

2018/19 Annual Business Plan



**Approved by the Halifax Water Board
January 25, 2018**

**Approved by Halifax Regional Council
March 20, 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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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 Mission, Vision and Values of Halifax Water are detailed in Appendix B.

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 [NSUARB] 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 2017/18 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 under \$ 74 million as outlined in the graphs below.

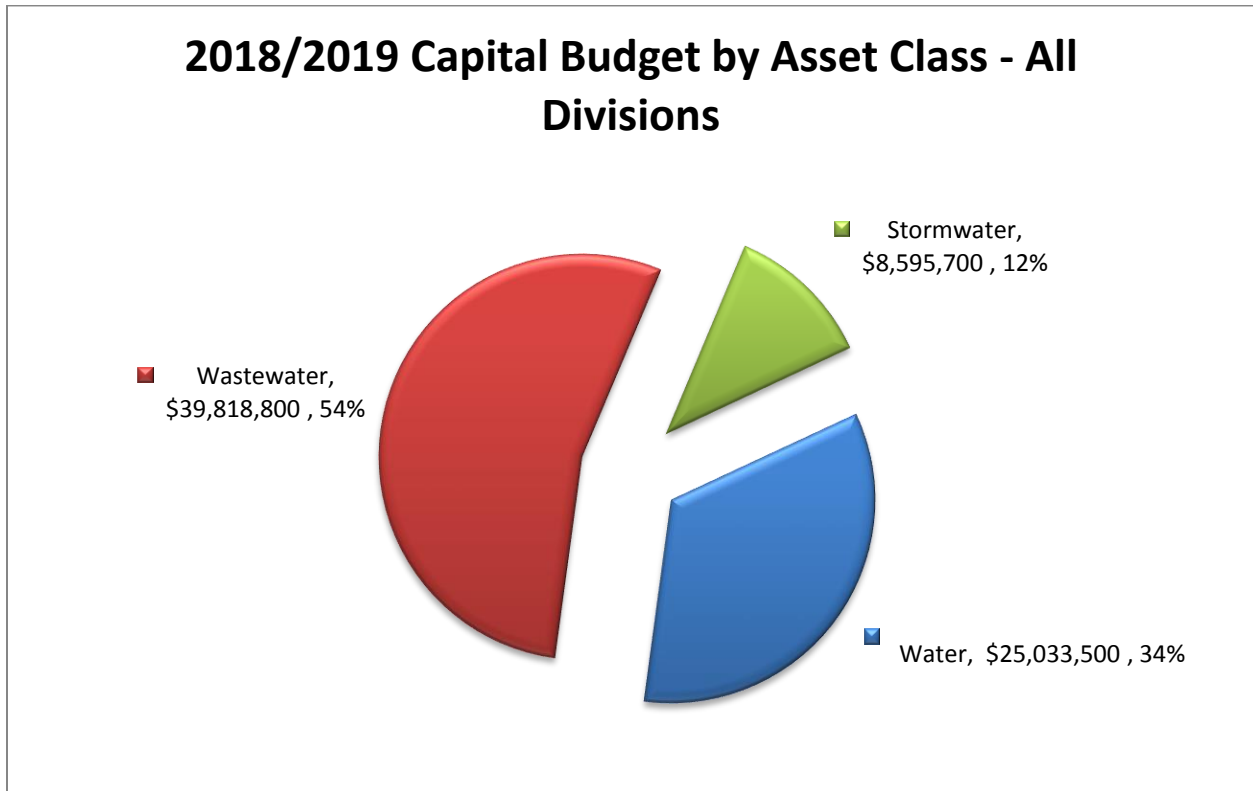


Figure 1 - Capital Budget by Asset Class

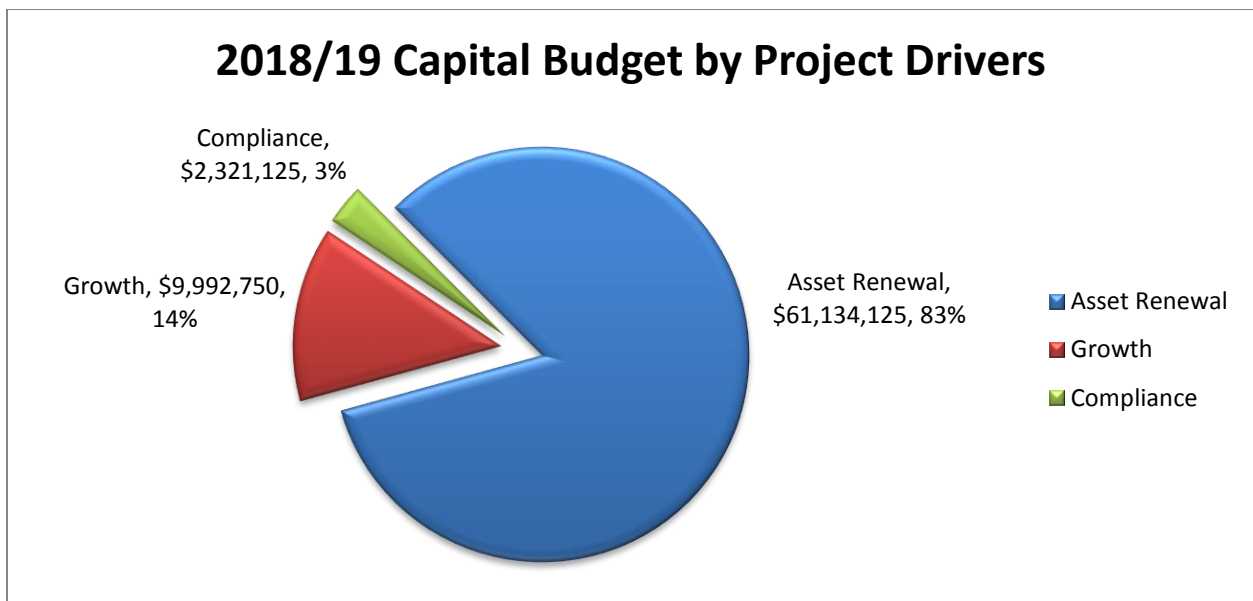


Figure 2 – Capital Budget by Strategic Driver

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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 categories: Water, Wastewater, Stormwater and Corporate Projects. Corporate projects are assigned to the three prime asset classes, based on cost of service allocations, approved by the NSUARB.

The summary totals for the three 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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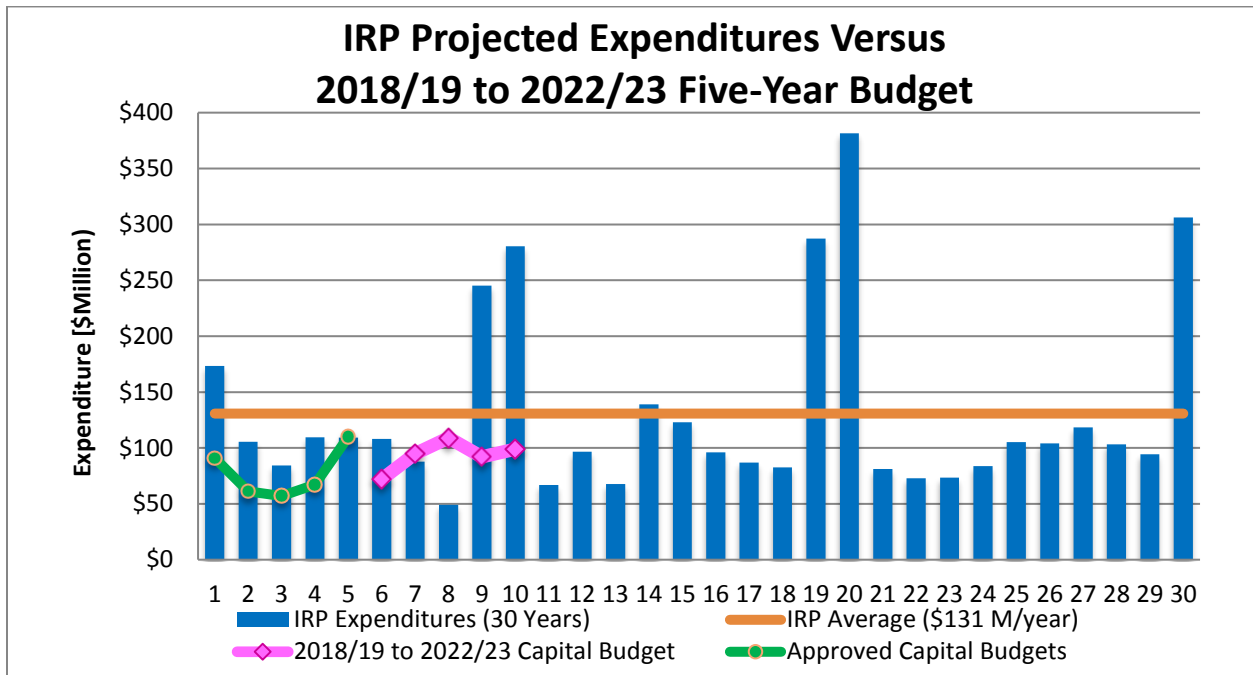


Figure 3 – IRP Projected Expenditures vs Proposed Five Year Capital Budget

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 \$2.17 million in 2018/19, an increase of \$108 thousand or 5.1% from the budget of \$2.06 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 – Projected Accumulated Operating Surplus (based on information as of November 30, 2017)

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.

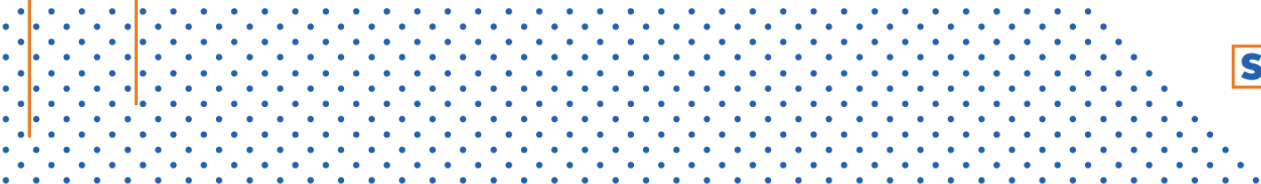
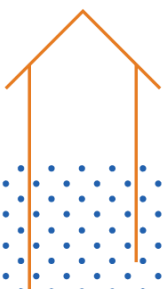
The goal is to develop an updated IRP that recalibrates the \$2.6 billion long-term investment identified in the first IRP [2012], and positions the utility for future updating on a five-year cycle.

Halifax Water expects to build on the key initiatives already underway to provide a revised IRP by mid-2019.



Appendix A

Organizational Chart



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Our Mission:

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

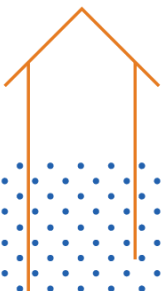
Our Vision:

- *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:

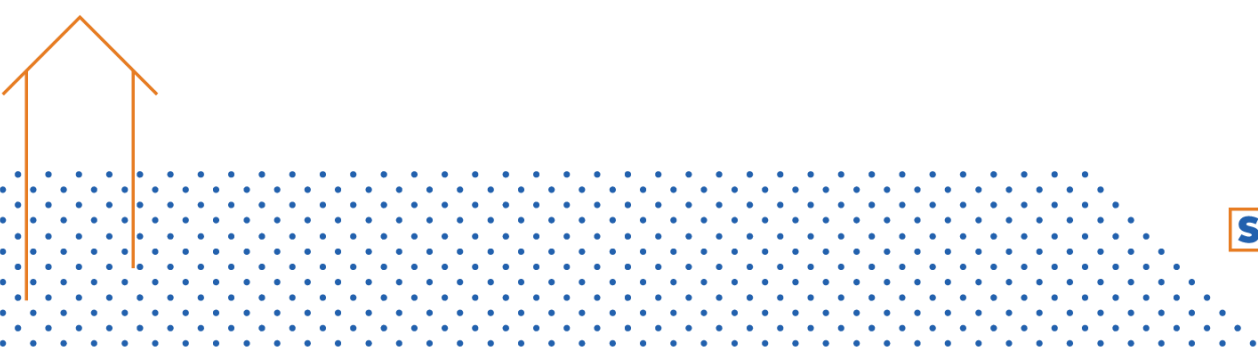
- *Engages employees, partners and stakeholders in achieving success;*
- *Encourages openness and transparency;*
- *Demonstrates individual and corporate accountability for results;*
- *Fosters innovation and progressive thinking;*
- *Respects diverse ideas, opinions and people;*
- *Is committed to service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





Appendix B

Mission, Vision & Values



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HALIFAX WATER ORGANIZATIONAL STRUCTURE

