to best communicate operational effectiveness statistics from Cityworks to Management.
- Enhanced integration with – Procurement, Skilled/Resources, Fleet Management, Non Moving Assets, Finance, GIS, Asset Management, Customer Experience, Work order/Resource routing through system interfaces or business process improvements.

The expansion of Cityworks CMMS to additional business units will include:

- Implementation of Cityworks for the Technical Services group to enhance their maintenance management practices and interactions with other areas already using Cityworks
- Continue Cityworks roll-out across all Water Supply Plant or Wastewater Treatment Facilities not completed in Deployment 3.
- Implement Cityworks Storeroom functionality for Facilities needing tighter control of consumables

5.4 Wet Weather Management

Like many municipalities and utilities across North America, Halifax Water's sanitary sewer system is subject to dramatic flow increases in response to precipitation events. Wet weather flows can lead to sanitary sewer releases, sewer backups/basement flooding, increased operation and maintenance cost, treatment process upsets, and treatment facility effluent quality & capacity issues. Recognizing the impacts of wet weather generated flows on the system, Halifax Water developed a proactive program to systematically address the negative impacts of wet weather on the collection system and wastewater treatment processes. The Halifax Water wet weather management program [WWMP] developed a strategy to efficiently manage the impacts of wet weather generated flows within the sanitary sewer system while monitoring and separating the combined sewer systems when practical to do so. The program is long term in nature and follows a phased implementation to meet the strategy.

Halifax Water maintains approximately 1,000 km of wastewater sewers, 300 km of combined sewers, 14 wastewater treatment facilities, and 172 wastewater pumping stations. Based on age, historical construction practices, maintenance, number of connections as well as other factors, there is significant opportunity for infiltration/inflow [I/I] to enter the wastewater system. The WWMP intends to systematically identify opportunities to employ wet weather management strategies to:

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1. Volumetrically reduce the quantity of sanitary sewer that is collected, pumped, and treated.
2. Store the flow during the wet weather period and then treat this flow post when the system has capacity.

Halifax Water is taking a responsible approach to wet weather management. The WWMP intends to apply the most cost effective strategy to successfully manage the wet weather flow generated in each sewershed.

A phased approach is being followed to implement this strategy. While the program phasing is prescriptive; it is important to revisit the objectives of the program periodically and adjust where necessary.

- **Phase I:** The initial phase of HW's WWMP involved initiation of the program and its structure. It was realized early that there is no "one size fits all" solution to wet weather management and the program needed to reflect this when implementing strategies. The initial program organizational structure was comprised of a wet weather steering committee and a wet weather action committee. This structure has been revisited in the last year to ensure that key contributors to the program are engaged.
- **Phase II:** Phase II of the program required identifying individual sewersheds that demonstrated a need for wet weather management. There was limited flow information available to make informed prioritization decisions in the service boundary. In the absence of measured flow information; pump station run time information was used as surrogate flow data. The entire service boundary was characterized using existing flow information and pump runtime data.
- **Phase III:** Pilot sewersheds were identified from the prioritization matrix from phase II. The pilots were selected strategically so that specific wet weather management techniques could be assessed. Pre and post project flows are being analyzed and compared in the individual sewersheds and a cost benefit analysis will be conducted on the projects with respect to wet weather flow reductions. This pilot program is intended to gather sound information on the costs of various wet weather management techniques and the possible impact they can have on the flow response to wet weather.
- **Phase IV:** As information from phase III is matured it will be applied to the service boundary to recommend and implement wet weather management projects in specific sewersheds. This will allow HW to implement the most cost effective strategies to manage Halifax Waters wet weather flows. Since the initiation of the program 205 sewersheds have been identified with varying degrees of impacts from wet weather events.

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The near term [2018/2019] goals for Halifax Water's Wet Weather Management Program include:

- 1. Continuation of the pilot projects:** Halifax Water's WWMP is currently running 5 pilot projects: Stuart Harris Sewershed, Cow Bay Rd, Leiblin Park, North Preston, and Crescent Ave. These pilot basins were chosen strategically to enable Halifax Water to validate what RDII reduction can be accomplished via various I/I reduction strategies. Industry indicates that approximately 50% of RDII is generated from public infrastructure and 50% is generated from private infrastructure. Specific strategies must be employed to each portion of the sewershed to address RDII globally in the catchment. Halifax Water intends to validate these statements through review of the flow data from the pilot projects. It is expected that the pilots will support the notion that comprehensive rehabilitation on both the public and private portion will be required to significantly reduce I/I, however in some cases public side pipe rehabilitation may be sufficient to achieve the desired targets.

- 2. Continuation of the Cost Benefit Analysis:** Phase IV of the WWMP involves applying a cost benefit analysis of the various strategies to manage Halifax Water's wet weather flows throughout the entire service boundary. As expected, the pilot sewersheds are demonstrating a measured reduction in RDII as the various wet weather management strategies are implemented. The financial cost of the RDII reduction will be normalized so that the information can be applied to the entire service boundary and compared to more traditional approaches to wet weather management such as capacity increase and storage. In order to complete the cost benefit analysis, it is important that the correct information is collected and assessed during the pilot stage. Information to support the cost benefit analysis will be assessed for each pilot as information becomes available. The program is structured to evaluate all wet weather activities moving forward using the same methodology. This effectively builds the knowledge base of wet weather management to enable Halifax Water to employ the most cost effective wet weather management strategy to each sub area of the service boundary.

- 3. Fairview old Clayton Park I/I Program:** The West Region Wastewater infrastructure Plan [WRWIP - finalized 2017] identified a number of predefined projects that are essential to the regional infrastructure plan. One of the identified projects was a wet weather management project in the Fairview Old Clayton Park [FOCP] area. The project scope includes the removal of approximately 200 liters per second of wet weather generated flow. This project was formally initiated by the WWMP in the summer of 2017 with a 10 year implementation deadline to support the regional infrastructure plan. In year one; the WWMP has installed the flow monitoring required to measure the impact of the project which will be used to validate success as it relates to the regional infrastructure plan. CCTV inspection of half of the project area is complete. Future years will see the completion of the sanitary sewershed evaluation study that will finalize the detailed execution of the project. The near term project objectives include strategy evaluation, selection and implementation of preferred solution, and execution by 2022. Flow monitoring and

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wet weather analysis will continue for the duration of the project to validate efforts. This timeline will allow for alternative strategies in the event that the program objective of 200 LPS peak flow is not realized in the first field execution.

The 2018/19 business year will see a continuation of flow monitoring and SSES in the sewershed and mainline renewal of a portion of the Fairview mainlines.

- 4. Supporting the Central East Region Wastewater Infrastructure Plan:** The Asset Management team will be completing a Wastewater Regional Infrastructure Plan in the East and Central region with expected completion 2019. The WWMP will work with the project team in strategy selection for management of wet weather flows. It is anticipated that wet weather flow management will be a part of the overall wastewater strategy for the region.

- 5. Program Expansion to the Entire Service Boundary:** In addition to supporting the asset management program the WWMP is methodically working through the prioritization matrix and identifying areas that can benefit from wet weather management program in the most cost effective manner. This effort will expand over the next five years and will identify and implement wet weather projects as well as increase the base dataset that is used in decision making for wet weather management at Halifax Water. In the next business year the program will begin SSES activities in the following sewersheds:
 - Fish Hatchery Park Sewershed
 - Bissett Lake Pump Station Sewershed,
 - The Dingle Sewershed, and
 - Whimsical Lake Pump Station Sewershed

- 6. Stuart Harris Lateral Top Hat Connection:** The Stuart Harris Sewershed mainlines were rehabilitated during phase II of the WWMP. While dramatic reductions in I/I have been realized there is still I/I penetrating the system around the lateral connections. The connection between the rehabilitated mainline and existing laterals will be made watertight by the trenchless installation of a CIPP tee joint. The resulting reduction in flow will be assess through the existing RDII methodology.

5.5 Resource Recovery

The Halifax Harbour Solutions Project included a 10 year contract for Biosolids Processing and Biosolids Transportation, commencing in 2006. There were minor adjustments to the contract durations because of project delays and temporary shutdown of the Halifax WWTF in relation to the flooding incident in January, 2009. The Biosolids Transportation Agreement expired on October 31, 2017 and the Biosolids Processing Agreement is due to expire in March 2019. A new Biosolids Transportation Agreement was executed in October 2017 with a new service provider. HW staff have been progressing the work on Biosolids Processing Agreement during 2017/18; this work shall continue into 2018-19. In

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conducting this exercise, staff are investigating overall resource recovery from this waste stream.

5.6 Septage Receiving Service

Halifax Water currently provides this service by accepting wastewater at certain strategic locations within the core wastewater collection system, with approval from NS Environment. Halifax Water has been working with NS Environment to allow operational flexibility to accept this wastewater anywhere in the system. This approach will allow Halifax water to optimize its collection and treatment system capacity and remain compliant with permit requirements. NS Environment has granted approval to this request. As a result, staff will be evaluating the system to make changes to this service that will be effective in the summer of 2018. Besides the core wastewater system, the Aerotech WWTF was also designed with additional capacity to treat part of the septage that is received. The Aerotech facility is under construction and is anticipated to be commissioned before the summer of 2018, therefore this facility will also play a continued role in the septage receiving service.

5.7 Environmental Management System Expansion

ISO 14001 is an international standard for environmental management systems [EMS]. The benefit of implementing an EMS is that it drives a process of continual improvement towards meeting defined environmental goals and objectives. Minimizing environmental impacts becomes one of the defined primary goals, and standard processes are put in place to identify issues and direct improvements through documented standard operating procedures. The standard pertaining to Environmental Management Systems [EMS] is 14001- 2004 and requires an organization to:

1. Establish an environmental policy.
2. Identify environmental aspects that can impact the environment.
3. Identify our applicable legal requirements.
4. Set appropriate environmental objectives and targets.
5. Establish programs to implement our policy, achieve objectives and meet targets.
6. Periodically audit and review activities to ensure that the policy is complied with and the environmental management system remains appropriate.
7. Be capable of adapting to changing circumstances.

In September 2015, ISO issued a new ISO 14001-2015 Standard and the EMS must be upgraded to be compliant with the new Standard by September 2018. The near term goal is to ensure the currently designated facilities meets the new standard by the specified

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date. To achieve this, EMS Awareness sessions on the new standard will be completed in November 2017 and an internal audit is scheduled for February 2018.

With the completion of this exercise, Halifax Water will work towards getting the remaining wastewater facilities certified, starting with Dartmouth in 2018. It is anticipated that all of the WWTFs will achieve the ISO Designation by 2020.

5.8 Energy Management

Through its Energy Management Program, Halifax Water is committed to creating and ensuring an ongoing focus on sustainability and energy efficiency throughout all operating areas. This program, is carried out in relation to Halifax Water’s Energy Management Policy through the Energy Management Steering Committee. The annual Energy Management Action Plan [EMAP], defines the goals, objectives, accountabilities, and structure for activities related to energy efficiency, energy recovery, greenhouse gas [GHG] reductions, sustainability and environmentally responsible energy use.

For 2018/19 and beyond, initiatives have been identified in the following areas:

Infrastructure / Operational Improvements

Capital projects that will result in improved energy efficiency, energy recovery, GHG reductions and operational cost savings have been identified throughout Halifax Water’s infrastructure. Projects being implemented or considered include:

<i>Ventilation Air Heat Recovery</i>	<i>UV Disinfection Upgrades</i>
<i>HVAC System Re-Commissioning</i>	<i>Pumping System Upgrades</i>
<i>HVAC & Building Envelope Upgrades</i>	<i>Pump/Meter Chamber Upgrades</i>

New construction capital projects [e.g. wastewater treatment facilities, pumping stations, etc.] are also reviewed at the conceptual and detailed design stages to ensure best-in-class energy efficiency and the lowest life cycle costs throughout the life of the asset.

Renewable Energy Generation

Halifax Water has identified renewable energy as an important way of offsetting energy costs and increasing revenue that will help the utility to significantly reduce energy use and greenhouse gas emissions in the region. Two key project areas have been identified: renewable energy and energy recovery from both water and wastewater systems.

To date, two renewable energy projects have been completed: the Pockwock Community Wind Farm, located near Pockwock Lake and the Orchard In-Line Energy Recovery Turbine, located in Bedford. These projects are operating above expectations, and will continue to generate revenue for the utility for decades to come.

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Energy recovery from process or waste streams is recognized as one of the biggest opportunities available to society. Recoverable energy is everywhere – in solid municipal/residential waste streams, industrial by-products, and water and wastewater streams. Halifax Water has significant recoverable energy resources available in both its water and wastewater streams. Halifax Water is currently focusing efforts on two specific energy recover projects.

Biosolids Energy Recovery: Halifax Water currently supplies over 35,000 tonnes per year of partially de-watered sewage sludge to its Aerotech Bio-Solids Processing Facility [BPF]. Currently, this sludge is turned into a soil amendment that can be used as fertilizer for topsoil manufacturing, sod growing, horticulture, and land reclamation. Energy recovery from biosolids is one of the most developed opportunities for treatment plants. This is commonly achieved through anaerobic digestion of wastewater sludge.

Halifax Water’s Mill Cove WWTF and Lakeside Timberlea WWTF are equipped with anaerobic digesters and the gas generated is utilized for digester operation and excess gas is used for space heating in the plants. The Mill Cove WWTF digesters were cleaned and refurbished in 2017; it is expected that the gas yield will increase as a result. The HHSP facilities and other small facilities have sludge dewatering equipment on site such that the biosolids are utilized as soil amendment for beneficial use. Halifax Water expects to continue this practice in the near future considering that the agricultural soil amendment program is very successful. There are several emerging technologies in the industry that show promise for alternative uses of biosolids for energy production; Halifax Water have been reviewing these technologies to determine the best opportunity; however, it must be developed cognizant of the risk that are associated with the complex issue of biosolids management.

Halifax Water continues to explore opportunities and options for the alternative re-use of biosolids as an available energy source that can contribute to overall GHG reductions and offset annual energy costs.

Cogswell District Energy System: A study was completed in 2016 to determine the feasibility and preliminary business case for an Ambient Temperature District Energy System [ATDES] within the Cogswell Redevelopment Area of downtown Halifax. The feasibility of the DES is predicated on the assumption that connection to the DES will be mandatory within the redevelopment area. To that end, HRM is pursuing amendments to its Charter through the Legislature to facilitate this authorization. Work on the Cogswell ATDES continues with stakeholder consultation, and preliminary and detailed design is slated to be completed in early 2018, in parallel with HRM’s effort to advance the Cogswell Redevelopment project.

5.9 Water Quality Master Plan

Based on research conducted by Dr. Graham Gagnon at Dalhousie University, Halifax Water is now dealing with a new source water challenge related to lake recovery.

From the 1970's onward, governments in the Canada and the United States have taken broad efforts to reduce air pollution broadly and specific efforts to reduce the effects of acid rain. Legislation to reduce sulfur oxide emissions and reduce pollution from coal burning has dramatically reduced air pollution. This has resulted in a measurable reduction in sulfate deposition into lakes in Atlantic Canada and elsewhere and a resultant rise in pH.

This is a positive development from an environmental perspective, however, it brings with it challenges from a drinking water treatment perspective. The rise in pH results in greater levels of natural organic matter [NOM] in source waters. NOM is a significant treatment challenge in treatment plants and we have observed that with increasing NOM levels come increased chemical costs and shorter filter run times. Increased pH levels also lead to increased levels of biotic activity in the water sources. Increased biotic activity promote greater occurrence of things like algae and taste and odour causing compounds such as geosmin.

These two effects of lake recovery have direct impacts on Halifax Water. Increased NOM increases treatment cost and may exert demands on treatment plants which are beyond what was contemplated when they were designed. Increased biotic activity requires treatments approaches that were not contemplated when the facilities were designed.

Source water management and, specifically, lake recovery, will be a focus area for research for the next several years beyond. The NSERC research chair with Dalhousie University will be a primary tool in addressing this issue. Halifax Water needs to quantify the degree to which source water will change in coming years and further, what changes in treatment techniques and infrastructure might be required to effectively and efficiently treat source water.

5.10 Lead Service Line Replacement Program

In the fall of 2016, the Halifax Water Board approved a new and proactive approach to dealing with lead and drinking water through the replacement of lead service lines [LSL's].

Halifax Water stopped using lead for service lines in the mid-1950's and since the 1970's has been working to remove LSL's. At one time, there may have been as many as 15,000 LSL's on the Halifax peninsula and in central Dartmouth. Today, as a result of these proactive efforts, there are as few 2,000 remaining.

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LSL's are jointly owned by both the customer and Halifax Water. Halifax Water owns the portion beneath the public right of way. While the customer owns the portion on their property. Unfortunately, only a small percentage of customers have replaced the private portion of the lead service. As a result, there may be as many as 10,000 LSL's remaining today on private property, in addition to the 2,000 remaining owned by Halifax Water. Research conducted in Halifax with Dalhousie University has confirmed that replacing only a portion of the LSL does not address the problem and in many cases can make the problem worse so it is very important that Halifax Water work with its customers to remove all remaining LSL's

The LSL plan approved by the Halifax Water Board has the following elements that are consistent with North American best practice and requires that Halifax Water partner with its customers to achieve the program goals:

- Complete removal of all LSL's by 2050.
- Development of a reliable LSL inventory.
- Frequent communication with customers,
- Free lead sampling for homes with suspected LSL's,
- Optimized corrosion control treatment.

In 2017, Halifax Water applied to the Nova Scotia Utility and Review Board to establish a financial assistance program for customers removing LSL's on private property. This program was approved on August 22, 2017 and will be available on an ongoing basis. The program provides for a 25% rebate, up to \$2,500 for homeowners replacing their LSL. Halifax Water is also seeking approval from the NSUARB to provide financing to customers for the balance of the LSL replacement cost.

In the upcoming year, Halifax Water will be working to accelerate the identification and replacement of LSL's. We will also be working to educate customers who have LSL's about the health risks and opportunities for replacement.

Since the 1970's, Halifax Water has been proactively addressing the challenge of lead service lines. Halifax Water has always met its regulatory requirements related to lead in drinking water and further adopted several utility best practices such as free customer sampling, corrosion control treatment, and working with interested customers to replace lead service lines. Despite that effort, Halifax Water still encounters residences with high levels of lead in drinking water drawn from within their home. In relation to this situation, Halifax Water requested Dalhousie University to direct research resources to the question of the occurrence of lead in the system. As a result of this research and Halifax Water experience, Halifax Water determined that to protect customers from the lead in drinking water, it is necessary for lead services to be removed in their entirety.

Lead service line ownership and responsibility is shared between the water utility and the customer, with the customer owning the portion on private property. Customers face many barriers to replace the portion on private property, with cost being the major impediment, and utilities are restricted from working on private property assets. As a result,

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approximately only 10% of utility customers have replaced their lead service line when the utility has replaced the public portion as part of a capital project. The inability to address customer barriers to private service line replacement has prevented utilities like Halifax Water from doing more to replace lead service lines.

In the United States, the EPA asked the National Drinking Water Advisory Council [NDWAC] to make recommendation for a new regulatory framework for lead. The NDWAC report recommended a fundamental change in the way lead is managed, with the most noteworthy recommendations being a commitment to removing all lead service lines by 2050. The recommendations also encouraged utilities to work with customers to ensure that lead service lines on private property are replaced. Subsequently, in April of 2016, the American Water Works Association [AWWA] endorsed the NDWAC recommendations signaling that the drinking water industry agrees that utilities must commit to removing lead service lines.

The NDWAC recommendations, and the subsequent endorsement by AWWA, confirmed for Halifax Water what was determined in 2012; that the only complete solution to lead in drinking water is complete removal of lead service lines. Halifax Water staff prepared a business plan for lead service line management based on the NDWAC recommendations to complete the removal of all lead service lines by 2050.

As a result of its efforts since the 1970's, Halifax Water has replaced all but 2,500 lead services within the public right of way. Replacing all of these services by 2050 is a moderate challenge for Halifax Water, but in order to do so safely, it will be necessary to convince customers to replace the private property portion at the same time. There are many barriers to customers having the desire or ability to replace LSL's and significant program effort will be directed towards working with those customers to improve their understanding of LSL issues and facilitate replacement.

Another significant aspect of this program will be working with the approximately 10,000 customers whose public portions of the LSL have been replaced but for whom the private LSL is still remaining. In order to do this, a cost effective reliable inventory of private LSL's will need to be developed.

Enabling all this will be the need to develop new business processes for dealing with LSLs and communicating information to customers about lead and lead programs.

5.11 Safety and Security Program

Safety:

Halifax Water's Occupational Health and Safety Program is based on the Internal Responsibility System [IRS], which is the foundation of the Nova Scotia Occupational Health and Safety Act. The IRS is an internal system that provides for direct responsibility for health and safety for all staff in an organization.

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The Safety and Security group of Regulatory Services has principal duties and responsibilities as part of the IRS as follows:

- Assist in formulating and supervising the execution of the utility's Occupational Health and Safety Program, and assist management to fulfill, to the greatest degree possible, its responsibilities for safety.
- Co-ordinate and/or provide safety training to staff in an effort to prevent accidents, minimize losses, increase productivity and efficiency, and ensure compliance with safety legislation and policies.
- Conduct safety audits in the workplace to identify safety hazards and recommend control measures.
- Assist in the development and maintenance of a system of accident investigation, reporting, and follow-up.
- Provide program education for job safety.
- Act as a resource to the Joint Occupational Health and Safety Committee [JOHSC].
- Maintain liaison with federal, provincial, and local safety organizations by taking part in the activities and services of these groups.

Halifax Water has established and maintains an Occupational Health and Safety Program in consultation with the Joint Occupational Health and Safety Committees.

In November 2015, Halifax Water engaged in the ***Preventing Workplace Injury [PWI]*** Program with WCB. An initial survey was conducted, with 247 employees participating. The survey was designed to gauge individual's perceptions on the current safety culture at Halifax Water and the awareness and understanding of safety policies and practices. After the completion of the survey a committee known as the Team of Doers was established in February of 2016

The Team of Doers met monthly for 18 months to review the outcomes of the survey and develop strategies to enhance the safety culture and awareness throughout Halifax Water. One of the first objectives of the team was to establish a Vision to provide direction on the activities for the Team.

Working together for an injury free and healthy workplace through empowering employees for positive change, so we will all return home safely.

The Team proceeded to review the results of the November 2015 survey to get a sense of some of the issues and perceptions surrounding Halifax Water's safety culture. Some of the common themes related to communications of safety issues, lack of formalized follow ups and understanding of safety and the related human resource policies.

The follow-up survey was completed in November 2017. The outcomes from the survey will assist in planning future initiatives improve the safety culture at Halifax Water.

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Technical Services has taken the lead in developing an ***Electrical Safety Plan [ESP]*** to enhance the current OH&S Manual. The ESP will provide staff the tools for the establishing safe operating and maintenance practices and procedures for working with energized electrical equipment and systems that are low or high voltage. Using the ESP, staff can develop risk and hazard assessment forms for staff to complete when undertaking work around energized equipment. As well, the appropriate job-specific training requirements can be created and the existing training matrix, managed by Human Resources, can be updated. The Plan will be completed and rolled out in 2018.

The updates to the ***Safety Site*** will be completed by the end of in 2018 with suggested enhancements to the electronic forms. Feedback with continue to be received from staff and updates will be made to the OH&S manual and associated forms as required.

Security:

Halifax Water's Security Program is based on enterprise assets protection and is designed to protect three types of assets: people, property, and information. It also considers intangible assets such as the organization's reputation, relationships, and creditworthiness. The program has been developed to take an all-hazards approach, be it from natural, intentional, or accidental hazards, when reviewing risks to the organization.

Halifax Water uses the three basic elements of a physical security system to protect its assets to ensure it accomplishes its mission.

Protection: The protection element is the physical barrier that delays the determined adversary and the opportunist in accomplishing their goals. Halifax Water uses barriers such as building fabric, fences, doors, door hardware, and containers to protect its assets.

Detection: The detection element indicates and may also verify an actual or attempted overt or covert penetration. Halifax Water uses intrusion alarms, access control systems, CCTV, guards, and patrols to protect its assets.

Response: This element is the reaction to an attempted or actual penetration. Halifax Water uses internal staff and police forces as required, to protect its assets.

Vulnerability:

In 2016, facility assessments were completed for the Herring Cove and Eastern Passage Wastewater Treatment Facilities in partnership with Public Safety Canada through the Regional Resilience Assessment Program [RRAP] utilizing the Critical Infrastructure Resilience Tool [CIRT]. All major water and wastewater treatment facilities have now been evaluated. The CIRT is a voluntary and non-regulatory vulnerability assessment tool that

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estimates the resilience and protective posture of critical infrastructure facilities in support of the National Strategy and Action Plan for Critical Infrastructure.

Emergency Management Planning:

Safe and reliable drinking water, sanitation and environmental protection are vital to the sustainability of communities within Halifax municipality. In recognition of this, Halifax Water maintains an Emergency Management Plan [EMP], as required by the provincial Emergency Management Act.

The purpose of the EMP is to establish an organizational structure and procedures for response to water and wastewater/stormwater incidents. It assigns roles and responsibilities for the activation and implementation of the plan during an emergency, using the Incident Command System [ICS]. The preparation and exercising of an EMP can save lives, reduce risk to public health, enhance system security, minimize property damage, and lessen liability.

Starting in 2017, the Halifax Regional Municipality is developing a response plan to extreme flooding events. Halifax Water has been assisting in the development of the plan, providing information on critical infrastructure, known drainage restrictions and flood prone areas.

5.12 Wastewater Quality Master Plan

Halifax Water has been consistently working towards achieving the goals of the Compliance Plan that was developed in 2014. However, building on the success and continuous improvement opportunities identified in the Water Quality Master Plan, it is prudent to build a Wastewater Quality Master Plan. The primary difference between a Compliance Plan and a Master Plan being that the former address the current issues and stays in compliance with the current legislation, while the latter is a forward thinking plan that addresses the utilities vision and the future legislation that might impact a utility. Since the introduction of federal Wastewater System Effluent Regulations, NS Environment has been reviewing and renewing Halifax Water's operating permits with steady increases in the compliance and reporting requirements. It is anticipated the wastewater regulations will continue to emerge rapidly over the several future years.

Halifax Water has been in active discussions with Dalhousie University in the recent past to create a research partnership for wastewater initiatives. The Industrial Research Chair program is well established at Dalhousie University and has a partnership with Halifax Water for its water quality and treatment initiatives. Halifax Water anticipates entering into an agreement with Dalhousie in 2018-19 and begin the development of a Wastewater Quality Master Plan. At a very conceptual level, this plan will focus on wastewater treatment and collection issues that currently exist, the defined issues of the future, and emerging issues. The plan will endeavor to focus on optimization of the Halifax Harbour Solutions Project

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WWTFs to be compliant with WSER well before the 2040 compliance timeline, biosolids management and resource recovery.

5.13 Asset Management

A number of previous initiatives identified in the Asset Management Roadmap Implementation [AMRI] have been reprioritized to be compatible with the AMP recommendations, to allow for an in-house approach by asset management staff, or due to resourcing constraints. Additionally, staff are continuing to develop programs to assist and enhance long-term infrastructure planning. Anticipated projects and programs for the Asset Management division are outlined below and within Table 5.

Table 5: Asset Management and Infrastructure Planning Initiatives [identified in the 2018/19 to 2022/23 Five-Year Business Plan]

Initiative or Program	Implementation Year [2018/19 to 2022/23]				
	2018/19	2019/20	2020/21	2021/22	2022/23
Update Asset Management Plan [Annual]					
Asset Management Program Development					
Condition Assessments by Asset Class					
Sewer Inspection Program [Annual]					
IT Strategy Projects					
Regional Infrastructure Plan					
Corporate Flow Monitoring Program [Annual]					
Review Flow Monitoring & Rain Gauge Strategy					
Implement Hydraulic Models					
Integrated Resource Plan Update					



2018/19 will see staff continuing with efforts for enhancing the annual Asset Management Plans. AM staff will be working to further refine the data that informs the plans including continuing to fill condition data, resolve data discrepancies in GIS, and generally improve the 'best available' information on each asset class. Staff will also continue to work with other departments to facilitate implementing recommendations from the Asset Management Plans.

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The Infrastructure Master Plan [The Plan] commenced in November 2017 will be a primary focus for the AM Team in 2018/19. The Plan will build on the work completed in the West Region Wastewater Infrastructure Plan [WRWIP] extending into the east and central regions for wastewater infrastructure and all regions for water infrastructure to create a comprehensive 30-year capital program. The Plan will begin the implementation of the corporate modelling strategy for the wastewater model and provide modelling standards for both water and wastewater modelling. The Infrastructure Master Plan is a critical input into the Regional Development Charge update, the Integrated Resource Plan update, and the next Halifax Water Rate Application.

Staff will continue with the annual sewer inspection condition assessment program using conventional closed circuit television [CCTV] and zoom camera technologies. Efforts to streamline the way staff are able to share the outputs from the inspections will continue through 2018/19. The annual flow monitoring program will also continue including a review of the overall flow monitoring strategy.

Highlighted initiatives for 2018/19 include:

- Update the Asset Management Plan
- Continue to improve the way asset management data is shared
- Asset Management Program Development [subject to direction from Executive Team and need to balance with ongoing corporate initiatives] and may cover:
 - expanding the current prioritization methodology
 - developing strategic maintenance management program
 - reviewing levels of service
 - enhancing capital budget support tools
 - developing an asset management resource library
 - assessing the suitability of current data management tools
- Scope, issue and update the Integrated Resource Plan
- Carry out driveway culvert data collection project
- Continue annual flow monitoring and sewer inspection programs
- Commence tasks associated with the hydraulic water model build

5.12 Integrated Resource Plan

Halifax Water completed its first formal Integrated Resource Plan [IRP] in October 2012 with the intention that it would be updated periodically. The IRP was done in collaboration with the NSUARB's consultant who initially recommended an IRP update in three years. However, the consultant also acknowledged the data limitations encountered during the completion of the IRP and recommended that Halifax Water work to fill the data gaps before the IRP was next updated.

Several important initiatives aimed at filling the data gaps have been underway since the completion of the first IRP. These included:

- Implementing the Wet Weather Management Program [with inflow and infiltration pilot projects];
- Continuing the implementation of the Asset Management Program [foundational elements from the Roadmap];
- Resolving asset attribute information in GIS, and specific inventory and condition assessment projects];
- Developing plans by asset class;
- Implementing the Corporate Flow Monitoring Program;
- Implementing the Sewer Inspection Program [conventional CCTV and zoom camera inspections];
- Completing the Hydraulic Modelling Assessment and Strategy;
- Completing the West Region Wastewater Infrastructure Plan [WRWIP].

The Infrastructure Master Plan project currently underway will cover the balance of the wastewater infrastructure planning for east and central regions, be inclusive of the program developed in the WRWIP, and include a water infrastructure plan for all regions. The project also includes a climate change assessment and policy component to develop a climate change adaptation plan and a systems optimization plan. Its completion will streamline a number of prior and long-term planning initiatives to facilitate regular Infrastructure Master Plan updates on a five-year cycle for water and wastewater infrastructure.

The IRP update will incorporate findings from work completed or planned to support the drivers of regulatory compliance, asset renewal, and growth.

The goal is to develop an updated IRP that recalibrates the \$2.6 billion long-term investment identified in the first IRP [2012], and positions the utility for future updating on a five-year cycle.

Halifax Water expects to build on the key initiatives already underway to provide a revised IRP by mid-2019.

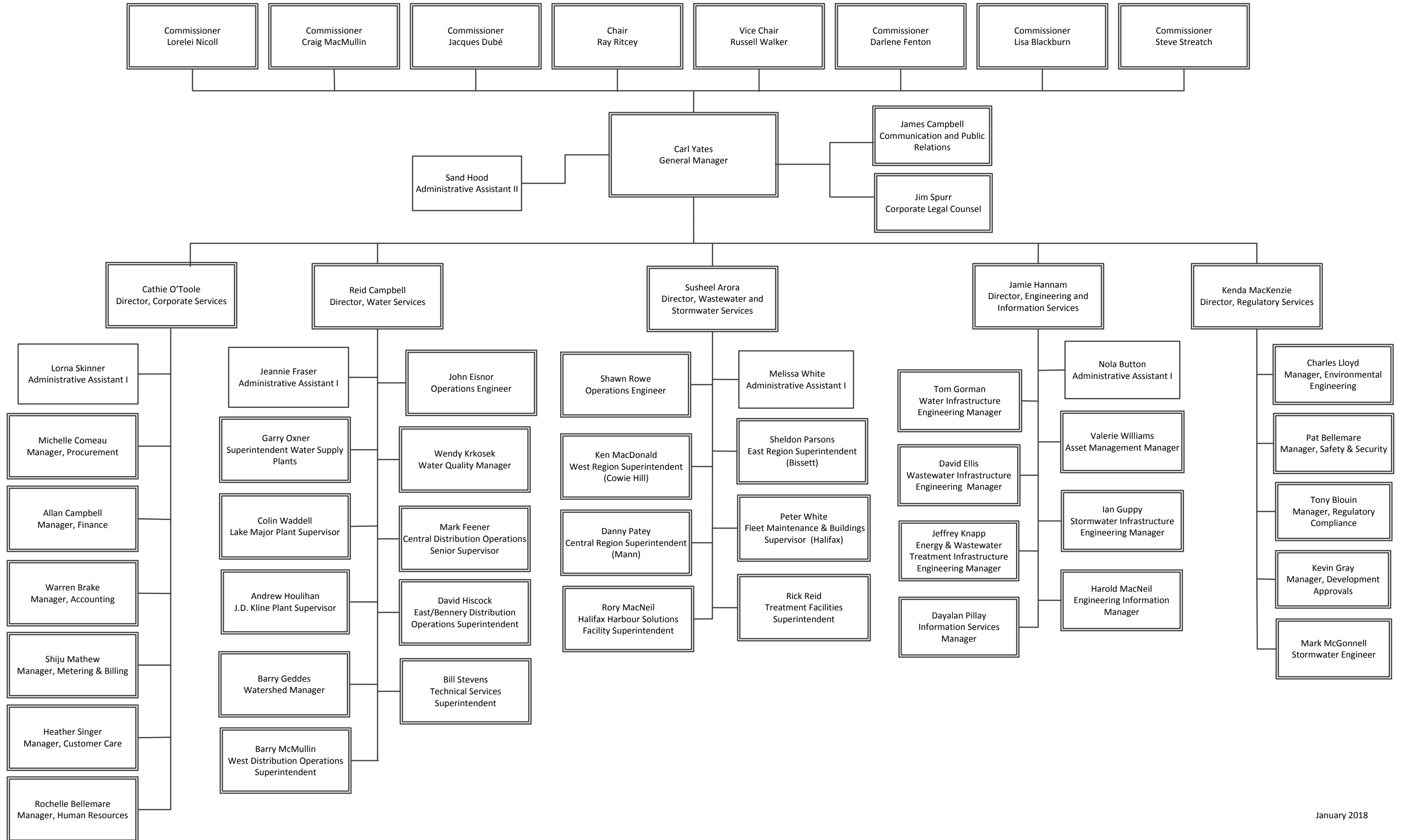


**STRAIGHT from
the SOURCE**

Appendix A

Organizational Chart

HALIFAX WATER ORGANIZATIONAL STRUCTURE



TO: Ray Ritcey, Chair and Members of the Halifax Regional Water Commission Board

SUBMITTED BY: Original Signed By:
Cathie O'Toole, MBA, CPA, CGA, Director, Corporate Services

APPROVED: Original Signed By:
Carl Yates, M.A.Sc., P.Eng., General Manager

DATE: January 10, 2018

SUBJECT: **Halifax Regional Water Commission Employees' Pension Plan (the "Pension Plan") 2018 Budget**

ORIGIN

The Halifax Regional Water Commission Board (the "Board") approves the annual Pension Plan Budget.

RECOMMENDATION

It is recommended the Board approve the attached 2018 Pension Plan Budget covering the period January 1, 2018 to December 31, 2018.

BACKGROUND

The purpose of the 2018 Pension Plan Budget, as provided in the attached Statement of changes in net assets available for benefits, is to outline the various revenues, contributions and expenses for the Pension Plan, and project net assets available for benefits as at December 31, 2018.

The 2018 Pension Plan Budget enclosed reports on the Defined Benefit Pension Plan of the Halifax Regional Water Commission. Supplemental plans, namely the Defined Contribution Plan and Notional Retirement Compensation Agreements are not included, as budget implications related to these plans are included in the annual operating budget of the Commission.

DISCUSSION

The attached Statement of changes in net assets available for benefits provides a comparison between the proposed 2018 Budget, the 2017 Approved Budget, and year end audited results for 2016.

As reported in the attached Statement of changes in net assets available for benefits, for 2018 the net assets available for benefits are projected to increase to \$123.0 million from \$112.7 million in 2017. This \$10.3 million (9%) increase is driven by favourable results anticipated related to revenues and contributions, net of expenses.

Revenue:

Total revenue for 2018 is budgeted at \$8.8 million, representing a \$3.5 million (67%) and \$2.5 (39%) increase over 2017 and 2016, respectively. Revenue is derived from two (2) sources:

- Investment income, and
- Increase in the fair value of investment assets.

The greatest impact in 2018 results from the projected increase in the fair value of investment assets to \$6.6 million, a \$3.6 million (123%) increase over 2017, and a \$2.5 million (62%) increase over 2016. Preliminary unaudited results as at November 30, 2017 show the fair value of investment assets have increased \$9.3 million during the eleven (11) month period. Although final results for 2017 are not known as yet, it is anticipated this growth trend will continue. Change in the fair value of investment assets tends to be more volatile compared to investment income. Increases over the past 4 years have gone from \$5.2 million in 2014, to a high of \$7.3 million in 2015, then to a low of \$3.2 million in 2016.

Investment income has been consistent in the past, averaging \$2.3 million in the three (3) years 2014-2016. Preliminary unaudited results as at November 30, 2017 shows investment income tracking at \$2.1 million for the year to date. Investment income budgeted in 2018 of \$2.3 million represents a \$0.1 million (4%) decrease compared to 2017, and is comparative to 2016. Investment income budgeted for 2018 is based on continued favourable results of the Halifax Regional Municipality (HRM) Master Trust. For the twelve (12) month period ended September 30, 2017 and the ten (10) month period ended October 31, 2017 the Master Trust earned net returns of 8% and 10%, respectively.

Contributions:

Overall contributions are expected to increase to \$6.2 million in 2018, representing an increase of \$0.3 million (5%) over 2017, and an increase of \$0.6 million (11%) compared to 2016. Increases in contributions are the result of net new hires at Halifax Water, normal salary and wage increases, and movement of personnel within salary bands.

Expenses:

Total expenses for 2018 are budgeted to decrease by \$0.1 million (2%) compared to 2017, and \$0.6 million (12%) compared to 2016. Benefit payments represent the majority of these expenses, and consist of: 1) benefits paid to pensioners, 2) termination, and 3) death benefits. Benefits paid to pensioners increase annually due to the net effect of members retiring. For 2018 amounts increase marginally from \$3.7 million in 2017 to \$3.8 million, based on upcoming retirements known at the time of this report, which are down comparative to previous years.

Termination payments and death benefits are extremely difficult to predict year-over-year. Collectively in 2016 termination and death benefits amount to \$1.5 million. Unaudited results for 2017 total \$0.6 million, which are comparative to the \$0.8 million budgeted. For 2018 the budget has been reduced to \$0.7 million. This represents a decrease of \$0.1 million (13%) from 2017, and \$0.3 million (29%) from 2016.

Administrative expenses account for approximately 4% of the overall budgeted expenses. For 2018 total administrative expenses are \$177 thousand compared to \$208 thousand in 2017 and \$210 thousand in 2016. Actuarial and consulting fees are the largest cost driver within this category at \$100 thousand, and show a reduction as compared to 2017 and 2016 of approximately \$30 thousand. All other expenses are comparable to 2017 and 2016.

ATTACHMENT

Statement of changes in net assets available for benefits, for the twelve (12) month period ended December 31, 2018.

Report Prepared by: <i>Original Signed By:</i> Allan Campbell, B.Comm, CPA, CMA, Manager, Finance 902-490-4288
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Halifax Regional Water Commission Employees' Pension Plan
Statement of changes in net assets available for benefits
January 1, 2018 to December 31, 2018

	Actual (Audited) 2016	Approved Budget 2017	Proposed Budget 2018
Revenue			
Net investment income:			
Total investment income	\$2,389,377	\$2,440,000	\$2,340,000
Investment manager fees	(\$138,922)	(\$140,000)	(\$166,000)
Increase (decrease) in the fair value of investment assets	\$4,056,258	\$2,960,000	\$6,590,000
	<u>\$6,306,713</u>	<u>\$5,260,000</u>	<u>\$8,764,000</u>
Contributions			
Participants:			
Current service (inc AVC's)	\$2,484,448	\$2,594,000	\$2,801,000
Sponsors:			
Current service	\$2,265,591	\$2,487,000	\$2,548,000
Unfunded liability	\$825,200	\$825,000	\$825,000
	<u>\$5,575,239</u>	<u>\$5,906,000</u>	<u>\$6,174,000</u>
Expenses			
Benefit payments:			
Benefit payments	\$3,536,894	\$3,699,000	\$3,754,000
Termination payments	\$992,572	\$800,000	\$700,000
Death benefit payments	\$509,236	\$0	\$0
	<u>\$5,038,702</u>	<u>\$4,499,000</u>	<u>\$4,454,000</u>
Administrative:			
Actuarial & consulting fees	\$128,676	\$130,000	\$100,000
Audit & accounting fees	\$15,999	\$8,000	\$9,000
Bank custodian fees	\$26,511	\$22,000	\$22,000
Insurance	\$7,950	\$8,000	\$9,000
Miscellaneous	\$14,433	\$13,000	\$15,000
Professional fees	\$12,845	\$20,000	\$15,000
Registration fees	\$2,158	\$2,000	\$2,000
Training (Trustees/ Administration/ Pension Committee)	\$1,127	\$5,000	\$5,000
	<u>\$5,248,400</u>	<u>\$4,707,000</u>	<u>\$4,631,000</u>
Increase (decrease) in net assets available for benefits	<u><u>\$6,633,551</u></u>	<u><u>\$6,459,000</u></u>	<u><u>\$10,307,000</u></u>
Net assets available for benefits, beginning of period	\$100,434,444	\$106,198,705	\$112,657,705
Increase (decrease) in net assets available for benefits	<u>\$6,633,551</u>	<u>\$6,459,000</u>	<u>\$10,307,000</u>
Net assets available for benefits, end of period	<u><u>\$107,067,995</u></u>	<u><u>\$112,657,705</u></u>	<u><u>\$122,964,705</u></u>

TO: Ray Ritcey, Chair and Members of the Halifax Regional Water Commission Board

SUBMITTED BY: *Original Signed By:*

Darlene Fenton
Chair of the Environment Health and Safety Committee

DATE: January 17, 2018

SUBJECT: **Integrated Stormwater Management Policy**

ORIGIN

On December 7, 2017, the Halifax/Halifax Water Integrated Stormwater Management Policy Draft Framework submitted to Halifax's Environment and Sustainability Standing Committee and approved to be forwarded to Halifax Regional Council.

Halifax/Halifax Water Integrated Stormwater Management Policy Draft Framework submitted to and approved by Halifax Regional Council on January 16, 2018

Submitted to and approved by Halifax Water, Environment Health and, Safety Committee meeting, January 18, 2018

RECOMMENDATION

The Environment, Health and Safety Committee, with the advice and recommendation of the General Manager, recommends that Halifax Water Board approve the Policy Framework for the Halifax/Halifax Water Integrated Stormwater Management Policy.

BACKGROUND

On February 26, 2013, Regional Council directed staff to develop an Integrated Stormwater Management Policy with the Halifax Regional Water Commission (Halifax Water), and in October 2013 a scope and overview of a stormwater management policy was presented to the Environment and Sustainability Standing Committee.

As detailed within an Information report to the Halifax Water Board on October 3, 2013, the Halifax Water Board and Halifax Water staff have formally acknowledged the

direction from HRM Regional Council and are working proactively with HRM staff to advance the development of an Integrated Stormwater Management Policy.

In broad terms, the objectives of an integrated policy were described as developing policies that guide municipal and utility operations and governance when delivering stormwater management services, in a manner that meets both legislative requirements and community expectations relating to public safety and environmental stewardship.

DISCUSSION

The purpose of this report is to provide a common policy framework, along with Halifax Municipality upon which to base a stormwater management policy, fully integrated into each organization's respective business plans.

Halifax's Environment and Sustainability Standing Committee approved the policy framework on December 7, 2017 and it was referred to Regional Council for their consideration on January 16, 2018. Halifax Regional Council approved the policy framework.

Stormwater Definition and Problem Statement

General Stormwater Cycle

Stormwater is runoff water from groundwater discharge, surface water, rain or melting snow that flows across the landscape. Runoff flows off rooftops, paved areas, graveled areas, bare soil, and lawns. Runoff gathers in increasingly large amounts along streets, drains, open channels, stormwater systems, and eventually discharges untreated into nearby water bodies. However, in combined sewer systems, stormwater flows with sewage to a wastewater treatment facility.

In urban areas, stormwater management is especially important due to decreases in natural land cover and the expansion of impervious surfaces like rooftops, sidewalks and roadways. These surfaces exacerbate runoff because they change the permeability of the landscape preventing rainwater from soaking in or infiltrating the soil. Some of the impacts of stormwater include flooding, sewer overflows and nonpoint source pollution.

Stormwater is managed using natural topography, watercourses and stormwater systems as well as best management practices, which include green infrastructure and low impact development. From inception with a rainfall or snowmelt event, stormwater flows through or across a variety of mediums prior to its destination in a natural watercourse or the ocean. These components include:

- Surface collection;
- Private property discharge;

- Overland flow;
- Public street flow;
- Piped and ditched flow;
- Major storm route flow; and,
- Natural watercourses.

Stormwater Problems

A properly designed and functioning stormwater system may include some or all the above components, conveys the runoff from all storm events without damage to property, harm to personal health, significant inconvenience to the public at large, or detrimental environmental effects.

However, the experience within Halifax has been that a variety of recent, and historical, storm events have caused damage and inconvenience to both public and private property. These storm events have caused problems that generally fall into the following categories:

- Private property flooding;
- Street flooding and icing in the street;
- Sewer backups;
- Excessive stormwater in the wastewater system; and,
- Degradation in receiving water quality.

From historical analysis of these typical problems by Halifax Water and Municipal staff, the root causes of the above noted stormwater flooding problems include:

- Poor site grading and lack of proper site drainage;
- Informal (no) major stormwater or overland flow routes;
- Poor street grading and drainage; and,
- Deficient stormwater systems.

One of the largest issues Halifax is currently facing is drainage and flooding problems that persist in areas that do not have a full and formal stormwater system that meets current standards. In these areas, the stormwater system may include open ditches, shallow storm sewers, or a structured stormwater system may not exist. In addition, many of these areas have no formal major storm route. Formal major storm routes are designed to convey stormwater from large rain events that exceed the design volume of piped systems, and direct stormwater over the street, through swales, large pipes or natural topography to avoid property damage or public harm and inconvenience.

Stormwater Quality

Stormwater pollution results when runoff picks up, carries and transports various pollutants (oil, grease, chemicals, dirt, sediment, nutrients, and pathogens). These pollutants can have a significant impact on downstream watersheds. Stormwater quality problems can be significantly reduced through the use of appropriate land development practices. The Municipality's proposed Stormwater Management and Erosion Control By-law, which is currently under development, will address some of the issues related to stormwater quality. In addition, Halifax Regional Plan policy adopted in 2014 stipulates that the Municipality fully supports a stormwater rate that provides incentives for retention of on-site stormwater. The Municipality and Halifax Water have subsequently reached a settlement agreement during the NSUARB stormwater Rate Hearing in February, 2017, where both parties agreed to develop joint design and construction standards that consider quality impacts. During the same Hearing, Halifax Water implemented a Credit system that provides financial incentives for retention of stormwater volumes.

Roles and Responsibilities

The overall responsibility for stormwater management is multi-jurisdictional. The federal, provincial and municipal governments along with Halifax Water and private property owners each have specific roles and responsibilities as stormwater moves through the stormwater cycle.

Province of Nova Scotia

The Province of Nova Scotia has jurisdiction for protection of water resources including natural watercourses (streams, rivers, lakes). The Province does not set discharge standards for stormwater quality (e.g. – nitrogen, phosphorus, etc.) in the same manner as wastewater. This is common across Canada – even though land based impacts can be extreme. For example, an assimilative capacity study carried out for the former Beechville/Lakeside/Timberlea Pollution Control Facility found that one of the greatest risks to water quality in the Nine Mile River was phosphorus from residential development around the headwater lakes. Although discharge standards are not established by the Province of Nova Scotia for stormwater, the installation of a public stormwater system falls under the Activities Designation Regulations, and the Province issues a Permit to Construct.

Halifax Water

Halifax Water is the municipal water, wastewater and stormwater utility serving the residents of Municipality. Halifax Water has authority to own and operate stormwater systems for the benefit of its customers within a defined service boundary (Attached). Halifax Water's stormwater system is comprised of catchbasins, pipes, manholes, roadside ditches, swales, culverts, stormwater holding tanks, ponds, and dams, which are vested in or under the control of Halifax Water, that eventually discharge into a local brook, river, or formal major stormwater systems where they exist.

Halifax Regional Municipality

The Municipality is responsible for the regulation of land development activities, which includes siting of buildings, grading of land, and assessing impacts of overland flow that result from the development of land, as well as stormwater systems used for municipal purposes, such as municipal parkland or other municipal facilities. The Municipality also owns and maintains those elements of the minor drainage systems (pipes, ditches, culverts, etc.) that fall outside of Halifax Water's stormwater service boundary. In addition, the Municipality owns and maintains the public street system, which is part of the stormwater system, and often accommodates the major stormwater flow; as well as bridges over natural watercourses and drainage corridors.

Private Property Owners

Property owners are responsible for stormwater flow across their individual properties, across adjacent property boundaries as well as stormwater management systems located on their property. Private Stormwater systems include rainwater leads, footing drains, private community systems, and slope protection within their privately-owned property. Private property owners must maintain drainage corridors and privately owned drainage infrastructure free of vegetation and debris to not block drainage flow routes or negatively interrupt drainage patterns.

Policy Framework

A stormwater policy should give specific regard to the following outcomes:

- Prevent loss of life and property damage due to major storms events;
- Efficient and effective work management processes, with a clear delineation of responsibilities between the Municipality and Halifax Water;
- Safe and convenient use of streets and other land areas before, during, and after storm events; and,
- Mitigate the long-term impacts of development on natural systems and downstream properties.

To address these outcomes, the Integrated Policy will be structured around four main issues or themes:

1. A capital investment strategy for stormwater infrastructure;
2. Ownership and maintenance of stormwater systems;
3. Land development practices; and,
4. Drainage on private properties.

1. Capital Investment Strategy

One of the stated purposes of the 2007 Transfer Agreement is “*To evolve the operation and administration of municipal wastewater services and municipal stormwater services towards a system whereby the general taxpayer of HRM does not subsidize the utility rate payer of HRWC, and the utility rate payer of HRWC does not subsidize the general taxpayer of HRM.*” Thus a capital investment strategy and funding for various types of capital projects must be consistent with the above provisions, in that funding is provided by the benefitting parties: The Municipality, Halifax Water, and/or private property owners.

An interim funding framework was developed and expired in 2015 to address several priority areas that required upgraded or new stormwater systems. Cow Bay Road, First Lake Drive, and Metropolitan Avenue stormwater system upgrades have been completed under the previous framework.

The demand for upgraded stormwater facilities is expected to far exceed the ability of either benefitting party to fund over the short to medium term. For this reason, clear priorities are needed regarding where to invest capital funds, which balances the needs of all benefitting parties. To this end, Halifax Water and the Municipality are jointly conducting a flood risk assessment of areas prone to flooding in Halifax, funded in part by the National Disaster Mitigation Program (NDMP).

2. Ownership and Maintenance of Municipal Stormwater Systems

Work completed to date addresses roles and responsibilities in relation to operations and maintenance of the stormwater system within the defined Halifax Water service boundary. The 2007 Transfer Agreement provided for the transfer of all existing municipal stormwater infrastructure within the street right of way or defined easements to Halifax Water. This infrastructure includes both “minor” piped systems (capacity for a maximum 1 in 5 year frequency storm event) and “major” systems (pipes, swales etc. with capacity for storm events greater than 1 in 5 year frequency). In 2013, a final version of the responsibilities guide (the “Merger Matrix”), and the work of a Special Technical Committee established under Section 37 of the Transfer Agreement subsequent to the final version of the Merger Matrix was completed.

Work management rules have been documented to reflect the responsibilities guide, and are constantly being reviewed and updated to ensure alignment with the 2007 Transfer Agreement between the Municipality and Halifax Water.

3. Land Development Practices

The Municipality is responsible for reviewing land development applications and approving subdivision grading and stormwater management plans. Halifax Water’s role is to review and approve the design of stormwater systems that will be owned and operated by Halifax Water. The Municipality and Halifax Water have agreed to work together to

develop a quality program for stormwater which would include the development and administration of joint design and construction standards, and the possible development of a credit for water quality as part of best management practices as described in the stormwater credit program.

Policies relating to watershed planning, floodplain protection, coastal inundation, and development standards such as best management practices, wetland protection and riparian buffers are included in the Regional Plan and have recently been reviewed as part of the 5-year review of the Regional Plan. There are however regulatory gaps that exist which relate to development standards and approvals. The Municipality has policies aimed at predicting and minimizing land based impacts associated with land development, including water quality impacts. The Municipality employs a watershed based approach to planning, which recognizes that watersheds are the fundamental unit for understanding impacts on water resources, and that water, soil, vegetation, and habitat are all connected.

The Regional Plan requires watershed studies in advance of secondary planning, which establish background water quality, predict impacts of development on water quality, influence community design, and provide a framework to monitor impacts. The outcome of watershed-based studies, including land suitability analyses, influence community and site design. Community design features recognize slope avoidance, coastal zone mapping, protection of floodplains, riparian buffers, mapping and avoidance of wetlands and other natural features.

The permit to construct issued by the Province will typically mandate no net increase to both minor and major flows in most situations, set limits on suspended solids related to construction activities, and ensure that a “Responsible Management Entity” will own the stormwater system. If carried out at the subdivision stages of development, this approach encourages public retention ponds, and may discourage source control, overlooking best management practices installed during site development.

There is growing evidence to suggest that a stormwater by-law which regulates site design features promote control of stormwater at source is more effective than public infrastructure at protecting water resources.

The **Stormwater Management By-law** referenced in the background section of this report could require drainage plans and sedimentation and erosion control plans for a broader range of activities such as large site specific developments, stand-alone site improvements such as parking lot construction, as well as grade alterations and top soil removal.

4. Drainage on Private Property

Since the merger with Halifax Water in 2007, business processes respond to, and triage drainage complaints between the Municipality and Halifax Water. In addition, a service level agreement has been implemented to better define responsibilities and levels of service provided to residents when responding to drainage complaints. Property owners are

responsible for stormwater flow across their individual properties, across adjacent property boundaries as well as stormwater management systems located on their property. However Halifax Water and the Municipality may provide advice when contacted regarding private drainage issues.

Emerging Issues

Wetlands

Wetlands are very effective at managing stormwater. However, natural Wetlands are considered private property if they are not abutting watercourses. This can be problematic in some situations, especially in mature urban or suburban environments where a wetland may extend across several properties.

Coordinated public policy decisions must be made to ensure that wetlands, where they exist, can be used effectively for stormwater management in all situations.

Combined Sewers

Development on combined sewers is becoming an issue as more and more development occurs in the Regional Centre. The majority of flow in a combined sewer is stormwater, and the Canadian Council of Ministers of the Environment (CCME) stipulate no net increase in overflows from development.

Developing in a mature urban environment that is already impacted is different than developing a greenfield site. For example, it has been estimated that the volume of stormwater from 1 acre of impervious land is equal to the domestic waste flow from 3,000 people. In some situations, separating the storm and sanitary sewers be advantageous, or low impact development can reduce stormwater flow from pre-development conditions.

Notwithstanding, current development standards have been developed with Greenfield development in mind, and significant policy decisions will be needed to address development in the Regional Centre. Emerging policy topics include how to deal with the major flow, what is an acceptable design storm on which to base capacity in a combined sewer, and what role can low impact development play in the urban center.

Flood Resilient Design Standards

Climate Change is making it harder and harder to predict rainfall events based on historical records. The insurance industry, Federal Government, academic community, and municipalities across the country are engaged at different levels to develop standards and guidelines that introduce flood resilient measures into development standards and design guidelines.

On January 18, 2018, the proposed Integrated Stormwater Management Policy was presented to the Halifax Water Environment, Health and Safety Committee. Subsequent to the presentation, the Committee passed a motion for approval in principle of the Integrated Stormwater Management Policy.

BUDGET IMPLICATIONS

There are no financial implications of this report. The Policy Framework should allow for better long-term financial planning.

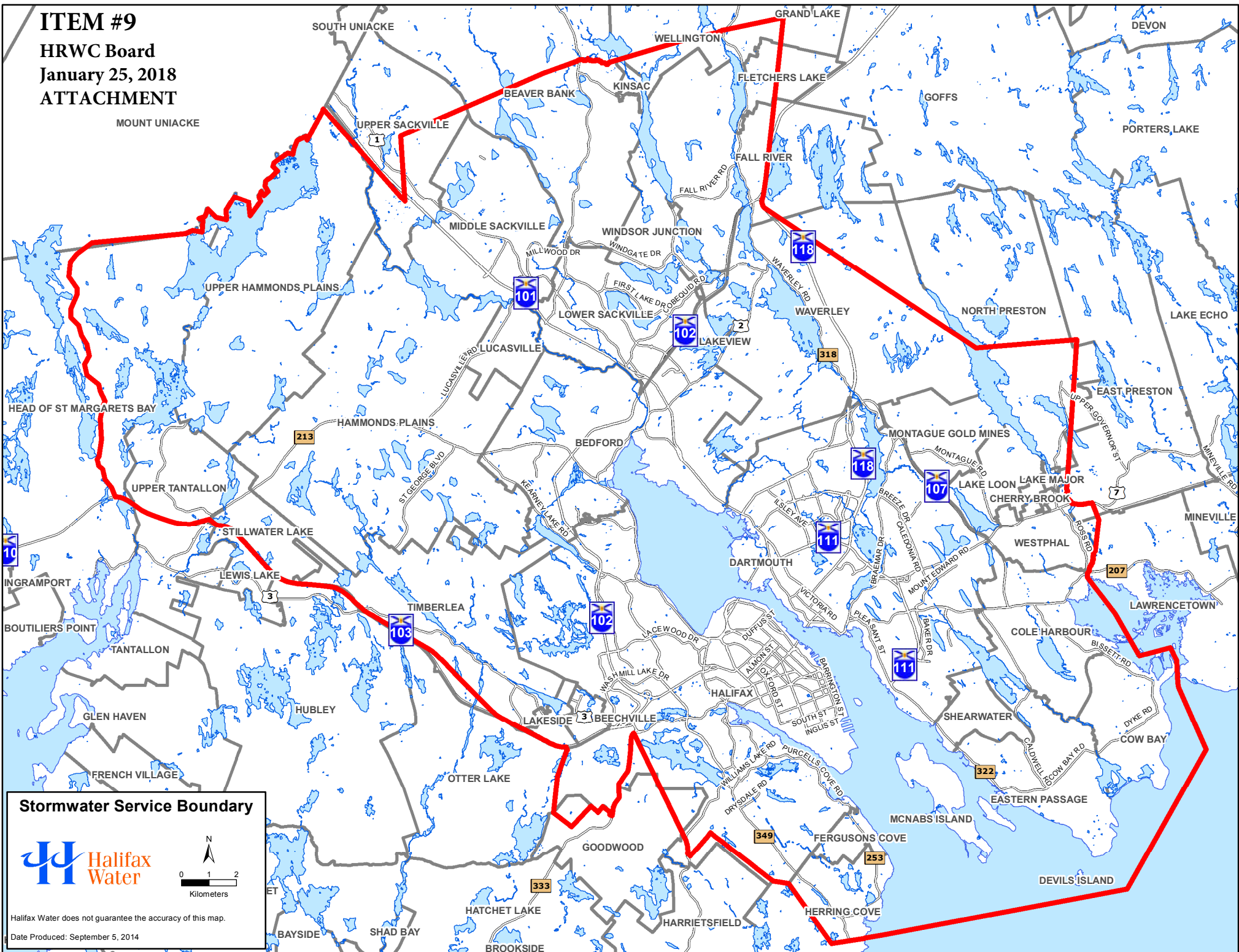
ATTACHMENTS

Sketch of the Stormwater Service Boundary

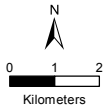
Report Prepared by:	<u>Original Signed By:</u> Kenda MacKenzie Director Regulatory Services, 902-237-7116
Approved by:	<u>Original Signed By:</u> Carl D. Yates, M.A.Sc., P. Eng. General Manager, 902-490-4804

ITEM #9
HRWC Board
January 25, 2018
ATTACHMENT

MOUNT UNIACKE



Stormwater Service Boundary



Halifax Water does not guarantee the accuracy of this map.

Date Produced: September 5, 2014

TO: Ray Ritcey, Chair and Members of the Halifax Regional Water Commission Board

SUBMITTED BY:

Original Signed By:

Cathie O'Toole, MBA, CPA, CGA, Director, Corporate Services

Original Signed By:

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

Original Signed By:

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

Original Signed By:

Kenda MacKenzie, P.Eng., Director, Regulatory Services

APPROVED: *Original Signed By:*

Carl D. Yates, M.A.Sc., P.Eng., General Manager

SUBJECT: **Financial and Operations Information Report**

INFORMATION REPORT

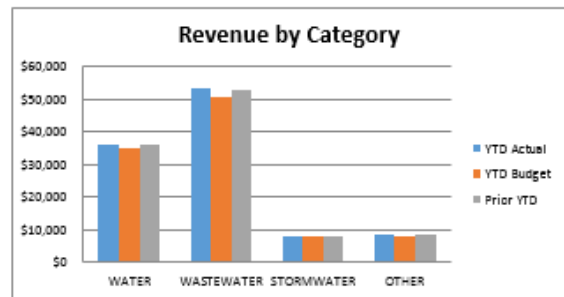
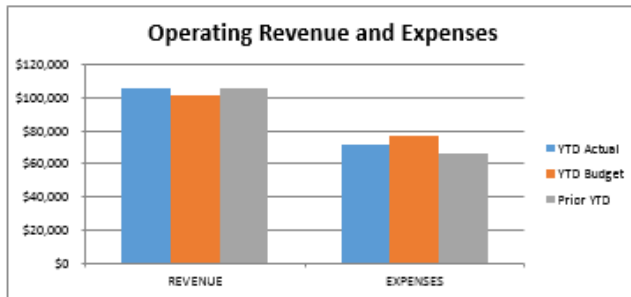
ORIGIN:

Regular update.

This report provides a high level overview of financial and operational performance for the utility. Financial results are presented first, followed by indicators and statistics for water and wastewater.

FINANCIAL

HALIFAX WATER
UNAUDITED FINANCIAL INFORMATION
APRIL 1/17 - DECEMBER 31/17 (9 MONTHS)
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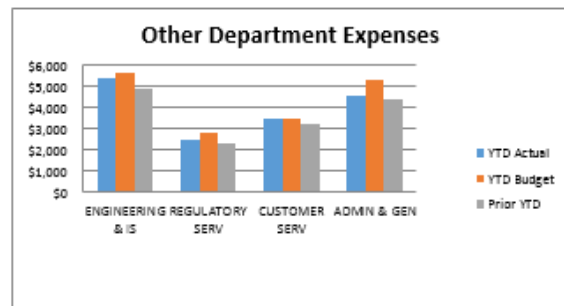
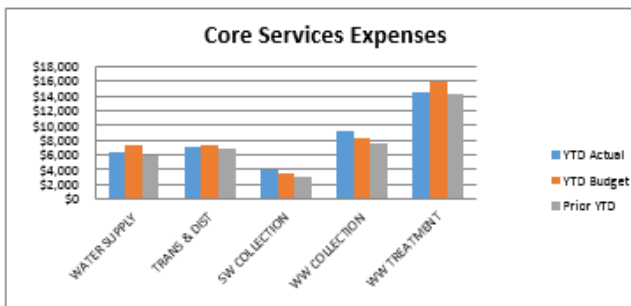


OPERATING REVENUE AND EXPENSES

	YTD Actual	YTD Budget	Prior YTD	% of Budget
REVENUE	\$105,304	\$101,630	\$105,253	77.61%
EXPENSES	\$71,866	\$76,412	\$66,475	70.54%
	\$33,438	\$25,278	\$38,783	99.21%

REVENUE BY CATEGORY

	YTD Actual	YTD Budget	Prior YTD
WATER	\$35,861	\$34,958	\$36,048
WASTEWATER	\$53,275	\$50,817	\$52,933
STORMWATER	\$7,884	\$7,336	\$7,349
OTHER	\$8,284	\$7,379	\$8,270
	\$105,304	\$101,630	\$105,253

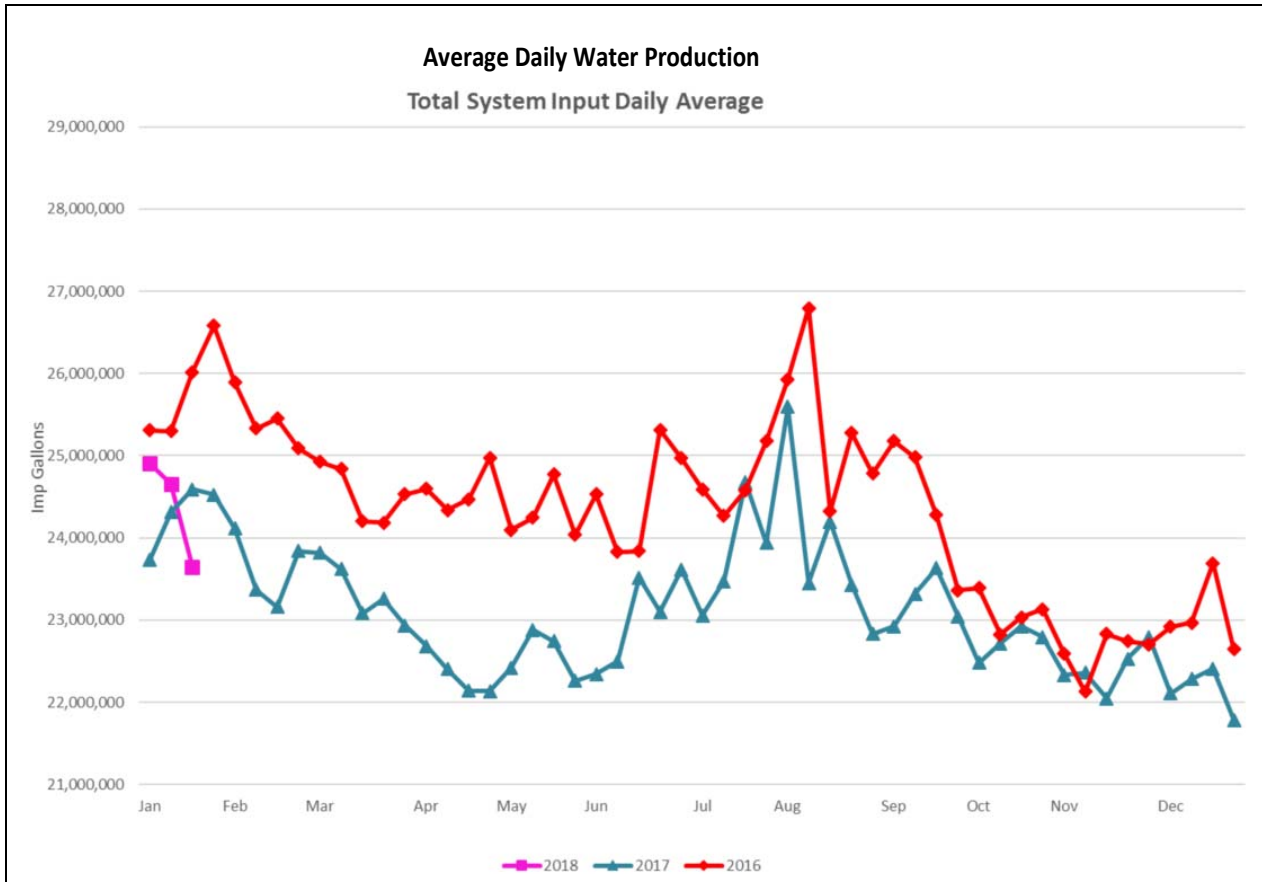


CORE SERVICES EXPENSES

	YTD Actual	YTD Budget	Prior YTD	% of Budget
WATER SUPPLY	\$6,282	\$7,223	\$5,994	65.18%
TRANS & DIST	\$7,013	\$7,381	\$6,807	71.26%
SW COLLECTION	\$3,856	\$3,465	\$3,093	83.47%
WW COLLECTION	\$9,249	\$8,219	\$7,603	84.40%
WW TREATMENT	\$14,561	\$16,012	\$14,318	68.21%
	\$40,961	\$42,306	\$37,814	72.62%

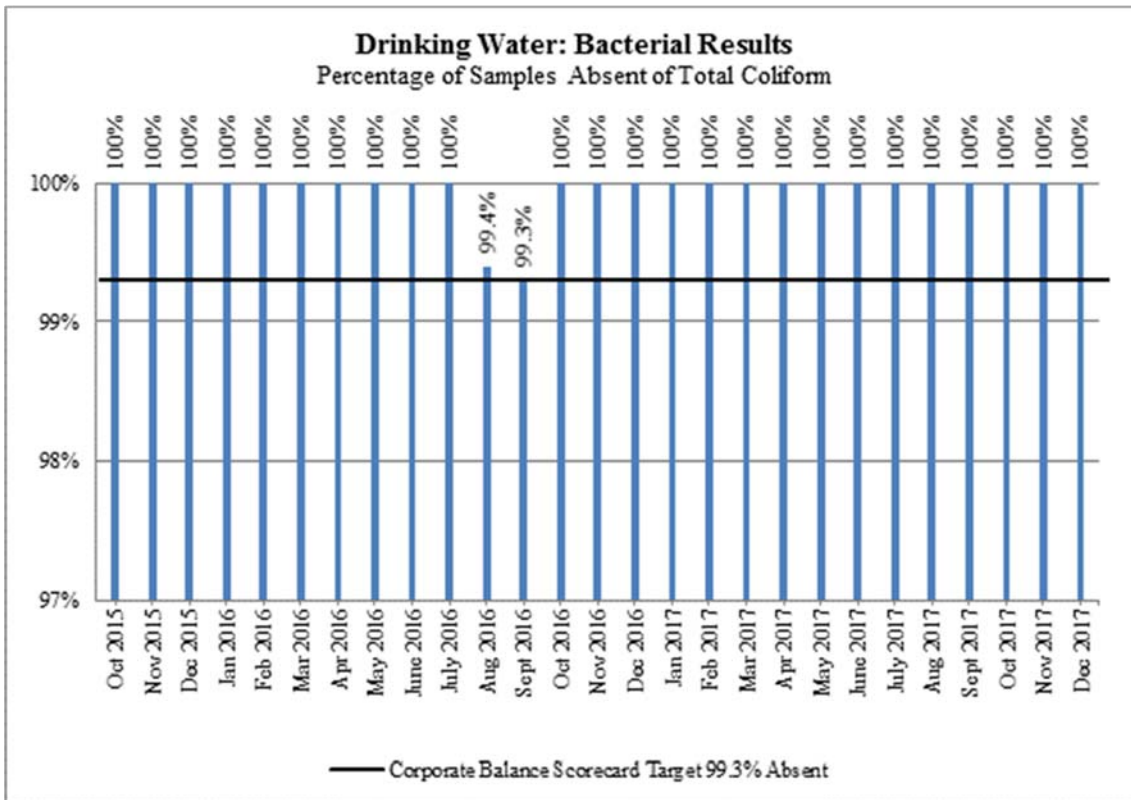
OTHER DEPARTMENT EXPENSES

	YTD Actual	YTD Budget	Prior YTD
ENGINEERING & IS	\$5,418	\$5,628	\$4,342
REGULATORY SERV	\$2,496	\$2,783	\$2,335
CUSTOMER SERV	\$3,510	\$3,470	\$3,251
ADMIN & GEN	\$4,539	\$5,322	\$4,405
	\$15,964	\$17,203	\$14,332



Regional Water Main Break/Leak Data		
Year	Total Breaks/Leaks	Current 12 Month Rolling Total (up to Dec. 31/17)
2015/16	226	198
2014/15	210	
2013/14	213	
2012/13	262	
2011/12	205	
Total	1116	
Yr. Avg.	217.6	

Water Accountability
Losses per Service Connection/Day (International Water Association Standard)
<i>Period Ending December 31, 2017</i>
Real Losses: 196 litres
CBS Target: 180



Water Quality Master Plan Objectives				
2017-2018 Q3				
Objective	Total Sites	% of Sites Achieving Target	All Sites: 90th Percentile < 15 µg/L	CBSC Awarded Points
Disinfection	64	91%	---	11
Total Trihalomethanes	25	100%	---	20
Haloacetic Acids	21	95%	---	16
Particle Removal	5	93%	---	13
Corrosion Control	69	---	5.59	20
TOTAL				80

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																Toxicity	Trend
	Rolling Averages - October, November and December 2017																	
	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)			
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	30	40	25	5000	1314	6-9	6.9	-	-	-	-	-	-	-	Not acutely lethal	Continued	
Dartmouth	50	29	40	26	5000	781	6-9	6.9	-	-	-	-	-	-	-	Not acutely lethal	Continued	
Herring Cove	50	15	40	10	5000	87	6-9	6.9	-	-	-	-	-	-	-	Not acutely lethal	Continued	
Eastern Passage	50	5	40	5	5000	47	6-9	6.9	-	-	-	-	-	-	-	Not acutely lethal	Continued	
Mill Cove	25	17	25	21	200	35	6-9	6.5	-	-	-	-	-	-	-	Not acutely lethal	Continued	
Springfield	20	5	20	5	200	21	6-9	7.0	-	-	-	-	-	-	-	-	Continued	
Frame	20	4	20	1	200	10	6-9	6.8	-	-	-	-	-	-	-	-	Continued	
Middle Musq.	20	5	20	20	200	126	6-9	8.0	-	-	-	-	-	-	-	-	Improved	
Uplands	20	5	20	5	200	10	6-9	7.0	-	-	-	-	-	-	-	-	Continued	
Aerotech	5	5	5	6	200	18	6-9	7.0	5.7 W 1.2 S	0.1	0.5	0.5	-	6.5	8.3	Not acutely lethal	Continued	
North Preston	10	4	10	5	200	10	6-9	6.7	3	0.2	1.5	0.3	-	-	-	-	Continued	
Lockview	20	5	20	15	200	10	6.5-9	6.7	8.0 S	0.1	1.2 S	0.4	-	-	-	-	Continued	
Steeves (Wellington)	20	5	20	2	200	10	6.5-9	7.2	14.4 S	0.1	1.0 S	0.1	-	-	-	-	Continued	
BLT	15	5	20	20	200	11	6-9	7.0	5 W 3 S	3	3 W 1 S	3	0.02 *	0.08	5	8.0	Not acutely lethal	Improved
Avg. of all Facilities	10		12		178		7.0		0.7		0.9		0.18		8.2			

NOTES & ACRONYMS:

CBOD₅ - 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

W / S - Winter / Summer compliance limits

NSE requires monthly averages be less than the NSE Compliance Limit for each parameter (Dartmouth, Eastern Passage, Halifax, Herring Cove, Mill Cove)

NSE requires quarterly averages be less than the NSE Compliance Limit for each parameter (Aerotech, Lockview, Mid. Musq., Frame, BLT, Uplands, North Preston, Steeves, Springfield)

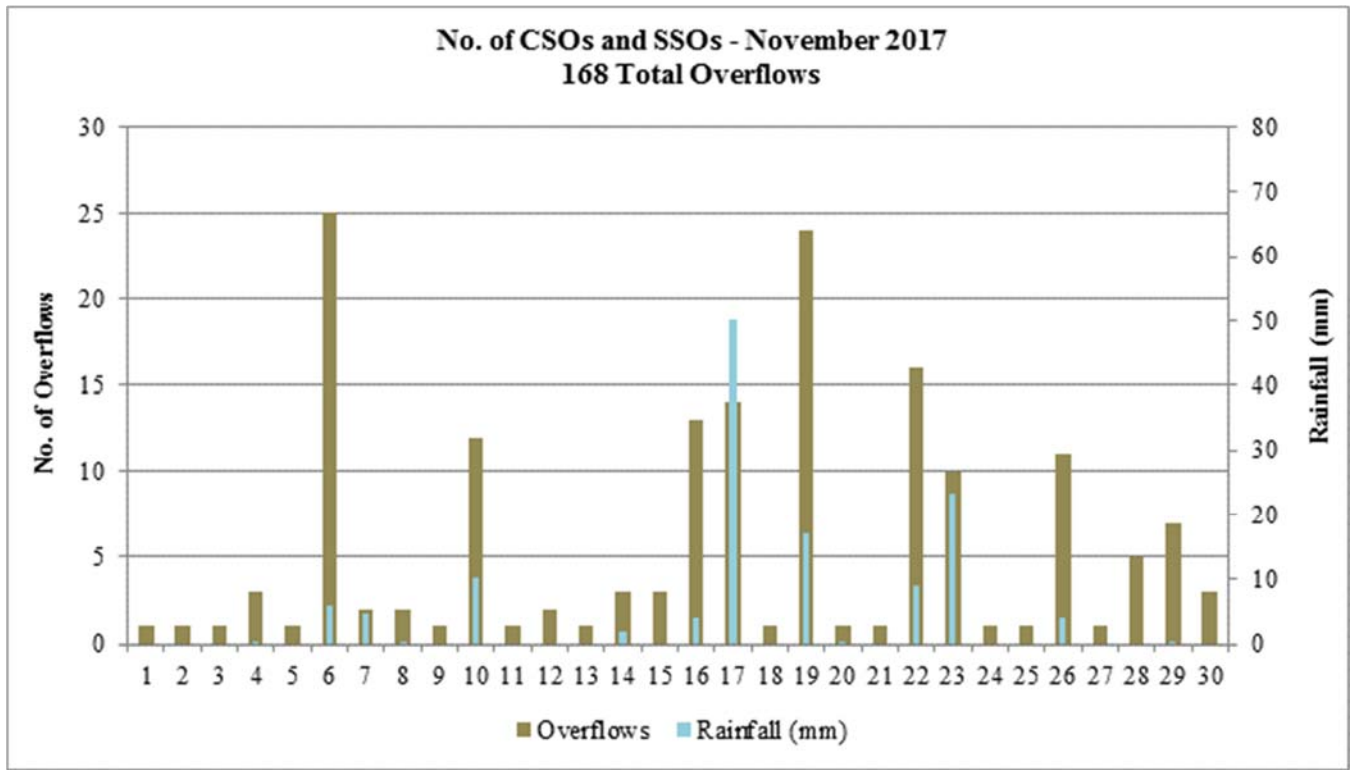
Continued - All parameters remain essentially unchanged since the last report

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

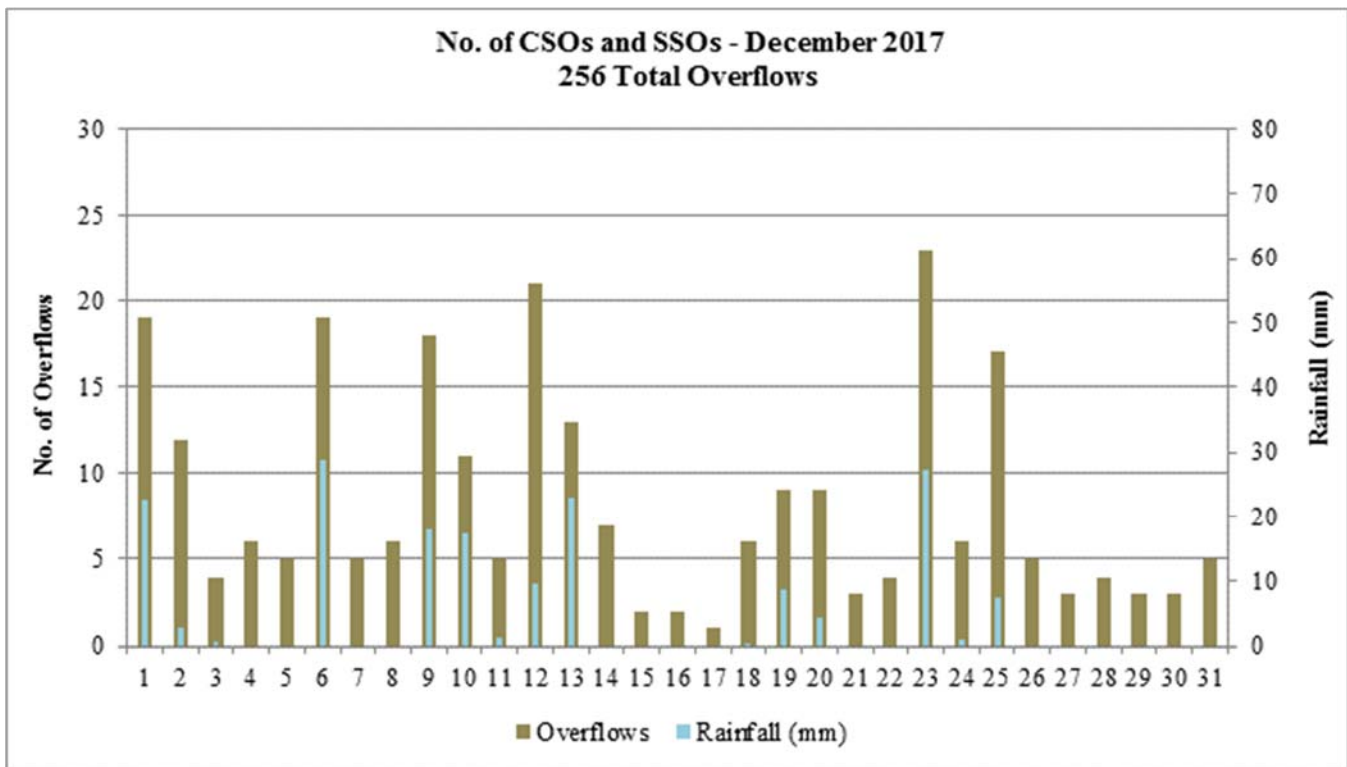
LEGEND

	NSE Compliant
	NSE Non-Compliant



NOTES & ACRONYMS: CSO - Combined Sewer Overflow SSO - Sanitary Sewer Overflow

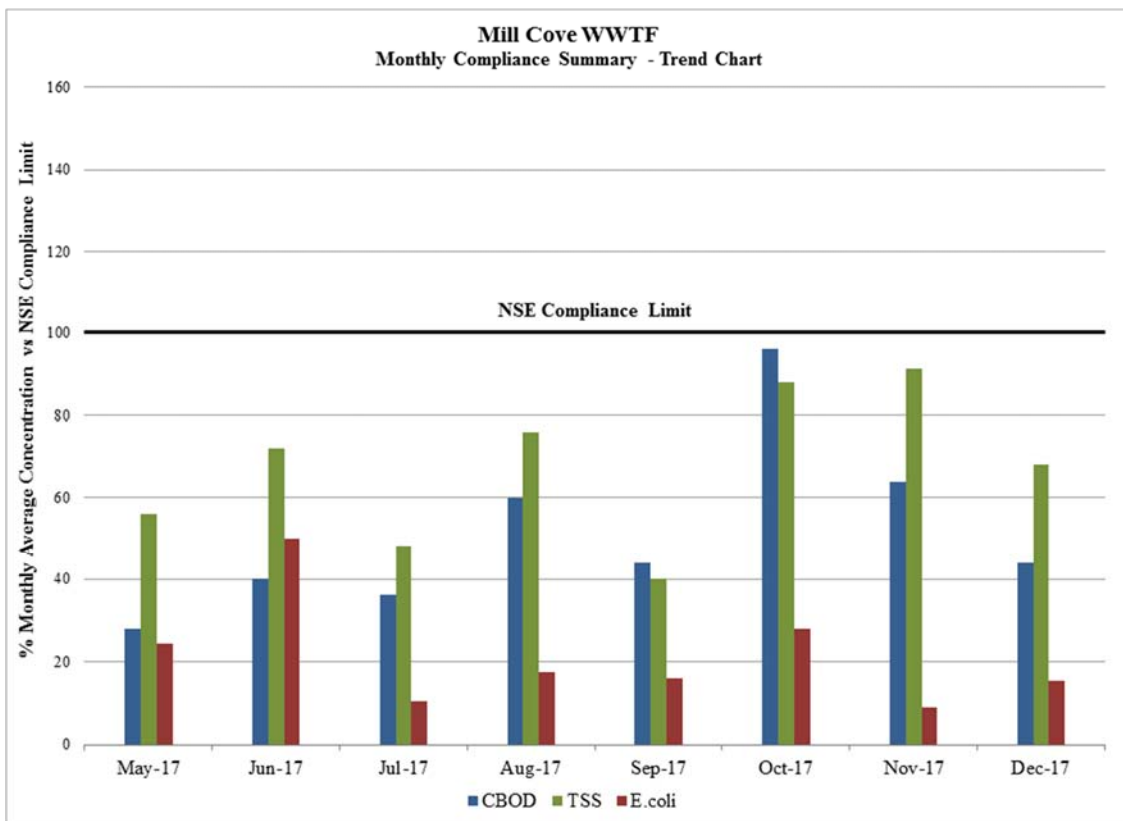
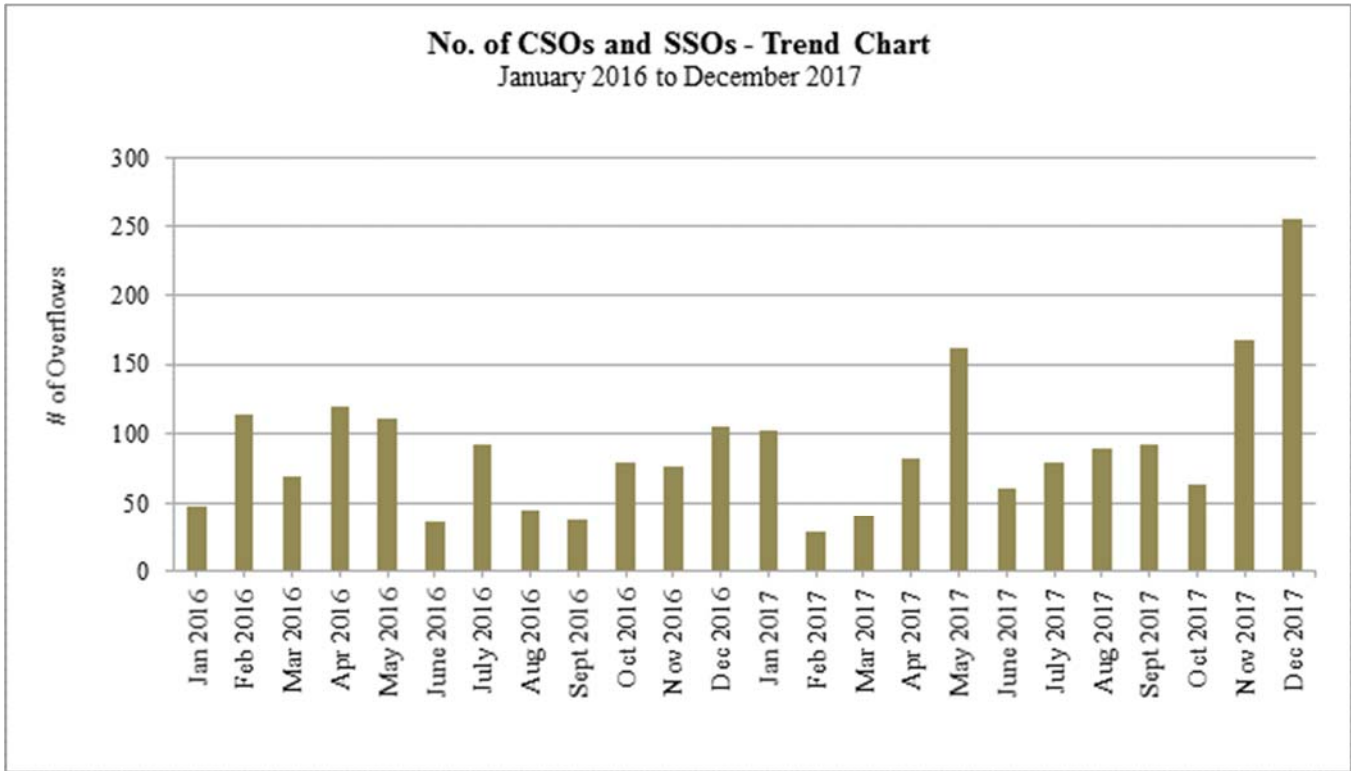
- Rainfall data is from Halifax Water’s rain gauge at the Halifax WWTF.
- There were twenty-five overflows on days when there was no recorded rainfall, as follows:
 1. November 12: The reason for the CSO at the North St CSO was debris creating a partial blockage of the flow control device.
 2. November 28: The CSOs at the Ferguson Rd CSO, the Grove St CSO and Wallace St CSO were the result of a flow reduction to Jamieson St PS & CSO in order to facilitate maintenance.
 3. Throughout the majority of November, the Lyle St CSO experienced apparent overflows due to a 24 hour maintenance pump flush cycle at the Park Ave PS.
 4. Beginning on November 15, CSOs at the Upper Water St CSO were due to partial blockages caused by debris.



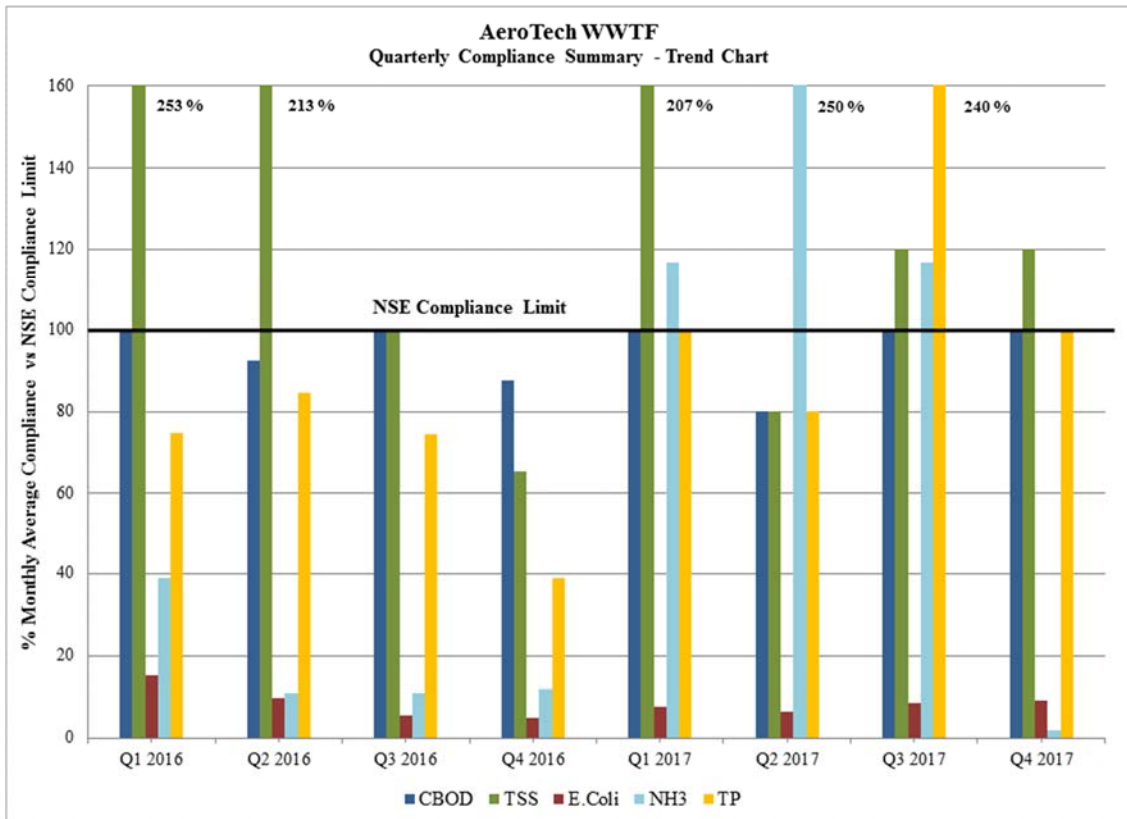
NOTES & ACRONYMS: CSO - Combined Sewer Overflow SSO - Sanitary Sewer Overflow

- Rainfall data is from Halifax Water’s rain gauge at the Halifax WWTF.
- There were sixty-four overflows on days when there was no recorded rainfall, as follows:
 1. December 4: The CSO at the Chain Rock PS & CSO was a direct result of the work being performed on the Northwest Arm Sewer Project. The CSO at the Maitland St PS & CSO was due to blockages caused by debris.
 2. December 5: The CSO at the Maitland St PS & CSO was due to blockages caused by debris.
 3. December 8: The CSO at the Melva St PS & CSO occurred due to maintenance performed in the wetwell.
 4. December 14: The reason for the CSO at the North St CSO was debris creating a partial blockage of the flow control device, the valves have been flushed. The CSO at the Maitland St PS & CSO occurred due to blockages caused by debris.
 5. December 21: The reason for the CSO at the Sackville St CSO is unknown. The CSO at the Maitland St PS & CSO occurred due to blockages caused by debris.
 6. December 22: The reason for the CSO at the North St CSO was debris creating a partial blockage of the flow control device, the valves have been flushed.

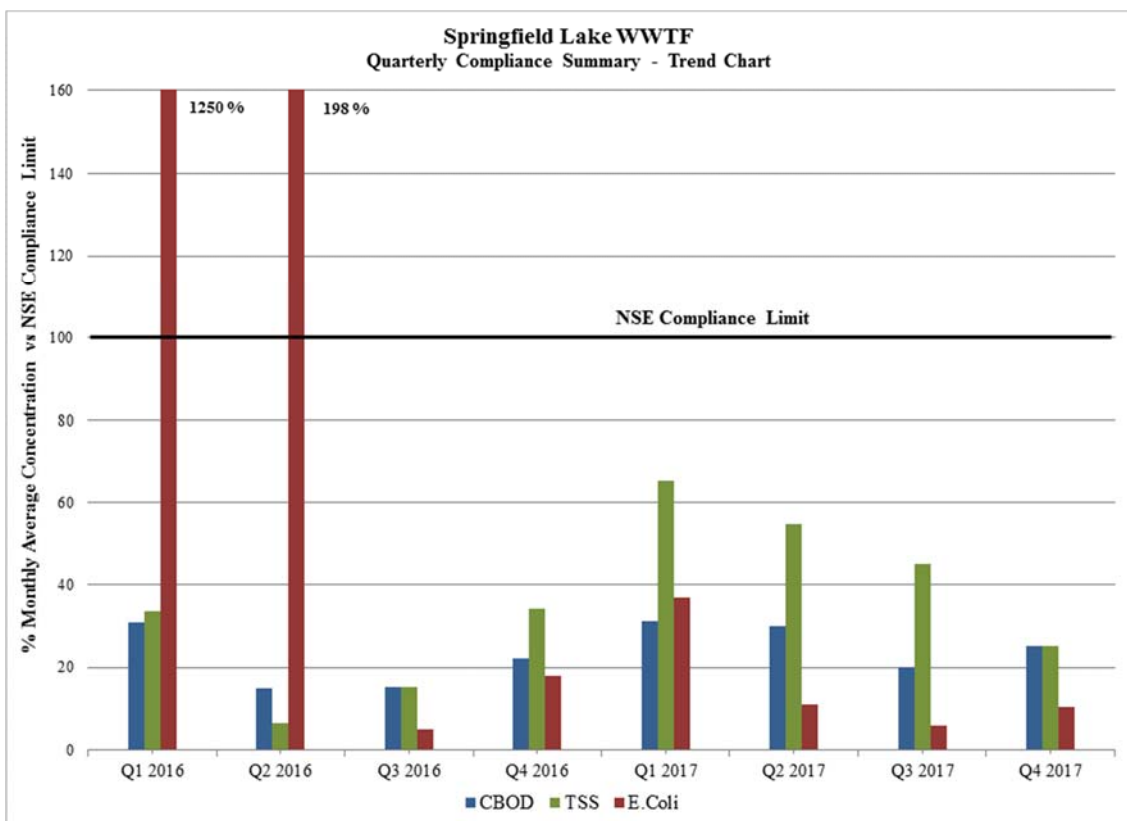
7. December 26: The CSO at the Melva St PS & CSO was due to a power outage.
8. Throughout the majority of December, the Lyle St CSO experienced apparent overflows due to a 24 hour maintenance pump flush cycle at the Park Ave PS. This is being further investigated.
9. Continuing into December, CSOs at the Upper Water St CSO were due to partial blockages caused by debris.
10. Throughout the majority of December, overflows at the Maritime Museum CSO occurred for an unknown reason and is under investigation.
11. Near the end of December, the Sackville St CSO began to experience overflows due to debris blockages in the flow control device and operations are investigating the root cause.



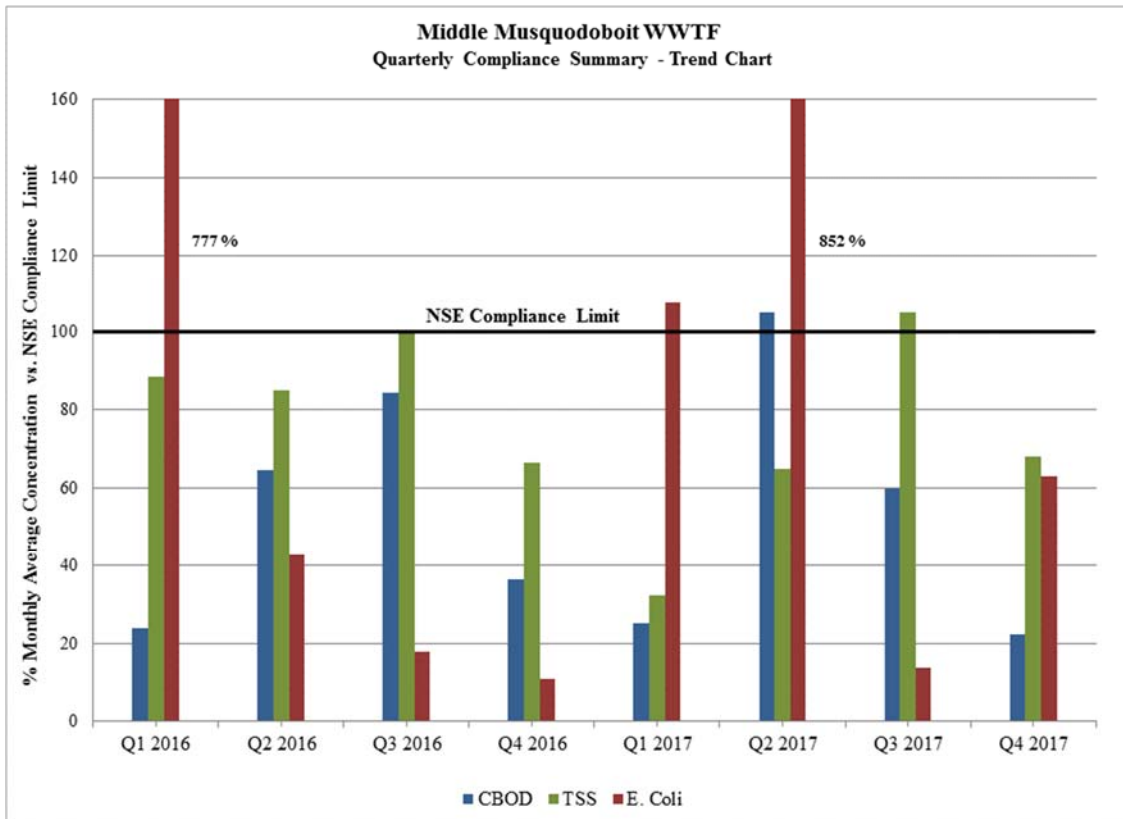
Lower numbers represent better performance.



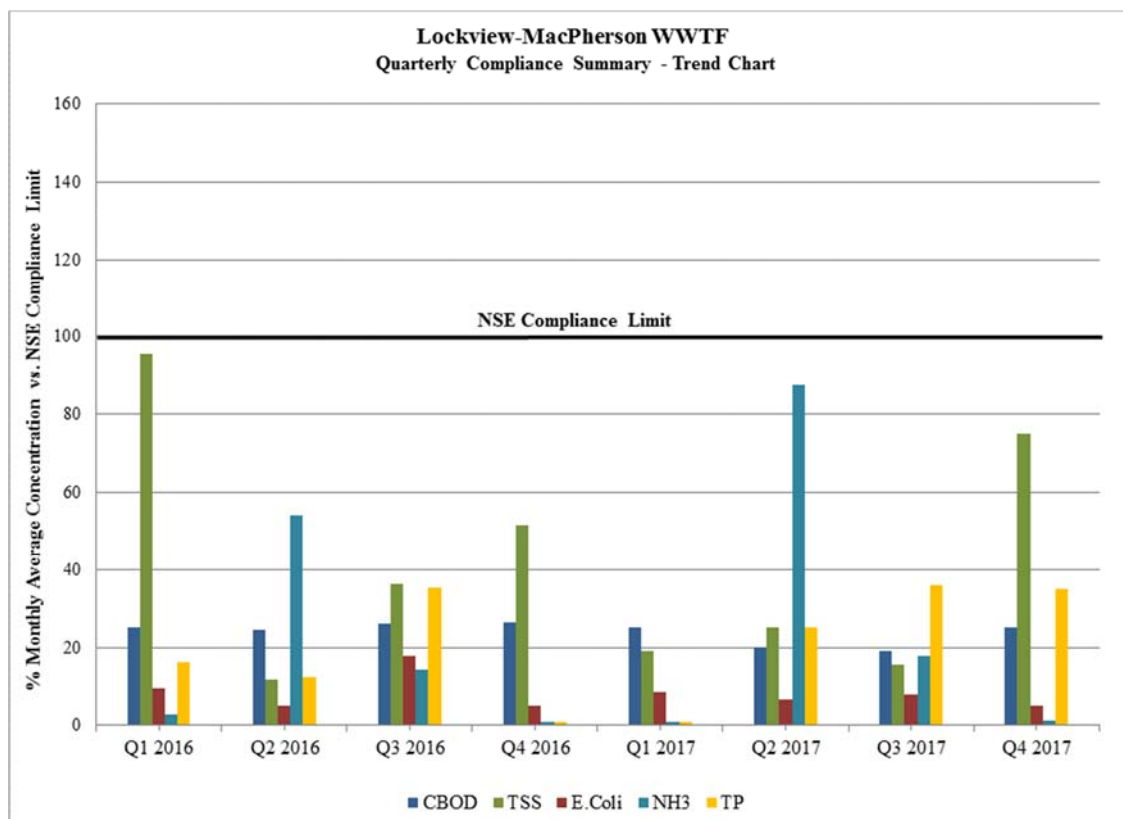
Lower numbers represent better performance.



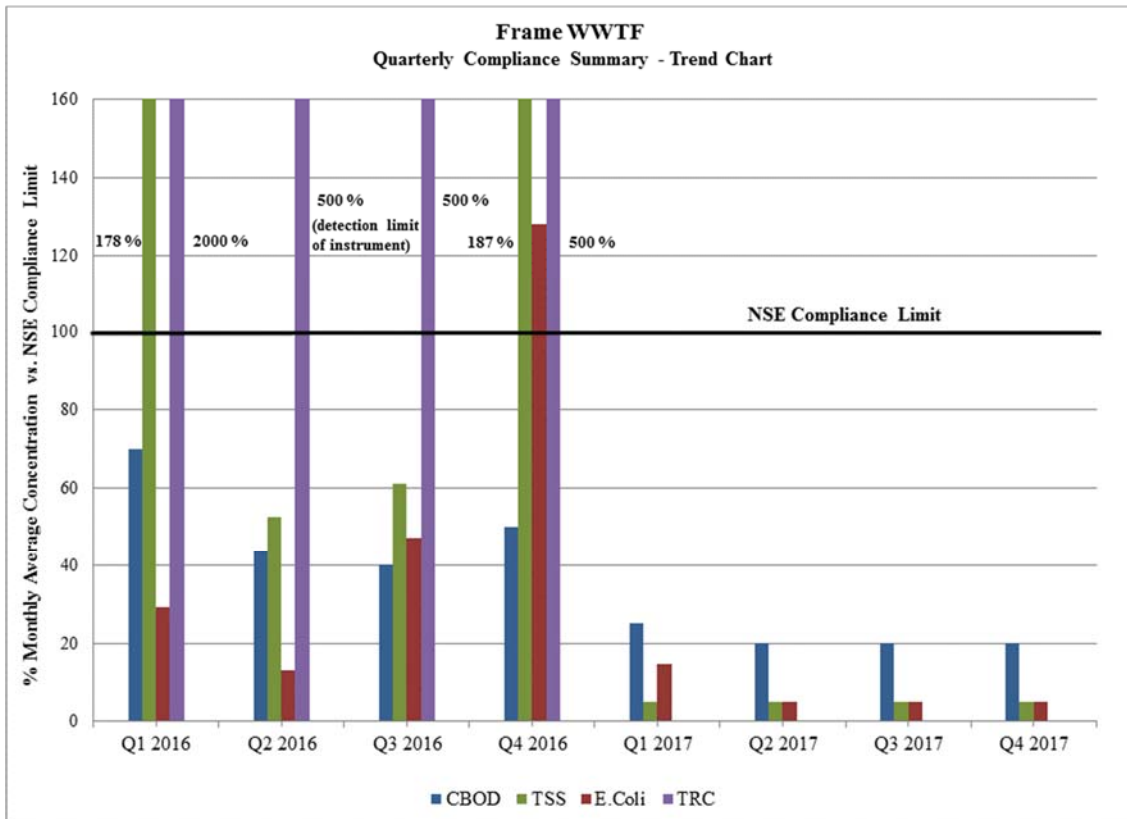
Lower numbers represent better performance.



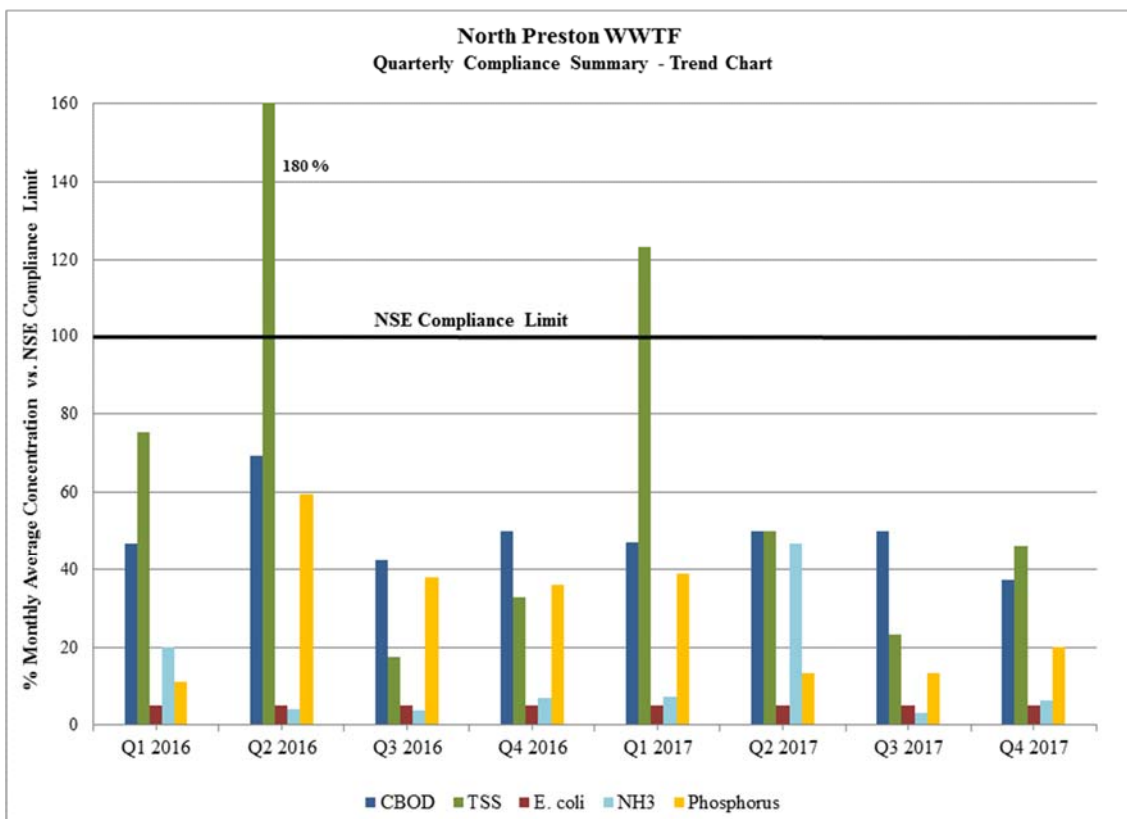
Lower numbers represent better performance.



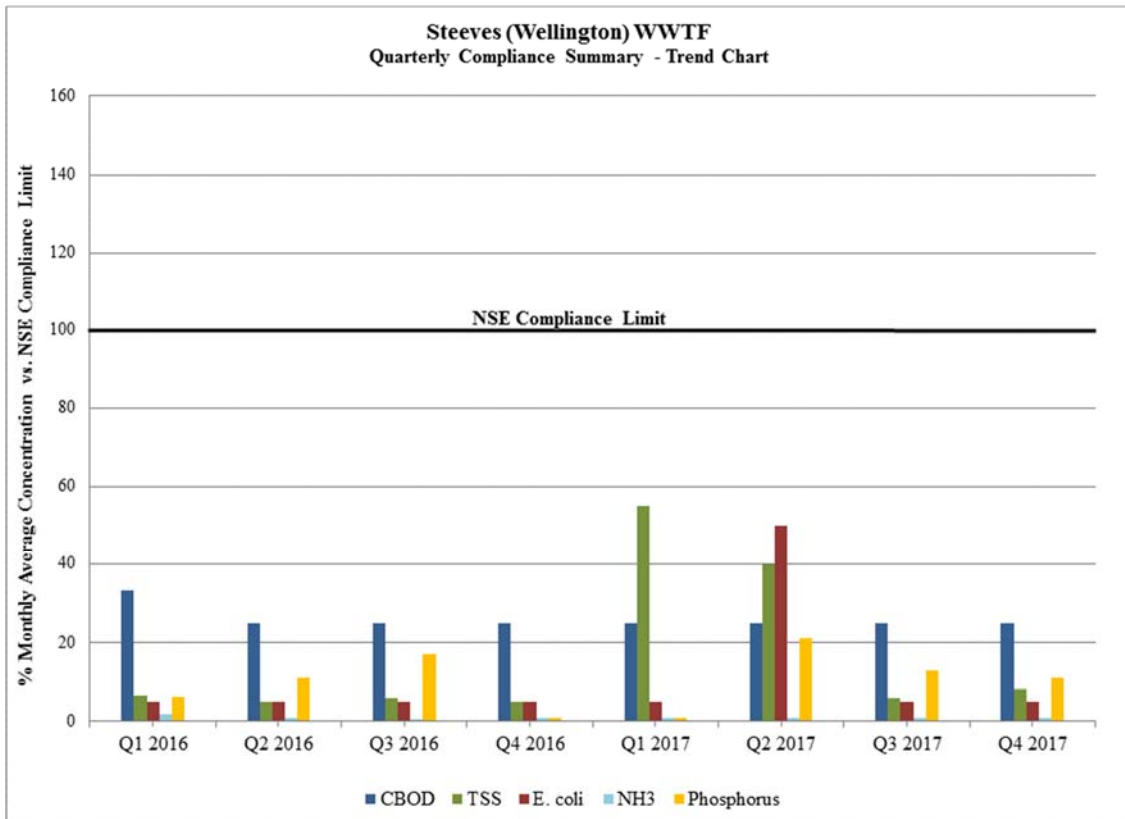
Lower numbers represent better performance.



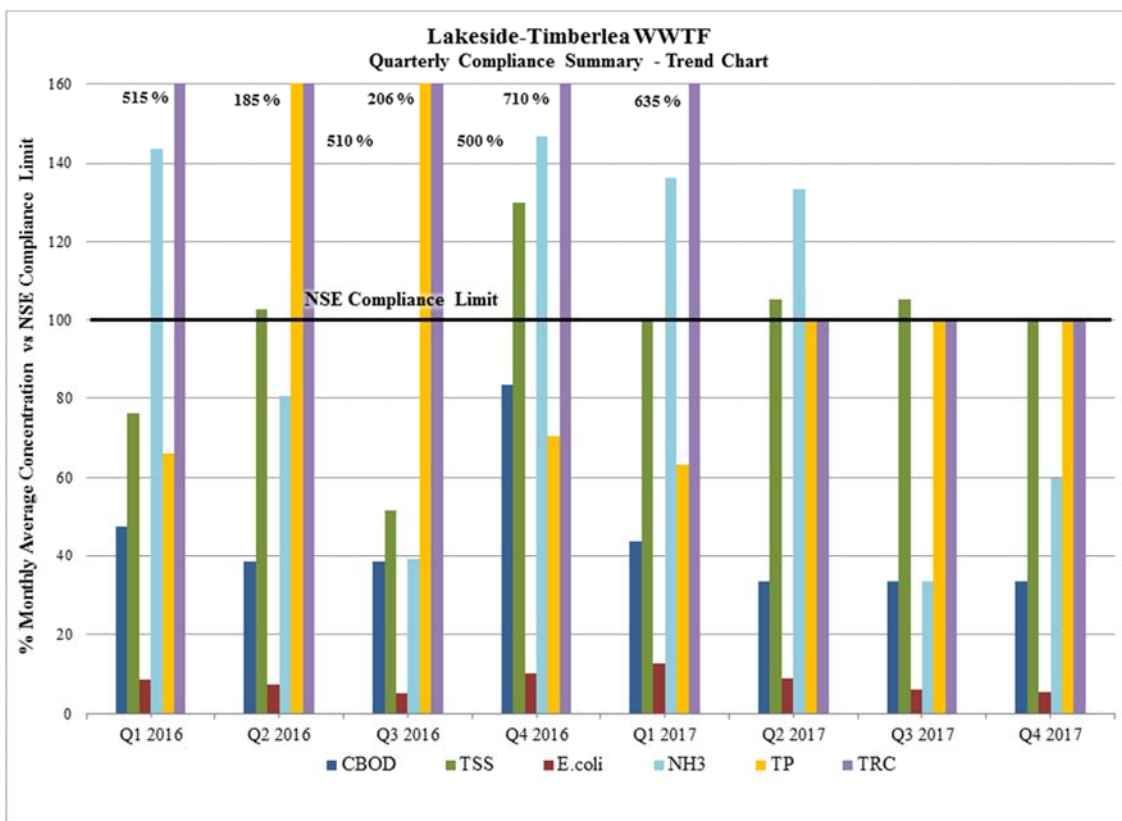
Lower numbers represent better performance.



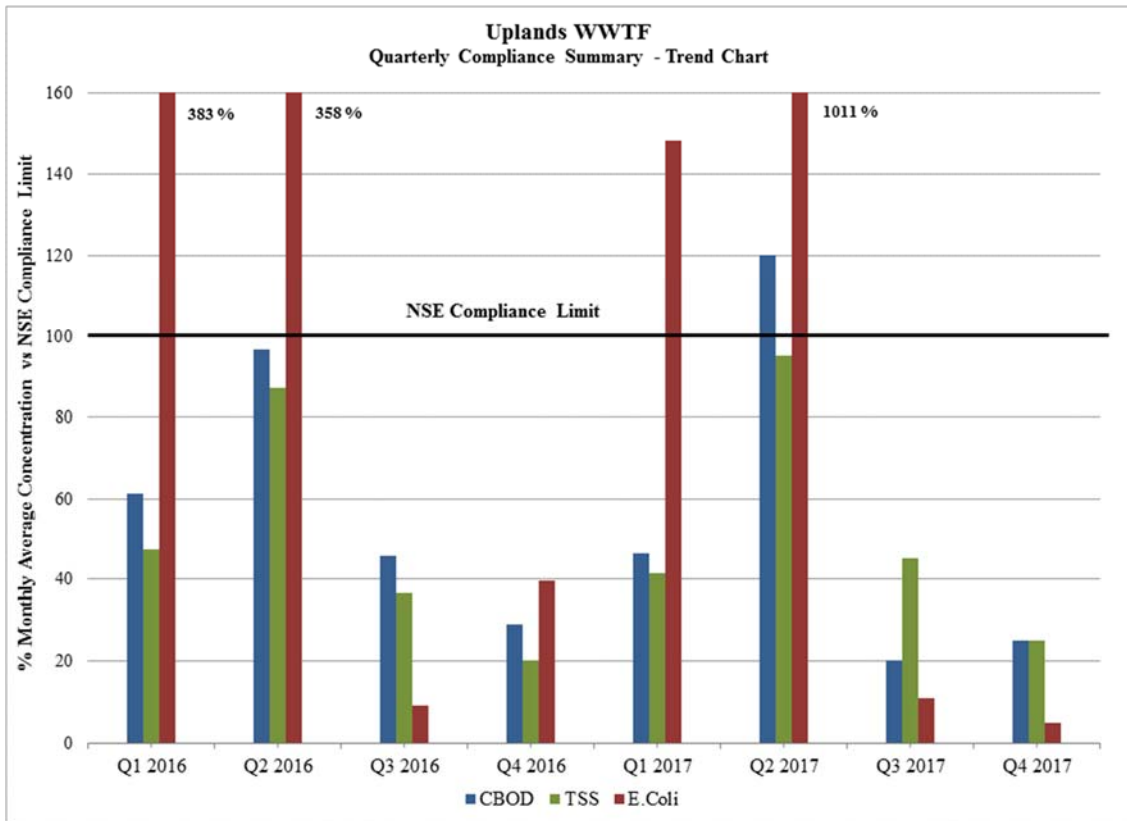
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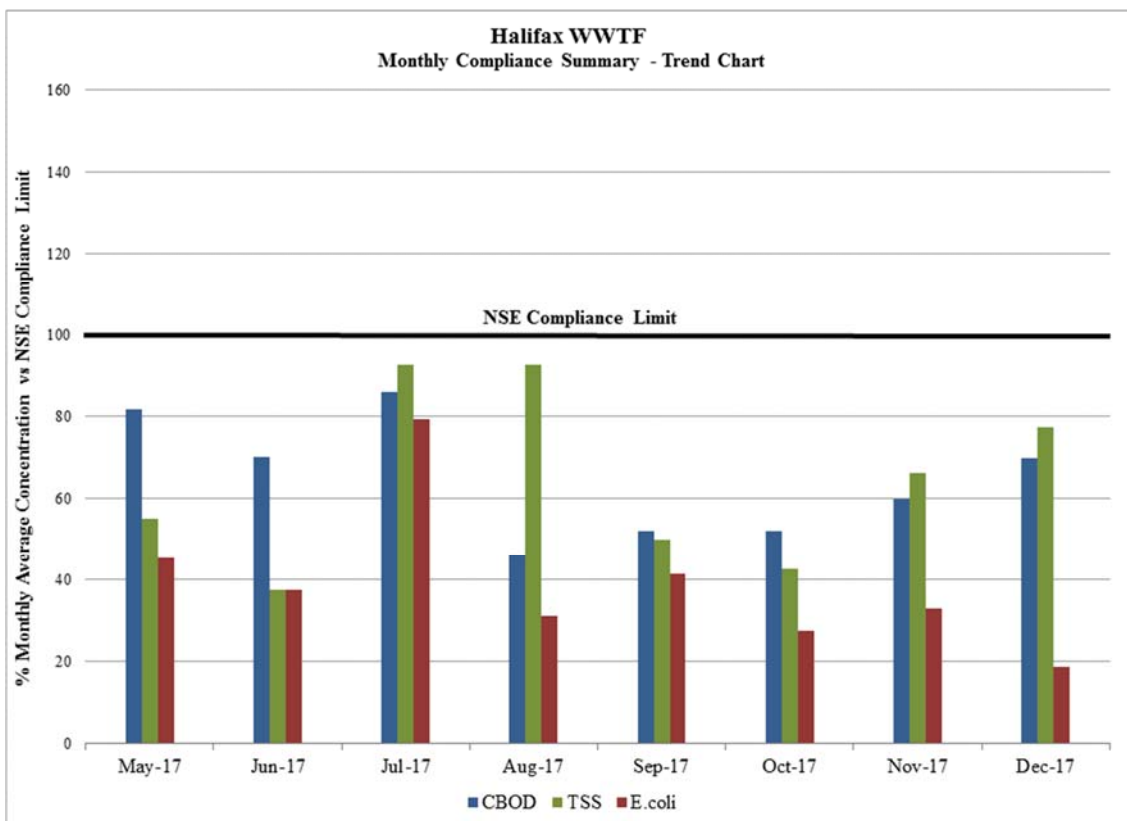
Lower numbers represent better performance.



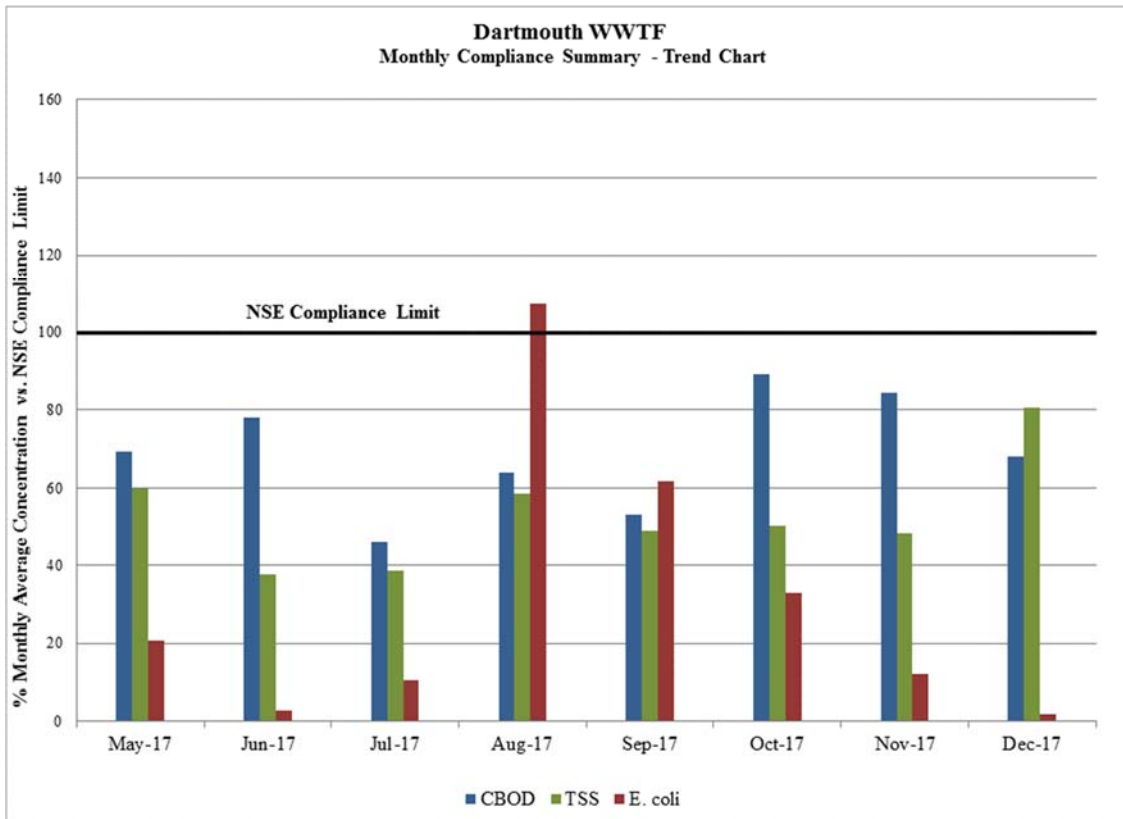
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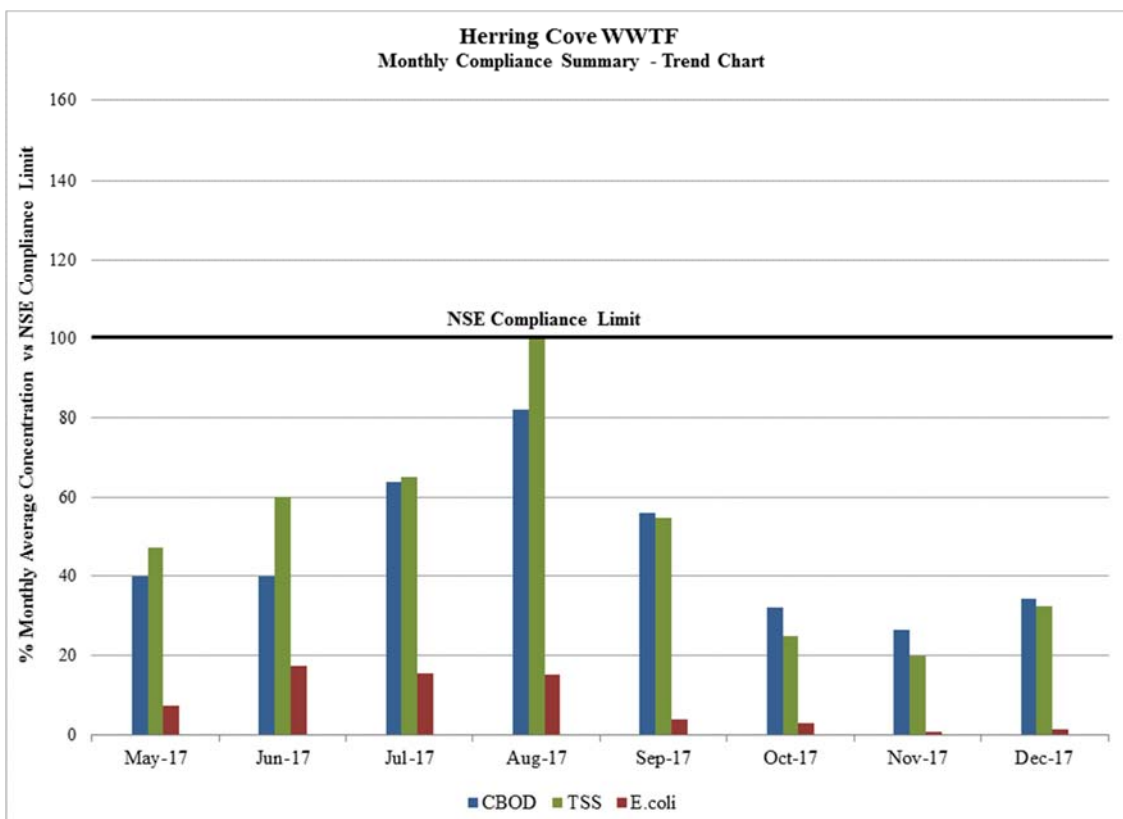
Lower numbers represent better performance.



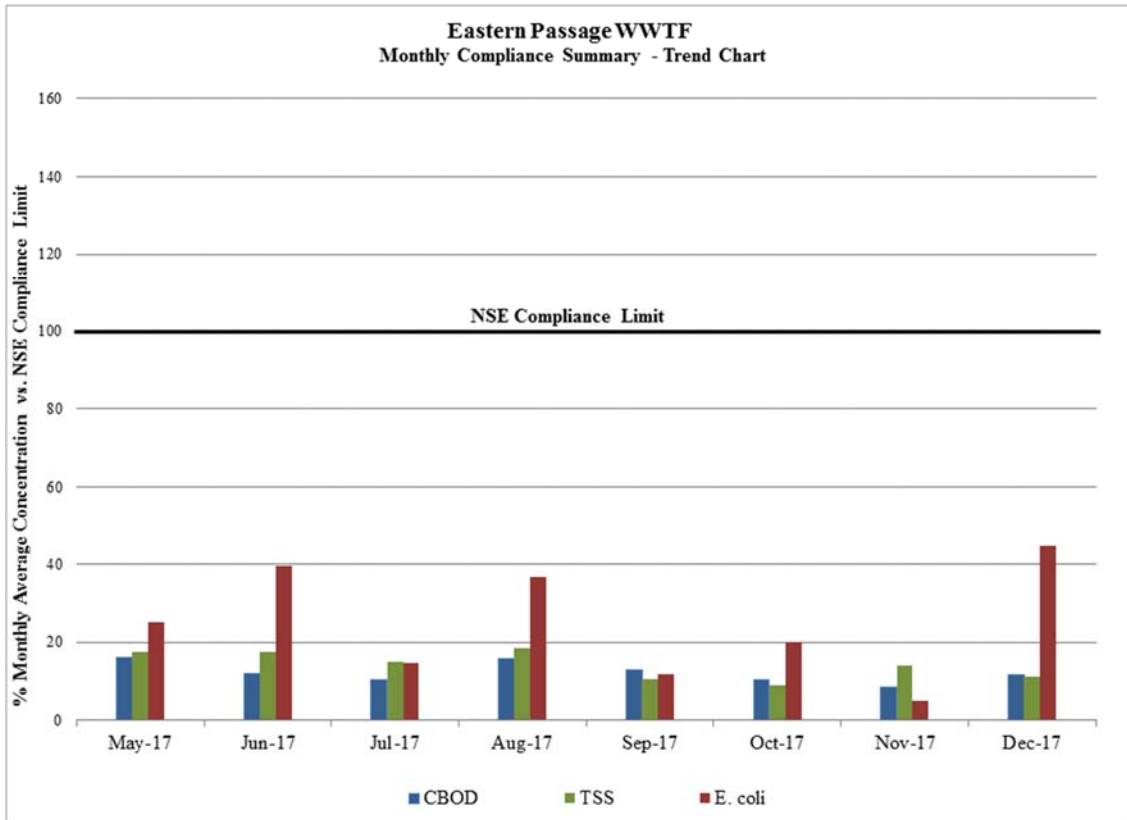
Lower numbers represent better performance.



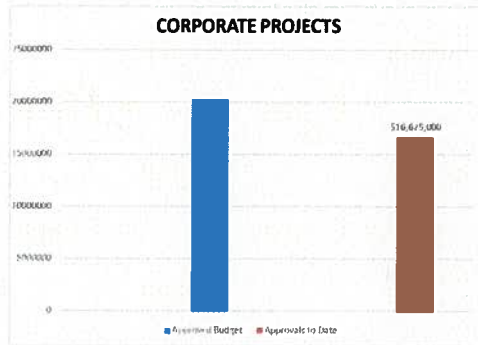
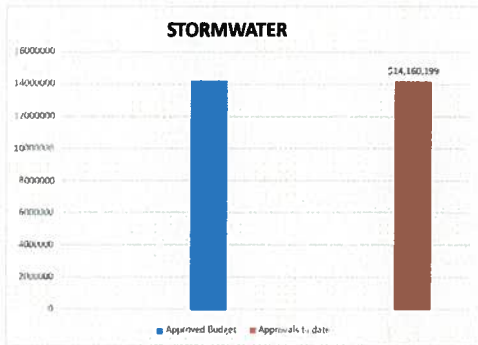
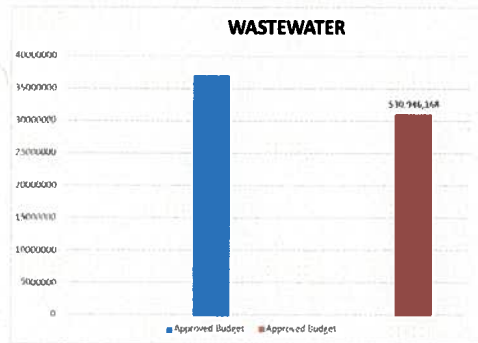
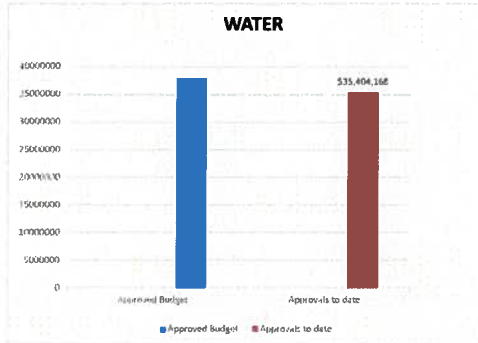
Lower numbers represent better performance.



Lower numbers represent better performance.



CAPITAL BUDGET APPROVALS TO DATE - 2017/18



WATER

Approved Budget \$38,091,520 93%
Approvals to date \$35,404,168

Total Budget: \$109,333,000
Total To Date: \$97,135,535

WASTEWATER

Approved Budget \$36,965,981 84%
Approvals to date \$30,946,168

Total % to date 89%

STORMWATER

Approved Budget \$14,213,000 100%
Approvals to date \$14,160,199

CORPORATE PROJECTS

Approved Budget \$20,237,000 82%
Approvals to date \$16,625,000

Original Signed *January 18, 2018*

Report Approved: **Date**
Jamie Hannam

HRWC Board Report 2I - Capital Budget Approvals to Date - January 25, 2018

Category	Net Impact on 17/18		Final Approval
	Total Approval	Capital Budget	
Water			
(blank)			
Bennery Lake WSP - Rapid Mixer Replacement project	\$130,000	\$130,000	9/25/2017
Bennery Lake WSP Water Supply Study	\$20,000	\$0	11/14/2017
Treatment Plants			
Lake Major WSP Waste Residual Management Study	\$78,000	\$0	3/30/2017
Treatment Facilities			
Purchase of PID No. 40149668 Bennery Lake	\$75,000	\$0	8/14/2017
Transmission			
Bedford Connector 750mm Replacement Phase 3	\$4,569,717	\$4,569,717	3/31/2017
Peninsula Low South Transmission Main Rehabilitation	\$8,500,000	\$8,500,000	4/10/2017
St. Margaret's Bay and Layton Drive water main renewal project funding increase	\$295,000	\$0	6/26/2017
Structures			
Leiblin Drive Booster Station Fire Pump Replacement Design	\$50,000	\$0	3/30/2017
Blue Mountain Meter Replacement	\$20,000	\$20,000	3/30/2017
Crestview Booster Station PRV Conversion	\$57,000	\$57,000	3/30/2017
Geizer 158 Reservoir Drainage Improvements	\$53,000	\$53,000	3/30/2017
Geizer 158 Reservoir Floor Replacement	\$2,750,000	\$2,750,000	7/6/2016
Lake Major Dam Replacement	\$7,789,391	\$7,789,391	4/10/2017
Pratt & Whitney PRV Communications Upgrade	\$10,000	\$10,000	3/30/2017
Silverside Booster Station - Control Panel Replacement	\$50,000	\$50,000	3/30/2017
Security			
Security Upgrade Program	\$150,000	\$150,000	8/17/2017
Facilities			
450 Cowie Hill - New DR7000 for Lab	\$14,000	\$14,000	3/30/2017
Bennery Lake WSP: Culvert Replacement	\$20,000	\$20,000	3/30/2017
Bennery Lake WSP: New Chlorine Analyzer	\$14,000	\$14,000	3/30/2017
Bennery Lake WSP: New Low Lift VFD Pump Replacement Program	\$110,000	\$110,000	3/30/2017
Bennery Lake WSP: New Magnetic Flow Meters	\$29,000	\$29,000	3/30/2017
Bennery Lake WSP: Plant MCC Replacement	\$75,000	\$75,000	11/14/2017
Bennery Lake WSP: Post Filter Chemical Addition Optimization	\$62,000	\$62,000	3/30/2017
Bennery Lake WSP: Replace Sludge Pumps and Valve Replacements	\$53,000	\$53,000	3/30/2017
Chlorine Analyzer Relocation - Geizer 158 Reservoir	\$33,000	\$33,000	3/30/2017
Inline Zeta Potential Meters for Water Plants	\$100,000	\$100,000	3/30/2017
JD Kline WSP: Effluent Valve Actuator Replacement Program	\$50,000	\$50,000	3/30/2017
JD Kline WSP: Filter Media and Underdrain Replacement Program	\$5,747,060	\$5,747,060	4/13/2017
JD Kline WSP: Lime Feed and Delivery System Replacement	\$300,000	\$300,000	1/3/2018
JD Kline: Ampgard III to Vacuum Contactor Conversion	\$40,000	\$40,000	3/30/2017
JD Kline: Bench-top Turbidimeters	\$6,000	\$6,000	3/30/2017
JD Kline: Chlorine Storage Room - System Modifications	\$70,000	\$70,000	3/30/2017

Category	Net Impact on 17/18		
	Total Approval	Capital Budget	Final Approval
JD Kline: pH Meter Replacements	\$10,000	\$10,000	3/30/2017
JD Kline: Raw Water Pumping Station Ladder Extension and Fall Protection Equipment	\$9,000	\$9,000	3/30/2017
JD Kline: Roof Replacement	\$220,000	\$220,000	3/30/2017
JD Kline: Slide Gate Actuators to Lagoons	\$44,000	\$44,000	3/30/2017
JD Kline: Turbidity Meters	\$50,000	\$50,000	3/30/2017
JD Kline: Westinghouse Electrical Panels Replacement	\$5,000	\$5,000	3/30/2017
JD Kline: VTS Alarm System Upgrade	\$7,000	\$7,000	3/30/2017
Lake Major WSP: Bench Top Turbidimeters	\$6,000	\$6,000	3/30/2017
Lake Major WSP: Blower Vent	\$35,000	\$35,000	3/30/2017
Lake Major WSP: Butterfly valve replacement program	\$100,000	\$100,000	3/30/2017
Lake Major WSP: Carbon Dioxide Feed System	\$215,000	\$215,000	4/13/2017
Lake Major WSP: Dry Polymer Feed System Replacement	\$75,000	\$75,000	6/28/2017
Lake Major WSP: Filter Media Replacement	\$200,000	\$200,000	3/30/2017
Lake Major WSP: Lime Feed and Delivery System Replacement	\$120,000	\$120,000	1/3/2018
Lake Major WSP: MCC Contactors Replacement	\$34,000	\$34,000	3/30/2017
Lake Major WSP: PLC Upgrade	\$360,000	\$360,000	12/6/2017
Lake Major WSP: Treatment Train Isolation	\$222,000	\$222,000	3/30/2017
Equipment			
Miscellaneous Equipment Replacement			
Mobile Event Trailer "The Shed"	\$60,000	\$0	6/6/2017
Purchase portable acoustic listening equipment	\$15,000	\$0	5/17/2017
Distribution			
Automated Flushing Program	\$20,000	\$20,000	3/30/2017
Bulk Fill Stations - Site Work Improvements	\$110,000	\$110,000	3/30/2017
Distribution System Chlorine Residual Analyzer Upgrade Program	\$100,000	\$100,000	4/4/2017
Hydrant Renewals	\$75,000	\$75,000	4/13/2017
Lead Service Line Replacement Program	\$400,000	\$400,000	4/13/2017
Re-Chlorination Stations - Sampson and Stokil Reservoirs	\$30,000	\$30,000	4/3/2017
Service Line Renewals	\$100,000	\$100,000	4/13/2017
Valve Renewals	\$125,000	\$125,000	4/13/2017
Water Distribution - Main Renewal Program	\$1,900,000	\$1,900,000	3/21/2017
Water Sampling Station Relocation Program	\$30,000	\$30,000	3/30/2017
Assets			
Watermain renewal stand alone projects Maitland Street/Warren Street	\$280,000	\$0	1/9/2018
Water Total	\$36,277,168	\$35,404,168	

Category	Net Impact on 17/18		Final Approval
	Total Approval	Capital Budget	
Wastewater			
(blank)			
Wastewater Lateral Lining 2018 - Engineering Services	\$25,000	\$25,000	12/1/2017
Fairview Clayton Park Bridgeview I/I Reduction - Engineering Services	\$25,000	\$25,000	12/1/2017
Pembrooke Street Sewer Replacement Design Phase	\$10,000	\$0	11/14/2017
Treatment Facilities			
Dartmouth WWTF: Ductwork Replacement	\$150,000	\$150,000	11/2/2017
Eastern Passage WWTF: Control Building HVAC Upgrade	\$8,000	\$8,000	5/23/2017
Halifax WWTF: Ductwork Replacement	\$41,000	\$61,000	1/0/1900
Herring Cove WWTF: Window Installation for Natural Light	\$20,000	\$20,000	7/25/2017
HSP Plants - Carbon Replacement	\$285,000	\$285,000	8/9/2017
Mill Cove WWTF	\$750,000	\$750,000	3/27/2017
Roach's Pond Pumping Station Trash Rack	\$50,000	\$0	8/1/2017
Dartmouth WWTF: Odour Control Study	\$40,000	\$40,000	8/21/2017
Halifax WWTF: Screenings Compactor Replacement	\$200,000	\$200,000	9/13/2017
Herring Cove WWTF: Overhead Door	\$20,000	\$20,000	9/13/2017
Eastern Passage Wastewater Treatment Facilities Process Optimization	\$70,000	\$0	7/25/2017
Structures			
Emergency Pumping Station Pump replacements	\$250,000	\$250,000	4/25/2017
Hines Road Sewer - Odour Management:	\$150,000	\$150,000	3/28/2017
Prince Albert Road WW IP	\$21,000	\$0	7/22/2017
Shipyard Road Pumping Station Upgrade	\$175,000	\$175,000	6/28/2017
Weybridge Lane Pumping Station CCC	\$100,000	\$100,000	10/25/2017
CSO Upgrades 2017	\$95,000	\$0	12/6/2017
Bedford West CCC (Water/Wastewater) Various phases 2017/18	\$71,000	\$0	1/9/2018
Security			
Security Upgrade Program	\$200,000	\$200,000	8/17/2017
Pumping Station			
Market Street Combined Sewer Replacement project	\$24,000	\$0	9/25/2017
Combined sewer upgrade - Quinpool Road from Preston Street to Oxford Street- Preliminary Investigation	\$15,000	\$0	10/26/2017
Force mains			
Kearney Lake Road Force main Extension	\$260,000	\$260,000	7/3/2017
Fleet			
Office Furniture and Building Improvements 2 Park Avenue	\$87,000	\$0	11/27/2018
Facilities			
Aerotech BPF - New Warehouse Ventilation System & HVAC Garage Door	\$16,000	\$0	10/5/2017

Category	Net Impact on 17/18		Final Approval
	Total Approval	Capital Budget	
HHST Surge Suppression Investigation	\$10,000	\$0	1/15/2018
Equipment			
I&I Reduction (SIR) Program Flow Meters and Related Equipment	\$25,000	\$25,000	4/13/2017
Miscellaneous Equipment Replacement	\$70,000	\$70,000	4/13/2017
Energy			
Dartmouth WWTF: MCC Ventilation Upgrades	\$100,000	\$100,000	11/17/2017
Dartmouth WWTF: Ventilation Air Heat Recovery	\$250,000	\$250,000	6/21/2017
Halifax WWTF: Cogswell Area District Energy System	\$105,000	\$105,000	12/12/2017
Halifax WWTF: MCC Ventilation Upgrades	\$130,000	\$130,000	11/21/2017
Collections			
Percy Street Storm Sewer Replacement	\$20,000	\$0	5/10/2017
Post Construction Consulting - Wastewater System Trenchless Rehabilitation Program	\$6,500	\$0	5/15/2017
Glendale Drive to Sackville Trunk Sewer Wastewater System Upgrade	\$25,000	\$0	11/2/2017
Collection System			
Balsam/Monroe Subdivision Sewer Upgrade	\$165,000	\$165,000	5/9/2017
Corporate Flow Monitoring Program	\$1,000,000	\$1,000,000	5/9/2017
East and Central Region Infrastructure Plan	\$600,000	\$600,000	11/23/2017
Hines Road Rider Sewer Extension	\$50,000	\$50,000	3/8/2017
Integrated Wastewater Projects - Program	\$1,000,000	\$1,000,000	3/21/2017
Lateral Replacements (non-tree roots)	\$1,300,000	\$1,300,000	
Lateral Replacements (tree roots)			
Leiblin Pumping Station Gravity Sewer	\$3,495,000	\$3,495,000	3/30/2017
Manhole Renewals	\$29,000	\$29,000	
Sewer Condition Assessments	\$300,000	\$300,000	5/9/2017
Wastewater Conveyance System Upgrade - Dingle	\$15,000	\$15,000	10/25/2017
Wet Weather Management Program	\$100,000	\$100,000	4/25/2017
Assets			
Deep Wastewater System in West Bedford Block 3-4 to decommission the BluewaterRoad Pumping Station	\$138,000	\$0	1/9/2018
Northwest Arm Sewer Rehabilitation	\$19,493,168	\$19,493,168	3/8/2017
Wastewater Total	\$31,584,668	\$30,946,168	
Stormwater			
Ditches and Culverts			
First Lake Drive Culvert Replacement Project	\$155,000	\$0	4/3/2017
Stormwater Total	\$155,000	\$0	
Stormwater			
Structures			
Ellenville Run Retaining Wall System Replacement	\$1,535,000	\$1,535,000	5/17/2017
Riverwood Drive SW IP	\$213,000	\$0	1/10/2018
Pipes			
Catchbasin Renewals	\$36,000	\$36,000	
Integrated Stormwater Projects Program	\$1,060,000	\$1,060,000	3/21/2017
Lateral Replacements	\$15,000	\$15,000	
Manhole Renewals	\$24,000	\$24,000	
Storm Sewer Condition Assessment	\$150,000	\$150,000	5/9/2017

Category	Net Impact on 17/18	
	Total Approval	Capital Budget
Sullivan's Pond Storm Sewer System Replacement Phase 1	\$9,581,199	\$9,581,199
Ditches and Culverts		
Blue Hill Road (near #77)	\$130,000	\$130,000
Cobequid Road (#510)	\$160,000	\$160,000
Cole Harbour Road (near #1560)	\$210,000	\$210,000
John Cross Drive (near #40)	\$200,000	\$200,000
Kipawa Crescent (near #14) (project did not proceed)	\$213,000	\$213,000
Lucasville Road (near #1419)	\$170,000	\$170,000
Montague Road (near #1044)	\$155,000	\$155,000
Softwind Lane (near #31)	\$105,000	\$105,000
Terradore Lane (near #7)	\$96,000	\$96,000
Waverley Road (near #4132)	\$115,000	\$115,000
Yankeetown Road (near #16)	\$205,000	\$205,000
Collections		
Baker Drive 2016 Stormwater Integrated Project (SWIP)	\$9,700	\$0
Stormwater Total	\$14,382,899	\$14,160,199
Corporate Projects		
(blank)		
GIS Hosting Implementation	\$245,000	\$0
Information Technology		
Desktop Computer Replacement Program	\$290,000	\$290,000
AMI Meter System Upgrades (50/50 w/ww)	\$11,685,000	\$11,685,000
Computerized Maintenance Management System Phase 2	\$2,000,000	\$2,000,000
IT Strategic Plan Additional funding	\$110,000	\$0
Network Infrastructure Upgrades	\$220,000	\$220,000
Fleet		
Fleet Upgrade Program Stormwater	\$280,000	\$280,000
Fleet Upgrade Program Wastewater	\$1,120,000	\$1,120,000
Fleet Upgrade Program Water	\$505,000	\$505,000
Facility		
Heating/Ventilation Upgrades in new phase of 450 Cowie Hill Road	\$100,000	\$100,000
Assets		
Assess AM Software and Tools	\$20,000	\$50,000
Asset Management Program Development	\$150,000	\$150,000
Climate Change Assessment and Policy	\$150,000	\$150,000
Long Term Planning Coordination Strategy (50/50 w/ww)	\$75,000	\$75,000
Host Static Website - Phase 1 (Detailed Requirements Development)	\$200,000	\$0
Corporate Projects Total	\$17,150,000	\$16,625,000
Grand Total	\$99,549,735	\$97,135,535

Item 3-I

01-Feb-18

FINANCIAL REPORT

Consolidated balance of the four operating accounts maintained by the Commission as of:	1-Feb-18	\$46,315,918
Rate of interest on the above balance - Investment Rate of Return	0.128%	\$46,315,918.33

TO: Ray Ritcey, Chair and Members of the Halifax Regional Water Commission Board

SUBMITTED BY: *Original Signed By:*
James Campbell, Communications and PR Coordinator

APPROVED: *Original Signed By:*
Carl Yates, M.A.Sc., P.Eng., General Manager

DATE: January 15, 2018

SUBJECT: **2017 Annual Customer Survey**

INFORMATION REPORT

ORIGIN

Operational Requirement, Corporate Balanced Scorecard (CBS) Performance Measurement

BACKGROUND

Since 2000, Halifax Water has engaged Corporate Research Associates (CRA), a highly respected local research firm, to compile information on a number of topics critical to the operation of the utility as it relates to public confidence and perception. The questions generally focus on customer satisfaction with services and products provided for water and wastewater/stormwater services.

For 2017, Halifax Water commissioned questions in the Fourth Quarter 2017 Halifax Urban Report and the Fourth Quarter 2017 CRA Atlantic Quarterly. Information from the Halifax Urban Report is based on telephone interviews conducted from October 19 to November 14, 2017.

Information from the CRA Atlantic Quarterly is based on telephone interviews conducted from November 9 to December 5, 2017.

The overall results are based on 756 interviews with individuals from the Halifax Regional Municipality population. A sample of 756 respondents would be expected to provide results accurate to within plus or minus 3.6 percentage points in 95 out of 100 samples.

DISCUSSION

The results this year across survey categories continue to remain stable with a high proportion of customers surveyed providing positive ratings for the services that Halifax Water provides. When taken in the context of one of the busiest construction seasons in many years and the inherent disruption that comes with multiple large-scale capital projects, it is good to see continued strong recognition and support from our customers.

Two of our Critical Success Factors as outlined in the Corporate Balanced Scorecard are: **High Quality Drinking Water** and **Service Excellence**. In these two categories the target for organizational indicators is set high. Our target is 85% of customers rating drinking water as either good or excellent, and 90% of customers satisfied or very satisfied with overall service from Halifax Water.

This year's results indicate 85% of customers perceive water quality as good or excellent, down slightly from 88% in 2016. A sub-category surveyed under drinking water quality was Water Safety. In this category, Halifax Water came in at 94% of customers rating our water as safe or very safe, down from a record high 97% in 2016. These consistently high, 90% plus, numbers indicates that customers hold the overall quality, safety, and value of our water in high regard across the region.

For Service Excellence, two categories address this broader topic; Satisfaction with Halifax Water's Products & Services; and Satisfaction with Halifax Water's Overall Service Delivery. In these categories, the results were 92% and 96%, respectively. These figures represent a consistent rating in Satisfaction with Halifax Water's Products & Services, and slight 1% increase in Halifax Water's Overall Service Delivery compared to 2016 results.

We continue to monitor how well our public messaging related to the Pollution Prevention (P2) "Don't Dump This" program is recognized, and if the message is getting through.

Messaging around Pollution Prevention has been underway for over a decade. Though there has been no targeted radio or TV ad campaign for a number of years, the overall theme continues to focus on the issue of floatables/flushables and the proper disposal of a variety of products as they relate mainly to Halifax harbour and to a lesser extent, other receiving waters. Over the last couple of years Halifax Water has taken a new approach to messaging these programs through our YouTube channel with videos such as "Toilet Paper, The One and Only Flushable Wipe", with just over 17,000 views, and "How to Bacon Responsibly", with just over 6,000 views.

The numbers for program recognition continue to remain stable compared to those in 2016. The results for intent of message, “Don’t Dump Certain Products” saw an increase from 70% in 2016 to 74% in 2017. Public recognition and message awareness related to the phrase, “Only Rain in the Storm Drain” dropped slightly from 74% in 2016 to 72%. With at least seven out of ten respondents consistently indicating recognition of the two programs, it is clear the messaging is well understood and resonates with our customers.

Respondents also recognized related secondary campaign messaging in the categories of Pollution Prevention, Help Protect Halifax Harbour, Saving the Environment, and Increase Awareness/Educate People. These results are down overall from 2016 results but still reflect significant recognition and awareness of the primary and secondary messages of harbour water quality related issues, flushables and proper disposal practices.

Customer support for Halifax Water’s management of the wastewater and stormwater assets remained steady. The 2016 figure stood at 72% completely or mostly supporting. For 2017 the figure stands at 72%. Halifax Water’s overall public reputation as stewards of the water, wastewater & stormwater system continues to be strong.

Regarding ePost electronic billing questions, 52% of survey respondents were aware of the service, up marginally from 51% in 2016; 28% of those opted to use the service, down 2% from 2016 results. Of the 28% using the service, 95% completely or mostly agreeing that the service is convenient and easy to use. This figure is down 1% from 2016. These numbers indicate the service is well received, when used, and that there continues to be room to further promote and expand uptake of the ePost electronic billing service.

New for this survey period were questions related to Halifax Water’s new Lead Service Line Replacement Subsidy Program. This program, which came into place in August 2017 following a positive decision from the NSUARB, provides for a 25% subsidy, up to \$2500.00, toward the replacement of a private lead service line. The questions focused on awareness of the program, whether the respondent’s home was constructed prior to 1960, and interest in participating in the program over the next five years. The data collected in this period will form the benchmark for future surveys.

With respect to awareness of the subsidy program, 20% were aware of the program; 47% were very or somewhat interested in participating; and 17% had homes constructed prior to 1960.

Halifax Water will be launching an enhanced Lead Service Line Replacement Program public information campaign this spring. The baseline data from the 2017 survey will help the utility gauge the success of the awareness program.

With the significant challenges posed by the multiple large-scale infrastructure projects undertaken; changes in stormwater rates and billing; and geosmin during this survey period, the continued customer support reflects well as we continue to roll out long term

ITEM # 4-I

HRWC Board

January 25, 2018

programs and projects. These include the updated Integrated Resource Plan, Regional Development Charge, Lead Service Line Replacement Program, Advance Metering Infrastructure(AMI), Lake Major Dam Replacement, Distribution System Renewal Program, Kearney Lake Road Trunk Sewer Upgrades and Ellenvale Run Retaining Wall System Replacement, to name a few. Continued targeted public messaging with our “Straight From the Source” branding will focus on the infrastructure deficit, regulatory compliance, asset renewal, system growth, protection of the environment and the positive impact our services have in the everyday lives of the residents we serve. This will help our customers appreciate the value of water, wastewater and stormwater services.

For the benefit of all staff, the survey has been placed on the Halifax Water Intranet, and hard copies distributed to all work locations.

Staff will be encouraged to take the time to read the survey results and provide any comments or suggestions they might have.

ATTACHMENT

CRA (Corporate Research Associates) 2017 Quality of Service Study, Final Report,
December 2017

Report Prepared by: *Original Signed By:*

James Campbell, Communications and PR Coordinator, 902-490-4604

2017 Quality of Service Study

Final Report

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Halifax Water

Prepared for:

Halifax Water

December 2017



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Introduction

Corporate Research Associates, Inc. (CRA) is pleased to present Halifax Water with the results of the **2017 Quality of Service Study**. Halifax Water commissioned questions on the Fourth Quarter 2017 *Halifax Urban Report* and the Fourth Quarter 2017 *CRA Atlantic Quarterly*[®]. These syndicated products provide information on consumer trends and public opinion on pivotal economic, political, social, and other issues across the region on a quarterly basis.

The total sample size for questions asked on both the *Halifax Urban Report* and the *Atlantic Quarterly*[®] is 756. A sample of 756 residents can be expected to yield an overall margin of sampling error of ± 3.6 percentage points in 95 out of 100 samples. Of these 756 residents, 583 receive their household water from Halifax Water. A sample of 583 Halifax Water customers can be expected to yield an overall margin of sampling error of ± 4.1 percentage points in 95 out of 100 samples. Due to a logistical error, questions W33, W34, and W35 were asked of 692 residents, which is expected to yield an overall margin of sampling error of ± 3.6 percentage points in 95 out of 100 samples.

A copy of the questionnaire is appended (Appendix A), as well as comprehensive banner tables (Appendix B) that present the results for each question by key demographic subgroups. The tables are noted by number throughout the report for easy reference. Unless otherwise stated, all results in this report are expressed as a percentage.



Executive Summary

Overall, results for the **2017 Quality of Service Study** indicate that Halifax Water continues to perform admirably across a multitude of categories, with a high proportion of the public offering positive ratings of the service provided. Most Halifax Water customers believe their water is safe, and continue to offer positive ratings of the quality of water they are provided, as quality ratings are consistent with results from 2016.

In terms of specific aspects of the service Halifax Water provides, ratings for *overall delivery of service* remain high and consistent compared with last year, as are ratings for key service indicators. Specifically, ratings for *staff accessibility*, *staff promptness*, *ability to answer questions*, and *politeness* are similar to one year ago. In addition, perceptions catalogued via Halifax Water's Customer Satisfaction Index, which provides an overall assessment of service performance among Halifax Water customers and is calculated based on customers' ratings on six service-focused questions, remain high.

In addition, a strong majority of Halifax residents continue to support Halifax Water managing the wastewater and stormwater systems. The Internet continues to be the preferred method to access information related to Halifax Water's pollution prevention, water, wastewater, and stormwater programs.

There continues to be a lack of confidence among a majority of the Halifax population in terms of the safety of water in the Halifax Harbour. Specifically, one in two residents are not confident that the water quality in the Halifax harbor is safe for recreational use.

Residents lack awareness of their primary source of their municipal tap water. Meanwhile, close to one in two residents report using a water filter or other home water treatment device.

Once again, Halifax Water customers were asked their opinion on a potential increase in water rates to treat odour and taste issues that are not a health concern, and results indicate that only four in ten customers support this measure. That said, on average, customers who support such an initiative are willing to spend \$59 extra every year for this service. The level of support for a rate increase to treat odour or taste issues remains on par with results from one year ago, however, supportive customers would be willing to pay more for this service, compared with last year.

Customers were again asked about ePost, Halifax Water's electronic billing service, and results reveal that, with little change in awareness or uptake, an opportunity continues to exist with respect to this service. Consistent with last year, one-half of customers are aware of ePost, while a minority currently use it to receive their bills electronically. Of note, those who use ePost find it convenient and easy to use. Among those who are aware of the service but are not currently using it, one-third are interested in receiving their water bills through an email notification.



This year, residents were asked about the subsidy program introduced in August by Halifax Water to assist residential customers with replacing their lead water service lines that connect the water main in the street to a customer's home. One in five residents are aware of this program. Among the minority with homes constructed prior to the 1960s, almost one-half indicated interest in using the subsidy program within the next few years.

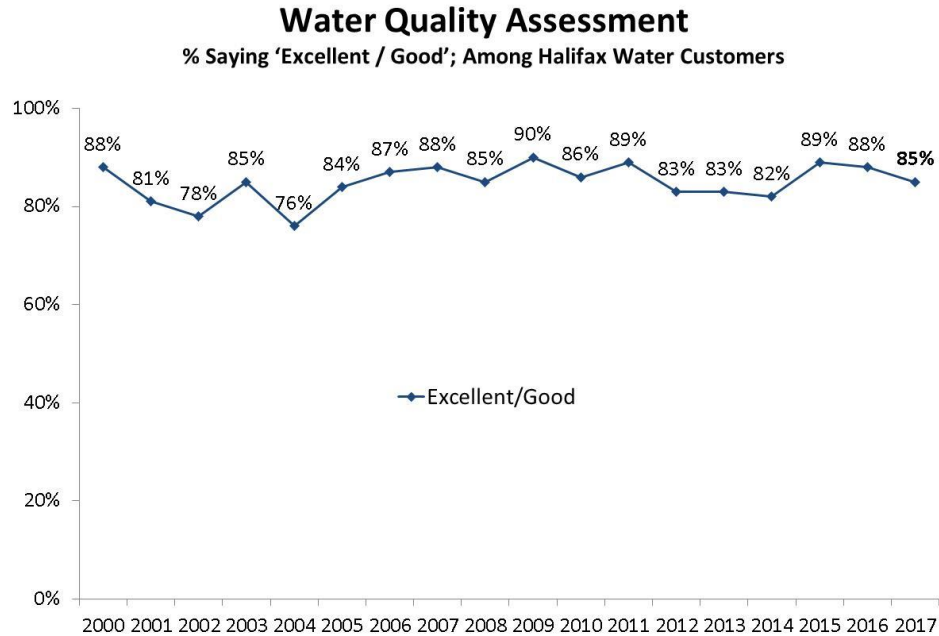
Overall, awareness level of the 'Don't Dump This' information campaign continues to exhibit a downward trend and remains at its lowest level since tracking began. Meanwhile, recall of the phrase 'Only Rain in the Storm Drain' is stable compared with last year, although much lower than the peak levels observed historically.



Detailed Analysis

Water Issues

The number of Halifax Water customers who rate their water quality as *excellent* or *good* is fairly consistent with 2016 findings. Specifically, just over eight in ten (84%, compared with 88%) residents offer a favourable assessment of their water quality. (Table W1)



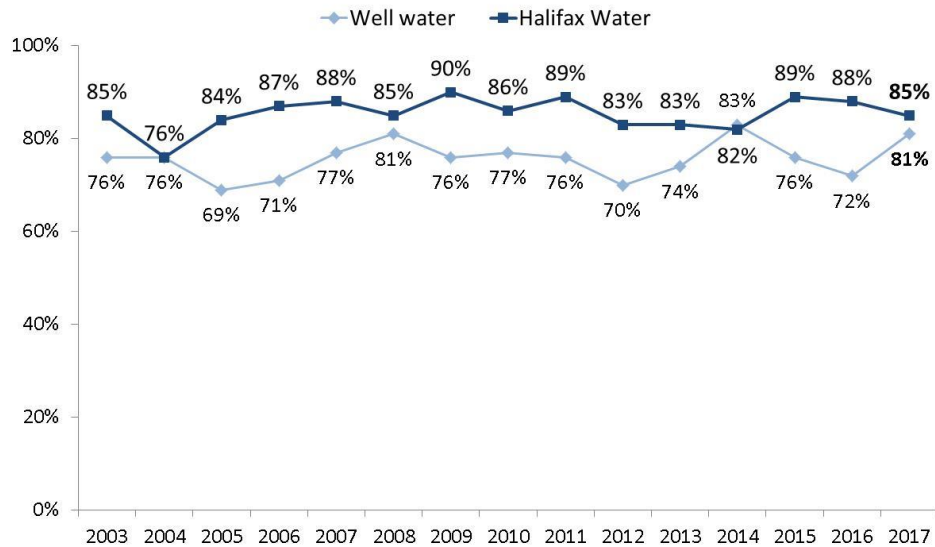
Q.W1: Overall, how would you rate the quality of water you receive in your household? Would you say it is excellent, good, only fair, or poor? (n=583)

Water quality ratings are consistent regionally, while the likelihood of assigning an *excellent* rating is more likely among Nova Scotians with a household income of \$50K or higher.



Halifax Water customers are currently just as likely as those with a well to rate the quality of their water as *excellent* or *good*. The proportion of residents with a well rating their water as *excellent* or *good* has improved compared with a year ago, while ratings among Halifax Water customers are stable.

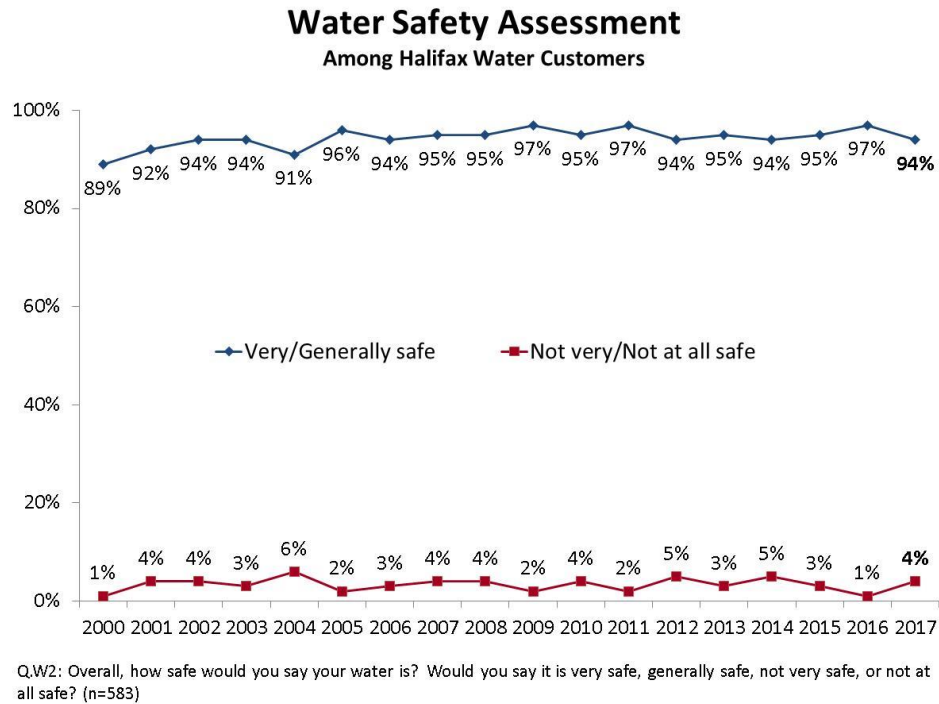
Water Safety Assessment Excellent/Good



Q.W1: Overall, how would you rate the quality of water you receive in your household? Would you say it is excellent, good, only fair, or poor? (Halifax Water n=583, Well n=154) *Note: In 2008, HRWC became Halifax Water.*



The vast majority of Halifax Water customers perceive their water as *very* or *generally safe*, while very few rate their water as *not very* or *not at all safe*, similar to previous years. Regionally there is little difference in opinion, however across the population, residents with household incomes of \$50K or below are less likely to perceive their water as safe. (Table W2)



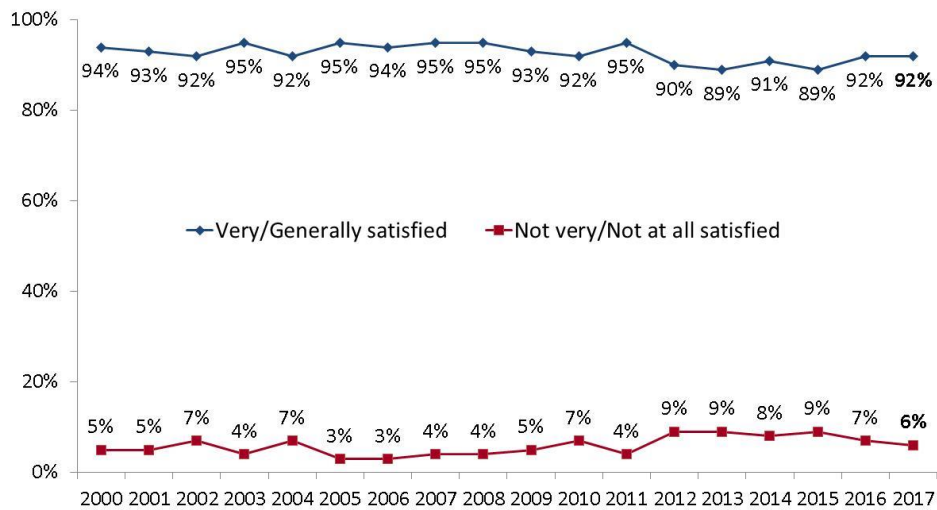
Among the small number of Halifax Water customers who believe their water is unsafe (n=28), concern with **chemicals, bad taste, odour, discolouration, and impurities** are top mentions. (Table W3)



Customer Satisfaction

The vast majority of customers are satisfied with the products and services they receive from Halifax Water, similar to previous findings. Specifically, nine in ten (92%, unchanged) customers report being *very or generally satisfied* with the products and services received from Halifax Water. Across the region, customers in the City of Halifax and Dartmouth and surrounding areas are somewhat more likely to report satisfaction with Halifax Water products and services than customers in the County of Halifax. (Table W5)

Satisfaction with Halifax Water’s Products and Services
Among Halifax Water Customers

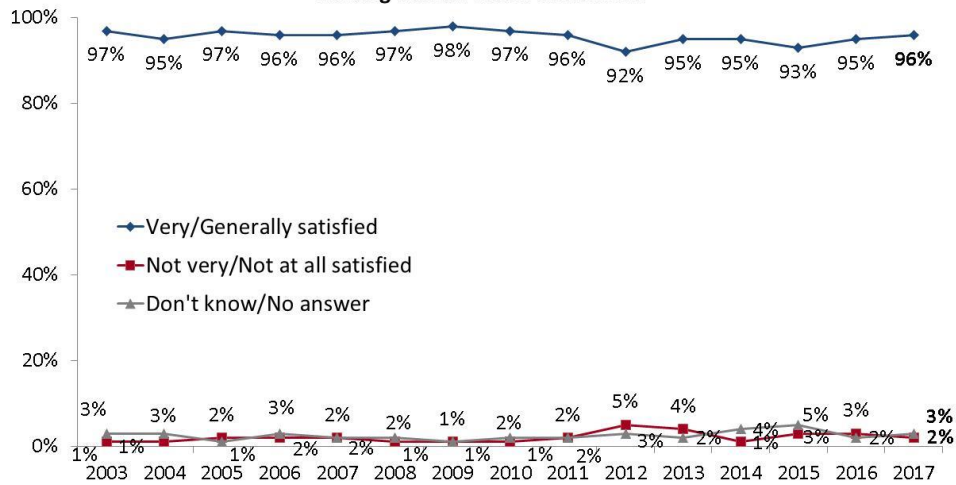


Q.W5: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] All things considered, would you say you are very satisfied, generally satisfied, not very satisfied, or not at all satisfied with the products and services you receive from Halifax Water? (n=583)



The number of customers satisfied with Halifax Water’s **overall delivery of service** remains widespread and is stable compared with previous findings. Specifically, 96 percent of residents offer a rating of *very* or *generally satisfied*, compared with 95 percent one year ago. Satisfaction in this regard is widespread regionally and across the population. (Table W6a)

Satisfaction with Halifax Water’s Overall Service Delivery Among Halifax Water Customers



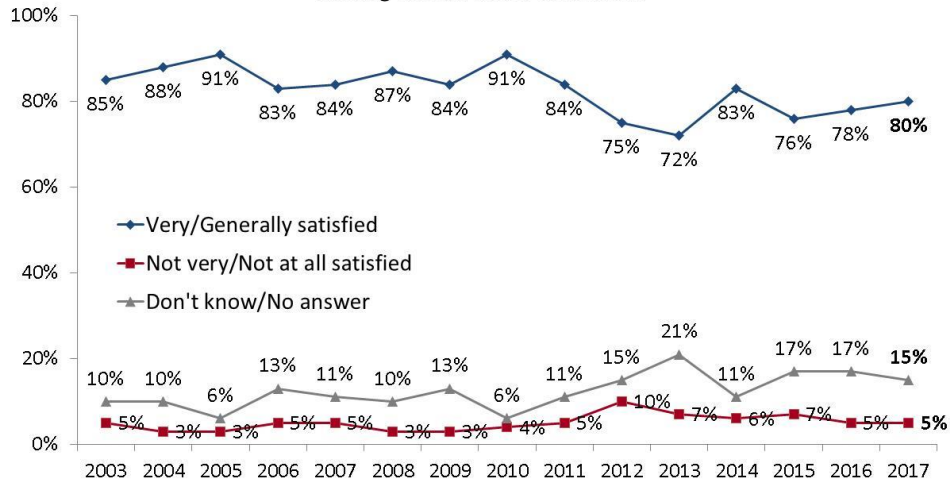
Q.W6a: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] For each of the following, please tell me whether you are very satisfied, generally satisfied, not very satisfied, or not at all satisfied with the service you have received from Halifax Water: Overall service delivery – How well Halifax Water delivers its services to you? (n=574)
Note: Responses for 'Have not used this Halifax Water service' have been removed from this table.



Consistent with results from last year, a large majority of customers are satisfied with Halifax Water’s staff **accessibility**. Specifically, eight in ten (80%, compared with 78%) customers report being *very or generally satisfied* with the accessibility of Halifax Water staff. Satisfaction with staff accessibility is consistent across the region, however, there is a modest decline in satisfaction with age, due to an increased propensity to not provide a definite response to the question with age. (Table W6b)

Satisfaction with Halifax Water’s Staff Accessibility

Among Halifax Water Customers



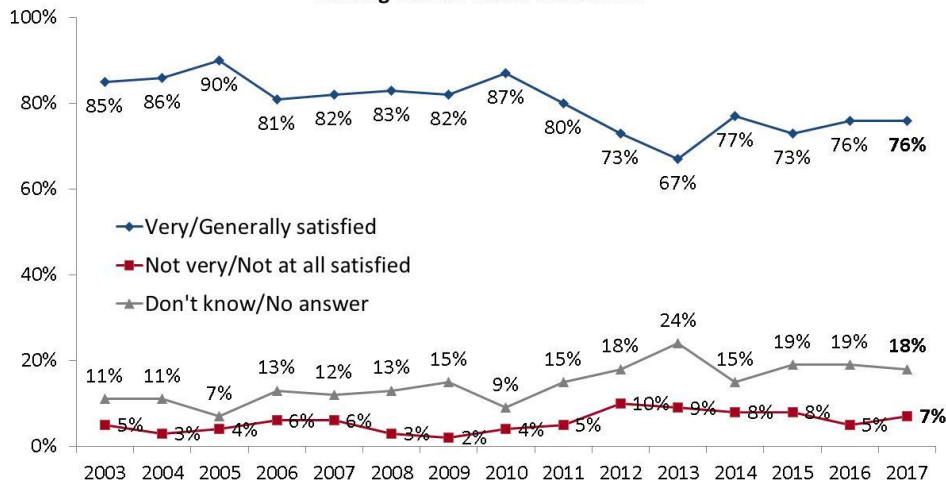
Q.W6b: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] For each of the following, please tell me whether you are very satisfied, generally satisfied, not very satisfied, or not at all satisfied with the service you have received from Halifax Water: Accessibility – How easy it was to reach Halifax Water staff when you needed to? (n=385)
Note: Responses for 'Have not used this Halifax Water service' have been removed from this table.



Similar to findings from 2016, a large majority of customers remain satisfied with the **promptness** of Halifax Water staff (i.e., how quickly staff were able to respond to questions). Specifically, three-quarters (76%, unchanged) of customers are *very or generally satisfied* with the promptness of staff at the organization. Ratings in this regard are generally positive across the region and population. (Table W6c)

Satisfaction with Halifax Water's Staff Promptness

Among Halifax Water Customers

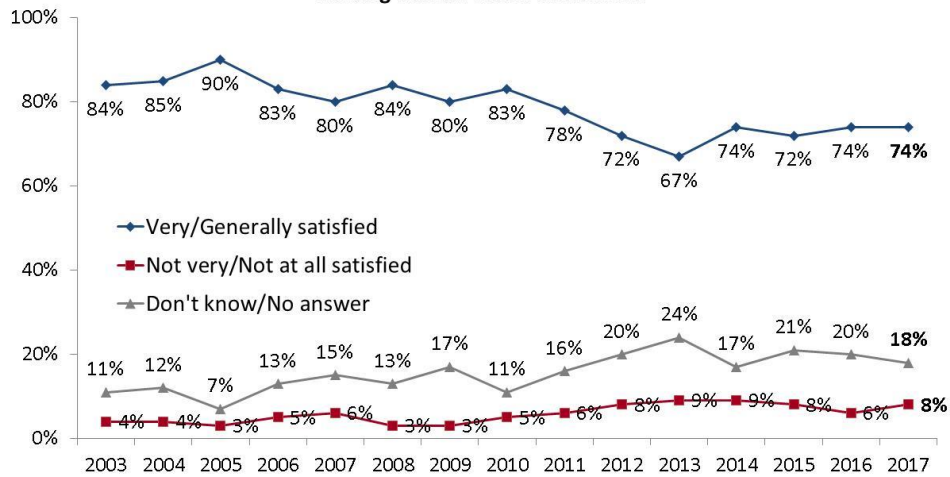


Q.W6c: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] For each of the following, please tell me whether you are very satisfied, generally satisfied, not very satisfied, or not at all satisfied with the service you have received from Halifax Water: Promptness – How quickly Halifax Water staff were able to respond to your questions? (n=383)
Note: Responses for 'Have not used this Halifax Water service' have been removed from this table.



Consistent with results from one year ago, a majority of customers continue to be satisfied with Halifax Water’s **ability to answer questions**. Specifically, three-quarters (74%, unchanged) of customers offer a rating of *very* or *generally satisfied* in this regard. Ratings are generally consistent across the region and population. (Table W6d)

Satisfaction with Halifax Water’s Ability to Answer Questions Among Halifax Water Customers

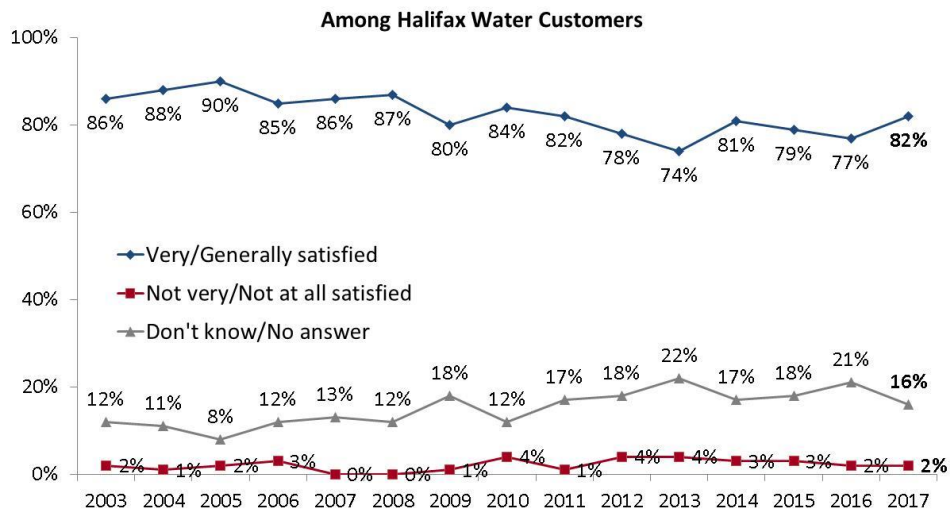


Q.W6d: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] For each of the following, please tell me whether you are very satisfied, generally satisfied, not very satisfied, or not at all satisfied with the service you have received from Halifax Water: Ability to answer questions – How well Halifax Water answers your questions? (n=391)
Note: Responses for 'Have not used this Halifax Water service' have been removed from this table.



Similar to findings obtained last year, a majority of Halifax Water customers remain satisfied with the **politeness** of Halifax Water staff, with eight in ten (82%, compared with 77%) customers offering a rating of *very* or *generally satisfied*. Satisfaction with politeness of staff is lower among those in Dartmouth and its surrounding area (with the percentage of ‘don’t know/no answer’ elevated in this area), while across the population, findings are generally consistent concerning satisfaction with Halifax Water staff’s politeness. (Table W6e)

Satisfaction with Halifax Water’s Politeness



Q.W6e: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] For each of the following, please tell me whether you are very satisfied, generally satisfied, not very satisfied, or not at all satisfied with the service you have received from Halifax Water: Politeness – The politeness of Halifax Water staff? (n=414)

Note: Responses for 'Have not used this Halifax Water service' have been removed from this table.



Customer Service Index

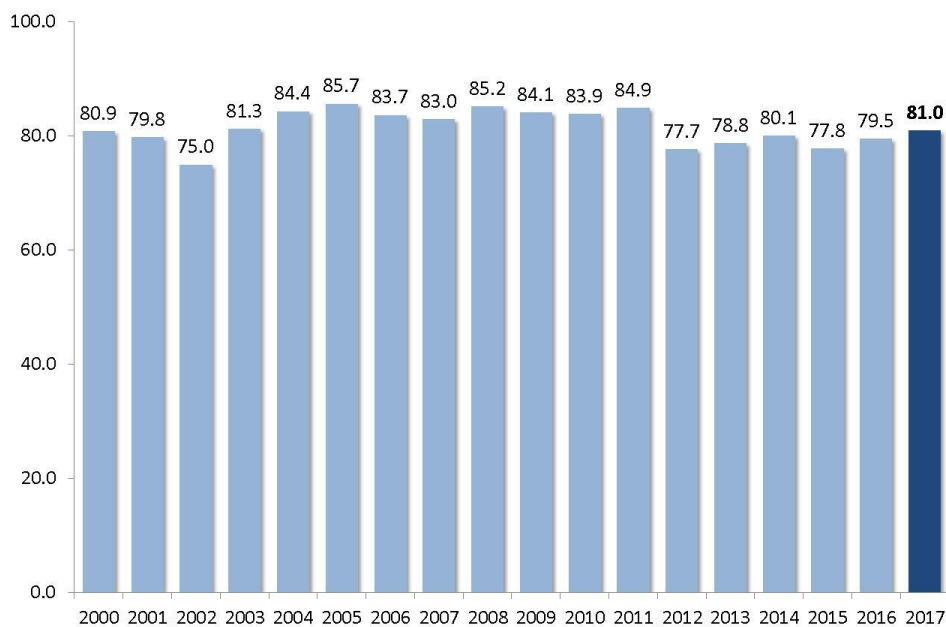
Once again, CRA is pleased to present the Halifax Water Customer Service Index (CSI). To provide an overall assessment of service performance, the CSI was calculated based on customers’ ratings on six service-focused questions, namely:

- Overall satisfaction with the Halifax Water (QW5);
- Satisfaction with overall service delivery (QW6a);
- Satisfaction with accessibility of Halifax Water staff (QW6b);
- Satisfaction with promptness of Halifax Water in responding to questions (QW6c);
- Satisfaction with Halifax Water’s ability to answer questions (QW6d); and
- Satisfaction with the politeness of Halifax Water staff (QW6e).

The Index contains only those Halifax residents who receive Halifax Water products and services. In calculating Index scores for each year, ratings on these six questions were averaged and transformed into a scale ranging from a low of 0 to a high of 100. Thus, the maximum possible score on the CSI is 100, while the minimum is 0. Any question for which a customer did not provide a response was eliminated from the calculation, with the Index score for that customer being calculated on the remaining questions.

The Customer Service Index is 81.0 this year, which is a marginal increase from one year ago. County of Halifax customers have a slightly lower index score compared with others. Across the population, customers under the age of 35 years have a slightly higher index score than those older.

Customer Service Index



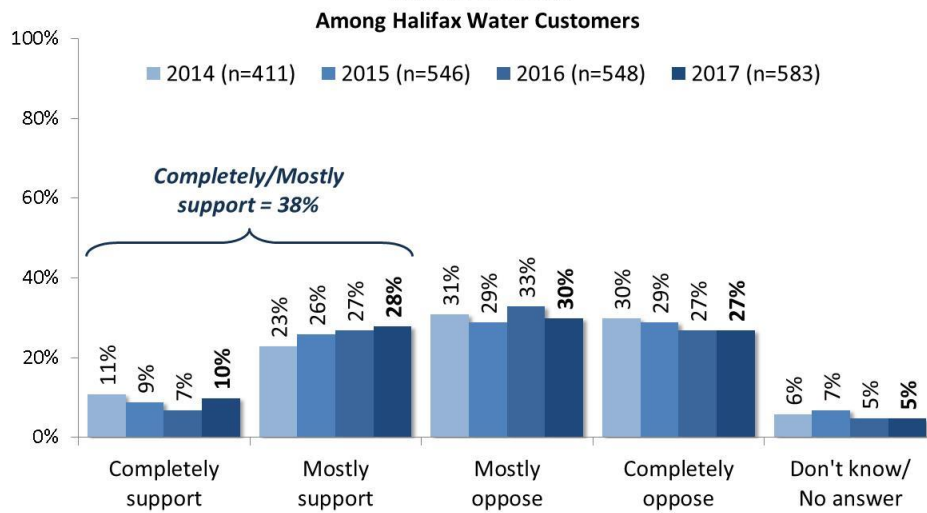
*Please note: Results prior to 2011 only include residents who own their home.
In 2011, the index calculation includes all Halifax Water residents.*



Odour and Taste Concerns

Once again this year, Halifax Water customers were asked whether they would support or oppose an increase in water rates to treat odour or taste issues that are not a health concern. Consistent with last year, results indicate a majority continue to oppose the idea of increasing water rates for this purpose, with nearly six in ten (57%, compared with 60%) opposing the rate increase, and four in ten (38%, compared with 34%) in support. (Table W29)

Opinion of Increasing Water Rates to Treat Odour or Taste Issues



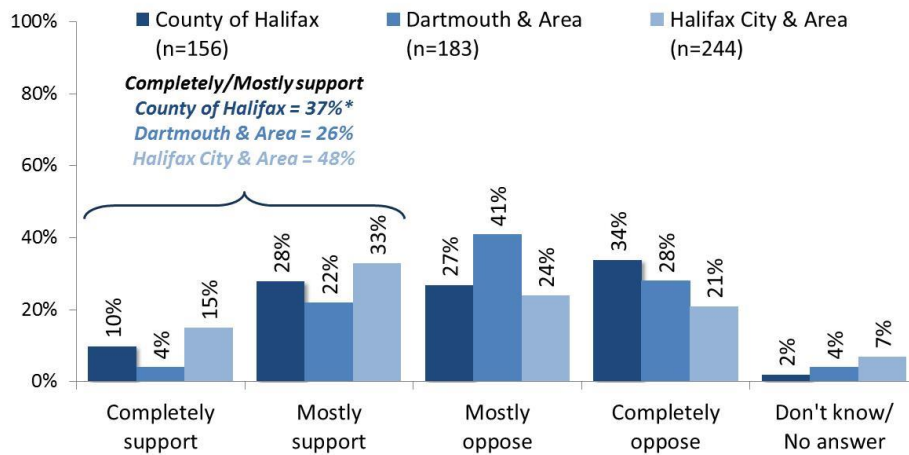
Q.W29: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] The water supplied by Halifax Water meets or exceeds Canadian Drinking Water Quality Guidelines. A small number of customers have noted odour or taste issues that are not health concerns. All things considered, would you completely support, mostly support, mostly oppose, or completely oppose an increase in your water rates to treat odour or taste issues that are not health concerns?



Regionally, customers in Halifax City and its surrounding area are more likely to support this increase in water rates, followed by customers in the County of Halifax, while customers in the Dartmouth and surrounding area are less likely to support an increase. Meanwhile, across the population, opposition is lowest among those with household incomes less than \$50K and highest among those with household incomes between \$50K and \$100K. (Table W29)

Opinion of Increasing Water Rates to Treat Odour or Taste Issues

Among Halifax Water Customers



Q.W29: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] The water supplied by Halifax Water meets or exceeds Canadian Drinking Water Quality Guidelines. A small number of customers have noted odour or taste issues that are not health concerns. All things considered, would you completely support, mostly support, mostly oppose, or completely oppose an increase in your water rates to treat odour or taste issues that are not health concerns?

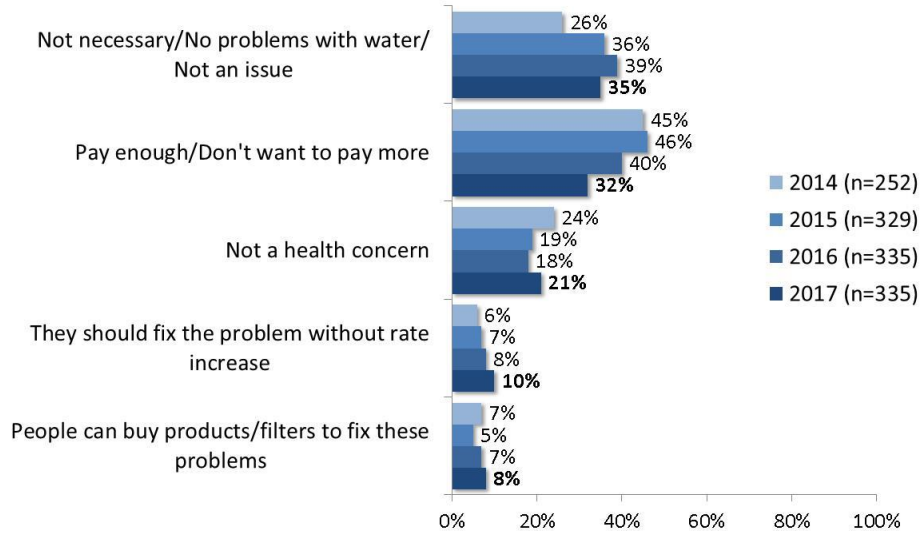
*Due to rounding.



Among those who oppose an increase in water rates to treat odour or taste issues, one-third of customers mention that **it is not necessary** and a similar number of customers mention **not wanting to pay more** as reasons to oppose a rate increase. Meanwhile, two in ten oppose a rate increase because it is **not a health concern**, while fewer mention that **Halifax Water should fix the problem without a rate increase** or that **people can buy filters to fix this problem**. Mentions of **not wanting to pay more** have been declining since 2015. (Table W30b)

Oppose an Increase in Water Rates to Treat Odour or Taste Issues

Key Unaided Mentions, Among Halifax Water Customers Who Oppose an Increase



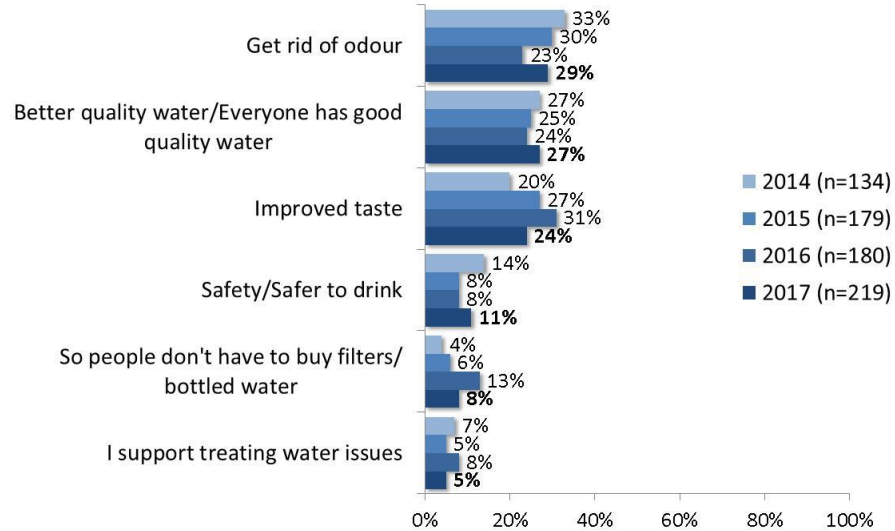
Q.W30b: [ASK IF 'OPPOSE' IN Q.W29] Why do you mostly oppose or completely oppose an increase in your water rates to treat odour or taste issues that are not health concerns? Probe: Any other reasons?



Customers offer a variety of reasons why they support an increase in their water rates to treat odour or taste issues that are not a health concern. Three in ten customers mention **getting rid of odour**, while one-quarter indicate **better quality water** or **improved taste** as reasons to support a rate increase. Other mentions by fewer customers include **safety, reduction of filters or bottled water**, and **general support of water treatment issues**. (Table W30a)

Support an Increase in Water Rates to Treat Odour or Taste Issues

Key Unaided Mentions, Among Halifax Water Customers Who Support an Increase

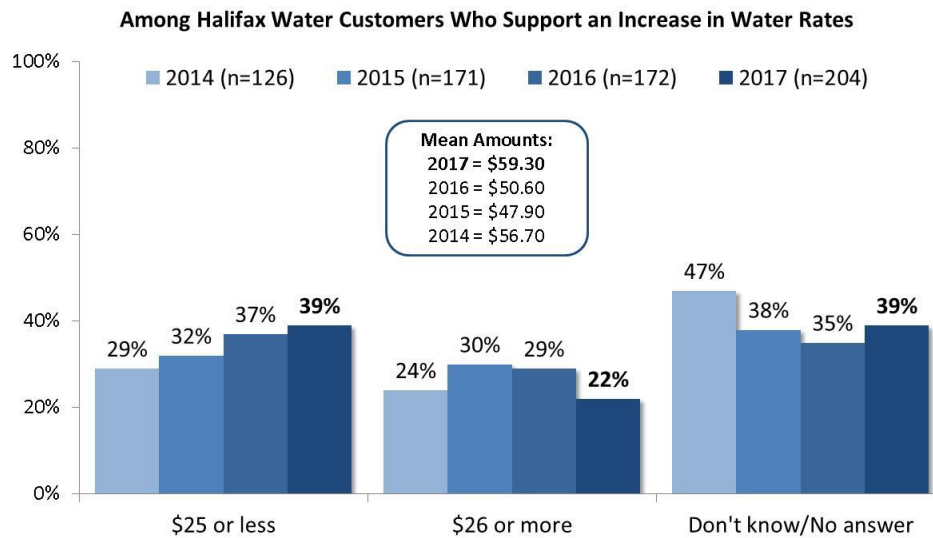


Q.W30a: [ASK IF 'SUPPORT' IN Q.W29] Why do you completely support or mostly support an increase in your water rates to treat odour or taste issues that are not health concerns? Probe: Any other reasons?



Among those who support an increase in rates to improve water odour and taste, the average amount they are willing to pay has increased this year. On average, customers are willing to spend \$59.30 (up from \$50.60) extra every year for this service. However, four in ten customers indicate that they would pay \$25 or less annually, which is stable compared with a year ago, and two in ten report that they would pay more, which has marginally declined from 2016. Furthermore, four in ten customers do not know how much they would be willing to pay or do not have an answer. (Table W31)

Amount Willing to Pay Annually to Improve the Odour and Taste of Your Water

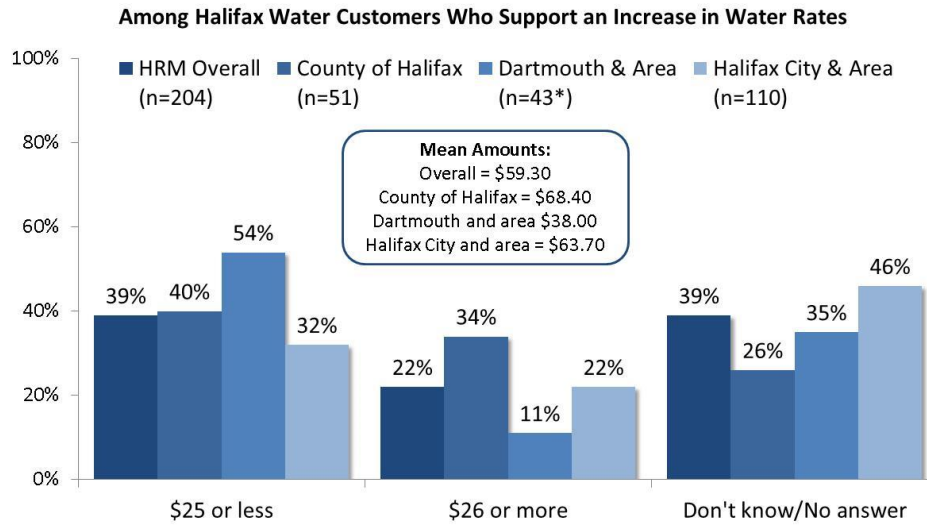


Q.W31: [ASK IF 'COMPLETELY/MOSTLY SUPPORT' IN Q.W29] How much extra would you be willing to pay annually on your bill to improve the odour and taste of your water? Please be as specific as possible and answer to the nearest dollar amount. *Note: Responses of 'Don't know/No answer' are excluded from calculation of the mean.*



Regionally, customers from Dartmouth and surrounding area are willing to pay much less on average than customers elsewhere. Meanwhile, across the population, males and younger customers are willing to pay more on average to improve the odour and taste of their water. (Table W31)

Amount Willing to Pay Annually to Improve the Odour and Taste of Your Water



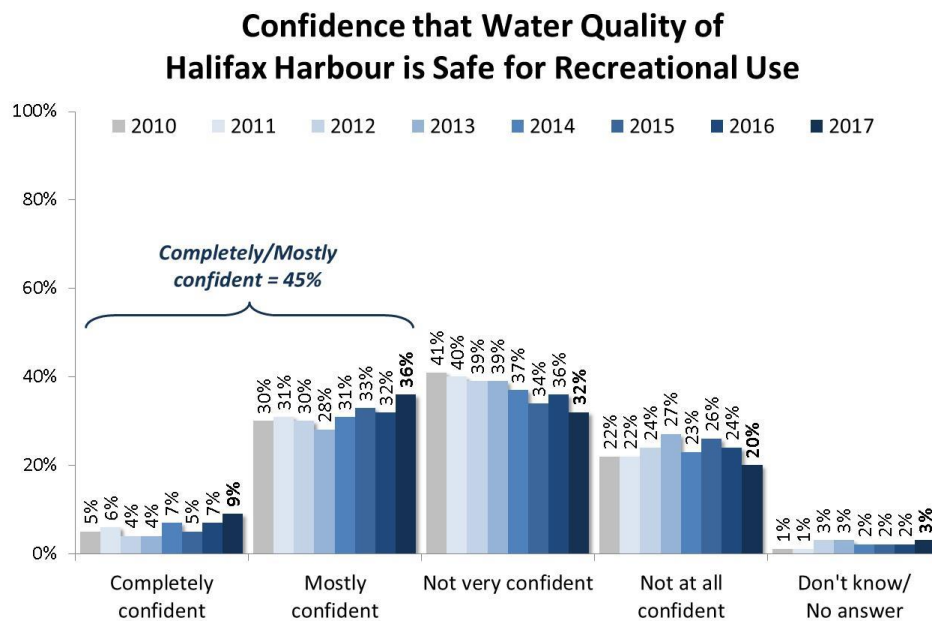
Q.W31: [ASK IF 'COMPLETELY/MOSTLY SUPPORT' IN Q.W29] How much extra would you be willing to pay annually on your bill to improve the odour and taste of your water? Please be as specific as possible and answer to the nearest dollar amount.

*Note: Responses of 'Don't know/No answer' are excluded from calculation of the mean. *Caution: Small sample size.*



Safety of Halifax Harbour for Recreation

There continues to be a lack of confidence among the population in terms of the safety of water in Halifax Harbour. That said, confidence has improved over the past year. Specifically, one-half (52%, down from 60%) of residents indicate that they are *not very* or *not at all confident* in the safety of water in the harbor for recreational activities, while over four in ten (45%, up from 39%) residents indicate that they are *completely* or *mostly confident*. While results are generally divided regionally and across the population, it is of note that Halifax Water customers are modestly more confident in this regard than non-customers. (Table W28)



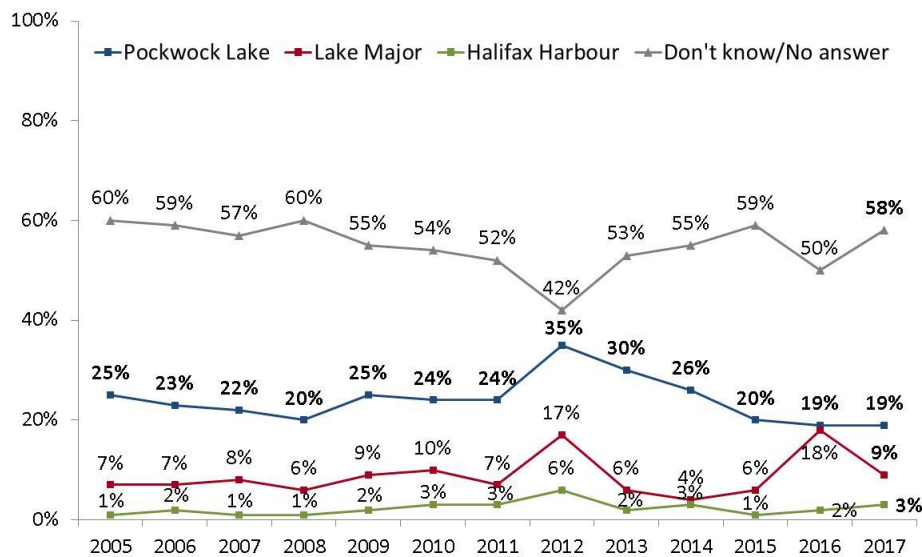
Q.W28: Harbour water samples indicate that the water is safe for recreational activities such as swimming and boating. How confident are you that the water quality of Halifax Harbour is safe for recreational activities? Are you completely confident, mostly confident, not very confident, or not at all confident? (n=756) *Note: Question wording differs slightly year-over-year.*



Water Source

There continues to be uncertainty with regards to Halifax residents' source of tap water, even more so than last year. Specifically, six in ten (58%, up from 50% last year) of Halifax Water customers cannot name the source of their tap water. Two in ten customers identify Pockwock Lake as the primary source, and one in ten identify Lake Major, while a small number mention other sources. Across the population, women, younger customers, and those with lower household incomes are more likely than others to be unsure of the source of their tap water. (Table W9)

Primary Source of Municipal Tap Water
Total Top Mentions, Among Halifax Water Customers

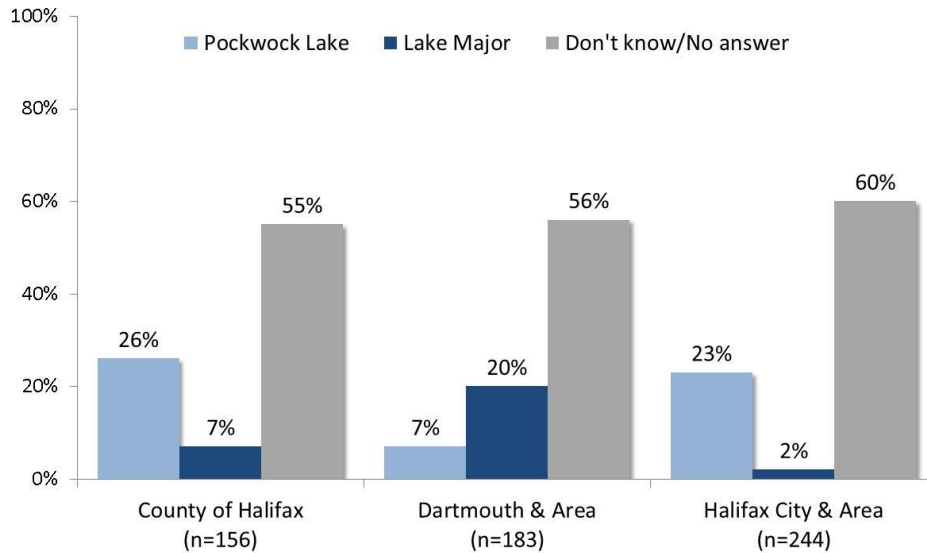


Q.W9: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] To the best of your knowledge, which body of water is the primary source of your tap water supplied by Halifax Water? Probe once: Any other sources? (n=583)



The number of customers who are unsure of their primary tap water source is fairly consistent across the region. Those in Dartmouth and its surrounding area are more likely than others in the region to name Lake Major as the primary source of their tap water, and least likely to name Pockwock Lake than others in the region. (Table W9)

Primary Source of Municipal Tap Water Key Mentions by Area, Among Halifax Water Customers



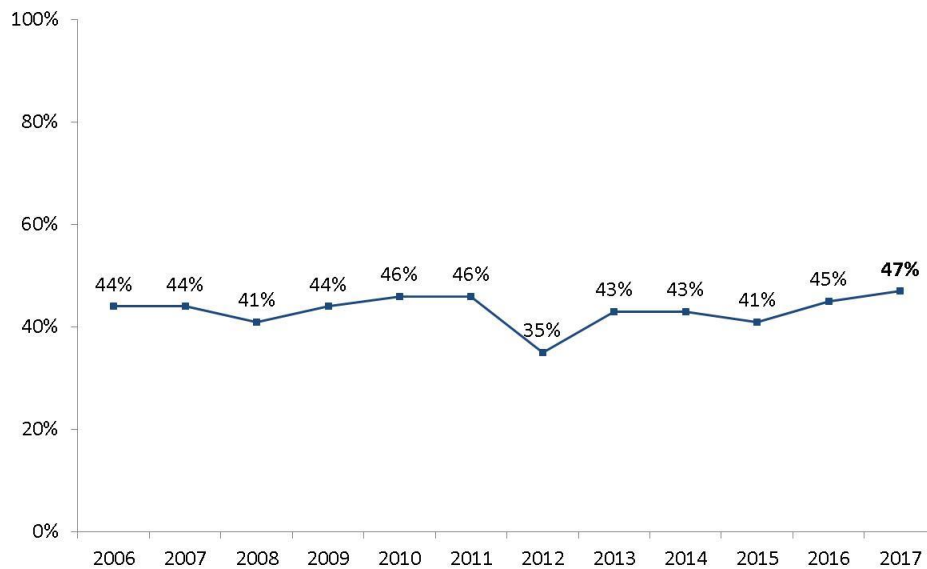
Q.W9: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] To the best of your knowledge, which body of water is the primary source of your tap water supplied by Halifax Water? Probe once: Any other sources?



Water Filter Use

Consistent with results from last year, nearly one-half of Halifax residents use a water filter or home water treatment device. Across the region, residents living in the County of Halifax are more likely to use a water filter or home water treatment device. Meanwhile, residents on a well (76%) are much more likely than Halifax Water customers (39%) to use a water filtration device. (Table W17a)

Use a Water Filter or Other Home Water Treatment Device?
% Saying "Yes"



Q.W17a: Do you use a water filter or other home water treatment device? (n=400)

In terms of the type of water filter or home treatment device, one-third of Halifax residents who use a water filter report using a **pitcher with a water filter**, while one in seven use a **water filter on their tap**. Approximately one in ten use a **fridge filter, water softener system** or **osmosis**. Other methods are used by few residents. Results are similar to previous findings with the exception of mentions of a pitcher with water filter, which have increased this year. (Table W17b)



Type of Water Filter or Other Home Treatment Device Used												
Key Mentions; n=183												
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Pitcher with water filter	54%	42%	43%	33%	33%	37%	21%	44%	31%	44%	25%	34%
Water filter on tap	21%	19%	19%	18%	16%	10%	33%	14%	16%	9%	11%	14%
Fridge filter/ Part of refrigerator	--	2%	3%	6%	10%	10%	15%	10%	14%	13%	12%	12%
Water softener system	5%	1%	7%	12%	11%	9%	9%	10%	18%	12%	18%	11%
Osmosis	--	--	2%	5%	5%	2%	4%	2%	7%	8%	6%	8%

W17b: Total Mentions

Halifax residents offer a number of reasons why they use a water filter or home treatment device. One-third do so to **improve taste**, while three in ten use such devices **to remove chemicals**, and two in ten report having **concerns about water quality**. All other reasons are mentioned by fewer than one in ten residents. (Table W17c)

Why Use a Water Filter or Other Home Treatment Device										
Key Mentions; n=183										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Improved taste	33%	32%	33%	31%	36%	36%	25%	24%	33%	32%
To remove chemicals	23%	24%	32%	21%	27%	27%	33%	26%	25%	28%
Concerns about water quality	18%	29%	20%	25%	23%	19%	20%	26%	12%	19%
Was given to me/Received as a gift/ Came with the fridge/house	4%	4%	9%	6%	3%	4%	6%	10%	7%	7%
To remove other particles/impurities	8%	2%	5%	9%	6%	4%	3%	4%	6%	7%
To remove bacteria	8%	7%	8%	8%	23%	9%	8%	6%	5%	6%

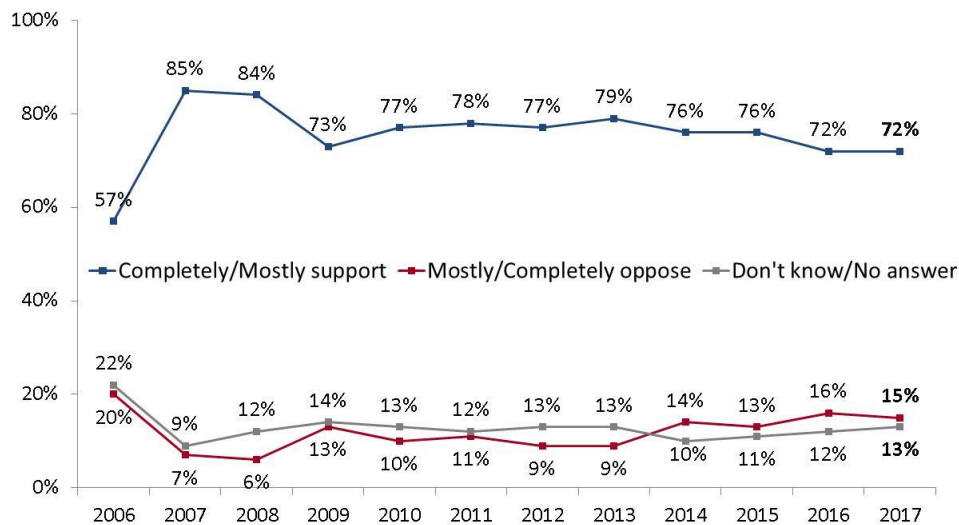
W17c: Total Mentions



Stormwater and Wastewater Systems

Consistent with findings from last year, there continues to be support for Halifax Water managing the wastewater and stormwater systems, with seven in ten (72%, unchanged) Halifax residents expressing support toward Halifax Water keeping these responsibilities. Regionally, residents in Halifax County are less supportive of this measure, while, across the population, younger residents are more likely to be in support. Of particular note, Halifax Water customers (79%) are much more likely than those on a well (46%) to support this measure. (Table W19)

Support for Halifax Water Management of Wastewater and Stormwater Systems

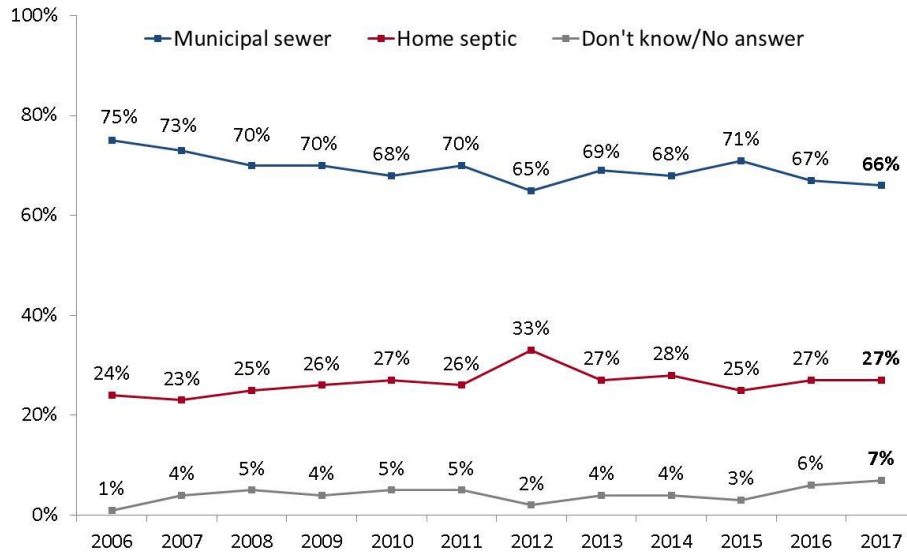


Q.W19: As previously mentioned, Halifax Water is responsible for the operation of municipal wastewater and stormwater systems, in addition to management of water. Do you completely support, mostly support, mostly oppose, or completely oppose Halifax Water managing the wastewater and stormwater systems? (n=400)



Two-thirds of Halifax residents are on municipal sewer, while one-quarter are on a home septic system. Results are consistent with previous findings. (Table 20)

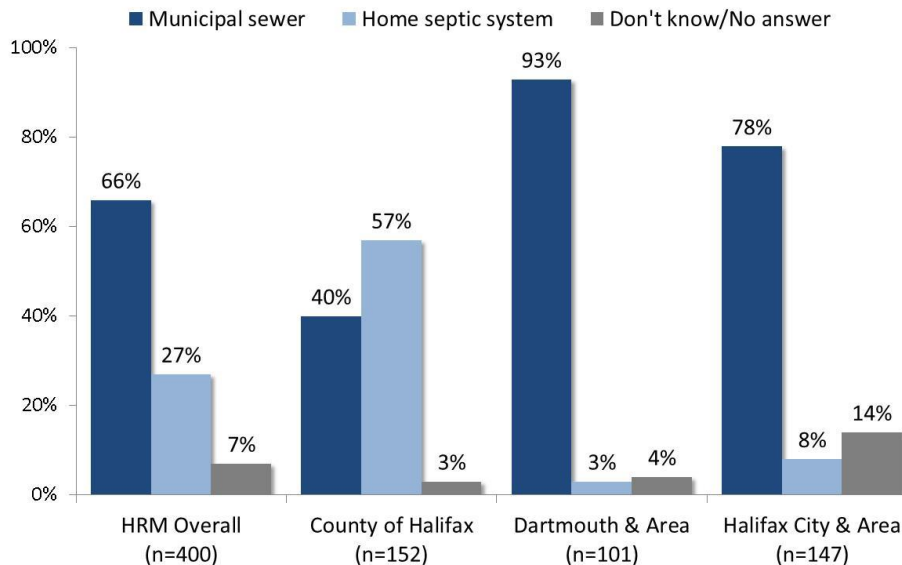
Home Septic or Municipal Sewer



Q.W20: Do you have a home septic system or are you on municipal sewer? (n=400)

Across the region, residents of Halifax County (outside of Halifax and Dartmouth) are much more likely to be on a home septic system, while those in Halifax city and Dartmouth are more likely to be on municipal sewer. Results are consistent with previous findings.

Home Septic or Municipal Sewer

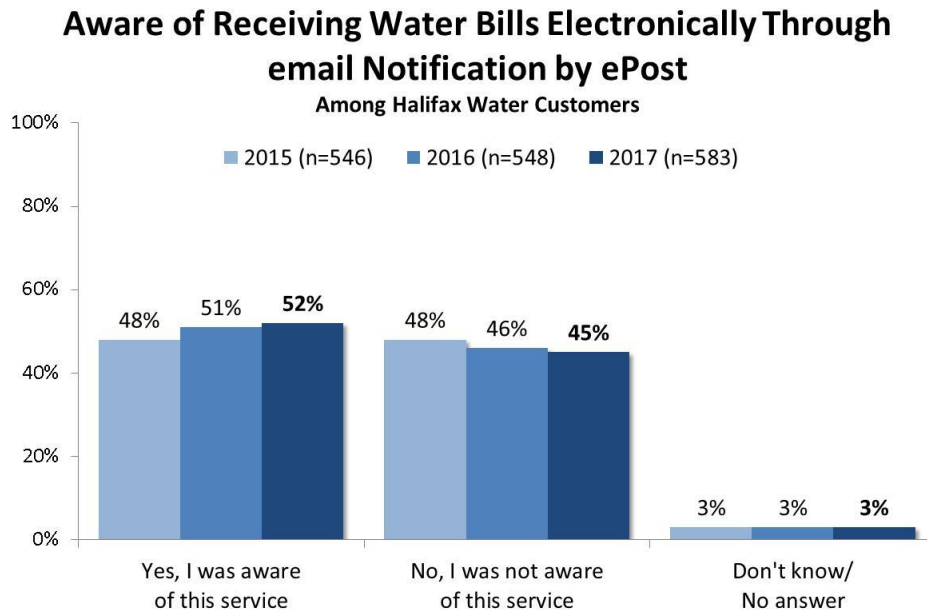


Q.W20: [HALIFAX URBAN ONLY] Do you have a home septic system or are you on municipal sewer?



Electronic Billing

Consistent with findings from last year, one-half of Halifax Water customers are aware that Halifax Water provides customers with the option of receiving their bills electronically through an email notification by ePost, with the highest level of awareness in Dartmouth and its surrounding areas and the lowest in the Halifax city area. Across the population, awareness of this service is higher among those with higher household incomes. (Table W25)

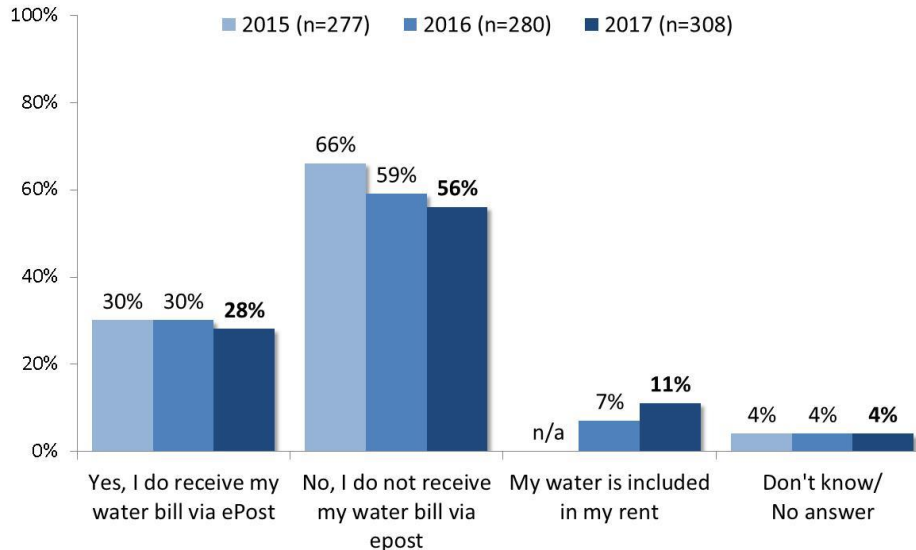


Q.W25: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4] Since September 2014, Halifax Water has been providing customers with the option of receiving their bills electronically through email notification by ePost. Prior to today were you aware of this service?

There has been little change in the uptake of electronic billing. Similar to results in 2016, three in ten (28%, compared with 30%) Halifax Water customers aware of the service receive their water bills electronically via ePost. Meanwhile, close to six in ten of these customers do not receive their water bill via ePost, and eleven percent indicate that their water bill is included in their rent. Results are consistent across the region, while across the population, uptake on this service is higher among younger customers. (Table W32)



Household Receives Water Bills Electronically via ePost Among Halifax Water Customers Who Are Aware of Water Bills Sent by ePost Service

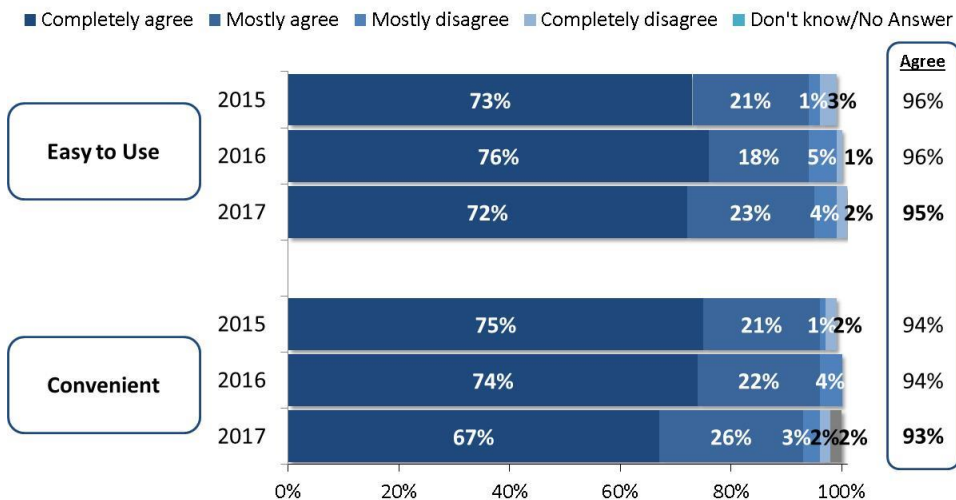


Q.W32: [ASK ONLY IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4 AND THOSE WHO SAID 'YES, I WAS AWARE OF THIS SERVICE' IN Q.W25] And does your household receive its water bills electronically via ePost?

Those who use ePost continue to offer favourable ratings of the service. The majority of Halifax Water customers *completely agree* that the service is easy to use (72%, compared with 76%) or convenient (67%, compared with 74%). (Tables W27a-b)

Opinion of Attributes About Receiving and Managing Water Bill Electronically Through ePost

Among Halifax Water Customers Who Receive Their Water Bill via ePost



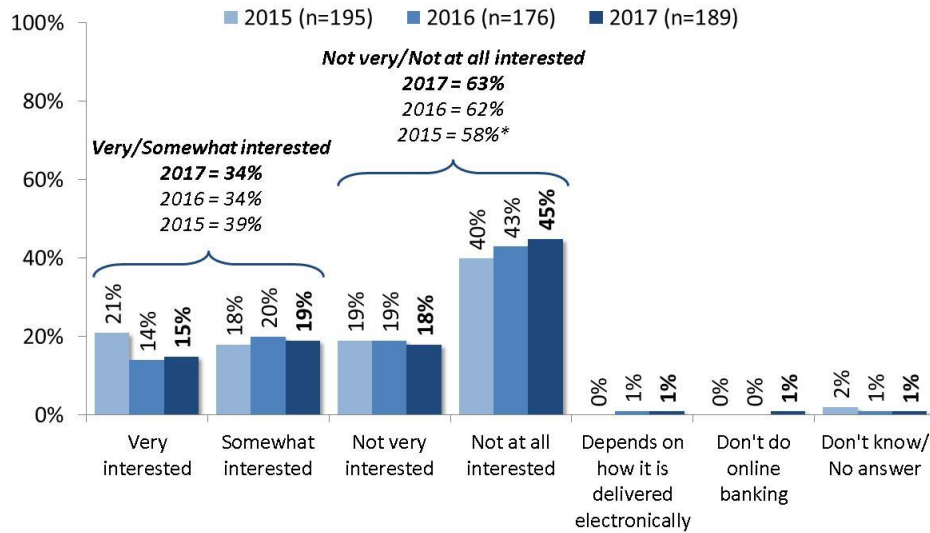
Q.W27a-b: [ASK IF 'YES, RECEIVE WATER FROM HALIFAX WATER' IN Q.W4 AND THOSE WHO SAID 'YES' IN Q.W32] And in your opinion, would you completely agree, mostly agree, mostly disagree, or completely disagree that receiving and managing your water bill electronically through ePost is: (2015 n=74, 2016 n=76, 2017 n=76)



There continues to be an opportunity to expand the current electronic billing services. Among the Halifax Water customers aware of email billing notification but not currently using it, one-third express some level of interest. (Table W18)

Interest in Receiving Water Bill Electronically

Among Those Who do Not Receive Water Bills via ePost



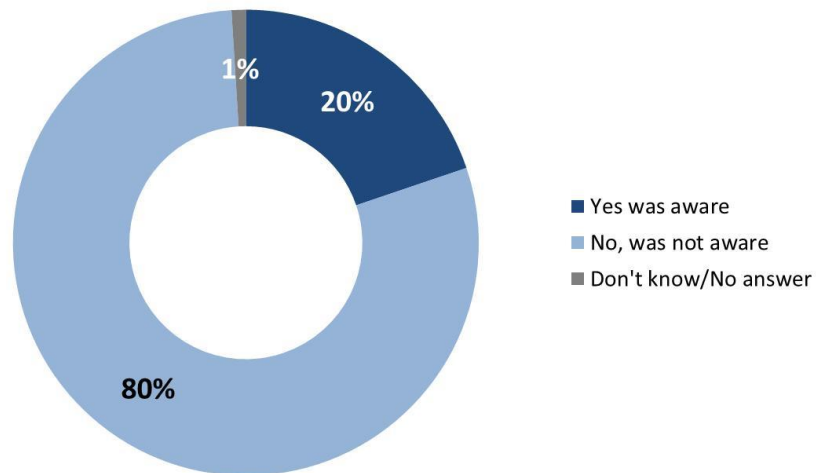
Q.W18: [ASK IF 'NO' IN Q.W32] How interested would you be in receiving your water, wastewater, and stormwater bill electronically through an email notification? Would you be very interested, somewhat interested, not very interested, or not at all interested? *Due to rounding.



Lead Water Lines

One in five residents were aware of the subsidy program introduced in August by Halifax Water to assist residential customers with replacing their lead water service lines that connect the water main in the street to a customer’s home. Awareness increases with age and household income. (Table W33)

Aware of Halifax Water’s Subsidy Program to Assist Residential Customers Replacing Lead Water Service Lines

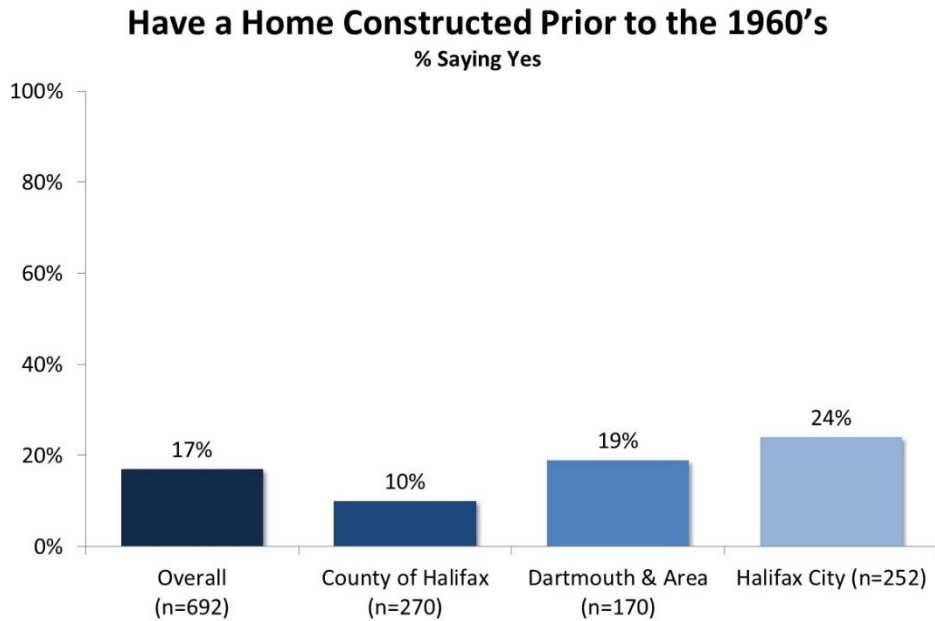


Q.W33: In August 2017 Halifax Water introduced a subsidy program to assist residential customers with replacing their lead water service lines that connect the water main in the street to a customer’s home. The program provides financial assistance for 25% of the cost, up to \$2,500. Prior to today, were you aware of this subsidy program? (n=692)

Note: Question Added partway through surveying.



As lead service lines are found primarily in homes constructed prior to the 1960s, participants were asked if they have a home constructed prior to the 1960s. Just under two in ten confirm having such a home, with those in Dartmouth and Halifax City and surrounding areas being more likely than those in Halifax County. (Table W34)



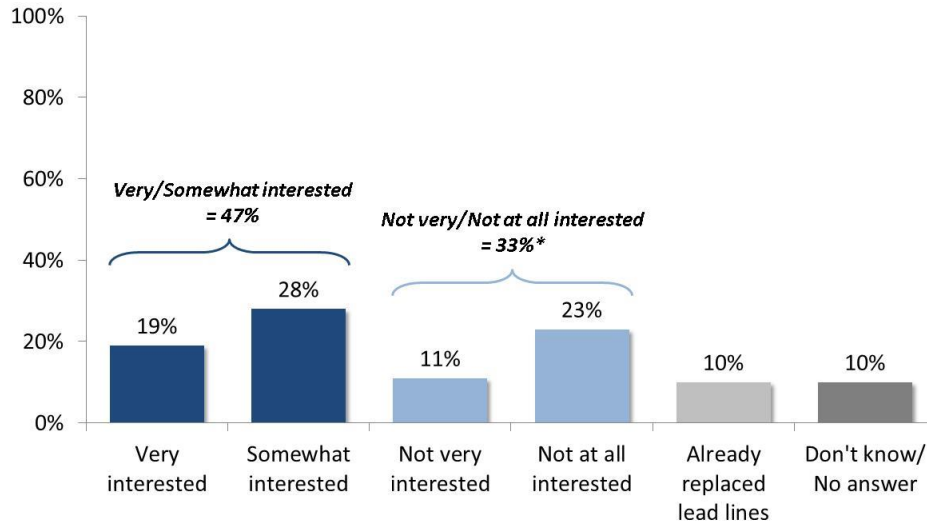
Q.W34: Lead service lines are found primarily in homes constructed prior to the 1960s. Do you have a home that was constructed prior to the 1960s? (n=692) *Note: Question Added partway through surveying.*



There is a moderate level of interest among those with homes constructed prior to the 1960s in using the subsidy program within the next few years, with nearly one-half expressing interest. (Table W35)

Interest in Using Subsidy Program within Next Few Years

Among Those Who Have a Home Constructed Prior to the 1960's



Q.W35: [ASK IF YES IN Q.W34] Lead can enter water through contact with lead water lines and possibly internal plumbing fixtures. High levels of lead can lead to serious health issues. Knowing this, are you very interested, somewhat interested, not very interested, or not at all interested in using this subsidy program within the next few years? (n=127)

**Due to rounding. Note: Question Added partway through surveying.*



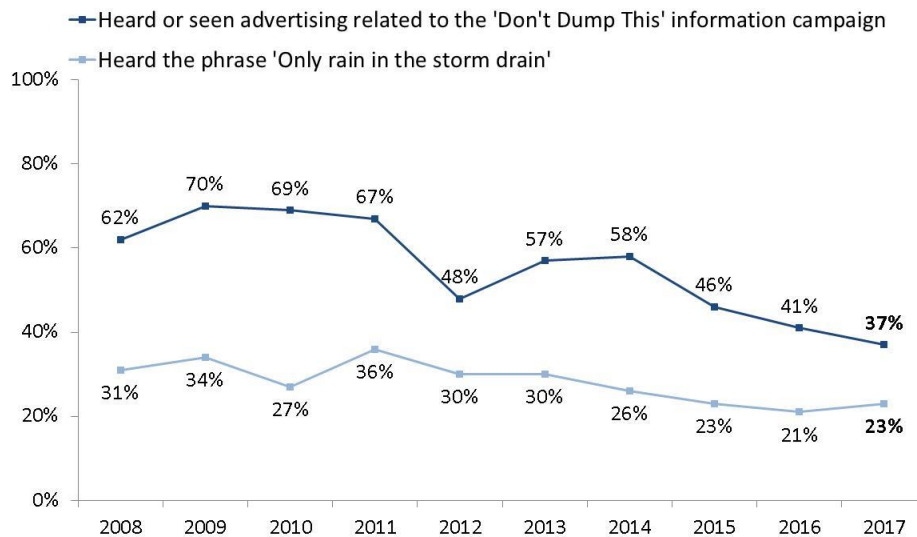
Information Campaigns

Awareness level of the ‘Don’t Dump This’ information campaign has continued the downward trend that has occurred over the past two years and, for the second consecutive year, is now at its lowest level since tracking began. Currently, nearly four in ten residents of Halifax report awareness of this campaign. Meanwhile, awareness of the ‘Only Rain in the Storm Drain’ campaign is stable this year relative to last year.

Those most likely to be aware of the ‘Don’t Dump This’ campaign include residents who are Halifax Water customers and those with higher household incomes. Meanwhile, likelihood to recall the phrase ‘Only Rain in the Storm Drain’ is lower among younger residents. (Tables W21 and W23)

Awareness of Information Campaigns

% Saying “Yes”



Q.W21: Prior to today, have you heard or seen any advertising related to the 'Don't Dump This' information campaign? (n=400)

Q.W23: Prior to today, have you heard the phrase 'Only rain in the storm drain'? (n=400)



Recall of the main message of the 'Don't Dump This' campaign is relatively consistent with results from one year ago. Three in four residents who recall the campaign mention that the main message of the campaign is to **not dump certain products**, while approximately one in ten state the main message is **environmental, protecting Halifax Harbour, and pollution prevention**. (Table W22)

Main Message of the 'Don't Dump This' Information Campaign										
Among those who recall advertising – Key Mentions; n=153										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Don't dump certain products	79%	73%	81%	76%	67%	78%	79%	73%	70%	74%
The environment	7%	8%	5%	5%	17%	12%	11%	9%	10%	11%
Help protect Halifax Harbour	--	25%	17%	11%	12%	14%	9%	6%	6%	9%
Pollution prevention	13%	16%	15%	16%	30%	19%	15%	13%	12%	8%
Help keep the water clean	--	1%	3%	3%	1%	1%	1%	6%	6%	5%

W22: Total Mentions

Among those who are aware of the 'Only Rain in the Storm Drain' campaign, seven in ten residents believe the main message is to **not dump certain products**, while one in ten indicate **saving the environment**. In addition, less than one in ten report **pollution prevention, only rain should go in there, helping protect the Halifax Harbour, and keeping storm drains clean/clear** as the main message of the campaign. (Table W24)

Main Message of the Phrase 'Only Rain in the Storm Drain'										
Among those who have heard the phrase – Key Mentions; n=98										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Don't dump certain products	77%	71%	72%	73%	64%	80%	76%	68%	74%	72%
The environment	1%	5%	4%	3%	11%	10%	6%	3%	5%	9%
Pollution prevention	12%	12%	15%	17%	21%	19%	17%	13%	15%	7%
Only rain should go in there	14%	15%	7%	8%	5%	6%	11%	9%	9%	6%
Help protect Halifax Harbour	--	4%	3%	4%	10%	8%	1%	--	--	6%

W24: Total Mentions



Once again, the Internet is the preferred method to access information related to Halifax Water’s pollution prevention and water, wastewater, and stormwater programs. Specifically, one-half of Halifax residents prefer to access this information via the **Internet**, while one in ten residents or fewer prefer the **Newspaper** or the **Television** for accessing information. Other methods are less often mentioned. (Table W26)

Most Preferred Method for Accessing Pollution and Water Programs Information in Halifax										
Key Mentions; n=400										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Internet (general)	48%	53%	52%	51%	50%	54%	63%	58%	59%	52%
Newspaper	20%	23%	20%	15%	21%	15%	11%	13%	10%	10%
TV	15%	23%	19%	14%	23%	12%	11%	11%	8%	8%
Phone/Would call them	3%	2%	2%	4%	13%	3%	8%	1%	7%	7%
Mail (flyers, newsletters)	6%	10%	7%	7%	12%	9%	5%	8%	6%	7%
Halifax Water website	1%	1%	4%	3%	3%	3%	3%	6%	7%	6%

W26: Total Mentions



Study Methodology

Questionnaire Design

The questions commissioned by Halifax Water and used in this study were designed by Corporate Research Associates Inc., in consultation with Halifax Water staff.

Sample Design and Selection

Halifax Water questions were fielded on CRA's *Halifax Urban Report* survey, in addition to some questions being fielded on the Halifax portion of CRA's *Atlantic Quarterly*® survey.

Urban Report

The sample for this study was drawn using systematic sampling procedures from a list of randomly-selected households compiled from listed telephone numbers in Halifax, drawn from a database that is updated quarterly. The sample was selected to match the geographical distribution of the population within the region and was designed to complete interviews with a representative sample of 400 adult residents, 18 years of age and older, of Halifax.

Atlantic Quarterly®

The sample for this study was drawn using systematic sampling procedures from a list of randomly-selected households compiled from listed telephone numbers in Nova Scotia, drawn from a database that is updated quarterly. The sample was selected to match the geographical distribution of the population within the province and was designed to complete interviews with a representative sample of 800 (with 803 being actually completed this quarter) adult residents, 18 years of age and older of Nova Scotia. Of these, 356 were conducted with residents of Halifax.

Survey Administration

The Urban Report® survey was conducted by telephone from October 19 to November 14, 2017, while the Atlantic Quarterly® survey was conducted by telephone from November 9 to December 5, 2017. All interviewing was conducted by fully-trained and supervised interviewers and a minimum of 10 percent of all completed interviews were monitored or subsequently verified.



Completion Results

Urban Report

Among all eligible respondents contacted, the rate of interview completion was 8 percent. Completion rate is calculated as the number of cooperative contacts (1,103) divided by the total of eligible numbers attempted (13,267).

The final disposition of all telephone numbers called is shown below in the *Marketing Research and Intelligence Association's (MRIA) Standard Record of Contact Format*.

COMPLETION RESULTS	
A. Total Numbers Attempted	17,536
Disconnect / Not in service/Blocked	3,748
Fax / Modem	86
Cell Phone / Pager	10
Non Residential Number / Incorrect Number	425
Duplicate	0
B. Eligible Numbers	13,267
Busy	126
Answering Machine	728
No Answer	8,504
Scheduled Call Back / Mid Call Back / Qualified Not Available	88
Illness / Incapable	15
Language Problem	44
C. Total Asked	3,762
Respondent / Gatekeeper Refusal	1,528
Mid Terminate / Hang up	1,104
Never Call List	27
D. Co-operative Contacts	1,103
Did Not Qualify / Quota Full	703
Complete	400



Atlantic Quarterly®

Among all eligible Nova Scotia residents contacted, the response rate was 10 percent. Response rate is calculated as the number of cooperative contacts (1,633) divided by the total number of eligible telephone numbers called (17,179).

The final disposition of all telephone numbers called is shown below in the *Marketing Research and Intelligence Association's (MRIA) Standard Record of Contact Format*.

COMPLETION RESULTS	
A. Total Numbers Attempted	33,753
Disconnect / Not in service/Blocked Number	15,553
Fax / Modem	125
Cell Phone / Pager	18
Non Residential Number / Incorrect Number	878
Duplicate	0
B. Eligible Numbers	17,179
Busy	249
Answering Machine	1,671
No Answer	8,388
Scheduled Call Back / Mid Call Back / Qualified Not Available	168
Illness / Incapable	24
Language Problem	44
C. Total Asked	6,635
Respondent / Gatekeeper Refusal	2,616
Mid Terminate / Hang up	2,349
Never Call List	37
D. Co-operative Contacts	1,633
Did Not Qualify / Quota Full	830
Complete	803



Sample Distribution

The overall results are based on 756 interviews with individuals from the Halifax population. A sample of 756 respondents would be expected to provide overall results accurate to within plus or minus 3.6 percentage points in 95 out of 100 samples.

Region	Sample Distribution	
	Sample	Margin of Error
County of Halifax	294	± 5.7%
Dartmouth and Area	187	± 7.2%
Halifax City and Area	275	± 5.9%
Halifax Water Customers	563	± 4.1%
Halifax	756	± 3.6%

¹95% confidence interval



TO: Ray Ritcey, Chair, and Members of the Halifax Regional Water Commission Board

SUBMITTED BY: *Original Signed By:*

Cathie O'Toole, MBA, CPA, CGA, Director, Corporate Services/CFO

APPROVED: *Original Signed By:*

Carl Yates, M.A.Sc., P.Eng, General Manager

DATE: January 12, 2018

SUBJECT: **2017/18 Cost Containment – Quarter 3**

INFORMATION REPORT

ORIGIN

The Cost Containment Process (Item #6) as approved by the Halifax Regional Water Commission (HRWC) Board, October 3, 2013.

April 14, 2015 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 as an organization. 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. Within the Decision, the NSUARB expressed its appreciation in receiving HRWC's first cost containment report, and HRWC's initiatives to contain its operating costs. HRWC filed this initial report with the NSUARB in September 2014, identifying \$2.8 million of savings for 2013/14. Since this initial report

annual reports continue to be filed with the NSUARB, the latest being June, 2017 where cost containment initiatives totaling \$5.1 million were reported for the fiscal year 2016/17.

DISCUSSION

A Summary Report of Cost Containment Initiatives for 2017/18 is attached, with updated information as at January 12, 2018. This report shows the cost containment initiatives effecting operations for 2017/18 as a result of new initiatives implemented thus far during the year, along with amounts of an ongoing nature from 2013/14 to 2016/17 inclusive. The inclusion of initiatives and amounts from prior years reflects an intentional focus on sustainable results over the long term. The projected cost savings by strategic area for 2017/18 is \$6.4 million as outlined in Figure #1 below:

Figure #1

Procurement Strategies	\$1,173,954	18%
Human Resource Strategies	\$2,725,509	43%
Information Technology (IT) Strategies	\$108,700	2%
Facilities/ Process Strategies	\$2,232,538	35%
Reduce Paper and Printing Costs	\$27,479	0%
Technology and Business Process Changes	<u>\$112,138</u>	2%
	<u><u>\$6,380,317</u></u>	

As shown above, cost containment initiatives impact the areas of Human Resource and Facilities/ Process Strategies the most. Under Human Resource Strategies the effects of pension plan re-design initiated in 2015/16 continues as one of the main drivers with respect to cost containment savings in the current year. Annual savings related to pension plan re-design approximates \$1.7 million, representing 62% of the savings within Human Resource Strategies, and 27% of the total projected cost savings for 2017/18. Savings of \$20.2 million for the employer was projected over a 14 year period, with a 50% likelihood the plan would be fully funded within 10 years.

Facilities/ Process Strategies contain initiatives of a 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 \$0.7 million of projected savings for the current year, representing 32% of savings within the category and 11% of the total projected savings for 2017/18.

Chemical costs are key to the operations of Halifax Water, in both water and wastewater services. Through its Procurement Strategies, staff continues to negotiate the best product and pricing to enable the facilities to operate in an efficient manner. This is evident in 2017/18 where savings related to chemical purchasing amount to an estimated \$0.4 million.

For 2017/18 there have been a number of new cost containment initiatives implemented totaling \$1.5 million, which are spread over the strategic areas of Procurement, Human Resources and Facilities/ Processes. One time initiatives for the year total \$1.4 million, and represent the majority of the initiatives implemented in 2017/18. Under Procurement, the initiatives relate to the deferral of expenditures, with the most significant being the Sahara inspection for the transmission main in the amount of \$0.3 million. This inspection was budgeted in 2017/18 but deemed not required during the year. For Human Resources, cost deferral again plays an important role, whereby positions budgeted for a full year were delayed until later into the budget year. This resulted approximate savings of \$0.3 million. Finally under Facilities/ Processes, reduced plant production within water services resulted cost savings of approximately \$0.4 million with respect to electricity and chemicals. New initiatives for 2017/18 have been highlighted for ease of reference in the Summary Report of Cost Containment Initiatives attached.

BUDGET IMPLICATIONS

Available information on cost containment initiatives were taken into consideration when the 2017/18 budgets were developed. Initiatives that impact future fiscal periods (not annual or one-time occurrences only) will be incorporated into budget cycles and processes of these future periods.

ATTACHMENTS

Summary Report – Cost Containment Initiatives

Report Prepared by:	<i>Original Signed By:</i> _____ Allan Campbell, <u>B.Comm</u> , CPA, CMA Manager, Finance
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#	Initiative	Comments	Year Initiated	2017/18 Cost Savings
1 General Budget Strategies				
Sub-total				\$0
2 Procurement Strategies				
	Insurance adjustment services - sole source relationship over a 10 year period	HW participated in a joint tender with 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
	Mobile devices - switched supplier and carrier	HW participated in a joint tender with HRM	2013/14	\$51,624
	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 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
	Replacement of wireless headsets for CCC staff	Wireless headsets were not performing as expected, therefore a switch was made to wired headsets which resulted in savings on a per unit cost basis, and also savings regarding the frequency and cost of replacement associated with the wired headsets.	2015/16	\$1,500
	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	An 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 WWTP	2017/18	\$110,000
	Bridge Lease	The new water line for the MacDonald bridge was not in service, resulting in a reduced bridge lease charge	2017/18	\$30,000
	Inspection fees (Water Operations - Regional)	The Sahara inspection for the transmission main as budgeted in not required during the current fiscal year	2017/18	\$250,000
	Deferral	Maintenance on the gabion wall at the Lake Major facility is deferred until 2018/19 due to environmental permitting	2017/18	\$100,000
Sub-total				\$1,173,954
3 Human Resource Strategies				
	Corporate ID Badges	updating the corporate ID badges to be deferred from the 2013/14 fiscal year to 2014/15 for existing employees	2013/14	\$3,200
	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
	Annual service awards banquet	Changed the venue and the cost of the meal	2014/15	\$15,000
	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, labour 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

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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, labour force assessment	January 1, 2016 saw the elimination the administrative assistant within Regulatory Services.	2015/16	\$57,000
Workload, labour 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
Hiring at Lake Major plant	Summer student not hired	2016/17	\$9,800
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 WWTP 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
Staff changeover	Pre-planning for an upcoming retirement resulted in a cost reduction, as the overlap period typically required for training purposes was of a shorter duration	2017/18	\$30,000
Overtime reductions	Overtime was reduced through the utilization of float technicians at the Halifax, Dartmouth and Herring Cove WWTF, and on-site dewatering at the Mill Cove WWTF	2017/18	\$156,648
Hiring deferment (Water Quality Manager)	The position of Water Quality Manager was not backfilled while waiting for the replacement to start	2017/18	\$66,000
Hiring deferment (Operator -Water Services)	The new Operator at the Lake Major facility did not start their position until September 1	2017/18	\$15,000
Hiring deferment (Operator -Water Services)	The new Operator at the Pockwock facility did not start their position until September 1	2017/18	\$15,000
Hiring deferment (Water Quality)	The new Supervisor and Inspector did not start until Q2; the Data Analyst did not start until Q3	2017/18	\$80,000
Hiring deferment (SCADA)	The new Supervisor position will not start until Q3 at the earliest	2017/18	\$50,000
Hiring deferment (Water Operations - Regional)	The two (2) new Utility Locators did not start until September 1	2017/18	\$53,000

Sub-total **\$2,725,509**

4 Information Technology (IT) 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 than 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
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	\$31,494
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

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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
Seasonal disinfection of wastewater effluents	In coordination with NSE, UV disinfection of effluents will not be required during certain periods of the year	2014/15	\$250,000
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
Herring Cove WWTF - Ventilation Air Heat Recovery	Expected energy savings	2015/16	\$28,300
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
Staff utilization	Using trained HW staff for traffic control on HW job sites unless contractors are required.	2015/16	\$50,000
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
Halifax WWTF - Ventilation Air Heat Recovery System	Implemented October, 2016	2016/17	\$32,300
Halifax WWTF - Carbon Scrubber By-Pass	Implemented April, 2016	2016/17	\$40,800
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
Boiler Replacement - JD Kline Plant	Anticipated savings related to oil usage and pricing resulting from the replacement of the old boiler.	2016/17	\$3,000
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 WWTP 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
Carbon Consumption	Through effective monitoring at the Halifax and Dartmouth WWTF, there will be a saving with respect to carbon purchases during the current fiscal year.	2017/18	\$92,922
Cost reductions (electricity)	Electrical costs reduced as a result of reduced plant production at the Lake Major facility	2017/18	\$90,000
Cost reductions (electricity)	Electrical costs reduced as a result of reduced plant production at the Pockwock facility	2017/18	\$50,000
Cost reductions (chemicals)	Chemical costs reduced as a result of reduced plant production at the Pockwock facility	2017/18	\$200,000
Cost reductions (chemicals)	Chemical costs reduced as a result of reduced plant production at the Lake Major facility	2017/18	\$100,000

Sub-total **\$2,232,538**

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

Sub-total **\$27,479**

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7 Technology and Business Process Changes

Workload, labour 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, labour force assessment	Re-structuring by management within the AMI project as a result of technological efficiencies anticipated.	2015/16	\$64,533

Sub-total **\$112,138**

\$6,380,317