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

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

Original Signed By Carl Yates for:
Reid Campbell, P.Eng., Director, Water Services

Original Signed By:
Susheel Arora, M.A.Sc., P.Eng., Director, Wastewater & Stormwater Services

Original Signed By:
Kenda MacKenzie, P.Eng., Director, Regulatory Services

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

SUBJECT: **Financial and Operations Information Report**

INFORMATION REPORT

ORIGIN:

Regular update.

This report provides a high level overview of financial and operational performance for the utility. Financial results are presented first, followed by indicators and statistics for water and wastewater.

June 15, 2018

Ray Ritcey, Chair
Halifax Water
Halifax, NS

The regular meeting of the Halifax Water Board will be held on Thursday, June 21, 2018 at 9:00 a.m. in the Boardroom at 450 Cowie Hill Road, Halifax.

AGENDA

In Camera Reports

1C Approval of Minutes of the In-Camera Meeting held on Thursday, March 29, 2018
2C Business Arising from Minutes
a) Governance Matter
3C Personnel Matter
4C Contractual Matter
5C Governance Matter - Verbal

In-Camera Information Reports

1C-I Legal Matter

Regular Reports

1. a) Ratification of In-Camera Motions
b) Approval of the Order of Business and Approval of Additions and Deletions
2. a) Approval of Minutes of the Regular Meeting held on Thursday, March 29, 2018
b) Approval of Minutes of the Special Meeting held on Thursday, April 19, 2018
3. Business Arising from Minutes
a)

Financial

4.1 2017/18 Audited Financial Statements and Year-End Results

4.2 Operating Results for the One Month ended April 30, 2018

4.3 Halifax Regional Water Commission Employees' Pension Plan Financial Statements for the Year Ended December 31, 2017

4.4 Halifax Regional Water Commission Employees' Pension Plan Financial Report – 1st Quarter, 2018

Capital

5.1 Solar Photovoltaic (Solar PV) Project Application $225,000
5.2 Ellenvale Run Retaining Wall System Replacement (Phase II) $2,361,000

TOTAL: $2,586,000

Other

6 Port Wallace Capital Cost Contribution

Information Reports

1-I Operations and Financial Monthly Update
2-I Capital Budget Approvals to Date
3-I Bank Balance
4-I 2017/18 Cost Containment
5-I 2018/19 Capital Budget Update
6-I Cogswell Redevelopment Project
7-I 2017/18 Lead Service Line Replacement Program
8-I Rodent Control
9-I Corporate Balanced Scorecard – 2017/18 Result
10-I Stormwater Billing Update
11-I Fit for Duty Policy Update
12-I Capital Cost Contribution - Financial Status Report for the Fiscal Year ended March 31, 2018

Original Signed By:

James G. Spurr
Secretary

HALIFAX REGIONAL WATER COMMISSION
MINUTES

March 29, 2018

PRESENT: Commissioner Ray Ritcey, Chair
Commissioner Russell Walker, Vice Chair
Commissioner Darlene Fenton
Commissioner Craig MacMullin
Commissioner Lisa Blackburn
Commissioner Steve Streatch
Commissioner Jacques Dubé
Commissioner Lorelei Nicoll

REGRETS:

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

TABLE OF CONTENTS

CALL TO ORDER

The Chair called the regular meeting to order at 9:00 a.m. in the Board Room of the HRWC, 450 Cowie Hill Road. The Board moved In Camera at 9:00 a.m. and the regular meeting reconvened at 10:35 a.m.

1a. RATIFICATION OF IN-CAMERA MOTIONS

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

MOTION PUT AND PASSED.

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

MOVED BY Commissioner Blackburn, seconded by Commissioner MacMullin that the Halifax Regional Water Commission Board approve the order of business and approve additions and deletions.

MOTION PUT AND PASSED.

2. APPROVAL OF MINUTES – January 25, 2018

MOVED BY Commissioner Nicoll, seconded by Commissioner Fenton that the Halifax Regional Water Commission Board approve the minutes of January 25, 2018.

MOTION PUT AND PASSED.

3. BUSINESS ARISING FROM MINUTES

a) None

4. OPERATING RESULTS FOR THE ELEVEN MONTHS ENDED FEBRUARY 28, 2018

A report dated March 20, 2018, was submitted.

Cathie O'Toole gave a brief overview of the operating results.

5. 2018 SPRING MFC DEBENTURE

A report dated March 21, 2018, was submitted.

MOVED BY Commissioner MacMullin, seconded by Commissioner Blackburn that the Halifax Regional Water Commission Board:

1. **Approve the financing of $500,000 for a five year term with a five year amortization schedule and an all-inclusive rate not to exceed 5.5%**
2. **Approve the financing of $1,000,000 for a ten year term with a ten year amortization schedule and an all-inclusive rate not to exceed 5.5%.**

6. BENEFITS ENHANCEMENTS

A report dated March 29, 2018, was submitted.

Commissioner Fenton asked if the enhanced services were also part of the current HRM benefit package. Commissioner Dube confirmed that they are included.

MOVED BY Commissioner Blackburn, seconded by Commissioner Streatch that the Halifax Regional Water Commission Board approve the enhancement of the current medical benefit plan to include Naturopathic and osteopathic services to a maximum of $400/member annually.

MOTION PUT AND PASSED.

7. PENSION PLAN AMENDMENTS

A report dated March 29, 2018, was submitted.

MOVED BY Commissioner MacMullin, seconded by Commissioner Nicoll that the Halifax Regional Water Commission Board approve Pension Plan Amendment #11, as attached, and the submission of a certified copy of the Amendment to the Superintendent of Pensions.

MOTION PUT AND PASSED.

8. CORPORATE BALANCED SCORECARD – 2018/19 PROGRAM

A report dated March 20, 2018, was submitted.

Carl Yates gave a brief presentation on the Corporate Balanced Scorecard.

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

1. **Corporate Balanced Scorecard targets for the 2018/19 fiscal year as detailed in the attached presentation.**
2. **The Organizational Award Program tied to the outcomes of the 12 Organizational Indicators as detailed in the attached presentation.**

MOTION PUT AND PASSED.

The next regular Board Meeting will be held on June 21, 2018.

The meeting was adjourned at 11:20 a.m.

Original Signed By:
James G. Spurr
Secretary

Original Signed By:
Commissioner Ray Ritcey
Chair

The following Information Items were submitted:

1-I Operations and Financial Monthly Update
2-I Capital Budget Approvals to Date
3-I Bank Balance
4-I 2017 Annual Report – Pension and Benefits Advisory Committee
5-I HRWC Employees' Pension Plan Q4 Financial Report
6-I HRM Pension Plan Investment Performance
7-I Cogswell Redevelopment Project
8-I Merchant Discount Fees for RDC Credit Card Payments

HALIFAX REGIONAL WATER COMMISSION
MINUTES

April 19, 2018
SPECIAL MEETING

PRESENT: Commissioner Russell Walker, Vice Chair
Commissioner Darlene Fenton
Commissioner Craig MacMullin (via teleconference)
Commissioner Steve Streatch

REGRETS: Commissioner Ray Ritcey, Chair
Commissioner Jacques Dubé
Commissioner Lorelei Nicoll
Commissioner Lisa Blackburn

STAFF: Carl Yates, General Manager, HRWC (via teleconference)
Cathie O'Toole, Director, Corporate Services, HRWC
James Spurr, Legal Counsel, HRWC
Jamie Hannam, Director, Engineering & IS, HRWC
Lorna Skinner, Administrative Assistant, HRWC

TABLE OF CONTENTS

CALL TO ORDER

The Chair called the regular meeting to order at 12:10 p.m. in the Board Room of the HRWC, 450 Cowie Hill Road.

1. ELLENVALE RUN RETAININGING WALL SYSTEM REPLACEMENT

A report dated April 13, 2018, was submitted.

Jamie Hannam gave an overview of the increased funding request. He noted that the tender price exceeded the design consultant's estimate but reflects fair market value. Mr. Hannam noted that the completion of this project is an extremely high priority and there are timing issues with construction as the work is being carried out in a water course.

MOVED BY Commissioner Streatch, seconded by Commissioner Fenton that the Halifax Regional Water Commission Board approve additional funding in the amount of $1,319,000 for the "Ellenvale Run Retaining Wall System Replacement" project, for a total estimated project cost of $2,854,000.

MOTION PUT AND PASSED.

The next regular Board Meeting will be held on June 21, 2018.

The meeting was adjourned at 12:23 p.m.

Original Signed By:
James G. Spurr
Secretary

Original Signed By:
Commissioner Russell Walker
Vice-Chair

ITEM # 4.1
HRWC Board
June 21, 2018

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

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

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

DATE: June 12, 2018

SUBJECT: **2017/18 Audited Financial Statements and Year End Results**

INFORMATION REPORT

ORIGIN

Operational and Regulatory Requirement.

RECOMMENDATION

It is recommended that the Board approve the March 31, 2018, Halifax Regional Water Commission's Audited Financial Statements prepared using International Financial Reporting Standards.

BACKGROUND

Halifax Regional Water Commission (HRWC) is required to submit Board-approved audited financial statements to the Halifax Regional Municipality (HRM) and the Nova Scotia Utility and Review Board (NSUARB).

DISCUSSION

Attached are the financial statements for the year ended March 31, 2018, presented in two formats.

HRWC is a fully regulated government business enterprise, falling under the jurisdiction of the Nova Scotia Utility and Review Board (NSUARB). The NSUARB requires that HRWC file Financial Statements and rate applications with the Board based on the NSUARB Handbook for

Accounting and Reporting for Water Utilities. The Accounting Standards Board (AcSB) requires rate regulated entities to conform to International Financial Reporting Standards (IFRS).

The underlying activities and operating results are similar under the two standards. The key differences are:

1) IFRS includes depreciation on contributed assets in the income statement, resulting in higher depreciation expense,
2) IFRS includes the amortization of contributed capital in the income statement, resulting in higher non-operating revenue,
3) IFRS requires componentization of assets records and shorter useful lives, resulting in higher depreciation expense,
4) IFRS does not permit the appropriation of long term debt principle payments in the income statement, resulting in lower non-operating expenses,
5) IFRS requires contributed capital be treated as a long-term liability, resulting in much higher long-term liabilities and much lower equity.

The on-site field work portion of the annual audit by Grant Thornton began April 30th. The audit timing was coordinated with HRM's presentation of its statements.

The following discussion of the operating results is based on the internal NSUARB form statements except where noted. The results reflect direct operating costs by department and allocations among water, wastewater and stormwater for common costs shared across all the services provided by HRWC.

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

Consolidated Income Statement - Page 2

Consolidated operating revenue of $138.1 million is slightly ahead revenue reported for the prior year. Consolidated operating expenses of $99.4 million are $6.6 million higher than last year.

Summarized Consolidated Operating Results				
	Actual YTD 2017/18 '000	Actual YTD 2016/17 '000	$ Change	% Change
Operating Revenue	**$138,145**	$137,997	$148	0.1%
Operating Expenses	**$99,437**	$92,822	$6,615	7.1%
Operating Profit (Loss)	**$38,708**	$45,175	($6,466)	-14.3%
Non Operating Revenue	**$4,486**	$3,322	$1,164	35.0%
Non Operating Expenditure	**$34,376**	$34,622	($246)	-0.7%
Net Surplus before OCI	**$8,819**	$13,875	($5,056)	-36.4%
Pension Plan Expense	**($5,015)**	($5,017)	$2	0.0%
OCI	**($1,750)**	$743	($2,493)	-335.4%
Net Surplus (Deficit)	**$2,054**	$9,601	($7,548)	-78.6%

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

The Net Surplus for the year is $2.1 million, a decline of $7.5 million from the prior year. The Net Surplus includes Pension Plan Expense of $5.0 million and Other Comprehensive Income (OCI) of $1.8 million. The Other Comprehensive Income is primarily the unrealized gains on employee benefit programs, such as investment returns on Pension Plan investments. Excluding OCI and Pension Plan Expense, the Net Surplus for the year is $8.8 million, a decline of $5.1 million as compared to the prior year.

The approved budget was for a loss of $6.7 million. The final result represents an improvement of $8.8 million over the budget.

Balance Sheet - Page 3

The Cash balance of $51.5 million is down from $55.9 million in the prior year. The decline is attributable to substantial expenditures associated with the current capital projects.

Balance Sheet Liquidity (Current Ratio)		
	2017/18	2016/17
Current Assets ('000)	**$93,333**	$90,705
Current Liabilities ('000)	**$50,583**	$41,831
Current Ratio	**1.85**	2.17

Increases in Accounts Receivable	
	2017/18
Addition of Stormwater ROW	**$1,886**
Other Customer Receivables	**$1,114**
HRM Cost Shared Capital Projects	**$2,580**
HRM Regional Development Charge	**$817**
HST Rebate	**$731**

The total Accounts Receivable balance of $39.4 million is up $7.0 million. The addition of the HRM Stormwater Right of Way charge on customer bills has increased the normal Customer Receivables balance. As requested by HRM Council, Stormwater customers are billed for this service and the proceeds are remitted to HRM. Accounts Receivable also increased as a result of pending claims associated with Build Canada and the Canada Water and Wastewater Fund. Receivables from HRM are higher due to a greater number of capital projects cost shared with HRM. The liquidity on the balance sheet (ratio of current assets divided by current liabilities) is 1.85, down from the ratio of 2.17 at the same time last year.

Plant in Service assets, net of Accumulated Depreciation, is $1.24 billion and is $63.3 million higher than at this time last year. A total of 335 Capital Work Orders were closed during the year, representing $103.2 million in Plant in Service Additions. This was offset by retirements of Plant in Service of $3.8 million and Depreciation of $36.2 million. The Northwest Arm Sewer Rehabilitation was the largest capital project completed in the fiscal year, with a value of $23.2 million. The Dartmouth Crossing-Cutter Avenue subdivision represented the largest developer contributed asset addition at $2.2 million. Capital Assets Under Construction is down $3.9 million to $24.6 million, net of external funding received under the Build Canada and Clean Water and Wastewater Fund programs. The following tables highlight the major projects completed and still in progress:

Capital Asset Additions	
	Cumulative '000
Northwest Arm Sewer Rehab	**$23,178**
Sullivan's Pond Storm Sewer Replacement	**$11,280**
Quinpool Road/Crown Drive Water Main	**$7,148**
MacDonald Bridge Transmission Main	**$6,964**
CMMS Computerized Maint. Mgmt Syst.	**$4,155**
Leiblin Drive Pump Station Replacement	**$3,456**
All other projects	**$47,044**
Total	**$103,224**

Capital Assets Under Construction	
	Cumulative '000
Aerotech Wastewater Treatment Facility	**$19,358**
AMI - Automated Metering Infrastructure	**$9,161**
JD Kline Filtration Replacement	**$1,550**
Mill Cove UV Upgrade	**$1,290**
All other projects	**$4,574**
Total Capital Expenditures	**$35,934**
External Funding Received	**($11,383)**
Net Assets Under Construction	**$24,550**

Current liabilities of $50.6 million are up $8.8 million from the prior year. The increase is attributable to holdbacks and accruals associated with completed capital projects.

The Accrued Post Retirement Benefits, Accrued Pre-Retirement Benefit, Deferred Pension Liability and Supplementary Employee Retirement Plan (SERP) have been updated based on the year end actuarial reports. The Deferred Pension Liability is $65.5 million, an increase of $7.0 million. For rate setting purposes, the NSUARB considers Pension costs on a cash basis, not on the basis of the full Pension liability and expense accrual.

The balance of the reserve for Regional Development Charges has increased from $13.1 million to $24.2 million, which is attributable to development activity in the Halifax area.

Long Term Debt is down $12.5 million from last year, which is a net of new debt of $10.0 million, repayments of $23.5 million, and an increase in the Current Portion of Long Term Debt of $1.0 million. The debt service ratio of 21.2% is well below the maximum 35% ratio allowed under the blanket guarantee agreement with HRM.

Long Term Debt by Service		
	2017/18	2016/17
	'000	'000
Water	**$53,697**	$59,599
Wastewater	**$127,043**	$133,409
Stormwater	**$11,043**	$11,324
Combined	**$191,783**	$204,333

Debt Servicing Ratio by Service		
	YTD Debt Servicing Cost Ratio	
	2017/18	2016/17
Water	**18.7%**	19.5%
Wastewater	**23.6%**	24.2%
Stormwater	**17.9%**	17.0%
Combined	**21.2%**	21.7%

The cumulative Operating Surplus of $16.7 million at the beginning of the fiscal year has grown to $20.5 million with the net profit before other comprehensive income of $3.8 million. The accumulated Operating Surplus will be drawn down by a budget loss of $12.1 million in 2018/19 and allows another year with no rate increases for Water, Wastewater, and Stormwater service.

Income Statement – All Services - Page 4

The following table compares the results, excluding OCI, with the budget approved at the February 2, 2017 Board meeting. The final results are $10.6 million better than budget with Revenue finishing higher than budget and Expenses finishing lower than budget.

Summarized Consolidated Operating Results			
	Actual 2017/18 '000	Budget 2017/18 '000	$ Variance
Operating Revenue	**$138,145**	$135,587	$2,558
Operating Expenses	**$104,452**	$106,241	($1,789)
Operating Profit (Loss)	**$33,694**	$29,346	$4,348
Non Operating Revenue	**$4,486**	$2,787	$1,699
Non Operating Expenditure	**$34,376**	$38,882	($4,506)
Net Surplus (Deficit)	**$3,804**	($6,750)	$10,554

Customer Rates

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

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

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

Operating Revenue

Operating Revenue is slightly ahead of the previous year and $2.6 million ahead of budget with Metered Sales accounting for the difference.

Operating Revenue Results

	Actual 2017/18 '000	Budget 2017/18 '000	$ Variance
Consumption Revenue	**$85,012**	$82,969	$2,043
Base Charge Revenue	**$32,845**	$33,044	($199)
Wastewater Rebate	**($642)**	($1,646)	$1,004
SW Site Generated Charge	**$6,169**	$6,700	($532)
Sub-total	**$123,383**	$121,067	$2,316
HRM Fire Prot & ROW	**$10,921**	$10,956	($35)
Other Operating Revenue	**$3,841**	$3,564	$277
Total	**$138,145**	$135,587	$2,558

Metered Sales consist of base and volumetric charges. Base charges are slightly below budget expectations. Volumetric revenue budgets for 2017/18 were based on a 3% decrease in metered consumption. Billed water consumption was unusually high the fourth quarter. This offset the normal annual decline in consumption and resulted in consumption 0.1% ahead of the prior year. This is the first time since 2009/10 that consumption did not decline from the previous year.

Wastewater Metered Sales also consists of a volumetric discharge component and a base charge component. For most customers, the discharge component is based on the metered water consumption, and the volumes reflect the decline in water consumption. The actual billed discharge volume increased by 0.3%. Wastewater Rebates are available to large customers whose metered water does not enter the Wastewater system. Rebates were $1.0 million less than budget, which benefits Wastewater Revenue.

Stormwater Site Generated revenue was below budget. Stormwater revenue was anticipated to remain the same when the new rate structure took effect July 1, 2018. The decline was a result of greater Stormwater appeals and a delay in adding some customers that had been exempt under the previous Stormwater rate framework. Other revenue categories are comparable with budget and forecasted amounts.

Operating Expenses

Operating Expenses of $99.4 million are $6.6 million higher than the prior year, $2.4 million below the budget for the year. Compared to the prior year, expense categories with the largest increases are Wastewater Collection, Stormwater Collection, Administration and Pension and Depreciation.

Financial Revenue

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

Financial Expenses

Long Term Debt costs decreased $0.7 million from the prior year. Debt servicing savings are a result of new debt issues having lower interest rates than older, maturing issues. New debt was issued in the Municipal Finance Corporation's (MFC's) Fall Debenture in the amount of $10.0 million. The Dividend/Grant In Lieu of Taxes is paid annually to HRM. The amount is based on the net asset value of water assets and increased this year to $4.8 million.

The following table shows operating results for each service.

Year to Date Operating Results by Service		
	2017/18	2016/17
	'000	'000
Water	**$1,043**	$3,731
Wastewater	**$2,884**	$3,484
Stormwater	**($124)**	$1,643
Net Surplus (Deficit)	**$3,804**	$8,858

Water Operations - Page 5

Water Operations show a profit of $1.0 million, compared to a profit of $3.7 million for the previous year at this time. Water revenue is virtually the same as the prior year. Operating Expenses are up $2.8 million with Administration & Pension and Depreciation showing the largest increases at $0.8 million each.

Wastewater Operations - Page 6

Wastewater Operations show a profit of $2.9 million, down from a profit of $3.5 million in the prior year. Wastewater revenue has increased $0.6 million from the prior year, with Metered Sales and Overstrength Agreements accounting for the increase. Operating expenses have increased by $2.5 million from the previous year. Expenses in Wastewater Collection are $0.9 million higher. Expenses were also higher in Wastewater Treatment, Customer Service, and Depreciation.

Stormwater Operations - Page 7

Stormwater Operations show a loss of $0.1 million, a decline from the profit of $1.6 million for the same period last year.

Revenue is down $0.5 million, primarily in Stormwater Site Generated Service. Expenses are higher for Stormwater Collection by $0.7 million and for Regulatory Services by $0.4 million.

Regulated and Unregulated Operations - Page 8

Activities regulated by the NSUARB show a profit of $2.1 million, a decline from the $7.6 million profit for the same period last year.

Unregulated activities show a profit of $1.6 million, ahead of the profit of $1.2 million for the prior year. The profit increase is a result of the contract to treat wastewater from the aircraft carrier that visited Halifax in the summer and lower costs associated with de-watering and bio-solids treatment.

Results by Activity		
	2017/18	2016/17
	'000	'000
Regulated Activities	**$2,203**	$7,626
Unregulated Activities	**$1,600**	$1,232
Net Surplus (Deficit)	**$3,804**	$8,858

Results under International Financial Reporting Standards - Pages 9 & 10

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

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

On the IFRS Income Statement, Operating Revenue is the same. Depreciation Expense is higher as contributed assets are depreciated and some assets are depreciated more quickly. Financial Revenue is higher as the amortization of contributed capital is treated as revenue. The most significant change is Financial Expenses are lower as there is no expense for the Long Term Debt Principal appropriation – a difference of $21.2 million for the full year.

The IFRS Net Profit for the year to date is $20.0 million, a decrease of $3.9 million from the prior year.

ATTACHMENTS

Audited Financial Statements for the twelve (12) months ended March 31, 2018 (IFRS format)

Unaudited Financial Statements for the twelve (12) months ended March 31, 2018 (Internal NSUARB & IFRS format)

Financial Information Graph of Revenue and Expenses for 2017/2018

Report prepared by: *Original Signed By:*

Warren Brake, B.Comm, CPA, CGA, Manager, Accounting, 902-490-4814

Financial Statements

Halifax Regional Water Commission

March 31, 2018

Contents

Halifax Regional Water Commission
Statement of earnings

Year ended March 31, 2018 (in thousands)

	2018	2017
Operating revenues		
Water	**$ 47,220**	$ 47,183
Wastewater	**69,994**	69,475
Stormwater	**10,016**	10,542
Fire protection	**7,074**	7,074
Private fire protection	**856**	831
Other operating revenue	**2,985**	2,892
	138,145	137,997
Operating expenditures (Note 14)		
Water supply and treatment	**8,646**	8,050
Water transmission and distribution	**9,410**	8,997
Wastewater collection	**12,642**	11,639
Stormwater collection	**4,842**	4,097
Wastewater treatment	**19,647**	19,794
Engineering and information services	**8,105**	7,576
Regulatory services	**2,450**	2,356
Customer service	**4,896**	4,432
Administration and pension	**12,553**	11,799
Depreciation and amortization	**41,625**	43,433
	124,816	122,173
Earnings from operations before financial and other revenues and expenditures	**13,329**	15,824
Financial and other revenues		
Interest	**694**	780
Contributed capital	**17,372**	17,980
Other	**3,792**	2,543
	21,858	21,303
Financial and other expenditures		
Interest on long term debt	**7,884**	8,475
Amortization of debt discount	**202**	199
Grant in lieu of taxes	**4,774**	4,578
Other	**354**	467
	13,214	13,719
Earnings for the year before regulatory deferral account balance amortization	**21,973**	23,408
Regulatory deferral account balance amortization (Note 5)	**(192)**	(192)
Earnings for the year	**$ 21,781**	$ 23,216

See accompanying notes to the financial statements.

Halifax Regional Water Commission
Statement of comprehensive earnings

Year ended March 31 (in thousands)		2018		2017
Earnings for the year	**$**	**21,781**	$	23,216
Other comprehensive (loss) income				
Items that will not be reclassified subsequently to earnings:				
Re-measurement on defined benefit plans		**(1,750)**		743
Total comprehensive earnings for the year	**$**	**20,031**	$	23,959

See accompanying notes to the financial statements.

Halifax Regional Water Commission
Statement of financial position

March 31 (in thousands)	2018	2017
Assets		
Current		
Cash and cash equivalents	**$ 51,470**	$ 55,879
Receivables		
Customer charges and contractual	**17,494**	13,321
Unbilled service revenues	**16,640**	17,158
Halifax Regional Municipality	**5,274**	1,880
Inventory	**1,442**	1,601
Prepaids	**1,013**	867
	93,333	90,706
Intangible assets (Note 11)	**13,877**	10,275
Capital work in progress	**24,550**	28,406
Utility plant in service (Note 12)	**1,200,430**	1,144,152
Total assets	**1,332,190**	1,273,539
Regulatory deferral account balance (Note 5)	**3,196**	3,388
Total assets and regulatory deferral account debit balances	**$ 1,335,386**	$ 1,276,927
Liabilities		
Current		
Payables and accruals		
Trade	**$ 22,715**	$ 16,790
Interest on long term debt	**2,030**	2,101
Halifax Regional Municipality	**2,439**	295
Contractor and customer deposits	**186**	191
Current portion of deferred contributed capital	**13,405**	12,889
Current portion of long term debt (Note 13)	**22,630**	21,669
Unearned revenue	**584**	787
	63,989	54,722
Deferred contributed capital	**842,967**	808,632
Long term debt (Note 13)	**190,871**	203,299
Employee benefit obligation – pension plan (Note 4)	**65,486**	58,480
Employee benefit obligation – post-retirement benefits (Note 4)	**430**	341
Employee benefit obligation – pre-retirement benefits (Note 4)	**3,983**	3,824
	1,167,726	1,129,298
Equity		
Accumulated other comprehensive (loss) (page 5)	**(44,943)**	(43,193)
Accumulated surplus (page 5)	**212,603**	190,822
	167,660	147,629
	$ 1,335,386	$ 1,276,927

Contingent liabilities (Note 3)
Commitments (Note 6)

Approved by the Board

_____ Commissioner _____ Commissioner

See accompanying notes to the financial statements.

Halifax Regional Water Commission
Statement of changes in equity
Year ended March 31 (in thousands)

	Accumulated other comprehensive (loss)	Accumulated surplus	Total
Balance at March 31, 2016	$ (43,936)	$ 167,606	$ 123,670
Earnings for the year	-	23,216	23,216
Other comprehensive income	743	-	743
Comprehensive earnings for the year	743	23,216	23,959
Balance at March 31, 2017	$ (43,193)	$ 190,822	$ 147,629
Balance at March 31, 2017	**$ (43,193)**	**$ 190,822**	**$ 147,629**
Earnings for the year	**-**	**21,781**	**21,781**
Other comprehensive loss	**(1,750)**	**-**	**(1,750)**
Comprehensive earnings for the year	**(1,750)**	**21,781**	**20,031**
Balance at March 31, 2018	**$ (44,943)**	**$ 212,603**	**$ 167,660**

See accompanying notes to the financial statements.

Halifax Regional Water Commission
Statement of cash flows

Year ended March 31 (in thousands)

	2018	2017
(Decrease) increase in cash and cash equivalents		
Operating		
Comprehensive earnings for the year	**$ 20,031**	$ 23,959
Depreciation and amortization	**25,926**	26,692
Employee benefit obligations	**7,254**	4,191
(Gain) loss on disposal of plant in service	**(127)**	59
	53,084	54,901
Change in non-cash operating working capital items (Note 7)	**754**	5,172
	53,838	60,073
Financing		
Proceeds from issuance of long term debt	**10,000**	9,053
Contributed capital	**11,162**	9,231
Debt issue costs, net	**121**	122
Principal repayment on Harbour Solutions long term debt	**(6,500)**	(6,500)
Principal repayments of long term debt	**(15,089)**	(16,695)
	(306)	(4,789)
Investing		
Deferred capital contributions	**3,701**	629
Proceeds from sale of plant in service	**120**	197
Purchase of capital work in progress	**(14,405)**	(19,393)
Purchase of utility plant in service	**(47,357)**	(27,316)
	(57,941)	(45,883)
Net change in cash and cash equivalents	**(4,409)**	9,401
Cash and cash equivalents, beginning of year	**55,879**	46,478
Cash and cash equivalents, end of year	**$ 51,470**	$ 55,879

See accompanying notes to the financial statements.

1. Nature of operations

The Halifax Regional Water Commission (the Commission) is a public utility owned and controlled by the Halifax Regional Municipality (HRM). The Commission is responsible for the supply of municipal water, wastewater and stormwater services to the residents of the HRM. The Commission's principal place of business is P.O. Box 8388 Station A, 450 Cowie Hill Road, Halifax, Nova Scotia. The Commission is exempt from income tax.

2. Summary of significant accounting policies

(a) Statement of compliance

The financial statements have been prepared in accordance with International Financial Reporting Standards (IFRS) issued by the International Accounting Standards Board (IASB). The principal accounting policies applied in the preparation of these financial statements are set out below. These policies have been consistently applied to all years presented, unless otherwise stated.

The financial statements were authorized for issue by the Board on June 21, 2018.

(b) Basis of measurement

The Commission's financial statements are prepared on the historical cost basis, except for certain financial instruments measured at fair value. The financial statements are presented in Canadian dollars and all values are rounded to the nearest thousand. The financial statements are presented in accordance with International Accounting Standards (IAS) 1 "Presentation of Financial Statements".

(c) Regulation

In matters of administrative policy relating to customers, rates, capital expenditures, depreciation rates and accounting matters, the Commission is subject to the jurisdiction of the Nova Scotia Utility and Review Board (NSUARB). Rates charged to and collected from customers are designed to recover costs of providing the regulated services. Halifax Water is required to prepare submissions in accordance with the Handbook issued by the NSUARB. There are differences in the accounting treatment of certain transactions from IFRS including the accounting of principal debt payments, employee future benefits, depreciation and amortization, and gains and losses on the disposal of plant in service and accumulated surplus.

Regulatory assets represent costs incurred that have been deferred as approved by the NSUARB and will be recovered through future rates collected from customers. The Commission's regulatory asset is disclosed in Note 5.

(d) Utility plant in service

Utility plant in service (Note 12) is recorded at cost, being the purchase price and directly attributable cost of acquisition or construction, including interest capitalized during construction. Contributions for capital expenditures are treated as deferred contributed capital on the statement of financial position and amortized over the estimated useful lives of the assets. Structures and land taken out of service are removed from utility plant in service and placed in plant not in service at cost less accumulated depreciation. Losses or gains related to assets retired, demolished or sold are charged or credited to the statement of earnings.

2. Summary of significant accounting policies (continued)

(e) Cash and cash equivalents

Cash and cash equivalents consists of cash on hand and balances with banks.

(f) Depreciation

Depreciation is provided using the straight-line method over the estimated useful lives of the assets.

The estimated useful lives for the major classifications of utility plant in service are as follows:

Culverts	25 to 50 years
Hydrants	50 to 80 years
Meters	20 to 25 years
Office equipment and furniture and transportation equipment	3 to 10 years
Pumping equipment	5 to 30 years
Purification and treatment equipment	20 to 50 years
SCADA equipment	5 to 25 years
Services and laterals	50 to 60 years
Structures and improvements	50 to 100 years
Tools and work equipment	5 to 30 years
Water, wastewater and stormwater mains	60 to 100 years

Depreciation commences in the year an asset is put in service and ready for its intended use. In the year of acquisition, depreciation is calculated at 50% of the above rates unless a project is significant, in which case depreciation is prorated for the number of months the asset was in use. The Commission does not maintain a depreciation fund. The Commission has received NSUARB approval for exemption from setting up a depreciation fund as long as net depreciable additions to plant exceed the depreciation charged.

(g) Inventory

Cost of inventory is comprised of direct materials and supplies. Inventories are valued at the lower of cost and net realizable value with cost being determined on a weighted average moving cost method.

(h) Revenues and expenditures

All revenues and expenditures are recorded on an accrual basis. Revenues relating to supplying water, wastewater and stormwater services are recorded based on cyclical billings and include an accrual for estimated amounts not yet billed. Fire protection revenue is recorded based on approved rates. Other revenues are recorded at the time services are performed, the amount can be measured reliably and collection is reasonably assured.

(i) Long term debt

Debt issue costs are deferred and amortized over the term of the debt to which it relates.

2. Summary of significant accounting policies (continued)

(j) Use of estimates and critical accounting judgments

In preparing the Commission's financial statements, management is required to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements and reported amounts of revenue and expenditures during the period. Significant estimates and assumptions include the following:

- At year end, revenue from water, stormwater and wastewater services has been earned, but not yet billed due to the timing of the billing cycles. Management estimates the unbilled revenue accrual based on historic billing trends.
- Management assumptions are used in the actuarial determination of employee benefit obligations, such as standard rates of inflation, mortality, discount rates, and anticipation of future salary increases.
- Useful lives of utility plant in service are reviewed at each reporting date based on expected patterns of usage and historical information.
- Recognition and measurement of provisions and contingencies.

Actual results could differ from these estimates.

(k) Financial instruments

The Commission initially recognizes and measures its financial assets and liabilities at fair value.

All financial instruments are classified into one of five categories: fair value through profit and loss, held to maturity, loans and receivables, available for sale financial assets, or other financial liabilities. All financial instruments are initially measured in the statement of financial position at fair value. Financial instruments subsequently measured at amortized cost include transaction costs.

Subsequent measurement and changes in fair value will depend on their initial classification, as follows:

- Fair value through profit and loss financial instruments are measured at fair value and changes in fair value are recognized in net earnings;
- Available for sale financial assets are measured at fair value with changes in fair value recorded in other comprehensive income until the financial asset is derecognized or impaired at which time the amounts would be recorded in profit or loss; and
- Loans and receivables, held to maturity investments, and other financial liabilities are measured at amortized cost using the effective interest method.

The Commission's financial assets and liabilities are classified and measured as follows:

Asset/Liability	Classification	Measurement
Cash and cash equivalents	Loans and receivables	Amortized cost
Receivables	Loans and receivables	Amortized cost
Receivable from HRM	Loans and receivables	Amortized cost
Payables and accruals	Other financial liabilities	Amortized cost
Long term debt	Other financial liabilities	Amortized cost
Deposits	Other financial liabilities	Amortized cost

(l) Provisions

A provision is recognized in the statement of financial position when the Commission has a legal or constructive obligation as a result of a past event, and it is probable that an outflow of economic benefits will be required to settle the obligation. If the effect is material, provisions are determined by discounting the expected future cash flows at a rate that reflects current market assessment of the time value of money and, where appropriate, the risks specific to the obligation.

2. Summary of significant accounting policies (continued)

(m) Impairments

At the end of each reporting period, the Commission reviews the carrying amounts of its tangible and intangible assets to determine whether there is an indication of an impairment loss. If any such indication exists, the recoverable amount of the assets is estimated in order to determine the extent of impairment loss (if any). The recoverable amount of any asset is the higher of its fair value less costs to sell and its value in use. Where it is not possible to estimate the recoverable amount of an individual asset, the impairment test is carried out on the asset's cash-generating unit (CGU), which is the lowest group of assets to which the asset belongs for which there are separately identifiable cash inflows that are largely independent of the cash inflows from other assets. The Commission has three CGU's (water, wastewater and stormwater) for which impairment testing is performed.

If the recoverable amount of the asset is estimated to be less than its carrying amount, the carrying amount of the asset is reduced to its recoverable amount. An impairment loss is recognized immediately in earnings. When an impairment loss is subsequently reversed, the carrying amount of the assets is increased to the revised estimate of its recoverable amount, but so that the increased carrying amount does not exceed the carrying amount that would have been determined had no impairment loss been recognized for the asset in prior years.

(n) Intangibles

Intangible assets include land access easements, water removal rights, studies, and capital master plans and are recorded at cost less accumulated amortization. Land rights include payment for easements and right of use over land and have an indefinite useful life. Intangibles with finite useful lives are amortized annually over the estimated useful lives. The expected useful lives are as follows:

Intangible assets	10 to 30 years

(o) Employee benefits obligations

The Commission accrues in its accounts, annually, the estimated liabilities for pensions and other employee benefits.

Pension benefits
The Commission provides employment, post-retirement and pre-retirement benefits through defined benefit plans and defined contribution plans.

The cost of pension benefits for defined contribution pension plans are expensed at the time active employees are compensated.

The defined benefit plans sponsored by the Commission determine the amount of pension benefits employees will receive on retirement by reference to length of service and salary levels. Obligations associated with defined benefit plans reside with the Commission, even if plan assets for funding the plan are set aside.

The liability recognized in the statement of financial position for defined benefit plans is the present value of the defined benefit obligation at the end of the reporting date less the fair value of plan assets.

Management estimates the defined benefit obligation annually with assistance from an independent actuary using the projected unit credit method. The defined benefit obligation uses estimates for inflation, medical cost trends, mortality, and anticipated salary levels. The discount factor used to present value estimated future cash flows is determined with reference to high quality corporate bonds that have terms to maturity approximating the terms of the related pension liability.

2. Summary of significant accounting policies (continued)

(o) Employee benefits obligations (continued)

Gains and losses resulting from re-measurements of the net defined benefit liability are charged to other comprehensive income in the period in which they arise. Service costs are recognized immediately into earnings.

Net interest cost related to pension obligations and returns on plan assets are included in salary and benefits on the statement of earnings.

Short-term employee benefits
Short-term employee benefit obligations that are due to be settled wholly within twelve months after the end of the annual reporting period in which the employees render the related service are measured on an undiscounted basis and are expensed as the related service is provided.

(p) Regulatory deferral account balance

The Commission early adopted IFRS 14 Regulatory Deferral Accounts and has continued to apply the accounting policies it applied in accordance with the Handbook for the recognition, measurement and impairment of assets and liabilities arising from rate regulation. These are referred to as regulatory deferral account balances.

Explanation of recognized amounts
Regulatory deferral account balances are recognized and measured at cost less amortization. Management continually assesses the likelihood of recovery of regulatory assets. If recovery through future rates is no longer considered probable, the amounts would be charged to the results of operations in the period that the assessment is made.

(q) Future accounting standards

At the date of authorization of these financial statements, certain new IFRS standards, amendments and interpretations to existing standards have been published by the IASB, but are not yet effective and have not been adopted early by the Commission.

Management anticipates that the relevant pronouncements will be adopted in the Commission's accounting policies for the first period beginning after the effective date of the pronouncement. Information on new standards, amendments and interpretations that may be relevant to the Commission's financial statements is provided below.

IFRS 15 Revenue from Contracts with Customers
The IASB released a new standard IFRS 15 Revenue from Contracts with Customers which replaces IAS 18 Revenue, IAS 11 Construction Contracts and certain revenue-related interpretations. The new standard provides a single, principle based five-step model to be applied to all contracts with customers requiring an entity to recognize revenue 1) in a manner that depicts the transfer of goods or services to customers and 2) at an amount that reflects the consideration the entity expects to be entitled to in exchange for those goods or services. IFRS 15 is effective for annual periods beginning on or after January 1, 2018. The Commission has assessed the impact of the new standard and concluded it will not be material to the financial statements.

IFRS 9 Financial Instruments
The IASB has replaced IAS 39 Financial Instruments: Recognition and Measurement in its entirety with a new standard IFRS 9 Financial Instruments. The final version of the standard introduces a new approach to financial asset classification, replaces the "incurred loss" impairment model with a more forward-looking expected loss model and substantially revises hedge accounting. The new standard IFRS 9 is effective for annual periods beginning on or after January 1, 2018. The Commission has assessed the impact of the new standard and concluded it will not be material to the financial statements.

2. Summary of significant accounting policies (continued)

(q) Future accounting standards (continued)

IFRS 16 Leases
The IASB issued IFRS 16, Leases, which replaces IAS 17, Leases. IFRS 16 provides a single lessee accounting model, requiring the recognition of assets and liabilities for all leases, unless the lease term is twelve months or less or the underlying asset has a low value. Lessor accounting remains largely unchanged from IAS 17. The new standard IFRS 16 is effective for annual periods beginning on or after January 1, 2019. The Commission is currently assessing the impact of this new standard.

3. Contingent liabilities

As a condition of a prior year sale of a property, the Commission indemnified the purchaser from claims or actions resulting from migration of halocarbons. The environmental risk is assessed to be low and the likelihood of any related liability is not determinable.

The Commission has been named along with the contractor for a flooding incident that occurred as a result of an overflow of wastewater at a pumping station associated with the Halifax Harbour Solutions Project (HHSP). The claim is being defended by the Commission's insurer and management believes exposure in this regard is minimal.

There are active claims against the Commission; however, the likelihood of actual liability is not determinable at this time. If the Commission's defense of active claims is unsuccessful, the potential exposure would be $1,000 - $2,000.

4. Employee benefit obligations

Retirement benefit plan – employees transferred from HRM
The Commission is responsible for funding the employer share of the contributions to the HRM pension plan for certain employees that transferred from HRM as of August 1, 2007. HRM administers this defined benefit pension plan and the Commission reimburses HRM for the pension costs related to the Commission's proportionate share of the employees covered under the plan. Due to the nature of the plan, the Commission does not have sufficient information to account for the plan as a defined benefit; therefore, the multiemployer defined benefit plan is accounted for in the same manner as a defined contribution plan. An expense is recorded in the period when the Commission is obligated to make contributions for services rendered by the employee. During 2018, the Commission funded $635 (2017 - $674) in contributions to the plan.

Defined benefit plans and other long term employment benefits
For all other employees, the Commission maintains a defined benefit pension plan and offers post-retirement health and insurance benefits. The pension plan provides pensions based upon length of service and best seven years' earnings. This defined benefit pension plan is funded by employer and employee contributions with employees contributing 10.65% of regular employee earnings. The Commission contributes 13.29% of payroll which includes 9.85% toward current service cost and 3.44% toward going concern special payments.

4. Employee benefit obligations (continued)

Employees who retired prior to July 1, 1998 have extended health benefits coverage for life and drug coverage until age 65. Employees who retired after July 1, 1998 and before December 31, 2008 have coverage for drug, extended health, dental and life insurance until age 65 on a 50/50 cost shared basis (100% basis for employees who retired after December 31, 2008). Extended health coverage for these retirees and their spouses after the age of 65 is available on an optional basis at 100% retiree cost and drug coverage is available through the provincially managed drug program.

The Commission also has a non-funded pre-retirement benefit that is accrued annually, but is payable on retirement, termination or death if the employee has at least 10 years of continuous service. The benefit is equal to three days' pay for each completed year of service, up to a maximum of six month's salary and can be taken as a lump sum payment at the date of retirement in lieu of pre-retirement leave.

Information about the Commission's plans, based on an actuarial extrapolation as at March 31, 2018, is as follows:

	Pension Plan		Post-retirement benefits		Pre-retirement benefits	
	2018	2017	**2018**	2017	**2018**	2017
Change in accrued benefit obligation						
Balance, beginning of year	**$ 168,363**	$ 152,633	**$ 341**	$ 466	**$ 3,824**	$ 3,724
Current service cost	**6,112**	5,020	**-**	-	**339**	308
Interest cost	**6,484**	6,160	**8**	11	**132**	129
Contributions by plan participants	**2,725**	2,417	**-**	-	**-**	-
Benefit payments	**(4,265)**	(4,715)	**(63)**	(61)	**(227)**	(377)
Re-measurements – actuarial (gains)/ losses from changes in demographic assumptions	**-**	-	**(42)**	31	**-**	-
Re-measurements – actuarial (gains)/ losses from changes in financial/experience assumptions	**7,762**	6,848	**186**	(106)	**(85)**	40
Balance, end of year	**187,181**	168,363	**430**	341	**3,983**	3,824
Change in fair value of plan assets						
Balance, beginning of year	**109,883**	98,368	-	-	**-**	-
Interest income	**4,206**	3,934	**-**	-	**-**	-
Administrative expenses	**(69)**	(144)	**-**	-	**-**	-
Actual return on plan assets	**5,952**	7,639	-	-	**-**	-
Benefit payments	**(4,265)**	(4,715)	**(63)**	(61)	**(227)**	(377)
Contributions: Employee	**2,725**	2,417	**-**	-	**-**	-
Employer	**3,263**	2,384	**63**	61	**227**	377
Balance, end of year	**121,695**	109,883	-	-	**-**	-
Accrued benefit liability at March 31	**$ 65,486**	$ 58,480	**$ 430**	$ 341	**$ 3,983**	$ 3,824

4. Employee benefit obligations (continued)

Included in the statement of earnings is pension expense of $8,461 (2017 - $7,390).

The significant actuarial assumptions adopted in measuring the Commission's accrued benefit obligations are as follows:

	2018 Pension Plan	2017 Pension Plan	**2018 Post-Retirement Benefits**	2017 Post-Retirement Benefits	**2018 Pre-Retirement Benefit**	2017 Pre-Retirement Benefit
Discount rate	**3.60%**	3.80%	**3.20%**	2.70%	**3.60%**	3.40%
Expected return on plan assets	**3.60%**	3.80%	**N/A**	N/A	**N/A**	N/A
Rate of compensation increase	**3.75%**	3.75%	**N/A**	N/A	**3.75%**	3.75%
Expenses for life benefits as a % of claims	**N/A**	N/A	**10.00%**	10.00%	**N/A**	N/A
Health benefit inflation per year	**N/A**	N/A	**6.92%**	7.16%	**N/A**	N/A
Dental benefit inflation per year	**N/A**	N/A	**4.50%**	4.50%	**N/A**	N/A

The measurement date used to determine the Plan assets and the accrued benefit obligation was March 31, 2018. The most recent valuation was completed January 1, 2016. The next review is scheduled for January 1, 2019.

The estimated employer contributions expected to be paid into the defined benefit plan and supplemental plan for the next fiscal year are $3,366.

5. Regulatory deferral account balance

In June 2011, the NSUARB granted the Commission approval to defer depreciation charges on certain assets transferred in 2010 from HRM relating to the Halifax Harbour Solutions Project (HHSP). Depreciation of $2,078 was deferred in each of fiscal 2011 and 2012. As a result, the Commission recognized a $4,156 regulatory deferral account. In absence of rate regulation, this regulatory deferral account balance would have been expensed as depreciation in fiscal 2011 and 2012. In May 2012, the NSUARB granted approval of the amortization of this deferral account over the remaining useful lives of the underlying assets, beginning in 2014. The expense recognized in 2018 is $192 (2017 - $192).

	2018	2017
Beginning balance	**$ 3,388**	$ 3,580
Amortization	**(192)**	(192)
Ending balance	**$ 3,196**	$ 3,388

6. Commitments

There is an agreement with HRM for renewal of the dividend/grant in lieu of taxes for fiscal years 2015/16 to 2019/20 for water services. Dividend payments are approved as part of revenue requirements by the NSUARB. There is no dividend/grant in lieu of taxes approved for wastewater/stormwater. The Commission is committed to a payment of $4,999 for the 2019 fiscal year.

At March 31, 2018, the Commission had $85,728 in expenditures from current and past approved capital budgets not yet expended.

7. Supplemental cash flow information

	2018	2017
Changes in non-cash operating working capital items		
Receivables, customer charges and unbilled	**$ (3,655)**	$ 1,333
Payable to/receivable from HRM, net	**(1,250)**	3,389
Inventory	**159**	83
Prepaids	**(146)**	(5)
Payables and accruals, trade	**5,925**	104
Accrued interest on long term debt	**(71)**	(128)
Contractor and customer deposits	**(5)**	(2)
Unearned revenue	**(203)**	398
	$ 754	$ 5,172

Interest paid during the year was $7,884 (2017 - $8,475).

8. Capital management

The Commission's objective when managing capital is to ensure sufficient liquidity to support its financial obligations and execute its operating and capital plans. The Commission monitors and makes adjustments to its capital structure through additional borrowings of long term debt which are used to finance capital projects.

The Commission considers its total capitalization to include all long term debt and total equity. The calculation is set out as follows:

	2018	2017
Long term debt (current portion)	**$ 22,630**	$ 21,669
Long term debt	**190,871**	203,299
Funded debt	**213,501**	224,968
Equity	**167,660**	147,629
Capital under management	**$ 381,161**	$ 372,597

The Commission is a regulated utility and is subject to the regulations of the NSUARB. As part of this regulation, the Commission must obtain approval by the NSUARB for all borrowings. The Commission has obtained regulatory approval for all borrowings during the fiscal year. The Commission is not subject to financial borrowing covenants other than as outlined in Note 10.

9. Financial instruments and risk management

The Commission applies a three-tier hierarchy framework for disclosing fair value of financial instruments, based on whether the inputs into the various valuation techniques are observable or unobservable. Observable techniques reflect market data obtained from independent sources, while unobservable inputs reflect management assumptions. Changes in valuation techniques of financial instruments may result in transfers of assigned levels. The hierarchy of input is as follows:

Level I	Quoted prices in active markets for identical assets or liabilities;
Level II	Inputs other than quoted prices included in Level I that are observable, either directly or indirectly; and
Level III	Inputs that are not based on observable market data.

The carrying values of current assets and current liabilities approximate their fair value due to the relatively short period to maturity of these financial instruments. Loans and receivables are carried at amortized cost. The fair value of variable rate long term debt is assumed to approximate its carrying value. Fair value has been estimated by discounting future cash flows at a rate offered for borrowings of similar maturities and credit quality at year end.

There were no transfers between classes of the fair value hierarchy during the year.

The Commission is exposed to risks as a result of holding financial instruments. Management considers and evaluates those risks on an on-going basis to ensure that the risks are appropriately managed. These potential risks include credit risk, interest risk, market risk and liquidity risk.

Credit risk
Credit risk arises from the possibility that the Commission's customers may experience financial difficulty and be unable to fulfill their obligations. The Commission's maximum exposure to credit risk corresponds to the cash and customer charges and contractual receivables. However, the Commission's customers are numerous and diverse, which reduces the concentration of credit risk.

An analysis of the Commission's receivables and continuity of the Commission's provision for impairment losses on receivables is as follows:

	2018	2017
Receivables		
Customer charges, contractual and unbilled	**$ 36,552**	$ 32,702
Less: allowance for doubtful accounts	**(2,418)**	(2,223)
	$ 34,134	$ 30,479

The credit quality of financial assets that are neither past due nor impaired are assessed with reference to historical information and includes the following considerations; new customers, existing customers and payment patterns / history.

Interest risk
Interest risk arises from the possibility that changes in interest rates will cause the Commission a potential loss. All of the Commission's long term debt is at varying fixed rates and has staggered maturity dates which reduce the interest rate risk.

9. Financial instruments and risk management (continued)

Market risk
Market risk arises from the possibility that the value of an investment will fluctuate as a result of changes in market prices. These changes could affect the market value of the investments in the Commission's employees' pension plan and consequently the plan's deficit. The risk is mitigated by the pension plan diversifying the types of investments in its portfolio.

Liquidity risk
Liquidity risk arises from the possibility of the Commission not being able to meet its cash requirements in a timely and cost effective manner. The Commission manages this risk by closely monitoring the cash on hand in comparison to upcoming cash commitments.

10. Related party transactions

The immediate parent and ultimate controlling party of the Commission is the HRM.

The Commission is obligated to make payments on debt, held in the name of HRM, associated with wastewater and stormwater assets which were transferred to the Commission in 2007 and subsequent years.

Amounts receivable from and payable to HRM have normal credit terms.

The Commission had the following related party transactions with HRM:

- The Commission recorded revenue for provision of water, wastewater and stormwater services to HRM in the amount of $5,097 (2017 - $5,025).
- The Commission recorded fire protection revenue from HRM of $7,074 (2017 - $7,074).
- The Commission paid a grant in lieu of tax of $4,774 (2017 - $4,578).
- The debt issued by the Commission was covered by a blanket guarantee from HRM subject to the Commission maintaining a debt service ratio of less than 35%.

Compensation of key management personnel

Members of the Board of Commissioners and Executive Management team are deemed to be key management personnel. It is the Board of Commissioners and Executive Management team who have the responsibility for planning, directing and controlling the activities of the Commission.

The following is compensation expense for key management personnel:

	2018	2017
Short term benefits	**$ 1,388**	$ 1,345
Post-employment benefits	**219**	243
Total compensation	**$ 1,607**	$ 1,588

11. Intangible assets

	2018	2017
Cost		
Beginning balance, April 1	**$ 13,213**	$ 12,232
Additions	**4,675**	981
Total cost, March 31	**17,888**	13,213
Accumulated amortization		
Beginning balance, April 1	**2,938**	2,031
Amortization	**1,073**	907
Total accumulated amortization, March 31	**4,011**	2,938
Net book value	**$ 13,877**	$ 10,275

12. Utility plant in service

	Land	Structures and improvements	Treatment and network equipment	Distribution and collection network	Tools and work equipment	Total
Cost						
Beginning balance, April 1, 2017	$ 20,780	$ 214,875	$ 218,773	$ 787,646	$ 18,322	**$ 1,260,396**
Additions	592	4,011	11,464	74,724	7,758	**98,549**
Disposals	-	(10)	(429)	(13)	-	**(452)**
Total cost, March 31, 2018	21,372	218,876	229,808	862,357	26,080	**1,358,493**
Accumulated depreciation						
Beginning balance, April 1, 2017	$ -	$ 33,807	$ 34,671	$ 43,744	$ 4,022	**$ 116,244**
Depreciation	-	9,378	12,409	16,224	3,808	**41,819**
Total accumulated depreciation March 31, 2018	-	43,185	47,080	59,968	7,830	**158,063**
Net book value, March 31, 2018	$ 21,372	$ 175,691	$ 182,728	$ 802,389	$ 18,250	**$ 1,200,430**

	Land	Structures and improvements	Treatment and network equipment	Distribution and collection network	Tools and work equipment	Total
Cost						
Beginning balance, April 1, 2016	$ 20,518	$ 206,944	$ 214,182	$ 760,027	$ 12,291	$ 1,213,962
Additions	262	8,726	4,814	28,005	6,874	48,681
Disposals	-	(795)	(223)	(386)	(843)	(2,247)
Total cost, March 31, 2017	20,780	214,875	218,773	787,646	18,322	1,260,396
Accumulated depreciation						
Beginning balance, April 1, 2016	$ -	$ 21,561	$ 22,714	$ 28,354	$ 1,676	$ 74,305
Depreciation	-	12,246	11,957	15,390	2,346	41,939
Total accumulated depreciation March 31, 2017	-	33,807	34,671	43,744	4,022	116,244
Net book value, March 31, 2017	$ 20,780	$ 181,068	$ 184,102	$ 743,902	$ 14,300	$ 1,144,152

13. Long-term debt

	Interest rates	2018	2017
Payable to Municipal Finance Corporation (MFC)			
Water	1.040% to 6.750%	**$ 63,181**	$ 68,380
Halifax Harbour Solutions	0.900% to 4.329%	**7,800**	8,450
Wastewater/stormwater	1.040% to 4.500%	**86,209**	85,120
Stormwater	1.040% to 4.114%	**11,723**	11,985
		168,913	173,935
Payable to Halifax Regional Municipality			
MFC Wastewater/stormwater	1.200% to 4.940%	**45,500**	52,066
		214,413	226,001
Less: debt issue costs		**(912)**	(1,033)
		213,501	224,968
Less: amount payable within one year		**(22,630)**	(21,669)
		$ 190,871	$ 203,299

The debentures are repayable in fixed annual or semi-annual principal instalments plus interest payable semi-annually. Principal instalments for the next five years are as follows:

2019	$ 22,630
2020	$ 23,759
2021	$ 18,084
2022	$ 16,039
2023	$ 40,752

14. Operating expenditures by nature

	2018	2017
Salaries and benefits	**$ 41,948**	$ 39,839
Training	**618**	656
Contract services	**13,619**	12,118
Electricity	**6,323**	6,295
Operating supplies	**9,945**	9,423
Professional services	**4,559**	4,768
Chemicals	**4,698**	4,404
Depreciation and amortization	**43,106**	44,670
	$ 124,816	$ 122,173

Halifax Regional Water Commission
Schedule of utility plant in service

Schedule A

Year ended March 31, 2018 (in thousands)

Water

	Land	Structures and improvements	Pumping equipment	Purification equipment	SCADA equipment	Transmission and distribution mains	Services	Meters	Hydrants	Aerotech and small systems	Tools and work equipment	Total
Cost												
Beginning balance, April 1, 2017												
Cost	$ 15,417	$ 92,334	$ 9,720	$ 23,771	$ 5,046	$ 350,101	$ 35,633	$ 14,920	$ 19,332	$ 9,564	$ 26,871	**$ 602,709**
Additions	592	2,997	593	1,451	125	22,706	1,608	1,501	585	270	4,001	**36,429**
Disposals	-	(5)	(10)	-	-	(13)	-	(839)	-	-	(2,748)	**(3,615)**
Total cost, March 31, 2018	16,009	95,326	10,303	25,222	5,171	372,794	37,241	15,582	19,917	9,834	28,124	**635,523**
Accumulated depreciation												
Beginning balance, April 1, 2017	-	28,034	7,028	15,478	3,689	80,244	6,377	5,950	3,902	2,922	18,309	**171,933**
Depreciation	-	1,526	263	1,013	171	4,675	612	125	305	328	(914)	**8,104**
Total accumulated depreciation, March 31, 2018	-	29,560	7,291	16,491	3,860	84,919	6,989	6,075	4,207	3,250	17,395	**180,037**
Net book value, March 31, 2018	$ 16,009	$ 65,766	$ 3,012	$ 8,731	$ 1,311	$ 287,875	$ 30,252	$ 9,507	$ 15,710	$ 6,584	$ 10,729	**$ 455,486**
Cost												
Beginning balance, April 1, 2016												
Cost	$ 15,297	$ 87,643	$ 9,711	$ 22,901	$ 4,792	$ 343,510	$ 34,082	$ 14,442	$ 18,887	$ 9,467	$ 23,876	$ 584,608
Additions	120	5,486	9	870	254	6,977	1,551	701	445	97	3,336	19,846
Disposals	-	(795)	-	-	-	(386)	-	(223)	-	-	(341)	(1,745)
Total cost, March 31, 2017	15,417	92,334	9,720	23,771	5,046	350,101	35,633	14,920	19,332	9,564	26,871	602,709
Accumulated depreciation												
Beginning balance, April 1, 2016	-	25,551	6,778	14,522	3,545	76,018	5,795	5,480	3,605	2,648	17,117	161,059
Depreciation	-	2,483	250	956	144	4,226	582	470	297	274	1,192	10,874
Total accumulated depreciation, March 31, 2017	-	28,034	7,028	15,478	3,689	80,244	6,377	5,950	3,902	2,922	18,309	171,933
Net book value, March 31, 2017	$ 15,417	$ 64,300	$ 2,692	$ 8,293	$ 1,357	$ 269,857	$ 29,256	$ 8,970	$ 15,430	$ 6,642	$ 8,562	$ 430,776

Schedules are presented in accordance with the NSUARB Accounting and Reporting Handbook for Water Utilities (Handbook).

Utility plant in service under IFRS differs from the Handbook due to exclusion of intangible assets, componentization of certain assets and useful lives for depreciation.

Halifax Regional Water Commission
Schedule of utility plant in service
Year ended March 31, 2018 (in thousands)

Schedule A

Wastewater

	Land	Structures and improvements	Pumping equipment	Treatment equipment	SCADA equipment	Collection system	Laterals	Meters	Tools and work equipment	Aerotech and small systems	Total
Cost											
Beginning balance, April 1, 2017											
Cost	$ 5,329	$ 175,208	$ 17,579	$ 161,122	$ 8,210	$ 290,169	$ 19,108	$ -	$ 25,407	$ 12,089	**$ 714,221**
Additions	-	1,003	3,387	1,377	197	29,640	2,790	1,501	7,665	475	**48,035**
Disposals	-	(5)	-	-	-	-		-	(143)		**(148)**
Total cost, March 31, 2018	5,329	176,206	20,966	162,499	8,407	319,809	21,898	1,501	32,929	12,564	**762,108**
Accumulated depreciation											
Beginning balance, April 1, 2017	-	53,697	6,577	47,255	1,366	57,418	1,502	-	11,573	3,450	**182,838**
Depreciation	-	4,319	712	8,035	503	4,186	410	38	2,421	443	**21,067**
Total accumulated depreciation, March 31, 2018	-	58,016	7,289	55,290	1,869	61,604	1,912	38	13,994	3,893	**203,905**
Net book value, March 31, 2018	$ 5,329	$ 118,190	$ 13,677	$ 107,209	$ 6,538	$ 258,205	$ 19,986	1,463	$ 18,935	$ 8,671	**$ 558,203**
Cost											
Beginning balance, April 1, 2016											
Cost	$ 5,187	$ 172,048	$ 16,870	$ 159,921	$ 7,777	$ 283,562	$ 16,170	$ -	$ 22,401	$ 11,994	$ 695,930
Additions	142	3,160	709	1,201	433	6,607	2,938	-	3,508	95	18,793
Disposals	-	-	-	-	-	-	-	-	(502)	-	(502)
Total cost, March 31, 2017	5,329	175,208	17,579	161,122	8,210	290,169	19,108	-	25,407	12,089	714,221
Accumulated depreciation											
Beginning balance, April 1, 2016	-	48,798	5,962	39,289	910	53,469	1,149	-	9,877	3,021	162,475
Depreciation	-	4,899	615	7,966	456	3,949	353	-	1,696	429	20,363
Total accumulated depreciation, March 31, 2017	-	53,697	6,577	47,255	1,366	57,418	1,502	-	11,573	3,450	182,838
Net book value, March 31, 2017	$ 5,329	$ 121,511	$ 11,002	$ 113,867	$ 6,844	$ 232,751	$ 17,606	$ -	$ 13,834	$ 8,639	$ 531,383

Schedules are presented in accordance with the NSUARB Accounting and Reporting Handbook for Water Utilities (Handbook).

Utility plant in service under IFRS differs from the Handbook due to exclusion of intangible assets, componentization of certain assets and useful lives for depreciation.

Halifax Regional Water Commission
Schedule of utility plant in service
Year ended March 31, 2018 (in thousands)

Schedule A

Stormwater

	Structures and improvements	Collection system	Laterals	Tools and work equipment	Total
Cost					
Beginning balance, April 1, 2017					
Cost	$ 9,785	$ 227,751	$ 4,611	$ 3,045	**$ 245,192**
Additions	11	17,696	285	767	**18,759**
Disposals	-	-	-	-	**-**
Total cost, March 31, 2018	9,796	245,447	4,896	3,812	**263,951**
Accumulated depreciation					
Beginning balance, April 1, 2017	1,402	36,380	301	870	**38,953**
Depreciation	177	5,889	95	477	**6,638**
Total accumulated depreciation, March 31, 2018	1,579	42,269	396	1,347	**45,591**
Net book value, March 31, 2018	$ 8,217	$ 203,178	$ 4,500	$ 2,465	**$ 218,360**
Cost					
Beginning balance, April 1, 2016					
Cost	$ 9,705	$ 218,501	$ 3,929	$ 2,034	$ 234,169
Additions	80	9,250	682	1,011	11,023
Disposals	-	-	-	-	-
Total cost, March 31, 2017	9,785	227,751	4,611	3,045	245,192
Accumulated depreciation					
Beginning balance, April 1, 2016	1,226	30,690	216	504	32,636
Depreciation	176	5,690	85	366	6,317
Total accumulated depreciation, March 31, 2017	1,402	36,380	301	870	38,953
Net book value, March 31, 2017	$ 8,383	$ 191,371	$ 4,310	$ 2,175	$ 206,239

During the year, $267 of interest was capitalized to Utility Plant in Service (2017 - $491).

Cumulative utility plant in service	**Water**	**Wastewater**	**Stormwater**	**Total**
Net book value, March 31, 2018	**$ 455,486**	**$ 558,203**	**$ 218,360**	**$ 1,232,049**
Net book value, March 31, 2017	$ 430,776	$ 531,383	$ 206,239	$ 1,168,398

Schedules are presented in accordance with the NSUARB Accounting and Reporting Handbook for Water Utilities (Handbook).

Utility plant in service under IFRS differs from the Handbook due to exclusion of intangible assets, componentization of certain assets and useful lives for depreciation.

Halifax Regional Water Commission — Schedule B

Schedule of long term debt

Year ended March 31, 2018 (in thousands)

	Interest rate	Final Maturity	Balance Remaining 2018	2017
Payable to Municipal Finance Corporation				
Water				
Debenture 23 A 1	4.250% to 6.125%	2018	**$ 600**	$ 700
Debenture 27 A 1	4.650% to 5.010%	2017	**-**	1,108
Debenture 28 A 1	6.500% to 6.750%	2018	**1,100**	1,200
Debenture 98 A 1	3.750% to 5.088%	2019	**3,671**	7,128
Debenture 29 A 1	0.900% to 4.329%	2019	**450**	675
Debenture 30 A 1	1.550% to 3.870%	2020	**525**	700
Debenture 31 A 1	1.630% to 4.221%	2021	**600**	750
Debenture 32 A 1	1.636% to 3.480%	2022	**1,000**	1,200
Debenture 32 C 1	1.510% to 3.160%	2022	**8,051**	8,587
Debenture 33 A 1	1.330% to 3.489%	2023	**8,090**	8,595
Debenture 33 B 1	1.285% to 4.114%	2023	**5,930**	6,300
Debenture 34 B 1	1.200% to 3.190%	2024	**11,622**	12,305
Debenture 35 B 1	1.040% to 2.894%	2025	**12,120**	12,794
Debenture 36 A 1	1.150% to 2.925%	2026	**1,800**	2,000
Debenture 36 B 1	1.150% to 2.506%	2026	**4,122**	4,338
Debenture 37 A 1	1.734% to 3.073%	2027	**3,500**	-
Halifax Harbour Solutions				
Debenture 29 A 1	0.900% to 4.329%	2019	**7,800**	8,450
Wastewater/stormwater				
Debenture 30 A 1	1.510% to 4.500%	2020	**2,210**	2,380
Debenture 32 A 1	1.636% to 3.480%	2022	**1,797**	1,917
Debenture 32 B 1	1.380% to 3.156%	2022	**24,000**	25,600
Debenture 32 C 1	1.510% to 3.160%	2022	**3,447**	3,676
Debenture 33 A 1	1.330% to 3.489%	2023	**13,488**	14,331
Debenture 33 B 1	1.285% to 4.114%	2023	**8,714**	9,259
Debenture 34 A 1	1.245% to 3.347%	2024	**4,734**	5,012
Debenture 34 B 1	1.200% to 3.190%	2024	**7,298**	7,727
Debenture 35 B 1	1.040% to 2.894%	2025	**12,699**	13,405
Debenture 36 B 1	1.150% to 2.506%	2026	**1,722**	1,813
Debenture 37 A 1	1.735% to 3.073%	2027	**6,100**	-
Stormwater				
Debenture 33 A 1	1.330% to 3.489%	2023	**432**	459
Debenture 33 B 1	1.285% to 4.114%	2023	**2,111**	2,243
Debenture 34 B 1	1.200% to 3.190%	2024	**5,017**	5,313
Debenture 35 B 1	1.040% to 2.894%	2025	**2,907**	3,069
Debenture 36 B 1	1.150% to 2.506%	2026	**856**	901
Debenture 37 A 1	1.734% to 3.073%	2027	**400**	-
			168,913	173,935
Payable to Halifax Regional Municipality				
Municipal Finance Corporation – Wastewater/stormwater				
Debenture 24 B 1	2.840% to 5.940%	2024	**38,500**	44,000
Debenture 27 A 1	4.650% to 5.010%	2017	**-**	66
Debenture 34 B 1	1.200% to 3.190%	2024	**7,000**	8,000
			45,500	52,066
			214,413	226,001
Less: debt issue costs			**(912)**	(1,033)
			213,501	224,968
Less: amount payable within one year			**(22,630)**	(21,669)
			$ 190,871	$ 203,299

The debentures are repayable in fixed annual or semi-annual principal instalments plus interest payable semi-annually. Principal instalments for the next five years are as follows:

2019	$ 22,630
2020	$ 23,759
2021	$ 18,084
2022	$ 16,039
2023	$ 40,752

Halifax Regional Water Commission
Schedule of operations for water service

Schedule C

Year ended March 31, 2018 (in thousands)

	2018	2017
Operating revenues		
Water service	**$ 47,220**	$ 47,183
Fire protection	**7,074**	7,074
Private fire protection services	**856**	831
Other operating revenue		
Bulk water stations	**304**	330
Customer late payment fees	**220**	282
Miscellaneous	**176**	153
	55,850	55,853
Operating expenditures		
Water supply and treatment	**8,645**	8,050
Water transmission and distribution	**9,410**	8,997
Engineering and information services	**3,850**	3,828
Regulatory services	**496**	493
Customer service	**2,348**	2,290
Administration and pension	**6,910**	5,966
Depreciation	**8,550**	7,756
	40,209	37,380
Earnings from operations before financial and other revenues and expenditures	**15,641**	18,473
Financial and other revenues		
Interest	**313**	351
Other	**485**	375
	798	726
Financial and other expenditures		
Interest on long term debt	**2,131**	2,378
Repayment of long term debt	**8,247**	8,400
Amortization of debt discount	**94**	95
Grant in lieu of taxes	**4,774**	4,578
Other	**149**	17
	15,395	15,468
Earnings for the year	**$ 1,044**	$ 3,731

Schedules are presented in accordance with the NSUARB Accounting and Reporting Handbook for Water Utilities (Handbook).

Halifax Regional Water Commission — Schedule D

Schedule of operations for wastewater service

Year ended March 31, 2018 (in thousands)

	2018	2017
Operating revenues		
Wastewater service	**$ 69,994**	$ 69,475
Other operating revenue		
Leachate and other contract revenue	**417**	440
Septage tipping fees	**812**	909
Over strength surcharge	**219**	23
Customer late payment fees	**169**	189
Miscellaneous	**471**	428
	72,082	71,464
Operating expenditures		
Wastewater collection	**12,644**	11,639
Wastewater treatment	**19,647**	19,793
Engineering and information services	**3,419**	3,223
Regulatory services	**929**	1,095
Customer service	**2,270**	1,842
Administration and pension	**4,853**	5,017
Depreciation	**11,905**	10,669
	55,667	53,278
Earnings from operations before financial and other revenues and expenditures	**16,415**	18,186
Financial and other revenues		
Interest	**311**	351
Other	**3,307**	2,168
	3,618	2,519
Financial and other expenditures		
Interest on long term debt	**5,185**	5,509
Repayment of long term debt	**11,747**	11,699
Amortization of debt discount	**98**	95
Other	**120**	32
	17,150	17,335
Earnings for the year	**$ 2,883**	$ 3,370

Schedules are presented in accordance with the NSUARB Accounting and Reporting Handbook for Water Utilities (Handbook).

Halifax Regional Water Commission — Schedule E

Schedule of operations for stormwater service

Year ended March 31, 2018 (in thousands)

	2018	2017
Operating revenues		
Stormwater site generated service	**$ 6,169**	$ 6,661
Stormwater right-of-way service	**3,847**	3,881
Other operating revenue		
Customer late payment fees	**93**	51
Miscellaneous	**105**	88
	10,214	10,681
Operating expenditures		
Stormwater collection	**4,842**	4,096
Engineering and information services	**556**	525
Regulatory services	**1,304**	768
Customer service	**278**	300
Administration and pension	**789**	816
Depreciation	**807**	677
	8,576	7,182
Earnings from operations before financial and other revenue and expenditures	**1,638**	3,499
Financial and other revenues		
Investment income	**70**	78
Financial and other expenditures		
Interest on long term debt	**568**	588
Repayment of long term debt	**1,253**	1,221
Amortization of debt discount	**10**	9
	1,831	1,818
(Loss) earnings for the year	**$ (123)**	$ 1,759

Schedules are presented in accordance with the NSUARB Accounting and Reporting Handbook for Water Utilities (Handbook).

Halifax Regional Water Commission
Schedule of regulated activities

Schedule F

Year ended March 31, 2018 (in thousands)

	2018	2017
Operating revenues		
Water service	**$ 47,220**	$ 47,183
Wastewater service	**69,994**	69,475
Stormwater service	**10,016**	10,542
Public fire protection	**7,074**	7,074
Private fire protection services	**856**	831
Other operating revenue	**1,230**	1,207
	136,390	136,312
Operating expenditures		
Water supply and treatment	**9,802**	9,137
Water transmission and distribution	**10,810**	10,411
Wastewater collection	**11,252**	10,347
Stormwater collection	**4,793**	4,039
Wastewater treatment	**18,054**	17,797
Engineering and information services	**7,265**	7,576
Regulatory services	**3,291**	2,356
Customer service	**4,861**	4,396
Administration and pension	**12,501**	11,768
Depreciation	**21,241**	19,095
	103,870	96,922
Earnings from operations before financial and other revenues and expenditures	**32,520**	39,390
Financial and other revenues		
Interest	**694**	780
Other	**3,096**	2,289
	3,790	3,069
Financial and other expenditures		
Interest on long term debt	**7,884**	8,475
Repayment of long term debt	**21,247**	21,320
Amortization of debt discount	**202**	199
Grant in lieu of taxes	**4,774**	4,578
	34,107	34,572
Earnings for the year	**$ 2,203**	$ 7,887

Schedules are presented in accordance with the NSUARB Accounting and Reporting Handbook for Water Utilities (Handbook).

Halifax Regional Water Commission
Schedule of unregulated activities
Year ended March 31, 2018 (in thousands)

Schedule F

	2018	2017
Operating revenues		
Dewatering	**$ 210**	$ 210
Septage tipping fees	**812**	909
Leachate treatment and contract revenue	**417**	440
Airplane effluent	**121**	89
Other operating revenue	**196**	196
	1,756	1,844
Operating expenditures		
Water supply and treatment	**18**	16
Wastewater treatment	**456**	830
Other	**87**	111
Depreciation	**21**	6
	582	963
Earnings from operations before financial and other revenues and expenditures	**1,174**	881
Financial and other revenues		
Other	**696**	139
Financial and other expenditures		
Other	**269**	49
Earnings for the year	**$ 1,601**	$ 971

Schedules are presented in accordance with the NSUARB Accounting and Reporting Handbook for Water Utilities (Handbook).

Halifax Regional Water Commission
Nova Scotia Utility and Review Board information

Schedule G

Year ended March 31, 2018 (in thousands)

Return on rate base	**2018**	2017
Rate of return on rate base for water service	**3.39%**	4.54%
Rate of return on rate base for wastewater service	**5.65%**	6.71%
Rate of return on rate base for stormwater service	**3.45%**	11.78%

Special purpose reserves

	Wastewater & Stormwater Reserves	RDC Water Reserve	RDC Wastewater Reserve	Other Capital Reserves	**2018 Total**	2017 Total
Reserve, beginning of year	$ 3,819	$ 1,246	$ 11,842	$ 5	**$ 16,912**	$ 8,070
Contributions and interest	-	1,086	10,075	1	**11,162**	9,230
Expenditures	(213)	-	-	-	**(213)**	(388)
Reserve, end of year	$ 3,606	$ 2,332	$ 21,917	$ 6	**$ 27,861**	$ 16,912

Summarized consolidated operating results

	Actual 2018	Actual 2017
Operating revenues	**$ 138,145**	$ 137,997
Operating expenditures	**99,437**	97,839
Earnings from operations before financial and other revenues and expenditures	**38,708**	40,158
Non-operating revenues	**4,486**	3,322
Non-operating expenditures	**34,376**	34,622
Earnings for the year	**$ 8,818**	$ 8,858

Schedules are presented in accordance with the NSUARB Accounting and Reporting Handbook for Water Utilities (Handbook).

HALIFAX WATER
UNAUDITED BALANCE SHEET - CONSOLIDATED
AS OF MARCH 31, 2018

	2018 '000	2017 '000
ASSETS		
Cash	$51,470	$55,879
Accounts Receivable	$39,408	$32,359
Materials & Supplies	$1,443	$1,601
Prepaid Expenses	$1,013	$867
	$93,333	$90,705
Regulatory Asset	$3,197	$3,388
Plant in Service	$1,231,848	$1,168,398
Assets Under Construction	$24,550	$28,406
	$1,259,595	$1,200,192
Unamortized Debt Discount & Issue Expense	$912	$1,033
	$1,353,841	**$1,291,930**
LIABILITIES & CAPITAL		
Trade Payables & Accrued Liabilities	$27,183	$19,185
Deposits & Unearned Revenue	$770	$977
Current Portion of Long Term Debt	$22,630	$21,669
	$50,583	$41,831
Pension & Accrued Retirement Benefits	$69,899	$62,645
RDC & Special Purpose Reserves	$25,470	$14,522
Long Term Debt	$191,783	$204,333
Total Liabilities	$337,736	$323,331
Capital Surplus, Committed Reserves, & Accumulated OCI	$995,624	$951,922
Operating Surplus	$16,677	$7,819
Excess (Deficiency) of Revenue over Expenditure - Consolidated	$3,804	$8,858
Total Capital & Surplus	$1,016,105	$968,599
	$1,353,841	**$1,291,930**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - CONSOLIDATED
APRIL 1/17 - MARCH 31/18 (12 MONTHS)
100.00%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/17 MAR 31/18 BUDGET* '000	APR 1/17 MAR 31/18 FORECAST '000	% of FORECAST
$11,667	$11,519	**OPERATING REVENUE**	$138,145	$137,997	$135,587	$137,266	100.64%
$11,541	$11,407	**OPERATING EXPENSES**	$99,437	$92,822	$101,883	$96,142	103.43%
$126	**$112**	**OPERATING PROFIT**	**$38,708**	**$45,175**	**$33,704**	**$41,124**	**94.13%**
		FINANCIAL REVENUE					
$79	$46	INVESTMENT INCOME	$694	$780	$346	$679	102.22%
$167	$167	PNS FUNDING HHSP DEBT	$2,000	$2,000	$2,000	$2,000	100.00%
$64	$77	MISCELLANEOUS	$1,793	$542	$441	$1,850	96.87%
$309	**$289**		**$4,486**	**$3,322**	**$2,787**	**$4,529**	**99.05%**
		FINANCIAL EXPENSES					
$628	$683	LONG TERM DEBT INTEREST	$7,884	$8,475	$9,530	$7,904	99.75%
$1,795	$1,843	LONG TERM DEBT PRINCIPAL	$21,247	$21,320	$24,289	$21,426	99.16%
$17	$17	AMORTIZATION DEBT DISCOUNT	$202	$199	$217	$200	100.97%
$398	$360	DIVIDEND/GRANT IN LIEU OF TAXES	$4,774	$4,578	$4,827	$4,774	100.00%
$171	$5	MISCELLANEOUS	$269	$49	$19	$158	170.07%
$3,009	**$2,908**		**$34,376**	**$34,622**	**$38,882**	**$34,462**	**99.75%**
($2,573)	**($2,507)**	**NET PROFIT (LOSS) BEFORE OTHER COMPREHENSIVE INCOME**	**$8,819**	**$13,875**	**($2,392)**	**$11,191**	**78.80%**
		NON NSUARB ITEMS					
($430)	($2,188)	PENSION PLAN EXPENSE	($5,015)	($5,017)	($4,358)	($4,358)	115.07%
($3,771)	$743	OTHER COMPREHENSIVE INCOME	($1,750)	$743	$0	$2,204	-79.39%
($4,201)	**($1,444)**		**($6,765)**	**($4,273)**	**($4,358)**	**($2,154)**	**314.10%**
($6,774)	**($3,951)**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$2,054**	**$9,601**	**($6,750)**	**$9,037**	**22.73%**

HALIFAX WATER
UNAUDITED BALANCE SHEET
AS OF MARCH 31, 2018

	2018 '000	2017 '000
ASSETS		
Cash	$51,470	$55,879
Accounts Receivable		
Customers & Contractual	$17,494	$13,321
Customers & Contractual - Unbilled Services	$16,640	$17,158
Halifax Regional Municipality	$5,275	$1,880
Materials & Supplies	$1,443	$1,601
Prepaid Expenses	$1,013	$867
	$93,333	$90,705
Regulatory Asset	$3,197	$3,388
Plant in Service - Water	$635,526	$602,711
Plant in Service - Wastewater	$762,108	$714,221
Plant in Service - Stormwater	$263,952	$245,193
Less: Accumulated Depreciation - Water	($179,463)	($171,935)
Accumulated Depreciation - Wastewater	($204,664)	($182,839)
Accumulated Depreciation - Stormwater	($45,611)	($38,953)
	$1,235,045	$1,171,787
Assets Under Construction	$24,550	$28,406
	$1,259,595	$1,200,192
Unamortized Debt Discount & Issue Expense	$912	$1,033
	$1,353,841	**$1,291,930**
LIABILITIES & CAPITAL		
Trade	$22,715	$16,790
Interest on Long Term Debt	$2,030	$2,101
Halifax Regional Municipality	$2,439	$295
Contractor & Customer Deposits	$186	$191
Unearned Revenue	$584	$786
Current Portion of Long Term Debt	$22,630	$21,669
	$50,583	$41,831
Accrued Post-Retirement Benefits	$430	$341
Accrued Pre-Retirement Benefit	$3,983	$3,824
Deferred Pension Liability	$65,486	$58,480
Special Purpose Reserves not allocated to projects	$1,222	$1,434
Regional Development Charge	$24,249	$13,088
Long Term Debt-Water	$53,697	$59,599
Long Term Debt-Wastewater	$127,043	$133,409
Long Term Debt-Stormwater	$11,043	$11,324
Total Liabilities	$337,736	$323,331
Capital Surplus	$1,025,797	$980,344
Committed Reserves	$2,391	$2,391
Accumulated Other Comprehensive Income	($44,943)	($43,193)
Operating Surplus used to Fund Capital	$12,380	$12,380
Operating Surplus	$16,677	$7,819
Excess (Deficiency) of Revenue over Expenditure - Consolidated	$3,804	$8,858
Total Capital & Surplus	$1,016,105	$968,599
	$1,353,841	**$1,291,930**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - ALL SERVICES
APRIL 1/17 - MARCH 31/18 (12 MONTHS)
100.00%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/17 MAR 31/18 BUDGET* '000	APR 1/17 MAR 31/18 FORECAST '000	% of BUDGET*	% of FORECAST
		REVENUE						
$4,011	$3,890	METERED SALES - WATER	$47,220	$47,183	$46,610	$46,610	101.31%	101.31%
$6,014	$5,806	METERED SALES - WASTEWATER	$69,994	$69,475	$67,756	$69,256	103.30%	101.07%
$338	$601	STORMWATER SITE GENERATED SERVICE	$6,169	$6,661	$6,700	$6,700	92.07%	92.07%
$590	$590	FIRE PROTECTION	$7,074	$7,074	$7,074	$7,074	100.00%	100.00%
$321	$323	STORMWATER RIGHT OF WAY SERVICE	$3,847	$3,881	$3,881	$3,847	99.10%	100.00%
$238	$223	OTHER SERVICES AND FEES	$2,937	$2,831	$2,716	$2,971	108.14%	98.86%
$130	$58	CUSTOMER LATE PAY./COLLECTION FEES	$482	$522	$491	$401	98.28%	120.35%
$26	$28	MISCELLANEOUS	$422	$369	$358	$407	117.93%	103.72%
$11,667	**$11,519**		**$138,145**	**$137,997**	**$135,587**	**$137,266**	**101.89%**	**100.64%**
		EXPENSES						
$605	$792	WATER SUPPLY & TREATMENT	$7,517	$7,028	$8,565	$7,338	87.76%	102.45%
$573	$536	TRANSMISSION & DISTRIBUTION	$8,591	$8,198	$8,969	$8,108	95.78%	105.95%
$1,209	$1,948	WASTEWATER COLLECTION	$11,287	$10,347	$9,653	$9,703	116.93%	116.33%
$1,658	$2,122	WASTEWATER TREATMENT PLANTS	$18,054	$17,797	$19,251	$18,161	93.78%	99.41%
$360	$471	STORMWATER COLLECTION	$4,797	$4,053	$4,589	$4,437	104.54%	108.11%
$294	$249	SMALL SYSTEMS AND OTHER SERVICES	$2,721	$3,018	$3,170	$2,834	85.84%	96.02%
$224	$204	SCADA, CONTROL & PUMPING	$2,219	$2,134	$2,210	$2,080	100.43%	106.70%
$949	$666	ENGINEERING & INFORMATION SERVICES	$7,265	$6,725	$7,504	$7,064	96.80%	102.83%
$248	$393	REGULATORY SERVICES	$3,291	$3,207	$3,710	$3,327	88.68%	98.89%
$522	$490	CUSTOMER SERVICE	$4,896	$4,431	$4,626	$4,626	105.83%	105.83%
$1,877	$1,220	ADMINISTRATION & PENSION	$7,538	$6,782	$7,096	$6,896	106.22%	109.31%
$3,022	$2,315	DEPRECIATION	$21,262	$19,101	$22,538	$21,568	94.34%	98.58%
$11,541	**$11,407**		**$99,437**	**$92,822**	**$101,883**	**$96,142**	**97.60%**	**103.43%**
$126	**$112**	**OPERATING PROFIT**	**$38,708**	**$45,175**	**$33,704**	**$41,124**	**114.85%**	**94.13%**
		FINANCIAL REVENUE						
$79	$46	INVESTMENT INCOME	$694	$780	$346	$679	200.72%	102.22%
$167	$167	PNS FUNDING HHSP DEBT	$2,000	$2,000	$2,000	$2,000	100.00%	100.00%
$64	$77	MISCELLANEOUS	$1,793	$542	$441	$1,850	406.25%	96.87%
$309	**$289**		**$4,486**	**$3,322**	**$2,787**	**$4,529**	**160.98%**	**99.05%**
		FINANCIAL EXPENSES						
$628	$683	LONG TERM DEBT INTEREST	$7,884	$8,475	$9,530	$7,904	82.73%	99.75%
$1,795	$1,843	LONG TERM DEBT PRINCIPAL	$21,247	$21,320	$24,289	$21,426	87.48%	99.16%
$17	$17	AMORTIZATION DEBT DISCOUNT	$202	$199	$217	$200	93.07%	100.97%
$398	$360	DIVIDEND/GRANT IN LIEU OF TAXES	$4,774	$4,578	$4,827	$4,774	98.90%	100.00%
$171	$5	MISCELLANEOUS	$269	$49	$19	$158	1399.61%	170.07%
$3,009	**$2,908**		**$34,376**	**$34,622**	**$38,882**	**$34,462**	**88.41%**	**99.75%**
($2,573)	**($2,507)**	**NET PROFIT (LOSS) BEFORE OTHER COMPREHENSIVE INCOME**	**$8,819**	**$13,875**	**($2,392)**	**$11,191**	**468.75%**	**78.80%**
		NON NSUARB ITEMS						
($430)	($2,188)	PENSION PLAN EXPENSE	($5,015)	($5,017)	($4,358)	($4,358)	115.07%	115.07%
($3,771)	$743	OTHER COMPREHENSIVE INCOME	($1,750)	$743	$0	$2,204	0.00%	-79.39%
($4,201)	**($1,444)**		**($6,765)**	**($4,273)**	**($4,358)**	**($2,154)**	**155.23%**	**314.10%**
($6,774)	**($3,951)**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$2,054**	**$9,601**	**($6,750)**	**$9,037**	**130.43%**	**22.73%**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - WATER OPERATIONS
APRIL 1/17 - MARCH 31/18 (12 MONTHS)
100.00%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/17 MAR 31/18 BUDGET* '000	APR 1/17 MAR 31/18 FORECAST '000	% of FORECAST
		REVENUE					
$4,011	$3,890	METERED SALES	$47,220	$47,183	$46,610	$46,610	101.31%
$590	$590	FIRE PROTECTION	$7,074	$7,074	$7,074	$7,074	100.00%
$75	$73	PRIVATE FIRE PROTECTION SERVICES	$856	$831	$857	$857	99.85%
$12	$15	BULK WATER STATIONS	$304	$330	$314	$305	99.62%
$21	$28	CUSTOMER LATE PAY./COLLECTION FEES	$220	$282	$212	$212	103.71%
$16	$12	MISCELLANEOUS	$176	$153	$139	$164	107.20%
$4,725	**$4,607**		**$55,850**	**$55,853**	**$55,207**	**$55,223**	**101.14%**
		EXPENSES					
$605	$792	WATER SUPPLY & TREATMENT	$7,517	$7,028	$8,565	$7,338	102.45%
$573	$536	TRANSMISSION & DISTRIBUTION	$8,591	$8,198	$8,969	$8,108	105.95%
$120	$67	SMALL SYSTEMS (inc. Contract Systems)	$1,128	$1,022	$1,073	$997	113.16%
$86	$81	SCADA, CONTROL & PUMPING	$819	$799	$873	$838	97.79%
$421	$316	ENGINEERING & INFORMATION SERVICES	$3,289	$2,977	$3,515	$3,350	98.19%
$52	$142	REGULATORY SERVICES	$1,057	$1,344	$1,374	$1,005	105.23%
$266	$281	CUSTOMER SERVICE	$2,348	$2,290	$2,357	$2,357	99.62%
$1,345	$1,674	ADMINISTRATION & PENSION	$6,910	$5,966	$5,836	$5,734	120.51%
$1,112	$958	DEPRECIATION	$8,550	$7,756	$9,218	$8,728	97.96%
$4,581	**$4,847**		**$40,210**	**$37,379**	**$41,781**	**$38,455**	**104.56%**
$144	**($240)**	**OPERATING PROFIT**	**$15,640**	**$18,474**	**$13,426**	**$16,768**	**93.27%**
		FINANCIAL REVENUE					
$36	$19	INVESTMENT INCOME	$313	$351	$156	$306	102.37%
$52	$37	MISCELLANEOUS	$485	$375	$428	$547	88.81%
$88	**$57**		**$798**	**$725**	**$583**	**$852**	**93.67%**
		FINANCIAL EXPENSES					
$155	$176	LONG TERM DEBT INTEREST	$2,131	$2,378	$2,683	$2,128	100.14%
$677	$732	LONG TERM DEBT PRINCIPAL	$8,247	$8,400	$9,012	$8,292	99.45%
$8	$8	AMORTIZATION DEBT DISCOUNT	$94	$95	$98	$93	100.82%
$398	$360	DIVIDEND/GRANT IN LIEU OF TAXES	$4,774	$4,578	$4,827	$4,774	100.00%
$61	$6	MISCELLANEOUS	$149	$17	$19	$158	94.35%
$1,299	**$1,282**		**$15,395**	**$15,468**	**$16,639**	**$15,445**	**99.67%**
($1,067)	**($1,465)**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$1,043**	**$3,731**	**($2,630)**	**$2,175**	**47.98%**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - WASTEWATER OPERATIONS
APRIL 1/17 - MARCH 31/18 (12 MONTHS)
100.00%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/17 MAR 31/18 BUDGET* '000	APR 1/17 MAR 31/18 FORECAST '000	% of FORECAST
		REVENUE					
$6,014	$5,806	METERED SALES	$69,994	$69,475	$67,756	$69,256	101.07%
$17	$0	WASTEWATER OVERSTRENGTH AGREEMENTS	$219	$23	$0	$205	106.61%
$35	$43	LEACHATE CONTRACT	$328	$357	$389	$389	84.33%
$8	$9	CONTRACT REVENUE	$89	$83	$86	$86	103.39%
$17	$17	DEWATERING FACILITY/SLUDGE LAGOON	$210	$210	$210	$210	99.99%
$32	$23	AIRLINE EFFLUENT	$121	$89	$86	$120	101.22%
$41	$42	SEPTAGE TIPPING FEES	$812	$909	$775	$800	101.45%
$15	$13	CUSTOMER LATE PAY./COLLECTION FEES	$169	$189	$240	$180	94.21%
$9	$10	MISCELLANEOUS	$140	$129	$129	$135	103.65%
$6,187	**$5,964**		**$72,081**	**$71,463**	**$69,670**	**$71,380**	**100.98%**
		EXPENSES					
$1,209	$1,948	WASTEWATER COLLECTION	$11,287	$10,347	$9,653	$9,703	116.33%
$1,658	$2,122	WASTEWATER TREATMENT PLANTS	$18,054	$17,797	$19,251	$18,161	99.41%
$126	$120	SMALL SYSTEMS	$1,175	$1,182	$1,276	$1,235	95.10%
$17	$24	DEWATERING FACILITY/ SLUDGE MGM'T	$134	$434	$380	$160	83.65%
($0)	$0	BIOSOLIDS TREATMENT	$1	$71	$101	$101	0.86%
$30	$38	LEACHATE CONTRACT	$283	$309	$341	$341	83.20%
$133	$120	SCADA, CONTROL & PUMPING	$1,355	$1,292	$1,306	$1,215	111.54%
$454	$301	ENGINEERING & INFORMATION SERVICES	$3,419	$3,223	$3,431	$3,195	107.02%
$62	$58	REGULATORY SERVICES	$929	$980	$1,094	$1,251	74.29%
$220	$179	CUSTOMER SERVICE	$2,270	$1,842	$2,064	$2,064	110.02%
$827	$1,491	ADMINISTRATION & PENSION	$4,853	$5,017	$4,833	$4,748	102.22%
$1,759	$1,220	DEPRECIATION	$11,905	$10,669	$12,465	$12,045	98.84%
$6,496	**$7,622**		**$55,667**	**$53,162**	**$56,194**	**$54,218**	**102.67%**
($309)	**($1,658)**	**OPERATING PROFIT**	**$16,415**	**$18,301**	**$13,476**	**$17,162**	**95.64%**
		FINANCIAL REVENUE					
$35	$20	INVESTMENT INCOME	$311	$351	$156	$306	101.94%
$167	$167	PNS FUNDING HHSP DEBT	$2,000	$2,000	$2,000	$2,000	100.00%
$12	$40	MISCELLANEOUS	$1,307	$168	$14	$1,304	100.25%
$213	**$226**		**$3,618**	**$2,519**	**$2,169**	**$3,609**	**100.25%**
		FINANCIAL EXPENSES					
$426	$457	LONG TERM DEBT INTEREST	$5,185	$5,509	$6,022	$5,206	99.60%
$1,010	$469	LONG TERM DEBT PRINCIPAL	$11,747	$11,699	$13,699	$11,881	98.87%
$8	$8	AMORTIZATION DEBT DISCOUNT	$98	$95	$107	$97	101.11%
$109	($0)	MISCELLANEOUS	$120	$32	$0	$0	0.00%
$1,554	**$933**		**$17,149**	**$17,335**	**$19,828**	**$17,183**	**99.80%**
($1,650)	**($2,365)**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$2,884**	**$3,484**	**($4,183)**	**$3,589**	**80.37%**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - STORMWATER OPERATIONS
APRIL 1/17 - MARCH 31/18 (12 MONTHS)
100.00%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/17 MAR 31/18 BUDGET* '000	APR 1/17 MAR 31/18 FORECAST '000	% of FORECAST
		REVENUE					
$338	$601	STORMWATER SITE GENERATED SERVICE	$6,169	$6,661	$6,700	$6,700	92.07%
$321	$323	STORMWATER RIGHT OF WAY SERVICE	$3,847	$3,881	$3,881	$3,847	100.00%
$95	$17	CUSTOMER LATE PAY./COLLECTION FEES	$93	$51	$39	$9	1011.00%
$1	$6	MISCELLANEOUS	$105	$88	$89	$107	98.46%
$755	**$948**		**$10,214**	**$10,681**	**$10,710**	**$10,663**	**95.79%**
		EXPENSES					
$360	$471	STORMWATER COLLECTION	$4,797	$4,053	$4,589	$4,437	108.11%
$4	$4	SCADA, CONTROL & PUMPING	$45	$43	$31	$27	164.79%
$74	$49	ENGINEERING & INFORMATION SERVICES	$556	$525	$558	$520	107.03%
$135	$193	REGULATORY SERVICES	$1,304	$884	$1,242	$1,071	121.68%
$36	$29	CUSTOMER SERVICE	$278	$300	$205	$205	135.07%
$135	$243	ADMINISTRATION & PENSION	$789	$816	$786	$772	102.23%
$150	$136	DEPRECIATION	$807	$677	$855	$795	101.50%
$893	**$1,126**		**$8,575**	**$7,298**	**$8,266**	**$7,828**	**109.55%**
($139)	**($178)**	**OPERATING PROFIT**	**$1,639**	**$3,383**	**$2,444**	**$2,835**	**57.79%**
		FINANCIAL REVENUE					
$8	$7	INVESTMENT INCOME	$70	$78	$35	$68	102.88%
$0	$0	MISCELLANEOUS	$0	$0	$0	$0	0.00%
$8	**$7**		**$70**	**$78**	**$35**	**$68**	**102.88%**
		FINANCIAL EXPENSES					
$47	$50	LONG TERM DEBT INTEREST	$568	$588	$825	$570	99.66%
$107	$643	LONG TERM DEBT PRINCIPAL	$1,253	$1,221	$1,577	$1,253	100.02%
$1	$1	AMORTIZATION DEBT DISCOUNT	$10	$9	$12	$10	100.89%
$156	**$693**		**$1,832**	**$1,818**	**$2,414**	**$1,833**	**99.91%**
($286)	**($864)**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**($124)**	**$1,643**	**$64**	**$1,070**	**111.56%**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - REGULATED AND UNREGULATED OPERATIONS
APRIL 1/17 - MARCH 31/18 (12 MONTHS)
100.00%

DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR	ACTUAL (YEAR TO DATE) LAST YEAR	APR 1/17 MAR 31/18 BUDGET*	APR 1/17 MAR 31/18 FORECAST	% of FORECAST
REGULATED ACTIVITIES					
REVENUE					
METERED SALES	$123,383	$123,319	$121,067	$122,567	100.67%
FIRE PROTECTION	$7,074	$7,074	$7,074	$7,074	100.00%
PRIVATE FIRE PROTECTION	$856	$831	$857	$857	99.85%
STORMWATER SERVICE	$3,847	$3,881	$3,881	$3,847	100.00%
OTHER OPERATING REVENUE	$1,389	$1,207	$1,141	$1,296	107.21%
	$136,549	**$136,312**	**$134,020**	**$135,641**	**100.67%**
EXPENSES					
WATER SUPPLY & TREATMENT	$7,517	$7,028	$8,565	$7,338	102.45%
TRANSMISSION & DISTRIBUTION	$8,591	$8,198	$8,969	$8,108	105.95%
WASTEWATER & STORMWATER COLLECTION	$16,046	$14,385	$14,241	$14,140	113.49%
WASTEWATER TREATMENT PLANTS	$18,054	$17,797	$19,251	$18,161	99.41%
SMALL SYSTEMS	$2,285	$2,188	$2,324	$2,208	103.53%
SCADA, CONTROL & PUMPING	$2,219	$2,134	$2,210	$2,080	106.70%
ENGINEERING & INFORMATION SERVICES	$7,265	$6,725	$7,504	$7,064	102.83%
REGULATORY SERVICES	$3,291	$3,207	$3,710	$3,327	98.89%
CUSTOMER SERVICE	$4,861	$4,396	$4,591	$4,591	105.87%
ADMINISTRATION & PENSION	$12,501	$11,768	$11,424	$11,233	111.28%
DEPRECIATION	$21,241	$19,095	$22,538	$21,568	98.48%
	$103,870	**$96,922**	**$105,330**	**$99,818**	**104.06%**
FINANCIAL REVENUE					
INVESTMENT INCOME	$694	$780	$346	$679	102.22%
MISCELLANEOUS	$2,938	$2,028	$2,083	$3,372	87.13%
	$3,632	**$2,808**	**$2,429**	**$4,051**	**89.65%**
FINANCIAL EXPENSES					
LONG TERM DEBT INTEREST	$7,884	$8,475	$9,530	$7,904	99.75%
LONG TERM DEBT PRINCIPAL	$21,247	$21,320	$24,289	$21,426	99.16%
AMORTIZATION DEBT DISCOUNT	$202	$199	$217	$200	100.97%
DIVIDEND/GRANT IN LIEU OF TAXES	$4,774	$4,578	$4,827	$4,774	100.00%
	$34,107	**$34,573**	**$38,863**	**$34,304**	**99.43%**
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	**$2,203**	**$7,626**	**($7,744)**	**$5,570**	**39.56%**
UNREGULATED ACTIVITIES					
REVENUE					
SEPTAGE TIPPING FEES	$812	$909	$775	$800	101.45%
LEACHATE CONTRACT	$328	$357	$389	$389	84.33%
CONTRACT REVENUE	$89	$83	$86	$86	103.39%
DEWATERING	$210	$210	$210	$210	99.99%
AIRLINE EFFLUENT	$121	$89	$86	$120	101.22%
ENERGY PROJECTS	$159	$159	$184	$184	86.52%
MISCELLANEOUS	$37	$37	$22	$22	172.71%
	$1,755	**$1,843**	**$1,750**	**$1,809**	**97.02%**
EXPENSES					
WATER SUPPLY & TREATMENT	$18	$16	$25	$25	71.12%
WASTEWATER TREATMENT	$456	$830	$821	$602	75.70%
SPONSORSHIPS & DONATIONS	$87	$66	$66	$56	157.16%
DEPRECIATION	$21	$6	$0	$0	0.00%
	$581	**$917**	**$912**	**$682**	**85.20%**
FINANCIAL REVENUE					
MISCELLANEOUS	$696	$355	$174	$295	236.11%
	$696	**$355**	**$174**	**$295**	**236.11%**
FINANCIAL EXPENSES					
MISCELLANEOUS	$269	$49	$19	$158	170.07%
	$269	$49	$19	$158	**170.07%**
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	**$1,600**	**$1,232**	**$994**	**$1,263**	**126.68%**
NET PROFIT (LOSS) AVAILABLE FOR TOTAL CAPITAL EXPENDITURES (REG & UNREG)	**$3,804**	**$8,858**	**($6,750)**	**$6,833**	**55.67%**

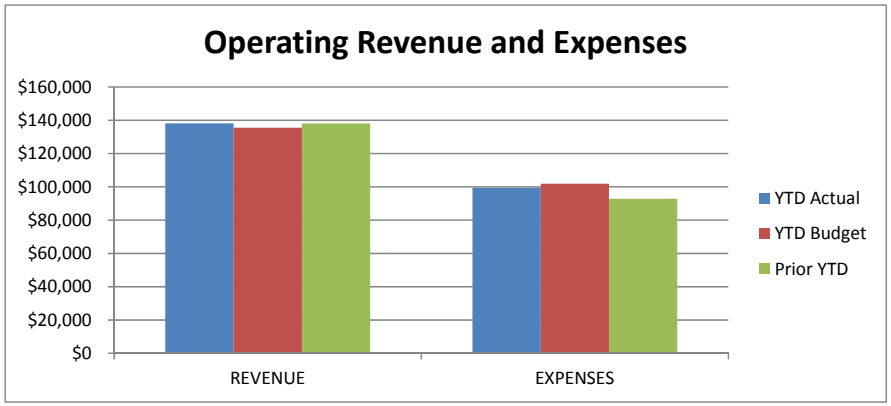
HALIFAX WATER
UNAUDITED BALANCE SHEET - IFRS FORMAT
AS OF MARCH 31, 2018

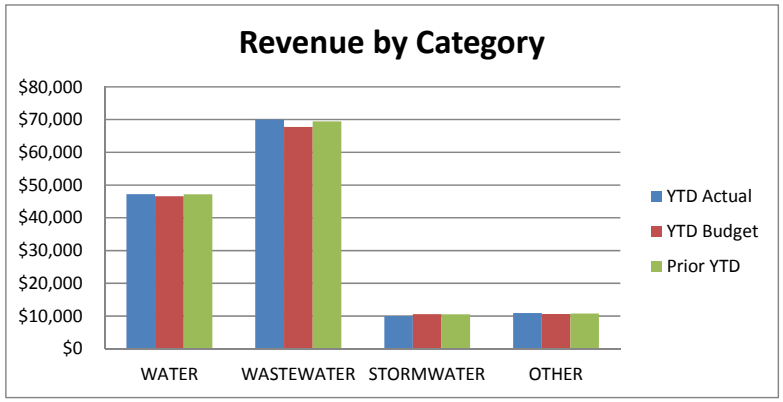
	2018 '000	2017 '000
ASSETS		
Cash	$51,470	$55,879
Accounts Receivable		
Customers & Contractual	$17,494	$13,321
Customers & Contractual - Unbilled Services	$16,640	$17,158
Halifax Regional Municipality	$5,275	$1,880
Materials & Supplies	$1,443	$1,601
Prepaid Expenses	$1,013	$867
	$93,333	$90,705
Regulatory Asset	$3,197	$3,388
Plant in Service - Water	$635,526	$602,711
Plant in Service - Wastewater	$762,108	$714,221
Plant in Service - Stormwater	$263,952	$245,193
Less: Accumulated Depreciation - Water	($188,838)	($178,449)
Accumulated Depreciation - Wastewater	($212,836)	($190,294)
Accumulated Depreciation - Stormwater	($45,605)	($38,953)
	$1,217,504	$1,157,817
Assets Under Construction	$24,550	$28,406
	$1,242,054	$1,186,223
Unamortized Debt Discount & Issue Expense	$912	$1,033
	$1,336,300	**$1,277,961**
LIABILITIES		
Trade	$22,715	$16,790
Interest on Long Term Debt	$2,030	$2,101
Halifax Regional Municipality	$2,439	$295
Contractor & Customer Deposits	$186	$191
Unearned Revenue	$584	$786
Current Portion of Deferred Contributed Capital	$13,405	$12,889
Current Portion of Long Term Debt	$22,630	$21,669
	$63,988	$54,720
Accrued Post-Retirement Benefits	$430	$341
Accrued Pre-Retirement Benefit	$3,983	$3,824
Deferred Pension Liability	$65,486	$58,480
Deferred Contributed Capital	$842,969	$808,633
Long Term Debt-Water	$53,697	$59,599
Long Term Debt-Wastewater	$127,043	$133,409
Long Term Debt-Stormwater	$11,043	$11,324
Total Liabilities	$1,168,639	$1,130,331
EQUITY		
Accumulated Other Comprehensive Income	($44,943)	($43,193)
Accumulated Surplus	$190,822	$167,607
Excess (Deficiency) of Revenue over Expenditure	$21,781	$23,216
Total Equity	$167,660	$147,630
	$1,336,300	**$1,277,961**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - IFRS FORMAT - ALL SERVICES
APRIL 1/17 - MARCH 31/18 (12 MONTHS)
100.00%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/17 MAR 31/18 BUDGET* '000	APR 1/17 MAR 31/18 FORECAST '000	% of BUDGET*	% of FORECAST
		REVENUE						
$4,011	$3,890	METERED SALES - WATER	$47,220	$47,183	$46,610	$46,610	101.31%	101.31%
$6,014	$5,806	METERED SALES - WASTEWATER	$69,994	$69,475	$67,756	$69,256	103.30%	101.07%
$338	$601	STORMWATER SITE GENERATED SERVICE	$6,169	$6,661	$6,700	$6,700	92.07%	92.07%
$590	$590	FIRE PROTECTION	$7,074	$7,074	$7,074	$7,074	100.00%	100.00%
$321	$323	STORMWATER RIGHT OF WAY SERVICE	$3,847	$3,881	$3,881	$3,847	99.10%	100.00%
$238	$223	OTHER SERVICES AND FEES	$2,937	$2,831	$2,716	$2,971	108.14%	98.86%
$130	$58	CUSTOMER LATE PAY./COLLECTION FEES	$482	$522	$491	$401	98.28%	120.35%
$26	$28	MISCELLANEOUS	$422	$369	$358	$407	117.93%	103.72%
$11,667	**$11,519**		**$138,145**	**$137,997**	**$135,587**	**$137,266**	**101.89%**	**100.64%**
		EXPENSES						
$605	$792	WATER SUPPLY & TREATMENT	$7,517	$7,028	$8,565	$7,338	87.76%	102.45%
$573	$536	TRANSMISSION & DISTRIBUTION	$8,591	$8,198	$8,969	$8,108	95.78%	105.95%
$1,209	$1,948	WASTEWATER COLLECTION	$11,287	$10,347	$9,653	$9,703	116.93%	116.33%
$1,658	$2,122	WASTEWATER TREATMENT PLANTS	$18,054	$17,797	$19,251	$18,161	93.78%	99.41%
$360	$471	STORMWATER COLLECTION	$4,797	$4,053	$4,589	$4,437	104.54%	108.11%
$294	$249	SMALL SYSTEMS AND OTHER SERVICES	$2,721	$3,018	$3,170	$2,834	85.84%	96.02%
$224	$204	SCADA, CONTROL & PUMPING	$2,219	$2,134	$2,210	$2,080	100.43%	106.70%
$949	$666	ENGINEERING & INFORMATION SERVICES	$7,265	$6,725	$7,504	$7,064	96.80%	102.83%
$248	$393	REGULATORY SERVICES	$3,291	$3,207	$3,710	$3,327	88.68%	98.89%
$522	$490	CUSTOMER SERVICE	$4,896	$4,431	$4,626	$4,626	105.83%	105.83%
$2,307	$3,407	ADMINISTRATION & PENSION	$12,553	$11,799	$11,455	$11,254	109.59%	111.54%
$1,326	$8,374	DEPRECIATION	$41,817	$43,625	$22,538	$35,063	185.54%	119.26%
$10,275	**$19,653**		**$125,007**	**$122,363**	**$106,241**	**$113,995**	**117.66%**	**109.66%**
$1,392	**($8,134)**	**OPERATING PROFIT**	**$13,138**	**$15,634**	**$29,346**	**$23,271**	**44.77%**	**56.46%**
		FINANCIAL REVENUE						
$79	$46	INVESTMENT INCOME	$694	$780	$346	$679	200.72%	102.22%
$167	$167	PNS FUNDING HHSP DEBT	$2,000	$2,000	$2,000	$2,000	100.00%	100.00%
$750	$5,274	MISCELLANEOUS	$19,165	$18,521	$441	$13,086	4343.43%	146.45%
$995	**$5,487**		**$21,858**	**$21,302**	**$2,787**	**$15,765**	**784.35%**	**138.65%**
		FINANCIAL EXPENSES						
$628	$683	LONG TERM DEBT INTEREST	$7,884	$8,475	$9,530	$7,904	82.73%	99.75%
$17	$17	AMORTIZATION DEBT DISCOUNT	$202	$199	$217	$200	93.07%	100.97%
$398	$360	DIVIDEND/GRANT IN LIEU OF TAXES	$4,774	$4,578	$4,827	$4,774	98.90%	100.00%
$377	$550	MISCELLANEOUS	$355	$466	$19	$158	1848.07%	224.57%
$1,420	**$1,609**		**$13,215**	**$13,719**	**$14,594**	**$13,036**	**90.56%**	**101.38%**
$967	**($4,257)**	**NET PROFIT (LOSS) BEFORE OTHER COMPREHENSIVE INCOME**	**$21,781**	**$23,216**	**$17,539**	**$26,000**	**124.19%**	**83.78%**
($3,771)	$743	**OTHER COMPREHENSIVE INCOME**	($1,750)	$743	$0	$2,204	0.00%	-79.39%
($2,804)	**($3,514)**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$20,031**	**$23,960**	**$17,539**	**$28,204**	**114.21%**	**71.02%**

HALIFAX WATER
UNAUDITED FINANCIAL INFORMATION
APRIL 1/17 - MARCH 31/18 (12 MONTHS)
'000



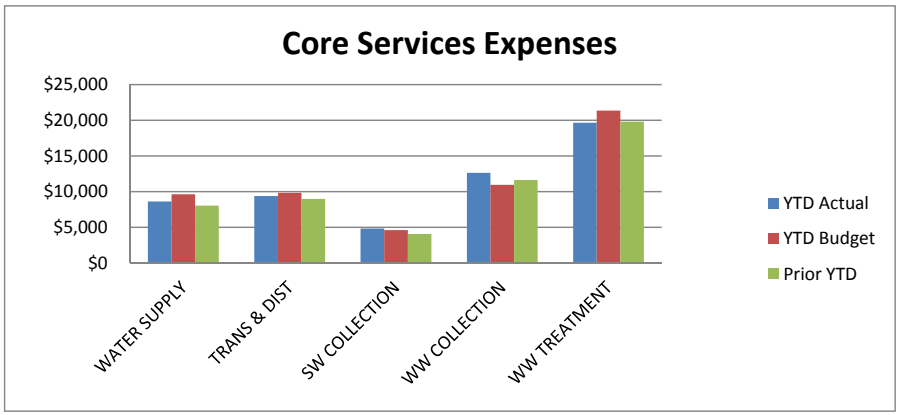


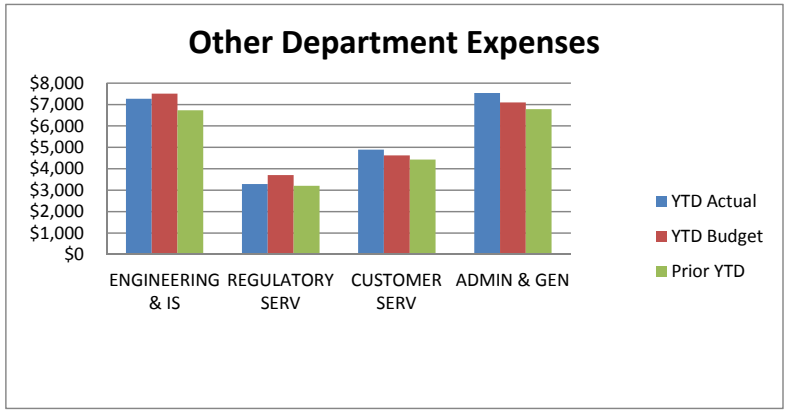
OPERATING REVENUE AND EXPENSES

	YTD Actual	YTD Budget	Prior YTD	% of Budget
REVENUE	$138,145	$135,587	$137,997	101.89%
EXPENSES	$99,437	$101,883	$92,822	97.60%
	$38,708	**$33,704**	**$45,175**	**114.85%**

REVENUE BY CATEGORY

	YTD Actual	YTD Budget	Prior YTD
WATER	$47,220	$46,610	$47,183
WASTEWATER	$69,994	$67,756	$69,475
STORMWATER	$10,015	$10,582	$10,542
OTHER	$10,916	$10,639	$10,797
	$138,145	**$135,587**	**$137,997**





CORE SERVICES EXPENSES

	YTD Actual	YTD Budget	Prior YTD	% of Budget
WATER SUPPLY	$8,646	$9,638	$8,050	89.70%
TRANS & DIST	$9,410	$9,842	$8,997	95.61%
SW COLLECTION	$4,842	$4,620	$4,097	104.81%
WW COLLECTION	$12,642	$10,959	$11,639	115.36%
WW TREATMENT	$19,647	$21,349	$19,794	92.03%
	$55,186	**$56,407**	**$52,576**	**97.84%**

OTHER DEPARTMENT EXPENSES

	YTD Actual	YTD Budget	Prior YTD
ENGINEERING & IS	$7,265	$7,504	$6,725
REGULATORY SERV	$3,291	$3,710	$3,207
CUSTOMER SERV	$4,896	$4,626	$4,431
ADMIN & GEN	$7,538	$7,096	$6,782
	$22,989	**$22,938**	**$21,146**

Halifax Water
Halifax Regional Water Commission

ITEM # 4.2
HRWC Board
June 21, 2018

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

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

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

DATE: June 13, 2018

SUBJECT: **Operating Results for the One Month Ended April 30, 2018**

INFORMATION REPORT

ORIGIN

Financial Statements

BACKGROUND

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

DISCUSSION

Attached are the operating results for the first one (1) month of the 2018/19 fiscal year, period ending April 30, 2018. The statements reflect direct operating costs by department and allocations among water, wastewater and stormwater for common costs shared across all the services provided by Halifax Regional Water Commission (HRWC).

HRWC is a fully regulated government business enterprise, falling under the jurisdiction of the Nova Scotia Utility and Review Board (NSUARB). The NSUARB requires that HRWC file Financial Statements and rate applications with the Board based on the NSUARB Handbook for Accounting and Reporting for Water Utilities. The Accounting Standards Board (AcSB) requires rate regulated entities to conform to International Financial Reporting Standards (IFRS). The Commission has converted the SAP financial records to IFRS for the purposes of the annual audit and consolidation of the financial statements with those of Halifax Regional Municipality (HRM). The budget for the 2018/19 fiscal year was prepared using the NSUARB format and financial results will continue to be provided in NSUARB format.

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

Consolidated Income Statement - Page 2

Consolidated operating revenue of $10.8 million is on par with revenue reported for the same time last year. Consolidated operating expenses of $7.2 million are $0.5 million higher than last year.

Summarized Consolidated Operating Results				
	Actual YTD 2018/19 '000	Actual YTD 2017/18 '000	$ Change	% Change
Operating Revenue	**$10,793**	$10,949	($156)	-1.4%
Operating Expenses	**$7,239**	$6,718	$521	7.8%
Operating Profit (Loss)	**$3,554**	$4,232	($677)	-16.0%
Non Operating Revenue	**$136**	$240	($104)	-43.3%
Non Operating Expenditure	**$2,822**	$3,002	($180)	-6.0%
Net Surplus before OCI	**$869**	$1,470	($601)	-40.9%
Pension Plan Expense	**($245)**	($417)	$172	-41.2%
OCI	**$0**	$184	($184)	-100.0%
Net Surplus (Deficit)	**$624**	$1,236	($613)	-49.6%

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

The Net Surplus for the year is $0.6 million, a decline from $1.2 million in the prior year. The Net Surplus includes Pension Plan Expense of $0.2 million.

The approved budget was for a loss of $12.1 million. The Forecast will be reviewed and updated throughout the year.

Balance Sheet - Page 3

Balance Sheet figures are as expected for early in the fiscal year. The cumulative Operating Surplus of $20.5 million at the beginning of the fiscal year has grown to $21.1 million with the year-to-date net profit before other comprehensive income of $0.6 million.

Income Statement - Page 4

Operating Revenue of $10.8 million is down slightly from the prior year but on par with expectations for early in the fiscal year.

Operating Expenses of $7.2 million are $0.5 million higher than the prior year. Expenses are typically under budget early in the fiscal year as planned initiatives for the new year are just beginning.

The following table shows operating results for each service.

Year to Date Operating Results by Service		
	2018/19	2017/18
	'000	'000
Water	**$348**	($98)
Wastewater	**$166**	$1,004
Stormwater	**$110**	$147
Net Surplus (Deficit)	**$624**	$1,053

Customer Rates

Rates for Water and Wastewater service were last adjusted on April 1, 2016. A new rate structure for Stormwater Service took effect July 1, 2017. An increase in rates or rate application is not anticipated for the 2018-/19 fiscal year. A summary of rates and rate changes is shown below:

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

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

Regulated and Unregulated Operations - Page 8

Activities regulated by the NSUARB show a profit of $0.5 million, a decline from the $1.1 million profit for the same period last year. Unregulated activities show a profit of $0.1 million, ahead of the small loss for the prior year.

Results by Activity		
	2018/19	2017/18
	'000	'000
Regulated Activities	**$539**	$1,084
Unregulated Activities	**$85**	($31)
Net Surplus (Deficit)	**$624**	$1,053

Results under International Financial Reporting Standards - Pages 9 & 10

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

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

On the IFRS Income Statement, Operating Revenue is the same. Depreciation Expense is higher as contributed assets are depreciated and some assets are depreciated more quickly. Financial Revenue is higher as the amortization of contributed capital is treated as revenue. The most significant change is Financial Expenses are lower as there is no expense for the Long Term Debt Principal appropriation – a difference of $22.6 million for the full year.

The IFRS Net Profit for the year to date of $2.2 million is on par with the prior year.

ATTACHMENTS

Unaudited Operating Results for the one (1) month ended April 30, 2018

Report prepared by: *Original Signed By:*

Warren Brake, B.Comm, CPA, CGA, Manager, Accounting, 902-490-4814

HALIFAX WATER
UNAUDITED BALANCE SHEET - CONSOLIDATED
AS OF APRIL 30, 2018

	2019 '000	2018 '000
ASSETS		
Cash	$53,161	$54,841
Accounts Receivable	$35,947	$33,851
Materials & Supplies	$1,439	$1,692
Prepaid Expenses	$981	$1,075
	$91,528	$91,459
Regulatory Asset	$3,181	$3,372
Plant in Service	$1,226,863	$1,165,650
Assets Under Construction	$25,792	$29,923
	$1,255,835	$1,198,946
Unamortized Debt Discount & Issue Expense	$896	$1,016
	$1,348,259	**$1,291,421**
LIABILITIES & CAPITAL		
Trade Payables & Accrued Liabilities	$22,323	$16,250
Deposits & Unearned Revenue	($130)	($159)
Current Portion of Long Term Debt	$22,630	$21,669
	$44,823	$37,760
Pension & Accrued Retirement Benefits	$70,161	$62,887
RDC & Special Purpose Reserves	$26,061	$15,855
Long Term Debt	$191,783	$204,333
Total Liabilities	$332,829	$320,835
Capital Surplus, Committed Reserves, & Accumulated OCI	$994,326	$952,856
Operating Surplus	$20,481	$16,677
Excess (Deficiency) of Revenue over Expenditure - Consolidated	$624	$1,053
Total Capital & Surplus	$1,015,430	$970,586
	$1,348,259	**$1,291,421**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - CONSOLIDATED
APRIL 1/18 - MARCH 31/19 (1 MONTH)
8.33%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/18 MAR 31/19 BUDGET* '000	APR 1/18 MAR 31/19 FORECAST '000	% of FORECAST
$10,793	$10,949	**OPERATING REVENUE**	$10,793	$10,949	$135,182	$135,182	7.98%
$7,239	$6,718	**OPERATING EXPENSES**	$7,239	$6,718	$108,770	$108,770	6.66%
$3,554	**$4,232**	**OPERATING PROFIT**	**$3,554**	**$4,232**	**$26,412**	**$26,412**	**13.46%**
		FINANCIAL REVENUE					
$76	$42	INVESTMENT INCOME	$76	$42	$480	$480	15.90%
$0	$167	PNS FUNDING HHSP DEBT	$0	$167	$0	$0	#DIV/0!
$60	$31	MISCELLANEOUS	$60	$31	$526	$526	11.39%
$136	**$240**		**$136**	**$240**	**$1,006**	**$1,006**	**13.54%**
		FINANCIAL EXPENSES					
$639	$673	LONG TERM DEBT INTEREST	$639	$673	$8,560	$8,560	7.46%
$1,737	$1,774	LONG TERM DEBT PRINCIPAL	$1,737	$1,774	$22,601	$22,601	7.68%
$17	$17	AMORTIZATION DEBT DISCOUNT	$17	$17	$245	$245	6.90%
$429	$402	DIVIDEND/GRANT IN LIEU OF TAXES	$429	$402	$5,142	$5,142	8.33%
$1	$135	MISCELLANEOUS	$1	$135	$16	$16	6.33%
$2,822	**$3,002**		**$2,822**	**$3,002**	**$36,564**	**$36,564**	**7.72%**
$869	**$1,470**	**NET PROFIT (LOSS) BEFORE OTHER COMPREHENSIVE INCOME**	**$869**	**$1,470**	**($9,146)**	**($9,146)**	**109.50%**
		NON NSUARB ITEMS					
($245)	($417)	PENSION PLAN EXPENSE	($245)	($417)	($2,940)	($2,940)	8.33%
$0	$184	OTHER COMPREHENSIVE INCOME	$0	$184	$0	$0	#DIV/0!
($245)	**($233)**		**($245)**	**($233)**	**($2,940)**	**($2,940)**	**8.33%**
$624	**$1,236**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$624**	**$1,236**	**($12,086)**	**($12,086)**	**105.16%**

HALIFAX WATER
UNAUDITED BALANCE SHEET
AS OF APRIL 30, 2018

	2019 '000	2018 '000
ASSETS		
Cash	$53,161	$54,841
Accounts Receivable		
Customers & Contractual	$17,568	$14,993
Customers & Contractual - Unbilled Services	$15,564	$17,045
Halifax Regional Municipality	$2,815	$1,813
Materials & Supplies	$1,439	$1,692
Prepaid Expenses	$981	$1,075
	$91,528	$91,459
Regulatory Asset	$3,181	$3,372
Plant in Service - Water	$635,526	$602,711
Plant in Service - Wastewater	$762,108	$714,225
Plant in Service - Stormwater	$263,952	$245,193
Less: Accumulated Depreciation - Water	($181,143)	($172,267)
Accumulated Depreciation - Wastewater	($207,403)	($185,045)
Accumulated Depreciation - Stormwater	($46,178)	($39,167)
	$1,230,044	$1,169,023
Assets Under Construction	$25,792	$29,923
	$1,255,835	$1,198,946
Unamortized Debt Discount & Issue Expense	$896	$1,016
	$1,348,259	**$1,291,421**
LIABILITIES & CAPITAL		
Trade	$17,244	$13,064
Interest on Long Term Debt	$2,491	$2,552
Halifax Regional Municipality	$2,588	$634
Contractor & Customer Deposits	$180	$182
Unearned Revenue	($310)	($341)
Current Portion of Long Term Debt	$22,630	$21,669
	$44,823	$37,760
Accrued Post-Retirement Benefits	$430	$341
Accrued Pre-Retirement Benefit	$4,000	$3,833
Deferred Pension Liability	$65,731	$58,713
Special Purpose Reserves not allocated to projects	$1,222	$1,434
Regional Development Charge	$24,840	$14,421
Long Term Debt-Water	$53,697	$59,599
Long Term Debt-Wastewater	$127,043	$133,409
Long Term Debt-Stormwater	$11,043	$11,324
Total Liabilities	$332,829	$320,835
Capital Surplus	$1,024,498	$981,095
Committed Reserves	$2,391	$2,391
Accumulated Other Comprehensive Income	($44,943)	($43,009)
Operating Surplus used to Fund Capital	$12,380	$12,380
Operating Surplus	$20,481	$16,677
Excess (Deficiency) of Revenue over Expenditure - Consolidated	$624	$1,053
Total Capital & Surplus	$1,015,430	$970,586
	$1,348,259	**$1,291,421**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - ALL SERVICES
APRIL 1/18 - MARCH 31/19 (1 MONTH)
8.33%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/18 MAR 31/19 BUDGET* '000	APR 1/18 MAR 31/19 FORECAST '000	% of BUDGET*	% of FORECAST
		REVENUE						
$3,729	$3,747	METERED SALES - WATER	$3,729	$3,747	$46,152	$46,152	8.08%	8.08%
$5,389	$5,500	METERED SALES - WASTEWATER	$5,389	$5,500	$67,601	$67,601	7.97%	7.97%
$519	$543	STORMWATER SITE GENERATED SERVICE	$519	$543	$6,752	$6,752	7.69%	7.69%
$590	$590	FIRE PROTECTION	$590	$590	$7,074	$7,074	8.33%	8.33%
$320	$323	STORMWATER RIGHT OF WAY SERVICE	$320	$323	$3,835	$3,835	8.33%	8.33%
$177	$204	OTHER SERVICES AND FEES	$177	$204	$2,905	$2,905	6.08%	6.08%
$38	$6	CUSTOMER LATE PAY./COLLECTION FEES	$38	$6	$491	$491	7.71%	7.71%
$32	$37	MISCELLANEOUS	$32	$37	$371	$371	8.61%	8.61%
$10,793	**$10,949**		**$10,793**	**$10,949**	**$135,182**	**$135,182**	**7.98%**	**7.98%**
		EXPENSES						
$543	$486	WATER SUPPLY & TREATMENT	$543	$486	$8,750	$8,750	6.21%	6.21%
$600	$605	TRANSMISSION & DISTRIBUTION	$600	$605	$10,323	$10,323	5.81%	5.81%
$665	$642	WASTEWATER COLLECTION	$665	$642	$10,622	$10,622	6.26%	6.26%
$1,172	$1,192	WASTEWATER TREATMENT PLANTS	$1,172	$1,192	$19,160	$19,160	6.12%	6.12%
$269	$339	STORMWATER COLLECTION	$269	$339	$5,239	$5,239	5.14%	5.14%
$222	$187	SMALL SYSTEMS AND OTHER SERVICES	$222	$187	$3,286	$3,286	6.75%	6.75%
$150	$156	SCADA, CONTROL & PUMPING	$150	$156	$2,565	$2,565	5.84%	5.84%
$620	$318	ENGINEERING & INFORMATION SERVICES	$620	$318	$8,177	$8,177	7.59%	7.59%
$248	$228	REGULATORY SERVICES	$248	$228	$3,763	$3,763	6.59%	6.59%
$368	$349	CUSTOMER SERVICE	$368	$349	$5,522	$5,522	6.67%	6.67%
$534	$565	ADMINISTRATION & PENSION	$534	$565	$7,929	$7,929	6.74%	6.74%
$1,848	$1,651	DEPRECIATION	$1,848	$1,651	$23,434	$23,434	7.88%	7.88%
$7,239	**$6,718**		**$7,239**	**$6,718**	**$108,770**	**$108,770**	**6.66%**	**6.66%**
$3,554	**$4,232**	**OPERATING PROFIT**	**$3,554**	**$4,232**	**$26,412**	**$26,412**	**13.46%**	**13.46%**
		FINANCIAL REVENUE						
$76	$42	INVESTMENT INCOME	$76	$42	$480	$480	15.90%	15.90%
$0	$167	PNS FUNDING HHSP DEBT	$0	$167	$0	$0	#DIV/0!	#DIV/0!
$60	$31	MISCELLANEOUS	$60	$31	$526	$526	11.39%	11.39%
$136	**$240**		**$136**	**$240**	**$1,006**	**$1,006**	**13.54%**	**13.54%**
		FINANCIAL EXPENSES						
$639	$673	LONG TERM DEBT INTEREST	$639	$673	$8,560	$8,560	7.46%	7.46%
$1,737	$1,774	LONG TERM DEBT PRINCIPAL	$1,737	$1,774	$22,601	$22,601	7.68%	7.68%
$17	$17	AMORTIZATION DEBT DISCOUNT	$17	$17	$245	$245	6.90%	6.90%
$429	$402	DIVIDEND/GRANT IN LIEU OF TAXES	$429	$402	$5,142	$5,142	8.33%	8.33%
$1	$135	MISCELLANEOUS	$1	$135	$16	$16	6.33%	6.33%
$2,822	**$3,002**		**$2,822**	**$3,002**	**$36,564**	**$36,564**	**7.72%**	**7.72%**
$869	**$1,470**	**NET PROFIT (LOSS) BEFORE OTHER COMPREHENSIVE INCOME**	**$869**	**$1,470**	**($9,146)**	**($9,146)**	**109.50%**	**109.50%**
		NON NSUARB ITEMS						
($245)	($417)	PENSION PLAN EXPENSE	($245)	($417)	($2,940)	($2,940)	8.33%	8.33%
$0	$184	OTHER COMPREHENSIVE INCOME	$0	$184	$0	$0	0.00%	#DIV/0!
($245)	**($233)**		**($245)**	**($233)**	**($2,940)**	**($2,940)**	**8.33%**	**8.33%**
$624	**$1,236**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$624**	**$1,236**	**($12,086)**	**($12,086)**	**105.16%**	**105.16%**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - WATER OPERATIONS
APRIL 1/18 - MARCH 31/19 (1 MONTH)
8.33%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/18 MAR 31/19 BUDGET* '000	APR 1/18 MAR 31/19 FORECAST '000	% of FORECAST
		REVENUE					
$3,729	$3,747	METERED SALES	$3,729	$3,747	$46,152	$46,152	8.08%
$590	$590	FIRE PROTECTION	$590	$590	$7,074	$7,074	8.33%
$74	$73	PRIVATE FIRE PROTECTION SERVICES	$74	$73	$860	$860	8.64%
$15	$23	BULK WATER STATIONS	$15	$23	$329	$329	4.59%
$21	$12	CUSTOMER LATE PAY./COLLECTION FEES	$21	$12	$233	$233	8.98%
$16	$15	MISCELLANEOUS	$16	$15	$154	$154	10.08%
$4,445	**$4,460**		**$4,445**	**$4,460**	**$54,803**	**$54,803**	**8.11%**
		EXPENSES					
$543	$486	WATER SUPPLY & TREATMENT	$543	$486	$8,750	$8,750	6.21%
$600	$605	TRANSMISSION & DISTRIBUTION	$600	$605	$10,323	$10,323	5.81%
$108	$85	SMALL SYSTEMS (inc. Contract Systems)	$108	$85	$1,194	$1,194	9.07%
$53	$52	SCADA, CONTROL & PUMPING	$53	$52	$965	$965	5.47%
$239	$146	ENGINEERING & INFORMATION SERVICES	$239	$146	$3,681	$3,681	6.50%
$58	$40	REGULATORY SERVICES	$58	$40	$997	$997	5.80%
$188	$266	CUSTOMER SERVICE	$188	$266	$2,813	$2,813	6.67%
$399	$806	ADMINISTRATION & PENSION	$399	$806	$5,538	$5,538	7.21%
$741	$674	DEPRECIATION	$741	$674	$9,229	$9,229	8.02%
$2,928	**$3,161**		**$2,928**	**$3,161**	**$43,490**	**$43,490**	**6.73%**
$1,516	**$1,299**	**OPERATING PROFIT**	**$1,516**	**$1,299**	**$11,313**	**$11,313**	**13.40%**
		FINANCIAL REVENUE					
$34	$19	INVESTMENT INCOME	$34	$19	$216	$216	15.90%
$52	$27	MISCELLANEOUS	$52	$27	$428	$428	12.03%
$86	**$46**		**$86**	**$46**	**$644**	**$644**	**13.33%**
		FINANCIAL EXPENSES					
$162	$183	LONG TERM DEBT INTEREST	$162	$183	$2,363	$2,363	6.86%
$655	$714	LONG TERM DEBT PRINCIPAL	$655	$714	$8,227	$8,227	7.96%
$8	$8	AMORTIZATION DEBT DISCOUNT	$8	$8	$108	$108	7.10%
$429	$402	DIVIDEND/GRANT IN LIEU OF TAXES	$429	$402	$5,142	$5,142	8.33%
$1	$135	MISCELLANEOUS	$1	$135	$11	$11	9.34%
$1,254	**$1,443**		**$1,254**	**$1,443**	**$15,850**	**$15,850**	**7.91%**
$348	**($98)**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$348**	**($98)**	**($3,893)**	**($3,893)**	**108.94%**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - WASTEWATER OPERATIONS
APRIL 1/18 - MARCH 31/19 (1 MONTH)
8.33%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/18 MAR 31/19 BUDGET* '000	APR 1/18 MAR 31/19 FORECAST '000	% of FORECAST
		REVENUE					
$5,389	$5,500	METERED SALES	$5,389	$5,500	$67,601	$67,601	7.97%
$2	$0	WASTEWATER OVERSTRENGTH AGREEMENTS	$2	$0	$0	$0	0.00%
$19	$16	LEACHATE CONTRACT	$19	$16	$387	$387	4.80%
$11	$8	CONTRACT REVENUE	$11	$8	$86	$86	12.66%
$17	$17	DEWATERING FACILITY/SLUDGE LAGOON	$17	$17	$210	$210	8.33%
$0	($0)	AIRLINE EFFLUENT	$0	($0)	$118	$118	0.00%
$38	$66	SEPTAGE TIPPING FEES	$38	$66	$915	$915	4.14%
$16	$2	CUSTOMER LATE PAY./COLLECTION FEES	$16	$2	$238	$238	6.87%
$9	$13	MISCELLANEOUS	$9	$13	$128	$128	7.36%
$5,502	**$5,622**		**$5,502**	**$5,622**	**$69,683**	**$69,683**	**7.90%**
		EXPENSES					
$665	$642	WASTEWATER COLLECTION	$665	$642	$10,622	$10,622	6.26%
$1,172	$1,192	WASTEWATER TREATMENT PLANTS	$1,172	$1,192	$19,160	$19,160	6.12%
$84	$85	SMALL SYSTEMS	$84	$85	$1,323	$1,323	6.33%
$13	$3	DEWATERING FACILITY/ SLUDGE MGM'T	$13	$3	$331	$331	4.07%
$0	$0	BIOSOLIDS TREATMENT	$0	$0	$101	$101	0.08%
$16	$13	LEACHATE CONTRACT	$16	$13	$337	$337	4.80%
$94	$100	SCADA, CONTROL & PUMPING	$94	$100	$1,563	$1,563	6.01%
$328	$148	ENGINEERING & INFORMATION SERVICES	$328	$148	$3,400	$3,400	9.64%
$78	$81	REGULATORY SERVICES	$78	$81	$1,133	$1,133	6.84%
$155	$72	CUSTOMER SERVICE	$155	$72	$2,455	$2,455	6.33%
$327	$151	ADMINISTRATION & PENSION	$327	$151	$4,585	$4,585	7.13%
$1,031	$913	DEPRECIATION	$1,031	$913	$13,251	$13,251	7.78%
$3,963	**$3,401**		**$3,963**	**$3,401**	**$58,262**	**$58,262**	**6.80%**
$1,540	**$2,221**	**OPERATING PROFIT**	**$1,540**	**$2,221**	**$11,420**	**$11,420**	**13.48%**
		FINANCIAL REVENUE					
$34	$19	INVESTMENT INCOME	$34	$19	$216	$216	15.90%
$0	$167	PNS FUNDING HHSP DEBT	$0	$167	$0	$0	0.00%
$8	$5	MISCELLANEOUS	$8	$5	$97	$97	8.56%
$43	**$190**		**$43**	**$190**	**$313**	**$313**	**13.62%**
		FINANCIAL EXPENSES					
$431	$414	LONG TERM DEBT INTEREST	$431	$414	$5,427	$5,427	7.94%
$978	$986	LONG TERM DEBT PRINCIPAL	$978	$986	$12,783	$12,783	7.65%
$8	$8	AMORTIZATION DEBT DISCOUNT	$8	$8	$119	$119	7.06%
$0	$0	MISCELLANEOUS	$0	$0	$5	$5	0.00%
$1,417	**$1,408**		**$1,417**	**$1,408**	**$18,334**	**$18,334**	**7.73%**
$166	**$1,004**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$166**	**$1,004**	**($6,600)**	**($6,600)**	**102.51%**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - STORMWATER OPERATIONS
APRIL 1/18 - MARCH 31/19 (1 MONTH)
8.33%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/18 MAR 31/19 BUDGET* '000	APR 1/18 MAR 31/19 FORECAST '000	% of FORECAST
		REVENUE					
$519	$543	STORMWATER SITE GENERATED SERVICE	$519	$543	$6,752	$6,752	7.69%
$320	$323	STORMWATER RIGHT OF WAY SERVICE	$320	$323	$3,835	$3,835	8.33%
$1	($8)	CUSTOMER LATE PAY./COLLECTION FEES	$1	($8)	$21	$21	2.86%
$7	$9	MISCELLANEOUS	$7	$9	$89	$89	7.86%
$846	**$867**		**$846**	**$867**	**$10,696**	**$10,696**	**7.91%**
		EXPENSES					
$269	$339	STORMWATER COLLECTION	$269	$339	$5,239	$5,239	5.14%
$3	$3	SCADA, CONTROL & PUMPING	$3	$3	$37	$37	8.13%
$53	$24	ENGINEERING & INFORMATION SERVICES	$53	$24	$1,095	$1,095	4.87%
$113	$107	REGULATORY SERVICES	$113	$107	$1,634	$1,634	6.91%
$25	$12	CUSTOMER SERVICE	$25	$12	$253	$253	9.99%
$53	$25	ADMINISTRATION & PENSION	$53	$25	$746	$746	7.13%
$76	$64	DEPRECIATION	$76	$64	$954	$954	7.99%
$593	**$573**		**$593**	**$573**	**$9,958**	**$9,958**	**5.96%**
$253	**$294**	**OPERATING PROFIT**	**$253**	**$294**	**$738**	**$738**	**34.31%**
		FINANCIAL REVENUE					
$8	$4	INVESTMENT INCOME	$8	$4	$48	$48	15.90%
$0	$0	MISCELLANEOUS	$0	$0	$0	$0	0.00%
$8	**$4**		**$8**	**$4**	**$48**	**$48**	**15.90%**
		FINANCIAL EXPENSES					
$46	$76	LONG TERM DEBT INTEREST	$46	$76	$770	$770	5.94%
$104	$75	LONG TERM DEBT PRINCIPAL	$104	$75	$1,591	$1,591	6.54%
$1	$1	AMORTIZATION DEBT DISCOUNT	$1	$1	$18	$18	4.66%
$151	**$151**		**$151**	**$151**	**$2,379**	**$2,379**	**6.33%**
$110	**$147**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$110**	**$147**	**($1,593)**	**($1,593)**	**106.92%**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - REGULATED AND UNREGULATED OPERATIONS
APRIL 1/18 - MARCH 31/19 (1 MONTH)
8.33%

DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR	ACTUAL (YEAR TO DATE) LAST YEAR	APR 1/18 MAR 31/19 BUDGET*	APR 1/18 MAR 31/19 FORECAST	% of FORECAST
REGULATED ACTIVITIES					
REVENUE					
METERED SALES	$9,638	$9,789	$120,505	$120,505	8.00%
FIRE PROTECTION	$590	$590	$7,074	$7,074	8.33%
PRIVATE FIRE PROTECTION	$74	$73	$860	$860	8.64%
STORMWATER SERVICE	$320	$323	$3,835	$3,835	8.33%
OTHER OPERATING REVENUE	$84	$64	$1,154	$1,154	7.29%
	$10,705	**$10,839**	**$133,429**	**$133,429**	**8.02%**
EXPENSES					
WATER SUPPLY & TREATMENT	$543	$486	$8,750	$8,750	6.21%
TRANSMISSION & DISTRIBUTION	$600	$605	$10,323	$10,323	5.81%
WASTEWATER & STORMWATER COLLECTION	$930	$980	$15,753	$15,753	5.90%
WASTEWATER TREATMENT PLANTS	$1,172	$1,192	$19,160	$19,160	6.12%
SMALL SYSTEMS	$191	$170	$2,492	$2,492	7.65%
SCADA, CONTROL & PUMPING	$150	$156	$2,565	$2,565	5.84%
ENGINEERING & INFORMATION SERVICES	$620	$318	$8,177	$8,177	7.59%
REGULATORY SERVICES	$248	$228	$3,763	$3,763	6.59%
CUSTOMER SERVICE	$365	$346	$5,487	$5,487	6.66%
ADMINISTRATION & PENSION	$777	$973	$10,639	$10,639	7.31%
DEPRECIATION	$1,846	$1,650	$23,416	$23,416	7.88%
	$7,442	**$7,104**	**$110,524**	**$110,524**	**6.73%**
FINANCIAL REVENUE					
INVESTMENT INCOME	$76	$42	$480	$480	15.90%
MISCELLANEOUS	$20	$173	$110	$110	18.36%
	$97	**$215**	**$590**	**$590**	**16.36%**
FINANCIAL EXPENSES					
LONG TERM DEBT INTEREST	$639	$673	$8,560	$8,560	7.46%
LONG TERM DEBT PRINCIPAL	$1,737	$1,774	$22,601	$22,601	7.68%
AMORTIZATION DEBT DISCOUNT	$17	$17	$245	$245	6.90%
DIVIDEND/GRANT IN LIEU OF TAXES	$429	$402	$5,142	$5,142	8.33%
	$2,821	**$2,867**	**$36,548**	**$36,548**	**7.72%**
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	**$539**	**$1,084**	**($13,053)**	**($13,053)**	**104.13%**
UNREGULATED ACTIVITIES					
REVENUE					
SEPTAGE TIPPING FEES	$38	$66	$915	$915	4.14%
LEACHATE CONTRACT	$19	$16	$387	$387	4.80%
CONTRACT REVENUE	$11	$8	$86	$86	12.66%
DEWATERING	$17	$17	$210	$210	8.33%
AIRLINE EFFLUENT	$0	($0)	$118	$118	0.00%
ENERGY PROJECTS	$13	$13	$167	$167	7.63%
MISCELLANEOUS	$3	$3	$37	$37	8.54%
	$101	**$124**	**$1,919**	**$1,919**	**5.24%**
EXPENSES					
WATER SUPPLY & TREATMENT	$2	$1	$25	$25	6.09%
WASTEWATER TREATMENT	$34	$17	$877	$877	3.84%
SPONSORSHIPS & DONATIONS	$5	$12	$266	$266	1.84%
DEPRECIATION	$1	$0	$18	$18	0.00%
	$42	**$31**	**$1,186**	**$1,186**	**3.51%**
FINANCIAL REVENUE					
MISCELLANEOUS	$27	$12	$249	$249	10.82%
	$27	**$12**	**$249**	**$249**	**10.82%**
FINANCIAL EXPENSES					
MISCELLANEOUS	$1	$135	$16	$16	6.33%
	$1	$135	$16	$16	**6.33%**
NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES	**$85**	**($31)**	**$967**	**$967**	**8.79%**
NET PROFIT (LOSS) AVAILABLE FOR TOTAL CAPITAL EXPENDITURES (REG & UNREG)	**$624**	**$1,053**	**($12,086)**	**($12,086)**	**105.16%**

HALIFAX WATER
UNAUDITED BALANCE SHEET - IFRS FORMAT
AS OF APRIL 30, 2018

	2019 '000	2018 '000
ASSETS		
Cash	$53,161	$54,841
Accounts Receivable		
Customers & Contractual	$17,568	$14,993
Customers & Contractual - Unbilled Services	$15,564	$17,045
Halifax Regional Municipality	$2,815	$1,813
Materials & Supplies	$1,439	$1,692
Prepaid Expenses	$981	$1,075
	$91,528	$91,459
Regulatory Asset	$3,181	$3,372
Plant in Service - Water	$635,526	$602,711
Plant in Service - Wastewater	$762,108	$714,225
Plant in Service - Stormwater	$263,952	$245,193
Less: Accumulated Depreciation - Water	($188,651)	($179,635)
Accumulated Depreciation - Wastewater	($214,428)	($192,355)
Accumulated Depreciation - Stormwater	($46,177)	($39,167)
	$1,215,511	$1,154,345
Assets Under Construction	$25,792	$29,923
	$1,241,302	$1,184,268
Unamortized Debt Discount & Issue Expense	$896	$1,016
	$1,333,726	**$1,276,743**
LIABILITIES		
Trade	$17,244	$13,064
Interest on Long Term Debt	$2,491	$2,552
Halifax Regional Municipality	$2,588	$634
Contractor & Customer Deposits	$180	$182
Unearned Revenue	($310)	($341)
Current Portion of Deferred Contributed Capital	$13,405	$12,889
Current Portion of Long Term Debt	$22,630	$21,669
	$58,228	$50,649
Accrued Post-Retirement Benefits	$430	$341
Accrued Pre-Retirement Benefit	$4,000	$3,833
Deferred Pension Liability	$65,731	$58,713
Deferred Contributed Capital	$841,955	$808,775
Long Term Debt-Water	$53,697	$59,599
Long Term Debt-Wastewater	$127,043	$133,409
Long Term Debt-Stormwater	$11,043	$11,324
Total Liabilities	$1,162,127	$1,126,644
EQUITY		
Accumulated Other Comprehensive Income	($44,943)	($43,009)
Accumulated Surplus	$214,354	$190,822
Excess (Deficiency) of Revenue over Expenditure	$2,189	$2,286
Total Equity	$171,600	$150,099
	$1,333,726	**$1,276,743**

HALIFAX WATER
UNAUDITED INCOME STATEMENT - IFRS FORMAT - ALL SERVICES
APRIL 1/18 - MARCH 31/19 (1 MONTH)
8.33%

ACTUAL (CURRENT MONTH) THIS YEAR '000	ACTUAL (CURRENT MONTH) LAST YEAR '000	DESCRIPTION	ACTUAL (YEAR TO DATE) THIS YEAR '000	ACTUAL (YEAR TO DATE) LAST YEAR '000	APR 1/18 MAR 31/19 BUDGET* '000	APR 1/18 MAR 31/19 FORECAST '000	% of BUDGET*	% of FORECAST
		REVENUE						
$3,729	$3,747	METERED SALES - WATER	$3,729	$3,747	$46,152	$46,152	8.08%	8.08%
$5,389	$5,500	METERED SALES - WASTEWATER	$5,389	$5,500	$67,601	$67,601	7.97%	7.97%
$519	$543	STORMWATER SITE GENERATED SERVICE	$519	$543	$6,752	$6,752	7.69%	7.69%
$590	$590	FIRE PROTECTION	$590	$590	$7,074	$7,074	8.33%	8.33%
$320	$323	STORMWATER RIGHT OF WAY SERVICE	$320	$323	$3,835	$3,835	8.33%	8.33%
$177	$204	OTHER SERVICES AND FEES	$177	$204	$2,905	$2,905	6.08%	6.08%
$38	$6	CUSTOMER LATE PAY./COLLECTION FEES	$38	$6	$491	$491	7.71%	7.71%
$32	$37	MISCELLANEOUS	$32	$37	$371	$371	8.61%	8.61%
$10,793	**$10,949**		**$10,793**	**$10,949**	**$135,182**	**$135,182**	**7.98%**	**7.98%**
		EXPENSES						
$543	$486	WATER SUPPLY & TREATMENT	$543	$486	$8,750	$8,750	6.21%	6.21%
$600	$605	TRANSMISSION & DISTRIBUTION	$600	$605	$10,323	$10,323	5.81%	5.81%
$665	$642	WASTEWATER COLLECTION	$665	$642	$10,622	$10,622	6.26%	6.26%
$1,172	$1,192	WASTEWATER TREATMENT PLANTS	$1,172	$1,192	$19,160	$19,160	6.12%	6.12%
$269	$339	STORMWATER COLLECTION	$269	$339	$5,239	$5,239	5.14%	5.14%
$222	$187	SMALL SYSTEMS AND OTHER SERVICES	$222	$187	$3,286	$3,286	6.75%	6.75%
$150	$156	SCADA, CONTROL & PUMPING	$150	$156	$2,565	$2,565	5.84%	5.84%
$620	$318	ENGINEERING & INFORMATION SERVICES	$620	$318	$8,177	$8,177	7.59%	7.59%
$248	$228	REGULATORY SERVICES	$248	$228	$3,763	$3,763	6.59%	6.59%
$368	$349	CUSTOMER SERVICE	$368	$349	$5,522	$5,522	6.67%	6.67%
$779	$982	ADMINISTRATION & PENSION	$779	$982	$10,869	$10,869	7.17%	7.17%
$3,468	$3,387	DEPRECIATION	$3,468	$3,387	$23,434	$35,959	14.80%	9.64%
$9,104	**$8,871**		**$9,104**	**$8,871**	**$111,710**	**$124,235**	**8.15%**	**7.33%**
$1,689	**$2,079**	**OPERATING PROFIT**	**$1,689**	**$2,079**	**$23,472**	**$10,947**	**7.20%**	**15.43%**
		FINANCIAL REVENUE						
$76	$42	INVESTMENT INCOME	$76	$42	$480	$480	15.90%	15.90%
$0	$167	PNS FUNDING HHSP DEBT	$0	$167	$0	$0	0.00%	0.00%
$1,508	$1,223	MISCELLANEOUS	$1,508	$1,223	$526	$13,051	287.01%	11.56%
$1,585	**$1,431**		**$1,585**	**$1,431**	**$1,006**	**$13,531**	**157.60%**	**11.71%**
		FINANCIAL EXPENSES						
$639	$673	LONG TERM DEBT INTEREST	$639	$673	$8,560	$8,560	7.46%	7.46%
$17	$17	AMORTIZATION DEBT DISCOUNT	$17	$17	$245	$245	6.90%	6.90%
$429	$402	DIVIDEND/GRANT IN LIEU OF TAXES	$429	$402	$5,142	$5,142	8.33%	8.33%
$1	$132	MISCELLANEOUS	$1	$132	$12	$12	7.96%	7.96%
$1,085	**$1,224**		**$1,085**	**$1,224**	**$13,959**	**$13,959**	**7.77%**	**7.77%**
$2,189	**$2,286**	**NET PROFIT (LOSS) BEFORE OTHER COMPREHENSIVE INCOME**	**$2,189**	**$2,286**	**$10,518**	**$10,518**	**20.81%**	**20.81%**
$0	$184	**OTHER COMPREHENSIVE INCOME**	$0	$184	$0	$0	0.00%	0.00%
$2,189	**$2,470**	**NET PROFIT (LOSS) AVAILABLE FOR CAPITAL EXPENDITURES**	**$2,189**	**$2,470**	**$10,518**	**$10,518**	**20.81%**	**20.81%**

Halifax Water
Halifax Regional Water Commission

ITEM # 4.3
HRWC Board
June 21, 2018

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

SUBMITTED BY: *Original Signed By:*
Allan Campbell, B.Comm, CPA, CMA, Manager, Finance
Cathie O'Toole, MBA, CPA, CGA, Director, Corporate Services

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

DATE: May 25, 2018

SUBJECT: **Halifax Regional Water Commission Employees' Pension Plan Financial Statements for the Year Ended December 31, 2017**

ORIGIN

The Halifax Regional Water Commission Employees' Pension Plan financial statements are audited annually.

RECOMMENDATION

It is recommended that the Commission Board approve the audited financial statements for the Halifax Regional Water Commission Employees' Pension Plan (the "Plan") for the year ended December 31, 2017.

BACKGROUND

Annually, the Plan's financial statements are prepared by staff and audited by the Commission's auditors, currently Grant Thornton, LLP.

DISCUSSION

Attached are the audited financial statements of the Plan for the year ended December 31, 2017, with comparative figures for 2016. Page numbers or note references in this report refer to the audited financial statements.

The auditor's report on Page 1 indicates that the financial statements present fairly, in all material respects, the financial position of the Plan as at December 31, 2017, the changes in net assets available for benefits, and changes in pension obligations in accordance with Canadian accounting standards for pension plans.

The Statement of Financial Position for the Plan is reported on page 2 of the financial statements, and the highlights are summarized in Table 1 below. The deficiency as at December 31, 2017 of $1.7 million compares favourably to the deficiency reported the prior year of $7.0 million, representing a change of $5.2 million or 75.1%. This is the result of higher reported values at year-end for net assets available for benefits relative to pension obligations. Net assets available for benefits as at December 31, 2017, amounted to $119.7 million compared to $107.1 million the prior year, an increase of $12.7 million or 11.8%. Pension obligations increased $7.4 million or 6.5% to $121.5 million as at December 31, 2017, up from $114.0 million in 2016.

Table 1:

Statement of financial position December 31				
			Change	
	2017	2016	$	%
Net assets available for benefits (note 4)	$119,731,882	$107,067,996	$12,663,886	*11.8%*
Pension obligations (note 5)	$121,473,083	$114,046,900	$7,426,183	*6.5%*
Deficiency	($1,741,201)	($6,978,904)	$5,237,703	*-75.1%*

The Statement of Changes in Net Assets Available for Benefits are reported on page 3 of the financial statements, with highlights summarized in Table 2 below. As stated previously, net assets available for benefits as at December 31, 2017 are reported as $119.7 million, compared to $107.1 million the previous year, representing an increase of $12.7 million or 11.8%. The comparable increase in net assets available for benefits in 2016 was reported as $6.6 million. Further details regarding net assets available for benefits can be found in Note 4 (page 12) of the financial statements.

Of the $12.7 million increase in net assets available for benefits in the current year, revenue had the greatest impact, with reported revenue totaling $11.2 million. This consisted of changes in the fair value of investment assets of $8.7 million, and net investment income of $2.5 million. In comparison to 2016, the change in the fair value of investment assets increased by $4.7 million (114.8%), and net investment income increased $0.2 million (10%). Assets of the Plan are invested as part of the Halifax Regional Municipality Master Trust, and represent 6.1% (2016, 6.0%) of the Master Trust's assets. The gross fund rate for 2017 was 11.3% (2016-5.5%), and the net fund rate after expenses was 10.9% (2016-5.1%). Higher returns experienced in 2017 by the Master Trust would explain the increase in

revenue compared to 2016, especially with respect to net investment income. Additional information related to net investment income can be found in Note 6 (page 13) of the financial statements, and later in this report.

Contributions also factor into the increase in net assets available for benefits. Combined contributions from employees and Halifax Water are reported at $5.9 million for 2017. In comparison to 2016, contributions increased by $0.3 million or 6.1%. This increase was due to net, new hires within Halifax Water and increases in remuneration of existing employees either through normal pay increases or movements within individual bands. Additional information related to contributions can be found in Note 7 (page 13) of the financial statements, and later in this report.

Expenses reduce net assets available for benefits, with expenses driven mainly by benefit payments. Expenses in 2017 are reported as $4.4 million, and compared to $5.2 million from the previous year, resulted in a favourable variance of $0.8 million or 15.5%. This reduction can be directly attributed to lower termination benefits and death benefits paid in 2017 compared to 2016. Additional information related to expenses can be found in Note 8 (page 13) and 9 (page 14) of the financial statements, and later in this report.

Further details regarding net assets available for benefits can be found in Note 4 (page 12) of the financial statements.

Table 2:

Statement of changes in net assets available for benefits				
December 31				
			Change	
	2017	2016	$	%
Revenue	$11,188,063	$6,306,713	$4,881,350	*77.4%*
Expenses	$4,436,981	$5,248,400	($811,419)	*-15.5%*
Increase in Net Revenue	$6,751,082	$1,058,313	$5,692,769	*537.9%*
Contributions (note 7)	$5,912,805	$5,575,239	$337,566	*6.1%*
Increase in net assets available for benefits	$12,663,887	$6,633,552	$6,030,335	*90.9%*

The Statement of Changes in Pension Obligations is reported on page 4 of the financial statements, and summarized in Table 3 below. Pension obligations increased to $121.5 million in 2017 compared to $114.0 million the prior year, an increase of $7.4 million or 6.5%.

Extrapolated results for benefits accrued of $5.1 million and interest on accrued benefits of $6.6 million were comparable to 2016, with reported increases of $0.3 million (6.6%) and $0.4 million (6.0%) respectively. Interest rates continue to be low, which increases liabilities.

Reductions to the pension obligation totaled $4.3 million, and are directly related to benefit payments made during 2017. Additional information related to benefit payments can be found in Note 8 (page 13) of the financial statements, and later in this report.

The valuation of pension obligations for 2017 and 2016 were extrapolated by the actuary as at December 31 for each year respectively. The last actuarial valuation was performed January 1, 2016, and the next actuarial valuation is scheduled for January 1, 2019.

Further details with respect to pension obligations can be found in Note 5 (page 12) of the financial statements.

Table 3:

Statement of changes in pension obligations December 31				
			Change	
	2017	2016	$	%
Pension obligations, beginning of year	$114,046,900	$108,055,300	$5,991,600	*5.5%*
Changes in actuarial assumptions	$0	$0	$0	*n/a*
Impact of Pension Plan changes	$0	$0	$0	*n/a*
Miscellaneous sources of decrease	$0	$0	$0	*n/a*
Interest accrued on benefits	$6,637,300	$6,259,500	$377,800	*6.0%*
Benefits accrued	$5,084,900	$4,770,802	$314,098	*6.6%*
Benefits paid (note 8)	($4,296,017)	($5,038,702)	$742,685	*-14.7%*
	$7,426,183	$5,991,600	$1,434,583	*23.9%*
Pension obligations, end of year	$121,473,083	$114,046,900	$7,426,183	*6.5%*

Additional notes in the financial statements include line-by-line comparisons of various categories. Table 4 below is a summary of each category, and details are provided for Notes 6 through 9 inclusive of the financial statements.

Table 4:

Summary of various categories December 31				
			Change	
	2017	2016	$	%
Net investment income (note 6)	$2,475,604	$2,250,455	$225,149	*10.0%*
Contributions (note 7)*	$5,912,805	$5,575,239	$337,566	*6.1%*
Benefit payments (note 8)	$4,296,017	$5,038,702	($742,685)	*-14.7%*
Administrative expenses (note 9)	$140,965	$209,698	($68,733)	*-32.8%*
* Employees' Contributions	$2,665,078	$2,484,448	$180,630	*7.3%*
Employer's Contributions	$3,247,727	$3,090,791	$156,936	*5.1%*
	$5,912,805	$5,575,239	$337,566	*6.1%*

Note 6 (page 13) of the financial statements reports net investment income of $2.5 million for 2017. This represents an increase of $0.2 million or 10.0% over 2016, with the increase being reflective of the higher returns experienced by the HRM Master Trust in 2017, as mentioned earlier in the report. Investment manager fees are comparable to 2016, showing only a moderate increase.

Note 7 (page 13) shows contribution details from employees and the employer, with combined contributions of $5.9 million reported for 2017. Compared to 2016, this represents an increase of $0.3 million or 6.1%. Higher contributions in 2017 is reflective of expected increases associated with net, new hires in 2017, as well as normal salary/wage increases and movements within bands for existing employees.

Note 8 (page 13) details the benefit payments of $4.3 million for 2017. Total benefit payments decreased by $0.7 million or 14.7% compared to 2016. Actual retirement benefit payments increased in 2017 to $3.7 million compared to $3.5 million in 2016, which represents new retirees from Halifax Water during the year. A decrease in total benefit payments was experienced under the categories of termination benefits and death benefit payments. Combined these expenditures were lower by $0.9 million compared to 2016, and tend to be less certain year-over-year, since they are contingent upon varying circumstances.

Note 9 (page 14) summarizes administrative expenses of the Plan, with expenditures totaling $141.0 thousand for 2017. This represents a reduction in expenses compared to 2016 of $68.7 thousand or 32.8%, with the decrease impacted primarily by lower actuarial and consulting fees. The actuarial and consulting fees reported in 2017 of $67.4 thousand were

$61.3 thousand lower than those of 2016, with the decrease attributed to the fact 2016 was a valuation year. Costs in 2016 were significantly higher as a result of additional work associated with the valuation. Other expenses were relative when compared to the prior year, with no significant dollar variances to report.

Solvency funding is not required as the Plan received a solvency funding exemption effective June 1, 2015. Currently the ratio of solvency assets to solvency liabilities is greater than the "solvency concerns" threshold of 85%, under Nova Scotia pension legislation. Should the solvency ratio fall below the 85% threshold, the Plan would be required to file a valuation within one (1) year, rather than the usual three (3) year period.

BUDGET IMPLICATIONS

There are no budget implications associated with the audited financial statements of the pension plan. Budget implications arise from the Actuarial Valuations.

ALTERNATIVES

None

ATTACHMENT

Halifax Regional Water Commission Employees' Pension Plan Financial Statements as at December 31, 2017

Report Prepared by: *Original Signed By:*

Allan Campbell, B.Comm, CPA, CMA, Manager, Finance
902-490-4288

Grant Thornton

Financial Statements

Halifax Regional Water Commission

Employees' Pension Plan

December 31, 2017

Contents

Grant Thornton LLP
Suite 1100
2000 Barrington Street
Halifax, NS
B3J 3K1

T (902) 421-1734
F (902) 420-1068
www.GrantThornton.ca

Independent auditor's report

Halifax Regional Water Commission
Employees' Pension Plan
Statement of financial position

December 31	2017	2016
Assets		
Investment assets (note 3)	**$ 119,713,036**	$ 107,043,865
Contributions receivable	**43,194**	40,166
	119,756,230	107,084,031
Liabilities		
Payables and accruals		
Trade	**24,348**	16,035
Net assets available for benefits (note 4)	**119,731,882**	107,067,996
Pension obligations (page 4)	**121,473,083**	114,046,900
Deficiency	**$ (1,741,201)**	$ (6,978,904)

On behalf of the Board

_____ Trustee

_____ Trustee

See accompanying notes to the financial statements.

Halifax Regional Water Commission
Employees' Pension Plan
Statement of changes in net assets available for benefits

Year Ended December 31	2017	2016
Revenue		
Net investment income (note 6)	**$ 2,475,604**	$ 2,250,455
Changes in the fair value of investment assets	**8,712,459**	4,056,258
	11,188,063	6,306,713
Contributions (note 7)		
Participants	**2,665,078**	2,484,448
Sponsor	**3,247,727**	3,090,791
	5,912,805	5,575,239
Expenses		
Benefit payments (note 8)	**4,296,017**	5,038,702
Administrative (note 9)	**140,965**	209,698
	4,436,982	5,248,400
Increase in net assets available for benefits	**$ 12,663,886**	$ 6,633,552
Net assets available for benefits, beginning of year	**$ 107,067,996**	$ 100,434,444
Increase in net assets available for benefits	**12,663,886**	6,633,552
Net assets available for benefits, end of year	**$ 119,731,882**	$ 107,067,996

See accompanying notes to the financial statements.

Halifax Regional Water Commission
Employees' Pension Plan
Statement of changes in pension obligations

Year Ended December 31	**2017**	2016
Pension obligations, beginning of year	**$ 114,046,900**	$ 108,055,300
Change in pension obligations		
Changes in actuarial assumptions (note 5)		-
Impact of Pension Plan changes		-
Miscellaneous sources of decrease		-
Interest accrued on benefits	**6,637,300**	6,259,500
Benefits accrued	**5,084,900**	4,770,802
Benefits paid (note 8)	**(4,296,017)**	(5,038,702)
	7,426,183	5,991,600
Pension obligations, end of year	**$ 121,473,083**	$ 114,046,900

See accompanying notes to the financial statements.

Halifax Regional Water Commission
Employees' Pension Plan
Notes to the financial statements

December 31, 2017

1. Description of the Plan

The Halifax Regional Water Commission Employees' Pension Plan (the "Plan") is registered under the Pension Benefits Act of Nova Scotia (Registration Number 0344614). The following description of the Plan is a summary only. For more complete information, reference should be made to the Plan agreement restated as at January 1, 2011 as amended and consolidated, in addition to Amendment #9 and Amendment #10, effective January 1, 2016.

(a) General

The Halifax Regional Water Commission maintains a contributory defined benefit pension plan for all employees, and participation in the Plan is compulsory for full-time and part-time employees. The pension plan provides pensions based upon length of service and best seven consecutive years' earnings.

The employees who transferred to the Halifax Regional Water Commission on August 1, 2007 with the transfer of the wastewater/stormwater operations have remained members of the Halifax Regional Municipality Pension Plan. The Halifax Regional Water Commission is responsible for funding the employer share of the contributions for these employees. All new employees hired after August 1, 2007 join the Halifax Regional Water Commission Employees' Pension Plan.

Effective June 1, 2015 revisions to the Nova Scotia Pension Benefits Act and Regulations came into effect which had some immediate impact on the Plan regarding administration of transfer deficiency holdbacks, vesting, small benefit pay-outs and death benefits. On March 29, 2018 the Halifax Regional Water Commission's Board of Directors approved Amendment #11, effective retroactively to June 1, 2015. The purpose of Amendment #11 is to formalize the required changes to the Plan text, bringing the text into compliance with the Pension Benefits Act of Nova Scotia. Amendment #11 is subject to final approval of the Regulator. Amendment #11 has no impact on the pension plan financial statements as the plan has been administered in accordance with the June 1, 2015 changes to the Nova Scotia Pension Benefits Act

(b) Funding policy

Employees' required contributions in 2017 were 10.65% (2016 – 10.65%) of pensionable earnings. Pensionable earnings are capped temporarily to a maximum of $140,945 through 2023, and will be indexed at a rate of 1% per annum thereafter. The Halifax Regional Water Commission matches employee contributions up to 9.85%. Basic contributions from employers and members due to the Plan at the end of the year are recorded on an accrual basis.

1. Description of the Plan (continued)

(b) Funding policy (continued)

In addition, the Plan and the Pension Benefits Act of Nova Scotia require that the Halifax Regional Water Commission, from time to time, make contributions to the Plan of such amounts which are required as special payments in accordance with the provisions of the Plan as determined by the actuary (see note 5).

(c) Retirement benefits

Employees are entitled to annual pension benefits of an amount equal to 2.0% of their best earnings averaged over the highest seven consecutive years of earnings for each year of credited service up to the maximum permitted by the Canada Revenue Agency. For credited service prior to January 1, 2016, the best average earnings cannot be less than the best average five consecutive years of earnings paid to an employee prior to 2016.

Benefits are adjusted each year. Adjustments are based on the increase in the Consumer Price Index over the previous calendar year to a maximum of 2% for benefits earned prior to January 1, 2016, and to a maximum of 1% for benefits earned after December 31, 2015.

(d) Disability pensions

Disabled employees continue to accrue credited service without having to continue their contributions. The employer and employees fund the actuarial cost of the pensions for disabled employees annually. Disabled employees are eligible for a pension if they meet the following criteria:

a) they have completed 10 years of continuous participation in the Plan;

b) they are not in receipt of a salary continuance benefit under an insured plan to which the Halifax Regional Water Commission contributes; and

c) they are totally and permanently disabled as certified by a medical practitioner.

(e) Death benefits

A survivor pension is payable to the member's surviving spouse at the rate of 60% of the member's pension credits accrued prior to June 1, 1998. The beneficiary of a single employee who dies before retirement will be entitled to the member's contributions and interest up to the month preceding death. In respect of pension credits accrued after June 1, 1998, the commuted value of the normal retirement benefits shall be paid to the member's beneficiary or estate.

On June 1, 2015 revisions to the Pension Benefits Act and Regulations came into effect. A change impacting the Plan was a survivor pension payable to the members surviving spouse for pension credits accrued between January 1, 1988 and May 31, 1998 is the greater of: 1) 60% of the survivor pension, or 2) the commuted value of the normal retirement benefits. The beneficiary or estate of a single employee who dies during this same time period would be entitled to the commuted value of the normal retirement benefits.

1. Description of the Plan (continued)

(f) Termination of employment

Subject to any statutory limitations, a member with two or more years of continuous service or Plan membership may elect to receive one of the following options:

a) a paid-up deferred pension commencing on the member's normal retirement date in an amount equal to the pension accrued to date of termination; or

b) transfer the value of benefit to the member's new employer's pension plan, a Retirement Savings Plan, or purchase a deferred annuity.

A member with less than two years of Plan membership or continuous service is entitled to a cash payment equal to the member's required contributions with interest calculated to the end of the month in which termination occurs. Upon termination, any member may transfer the value of benefits to his or her new employer's pension plan or Retirement Savings Plan.

On June 1, 2015 revisions to the Pension Benefits Act and Regulations came into effect. One change that impacted the Plan on that date was the provision for immediate vesting, which supersedes the two (2) year vesting period in the Plan as described above.

(g) Voluntary contributions

Members of the Plan may make additional voluntary contributions up to the deductible limit provided under the Income Tax Act. The non locked-in additional voluntary contributions may be withdrawn from the Plan by a member prior to termination or retirement, either in the form of a lump sum cash payment or transferred directly to the member's Retirement Savings Plan.

Members of the Plan may transfer non locked-in or locked-in benefits from a previous employer. Non locked-in benefits are administered as outlined in the previous paragraph. Locked-in benefits can be withdrawn within ten years of the normal retirement date. Upon retirement, the locked-in and non locked-in contributions may be used to purchase an annuity.

(h) Income taxes

The Plan is not subject to income taxes since it is a Registered Pension Trust as defined by the Income Tax Act.

2. Statement of compliance with Canadian accounting standards for pension plans and summary of significant accounting policies

The financial statements are presented in accordance with Canadian accounting standards for pension plans in Part IV of the Chartered Professional Accountants of Canada (CPA) Handbook, Section 4600 – Pension Plans. Section 4600 provides specific accounting guidance on pension obligations and investments, with investments complying with international financial reporting standards ("IFRS") in Part I of the CPA Canada Handbook. For accounting policies that do not relate to either investments or pension obligations, the plan must consistently comply with either IFRS or accounting standards for private enterprises ("ASPE") in Part II of the CPA Canada Handbook. The plan has elected to comply on a consistent basis with ASPE. To the extent that ASPE is inconsistent with Section 4600, Section 4600 takes precedence.

(a) Financial instruments

Financial assets and financial liabilities are recognized when the Plan becomes a party to the contractual provisions of the financial instrument.

Financial assets are derecognized when the contractual rights to the cash flows from the financial assets expire, or when the financial asset and all substantial risks and rewards are transferred.

A financial liability is derecognized when it is extinguished, discharged, cancelled or expires.

All financial assets and financial liabilities are initially measured at fair value. Fair value is an estimate of the amount of consideration that would be agreed upon in an arm's length transaction between knowledgeable, willing parties who are under no compulsion to act.

Financial assets and liabilities are subsequently measured as described below:

Investment assets
All investment assets are measured at fair value at the date of the statement of financial position in accordance with IFRS 13: Fair Value Measurement Part I of the CPA Canada Handbook. Fair values of investment assets are determined as follows:

- Pooled funds are valued at the unit value supplied by the Master Trust administrator and which represent the Plan's proportionate share of underlying net assets at fair value determined using closing bid prices.

Transaction costs are not included in the fair value of investment assets either on initial recognition or on subsequent re-measurement. Transaction costs are included in the statement of changes in net assets available for benefits as part of expenses incurred in the period.

Investment income, excluding changes in the fair value of investment assets, is presented in the statement of changes in net assets available for benefits.

2. Statement of compliance with Canadian accounting standards for pension plans and summary of significant accounting policies (continued)

(a) Financial instruments (continued)

Financial liabilities
Financial liabilities are measured subsequently at amortized cost using the effective interest method.

(b) Pension obligations

The Plan is a defined benefit plan established for members. The pension obligations recognized in the statements of financial position are the actuarial present value of accrued pension benefits determined by applying best estimate assumptions and the projected benefit method prorated on services.

(c) Net investment income

Income from investments is recognized on an accrual basis and includes dividend income (recognized on ex-dividend date), interest income, and is net of investment manager fees.

(d) Changes in the fair value of investment assets and liabilities

This includes both realized gains or losses on sale of investments and unrealized gains or losses on investments.

Realized gains or losses on sale of investments are the difference between the proceeds received and the average cost of investments sold.

Unrealized gains or losses on investments represent the difference between the carrying value at the year end and the carrying value at the previous year end or purchase value during the year, less the reversal of previously recognized unrealized gains and losses in respect of disposals during the year.

(e) Contributions

Required employee and employer contributions are recorded the month following when the payroll deductions are made. Employee and employer contributions, as well as special payments due to the Plan at the end of the year are recorded on an accrual basis. Cash received from pension plan transfers or members for service purchases are recorded when received.

(f) Benefits

Benefit payments to retired members, commuted value payments and refunds to former members are recorded in the period paid. Accrued benefits are recorded as part of the accrued pension benefit obligation.

2. Statement of compliance with Canadian accounting standards for pension plans and summary of significant accounting policies (continued)

(g) Estimation uncertainty

When preparing the financial statements, management undertakes a number of judgments, estimates and assumptions about recognition and measurement of assets, liabilities, revenue and expenses. The actual results are likely to differ from the judgments, estimates and assumptions made by management and will seldom equal the estimated results. Information about the significant judgments, estimates and assumptions that have the most significant effect on the recognition and measurement of assets, liabilities, revenue and expenses are discussed below:

Fair value of financial instruments
Management uses valuation techniques in measuring the fair value of financial instruments, where active market quotes are not available. Details of the assumptions used are given in the notes regarding financial assets and liabilities. In applying the valuation techniques, management makes maximum use of market inputs, and uses estimates and assumptions that are, as far as possible, consistent with observable data that market participants would use in pricing the instrument. Where applicable data is not observable, management uses its best estimate about the assumptions that market participants would make. These estimates may vary from the actual prices that would be achieved in an arm's length transaction at the reporting date.

Pension obligations
Management estimates the pension obligations annually with the assistance of an independent actuary; however, the actual outcome may vary due to estimation uncertainties. The estimate of the pension obligation of $121,473,083 (2016 - $114,046,900) is based on assumed rates of retirement, mortality, breaks in service and contributory hours. Discount factors are determined at or near year-end to reflect the long term expectation of investment returns that are denominated in the currency in which the benefits will be paid and that have terms to maturity approximating the terms of the related pension obligation.

(h) New accounting standards not yet adopted

The International Accounting Standards Board (IASB) has issued a number of new and amended standards that are not yet effective and have not been early adopted by the Plan.

- IFRS 9, *Financial Instruments*. The new standards will replace IAS 39, *Financial Instruments: Recognition and Measurement* and includes guidance on recognition and derecognition of financial assets and financial liabilities. The new standard is tentatively effective for annual periods beginning on or after January 1, 2018 and early application is permitted.

Management does not expect any significant impact on either the Plan's financial position or performance when adopting this new standard.

3. Investment assets

The investment in the Halifax Regional Municipality Master Trust (the "HRM Master Trust") is recorded at its fair value. The Plan's interest in the HRM Master Trust represents 6.11% (December 31, 2016 – 6.01%) of the HRM Master Trust units. The remaining units are held by the Halifax Regional Municipality ("HRM"). The co-mingling of investments does not affect the actuarial liabilities or the net assets available for benefits of the Plan.

The fair value of the investment in the HRM Master Trust is determined as at the date of the statements of financial position as described in note 2(a). The fair value of the investment in the HRM Master Trust is categorized as a Level 2 investment under fair value hierarchy measurement.

Section 67 (3) of the *Pension Benefits Act Regulations* requires disclosure of each investment asset that has a fair value greater than two percent (2%) of the fair value of all the investment assets of the Plan. The following schedule reports all investments having a fair value greater than 2% of the fair value of all investment assets of the Plan.

Investment	Investment type	Market value
Wellington Management Global Total Return Fund	Foreign Bonds	$5,106,962
Putnam Canadian Fixed Income Global Alpha Fund	Canadian Bonds	3,910,459
Wellington Emerging Markets Local Equity Fund	Emerging Market Equities	3,226,427
GCM Grosvenor Opportunistic Investments, LP	Limited Partnership	2,748,659
Blackrock Active Canadian Equity Fund	Canadian Equities	2,715,343
UBS (UK) Real Estate Funds Selection Global Ex Canada, L.P.	Limited Partnership	2,483,348
		$ 20,191,197

4. Net assets available for benefits	2017	2016
Allocation of net assets available for benefits		
To pension plan	**$ 119,238,702**	$ 106,638,861
To extra voluntary contribution benefits	**245,513**	204,657
To individual locked in amounts	**247,667**	224,478
	$ 119,731,882	$ 107,067,996

5. Pension obligations

The actuarial value of accrued benefits, determined periodically by the Plan's actuary, is the amount that results from applying actuarial assumptions to adjust the Plan benefits to reflect the time value of money between the valuation date and the expected date of payment. The significant actuarial assumptions used include:

a) 40% of members will retire at the age of 65, and 60% will retire at the earliest date of eligibility for an unreduced pension;

b) interest rate assumption of 5.80% per annum (2016 – 5.80%);

c) salary scale assumption of 3.90% per annum (2016 – 3.90%); and

d) life expectancy of participants based upon the CPM-2014 Combined mortality table, with Scale CPM-B improvements.

An actuarial valuation of the Halifax Regional Water Commission Employees' Pension Plan was performed as at January 1, 2016 by Eckler Ltd. The January 1, 2016 actuarial valuation resulted in an unfunded liability of $7,620,900, and the Halifax Regional Water Commission was required to make special payments which were being amortized over 15 years. This resulted in an unfunded liability payment of $825,200 (2016 - $825,200) as shown in note 7. The unfunded liability payment of $825,200 will continue until a new actuarial valuation is completed, with the next normal actuarial valuation of the Halifax Regional Water Commission Employees' Pension Plan required to be performed no later than January 1, 2019.

6. Net investment income

	2017	2016
Income from investment funds	**$ 2,622,024**	$ 2,389,377
Investment manager fees	**(146,420)**	(138,922)
	$ 2,475,604	$ 2,250,455

7. Contributions

	2017	2016
Participants' contributions		
Required	**$ 2,619,586**	$ 2,453,597
Reciprocal transfer agreements		-
Voluntary	**45,492**	30,851
	$ 2,665,078	$ 2,484,448
Sponsor's contributions		
Required	**$ 2,422,527**	$ 2,265,591
Unfunded liability	**825,200**	825,200
Special		-
	$ 3,247,727	$ 3,090,791

8. Benefit payments

	2017	2016
Retirement benefit payments	**$ 3,738,659**	$ 3,536,894
Termination benefit payments	**314,591**	992,572
Death benefit payments	**242,767**	509,236
	$ 4,296,017	$ 5,038,702

During 2017, there were 8 termination benefit payments (2016 – 16) and 1 death benefit payment (2016 – 1). Termination benefits are paid out as described in note 1(f) and death benefit payments are paid out as described in note 1(e).

9. Administrative expenses

	2017	2016
Actuarial and consulting fees	**$ 67,394**	$ 128,676
Audit and accounting fees	**9,283**	15,999
Bank custodian fees	**20,132**	26,510
Insurance	**8,347**	7,950
Miscellaneous	**18,965**	15,560
Professional fees	**14,623**	12,845
Registration fees	**2,221**	2,158
	$ 140,965	$ 209,698

10. Related party transactions

The Halifax Regional Water Commission, the Plan's sponsor, collects the Plan's contributions and pays certain expenses on behalf of the Plan. These items are then credited or charged back to the Plan.

11. Financial instruments

Financial instruments risk exposure and management
The Plan is exposed to various risks in relation to its investment in the HRM Master Trust, consisting of investment assets. The Plan's financial assets are categorized in Level 2. The main types of risks are market risk, credit risk and liquidity risk.

The Plan's risk management policy is derived from the HRM Master Trust in which the Plan holds units. The HRM Master Trust has formal policies and procedures placed upon it that establish an asset mix among equity and fixed income investments, required diversification of investments within categories, a set limit on the size of exposure to individual investments, and a requirement to use A-rated counterparties.

The Plan does not actively engage in the trading of financial assets for speculative purposes nor does it write options. The most significant financial risks to which the Plan is exposed are described below:

(a) Market risks

Market risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market prices. For purposes of this disclosure, the Plan segregates market risk into three categories: interest rate risk, currency risk and other price risk.

i. Interest rate risk
Interest rate risk refers to the fact that the value of the Plan's assets is affected by changes in nominal interest rates and equity markets.

ii. Currency risk
The Plan's functional currency is Canadian dollars and all of the Plan's transactions are carried out in Canadian dollars.

11. Financial instruments (continued)

(a) Market risks (continued)

iii. Other price risk

Other price risk is the risk that the fair value or future cash flows of financial instruments will fluctuate because of changes in market prices, other than those arising from interest rate risk or currency risk, whether those changes are caused by factors specific to the individual investment or factors affecting all securities traded in the market.

All investments have a risk of loss of capital. The maximum risk resulting from the investments is determined by the fair value of these instruments, which total $119,713,036 at December 31, 2017 (2016 - $107,043,865). A one percent (1%) change in market risk (holding all variables constant) will impact the fair value of these investments by approximately $1,197,130 (2016 - $1,070,439).

(b) Credit risk

Credit risk on financial instruments is the risk of financial loss occurring as a result of default or insolvency of a counterparty on its obligations to the Plan. The Plan's credit risk is primarily attributable to the underlying assets of the HRM Master Trust. Credit risk is mitigated through the management of the HRM Master Trust assets with generally accepted parameters of safety and prudence, using a diversified investment program. Investments in the HRM Master Trust must adhere to specific limitations as outlined in the Halifax Regional Municipality's Statement of Investment Policies and Procedures for the Defined Benefit Pension Plan ("the Statement of Investment Policies and Procedures").

(c) Liquidity risk

Liquidity risk is the risk of not being able to meet the Plan's cash requirements in a timely and cost effective manner. Liquidity requirements are managed through income generated from investments and monthly contributions made by members and participating employers. The sources of funds are used to pay pension benefits, make additional investments and fund operating expenses. The Plan's primary future liabilities include the accrued benefit obligation of the Plan. The Plan's main asset, the investment in the HRM Master Trust, is liquid as cash is available to make required payments.

The following are the contractual maturities of financial liabilities:

Payments due year ending December 31, 2017

	Total	Less than 1 year	1 - 3 years	4 - 5 years	After 5 years
Payables and accruals	**$ 24,348**	**$ 24,348**	$ -	$ -	$ -

11. Financial instruments (continued)

(c) Liquidity risk (continued)

Payments due year ending December 31, 2016

	Total	Less than 1 year	1 - 3 years	4 - 5 years	After 5 years
Payables and accruals	$ **16,035**	$ **16,035**	$ -	$ -	$ -

Fair value disclosure

The financial instruments recognized at fair value on the statement of financial position must be classified as one of three fair value hierarchy levels. This hierarchy groups financial assets and liabilities into three levels based on the significance of inputs used in measuring the fair value of the financial assets and liabilities. The fair value hierarchy has the following levels:

Level 1: quoted prices (unadjusted) in active markets for identical assets or liabilities;

Level 2: inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly (i.e. as prices) or indirectly (i.e. derived from prices); and

Level 3: inputs for the asset or liability that are not based on observable market data (unobservable inputs).

The level within which the financial asset or liability is classified is determined based on the lowest level of significant input to the fair value measurement. The financial assets and liabilities measured at fair value in the statement of financial position are grouped into the fair value hierarchy as follows:

Financial assets at fair value as at December 31, 2017

	Level 1	Level 2	Level 3	Total
Assets				
Pooled fund	$ -	$ 119,713,036	$ -	$119,713,036

11. Financial instruments (continued)

Fair value disclosure (continued)

Financial assets at fair value as at December 31, 2016

	Level 1	Level 2	Level 3	Total
Assets				
Pooled fund	$ -	$ 107,043,865	$ -	$ 107,043,865

The methods and valuation techniques used for the purpose of measuring fair value are unchanged compared to the previous reporting period.

12. Capital management

The Plan defines its capital as the deficiency of the Plan, as determined annually based on the fair value of net assets and actuarial liabilities, provided by the actuarial valuation prepared by the Plan's independent actuary (note 5).

The overall objectives in investing the assets of the Plan are to ensure sufficient liquidity to support its financial obligations, to continue to provide benefits in the best interest of its members, to remain financially self-sufficient and to preserve and enhance the value of capital through adequate diversification in high quality investments and achieve the highest investment return that can be obtained with the assumption of an acceptable degree of risk. The Plan holds units with the HRM Master Trust which has formal policies and procedures that establish asset mix, require diversification within different categories, set a limit on the exposure to individual investments and provides a requirement to use A-rated counterparties.

Halifax Water
Halifax Regional Water Commission

ITEM # 4.4
HRWC Board
June 21, 2018

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

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

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

DATE: June 1, 2018

SUBJECT: **Halifax Regional Water Commission Employees' Pension Plan Financial Report - 1st Quarter, 2018**

INFORMATION REPORT

ORIGIN

Financial reporting for the Halifax Regional Water Commission Employees' Pension Plan (hereinafter called the "Plan").

BACKGROUND

The Board is required to review the periodic (quarterly) financial results of the Plan throughout the year.

DISCUSSION

The attached statement of changes in net assets available for benefits outlines the annual budget for the Plan and actual financial performance for the 1st quarter (January 1 to March 31, 2018). Favourable or unfavourable variances reported compare actual results to prorated budget amounts (25% = 3 months/ 12 months), which serves as a benchmark for the three (3) month period in 2018. Yearend unaudited results for 2017, and audited results for 2016 are shown for comparative purposes.

As shown on the statement of changes in net assets available for benefits, net assets available for benefits have increased by $2.3 million for the three (3) month period ending March 31, 2018. The annual budget for 2018 forecasted an increase in net assets available of $10.3 million. Actual results for the period of $2.3 million compared to the benchmark of $2.6 million results in an unfavourable variance in the amount of $0.3 million.

The annual budget forecasted revenue of $8.8 million. Revenue for the period totaled $1.8 million, which when compared to the benchmark of $2.2 million results in an unfavourable variance of $0.4 million. Revenue is affected largely by the performance of the HRM Master Trust, and change tends to be more volatile compared to contributions and expenses of the Plan. This variance is attributed directly to the fact the actual increase in the fair value of the investment assets was lower than expected. The increase for the period totaled $1.3 million compared to the benchmark of $1.6 million, a difference of $0.3 million or 19%. Investment income for the period performed slightly below expectations, showing an unfavorable variance of $0.1 million or 14%.

Contributions of $1.4 million are tracking as expected, showing an unfavourable variance of $0.1 million, but are under budget mainly due to timing differences associated with pay increases.

Expenses of $1.0 million for the period are lower than the benchmark of $1.2 million resulting in a favourable variance of $0.2 million or 15%. The main contributor to this favourable variance is termination benefit payments of $5.7 thousand for the first quarter, which came in considerably lower than the benchmark of $175.0 thousand. The remainder of the variance is due to the timing of administrative expenses, which totaled $37.8 for the period compared to the benchmark of $44.3 thousand.

ATTACHMENT

Statement of changes in net assets available for benefits, for the three (3) month period ended March 31, 2018.

Report Prepared by: *Original Signed By:*

Allan Campbell, B.Comm, CPA, CMA
Manager, Finance 902-490-4288

Halifax Regional Water Commission Employees' Pension Plan
Statement of changes in net assets available for benefits
For the three (3) month period ended
Benchmark *25%*

	March 31, 2018						
				Variance			
			Prorated	Actual versus Prorated Budget		Actual	
	2018		Budget	Favourable (Unfavourable)		(Unaudited)	Actual
	Budget	Actual	25%	$	%	2017	2016
Revenue[1]							
Net investment income:							
Total investment income	$2,340,000	$500,253	*$585,000*	*($84,747)*	*-14%*	$2,622,024	$2,389,377
Investment manager fees	($166,000)	($34,241)	*($41,500)*	*$7,259*	*-17%*	($146,420)	($138,922)
Increase (decrease) in the fair value of investment assets	$6,590,000	$1,333,007	*$1,647,500*	*($314,493)*	*-19%*	$8,712,459	$4,056,258
	$8,764,000	**$1,799,019**	*$2,191,000*	*($391,981)*	***-18%***	**$11,188,063**	**$6,306,713**
Contributions[2]							
Participants:							
Current service (inc AVC's)	$2,801,000	$643,063	*$700,250*	*($57,187)*	*-8%*	$2,665,078	$2,484,448
Sponsors:							
Current service (inc LTD)	$2,548,000	$584,200	*$637,000*	*($52,800)*	*-8%*	$2,422,527	$2,265,591
Unfunded liability	$825,000	$206,315	*$206,250*	*$65*	*0%*	$825,200	$825,200
	$6,174,000	**$1,433,578**	*$1,543,500*	*($109,922)*	***-7%***	**$5,912,805**	**$5,575,239**
Expenses[3]							
Benefit payments:							
Benefit payments	$3,754,000	$938,926	*$938,500*	*($426)*	*0%*	$3,738,659	$3,536,894
Termination payments	$700,000	$5,728	*$175,000*	*$169,272*	*97%*	$314,591	$992,572
Death benefit payments	$0	$0	*$0*	*$0*	*n/a*	$242,767	$509,236
Administrative:							
Actuarial & consulting fees	$100,000	$16,113	*$25,000*	*$8,887*	*36%*	$67,394	$128,676
Audit & accounting fees	$9,000	$0	*$2,250*	*$2,250*	*100%*	$9,283	$15,999
Bank custodian fees	$22,000	$12,382	*$5,500*	*($6,882)*	*-125%*	$20,132	$26,510
Insurance	$9,000	$0	*$2,250*	*$2,250*	*100%*	$8,347	$7,950
Miscellaneous	$15,000	$5,423	*$3,750*	*($1,673)*	*-45%*	$18,965	$14,433
Professional fees	$15,000	$3,848	*$3,750*	*($98)*	*-3%*	$14,623	$12,845
Registration fees	$2,000	$0	*$500*	*$500*	*100%*	$2,221	$2,158
Training (Trustees/ Administration/ Pension Committee)	$5,000	$0	*$1,250*	*$1,250*	*100%*	$0	$1,127
	$4,631,000	**$982,419**	*$1,157,750*	*$175,331*	***15%***	**$4,436,982**	**$5,248,400**
Increase (decrease) in net assets available for benefits	**$10,307,000**	**$2,250,178**	*$2,576,750*	*($326,572)*	***-13%***	**$12,663,886**	**$6,633,552**
Net assets available for benefits, beginning of period	**$112,657,705**	**$119,731,882**				**$107,067,996**	**$100,434,444**
Increase (decrease) in net assets available for benefits	**$10,307,000**	**$2,250,178**				**$12,663,886**	**$6,633,552**
Net assets available for benefits, end of period	**$122,964,705**	**$121,982,060**				**$119,731,882**	**$107,067,996**

For the purposes of this statement, expenses are reported on a cash basis. Comparative years are reported on an accrual basis as that is how they are reported on the financial statements.

Halifax Water
Halifax Regional Water Commission

ITEM #5.1

HRWC Board

June 21, 2018

TO: Ray Ritcey, B. Comm, MBA CPA/CGA, Chair and Members of the Halifax Water Board of Commissioners

SUBMITTED BY: *Original Signed By:*

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

APPROVED: *Original Signed By:*

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

DATE: June 8, 2018

SUBJECT: **Solar Photovoltaic (Solar PV) Project Application**

ORIGIN

Halifax Water Staff.

RECOMMENDATION

It is recommended that the Halifax Water Board:

1. Endorse the enclosed *"HRWC Solar PV Project Development Plan"*.
2. Approve proceeding with:
   - Phase 1 – Application under the provincial *"Solar Electricity for Community Buildings Pilot Program"*; and
   - Phase 2 - Issuance, acceptance and evaluation of Request for Quotes (RFQs) or Request for Proposals (RFPs) for the development of the identified solar PV project at the J.D. Kline Water Supply Plant.
3. Forward to Halifax Regional Municipality (HRM) Council to request a Council Resolution indicating support for the project as identified.

BACKGROUND

Halifax Water is considering the installation and operation of Solar PV technology to be used to generate electrical power to offset electrical energy use and generate revenue from the sale and supply of electrical power to the Nova Scotia Power Inc. (NSPI) distribution or transmission grids.

In the province's "*2015 Electricity Plan: Our Electricity Future*", Nova Scotia committed to introducing a new solar energy program. This program is designed to help Nova Scotia learn more about how solar electricity can help Nova Scotia move to a cleaner electricity system in a cost-effective way, while encouraging and enabling community participation in renewable energy generation.

The "*Solar Electricity for Community Buildings Pilot Program*" is designed to allow participation by Municipalities (or wholly owned subsidiaries), Mi'kmaq Bands, Academic Institutions and Non-profits through the installation of a Solar PV array with a capacity of up to 75 kW for electricity generation on or around suitable buildings.

The provincial *Solar Electricity for Community Buildings Pilot Program* will utilize a "Request for Proposal" process whereby prospective proponents (e.g. Halifax Water) submit proposals to design, build, and maintain a solar array on their property, and will sell the energy to the applicable electric utility (e.g. Nova Scotia Power Inc.) under a 20 year Power Purchase Agreement (PPA). Within the submitted proposal, the Proponent shall set or "bid" its buy-back price for the solar electricity generated under the program. Proposals shall be scored based on 1) Meeting the mandatory submission requirements; 2) A screening of the financial and technical feasibility of the project; and 3) Ranking the submitted selling price against all other applicants, whereby the lowest power purchase prices will receive the highest rank - all other evaluated prices will be ranked relative to the lowest price submitted. Contracts will then be awarded by rank until maximum program capacities are reached among utilities and counties.

DISCUSSION

Halifax Water has a strong focus on energy conservation and efficiency improvement, as well as renewable energy generation. Solar energy is one type of renewable and sustainable energy that could be utilized by Halifax Water at a number of its current facility sites. These sites are identified below, and show the available versus required area to install a 75 kW system. Those sites with available areas shown in red **do not** meet the space requirements of the proposed 75 kW system.

Facility	Install Location	Available Area (m^2)			Primary Orientation
		Roof	Ground/Clearwell/Other		
JD Kline WSP	Roof/Clearwell	2501	2706	-	SSE
Lake Major WSP	Roof/Clearwell	2343	1260	-	SE
Mill Cove WPCP	North/South Clarifiers	616	400	-	SSW
Dartmouth WWTF	Roof/Ground	2106	2580	-	SW
Halifax WWTF	Roof	3168	-	-	SW
Herring Cove WWTF	Roof/Ground	1485	1400	-	SW
Eastern Passage WWTF	Roof/Old Clarifiers/Clarifiers	441	484	950	SSW
450 Cowie Hill Road	New Roof/Old Roof/Parking	1081	646	2880	SE
455 Cowie Hill Road	Garage Roof/Admin Roof/Parking	1408	1260	675	SSW
Module Area/kW		10	m^2/kW		
Array Capacity		75	kW		
Total Array Area		750	m^2		

While most of the above noted sites could accommodate the 75 kW solar array as proposed, some sites are deemed to be better and more cost effective than others. For instance:

1) it is expected any of the rooftop sites identified would require a structural engineering analysis, and may require structural upgrading, along with railings/fall protection facilities;
2) the larger parking area sites would require larger than normal support structures to support the array, with allowance for precipitation removal;
3) clarifier based structures would require enough height to allow work on and operation of the clarifiers to go unhindered. Each of these solutions would add significant costs to the project, with no direct benefit to energy production nor financial returns.

The location that makes the most sense from a technical and financial perspective is the ground mount sites at the JD Kline WSP at Pockwock Lake. The JD Kline clear well area is a flat, stable location with an area of approx. 2,700 m^2. Although the Dartmouth WWTF site appears to be practical for this type of project, it is limited due to the future requirements to upgrade the WWTF to secondary treatment by 2040, to be compliant with the Wastewater System Effluent Regulations. As such, the project lifespan would be limited to 15 years, thus limiting its economic feasibility.

Figure 1 - JD Kline WSP - Conceptual Plan – Plan View

Solar radiation intensity (watts/m^2/day), energy production (kWh/year) and annual revenues ($/year) are expected to be similar for both locations.

From a financial perspective, the project is expected to cost approximately $225,000, including net HST and overheads. This estimate is based on current industry guidelines, which puts the cost of a ground based solar array in the range of $2,000/W to $3,000/W of installed power, depending on the size and complexity of the installation. This analysis has conservatively used $3,000/kW as the installed cost. The solar analysis shows an approximate annual energy production in the range of 99,500 kWh/year. Assuming an energy bid rate of $0.295/kWh, total annual revenues would be approximately $29,363 per year. Based on these assumptions, and using a 25% Equity/75% debt financing model, the project shows a positive financial return with an NPV of $103,012, an IRR of 8.7%, and a payback period of 9.5 years.

Financial results were calculated using an installed cost of $3,000/kW, and an energy sales price of $0.295/kWh. This energy sales price was compared to the sales prices of the approved 2017/18 projects. Provincially, projects ranged from a low of $0.15/kWn (Dalhousie, IDEA Building Array, 50 kW) to a high of $0.39/kWh (Glooscap First Nation, Rooftop Installation, 22 kW). Within HRM, projects ranged from a low of $0.15/kWn (Dalhousie, IDEA Building Array, 50 kW) to a high of $0.36/kWh (Ecology Action Centre, Existing Rooftop Expansion, 7 kW). The provincial average sell price was $0.264/kWh, while the HRM projects had an average sell price of $0.274/kWh.

For this proposed project, a bid price of $0.295/kWh was deemed to be a good starting point, is within the range for previously approved applications, and selected to allow a payback within 10 years, given the estimated project costs. Additional scenarios could be evaluated to further refine the costs, equity vs. debt, payback, NPV, IRR, and energy production.
Based on the preliminary analyses of the available solar energy resources in the Halifax region, and based on the preliminary financial analysis of the proposed 75 kW system, it is recommended that the HRWC Board approve making an application under the provincial *Solar for Community Buildings Pilot Program.*

The overall project is proposed to take a phased approach, as outlined below:

1. Phase 1 – Program Application - Prepare and complete a Solar Energy for Community Buildings Pilot Program Application for one (1) 75 kW solar array project.

2. Phase 2 – Request for Proposal (RFP) - Contingent on receiving Halifax Water Board and HRM Council approval, and a project approval from the Program, issue a request for proposal for the completion of a detailed design and construction cost analysis for the 75 kW solar array. This process would provide detailed cost information upon which a final decision would be made to proceed. It would also identify the required hardware, equipment, technical requirements, etc., along with potential suppliers, installers, accurate project costing and implementation plans.

3. Phase 3 – Halifax Water Board Approval - Contingent on receiving a project approval from NSDOE, and actual costs received during the RFP process in Phase 2 being in line with the original estimate, seek Halifax Water Board approval for Phase 4 – Construction & Commercial Operation of the project.

4. Phase 4 – Construction and Commercial Operation - Construct and commission the full 75 kW solar array.

BUDGET IMPLICATIONS

There is expected to be no budget implications for the completion of Phases 1 and 2 of this project.

Contingent upon the successful completion of Phases 1 and 2 as described above, the project would proceed if the business case remains positive with a reasonable period of return on investment, and no annual unregulated operating budget deficits (i.e: there must be an annual net surplus). Halifax Water Board approval, approval for funding from

unregulated activities would be sought from the 2018/19 and/or 2019/20 budget years. This project would be considered unregulated activity.

ALTERNATIVES:

The Halifax Water Board may choose not to proceed with a submission under the provincial Solar Energy for Community Buildings Pilot Program.

ATTACHMENTS

Attachment A – Preliminary Financial Analysis

Report Prepared by: *Original Signed By:*

Jeff Knapp, FEC, P. Eng., CEM
Manger, Energy & WWTF Infrastructure Engineering
(902) 471-2791

Financial Reviewed by: *Original Signed By:*

Cathie O'Toole, MBA, CPA, CGA, Director, Corporate Services
(902) 490-3685

Halifax Regional Water Commission

Project Location: JD Kline WSP
Project Details: One 75 kW Solar PV Installation
Completed By:: J. Knapp
Date/Version: June 14, 2018

PRELIMINARY

JD Kline WSP
One 75 kW Solar PV Installation

Technical Assumptions	Value	Units	Comments
DC System Size	75.0	kW	
Module Type	Premium		
Array Type	Fixed		
Module Output	375	W	
No. of Modules	200		
Module Area	1.984	m^2	Data based on Canadian Solar KuDymond High Efficiency
Total Module Area	396.8	m2	Mono Perc Module
Module Efficiency	18.9%		P/N - CS3U-375MS-FG
Total System Power	75.0	kWp	Module Efficiency - 18.9%
System Losses	11.85%		System Voltage 1500V (IEC)
Soiling	2.0%		Cell Type - Mono-crustalline
Shading	0.0%		Cell Arrangement - 144 [2 x (12x6)]
Snow	2.0%		Dimensions - 2000 x 992 x 5.8 mm
Mismatch	2.0%		Weight - 29 kg
Wiring	2.0%		-0.37%/°C TCP
Connections	0.5%		
Light-Induced Degredation	0.5%		
Nameplate Rating	1.0%		
Age	0.5%		
Availability	2.0%		
Tilt	45.0	deg.	
Azimuth	180.0	deg.	
Average Daily Irradiation	4.12	$kWh/m^2/day$	Ref. National Renewable Energy Laboratory
Average Annual Irradiation	1505.6	$kWh/m^2/yr$	https://pvwatts.nrel.gov/
Average Annual Energy Production	99534	kWh/yr	

Financial/Economic Assumptions	Value	Units	Comments
Base Year Value of Power Sold	$295.00	$/MWh	Estimate
Base Year Cost of Purchased Power	$76.82	$/MWh	Based on 2017 NSPI rates, Rate Class 22, Medium Industrial
Base Year Cost of Fuel Oil	$0.70	$/L	
Annual Maintenance	$0.020	$/kWh	Cleaning, testing, inspecting.
Capacity Cost	$3,000	/kW	Assumption
Total Capital Cost	$225,000		Assumption
External Funding	$0		Assumption
Net Capital Cost	$225,000		
Corporate Discount Rate for NPV Analysis	3.00%		As per C. O'Toole
Annual Escalation Rate - COMFIT Rate	0.0%		
Annual Escalation Rate - Inflation	2.0%		Assumption.
Harmonized Sales Tax (Net)	4.286%		
Labour Rate	$30.00	/hr	$30.00/hr Average for WWTF Technicians
Benefit Costs	23.0%		As per C. O'Toole
Labour Hours	1.0	hrs/week	Estimate.
Amortization Term	20.0	years	Assumption. Choose Scenario.
Equity Contribution	25%		Assumption. Choose Scenario.
Debt Contribution	75%		Assumption. Choose Scenario.
Cost of Equity	0.00%		Assumption
Cost of Debt	3.62%		As per W. Brake.
Weighted Average Cost of Capital	2.72%		
Depreciation Term	25.0	years	Assumption

Solar Calculations

Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)
January	2.42	4880
February	3.11	5617
March	4.70	9250
April	4.86	9047
May	5.50	10410
June	5.47	9840
July	5.60	10262
August	5.59	10276
September	4.91	8801
October	3.43	6615
November	2.12	4053
December	1.80	3608
Annual	**4.12**	**92657**

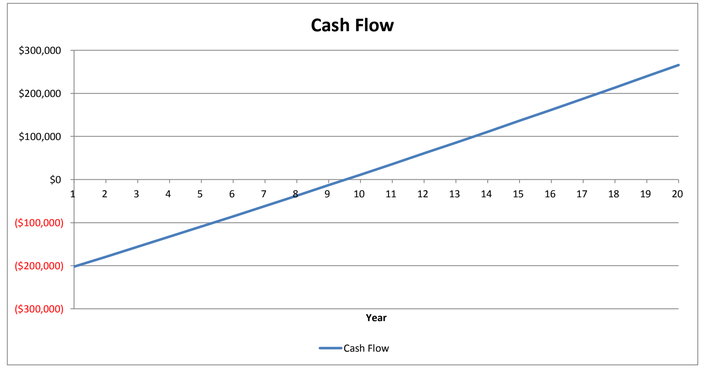
		Based on 20 year Power Purchase Agreement (PPA) with NSPI																				New PPA Reuired Post 20 Years				
Base Data																										
Operating Period	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Operating Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Generation Capacity (MWh)		99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5
Income Statement																										
Revenues																										
COMFIT Energy Price ($/MWh)		$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$295	$75	$75	$75	$75	$75
Energy Revenues		$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$29,363	$7,465	$7,465	$7,465	$7,465	$7,465
Sub-Total Revenues		**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$29,363**	**$7,465**	**$7,465**	**$7,465**	**$7,465**	**$7,465**
O&M Expenses																										
Major Component Replacement		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Maintenance		$1,991	$2,031	$2,071	$2,113	$2,155	$2,198	$2,242	$2,287	$2,332	$2,379	$2,427	$2,475	$2,525	$2,575	$2,627	$2,679	$2,733	$2,787	$2,843	$2,900	$2,958	$3,017	$3,078	$3,139	$3,202
Sub-Total O&M		**$1,991**	**$2,031**	**$2,071**	**$2,113**	**$2,155**	**$2,198**	**$2,242**	**$2,287**	**$2,332**	**$2,379**	**$2,427**	**$2,475**	**$2,525**	**$2,575**	**$2,627**	**$2,679**	**$2,733**	**$2,787**	**$2,843**	**$2,900**	**$2,958**	**$3,017**	**$3,078**	**$3,139**	**$3,202**
Debt Servicing																										
Starting Balance		$168,750	$160,313	$151,875	$143,438	$135,000	$126,563	$118,125	$109,688	$101,250	$92,813	$84,375	$75,938	$67,500	$59,063	$50,625	$42,188	$33,750	$25,313	$16,875	$8,438	$0	$0	$0	$0	$0
Ending Balance		$160,313	$151,875	$143,438	$135,000	$126,563	$118,125	$109,688	$101,250	$92,813	$84,375	$75,938	$67,500	$59,063	$50,625	$42,188	$33,750	$25,313	$16,875	$8,438	$0	$0	$0	$0	$0	$0
Principal		$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$8,438	$0	$0	$0	$0	$0
Interest		$4,582	$4,352	$4,123	$3,894	$3,665	$3,436	$3,207	$2,978	$2,749	$2,520	$2,291	$2,062	$1,833	$1,604	$1,374	$1,145	$916	$687	$458	$229	$0	$0	$0	$0	$0
Sub-Total Debt Servicing (P &I)		**$13,019**	**$12,790**	**$12,561**	**$12,332**	**$12,103**	**$11,874**	**$11,645**	**$11,416**	**$11,186**	**$10,957**	**$10,728**	**$10,499**	**$10,270**	**$10,041**	**$9,812**	**$9,583**	**$9,354**	**$9,125**	**$8,896**	**$8,667**	**$0**	**$0**	**$0**	**$0**	**$0**
(Revenues - O&M Exp - Interest)	**Capital Cost (225,000)**	**22,790**	**22,980**	**23,168**	**23,356**	**23,543**	**23,729**	**23,914**	**24,098**	**24,281**	**24,464**	**24,645**	**24,826**	**25,005**	**25,184**	**25,362**	**25,538**	**25,714**	**25,888**	**26,061**	**26,234**	**4,507**	**4,448**	**4,388**	**4,326**	**4,263**
		(202,210)	**(179,230)**	**(156,062)**	**(132,706)**	**(109,163)**	**(85,435)**	**(61,521)**	**(37,423)**	**(13,142)**	**11,322**	**35,967**	**60,793**	**85,798**	**110,982**	**136,344**	**161,882**	**187,595**	**213,483**	**239,545**	**265,778**	**270,285**	**274,733**	**279,120**	**283,446**	**287,710**
Total Cumulative Cash Flow		**$14,353**	**$14,542**	**$14,731**	**$14,918**	**$15,105**	**$15,291**	**$15,476**	**$15,660**	**$15,844**	**$16,026**	**$16,208**	**$16,388**	**$16,568**	**$16,746**	**$16,924**	**$17,101**	**$17,276**	**$17,450**	**$17,624**	**$17,796**	**$4,507**	**$4,448**	**$4,388**	**$4,326**	**$4,263**
Depreciation (Assumes Straight Line to Term)	Term = 25 yr	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
		$9,000	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	**$9,000**	9,000	9,000	9,000	9,000	9,000
Total Net Cash Flow (excludes Depreciation)		**$22,790**	**$22,980**	**$23,168**	**$23,356**	**$23,543**	**$23,729**	**$23,914**	**$24,098**	**$24,281**	**$24,464**	**$24,645**	**$24,826**	**$25,005**	**$25,184**	**$25,362**	**$25,538**	**$25,714**	**$25,888**	**$26,061**	**$26,234**	**$4,507**	**$4,448**	**$4,388**	**$4,326**	**$4,263**
Total Net Income		**5,353**	**5,542**	**5,731**	**5,918**	**6,105**	**6,291**	**6,476**	**6,660**	**6,844**	**7,026**	**7,208**	**7,388**	**7,568**	**7,746**	**7,924**	**8,101**	**8,276**	**8,450**	**8,624**	**8,796**	**(4,493)**	**(4,552)**	**(4,612)**	**(4,674)**	**(4,737)**

Choose a Scenario

25% Equity / 75% Debt / No Ext Fund / 20 Year Term

NPV/IRR Analysis	
Project NPV (based on Net Income)	**$103,012**
Project IRR	**8.7%**
Simple Payback	**9.5 yrs**

Scenario: 5	Equity	Debt	Ext Fund	Term
1 100% Equity / 0% Debt / No Ext Fund / 0 Year Term	100%	0%	$0	0
2 50% Equity / 50% Debt / No Ext Fund / 10 Year Term	50%	50%	$0	10
3 0% Equity / 100% Debt / No Ext Fund / 10 Year Term	0%	100%	$0	10
4 0% Equity / 100% Debt / No Ext Fund / 15 Year Term	0%	100%	$0	15
5 25% Equity / 75% Debt / No Ext Fund / 20 Year Term	25%	75%	$0	20
6 0% Equity / 100% Debt / No Ext Fund / 25 Year Term	0%	100%	$0	25



Halifax Water
Halifax Regional Water Commission

ITEM #5.2

HRWC Board

June 21, 2018

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

SUBMITTED BY: *Original Signed By:*
Jamie Hannam, P. Eng.
Director, Engineering & Information Services

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

DATE: June 6, 2018

SUBJECT: **Ellenvale Run Retaining Wall System Replacement (Phase II)**

ORIGIN

The 2018/19 Capital Budget.

RECOMMENDATION

The Halifax Water Board approve the Ellenvale Run Retaining Wall System - Replacement project (Phase II) at an estimated cost of $2,361,000.

BACKGROUND

Ellenvale Run is an urban stormwater drainage system in Dartmouth that Halifax Water is responsible for as specifically identified in the 2007 Transfer Agreement between the Halifax Regional Municipality and Halifax Water. The approximately five kilometres drainage system with headwaters at Lake LeMont/Topsail Lake serves approximately 900 hectares of land and consists of natural riparian areas, culverts, various types of retaining walls, and buried pipe which eventually discharges into the northwest end of Morris Lake.

The drainage corridor of Ellenvale Run (indicated on Attachment 1) has several sections that form a rectangular channel, framed by two retaining walls and a relatively flat bottom. Significant sections of these retaining walls are at the end of their service life and in some cases have required immediate attention by Halifax Water Operations staff to stabilize its

condition temporarily. The risks associated with the failure of these assets range from possible flooding to public health and safety.

Halifax Water engaged DesignPoint Engineering & Surveying Ltd. to undertake an assessment of the retaining wall system. In December 2016, DesignPoint delivered their final report on the condition assessment, which presented a prioritized list of 11 sections of the Ellenvale Run.

Detailed design on the first two prioritized sections (Sections 3 & 8) was completed in August 2017. Funding in the amount of $1,535,000 was approved for the project in May 2017. The project was originally tendered in the fall of 2017, however, the construction tender for this work was postponed due to constraints with the supply of the required pre-cast concrete products within the short time frame. The project was re-tendered in February 2018. With the low tender bid being in excess of the original funding approval, Halifax Water and the NSURB recently approved additional funding in the amount of $1,319,000, for a revised total project cost for $2,854,000, to complete the construction of Sections 3 & 8. Additional funding in the amount of $846,000 was reallocated from the Ellenvale Run Retaining Wall System Replacement project within the 2018/2019 Capital budget. The tender for the Phase I work has been awarded and construction activities have begun.

DISCUSSION

The second project for Ellenvale Run is prioritized as Section 1 & 2 from the DesignPoint report and is included with the 2018/19 Capital budget. The detailed design for the Phase II work is currently nearing completion. The scope of work for the next project includes 153 m of new pre-cast channel liner and associated construction/reinstatement in the area of John Cross Drive and Elwin Crescent.

Based on the detailed design and reflection of Phase 1 pricing, the Phase II total project cost was revised to $2,361,000 as per the attached project cost estimate (attachment 2). The 2018/2019 Capital budget – Stormwater had identified $2,525,000 for the Ellenvale Run Retaining Wall System Replacement. With the reallocation of $846,000 for the Phase I work, an additional $682,000 is required to undertake the project.

The additional funding of $682,000 is available within the 2018/19 Capital Budget under the Windmill Road PS Replacement Project. The intent was to undertake this project in 2018. However, it has most recently been determined that the required land is owned by the Department of National Defense and the associated land acquisition will delay the project to 2019. Thus, the additional funding of $682,000 can be reallocated from this project.

BUDGET IMPLICATIONS

Funding in the amount of $1,679,000 is available within the 2018/19 Capital Budget under Stormwater - Ellenvale Run Retaining Wall System – Replacement. Additional funding in the amount of $682,000 is available from the deferral of the Windmill Road Pump Station Replacement project as detailed in the Discussion section above.

The proposed expenditures meet the "No Regrets – Unavoidable Needs" approach of the 2012 Integrated Resource Plan. The proposed works meet the NR-UN criteria of "Firm regulatory requirement" and "Required to ensure infrastructure system integrity and safety," as significant lengths of the retaining walls are at the end of their service life along with some sections that have previously failed and been temporarily repaired by Halifax Water Operations Staff.

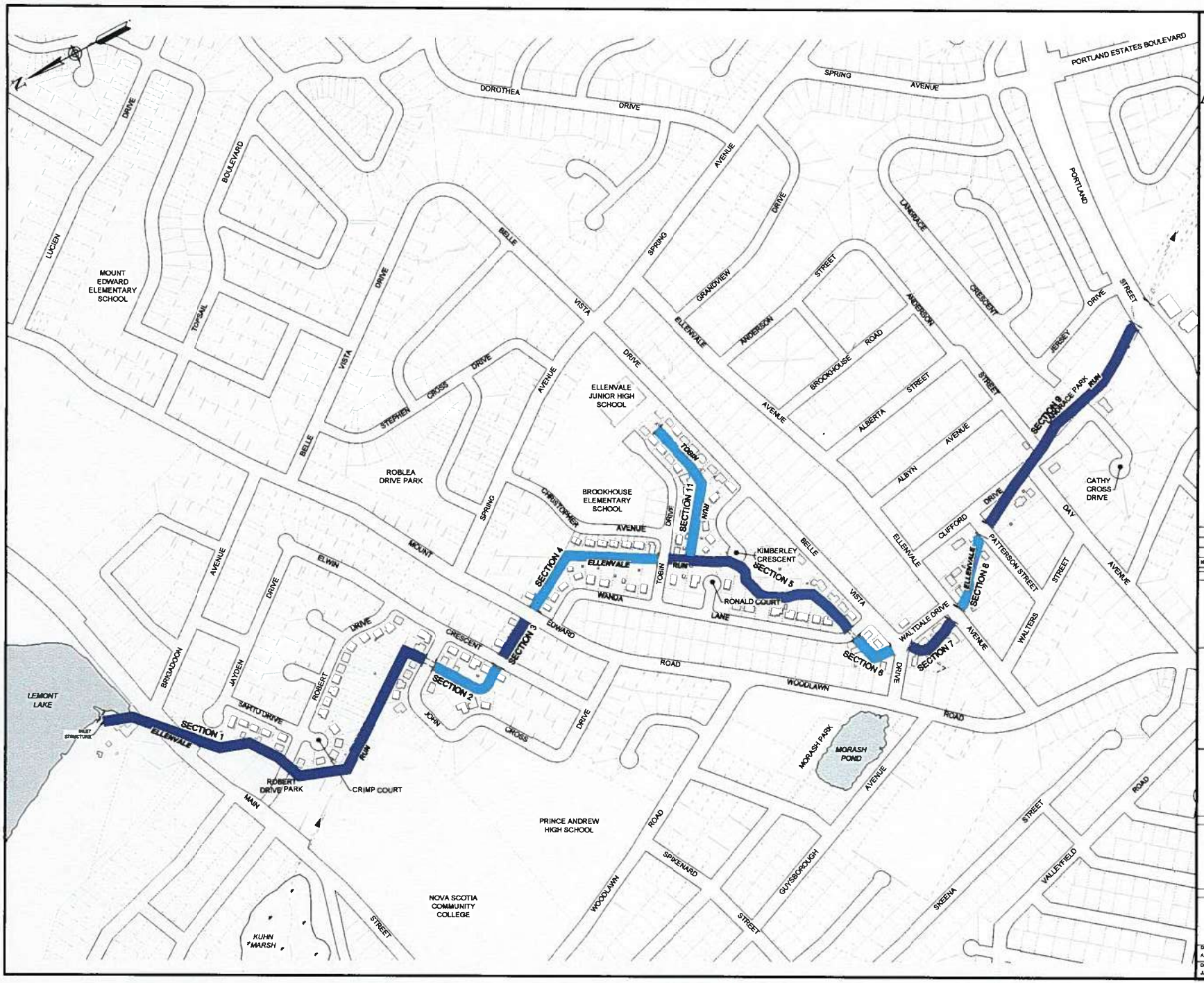
ALTERNATIVES

There are no recommended alternatives.

ATTACHMENT

Attachment 1 - Ellenvale Run – Site Plan
Attachment 2 – Cost Estimate
Attachment 3 – Ellenvale Phase II Budget

Report Prepared By:	*Original Signed By:* Peter Maynard, P. Eng., Project Engineer, (902) 478-7350
Financial Reviewed By:	*Original Signed By:* Cathie O'Toole, MBA, CPA, CGA, Director of Corporate Services, (902) 490-3685



ITEM #5.2

June 21, 2018

ATTACHMENT 1

ISSUED FOR REVIEW, NOT FOR CONSTRUCTION

1:2500

ISSUE	DATE	DESCRIPTION
3	DEC. 8, 2018	ISSUED FOR FINAL REPORT
2	SEPT. 30, 2018	REVISED AS PER HRWC COMMENTS
1	JUL. 6, 2018	ISSUED FOR DRAFT REPORT

CONSULTANT

DESIGN POINT ENGINEERING & SURVEYING

CLIENT

Halifax Water

PROJECT DESCRIPTION

ELLENVALE RUN
RETAINING WALL ASSETS
CONDITION ASSESSMENT

DARTMOUTH, NOVA SCOTIA

SHEET DESCRIPTION

SITE PLAN

Drawn	Engineer	Project No.	Drawing No.
A. SKETCHLEY	D. WOODFORD	16-001	1 of 1
Date of 1st Issue	Scale	Filename	
JUL. 6, 2018	1:2500	16-001CBase.dwg	

ESTIMATE OF PROBABLE COST

Ellenvale Run Section 1 33 m

Upstream of John Cross Culvert

Project Number: 17-014

Date: 23-May-2018

Note: This opinion of probable cost is an estimate only. The estimate is based on unit rates obtained from previous tenders of similar work and represents a budget only. The actual construction cost will be subject to various factors that are not known at the time of estimate preparation, including market conditions, industry workload, and approval process. The actual cost cannot be known until the project is tendered and a contract is awarded. This estimate should be used with caution if using for budgeting purposes.

No.	Unit Description	Unit	Quantity	Unit Rate	Estimated Cost
1.0	**Earthworks**				
1.1	Trench Rock	m^3	330	$ 50.00	$ 16,500.00
1.2	Unsuitable Material	m^3	69	$ 35.00	$ 2,406.25
1.3	Acid Rock Disposal	m^3	110	$ 75.00	$ 8,250.00
1.4	Offsite Storage of Bed Materials	m^3	330	$ 50.00	$ 16,500.00
	Subtotal				**$ 24,750.00**
2.0	**Envriomental Controls**				
2.1	Temporary Pumping	LS	1	$ 50,000.00	$ 50,000.00
2.2	Sand Bag Dam	LS	2	$ 10,000.00	$ 20,000.00
2.3	Electro Fishing	LS	1	$ 8,000.00	$ 8,000.00
2.4	Filter Fence	m	66	$ 10.00	$ 660.00
	Subtotal				**$ 78,660.00**
3.0	**Storm System**				
3.1	Precast Channel Liner	m	33	$ 10,000.00	$ 330,000.00
3.2	Cast-In-Place Concrete (connection to existing)	each	2	$ 8,000.00	$ 16,000.00
	Subtotal				**$ 346,000.00**
4.0	**Landscaping**				
4.1	Topsoil and Sod	m^2	33	$12.00	$ 396.00
4.2	Trees	each	5	$750.00	$ 3,712.50
4.3	In-Stream Vegetation (1gal Pot)	m^2	85	$15.00	$ 1,278.75
	Subtotal				**$ 5,387.25**
5.0	**Additional Items**				
5.1	Street Reinstatement	each	1	$ 5,000.00	$ 5,000.00
5.2	Private Property Yard Reinstatement	LS	1	$ 10,000.00	$ 10,000.00
5.3	Street Cleaning	LS	1	$ 1,500.00	$ 1,500.00
	Subtotal				**$ 16,500.00**
				Subtotal	$ 471,297.25
				Engineering Services (8%)	$ 37,703.78
				Contingency (20%)	$ 101,800.21
				HST (15%)	$ 91,620.19
				Total	**$ 702,421.42**

ESTIMATE OF PROBABLE COST

Ellenvale Run Section 2 120 m

John Cross Culvert to Elwin Crescent

Project Number: 17-014

Date: 23-May-2018

Note: This opinion of probable cost is an estimate only. The estimate is based on unit rates obtained from previous tenders of similar work and represents a budget only. The actual construction cost will be subject to various factors that are not known at the time of estimate preparation, including market conditions, industry workload, and approval process. The actual cost cannot be known until the project is tendered and a contract is awarded. This estimate should be used with caution if using for budgeting purposes.

No.	Unit Description	Unit	Quantity	Unit Rate	Estimated Cost
1.0	**Earthworks**				
1.1	Trench Rock	m^3	1200	$ 50.00	$ 60,000.00
1.2	Unsuitable Material	m^3	250	$ 35.00	$ 8,750.00
1.3	Acid Rock Disposal	m^3	400	$ 75.00	$ 30,000.00
1.4	Offsite Storage of Bed Materials	m^3	1200	$ 50.00	$ 60,000.00
	Subtotal				**$ 90,000.00**
2.0	**Envriomental Controls**				
2.1	Temporary Pumping	LS	1	$ 50,000.00	$ 50,000.00
2.2	Sand Bag Dam	LS	2	$ 10,000.00	$ 20,000.00
2.3	Electro Fishing	LS	1	$ 8,000.00	$ 8,000.00
2.4	Filter Fence	m	250	$ 10.00	$ 2,500.00
	Subtotal				**$ 80,500.00**
3.1	**Storm System**				
3.1	Precast Channel Liner	m	120	$ 10,000.00	$ 1,200,000.00
3.2	Cast-In-Place Concrete (connection to existing)	each	2	$ 8,000.00	$ 16,000.00
	Subtotal				**$ 1,216,000.00**
4.0	**Landscaping**				
4.1	Topsoil and Sod	m^2	120	$12.00	$ 1,440.00
4.2	Trees	each	18	$750.00	$ 13,500.00
4.3	In-Stream Vegetation (1gal Pot)	m^2	310	$15.00	$ 4,650.00
	Subtotal				**$ 19,590.00**
5.0	**Additional Items**				
5.1	Street Reinstatement	each	1	$ 5,000.00	$ 5,000.00
5.2	Private Property Yard Reinstatement	LS	1	$ 10,000.00	$ 10,000.00
5.3	Street Cleaning	LS	1	$ 1,500.00	$ 1,500.00
	Subtotal				**$ 16,500.00**
				Subtotal	$ 1,422,590.00
				Engineering Services (8%)	$ 113,807.20
				Contingency (20%)	$ 307,279.44
				HST (15%)	$ 276,551.50
				Total	**$ 2,120,228.14**

Ellenvale Run (Phase II) - Sections 1 & 2

Cost Estimate	
Construction Estimate (May 2018)	$1,893,888
Construction Contingency (10%)	$189,389
Engineering	$136,045 includes detailed design, tender and construction services
Subtotal	$2,219,322
4.286% Net HST	$95,120
Subtotal	$2,314,442
Direct Halifax Water Cost (1%)	$23,144
Subtotal	$2,337,586
Interest & Overhead (1%)	$23,376
Total	**$2,360,962**

Ellenvale Run 2018/2019 budget (Phase II)	$2,525,000
Re-allocated to Phase I	$846,000
2018/2019 budget remaining	$1,679,000

Phase II total cost estimate	$2,360,962
2018/2019 budget remaining	$1,679,000
Additional Phase II funding required	**$681,962**

Halifax Water
Halifax Regional Water Commission

ITEM #6
HRWC Board
June 21, 2018

TO: Ray Ritcey, BComm., MBA CPA/CGA, Chair and Members of the Halifax Water Board of Commissioners

SUBMITTED BY: *Original Signed By:*
Kenda MacKenzie, P. Eng., Director, Regulatory Services

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

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

DATE: June 21, 2018

SUBJECT: **Port Wallace Capital Cost Contribution**

ORIGIN

Halifax Regional Municipality Council Report titled *Port Wallace Master Infrastructure Study, Urban Service Area Expansion, and Plan Amendment Request (Case 21601),* dated March 27, 2018.

RECOMMENDATION

It is recommended that the Halifax Water Board:

Direct staff to prepare a detailed Capital Cost Contribution (CCC) analysis for oversized water and wastewater infrastructure to facilitate development in the Port Wallace master plan area.

BACKGROUND

The Halifax Regional Municipality 2014 Regional Plan identifies Port Wallace, located on the northeastern edge of Dartmouth, as a potential future growth area due to the proximity to the existing Urban Service Area boundary. It is one of three potential new communities located inside the Urban Settlement Designation that, within the life of the Regional Plan (2031), could be serviced with municipal water and wastewater services, subject to a secondary planning process and Regional Council approval. Port Wallace was also one of several greenfield development areas identified in the 2006 version of the Regional Plan for development prior to 2026 based primarily on the potential low cost of providing municipal services.

To consider allowing new growth in the area, the Regional Plan requires that the Urban Service Area boundary be expanded. Prior to any expansion Regional Council must consider various criteria including, completion of a watershed study, adoption of a secondary planning strategy and establishment of potential charges by the appropriate approval bodies including Regional Council, the Halifax Water Board and the Nova Scotia Utility and Review Board (NSUARB).

In 2014, Regional Council established an Interim Port Wallace Secondary Plan study area and directed that a secondary planning strategy be undertaken to design the community and determine servicing needs. The Port Wallace Secondary Plan study area was finalized in 2016. Consideration of site design, densities, open space and other community amenities will be presented in secondary plan policies and land use by-laws for consideration by Regional Council. The preferred concept plan can be found in Attachment A.

The land holdings within the Port Wallace are principally owned by four developers, they are: Conrad Brothers Limited, Port Wallace Holdings Limited, Unia Developments Limited and W. Eric Whebby Limited.

Developer	**Residential (acres)**	**Industrial (acres)**
Conrad Brothers Limited	53	242
Port Wallace Holdings Limited	394	
Unia Developments Limited	64	
W. Eric Whebby Limited	26	
Total Acreage	**537**	**242**

DISCUSSION

In developing the secondary plan land use policies and by-laws, both Halifax Water and HRM must consider their financial ability to absorb and manage related costs. To establish

potential growth-related infrastructure costs related to designing the new community, Halifax Water and HRM study the capacity of the existing infrastructure to determine if and how it can accommodate the proposed development. This includes analyzing different infrastructure scenarios based on different conceptual designs for the site. The *Port Wallace Capital Cost Contribution Analysis Baseline Study* (CBCL, 2018), can be found in Attachment B, was conducted to aid Halifax Water and HRM consider different scenarios for upgrading infrastructure, and to establish baseline costs.

In addition to this, both Halifax Water and HRM have policies that allow for consideration of cost sharing with a developer in building new oversized infrastructure that is being established for a growth area. Cost sharing would recognize that the new oversized infrastructure being developed benefits existing residents and businesses located outside of the growth area. A financial model will be prepared that establishes how the infrastructure investments are funded among the parties. This includes capital cost contributions.

The primary purpose of this report is for the Halifax Water Board to provide direction to staff on whether to proceed with a detailed capital cost contribution analysis in parallel to HRM completing the Secondary Plan for Port Wallace. This step does not bind Regional Council or the Halifax Water Board to any charges, capital infrastructure investments or the preferred concept design.

Port Wallace Capital Cost Contribution Analysis Baseline Study

Following the public input to the community design concepts, the *Port Wallace Capital Cost Contribution Analysis Baseline Study* was commissioned to evaluate the cost of providing municipal services to the Port Wallace Secondary Plan study area. The study included a review of available background information (Watershed and Land Suitability Analysis studies, the predesign baseline reports), design concepts and various stakeholder development plans, reports, and preliminary water and wastewater servicing system designs.

The *Port Wallace Capital Cost Contribution Analysis Baseline Study* is a design brief which addresses issues at a broad conceptual level, illustrating land use and infrastructure components with cost estimates, and identifies opportunities and constraints relating to capacity allocations, development sequence, and conflicts between systems. The estimated costs presented in this report have been shared with developers, and will be subject to further discussion with all landowners through the capital cost contribution process.

Using the submitted design concepts, the consultant (CBCL) conducted a detailed analysis of the water, wastewater, storm, and transportation systems. The key findings of the report from a water, wastewater and stormwater perspective are as follows:

Water

1. **The existing water transmission system has sufficient capacity to service the Port Wallace area**.

   The water system area master infrastructure plan can be viewed in Attachment C.

2. **There are servicing restrictions within the Port Wallace development area, specifically the Conrad Lands north of the Forest Hills Extension**.

   The maximum serviceable elevation from a gravity fed water service on the Conrad lands is 70 metres. Lands above this elevation would require either the developer to install a water booster station, to be transferred to Halifax Water upon completion, to bring the water distribution system to minimum service levels or require each water service connection to install a booster pump within their private plumbing arrangement. This would be achieved at either the developer's expense (with long term operational, maintenance and renewal costs to Halifax Water) or the future customer.

3. **The development can be adequately serviced with a 400mm diameter water main**.

   Oversizing of the water main, 300 mm to 400 mm, would be a line item in the phase costs of the capital cost contribution financial model.

Wastewater

1. **Capacity within the Waverley Road wastewater system does not currently exist to accommodate the Port Wallace development. Upgrades are required prior to any development occurring.**

   The North Dartmouth Trunk Sewer has been sized to accommodate the wastewater generated from the Port Wallace development. This requires a new wastewater pumping station on Waverley Road, and wastewater force mains crossing Shubenacadie Canal and connected to the North Dartmouth Trunk Sewer on Wright Avenue. Both of these components would be would be line items in the phase costs of the capital cost contribution financial model.

   In order to facilitate any development prior to the commissioning of the new wastewater pumping station and force mains, upgrades to the existing Waverley Road wastewater system is required. This would be an interim solution; all wastewater will be directed to the North Dartmouth Trunk Sewer upon the new wastewater pumping station commissioning.

The wastewater system area master infrastructure plan can be viewed in Attachment D.

2. **A new wastewater force main connection is required through Shubie Park and under the Shubenacadie Canal.**

   This is an environmentally and culturally sensitive area with significant construction constraints. The connection will also require a crossing of Highway 118. These lands are owned by the Department of Natural Resources (DNR) and NSTIR. As such, this connection is subject to DNR and NSTIR approval. The Shubenacadie Canal Commission is also a significant stakeholder.

   The proposed force main connection provides the opportunity for other utilities to cross at the same location and share the costs. One such opportunity is the twinning of a regional water transmission main from the Topsail control chamber near Main Street in Dartmouth, to Ilsley Avenue in Burnside.

   Halifax Water has made application to DNR and will be the lead utility securing the requirements of the crossing. The other utilities will then obtain leases from Halifax Water.

Stormwater

1. **No stormwater elements have been identified which are considered to warrant capital cost contribution or shared developer cost.**

Development Phasing

The respective land owners have submitted proposed phasing plans for their lands, with development starting in 2019, the phases are summarized in the table below. It should be noted that HRM Council has not approved the Secondary Plan for Port Wallace and it is not anticipated that will be in place to allow for lots to be created, and CCCs collected, by 2019. However, the start dates for the phases would be adjusted accordingly based on the Secondary Planning approval.

Conrad Brothers Limited proposes starting the residential portion of their holdings in 2021, completing the residential holdings in 2027. The industrial portion of their lands are proposed to commence development in 2022, extending to 2035.

Port Wallace Holdings Limited proposes commencing Phase 1 in 2019, with full buildout of their lands by 2028.

Unia proposes developing a small portion by 2024, with the balance of their lands being developed in 2031 & 2033.

The former racetrack lands are owned by W. Eric Whebby Limited. These lands, are proposed to develop in two phases between 2027 & 2029.

Year	Conrad Brothers	Port Wallace Holdings	Unia Developments	W. Eric Whebby Limited
2019		65		
2020		42.4		
2021	19.8	75		
2022	31	35.4		
2023	23.5	51		
2024		26.9	5.06	
2025	28.3	36		
2026		31.9		
2027	57.6	14.7		17.5
2028	22.8	16		
2029	17.7			8.5
2030	24.5			
2031			30.44	
2032	18.3			
2033	22		12.06	
2034				
2035	13.7			
Unallocated	15.8		16.44	
Total acres	**295**	**394.3**	**64**	**26**

BUDGET IMPLICATIONS

Water

The oversized water infrastructure cost estimate, as prepared by the consultant, can be viewed in Attachment E. The consultant determined there was not a benefit to existing Halifax Water customers. The cost of the oversized water infrastructure would be funded by the fire protection charge (29% of the oversized cost paid by HRM) and the developers.

The class D water infrastructure cost estimate prepared by the consultant suggests there is approximately $2,000,000 of oversized water system infrastructure.

Wastewater

The oversized wastewater infrastructure cost estimate, as prepared by the consultant, can be viewed in Attachment F. The consultant determined there was a 30% benefit to the existing Halifax Water customer. This percentage would be further reviewed should a detailed capital cost contribution analysis be directed by the Halifax Water Board. The remaining 70% of the oversized wastewater infrastructure would be funded by the developers.

The class D water infrastructure cost estimate prepared by the consultant suggests there is approximately $9,400,000 of oversized water system infrastructure.

The cost estimates for both water and wastewater are Class D estimates with a 40% contingency and did not contain engineering fees. The cost estimates for both would be refined to a 15% contingency level, should staff be directed to proceed with establishing a CCC. In order to prepare a financial model and establish a Charge to submit the NSUARB, a supplemental consulting exercise is required. This study is estimated to be $30,000 and the costs of the study will be incorporated into the charge and recovered through the CCC.

Based on the existing cost estimates, Halifax Water's capital expenditures for the benefit to existing customers is $2.82 million for the proposed oversized wastewater system. This will be paid as those infrastructure components are constructed and will be identified in the phasing of the detailed financial model.

If a CCC is established and the development be slower than predicted, risk exists that Halifax Water would incur the financing costs.

Refer to Attachment G, 2016/17 Summary of Capital Costs Charge Areas. Staff are exploring ways to mitigate existing financial risks. Staff propose to include, in the supplemental study noted above, a detailed analysis of risk to Halifax Water and the rate payers under various build out and phasing scenarios for Port Wallace.

ALTERNATIVES:

The Halifax Water Board may choose not to proceed with a Port Wallace capital cost contribution. This would require the developer(s) to finance the infrastructure on their own.

ATTACHMENTS

Attachment A – Preferred Concept Plan
Attachment B – Port Wallace Capital Cost Contribution Analysis Baseline Study
Attachment C – Water System Infrastructure Master Plan
Attachment D – Wastewater System Infrastructure Master Plan
Attachment E – Oversized Water Infrastructure Cost Estimate
Attachment F – Oversized Wastewater Infrastructure Cost Estimate
Attachment G – Halifax Water Capital Cost Contribution Report – Summary to March 31, 2017

Report Prepared by: *Original Signed By:*

Kevin Gray, MURP, P. Eng., Manger, Engineering Approvals
(902) 490-5939

ITEM 6
June 21, 2018
ATTACHMENT A

ATTACHMENT A: PREFERRED CONCEPT PLAN

ITEM #6
June 21, 2018
ATTACHMENT B

PORT WALLACE CAPITAL COST CONTRIBUTION ANALYSIS BASELINE STUDY

Final Report

CBCL LIMITED
Consulting Engineers

ISO 9001
Registered Company

UPLAND

Prepared for

HALIFAX

Contents

Appendices

Executive Summary

The Port Wallace Study area is comprised of approximately 285 hectares and is located to the north and south of Highway 107 at the Montague Road intersection. The site is largely undeveloped, and plans are in place to construct over 3,700 residential units as well as some commercial, industrial and institutional development. The area was previously identified under the Regional Municipal Planning Strategy (RMPS, 2006) to be serviced with water, wastewater, and stormwater systems. There are a number of land owners involved in the development of this site who have presented proposed development layout and phasing plans for their lands. The developers are Port Wallace Holdings Limited, Conrad, Unia, and Whebby.

This capital cost contribution analysis establishes long-term infrastructure requirements necessary to service the development of Port Wallace. The infrastructure considered in this study includes transportation, wastewater, stormwater, potable and fire suppression water systems, and suggests how the community can fulfill a role within the regional context. The primary purpose of this study is to develop a basis for Halifax Regional Municipality (HRM) Regional Council and Halifax Water (HW) to assess and validate costs and risks associated with infrastructure requirements necessary to service the Port Wallace site growth area.

To facilitate the development of Port Wallace, this study identified the following required infrastructure upgrades:

Transportation:
Upgrades to existing intersections are required on Montague Road, Waverley Road, Caledonia Road and Main Street/Forest Hills Extension. These upgrades can be constructed successively at a rate which parallels buildout of the Port Wallace area.

Estimated cost borne by HRM: $16,000,000
Estimated cost borne by the developers: $5,100,000

Wastewater:
The existing municipal wastewater system does not have any additional capacity and cannot support any additional development. The existing pump station at 390 Waverley Road should be upgraded/replaced, and a new forcemain constructed to tie into the North Dartmouth Trunk Sewer which runs parallel to Highway 118. The sanitary system needs to be upgraded prior to any development in Port Wallace.

Estimated cost born by HRM/HW: $4,000,000.
Estimated cost born by the developers: $9,400,000.

Stormwater:
No stormwater elements have been identified which are considered to warrant capital cost contribution or shared developer cost.

Potable Water and Fire Suppression:
To service Port Wallace, some internal upsizing is required and has been identified in the water section of the report. The pipe upsizing should be constructed in conjunction with road construction.

Estimated cost born by the developers: $2,000,000.

Transportation

CBCL Limited completed an assessment of the existing and future road network as it relates to the Port Wallace development. The existing road network and intersections were examined under current operating conditions (2017), 50% buildout (2031) and full buildout (2047). A background growth rate of 1% was applied between 2017 and 2031, with a background growth rate of 0.75% being applied from 2031 and beyond. A number of potential road network layouts were established based on various potential road configurations within the study area, connections to the existing road network and future road upgrades outside the study area. AM and PM analysis were completed for these layouts. Both 10% and 20% non–auto mode shares were subsequently assessed for each of the road network layouts.

The 2017 models indicate that the majority of existing modeled intersections currently provide a satisfactory level of service, with the exception of Main Street/Forest Hills Extension signalised intersection which HRM is aware of. The 2031 models identified key intersections which have a poor operational performance. The 2047 model shows a further decrease in the level of service at the key intersections.

This development represents a substantial increase in trip generation for the immediate area. To facilitate the Port Wallace development, it is recommended that the intersections identified with poor levels of service be upgraded, and the potential to reduce trip generation be pursued to the greatest extent possible. Further modeling and preliminary engineering design would be required to determine the extent of intersection upgrades required to achieve an acceptable level of service at the 2031 and 2047 horizons; however, for the purposes of this report possible suitable upgrades have been established based on engineering judgement. A preliminary summary of recommended intersection upgrades based on percentage of overall buildout is given within the body of this report, in section 2.11.

Transit services are seen as the primary method of reducing trip generation and should be implemented in the initial stages of the development. We believe that non-auto modes in particular, transit and active transportation, should be widely supported and encouraged for the Port Wallace development given the level of trips generated during the buildout period.

Wastewater

Wastewater from the study area will be discharged to the existing municipal sewer system on Waverley Road. Flow is directed towards Dartmouth center via a series of gravity sewers and pump stations. This study assessed the wastewater system from Montague Road to the pump station at civic 200 Waverley Road.

There are portions of the gravity system which have limited capacity and will require upgrades due to this development. There is currently no available additional capacity at the 390 Waverley Road pumping station or at the 200 Waverley Road pumping station. Port Wallace Holdings Limited (PWHL) has forwarded a proposal to temporarily increase the capacity of the pump station at 390 Waverley Road which would increase flow to the 200 Waverley Road pump station which has no available capacity.

The pumping station at 390 Waverley Road should be upgraded/replaced and a force main should be rerouted west, across the Shubenacadie Canal to the North Dartmouth Trunk Sewer on the west side of Highway 118. The North Dartmouth Trunk Sewer has capacity for the Port Wallace development.

Planned capital works for capacity upgrades should be reviewed in the event of modifications to the development areas and characteristics.

Stormwater

There are a number of pipes and/or drainage courses which enter the study area from lands upstream. It is the responsibility of each land owner to manage the stormwater on their property. If the mechanism for stormwater conveyance is altered the developer is responsible to insure that pre and post flows are maintained. For example if stormwater currently flows over land or in a ditch and the developer requests to change to a hard pipe sewer system some form of detention facility would likely be required to offset the reduced time of concentration.

The Port Wallace study area is within the Lake Charles watershed. Lake Charles is a headwater lake which flows in two directions with a number of significant water bodies downstream. The proposed Port Wallace development area contains several small watercourses, marshes, swamps and bogs as well as a major watercourse, Barry's Run, which discharges to a fen wetland.

Areas of environmental contamination and cultural significance have been identified within Port Wallace. It is vital that potential contamination is fully investigated and appropriate action taken for the protection of public health and safety. One of the areas of environmental and cultural significance is the aforementioned Barry's Run. It has been proposed to utilize Barry's Run as a stormwater management mechanism. For environmental, ecological and cultural reasons, Barry's Run should not be considered for stormwater management for the Port Wallace development. Other areas of potential concern are discussed in detail in the main body of the report.

Stormwater management is required to maintain peak pre-development runoff rates for the 1 in 2, 5, 10, 25, 50 and 100-year storm events to meet Halifax Water and Nova Scotia Environment requirements. Within HRM, and throughout Atlantic Canada, these requirements have traditionally been achieved by constructing centralised stormwater management facilities such as large detention ponds, which are ultimately owned by the stormwater management utility.

Centralized stormwater management infrastructure based solely on rate control represents a simplified ownership, maintenance and liability model, however they do not mimic the natural environment, can often increase the risk of downstream flooding and degrade water quality. Throughout North America and Europe the goals of stormwater management have been adjusted to account for this. Quantity and quality control are more prevalent in much of today's stormwater management guidelines and are becoming a more central requirement in stormwater management in many municipalities.

Source control is generally considered the most favourable way to achieve this. Traditional stormwater systems collect rainwater where it falls and directs runoff downstream through pipes, roadways, ditches, creeks, etc. Source control is the process of infiltrating rain water where it falls, much like the undeveloped, natural environment. Water which does not infiltrate is then routed downstream through pipes, roadways, ditches, creeks, etc. Source control reduces the total amount of water in the municipal storm system, reduces risk of flooding, improves water quality, promotes ground water recharge and offers many more benefits.

Previous reports completed by others have recommended that source control be implemented within the Port Wallace study area and the landowners have demonstrated their intent to implement source control by proposing Low Impact Development (LID) measures. LIDs include; rain gardens, bio swales, infiltration trenches, permeable pavement, infiltration galleries, absorbent landscape, etc. LIDs are ideally installed on public as well as private property. Due to the current Nova Scotia Environment and Halifax Water mandate for stormwater management, the developers may have some difficulty pursuing the LID approach on private property however, Halifax Regional Municipality Council passed a motion on March 4, 2014 pertaining to stormwater management which noted that the design of Port Wallace should include stormwater management facilities on private property.

It is recommended that this motion be built upon by HRM to facilitate the implementation of source control techniques on both public and private lands. This practice is becoming common across Canada. Not following this approach will likely lead to increased flooding risk, degraded water quality, and thereby not meet the project requirements.

Potable & Fire Suppression Water

This study is intended to establish the minimum water and fire flow service requirements necessary to achieve the Halifax Water design guidelines within the Port Wallace Development. The addition of Port Wallace to the water system will increase water demands and an analysis of the existing infrastructure has been carried out to understand the impacts of the additional demand.

For the purposes of the study, Halifax Water provided a copy of the water model understood to be representative of the system to 2017. WaterCAD V8i (SELECTSeries 6) was used to model current conditions, future background growth and the addition of Port Wallace. Meetings between Halifax Water and CBCL were held to develop an understanding of current system operation. The outcome from the meetings helped to establish the design constraints for evaluating the impact of future growth within the Port Wallace study area and background growth to the existing system.

The system should be capable of achieving the desired fire flow for the given land use while maintaining a minimum of 22 psi throughout the system. A 400 mm waterline along Avenue du Portage Extension and to the Conrad Lands is recommended to provide service to the full study area. Areas within the study area where 300mm watermains are recommended have been identified in the main body of the report.

Crossing the Shubenacadie Park and Highway 118

This development will very likely require a new forcemain to run from an upgraded pump station at 390 Waverley Road to the North Dartmouth Trunk Sewer. This forcemain would cross through Shubie Park, including the Shubenacadie canal, and cross Highway 118. This is an environmentally and culturally sensitive area with significant construction constraints. The lands are owned by the Department of Natural Resources (DNR) and Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR). As such, the sanitary servicing concept recommended in this report is subject to DNR and NSTIR approval. The Shubenacadie canal commission are also a significant stakeholder.

Future regional growth will require a transmission watermain to make a similar crossing. Other utilities have also have expressed an interest in a crossing including gas, power and communications. It would likely be financially and environmentally beneficial to complete these crossings concurrently. This potential for a common utility corridor should be incrementally investigated with all utilities. Cost contribution discussions should be held in parallel with the design development.

This study will identify order of magnitude costing for the crossing as it relates to Port Wallace developments. A number of potential crossing mechanisms have been discussed including tunneling and pipe/pedestrian bridges. Subsequent to this study it is recommended that a crossing design be agreed upon with all interested stakeholders which would subsequently be submitted to the DNR, the canal commission and NSTIR for review.

The critical path for the development of Port Wallace is the sanitary service. Crossing the canal and Highway 118 will take significant coordination, design and approval effort. It is recommended this process begin as soon as possible.

Costs

This report identifies infrastructure upgrades required to service the Port Wallace Study area and future growth within HRM. The benefactors for each upgrade have been recognised and costs should be apportioned between benefactors. It is suggested to allocate costs related to transportation upgrades based on trip generation and that sanitary and water upgrades are allocated based on gross development area. The costs for internal site development and connections to existing infrastructure at a property owner's boundary should be borne by the individual developer. Internal upsizing required to service the full study area should be shared between each developer based on trips generated or contribution area as outlined above. Following this report a more detailed design and cost estimate should be completed to establish capitol cost contribution charges.

Chapter 1 Introduction

1.1 Background

The Port Wallace Secondary Planning Study Area was identified as one of six areas under the Regional Municipal Planning Strategy (RMPS, 2006) to be serviced with water, wastewater, and stormwater systems. Prior to servicing, an evaluation of cost to provide municipal services and transportation links to the study area was required. A Watershed Study was also required.

On March 4, 2014, following the completion of the aforementioned studies – the Cost of Servicing Study, (COS, CBCL Limited., 2009); and the Shubenacadie Lakes Subwatershed Study – Final Report, (SWS, AECOM, 2013), respectively – Regional Council passed a motion to proceed with the Port Wallace Secondary Planning Process.

Subsequently, a Land Suitability Analysis (LSA) was completed by WSP in 2016 (WSP LSA, 2016) to determine areas of environmental and cultural importance based on physical attributes inherent to the study area. This process included an assessment and mapping of natural systems and critical areas, the purpose of which was to identify, map and assess natural environmental features, cultural landscape features, and engineered structures critical to maintain natural ecological functions.

This master infrastructure study represents the next stage in the secondary planning process by conducting a detailed assessment of the regional and local infrastructure required to support the proposed development. The intent of this study is to establish the long term infrastructure requirements necessary to service this proposed growth area. The infrastructure to be considered in this study includes water, wastewater, and stormwater and transportation systems. The primary purpose of this study is to develop a basis for HRM Regional Council and Halifax Water (HW) to assess and validate costs and risks associated with infrastructure requirements necessary to service this proposed growth area. The general location of the study area is shown in Figure 1: General Location of Study Area and Key Intersections.

1.2 Report Structure

This is a broad report covering a range of disciplines and includes an introduction with five main chapters. Each chapter discusses a particular infrastructure system as follows:

1. Introduction;
2. Transportation;
3. Wastewater;
4. Stormwater; and
5. Potable water and fire suppression.

It is anticipated that most readers of this report will be interested in the chapter which discusses their particular area of expertise rather than reviewing the report as a whole. To accommodate a discipline based review each chapter has been written as a standalone section which can be reviewed independently of the other chapters.

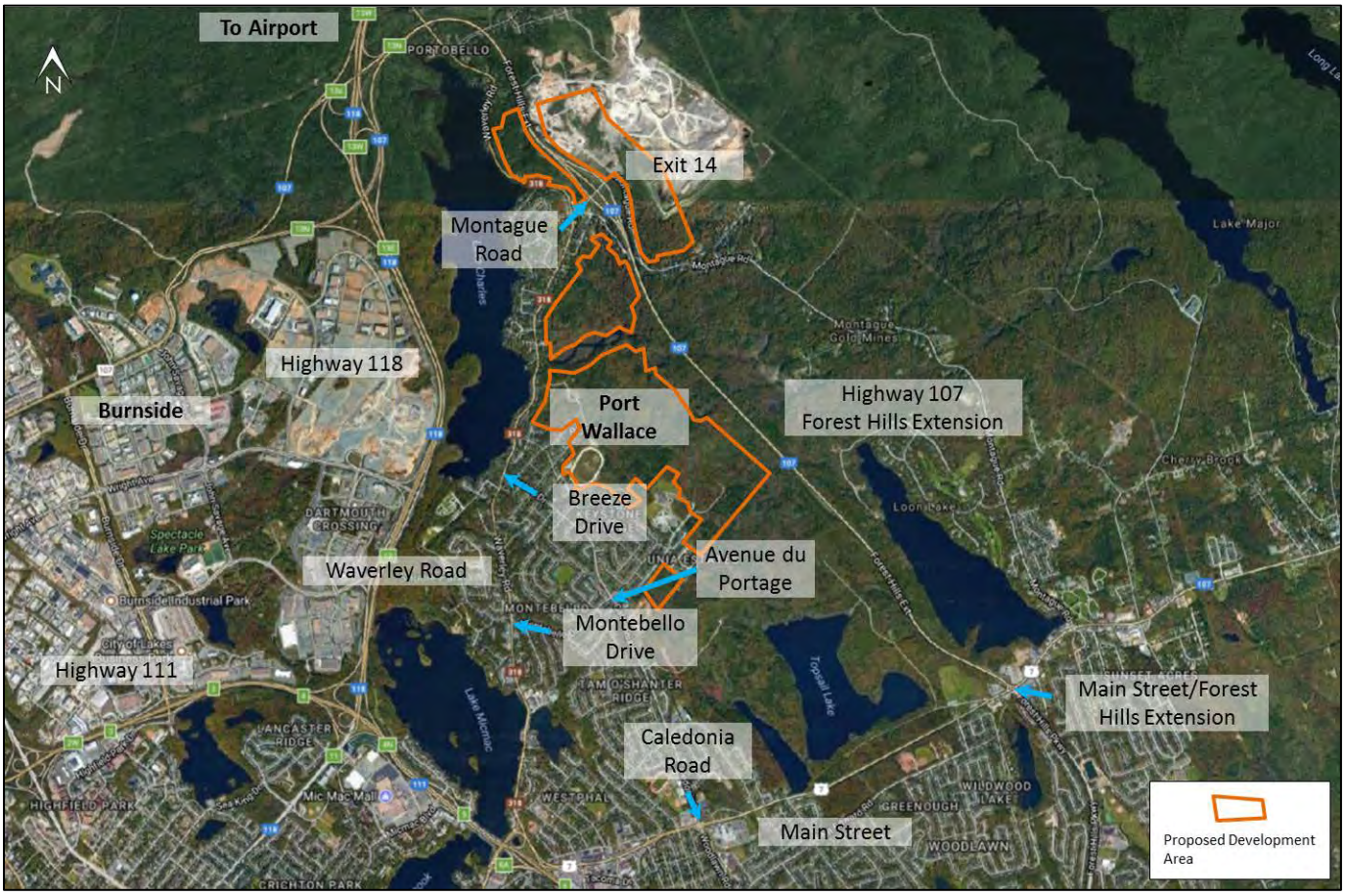


Figure 1: General Location of Study Area and Key Intersections

1.3 Land Ownership and Stakeholder Engagement

Error! Reference source not found. outlines the current property owners as well as the study area. The land owners engaged as part of this study were:

→ Conrad Brothers;
→ Port Wallace Holdings Limited;
→ Frank/Eric Whebby; and
→ Unia.

Three meetings were held with the stakeholders and/or their representatives. During our first meeting, each stakeholder provided their development plans, outlined their work to date and discussed their phasing intent. A follow-up meeting was conducted for stakeholders to offer their input to this study. At a third meeting, CBCL provided initial feedback on the preliminary findings of the report.

The southern portion of the Unia lands, PID 41254822, has poor development potential due to an environmental encumbrance. The land owner has requested that this portion of land be removed from the study area they have indicated as they intend to develop this portion of land in accordance with its existing zoning. There are no known issues with this proposal at this time. For the purposes of this report, these lands have been kept within the study area, however, they can be removed from consideration at a later stage if deemed appropriate by HRM.

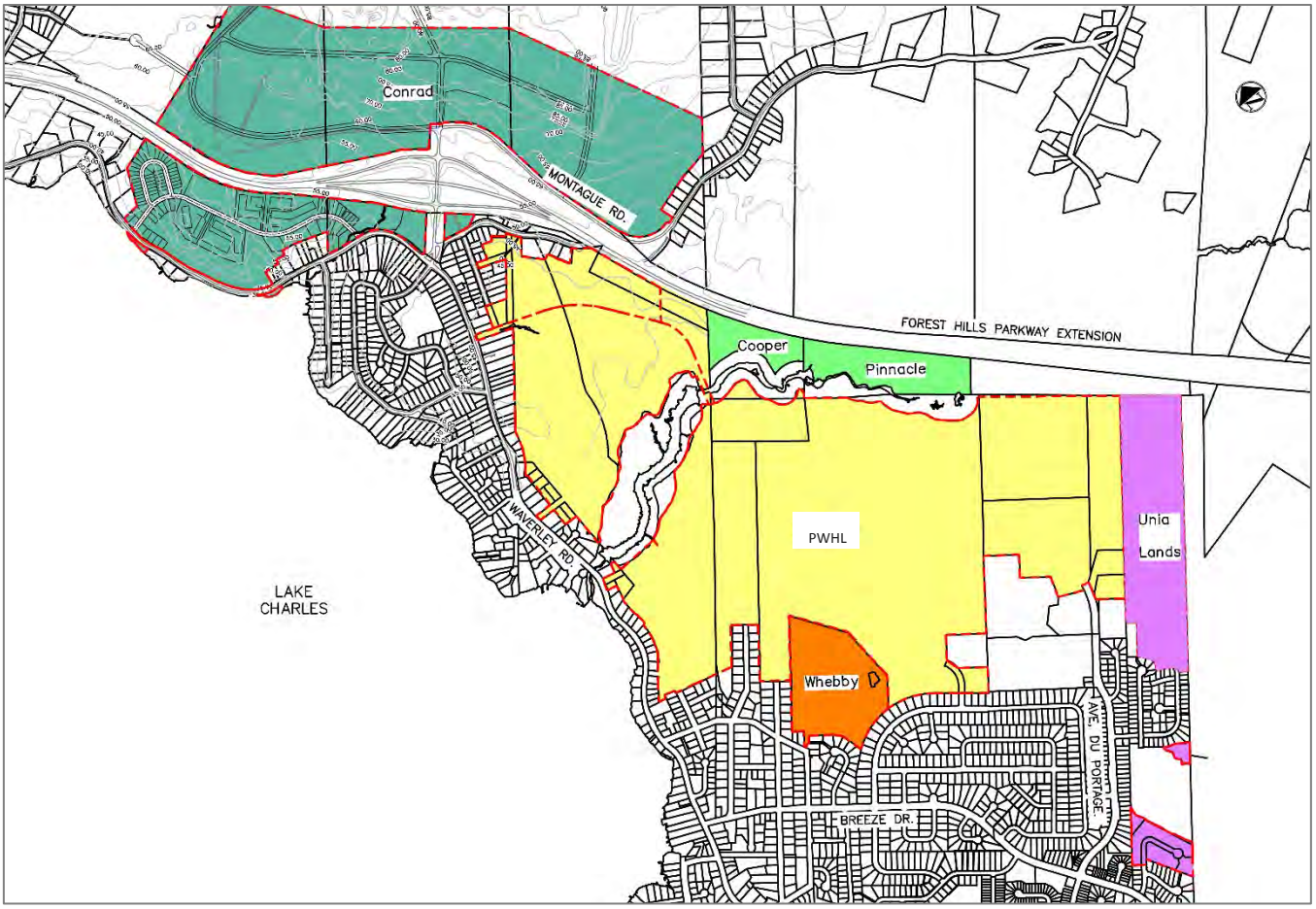


Figure 2: Land Owners

There were two land owners within the study area who could not be contacted by HRM PID 41365180. The property owner is noted on property online as George Anthony Cooper of Dartmouth, and PID 41025321 is owned by Pinnacle Properties. These properties were shown to have significant constraints to development in the land suitability assessment, which indicates there may be very limited financial benefit to be gained from development of these parcels and therefore, at present, future development of these properties is considered unlikely. Through the course of this development, the land owners should be contacted to confirm they do not intend to develop these parcels in the future, or the development layout be configured to offer access to these lots. Alternatively, HRM may decide that the constraints on the lands are such that they would not permit the area to be developed, and they may implement a non-development zone on those lots.

1.4 Population Projections and Project Buildout

Development of Port Wallace will be a joint effort from a number of developers and public agencies. Each developer has presented their proposed development layout, phasing plans and buildout timeline. The development layouts and phases integrate well to create an overall area plan which demonstrates a homogenous style and pattern. The developers have submitted a cumulative unit count of 3,744 residential units. Commercial, institutional and industrial development is also proposed.

Port Wallace Holdings Limited and Conrad Developments have expressed the strongest desire to begin development in the near future; Unia and Whebby have indicated they intend to commence development further down the road. A holistic review of the buildout timelines put forward by each developer shows a buildout overlap between developments. This overlap identifies a potential overall buildout scenario of over 300 units per year. This could equate to a full project buildout timeline as short as 12 years. This is considered very aggressive for Port Wallace.

This study does not aim to agree or disagree with the development timelines presented by any developer, but to review the development as a whole in terms of risk to HRM and Halifax Water. Project buildout timeline has been a significant issue for HRM and Halifax Water in the past where they have made capital investments in infrastructure to support large developments. In some cases, the rate of buildout, which was initially presented by the developers, was not achieved by all landowners. This delayed the generation of the tax revenue required by HRM and Halifax Water to recoup the initial capital investment, meaning that HRM and Halifax Water would be financing this infrastructure over longer than expected time frames at a higher cost to them.

A full buildout timeline for the study area of 30 years has been estimated. This equates to an average of 125 new residential units per year. While 125 units per year represents a significant portion of the annual average HRM new building permit applications and a substantial construction effort, it is considered to represent an acceptable timeline for the development, based on the information provided by the developers and overall growth in HRM.

In the infrastructure sections in this report, we have outlined upgrades based on buildout rate where possible. For example, road intersection upgrades are triggered at 10, 30, 50 & 70% buildout. This is in an effort to promote a distributed rate of capital cost investment for HRM, Halifax Water and the developers. Should development proceed at a faster rate and full development be achieved in say 12 years, the upgrades will still be constructed as required. Should development proceed at a slower rate full buildout may be achieved in say 60 years, the capital costs would be deferred in line with the rate of development. Populations and occupancy rates are taken from HRM and Halifax Water design guidelines. These are considered to be accurate representations of current and future occupancy rates. Potential occupancy rates outside the existing guidelines were not considered herein as they would represent a significant deviation from the established acceptable standard of practice in this jurisdiction and would require significant, detailed study and analysis to offer appropriate justification. Population and population equivalents for each sub area within Port Wallace are given in Table 1, with the sub areas being shown in Figure 3.

Table 1: Population Equivalents

Port Wallace Area	Population Equivalent
PW 1	1,147
PW 2	4,163
PW 3	1,477
PW 4	1,047
PW 5	2,096
PW 6	1,513
PW 7	633
PW 8	1,247
PW 9	906
PW 10	586
PW 11	106
Total:	14,921

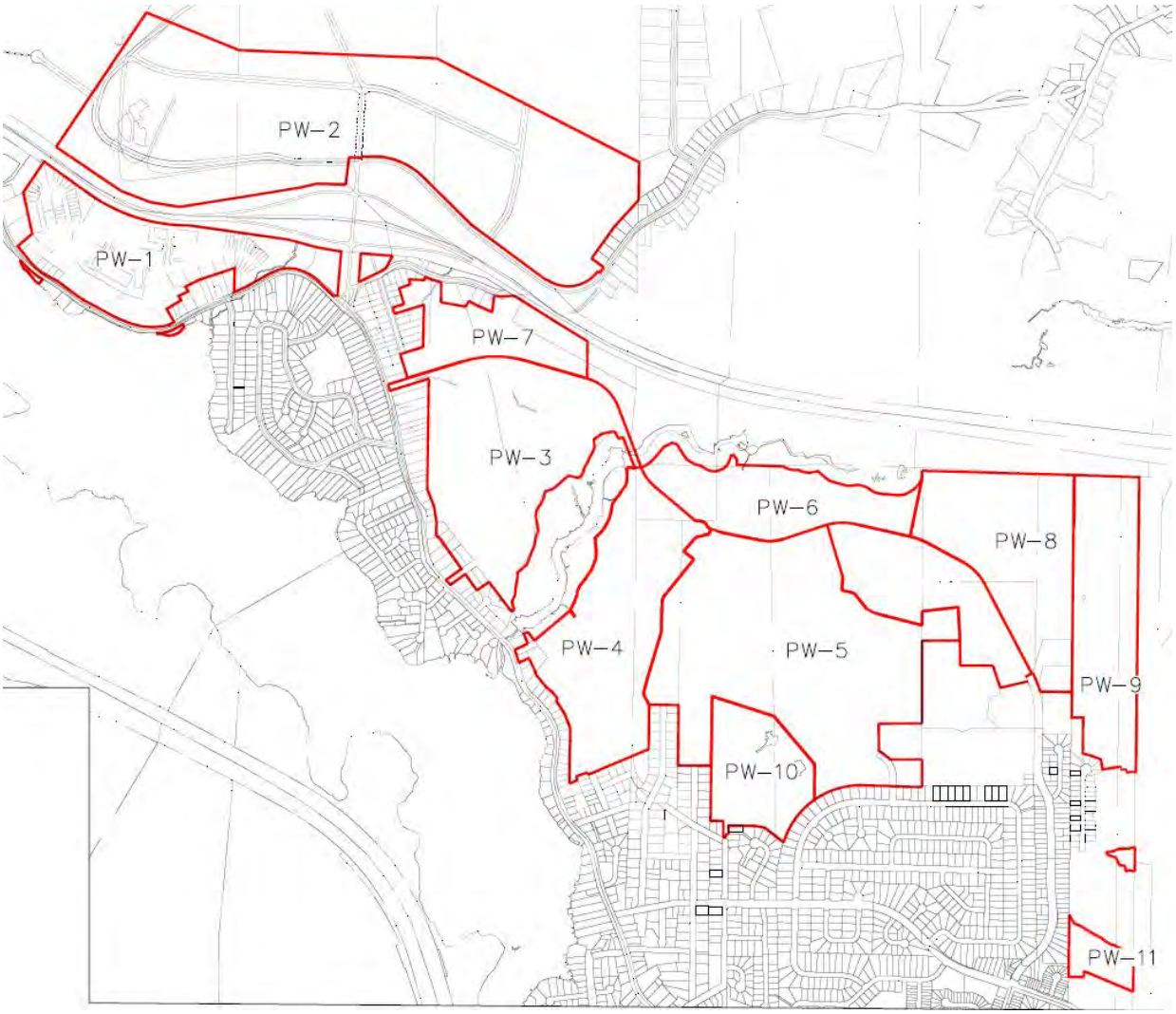


Figure 3: Port Wallace Sub Areas

Chapter 2 Transportation

2.1 Transportation Objectives

CBCL Limited completed an assessment of the existing and future road network as it relates to the Port Wallace study area. There are a number of potential road network layouts proposed by the developers within Port Wallace, with each layout representing a different potential road connection to the existing network. CBCL reviewed each of the proposed layouts considering the existing road network as well as assessing a number of potential future offsite upgrades. Each scenario was assessed under varying background growth conditions and with varying non-auto mode share.

Analysis of possible development layouts with different access options and potential future offsite infrastructure upgrades was completed. Varying levels of background growth and percentages of non-auto mode share (transit, walking, bicycling, taxi, rideshare, etc.) were adopted, to determine the level of service, queues and delays at major intersections within the study area.

This section provides an overview of the trip generation and suggested transportation infrastructure improvements associated with the Port Wallace study area. There are a number of landowners affected including Port Wallace Holdings Limited, Conrad Brothers Ltd, J&W Whebby Enterprises and Unia Estates. It is understood that the site could be available for development as soon as 2018. WSP has completed a review and analysis of the Port Wallace Holdings Limited proposals on behalf of Port Wallace Holdings Limited. HRM has also undertaken a comprehensive analysis of the baseline conditions within the area, as well as the proposed development and its impact on the surrounding road network using the VISUM model. CBCL completed a number of tasks as part of the infrastructure study, including:

- → Review of previously completed reports;
- → Review, assess, validate and modify the VISUM model outputs;
- → Conduct peak hour turning movement counts at key intersections;
- → Modify modelled trip distribution;
- → Assignment and mode choice assumptions;
- → Validate delays at key intersections; and
- → Conduct intersection modelling analysis using Synchro.

2.2 Site Description

The Port Wallace study area is currently largely undeveloped lands and owned by various developers. A portion of the land, owned by Conrad Brothers, is currently in operation as a quarry with trucks accessing Highway 107 (Forest Hills Extension) at Exit 14, Montague Road on the east side of the highway. There is also a secondary access on the west via local residential streets. It is understood that quarry vehicles do not typically utilise this access. We understand that operations at this site are expected to continue in the future, but also that these operations are seasonally dependent. The quarry vehicles mainly access the Forest Hills Extension to travel north and south away from the quarry. The site is bordered by Highway 107 Forest Hills Extension to the east, and Waverley Road to the west. The Port Wallace Study Area is bisected by Highway 107, which is accessible from Exit 14 at Montague Road.

Access to Highway 107 Exit 14 is currently along Waverley Road and Montague Road to the north of the site. Access to Main Street is currently via Avenue du Portage and Caledonia Road. The general location of the study area and existing access points are previously shown in Figure 1.

2.3 Initial Review

CBCL Limited reviewed background information provided from a number of sources, we also reviewed analysis undertaken by WSP and HRM, on behalf of various developers. The review included consideration of the anticipated numbers of residents or number of residential units as part of the development, a comparison of traffic count data obtained during different months and over different years, the estimated trip generation, distribution and non-auto mode share, and also the proposed access points, both existing and new.

2.3.1 Port Wallace Pre-Design Baseline Study (HRM 2014)

The HRM Baseline Report included an analysis of pre-designed baseline conditions for transportation services and forms an essential part of the secondary planning process undertaken by HRM. In this report, there were two main tasks: to determine the capacity constraints in the road, active transportation, and transit network systems; and to identify critical infrastructure deficiencies.

The key points to be noted from the study include:

- → The southern section of Waverley Road/Braemar Drive is at capacity and the signals at Montebello Road are also near capacity;
- → The remaining roads and intersections have spare capacity to accommodate new development;
- → Main constraints to active transportation in the area are street layout, grades, and the lack of infrastructure; and
- → The transit system in the area is underutilized. Transit accounts for 7.5% of commuting trips. The contributing factors are population density, street layout, lack of active transportation connections, and limited service to areas other than the Regional Centre.

2.3.2 Port Wallace Development Access Review (WSP May 2017)

This analysis was undertaken by WSP on behalf of Port Wallace Holdings Limited, and included a total number of 3,189 residential units (single family and multi-unit buildings) for the development. The Access Review considered a number of options for access from the development including:

- → All traffic loading on to Waverley Road;
- → Traffic being split between Waverley Road and a one-way only intersection on the Highway 107 Forest Hills Extension; and
- → Traffic split between Waverley Road and a new full intersection on the Highway 107 Forest Hills Extension.

The Access Review also included a bridge across Barry's Run between the two parts of Port Wallace Holdings Limited's proposed development.

The inclusion of a bridge to connect both parts of the development would allow for a continuous spine road through the development, and would also allow for a more efficient transit service.

In terms of phasing, WSP assumed a 10 year buildout timeline for full buildout of the Port Wallace Holdings Limited development. They also assumed that traffic from the development would be heading towards Waverley Road to the north and south, but would also use a right-in/right-out connection from the Highway 107 Forest Hills Extension to the Port Wallace development. In terms of typical build rates by developers, constructing 3,189 residential units in 10 years appears to be very ambitious given the number of anticipated trips generated by the development and current limitations on the road infrastructure.

WSP assumed a 20% non-auto mode choice, which is higher than HRM's assumption. If we are taking the long-term view of the proposed development, then a 20% share should be encouraged to help to reduce and to mitigate the number of peak hour trips generated by the Port Wallace development.

The key points to be noted from the study include:

→ It did not include the Conrad Residential and Industrial Lands;

→ Improvements are required for the Montague Road corridor, and intersection upgrades are required at the Waverley/Montebello, Waverley/Breeze, Caledonia/Montebello intersections; and

→ Planning should continue to preserve a road reserve for a future connection to the Forest Hills Extension.

2.3.1 Port Wallace Travel Demand Modelling Report (HRM 2017)

The information included in the Baseline Report was used as the basis for the work undertaken to create the Travel Demand Modelling Report. An estimate of 3,500 residential units were included as part of the development. The analysis considered that full buildout of the development would be in 2031 which coincides with the regional plan travel demand model developed by HRM. The baseline VISUM model looked at the wider study area as well as a sub-area model using PM peak hour travel demand. The model looked at five key intersections within the sub-area which surround the Port Wallace development and would be most directly affected by the generated trips. Background traffic growth was considered and compared with WSP's baseline traffic volumes as shown later in this section. In terms of trip generation, the VISUM model includes a 10% non-auto mode choice, half of the 20% assumed by WSP.

The key points to be noted from the study include:

→ The critical peak hour period is the PM peak hour;

→ At full buildout, the proposed development will generate 2,900 PM peak hour external trips;

→ The forecast demand with and without development will exceed the capacity of Forest Hills Extension, from Montague Road to Highway 118;

→ The forecast demand for Braemar Drive, just south of Montebello, is 1,100 vehicles per hour (vph) in the peak hour direction.

2.3.2 Summary

The Port Wallace Pre-Design baseline Study, Travel Demand Modelling Report, and the Access Review studies are consistent in their approach. Based on the analysis undertaken by CBCL, which is outlined in Section 2.9 below, CBCL generally agrees with the results of the HRM and WSP studies.

2.4 Access

2.4.1 Existing Access

There are two undeveloped portions of the study area, a portion of lands to the west of Montague Road, south of the highway owned by Conrad and the remainder of the study area to the east of Montague Road/Waverley Road. The Conrad lands front on Waverley Road. The lands to the east front on Waverley Road and have a number of dead end roads which will be used for future site access, these include Avenue du Portage, Rosecroft Drive, Lethbridge Avenue, Belvedere Drive and Lynwood Drive.

There are three existing Halifax Transit bus services, routes 10, 54 and 55 that serve the area surrounding Port Wallace. Routes 10 and 54 travel into the residential areas close to Avenue du Portage, and route 55 travels along Waverley Road.

There are also multiple active transportation trails in the area that encourage active transportation with connections to Waverley Road and Main Street, as well as an existing bicycle lane along Waverley Road/Braemar Drive.

2.4.2 Access Routes - Option Review

Proposed access to the site in the future will still include Waverley Road and Main Street/Caledonia Road. Waverley Road provides access both north to Exit 14 on Highway 107 towards Burnside Industrial Park, and to the Airport, and south towards Main Street, downtown Dartmouth and Halifax, as well as the Eastern Shore. These will continue to be the main access routes during the initial phase of the development as residential areas are constructed. The direct access point into Port Wallace will be via a continuation of Avenue du Portage which would become a spine road through the development. Routes to and from the site were determined in terms of route direction, trips were generated going North, South, East and West. There are a number of route options being discussed at the moment to accommodate the anticipated level of new traffic coming from the development. The route options are described in the following text and are shown in corresponding figures.

2.4.3 Option 1 (Baseline)

Option 1 is shown in Figure 4: Access Option 1 below. New traffic to access Waverley Road at the existing Montebello Drive and Breeze Drive intersections, plus via seven new access points A, B, C, D, E, F and G; Access to Main Street is via the Forest Hills Extension and Caledonia Road intersections. Access to Forest Hills Extension is via the Montague Road interchange. Option 1 includes a bridge connection across Barry's Run.

- → Access A - New intersection with Waverley Road via a vacant lot and an extension of Lynwood Drive (Primary access point);
- → Access B – New intersection with Waverley Road opposite Applewood Lane (Secondary access point); and
- → Access C – New Intersection with Waverley Road opposite Meadow Walk (Secondary access point);
- → Access D – New Intersection with Waverley Road for the Conrad Residential lands. (Location to be determined);
- → Access E – New Intersection with Waverley Road for the Conrad Residential lands. (Location to be determined);
- → Access F – New Intersection with Cono Drive for the Conrad Industrial lands. (Location to be determined); and
- → Access G – New Intersection with Montague Road for the Conrad Industrial lands. (Location to be determined).

Figure 4: Access Option 1

2.4.4 Option 1A

This option consists of Option 1 plus construction of right-in/right-out access from the Forest Hills Extension to the proposed Port Wallace development.

The above details are shown in Figure 5: Access Option 1A.

Figure 5: Access Option 1A

2.4.5 Option 2

This option consists of Option 1 plus construction of a full access (possibly a roundabout) on the Forest Hills Extension to the proposed development. Option 2 does not include a bridge connection across Barry's Run.

The above details are shown in Figure 6: Access Option 2.

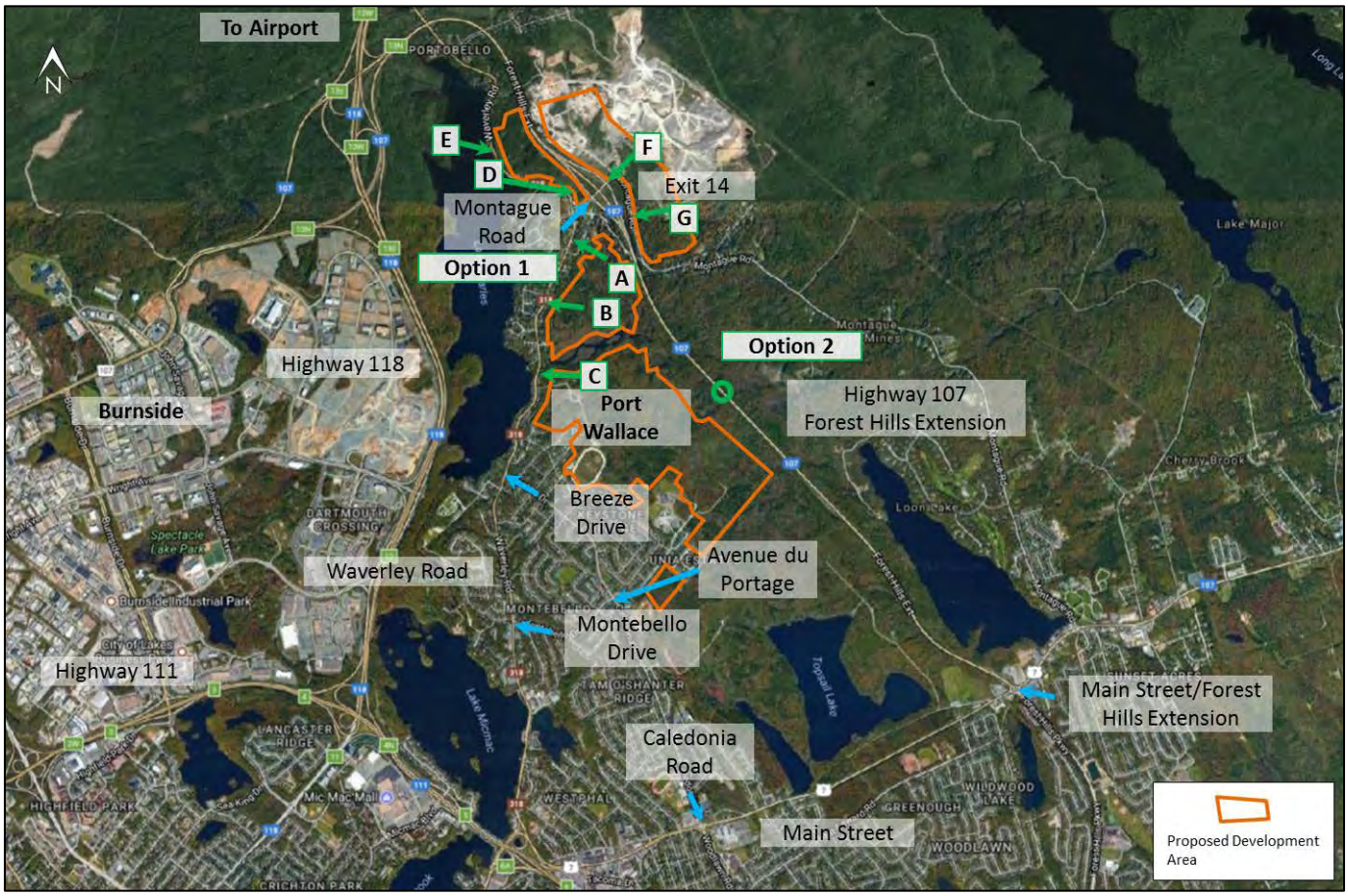


Figure 6: Access Option 2

2.5 Baseline Traffic Volume and Background Growth

2.5.1 CBCL Limited Data Collection

To provide an updated baseline, and to allow us to make a comparison with previous analysis, CBCL Limited undertook traffic turning movement counts over three days in May 2017. The traffic counts were undertaken to establish a new baseline and to provide confirmation of the VISUM modelling and analysis already undertaken by HRM. The counts were made on either Tuesday, May 9; Wednesday, May 10; or Thursday, May 11, 2017 at the following intersections:

→ Waverley Road/Montague Road;
→ Waverley Road/Montebello Drive;
→ Waverley Road/Breeze Drive;
→ Breeze Drive/Montebello Drive/Caledonia Road;
→ Main Street/Caledonia Road/Woodlawn Road;
→ Main Street/Forest Hills Extension/Forest Hills Parkway; and
→ Highway 107/Montague Road ramp terminals.

The hours of data collection included peak hours from 7:00 am to 9:00 am and 4:00 pm to 6:00 pm during the weekdays mentioned above. Traffic counts were conducted for one day at each intersection. The traffic counts were conducted using "Miovision" video traffic data collection technology and were undertaken over as short a time period as possible to minimize the risk of daily or weekly variations. To provide sufficient information by vehicle type, the following classifications were adopted:

→ Passenger vehicles;
→ Medium trucks;
→ Heavy trucks and buses;
→ Pedestrians; and
→ Cyclists.

From the May 2017 traffic counts, we have established the turning movements at key intersections within the study area, creating a baseline traffic conditions. The results of the turning movement counts have been used as the basis of the Synchro modelling work being undertaken.

2.5.2 Trip Patterns

The traffic count data indicates that the distribution of trips to and from the study area show a similar pattern of outbound and inbound trips. For example, traffic volumes using the northbound ramp at the Montague Road interchange during the AM peak hour are similar to the traffic volumes using the southbound ramp during the PM peak hour. This would indicate that commuters are using the same routes during both the morning and evening rush hour periods.

A comparison of the intersection traffic count data obtained by HRM and CBCL Limited shows that although HRM's data were collected between 2009 and 2013 (generally May, September, October), accounting for growth and allowing for variations due to the recording days/times of the year they are very similar to the data collected by CBCL in May 2017. However, CBCL's counts are a little higher as would be expected given 4 to 8 years' worth of background growth within the area. The comparison would also appear to indicate that traffic patterns and volumes have changed very little over an eight year period due to the existing residential neighbourhoods being well established.

2.5.3 Background Growth

We compared the 2031 traffic volumes generated by HRM VISUM, WSP and CBCL without any future development, only background growth, for the key intersections within the study area. Background growth was assumed to be 1% per year for the period from 2017 to 2031. Background growth beyond 2031 was assumed to be 0.75% per year. The results of the comparison show that, including the reported rounding differences, all three sources of data are generally within 200 vehicles plus or minus of each other. Some larger differences appear at various locations within the study area road network, generally CBCL's values are greater than either HRM or WSP's values. This is due to our methodology of adopting a "worst case scenario" for background traffic growth and applying a 1% increase to 2031 across the board. A lower background growth rate would make the corresponding differences smaller. All three sources of data are within reasonable limits accounting for various time periods and rounding differences.

2.5.4 Forest Hills Extension

While comparing the VISUM model with our own 2031 baseline analysis, it became apparent that traffic using the Forest Hills Extension in the northbound direction was much higher in VISUM than in CBCL's analyses.

Through investigating individual turning movements and zone to zone volumes, the volume of traffic coming from the Porter's Lake direction to the Forest Hills Extension northbound showed an increase of over 400 vehicles which were attributed to an unrelated proposed development in the Porter's Lake area. In the VISUM model, these ~400 vehicles are using the Exit 14 northbound ramp to bypass Highway 107 to avoid the congestion on Highway 107, which would not likely occur in reality. Therefore, to represent the worst case scenario, these ~400 vehicles were reallocated from the ramp to the Highway 107 in the Synchro analysis. By removing these ~ 400 trips from the ramp and adding them back on to the main Forest Hills Extension, the traffic volumes at the ramp from the VISUM model and CBCL's analysis on this section were more comparable.

2.6 Trip Generation and Mode Choice

2.6.1 Number of Residential Units, Commercial, and Industrial Areas

Based on the information provided by the land owners, the estimated number of residential units anticipated for the Port Wallace development is 3,744. The analysis also includes 184 acres of light industrial and 152,000 square feet of commercial area. While it is anticipated that the Port Wallace development may have institutional land uses, these land uses typically do not generate or attract trips from outside of the immediate surrounding area.

2.6.2 Trip Generation

The trip generation analysis undertaken by CBCL has been based on standard trip rates from the Institute of Transportation Engineers (ITE) Trip Generation Handbook (9th edition). Note that a comparison of the ITE trip generation rates adopted by CBCL indicates that they are similar to the rates and land use codes used by HRM and WSP in their analysis. At full buildout, the Port Wallace development is expected to generate 3,400 trips during the AM peak hour, and 4,200 trips during the PM peak hour.

2.6.3 Trip Reductions

An estimated buildout timeline of 30 years has been assumed for this development. As we are considering long term future planning for trip generation, there are a number of significant possibilities relating to transportation that we must include in our analysis. For the purposes of this analysis, we have examined AM and PM peak hours as they generally have more trips than any other time of the day.

Trip generation considerations included:

- → The number of jobs within Burnside Industrial Park and at the Halifax International Airport are likely to increase given the level of expansion being proposed at both locations;
- → Based on the rate of advances in vehicle technology, autonomous vehicles are potentially going to be on our roads within the 30 year buildout. Autonomous vehicles have the potential to reduce car ownership as they may provide an on-demand transportation service without the need for private ownership. It is anticipated that this would operate in a similar way to a taxi service, so trips will be made to a specific destination. This could also reduce the requirement for parking space provision currently accommodated in new developments;
- → We also anticipate that a small percentage of people living within the site will also work at some of the shops and schools proposed as part of the multi-use development. These trips are classed as internal trips, and would not impact the surrounding existing road connections during peak hours;

→ We also considered trips by active transportation (AT) instead of by private vehicle. The proposed development includes AT trails, with connections to existing AT facilities around the site for walking and bicycling;
→ There are also opportunities to reduce the number of private vehicle trips by people choosing to use transit services to and from the site. The existing transit services routes 10, 54 and 55 that travel close to the Port Wallace development could potentially be altered to include a loop through the new development, or perhaps a new transit service could be offered based on sufficient demand. One way of helping to reduce private-and particularly single occupancy vehicle trips, would be to encourage the introduction of sustainable, reliable transit services to Burnside Industrial Park and Halifax International Airport. If demand was sufficient, perhaps consideration of a transit hub within the development could also be considered; and
→ We anticipate that some of the residents of the proposed development will be retired. The anticipation is that most residents will be families, and therefore are more likely to be making vehicle trips during the peak hours. However, another shift in traditional working and travel patterns could be that more people will be working from home in the future, or indeed able to work flexible hours to avoid travelling in peak hour traffic.

Assumed trip reduction rates were chosen based on the likelihood of trips not being made during peak hours. The reductions adopted are the same for both AM and PM peak hours due to this being a high level analysis.

Trip reduction rates include non-auto mode share (transit and AT trips) and internal trips. Residential trips were reduced by 27%. Commercial trips were reduced by 75% to account for site synergies. Industrial trips were not reduced.

From a comparison of the HRM and WSP reports, HRM's Port Wallace Master Plan Area Travel Demand Modelling Report (2017) used 10% reduction for non-auto mode choice, and 75% reduction for neighborhood shopping and on site synergies. WSP's Access Review on Proposed Residential Development - Port Wallace (2014) used 20% reduction for non-auto mode choice and 75% reduction for neighborhood shopping and on site synergies.

At full buildout, the Port Wallace development is expected to generate 2,450 net external vehicle trips during the AM peak hour, and 3,050 net external vehicle trips during the PM peak hour.

Based on our analysis, we found that after the trip reductions and non-auto mode choice factors were applied, the adjusted external trips are similar to the HRM and WSP estimates of adjusted trip generation.

2.7 Trip Distribution

We have assumed that there will be five main access routes to the residential developments via the existing access on Avenue du Portage, and Waverley Road. This will be the case until the sites are more developed. Avenue du Portage should be extended through the site as a primary/spine road in the future. The existing access routes are as follows:
→ From Waverley Road via Breeze Drive;
→ From Waverley Road via Montebello Road; and
→ From Main Street via Caledonia Road.

Access to the Conrad residential lands would be directly from Waverley Road at two new access points. Access to the Conrad industrial lands would be from two new access points with Montague Road, and one at the Cono Drive/Montague Road intersection. Access to the Whebby and Unia lands will be via adjacent existing development or through the study area.

2.7.1 Initial Review

In terms of residential trip distribution assumptions, HRM initially adopted the trip distribution percentages from the 2031 PM peak VISUM Regional Travel Demand Model. These percentages were then compared to the trip distribution percentages shown in WSP's Access Review which are as follows:

→ North - 10%;
→ East - 5%;
→ South - 35%; and
→ West - 50%.

Following this, the Origin Destination (OD) tables were adjusted by HRM and the final residential trip distribution assumptions adopted in the VISUM model are as follows:

→ North - 7%;
→ East - 5%;
→ South - 30%; and
→ West - 58%.

2.7.2 Recommended

Each of these general directions of distribution was allocated a percentage of trips to and from the site at 50% (2031) and full buildout (2047). Note that the trip distribution percentages were based on a combination of CBCL's own estimation and the trip distribution percentages used by HRM and WSP, and are as follows:

→ North - 7%;
→ East - 6%;
→ South - 38%; and
→ West - 49%.

Development traffic has been assigned to the available routes based on the CBCL trip assignment assumptions which differed depending on the route option being analysed.

Considering future roadway connections, it is proposed that there be five new access points (A, B, C, D, and E) from the proposed developments on to Waverley Road, as described in section 2.4 above. Other options for access include the construction of a right-in/right-out access only on to the Forest Hills Extension, or a full access on the Forest Hills Extension which we have modelled as a roundabout for the purposes of this study.

2.8 Analysis Assumptions and Constrains

Several assumptions have been incorporated into the concept plan and have been adopted for the transportation analysis. These assumptions and constraints are as follows:

→ Background growth rates applied to our baseline 2017 traffic volumes were 1% per year to 2031, and 0.75% per year from 2031 to 2047;

→ Development is anticipated to commence in 2018. We have assumed a 30 year buildout for this study area, therefore the buildout year is assumed to be 2048. For the purposes of this analysis, a full buildout year of 2047 has been used to accommodate existing models and data. For the purposes of this assessment, it is anticipated that there will be a negligible change in traffic patterns between 2047 and 2048;
→ 2031 is the limit of HRM's VISUM model;
→ We have assumed 50% of the total development area is to be constructed by 2031;
→ An estimate of trip distribution from the entire development at full buildout (2047) has been made using existing and future access points;
→ The residential area would include approximately 3,744 units, split between single-family detached housing, apartments and condos/townhouses;
→ Significant traffic (including private vehicle trips, walking, cycling, transit trips) will be generated by a development of this size and the types of land use anticipated;
→ Assumptions have been made to reduce the number of private vehicle trips from the entire development during peak hours. This is based on percentages of people making internal trips, working from home, using active transportation or transit, amongst other modes or travel patterns;
→ Active transportation, and transit services and use needs form a large part of travel to and from the site, including connections to existing active transportation facilities;
→ Non-auto mode choice was assumed at 10%;
→ Waverley Road is the most likely point of access to the site to/from the Highways 107 and 111, Main Street, and downtown Dartmouth and Halifax, at least initially;
→ The Forest Hills Extension (Highway 107) offers a potential future connection point as the site is developed; and
→ Forest Hills Extension (Highway 107) will be widened by 2031.

2.9 Baseline and Scenario Results

In discussion with HRM, several scenarios were developed for modelling in Synchro based on the access options discussed above, in conjunction with the two horizon years (2031 and 2047), 50% and 100% buildout, and modelled for both AM and PM peak hours. Each modelled intersection was examined in terms of level of service (LoS), and queues and delays, which are the key indicators for intersection analysis.

In summary, the majority of the intersections examined do not have any operational issues under existing 2017 AM and PM peak hour conditions, with the exception of the Main Street/Forest Hills Extension signalized intersection which HRM are aware of. Looking at 2031 AM peak hour conditions and a 50% buildout of Port Wallace, the following intersections show signs of poor operational performance including lower level of service, longer queues and delays for vehicles passing through the intersections:
→ Highway 107 ramp northbound;
→ Waverley Road/Montague Road;
→ Waverley Road/Option 1 Access A; and
→ Breeze Drive/Avenue du Portage/Caledonia Road.

As for the 2031 PM conditions, more intersections display poor operational performance, namely;
→ Highway 107 ramp southbound;
→ Waverley Road/Montague Road;
→ Waverley Road/Option 1 Access A;
→ Waverley Road/Option 1 Access B;

→ Waverley Road/Option 1 Access C;
→ Waverley Road/Montebello Road; and
→ Breeze Drive/Avenue du Portage/Caledonia Road.

Note that our Level of Service (LoS) analyses for 2031 agree with HRM and WSP's recommendation on upgrading Montebello Road at Waverley Road with an additional northbound right turn lane.

Figure 7: Intersections Displaying Poor Operational Performance During the 2031 Peak Hour illustrates

Figure 7: Intersections Displaying Poor Operational Performance During the 2031 Peak Hour

intersections displaying poor performance during the 2031 peak hour.

Although the proposed access points A, B and C show poor level of service at 2031, we assume that the developer will be implementing mitigation measures so that they operate satisfactorily.

Similarly by 2047, using a 0.75% background growth rate beyond 2031, plus the inclusion of a 10% non-auto mode choice, the following intersections show poor level of service during the AM peak hour in addition to the intersections mentioned above for 2031 AM peak hour:

→ Main Street/Caledonia Road;
→ Waverley Road/Access Road B; and
→ Waverley Road/Access Road C.

The following intersections also show poor level of service during the 2047 PM peak hour in addition to the intersections mentioned above for 2031 PM peak hour:

→ Main Street/Caledonia Road; and

→ Highway 107 Exit 14 ramp northbound.

Figure 8: Intersections Displaying Poor Operational Performance During the 2047 Peak Hour illustrates intersections displaying poor performance during the 2047 peak hour.

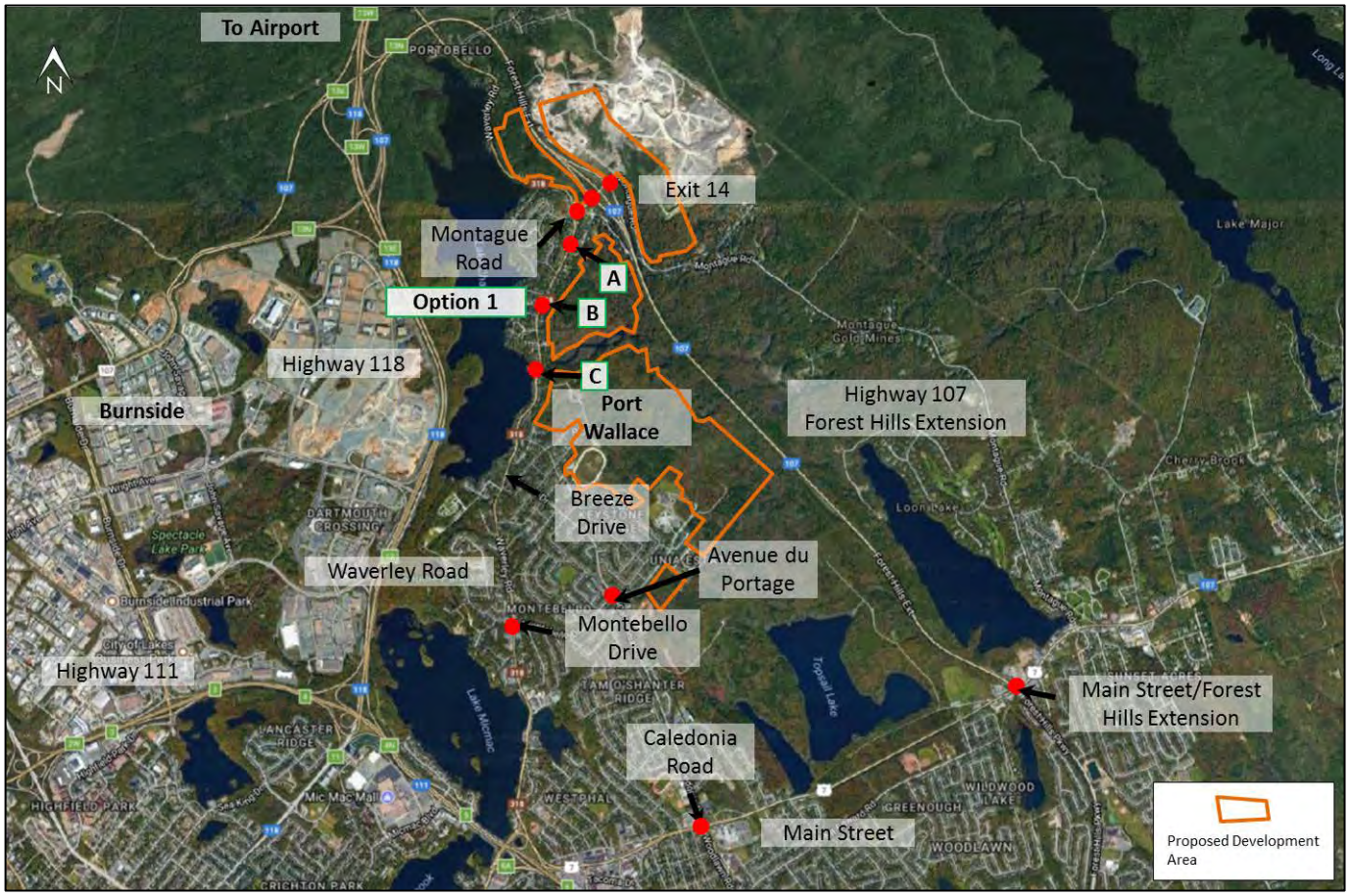


Figure 8: Intersections Displaying Poor Operational Performance During the 2047 Peak Hour

We note that Waverley Road/Braemar Drive south of Montebello, a two-lane arterial road, currently carries approximately 930 vehicles per hour (vph) in the peak direction during the peak period. This is expected to increase to 1,250 vph by 2031 at 50% buildout. For comparison, sections of St Margaret's Bay Road, another two-lane arterial road, currently carry traffic volumes exceeding 1,200 vph in the peak direction during the peak hour. This would suggest that Waverley Road/Braemar Drive could carry similar traffic volumes without the need to widen the roadway before 2031.

Including future Port Wallace development, traffic heading to and from Highway 107 at Exit 14 will use up any spare capacity on the Montague Road overpass which is currently two lanes wide, one lane in each direction. Improvements at each ramp terminal intersection may mitigate the need to widen the structure. Further detailed analysis of future traffic volumes and queue lengths will be required to confirm this.

2.10 Sensitivity Analysis

HRM requested that we run a few sensitivity tests using the VISUM model to examine the impacts of additional scenarios on the surrounding road network.

2.10.1 New Connection to Forest Hills Extension

Firstly, we compared Option 1 and Option 1A. Option 1A offers a right in/right out access from Highway 107. The analysis showed that there is no appreciable difference in overall LOS at the surrounding intersections between Option 1 and Option 1A. However, the results of the analysis did show that the 95th percentile queue length, V/C ratio, and average delay in seconds by intersection approaches improve slightly with Option 1A compared to Option 1.

Therefore, there would appear to be little difference in the impact at the intersections by including a right in/right out access to the Forest Hills Extension.

Similarly, Option 2 (Option 1 plus full access on to the Forest Hills Extension) improves the 95th percentile queue length, V/C ratio, and average delay in seconds by intersection approaches at the Caledonia/Montebello intersection. However, there is no appreciable difference in overall LOS in between Option 1 and Option 2.

Therefore, Option 2 does not eliminate the need to upgrade the Caledonia/Montebello intersection.

2.10.2 Non-Auto Mode Choice

Secondly, we examined the effect of using a 20% non-auto mode choice mode choice in 2047 for full buildout of the development. In reviewing the non-auto mode share percentages used in HRM and WSP's analysis, the VISUM model, which used a 10% value, was adjusted to include a 20% value.

The results of this analysis showed that conditions at both northbound and southbound ramps on the Highway 107 Forest Hills Extension improved such that there was no operational issue at these locations during the AM peak period. However, during the PM peak period, conditions at all intersection location were the same as with the 10% non-auto mode choice.

There was very little difference in overall traffic volumes based on the two values, therefore, there would appear to be little benefit in the impact to the surrounding intersections from a 20% non-auto mode choice. However, we believe that non-auto modes, in particular, transit and active transportation should be widely supported and encouraged for the Port Wallace development given the level of trips generated during the buildout period.

2.10.3 Forest Hills Extension Twinning

Lastly, we examined the impact of twinning the Highway 107 Forest Hills Extension from Exit 14 to the interchange with Highway 118. Using the VISUM model, we examined the forecast travel demand on this section of highway with and without the Port Wallace development. Currently, peak hour traffic volumes in the peak direction are estimated at 1,400 to 1,600 vehicles per hour (vph). This is at or near the capacity of this two-lane highway section. Without the Port Wallace development, 2031 peak hour travel demand on this section is expected to exceed 1,900 vph in the peak direction. With the Port Wallace development, peak hour travel demand is expected to exceed 2,300 vph in the peak direction.

Using the VISUM model and adjusting the links which represent this section of highway, we changed the link type from one lane in each direction to two lanes in each direction which simulates a twinned highway. From the analysis, it was found that 170 additional vehicles are heading to the north via the new twinned highway during the AM peak period. Moreover, there is an extra 40 vehicles using the twinned highway to come south during the AM peak period. Similarly, during the PM peak period, there are additional 255 vehicles coming to the south via the twinned highway. The results of this analysis show that there is a significant difference in the volumes of directional traffic, specifically traffic heading to the north and south via the Highway 107 ramps. The twinned highway attracts significantly more vehicles than the existing two lane highway. In addition, should an intersection on the Forest Hills Extension from the Port Wallace development be constructed and the highway twinned from this intersection, this would alleviate traffic issues at the Waverley Road and Exit 14 ramp terminals.

While the Port Wallace development will add traffic to the section of Highway 107, from the Exit 14 interchange to the interchange with Highway 118, improvements to this section of highway will be needed with or without the development.

2.11 Infrastructure Plan

The surrounding road network has been assessed under a number of different scenarios. Each potential development layout or infrastructure configuration will generate a different trip distribution. This affects the level of service at each intersection and therefore the potential required infrastructure upgrades. Detailed analysis will be required at the time of preliminary/detailed design to determine the appropriate upgrade for each intersection.

For the purpose of the costing discussion given herein, we have compared two scenarios: 2031 without Port Wallace vs 2031 with Port Wallace, as most of the upgrades are triggered by 2031, with the remaining being required before 2047. Both scenarios show intersections with poor levels of service. Preliminary estimated upgrade timelines have been developed for this study and are provided below.

As indicated above, the way the development will connect to existing infrastructure is undefined at this point. For the purposes of this study we have reviewed Infrastructure configuration Option 1 at full buildout. Intersections have been reviewed to determine the trigger point where level of service is no longer acceptable based on the anticipated increased traffic volumes. This trigger point was established on an individual basis for each intersection based on the total number of vehicles, the total wait time and an overall level of service for all turning movements within the intersection. The cost of the transportation upgrades is shown in Table 2 below.

The recommended infrastructure improvements shown above are described in more detail in the section below, and have been grouped by specific geographic corridors**.** Figure 9: Infrastructure Improvement Corridor shows the infrastructure improvement corridors recommended to be upgraded based on our analysis.

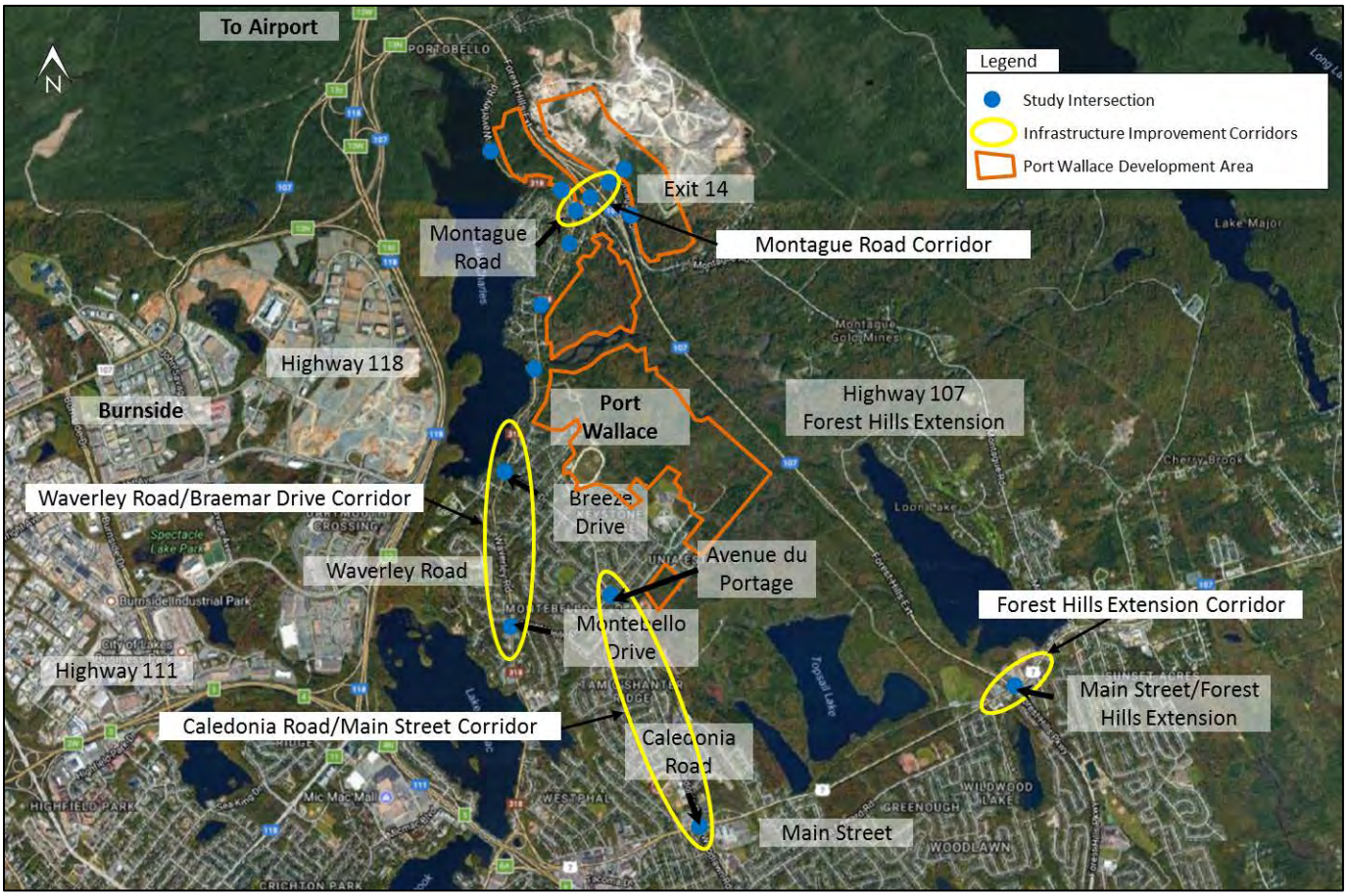


Figure 9: Infrastructure Improvement Corridor

2.11.1 Montague Road Corridor

Looking at the analysis completed and at some of the individual intersections and upgrades required based on Option 1, and for a 50% buildout at 2031, the following points should be noted:

→ Montague Road and Ramp Terminal (South) – The Highway 107 Exit 14 south ramp terminal will also require a roundabout to accommodate development traffic coming from Port Wallace heading towards the highway.

This roundabout would need to be 50 metre diameter with a single circulating lane and a southbound right turn lane to remove this movement from the traffic passing through the roundabout, in particular the left turn movement.

Trigger Point: 10% buildout (400 residential units)

→ Montague / Charles Keating / Waverley – The existing Montague Road / Waverley Road stop controlled intersection will require a single lane roundabout, while maintaining the right turn slip lane from Montague Road.

Trigger Point: Construction of the Montague/Ramp Terminal South Roundabout.

→ Montague Road and Ramp Terminal (North) – The Highway 107 Exit 14 north ramp terminal will require a roundabout to accommodate development traffic coming from Port Wallace heading towards the highway.

This roundabout would need to be 50 metre diameter with a single circulating lane. In addition, this intersection should also include a westbound right turn slip lane on the approach to the roundabout to remove this movement from the through traffic. An eastbound through traffic bypass lane could also be included to remove the conflict between through traffic and left turn traffic.

Trigger Point: Development of the Conrad Industrial Lands and/or 30% residential development (1100 residential units).

→ Montague Road at Cono Drive (Access F) – Improvements to this intersection will be needed to accommodate the development of the Conrad Industrial lands. This plan assumes that a single lane roundabout will be required, however given its proximity to the Montague Road/Ramp Terminal North intersection, a single five-leg roundabout may be required. Further analysis will be required. Access G/Montague Road – additional access from Conrad Industrial Lands.

Trigger Point: Development of the Conrad Industrial Lands or construction of the Montague/Ramp Terminal North roundabout.

→ Montague Road Overpass – Including future Port Wallace development, traffic heading to and from Highway 107 at Exit 14 will use up any spare capacity on the Montague Road overpass which is currently two lanes wide, one lane in each direction. Based on the inclusion of a roundabout at each ramp terminal, and through providing bypass and slip lanes, any peak hour queuing across the bridge should be accommodated within the existing cross section of one lane in each direction. This would mitigate the need to widen the structure at this time, however further more detailed analysis of future traffic volumes and queue lengths would be required to determine if the structure would need to be widened at a later date.

Trigger Point: TBD.

2.11.2 Waverley Road/Braemar Drive Corridor

→ Access A / Waverley – Assume two lane westbound approach as Access A. Install a southbound left turning lane on Waverley Road. Install traffic signals.

Trigger Point: 0% buildout. Southbound left turn lane on Waverley Road and traffic signal civil works will be needed when Access Road A is constructed. It is assumed that Access Road A will be one of the first roads constructed. Traffic signals (electrical) will be constructed by the local developer when signals are warranted.

→ Access B / Applewood Lane and Waverley Road – Install a southbound left turning lane on Waverley Road. Traffic signals if required will be the responsibility of the local developer.

Trigger Point: TBD by the local developer.

→ Access C / Meadow Walk & Waverley – Install a southbound left turning lane on Waverley Road. Traffic signals if required will be the responsibility of the local developer.

Trigger Point: TBD by the local developer.

→ Access D / Waverley Road – Install a northbound left turning lane on Waverley Road. Traffic signals if required will be the responsibility of the local developer.

Trigger Point: TBD by the local developer.

→ Access E / Waverley Road – Install a northbound left turning lane on Waverley Road. Traffic signals if required will be the responsibility of the local developer.

Trigger Point: TBD by the local developer.

→ Breeze / Waverley – Install additional westbound lane on Breeze Drive, and install traffic signals.

Trigger Point: 70% buildout (2,600 residential units).

→ Montebello / Waverley – Install northbound right turn lane on Waverley Road.

Trigger Point: 50% buildout (1,900 residential units).

2.11.3 Breeze Drive/Caledonia Road Corridor

→ Montebello / Avenue du Portage / Caledonia / Breeze – Install traffic signals.

Trigger Point: 10% buildout (400 residential units) and/or the extension of Avenue du Portage (Access A) to Waverley Road.

2.11.4 Forest Hills Extension

→ Forest Hills Extension Twinning – The requirement for twinning of Highway 107 from Exit 14 to Highway 118 at Burnside will need to be monitored as time goes by. This upgrade would need to be instigated in conjunction with NSTIR. This study assumes that twinning will occur by 2031.

Trigger Point: TBD

→ New connection to Forest Hills Extension – Option 1A considers a right in / right turn out connection on Highway 107. Option 2 considers a full access to Highway 107 (Roundabout or Interchange). While a new connection to Highway 107 would improve operations on Waverley Road and the Montague Road interchange, it has not been costed as part of this Infrastructure Plan.

Trigger Point: Not Considered.

2.11.5 Main Street

→ Main / Caledonia / Woodlawn – Traffic signal optimization.

Trigger Point: 70% buildout (2600 residential units).

→ Main / Forest Hills – This intersection is at or near capacity during the peak hour. Upgrades to this intersection will be required if the Cherrybrook Bypass is not constructed. For the purposes of this study, it is assumed that this intersection would be converted to a multi-lane roundabout.

Trigger Point: TBD.

2.11.6 Cost Estimates, Timing, and Cost Sharing

Class D cost estimates are presented in Table 2 and include a 45% contingency, and 12% engineering fees. The cost estimates are in 2017 dollars and do not include land acquisition. For upgrades where the trigger point has not been determined, the timing of these projects for cost estimating purposes were established as noted below.

For upgrades that will be funded 100% by the local developer Access points A, B, C, D, E, and G, these projects have not been included in Table 2. Access point F (Cono Drive) has been included in Table 2 as it would be a cost shared project between HRM and local developer. The Forest Hills Extension twinning project has not been included since it will be needed with or without the Port Wallace development.

Improvements to the Main at Forest Hills Extension were assumed to occur at 50% buildout for costing purposes. Looking at the Main Street/Forest Hills Extension intersection, HRM is aware that there is a significant volume of traffic using this intersection even before the Port Wallace development goes ahead. Our analysis shows that less than 5% of the total trips (including residential, industrial, commercial and institutional) generated by the development would use the Main Street/Forest Hills Extension intersection. This in turn represents a smaller percentage of the cost sharing by the local developers at this location.

Many of these existing intersections are currently at a satisfactory level of service, and therefore have additional available capacity. The capacity of a few intersections is exceeded over the timeline of this development due to increased road use, triggering upgrade requirements. Increased road use originates from a combination of the Port Wallace development and background growth. Cost sharing has been allocated based on HRM Capital Cost Contribution policy with background growth included as an HRM responsibility.

Should Port Wallace not proceed, some existing intersections within the study area are shown to require upgrades over the next 30 years based on background growth alone. These intersections are: Montague Rd / Ramp Terminal (South), Main / Forest Hills, and Montebello / Avenue du Portage / Caledonia / Breeze. It is anticipated that the costs for upgrading these intersections would be shared between the developers and HRM.

Cost sharing has been typically allocated based on the % share of total traffic approaching (or exiting) an intersection. When using the model (as opposed to a manual trip distribution and assignment) to estimate cost sharing, there is induced traffic. This is traffic that shifts from one facility to another when road system capacity is changed. Spare capacity is equally allocated to background and site generated traffic.

The HRM CCC policy states that: *"… In cases where existing traffic has been shifted from an existing facility, thereby releasing capacity for use by traffic generation in the charge area, no direct benefit will be attributed to the Municipality…"*

To factor this in, % traffic share has been allocated by comparing the 2031 PM Peak model run without Port Wallace to the 2031 PM peak model run with Port Wallace. The 2031 model with and without Port Wallace includes background growth.

The model results are given below in Table 2**.**

Table 2: Cost Sharing Between Developers and HRM

Project	Cost ($M)	Baseline Volume Without Development	Baseline Volume With Development	Volume Difference	Developer Share	Developer Share (Rounding Adjustment)	Developer Cost ($M)	HRM Cost ($M)
Cono Drive (Access F)	2.40	830	1,500	670	44.7%	45%	1.1	1.3
Ramp Terminal (North)	2.40	1,000	1,750	750	42.9%	45%	1.1	1.3
Ramp Terminal (South)	2.40	1,500	2,300	800	34.8%	35%	0.8	1.6
Charles Keating	2.40	1,200	2,000	800	40.0%	40%	1.0	1.4
Waverley at Breeze	0.70	650	1,300	650	50.0%	50%	0.4	0.4
Waverley at Montebello	0.35	1,300	1,900	600	31.6%	30%	0.1	0.2
Main at Forest Hills	10.00	4,250	4,700	450	9.6%	5%	0.5	9.5
Main at Caledonia	0.00	3,250	4,300	1050	24.4%	25%	0.0	0.0
Caledonia at Avenue du Portage	0.40	700	1,300	600	46.2%	45%	0.2	0.2
Total Cost (with Main at Forest Hills)	**21.05**						**5.1**	**16.0**
Total Cost (without Forest Hills)	**11.05**						**4.6**	**6.5**
Total Developer Share (with Main at Forest Hills)	**24%**							
Total Developer Share (without Main at Forest Hills)	**42%**							

Chapter 3 Wastewater

3.1 Introduction

3.1.1 Objectives

This analysis has the objective of evaluating the existing sanitary system capacity downstream of the planned Port Wallace Development, and identifies potential upgrades in order to service this development's wastewater flows. The existing sewer system and planned Port Wallace development are shown in Figure 10: Existing Sanitary Sewershed in Relation to Proposed Development Area. Letters A and B Denote the Start and End of the Profile in Figure 11.

The limiting sections of the existing sanitary system have been identified by comparing the available capacity of the existing system with the projected flows of the proposed development. If, for a given phase of development, the projected flows exceed the available capacity, updates are required prior to that phase of development. Upgrades of the downstream system have been designed to meet the ultimate service requirements of the development at full buildout.

This chapter presents calculations of future design flows and an assessment of existing system capacity. The results show, for each section, at which phase of development upgrades will need to be completed.

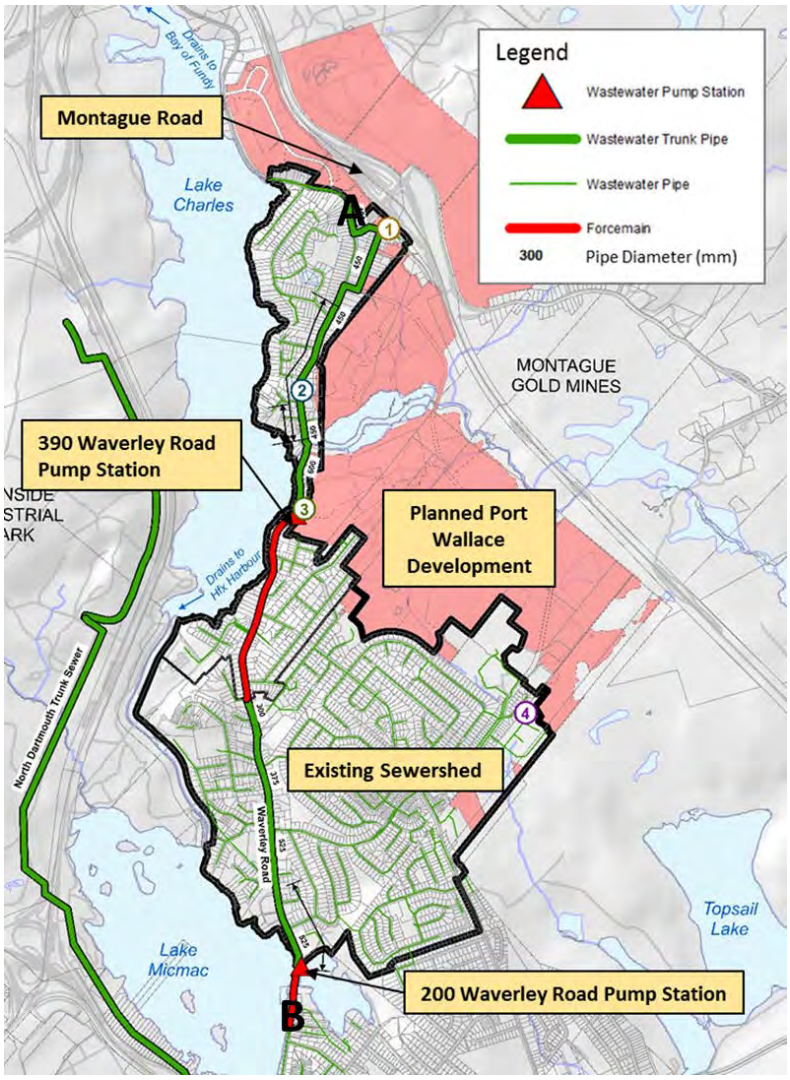


Figure 10: Existing Sanitary Sewershed in Relation to Proposed Development Area. Letters A and B Denote the Start and End of the Profile in Figure 11

3.1.2 Existing System

The existing gravity system is depicted in plan view in Figure 10: Existing Sanitary Sewershed in Relation to Proposed Development Area. Letters A and B Denote the Start and End of the Profile in Figure 11 and in profile in Figure 11: Profile of Existing Sanitary Sewer System. The existing sewer originates at the intersection of Montague Road and Waverley Road and continues south along Waverley Road to a pumping station (PS) at 390 Waverley Road. Flow is then pumped further south on Waverley Road into another gravity sewer system. This gravity system discharges to the pumping station at 200 Waverley Road, which pumps to the Dartmouth Trunk Sewer. The topography in the area explains the need for two pumping stations in the area. A complete gravity system could only be constructed with excavations in the order of 20m of depth.

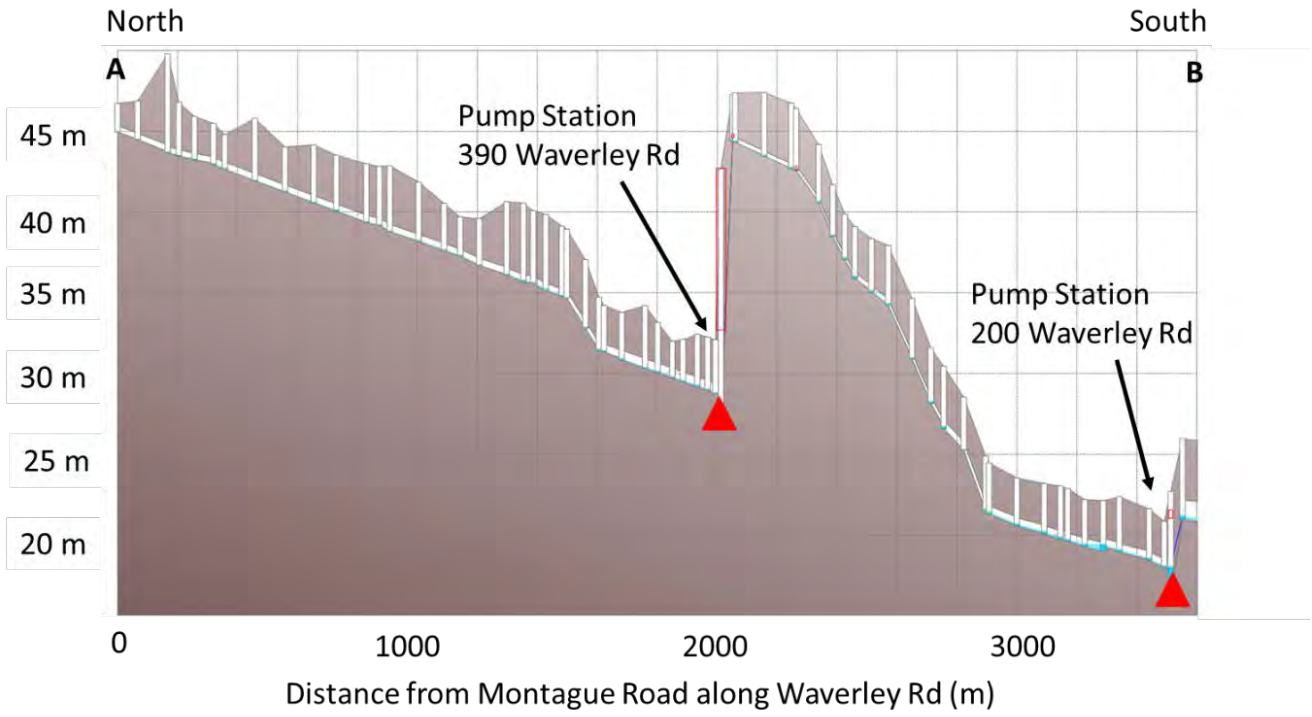


Figure 11: Profile of Existing Sanitary Sewer System

The gravity system upstream of the 390 Waverley Road PS is comprised of concrete pipes with diameters in the order of 400mm to 600mm (according to the Halifax Water GIS). Downstream, between the 390 Waverley Road PS and the 200 Waverley Road PS, the gravity system has similar slopes, but is comprised of smaller diameter pipes, that range from 375mm to 525mm. This section of gravity sewer therefore has a lower overall capacity compared to the gravity system upstream of the 390 Waverley Road PS.

3.1.3 Proposed Changes

The proposed Port Wallace development area is shown in Figure 10: Existing Sanitary Sewershed in Relation to Proposed Development Area. Letters A and B Denote the Start and End of the Profile in Figure 11**.** The proposed area is composed of varied land ownership and land uses (as shown in Figures 1, 2 and 3 respectively in previous chapters). The new wastewater system will connect to the existing wastewater system at distinct connections points. Four connection points have been identified based on: (1) pre-development grading (i.e., LIDAR flow paths), (2) the conceptual layout of the proposed development (provided by the developers), and (3) spatial arrangement of existing parcels.

Therefore, the location of the connection points are subject to change:

→ Connection Point 1 is at the intersection of Wilcot Lane and Lynwood Drive;

→ Connection Points 2 and 3 are along Waverley Road, at Applewood Lane and at the 390 Waverley Road Pump Station respectively; and

→ The fourth connection point, at Stanfield Avenue, is off of the main trunk sewer, at the fringe of the existing sewer system.

The connection points and associated contribution areas are shown in Figure 12: Connection Points Where the Proposed Wastewater System will Connect into the Existing System, and Associated Contribution Areas.

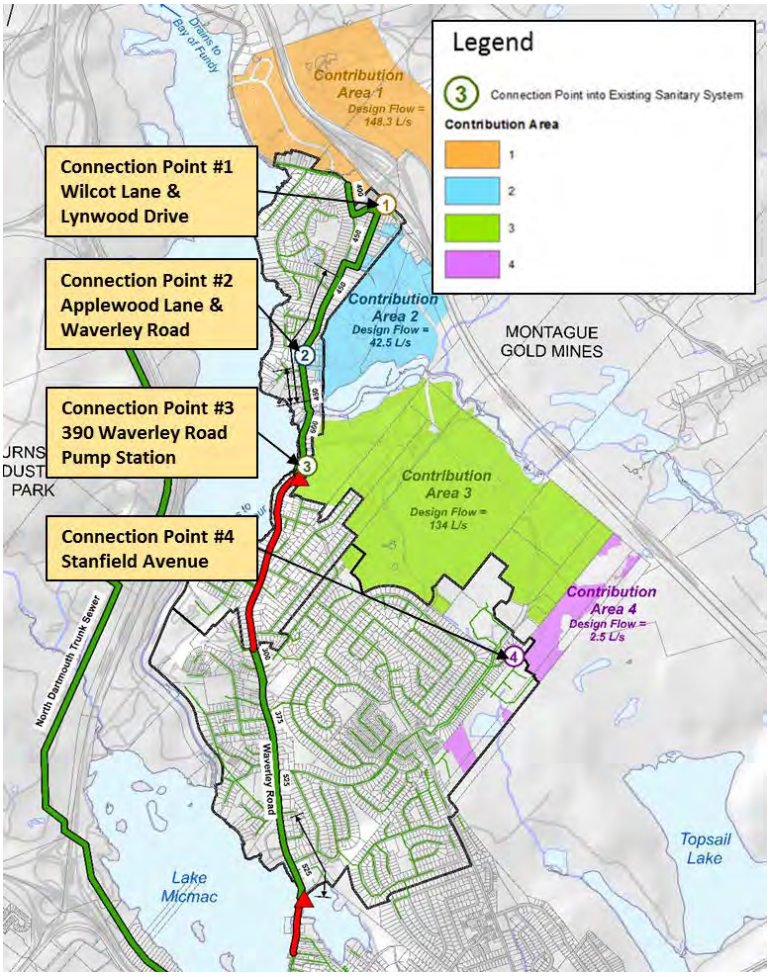


Figure 12: Connection Points Where the Proposed Wastewater System will Connect into the Existing System, and Associated Contribution Areas

3.1.4 Previous Studies

Several studies have previously been completed and contribute to the understanding of the existing sanitary system:

→ The Dartmouth Cove Wastewater Management Study (CBCL Limited, 2007) analysed possible routing paths for the future wastewater flows from the Port Wallace development, recommending the option of routing the flows to the North Dartmouth Trunk Sewer;

→ The Halifax Water Cost of Servicing Plan (CBCL Limited, 2009) noted that the 390 Waverley Road Pump Station will need to be upgraded to receive wastewater flows from the Port Wallace development;
→ The Regional Wastewater Functional Plan (CBCL Limited, 2012) provided a capacity analysis of the North Dartmouth Trunk Sewer (NDTS) and its downstream system. The impacts of future flows from the Port Wallace development to the NDTS was also evaluated, and confirmed the NDTS had adequate capacity to handle flow from this development; and
→ A drawdown test of the 390 Waverley Road Pump Station was carried out by DesignPoint on January 29, 2015.

3.1.5 Scope

The following analyses were included as part of the wastewater component of this study:
→ Capacity analyses of the 390 Waverley Road Pump Station, the 200 Waverley Road Pump Station and their respective upstream wastewater systems were completed to assess future partial development conditions for Port Wallace. These analyses were not previously carried out as part of the Regional Wastewater Functional Plan (CBCL Limited, 2012); this was confirmed by CBCL Limited and Halifax Water during the May 31, 2017 meeting;
→ A wastewater capacity analysis of the North Dartmouth Trunk Sewer with respect to the Port Wallace development was not completed, because this analysis was done as part of the Regional Wastewater Functional Plan (CBCL Limited, 2012); this was confirmed by CBCL Limited and Halifax Water during the May 31, 2017 meeting; and
→ Since the intent of this masterplan is to establish long term infrastructure requirements, detailed design of the sanitary system was not included.

3.2 Methodology

3.2.1 Specifications

The sanitary system analysis presented here follows the most up-to-date version of the Halifax Water Design Specification for water, wastewater & Stormwater systems 2017. In addition to this, all assumptions for non-residential properties (industrial and commercial) were based on the Atlantic Canada Wastewater Guidelines Manual (Environment Canada, 2006).

3.2.2 Approach

The following steps were undertaken as part of this analysis:
1. Calculation of design flows into the existing sanitary system based on the existing sewershed areas and land uses (Section 4.2.3);
2. Calculation of design flows for the proposed Port Wallace development into each of the four connection points (Section 4.2.3);
3. Drawdown analysis for the 200 Waverley Road Pump Station (Section 4.2.4);
4. Hydraulic modelling of the existing sanitary system (pipes and pump stations) (Section 4.2.5);
5. Calculation of the remaining capacity of the existing system based on the existing flows (Section 4.2.6); and
6. Comparison of the remaining capacity of the existing system with the future development design flows (Section 4.2.7).

3.2.3 Design Flow Calculations

Design flows were calculated for both for the proposed Port Wallace development and for the existing sanitary system using the equations in the specifications described above.

→ For the existing system, flows were calculated based on the types and numbers of establishments within the existing sewershed;

→ For the proposed development, flows were calculated to the four connections points detailed above. The proposed development areas and number and type of units for the proposed development were based on information provided by the developers; and

→ It is noted that these design flows were calculated based on the equations in the specifications described above, and therefore not calibrated based on flow gauges.

The following assumptions were made based on the specifications described above. Assumed flow allowances, operational periods and peaking factors for various types of establishments are presented in Table 3.

→ Safety Factor 1.25;

→ I/I Allowance: 0.28 L/ha/s;

→ Single Unit Dwelling: 3.35 people/unit;

→ Townhouse: 3.35 people/unit; and

→ Multi-Unit Dwelling: 2.25 people/unit.

Table 3: Flow Allowance Assumptions for Various Types of Establishments

Type of Establishment	Daily Flow Allowance	Operational Period	Peaking Factor
Light Industrial/Commercial Area	35,000 L/ha	12 hours	1.0
Residential	300 L/person/day	24 hours	(Harmon)
School	105 L/person/day	8 hours	1.5
Restaurant	225 L/seat/day + 100 L/employee/day	16 hours	2.0
Carwash	340 L/car/day	16 hours	4.0
Gas Station	20 L/car/day	24 hours	4.0
Industrial/Commercial Building	45 L/person/day	12 hours	2.0

3.2.4 Pump Station Drawdown Analyses

A drawdown test of the 390 Waverley Road Pump Station had previously been carried out by DesignPoint on January 29, 2015. To close the information gap on the capacity of the 200 Waverley Road Pump Station, CBCL Limited and Halifax Water completed a drawdown test at that location on June 19, 2017.

3.2.5 Hydraulic Modelling

The EPA-SWMM5 modelling engine was used in combination with the PCSWMM interface to assess the capacity of the existing sanitary system. The hydraulic model uses the characteristics of the existing sanitary system's pipes (e.g., sizes, slopes, material, spatial arrangement) and pump stations (e.g., information from drawdown analyses) to assess how much flow the system is able to transmit downstream.

3.2.6 Remaining Capacity of Existing System

Next, the hydraulic model was used to evaluate the remaining capacity of the existing system.

→ Firstly, the existing flows calculated above were inputted into the model to identify whether sections of the existing system are currently under capacity; and

→ Secondly, flows were incrementally increased to determine the maximum amount of flow that can be added in addition to the existing flow until a pipe is full. This is called the "remaining capacity" or "flow thresholds", because flow above this threshold requires an upgrade to the existing system.

3.2.7 Required Upgrades to Service Proposed Design Flow

Once the above results were obtained, the flow capacity thresholds were compared with the calculated future design flows. Some parts of the system were found to already have the capacity to absorb the future development flows (see Results and Recommendations below). For the locations that did not have sufficient capacity, the percentage of development (or "phase" of development) at which the upgrade would be necessary was calculated.

> *For example, if the flow capacity threshold downstream of a connection point is 50 L/s and the future development design flow at that connection point is expected to be 100 L/s, the upgrade will be necessary by the time 50% of development occurs.*

3.3 Results and Recommendations

Results are presented in the following order: the design flow calculations are reported first, followed by the results of the capacity analysis and associated recommended upgrades.

3.3.1 Future Development Design Flows

The calculated design flows for Contributions Areas 1-4 of the proposed Port Wallace development are presented in the "Total Design Flow" column of Table 4. The largest flows are expected from Connection Points 1 and 3, with only minor flows at Connection Point 4.

Table 4: Estimated Wastewater Design Flows for Port Wallace

Connection Point #	Connection Point Location	Development Type	Development Area	Design Flow [HW Formula] (L/s)	Total Design Flow (L/s)	Cumulative Design Flow (L/s)	Remaining Capacity (L/s)	Percentage of Development (%)
1	Wilcot Lane & Lynwood Drive	Residential	PW-2 (Conrad)	28.7	148.3	148.3	111.0	75
		Light Industrial	PW-1 (Conrad)	119.6				
2	Applewood Lane & Waverley Road	Residential	PW-3 (Port Wallace Holdings Limited)	39.4	42.5	190.8	173.0	91
			PW-7 (Port Wallace Holdings Limited)					
		Institutional	PW-3 (Port Wallace Holdings Limited)	3.1				
3	390 Waverley Road PS	Residential	PW-4 (Port Wallace Holdings Limited)	125.2	134.0	324.8	N/A	>100
			PW-5 (Port Wallace Holdings Limited)					
			PW-6 (Port Wallace Holdings Limited)					
			PW-8 (Port Wallace Holdings Limited)					
			PW-9 (Port Wallace Holdings Limited)					
			PW-10 (Unia)					
		Commercial	PW-5 (Port Wallace Holdings Limited)	8.8				
			PW-6 (Port Wallace Holdings Limited)					
			PW-8 (Port Wallace Holdings Limited)					
4	Stanfield Avenue	Residential	PW-11 (Unia)	2.5	2.5	2.5	N/A	>100

3.3.2 Remaining Capacity of Existing System and Rcommended Upgrades

Recommendations are as follows (explained in more detail below):

1. Upgrade 390 Waverley Road Pump Station;
2. Upgrade Wastewater Pipes at 75% Development of Area 1; and
3. Revise Analysis Upon Changes to Planned Development.

1. Upgrade of 390 Waverley Road Pump Station

The key limiting component of the existing sanitary sewer system was found to be the 390 Waverley Road Pump Station. Based on a drawdown test (DesignPoint, January 29, 2015), the firm capacity of the 390 Waverley Road Pump Station is 37.0 l/s. Given that flows from the existing sewershed were calculated at 47.8 l/s (using the current HW design formula), this means that this Pump Station's current capacity is below its design capacity and that there is no available capacity for the proposed development. Figure 13: Proposed Rerouting of Flow from 390 Waverley Road Pump Station to North Dartmouth Trunk Sewer shows the comparison of upstream flows and pumping station capacities. This information therefore indicates that an upgrade to the 390 Waverley Road pumping station would be required to service any upstream future development. This upgrade should occur before development in the Port Wallace area is undertaken.

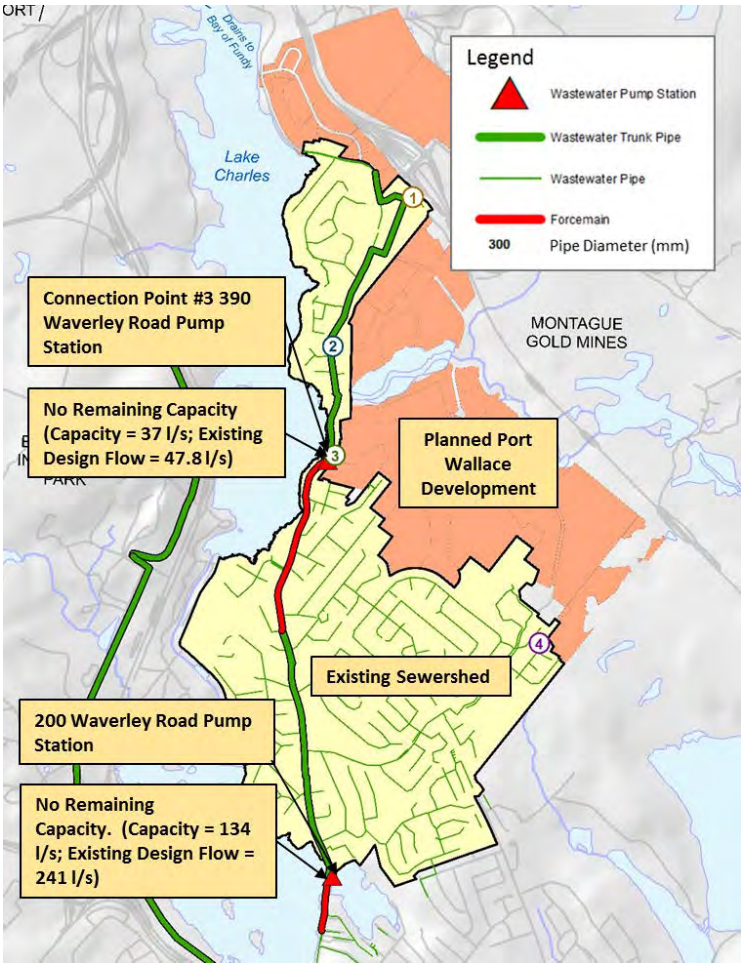


Figure 13: Proposed Rerouting of Flow from 390 Waverley Road Pump Station to North Dartmouth Trunk Sewer

2. Upgrade Wastewater Sewer Pipes at 75% Development of Area 1

If wastewater flows from Contribution Area 1 are directed to the wastewater system upstream of Connection Point 1 and exceed 111 L/s, upgrades to the wastewater system would be required. This upgrade is shown as Phase 2 in Table 5 (also see Figure 14: Proposed Options for Rerouting of Flow from 390 Waverley Road Pump Station).

Table 5: Summary of Required Upgrades to the Existing Sanitary System

PHASE #	PHASE 1	PHASE 2
Connection Point	3	1
Contribution Area(s)	All	1
Developers	Conrad, Port Wallace Holdings Limited, Unia	Conrad
Remaining Capacity (L/s)	0	111
Total Design Flow (L/s)	324.8	148
Percentage of Contribution Area Development at Which Threshold is Reached	0%	75%
Capital Works	1) Replace 390 Waverley Road Pumping Station 2) New forcemain from Pumping Station to North Dartmouth Trunk Sewer. This includes: • New trench under Jaybe Drive and Ethel Court; • Crossing under; Shubenacadie Canal; and • Crossing under Highway 118.	Pipe Upgrade - 350m of 450mm pipe Upstream of Wilcot Lane Note: Only needed if connection is made upstream of Wilcot Lane.

3. Revise Analyses upon Changes to Planned Development

Although it was found that, other than the necessary upgrades mentioned above, the remaining sanitary system has adequate capacity to meet the service demands of the existing area, thresholds at which the capacity of the existing system would be surpassed were still identified throughout the sewer. It was found that several locations would be at or near capacity with full development. For example, sections near capacity at full development include portions of the gravity system between Highway 107 and the 390 Waverley Road Pump Station. Therefore, it is recommended that the flows be reassessed if there are future changes and refinements to the proposed development.

3.3.3 Options for Rerouting Flow from 390 Waverley Road Pump Station

It was shown in the previous section that both the 390 Waverley Road and 200 Waverley Road Pump Stations are under capacity according to the current design standards. Upgrading the 390 Waverley Road Pump Station will increase the amount of flow that has to be carried by the downstream system. It is therefore important to evaluate the available options to convey the increased flows through the downstream system. Figure 14: Proposed Options for Rerouting of Flow from 390 Waverley Road Pump Station shows three potential options that have been investigated:

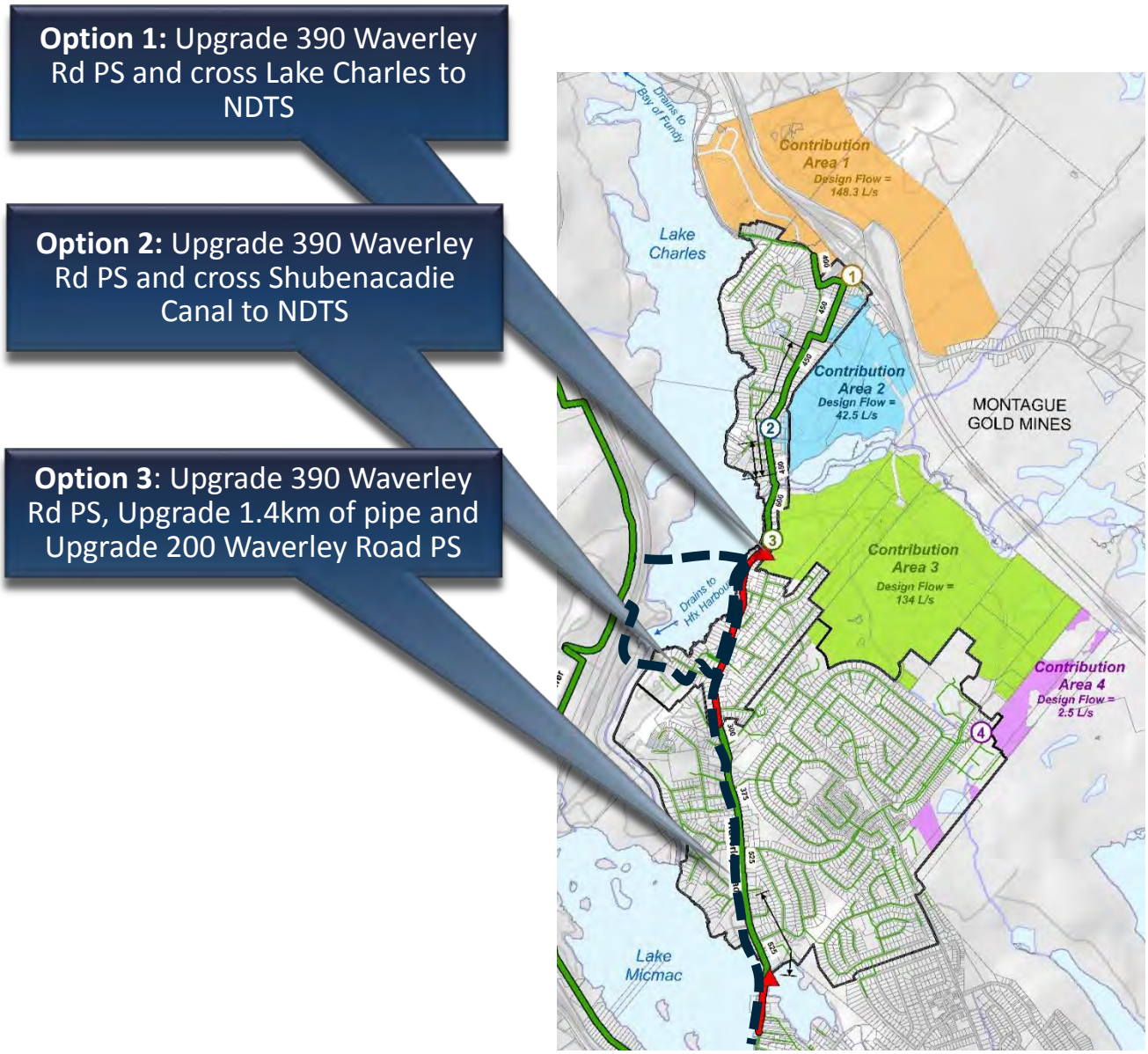


Figure 14: Proposed Options for Rerouting of Flow from 390 Waverley Road Pump Station

1. **Reroute Flow from 390 Waverley Road Pump Station to North Dartmouth Trunk Sewer by Crossing Lake Charles**

This is an option that had been investigated in the Dartmouth Cove Wastewater Management Study (CBCL, 2007) and was promoted as having potentially lower costs than crossing under the Shubenacadie Canal. Halifax Water investigated this option, and made the decision in September 2016 that it was not feasible from an access and maintenance perspective. This option was therefore not pursued further.

2. Reroute Flow from 390 Waverley Road Pump Station to North Dartmouth Trunk Sewer

The capacity analysis revealed that the 200 Waverley Road Pump Station is also under capacity and that several sections of wastewater pipes upstream of the 200 Waverley Road Pump Station are very close to capacity. The capacity analysis was based on published flow calculations in the Halifax Water Design Specification for water, wastewater and stormwater systems 2017 which include a 1.25 safety factor. It is recommended that the 390 Waverley Road Pump Station forcemain be rerouted to the NDTS west, across the Shubie Canal to the North Dartmouth Trunk Sewer on Highway 118.

Redirection of the flow will mean that the 200 Waverley Road Pump Station will not receive flows from proposed Contribution Areas 1-3. Furthermore, the area to be rerouted to the North Dartmouth Trunk Sewer represents 30.2% of the existing sewershed (hatched in Figure 15: Proposed Rerouting of Flow from 390 Waverley Road Pump Station to North Dartmouth Trunk Sewer), which means that approximately 30% of the flows to the 200 Waverley Road Pump Station will be relieved. This decrease in flows will largely offset the additional flow from Contribution Area 4, which will connect at Stanfield Avenue (downstream from the Pump Station at 390 Waverley Road) and will flow to the 200 Waverley Road Pump Station.

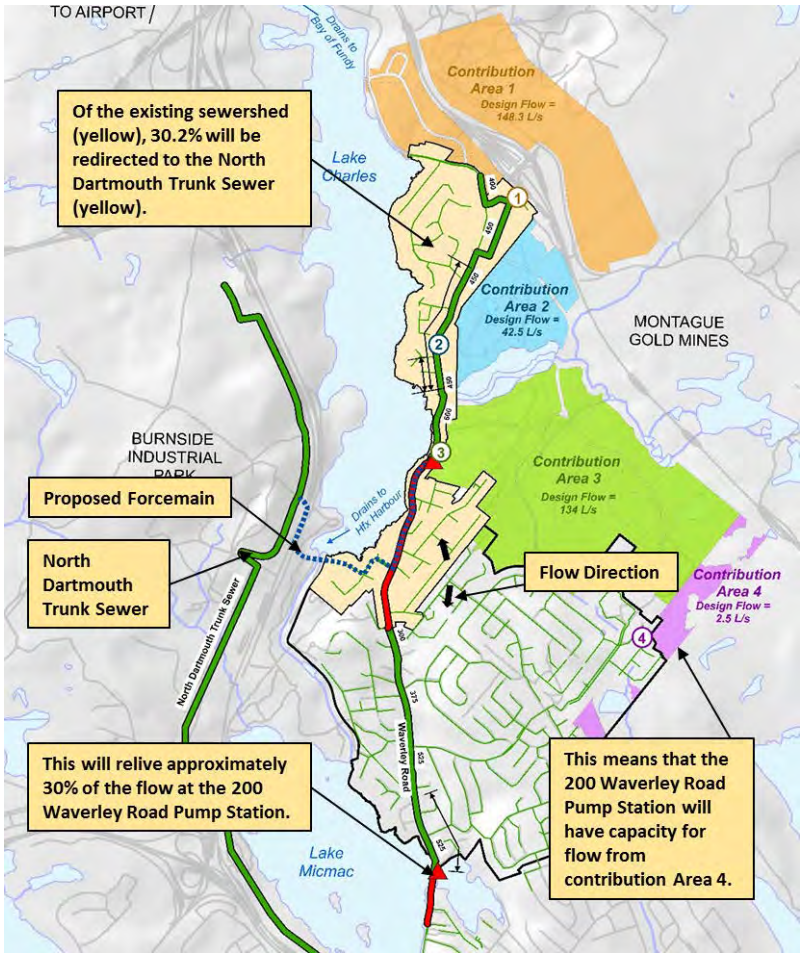


Figure 15: Proposed Rerouting of Flow from 390 Waverley Road Pump Station to North Dartmouth Trunk Sewer

Previous studies have proposed this diversion (e.g. Dartmouth Cove Wastewater Management Study, CBCL Limited, 2007) and have verified that the North Dartmouth Trunk Sewer has capacity to receive wastewater flows from the proposed Port Wallace development (Regional Wastewater Functional Plan, CBCL Limited, 2012).

The upgrade and rerouting of the 390 Waverley Road Pump Station are shown as Phase 1 in Table 5. The table shows that there is 0 l/s remaining capacity and that the upgrade must be completed prior to any development in the Port Wallace Contribution Areas.

3. Upgrade 390 Waverley Rd PS, Upgrade 1.4km of pipe and Upgrade 200 Waverley Road PS

This third option is also potentially feasible and needed to be investigated. Its benefits are that the construction will be simpler and only require an upgrade to existing components, as opposed to acquiring new easements through land owned by the Province and conducting delicate construction work under a river and through a highway. Permitting will be made simpler as well.

The significant drawback of this option is that it involves a very large amount of upgrade work: in addition to upgrading the 390 Waverley Road pumping station (and associated forcemain), the gravity pipe will need to be replaced along 1.4km Waverley Road, and the 200 Waverley Road pumping station (and associated forcemain) will need to be upgraded as well. This is a significantly larger amount of work and its costs far exceed that of option 2.

3.4 Wastewater System Upgrade Cost Sharing Mechanisim

When considering the cost of upgrades, it would be fair to assume that the portion of cost carried by each developer should be equivalent to the gross catchment area that each developer contributes to the system

Another consideration for cost sharing is that the proposed forcemain will cross the Shubenacadie Canal, since a canal crossing may also be required for water, gas and other utilities. The potential for a cost sharing mechanism between these projects should be explored as dates and timelines for each become solidified.

The development of Port Wallace will increase demand on the sanitary system. This will therefore increase operational costs such as pumping demands at lift stations. It is anticipated that these costs will be borne by Halifax Water.

Chapter 4 Stormwater

No stormwater elements have been identified which are considered to warrant capital cost contribution or shared developer cost.

There are several pipes and/or drainage courses which enter the study area from lands upstream. It is the responsibility of each land owner to manage the stormwater on their property. If the mechanism for stormwater conveyance is altered, the developer is responsible to ensure that pre and post development flows are maintained. For example, if stormwater currently flows overland or in a ditch and the developer requests a change to a hard pipe sewer system, some form of stormwater control system would likely be required to offset the reduced time of concentration.

The proposed Port Wallace development area is located within the Lake Charles watershed on the east side of the lake as shown in Figure 16. All stormwater runoff from the proposed development area is currently discharged into Lake Charles, while a portion of the development area first drains into a major watercourse referred to as Barry's Run. Since Lake Charles is a headwater lake that flows in two directions, impacts to water quality or quantity in the lake from the proposed development would be distributed to several other lakes already experiencing the effects of urbanization, and would cascade downstream in a cumulative manner. This is of concern since Fletcher's Lake is a source of drinking water in HRM, and the Shubenacadie River is the source of drinking water to Enfield (Municipality of East Hants), with many individual users drawing their drinking water directly from the river. It is emphasized that the historic gold mining operations and other past uses of the area have resulted in contamination of the soil. Further information can be obtained in the references noted below, as well as the technical appendix to this document. Following the recommendations for stormwater management will be critical to prevent further impacts.

Flooding risks are also a clear concern of a very sensitive nature in the Shubenacadie River system through the Municipality of East Hants, as well as through downtown Dartmouth and the Sullivan's Pond area residents. Protecting Lake Charles and the downstream lakes is further emphasized by the cultural significance and recreational use of the lakes. According to the Shubenacadie Lakes Subwatershed Study (AECOM, 2012), additional water quality objectives should therefore be implemented for the Port Wallace development, including a "no net export of phosphorous" objective. Thus, stormwater management for the Port Wallace development is critical and will require a specific plan to address those issues.

Additional references:

Land Suitability Analysis - Port Wallace Secondary Planning Study Area, WSP, February 23, 2016

Version 4.0Historical gold mining, Montague area, Halifax County, Nova Scotia. P. K. Smith & T. A. Goodwin.

N. S. Department of Natural Resources Open File Map 2009-1, Sheet 28, 200

(http://novascotiagold.ca/theme/exploitation_de_lor-mining/montague-eng.php)

Abandoned escape shaft on the Skerry Mine, Montague Gold District

http://www.novascotia.ca/nse/contaminatedsites/docs/goldminetailingpics.pdf

[1] Nova Scotia Department of Environment, "Historic Gold Mine Tailings".

Accessed Sept 07, 2017. <https://novascotia.ca/nse/contaminatedsites/docs/faq-goldminetailings.pdf.>

Parker, S., McNabb, D, Hartling, P., O'Rielly, G., Skilliter, D. "Consequences of Historical Mining." Virtual Museum of Canada.

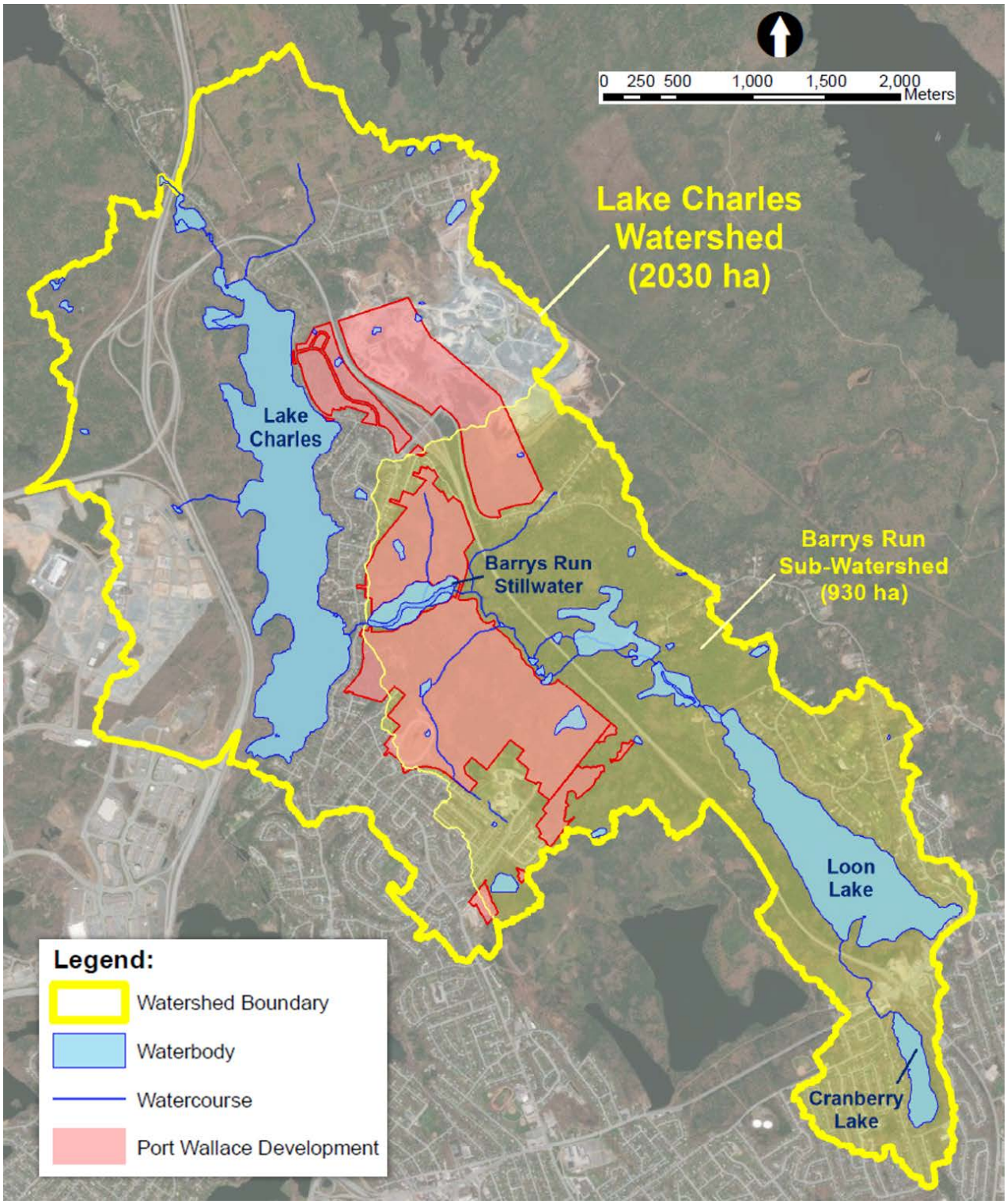


Figure 16: Lake Charles and Barry's Run Watershed Delineation

The use of LID for the Port Wallace development instead of conventional retention ponds will allow for stormwater to infiltrate with a similar amount to pre-development conditions, which will help maintain existing runoff volumes, as well as peak flows, and protect the water quality of the runoff discharged to Lake Charles.

While Halifax Water currently requires all new development to maintain pre-development peak flow rates for stormwater runoff, there are no existing requirements for controlling runoff volumes, which can also increase lake levels (and therefore in this case increase peak flows downstream), erosion risks and resuspension of sediment (that may include contamination) if they are not maintained. Meeting the Halifax Water requirements in this system will therefore entail runoff volume control, which is not provided by detention ponds. Suitable potential stormwater management approaches may include runoff source control practices that aim to mimic the natural hydrology of the watershed, providing water quality treatment and infiltration. This approach to stormwater management is commonly referred to in Canada and the USA as Low Impact Development (LID), Stormwater Best Management Practices (BMPs) or using Green Infrastructure (GI), and are infiltration-based. The use of LID techniques for the Port Wallace development will allow a similar amount of stormwater to infiltrate as during pre-development conditions, which will help maintain existing runoff volumes, peak flows, and protect the water quality of the runoff discharged to Lake Charles.

The proposed Port Wallace development area contains several small watercourses, marshes, swamps and bogs, as well as a major watercourse that discharges to a fen wetland. The major watercourse is referred to as Barry's Run, and the fen wetland is referred to as Barry's Run Stillwater or Summit Reservoir. This reservoir is potentially contaminated due to historic gold mining operations and is also a component of the Shubenacadie Canal System National Historical Civil Engineering Site. Any impacts to the current hydrology, water quality and structure of the reservoir should therefore be avoided due to the risk of contamination as well as its cultural significance. Preservation of the Barry's Run Stillwater can be achieved using LID practices in the upstream development drainage area that achieve the effect of mimicking the natural pre-development hydrology of the watershed.

4.1 Barry's Run Stillwater

According to the Land Suitability Assessment: Port Wallace Secondary Planning Study Area (WSP, 2017), one of the major natural corridors and cultural assets within the proposed Port Wallace development area is the Barry's Run Stillwater or Summit Reservoir. Barry's Run was identified by the Land Suitability Assessment as containing contaminated soils that originate from historic gold mining that are hazardous to human health. The Land Suitability Assessment also states that development in the Barry's Run Stillwater site is "totally constrained" from a cultural assets standpoint due to it being a National Historic Civil Engineering Site, whereas the dam area of the reservoir is expected to become a Registered Archaeological Site by Special Places upon submission of Maritime Archaeological Resource Inventory forms. Furthermore, the Land Suitability Assessment recommends for Barry's Run to be a central open space that provides active and passive recreational activities for the community, and local residents have identified Barry's Run as a significant cultural landmark that possesses intrinsic cultural beauty and value. The Shubenacadie Canal Commission has also expressed concern for the preservation of the dam, and an archaeological assessment carried out by CRM Group in 2014 recommended that no ground disturbance occur within a 10 m buffer of the dam extension.

The existing hydrology and water quality of the Barry's Run Stillwater should therefore be maintained under future development conditions to prevent ground disturbance and preserve the cultural asset.

Increased runoff volumes discharged to the reservoir from future development could increase erosion, disturb contaminated soils, damage existing wetland plants and/or damage the existing dam, and therefore should not be allowed.

Conventional stormwater flow control measures (retention ponds) do not adequately control runoff volumes or water quality since they do not infiltrate stormwater, and they also tend to concentrate pollutants. Thus, source control LID stormwater practices are recommended and may be required for future upstream development to maintain the existing peak flows, runoff volumes and water quality of the runoff discharged to Barry's Run from both private properties and the road right-of-way.

There has been some discussion on the use of Barry's Run Stillwater as a stormwater retention pond for the proposed Port Wallace development. However, due to the above environmental and cultural concerns, it is our recommendation that Barry's Run Stillwater not be converted into a stormwater retention pond. Furthermore, stormwater treatment would still be required upstream of the pond, as the pond would not provide adequate phosphorous treatment.

4.2 Halifax Water Requirements

Stormwater management design will be required to follow the most up-to-date version of the Halifax Water Design Specification for Water, Wastewater and Stormwater Systems (2017). A summary of the key requirements from these standards are as follows:

- → The minor system shall convey the 1 in 5 year storm and the major system shall convey the 1 in 100 year storm event;
- → A stormwater management plan shall be submitted containing design criteria for 1 in 5, 10, 25, 50 and 100 year storm events; and,
- → Peak pre-development runoff rates shall be maintained for the 1 in 2, 1 in 5, 1 in 10 and 1 in 100 year storm events.

It is noted that to adhere to this requirement, this will include no increased risk of flooding in the downstream watersheds. As noted above, this can only be achieved through measures that maintain the current infiltration volumes, such as some LID or green infrastructure.

4.3 Nova Scotia Environment Requirements

Nova Scotia Environment (NSE) currently requires the following for stormwater management in the province:

- → Pre-development peak flows must be maintained under post-development conditions for up to the 1 in 5 year storm event; and
- → For the 1 in 5 year to 1 in 100 year storm events, peak flows cannot creating flooding or cause physical damage to property or structures down gradient of the development site. NSE will accept +/- 10% allowance when balancing pre/post development flows, except where pre-existing flooding conditions exist.

Since the current NSE regulatory requirements for stormwater management are less strict than those imposed by Halifax Water, following Halifax Water specifications will ensure that the NSE regulations are also met.

4.4 Summary of Stormwater Design Criteria for Port Wallace

The following is a summary of the stormwater design criteria required by this Master Plan for the proposed Port Wallace development.

Runoff needs be controlled at its source to prevent accumulation and therefore erosion risks, which precludes the use of detention ponds. Surface water has the potential to put contaminated sediments in suspension and therefore water needs to be infiltrated to prevent an increase in volume, and the use of plant material for filtration and uptake of metals should be encouraged wherever possible.

1. Maintain 1 in 2 year, 1 in 5 year, 1 in 10 year and 1 in 100 year pre-development peak flows and runoff volumes at any discharge point from the development area as well as any point downstream;
2. Preserve the Barry's Run Stillwater as it is unsuitable for stormwater management;
3. Achieve no increase in phosphorous in stormwater runoff by using LID for stormwater management with enhanced nutrient reduction methods;
4. Eliminate the use of detention ponds and promote runoff control at its source;
5. Promote biodiversity and the use of plant material for filtration and uptake of metals, implement wetland and riparian buffer of 20 metres for all development;
6. Include LID stormwater management infrastructure on both private properties and within the road right-of-way; and
7. Encourage the use of LID systems that enhance biodiversity, carbon sequestration, filtration and treatment of other pollutants than phosphorous, notably sediment, nitrogen and substances of concern in the area.

Chapter 5 Potable Water and Fire Suppression

The proposed Port Wallace Development extends from Avenue du Portage north to lands adjacent to Spider Lake Road on both sides of the Forest Hills Parkway, Highway 107. The development falls adjacent to the Burnside High Water Pressure Zone with existing ground elevations ranging from a low of 40 m (130 ft) to a high of 85 m (279 ft). The Burnside High Zone forms part of the East Region Water system which is primarily supplied with water by the Lake Major Water Treatment Plant (WTP).

Where existing infrastructure was found deficient, possible system upgrades necessary to service the development while maintaining the existing level of service today have been identified.

The Lake Major WTP supplies the East Dartmouth Region through a 1,050 mm (42") diameter water transmission main to the Topsail control chamber located at Topsail Lake near Main Street in Dartmouth. From the Topsail chamber, water flows either to the Mount Edward Reservoirs or the Burnside High Zone. The 1,050 mm (42") main continues parallel to Main Street to an interconnection at the former Lake Lamont Pump Station. The interconnection is connected to the Burnside High zone through an existing 600 mm (24") diameter water feedermain starting at Lake Lamont and follows Caledonia Road west to Shubie Park then south along Highway 111 to Ilsley Avenue in Burnside. The Akerley Reservoir floats on the Burnside High Zone and is connected to the zone with a 600 mm (24") diameter main.

This study is intended to establish the minimum water and fire flow service requirements necessary to achieve the Halifax Water design specification within the Port Wallace development. The addition of Port Wallace to the water system will increase water demands. As a result, an analysis of the existing infrastructure has been carried out to understand the impacts of the additional demand. Where existing infrastructure was found deficient, possible system upgrades necessary to service the development, while maintaining the existing level of service, have been identified.

5.1 Port Wallace

Proposed Port Wallace land use and master plans were used to establish likely pipe line routes to service the development. Local distribution mains are assumed to be 200 mm diameter and 300 mm diameter. Through iteration, the pipe size along the Avenue du Portage Extension was established for the development to ensure a suitable level of service for the entire study area.

Assumed potential points of connection to the existing Burnside High Zone are as follows:

→ Existing 600 mm diameter transmission main at intersection of Caledonia Road and Avenue du Portage;
→ Existing 350 mm diameter at 420 Waverley Road;
→ Existing 350 mm diameter at the intersection of Applewood Lane and Waverley Road;
→ Existing 350 mm diameter at 733 Waverley Road;
→ Existing 350 mm diameter at 804 Waverley Road;
→ Existing 300 mm diameter at Marjorie Ann Drive; and
→ Existing 200 mm diameter mains at the end of White Street and Belvedere Dr. and the intersection of Lexington Avenue and Rosecroft Drive.

5.2 Water System Analysis

The water system analysis follows the Halifax Water Design Specifications for Water, Wastewater & Stormwater, 2017 Edition, to establish a desired level of service, including water consumption, fire flows and peaking factors. For the purposes of the study, Halifax Water provided a copy of the water model understood to be representative of the system to 2017. WaterCAD V8i (SELECTSeries 6) was used to model current conditions, future background growth and the addition of Port Wallace. Meetings between Halifax Water and CBCL were held to develop an understanding of current system operation. The outcome from the meetings helped establish the design constraints for evaluating the impact of future growth within the Port Wallace study area and background growth to the existing system.

In addition to the meeting with Halifax Water, CBCL has reviewed previous reports and memos pertaining to the East Region Water System:

→ East Region (Dartmouth) Water Infrastructure Master Plan (July 1999) - Final Report, CBCL Limited;
→ Cost of Servicing Plan, Regional Planning Greenfield Sites (February 2009) - Final Report, CBCL Limited; and
→ Port Wallace: Municipal Services, Pre-Design Baseline Report, September 8 2014, Halifax Water.

Following the issue of the report on November 6, 2017 a meeting was held with stakeholders to review assumptions made in the report. Conrad has confirmed that the maximum service elevation for lands north of Highway 107 is to be 70 m (229 ft). The analysis was redone taking into consideration the revised service elevation.

Subsequent to the stakeholder meeting, a second meeting with Halifax Water and CBCL was coordinated. Discussions during the meeting confirmed that Halifax Water does not intend to establish a reduced pressure zone for the Port Wallace development. However, a reduced zone may be established in the future to address high pressures along Waverley road. Therefore, the analysis should consider an impact to the development should a reduced zone be established in the future.

5.3 Water Demands

CBCL reviewed historical water consumption records. The 99.5 percentile of daily water consumption from 2015 to 2017 was defined as the baseline maximum day demand (MDD) for the study. Port Wallace and background growth water demands have been established based on the background and development growth established in Chapter 1.

Port Wallace water demands have been developed in accordance with Halifax Water Design Specification and are a function of equivalent domestic population with a design average consumption of 410 L/cap/day. Maximum day and minimum hour peaking factors have been calculated based on a weighted average of the land uses. Land use populations have been established as follows, and are shown in Table 6:

→ Domestic:
→ Single Unit: 3.35 people / unit;
→ Semi-detached and Townhouse: 3.35 people / unit;
→ Multi-Unit: 2.25 people per unit;
→ Commercial & Industrial: 45 people / hectare;

→ Institutional; and
→ School: 115 L/student/day (Assumed 1000 students).

Table 6: Port Wallace Design Demands

Water Demand (MLD)	Residential		Comm.	Ind.	Inst.
	Single/ Town House	Multi-Unit			
Average Day Demand (ADD)	2.1	2.1	0.1	1.7	0.1
Maximum Day Factor	1.65	1.3	1.1	1.1	1.1
Maximum Day Demand (MDD)	3.5	2.7	0.1	1.9	0.1
Minimum Hour Factor	0.7	0.84	0.84	0.84	0.84
Minimum Hour Demand (Min HD)	1.5	1.8	0.1	1.4	0.1

Summary of Total Port Wallace Design Demands:
→ Average Day Demand: 6.1 MLD;
→ Maximum Day Demand: 8.1 MLD;
→ Weighted Maximum Day Factor: 1.33;
→ Minimum Hour Demand: 4.8 MLD; and
→ Weighted Min Hour Factor: 0.79.

The East Region maximum day demands under existing conditions and the study horizon are summarized in Table 7.

Table 7: East Region Maximum Day Demand

Demand Allocation Area	Baseline Year	15 year Horizon 2032	30 Year Horizon 2047
East Region MDD (excluding Port Wallace)	42.3 MLD	47.3 MLD	52.9 MLD
Port Wallace MDD	-	4.2 MLD	8.2 MLD
Total East Region MDD	**42.3 MLD**	**51.5 MLD**	**61.1 MLD**

Fire Flow requirements are based on the established Halifax Water Design Specification estimated flows and durations:
→ Domestic;
→ Single Unit: 3,300 L/min for 1.5 hours;
→ Semi-detached and Townhouse: 4,542 L/min for 1.75 hours;
→ Multi-Unit: 13,620 L/min for 3 hours;
→ Commercial & Industrial: 13,620 L/min for 3 hours; and
→ Institutional: 13,620 L/min for 3 hours.

The system should be capable of achieving the desired fire flow for the given land use while maintaining a minimum of 22 psi throughout the system. The above fire flow requirements are guidelines for the purposes of evaluating the system capacity only. Fire Underwriters Survey calculations have not been undertaken at this time.

5.4 Existing East Region Operation

The Mount Edward Reservoirs and the Burnside High Zone are on the same maximum Hydraulic Grade Line (HGL) of 119 m (390 ft). Water is supplied to either the Mount Edward Reservoirs or the Burnside High Zone utilizing the Topsail control chamber. Under typical operation, flow is controlled by Halifax Water to direct water to either the Mount Edward Reservoirs or to the Burnside High Zone or both at the same time. Under a fire flow scenario, it is assumed that water supply from the Lake Major WTP is unavailable, however, the Mount Edward Reservoirs can backfeed and supply the Burnside High Zone. Under these scenarios, it was assumed the Mount Edward Reservoirs are at 115.8 m (380 ft).

The Akerley Reservoir water level varies daily and has a maximum level of 119 m (390 ft) to a low of 115 m (375 ft) and is always available to supply water. For the purposes of the hydraulic analysis, the Akerley Reservoir HGL was assumed to be 115.8 m (380 ft) under all scenarios.

5.5 Hydraulic Modelling Results

A number of model scenarios were generated to establish existing conditions, and impact of future growth, with and without the addition of Port Wallace.

5.5.1 Transmission System Considerations

The model shows that under both current and future maximum day conditions, the Lake Major WTP can supply the Eastern Region system the required maximum day demand while maintaining the Akerley and Mount Edward Reservoirs at the Full Service Level (FSL) of 119 m (390 ft). These results were validated with historical data recorded by the Halifax Water SCADA system. Therefore, the existing transmission system appears sufficient to service the Port Wallace development and regional updates do not appear to be required.

5.5.2 Port Wallace Storage Requirements

The Port Wallace potable water storage requirements are established in accordance with the Atlantic Canada Guidelines for Supply, Treatment, Storage, Distribution and Operating of Drinking Water Supply systems and are a function of MDD and Fire Flow requirements. A summary of the water storage requirements is shown in Table 8.

Table 8: Water Storage Requirements

Item	Requirement
Fire Storage	Required fire flow over required duration (as per IAO – FUS Guidelines and/or as established by the Community's Regulators)
Peak Balancing Storage	25% of maximum day demand
Emergency Storage	25% of fire storage plus peak balancing storage OR 15% of projected average daily design flow

The water storage requirements for Port Wallace are calculated assuming development occurring over a 30 year horizon MDD and a 13,620 L/min fire flow resulting in a required storage volume of 5.7 ML (1.25 MIG).

The primary water storage for the Eastern Region is the Mount Edward Reservoirs at 45 ML and Akerley Reservoir with 36 ML for a total of 81 ML. The total required volume for the Eastern Region for the 30 year

horizon, including Port Wallace and allowing for two fire flow volumes, is 27.2 ML based on the above calculation. Alternatively, storage equivalent to an average day demand may be desirable from an operational perspective. The 30 year ADD is 47.1 ML which is less than current storage volume. Therefore, the total existing storage volume in the Eastern Region appears sufficient for the 30 year demand horizon including the proposed Port Wallace development.

The Akerley Reservoir has sufficient emergency and fire volume storage for future demands. However, peak balance is restricted to the top 4.57 m (15 ft) of the tank and represents a volume of 9 ML. The 30 year demand attributed to the Akerley Reservoir is 32.8 MLD which results in a required peak balance volume of 8.2 ML. Therefore, the Akerley Reservoir has sufficient volume for future growth including Port Wallace.

5.5.3 Port Wallace Internal Distribution

Water distribution mains within Port Wallace are assumed to follow proposed rights-of-way. A new primary watermain to connect the 600 mm diameter Caledonia Road feedermain(s) appears necessary to service the entire development. This primary watermain will also provide redundancy to the exiting 350 mm watermain on Waverley Road. The existing 300 mm diameter watermain along Avenue du Portage is not sufficient to satisfy fire flow requirements at the ends of the development. Therefore, it is assumed that a new watermain paralleling the existing will connect at Caledonia Road and be extended along Avenue du Portage, across Barry's Run and terminating at the existing 350 mm diameter Waverley Road watermain. A primary watermain leg off the Avenue du Portage main to connect to the Conrad Lands north of Highway 107 will also be required. This leg is assumed to connect to the existing 400 mm diameter main crossing Highway 107. All Conrad Lands north east of Highway 107 are understood to be light industrial. It is assumed that the watermain will be looped within Conrad lands with a connection to the existing 300 mm watermain on Marjorie Ann Drive providing a secondary connection.

A new primary watermain to connect the 600 mm diameter Caledonia Road feedermains will be necessary to service the entire development.

Utilizing existing contour information, it would appear that elevations within Port Wallace and along Waverley Road will result in pressures exceeding Halifax Water Design Specification maximums. Halifax Water's preference is to not affect the current level of service for existing customers along Waverley Road and would approve pressures exceeding the maximum pressure range for the Port Wallace development. Halifax Water noted that a pressure zone may be created in the future to address these high pressures and such a zone would not be tied to the development. For the purposes of the analysis, the reduced pressure zone was assumed to have a HGL of 103.6 m (340 ft). The primary watermain within Port Wallace would be excluded from a future zone.

It is understood that construction of Avenue du Portage may precede the initial phases of the development and it assumed that the primary watermain will be constructed at this time. Therefore, construction of the primary watermain may not be driven by buildout of the development. Conrad Lands south of Highway 107 can be serviced off the Waverley Road main.

The modelling shows that the primary watermain along Avenue du Portage should be a minimum of 400 mm diameter to provide an adequate level of service under a fire flow scenario to the proposed Port Wallace development. This primary watermain would also connect to the Conrad lands north of Highway 107. This primary watermain size appears to satisfy hydraulic constraints with or without regional feedermain twinning and/or with or without a future pressure zone. Note that should a pressure zone be implemented in the future,

it appears necessary for local watermain upgrades from 350 mm to 400 mm on Waverley Road from Avenue du Portage connection to the future Conrad Land Connection at 805 Waverley Road. It is assumed that the local watermain upgrades would be covered by Halifax Water under the implementation of the reduced pressure zone should that proceed in the future.

5.5.4 Hydrant Flow Testing Review

Hydrant flow testing was undertaken by Risk Management Services in May of 2016 and provided to CBCL by Port Wallace Holdings Ltd. A summary of the hydrant flow testing results and model outputs as shown in Table 9. The model outputs are based on an assumed Akerley reservoir level of 119 m (390 ft) and the Topsail Feed to the Burnside High Zone closed. System demands were modeled at 50% of current Maximum Day Demand. It would be recommend to collect the data recorded by the Halifax Water PI system during the flow testing to establish the actual baseline conditions at the time of the Hydrant flow testing. However, this is outside of the scope of this study.

Table 9: Hydrant Flow Testing and Model Output

Item	Hydrant Flow Testing			Model Output	
Test #	Flow (L/min)	Static (Pre-test) Pressure (psi)	Residual Pressure (psi)	Static (Pre-test) Pressure (psi)	Residual Pressure (psi)
1	8,750	100	76	99	67
2	6,210	108	99	106	92
3	5,900	100	85	98	89
4	6,820	67	50	72	55
5	6,740	70	56	75	38
6	6,815	68	52	67	43
7	6,360	50	42	52	43

5.6 Water System Analysis Summary

The water system analysis is summarized as follows:

- → The existing Eastern Region water transmission system has sufficient capacity to service future growth, including Port Wallace. Regional upgrades are not required.
- → The existing Eastern Region water service area appears to have sufficient water storage considering the 30 year horizon, including the Port Wallace development;
- → Halifax Water may implement a reduced pressure zone for the low lands along Waverley Road in the future, however, the related infrastructure would not be tied to the development. The primary watermain along Ave du Portage Extension would not fall within the reduced pressure zone.
- → Halifax Water has approved pressures within Port Wallace to exceed design specification maximums;
- → The maximum service elevation within the Conrad Lands north of Highway 107 was confirmed by the developer to be no greater than 70 m (229 feet); and
- → The Port Wallace development can be adequately serviced with a 400 mm diameter primary watermain along the Avenue du Portage Extension.

Refer to Figure 17 for the Port Wallace water system master plan considered in the analysis.

NORTH

SPIDER LAKE RD.

LAKE CHARLES

POSSIBLE LIMITS OF FUTURE REDUCED ZONE

EXISTING AKERLEY RESERVOIR
TWL: 119 m (390 FT)
LWL: 115 m (375 FT)

PROP. PORT WALLACE DEVELOPMENT BOUNDARY

EX. LAKE MAJOR WTP

WAVERLEY RD.

HIGHWAY 118

MONTAGUE RD.

FUTURE CHECK VALVE (TYP.)

PROPOSED 400ø. PRIMARY WATERMAIN

CLOSED VALVE (TYP.)

TRENCHLESS CROSSING

AVE. DU PORTAGE EXT.

FUTURE 107 BYPASS

FUTURE PRV

EX. 600ø

WRIGHT AVE.

BURNSIDE INDUSTRIAL PARK

BURNSIDE DRIVE

DARTMOUTH CROSSING

BREEZE DR.

AVE. DU PORTAGE

FOREST HILLS PARKWAY EXTENSION

SHUBIE PARK

EXISTING 300ø TO REMAIN

CONNECT PROP. 400ø TO EX. 600ø AT CALEDONIA ROAD

LAKE LOON

FUTURE 600ø TRANSMISSION MAIN TWINNING FOR REGIONAL SERVICING

FUTURE 600ø

CALEDONIA RD.

EX. 600ø

LAMONT LAKE

TOPSAIL LAKE

EXISTING 1050ø

TOPSAIL CONTROL CHAMBER

HIGHWAY 111

LAKE MIC MAC

MAIN ST.

EXISTING MT EDWARD RESERVOIRS
TWL: 119 m (390 FT)

POSSIBLE FUTURE 600 TO CONNECT TO EXISTING 1050ø AT LAKE LAMONT

LEGEND

- PROP. WATERMAIN
- PROP. WATERMAIN (250ø AND LESS)
- EX. WATERMAIN (300ø AND LESS)
- EX. WATERMAIN (350ø AND GREATER)
- EX. 1050ø WATERMAIN

CBCL LIMITED
Consulting Engineers

HALIFAX

PORT WALLACE MASTER PLAN
INFRASTRUCTURE STUDY

WATER SYSTEM MASTER PLAN

PROJECT NO.: 171013.00
DATE: JULY 2017

FIGURE
17

5.7 Water System Cost Sharing Mechanisim

The key infrastructure that is recommend for the Port Wallace development is identified on Figure 18 and summarized in Table 10. A proposed cost sharing mechanism along with infrastructure triggers have also been identified.

Estimates for key infrastructure have been included in the Appendix E.

Table 10: Water Infrastructure Phasing and Cost Sharing Mechanism

Water Infrastructure Phasing	Development Trigger	Recommended Cost Sharing Mechanism	
		Municipal	Developer
1.1a – 600 mm diameter Water Transmission Main (Lake Lamont to Ave du Portage)	Regionally Driven	100%	0%
1.1b – 600 mm diameter Water Transmission Main (Ave du Portage to Burnside)	Regionally Driven	100%	0%
1.2a - 400 mm diameter Primary Watermain along Ave du Portage	Construction of Ave du Portage Extension	0%	100% Developer Cost-Shared
1.2b - 400 mm diameter Primary from Ave du Portage to Conrad Lands	Development of PW-2 Lands	0%	100% Developer Cost-Shared
1.2c - 400 mm diameter from Caledonia Road to parallel existing 300 mm	Construction of 1.2a	0%	100% Developer Cost-Shared
1.3a – 300 mm diameter Mains from Waverley Road (base cost for developer)	0 – 10%	0%	100% Developer Cost-Shared
1.4a – 300 mm Conrad Lands Looping (base cost for developer)	Development of PW-2 Lands	0%	100% Developer Cost-Shared
1.4b – 300 mm diameter off Waverley Road to service Conrad Lands (base cost for developer)	Development of PW-1 Lands	0%	100% Developer Cost-Shared
1.5 – 300 mm Diameter connection to Spider Lake Rd (base cost for developer)	Development of PW-2 Lands	0%	100% Developer Cost-Shared

NORTH

SPIDER LAKE RD.

HIGHWAY 118

LAKE CHARLES

WAVERLEY RD.

MONTAGUE RD.

BREEZE DR.

CALEDONIA RD.

WRIGHT AVE.

BURNSIDE DRIVE

BARRY'S RUN

FUTURE 107 BYPASS

FOREST HILLS PARKWAY EXTENSION

AVE. DU PORTAGE EXT.

AVE. DU PORTAGE

BURNSIDE INDUSTRIAL PARK

DARTMOUTH CROSSING

SHUBIE PARK

LAKE MIC MAC

LAKE LOON

TOPSAIL LAKE

1.5 — 300ø

1.4a — CONRAD LANDS — 300ø

1.4b — CONRAD LANDS — 300ø

1.2a — PORT WALLACE HOLDINGS LTD. — 400ø

1.2b — 400ø

1.2a — 300ø

1.3a — PORT WALLACE HOLDINGS LTD. — 300ø

1.3a — PORT WALLACE HOLDINGS LTD. — 300ø

1.2a — 400ø

1.2a — 300ø

1.2a — 300ø

1.2c — 300ø

1.1a — FUTURE 600ø

1.1b — 600ø

PW-1

PW-2

PW-3

PW-4

PW-5

PW-6

PW-7

PW-8

PW-9 — UNIA LANDS

PW-9 — UNIA LANDS

PW-10 — WHEBBY RACE-TRACK LANDS

MAXIMUM GROUND ELEVATION WITHIN CONRAD LANDS NO HIGHER THAN 70 m (229 FT)

PROP. PORT WALLACE DEVELOPMENT BOUNDARY

PROP. 300ø WATERMAIN

EXISTING 400ø HIGHWAY CROSSING

FUTURE CHECK VALVE (TYP.)

FUTURE CLOSED VALVE (TYP.)

ASSUMED FUTURE REDUCED ZONE BOUNDARY

FUTURE PRV ASSUMED HGL = 340 FT

TRENCHLESS CROSSING

FUTURE. 600ø TRANSMISSION MAIN TWINNING FOR REGIONAL SERVICING

CONNECT PROP. 400ø TO EX. 600ø AT CALEDONIA RD.

EX. 300ø TO REMAIN

EX. 600ø

EX. 600ø

EX. 600ø

EX. AKERLEY RESERVOIR
TWL: 119 m (390 FT)

R

LEGEND

- PROP. WATERMAIN (300ø & LARGER)
- PROP. WATERMAIN (250ø & LESS)
- EX. WATERMAIN (LESS THAN 350ø)
- EX. WATERMAIN (350ø & GREATER)
- EX. WATERMAIN (1050ø & GREATER)

No.	Description	Date	By
D	REVISED FOR REISSUED FINAL RPT	15 JAN/18	JAB
C	REVISED FOR FINAL REPORT	27 OCT/17	JAB
B	RE-ISSUED FOR FINAL DRAFT	30 AUG/17	JAB
A	ISSUED FOR DRAFT REPORT	16 AUG/17	JAB

Revision or Issue

HALIFAX

PORT WALLACE MASTER PLAN INFRASTRUCTURE STUDY

WATER SYSTEM MASTER PLAN

HALIFAX

CBCL LIMITED
Consulting Engineers

CBCL No	Contract No	Date	Scale
171013.00		AUG 2017	N.T.S.

Designed	Drawn
JC	BWM
Checked	Approved
	JAB

Sheet No 1 of 1

Drawing No 18

DRAWING NAME: K:\PROJECTS\171013.00 PORT WALLACE MASTER PLAN INFRASTRUCTURE STUDY\20 CAD\01 CIVIL\ARF WATER\171013.00 - BASEPLAN-ARCHD.JC.DWG LAYOUT NAME: 6-2 PLOT DATE: January-19-18 3:21:32 PM CAD OPERATOR: JCAIR

APPENDIX A – Baseline Turning Movements

Port Wallace Master Plan- Infrastructure Study
2017 Existing Volumes - AM Peak Hour (Total)

Note: Total volume includes lights, mediums, articulated trucks , and bicycles

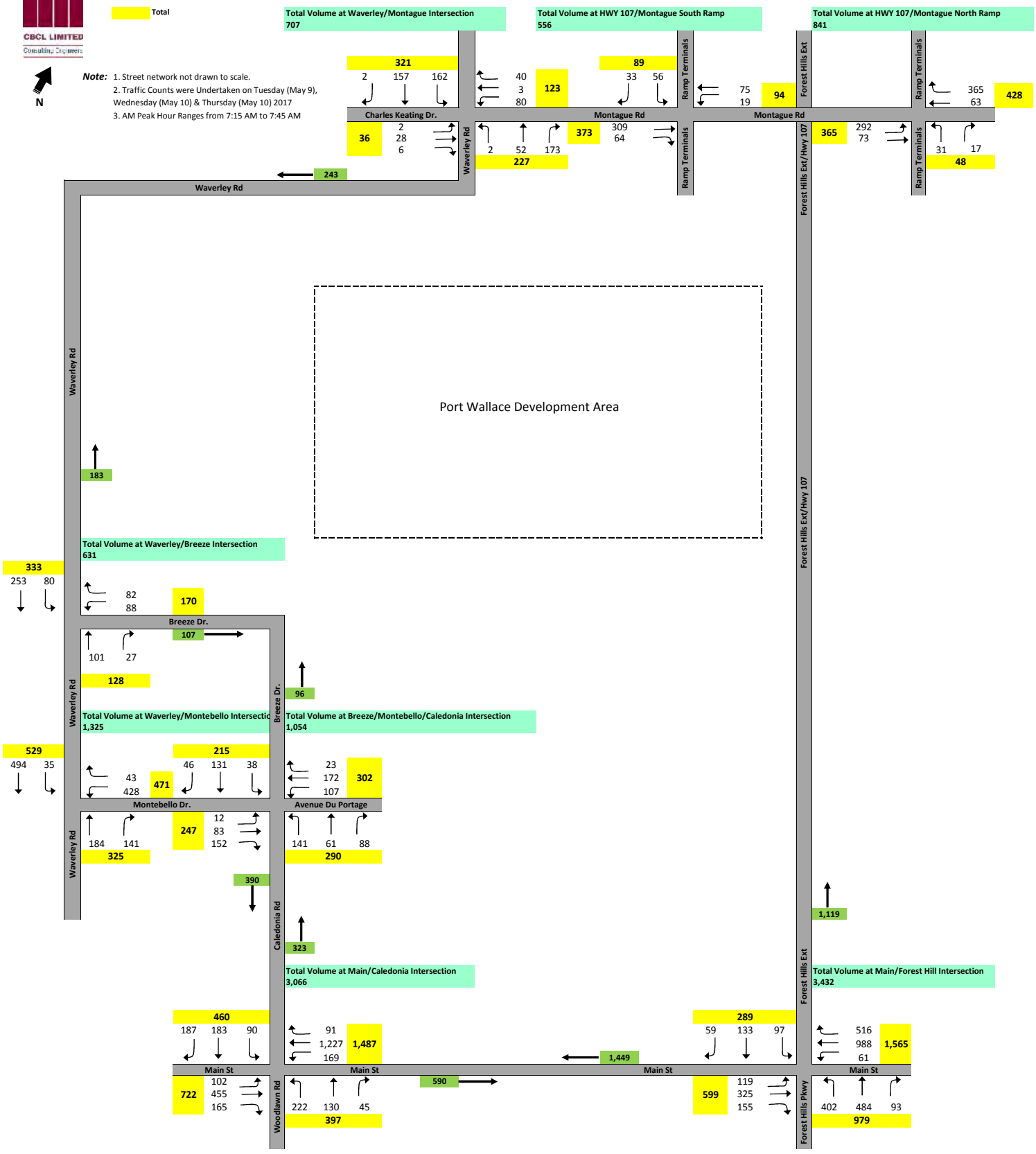
Run ID 1

CBCL LIMITED
Consulting Engineers

Total

Note:
1. Street network not drawn to scale.
2. Traffic Counts were Undertaken on Tuesday (May 9), Wednesday (May 10) & Thursday (May 10) 2017
3. AM Peak Hour Ranges from 7:15 AM to 7:45 AM

N



Port Wallace Master Plan- Infrastructure Study

2017 Existing Volumes - PM Peak Hour (Total)

Note: Total volume includes lights, mediums, articulated trucks , and bicycles

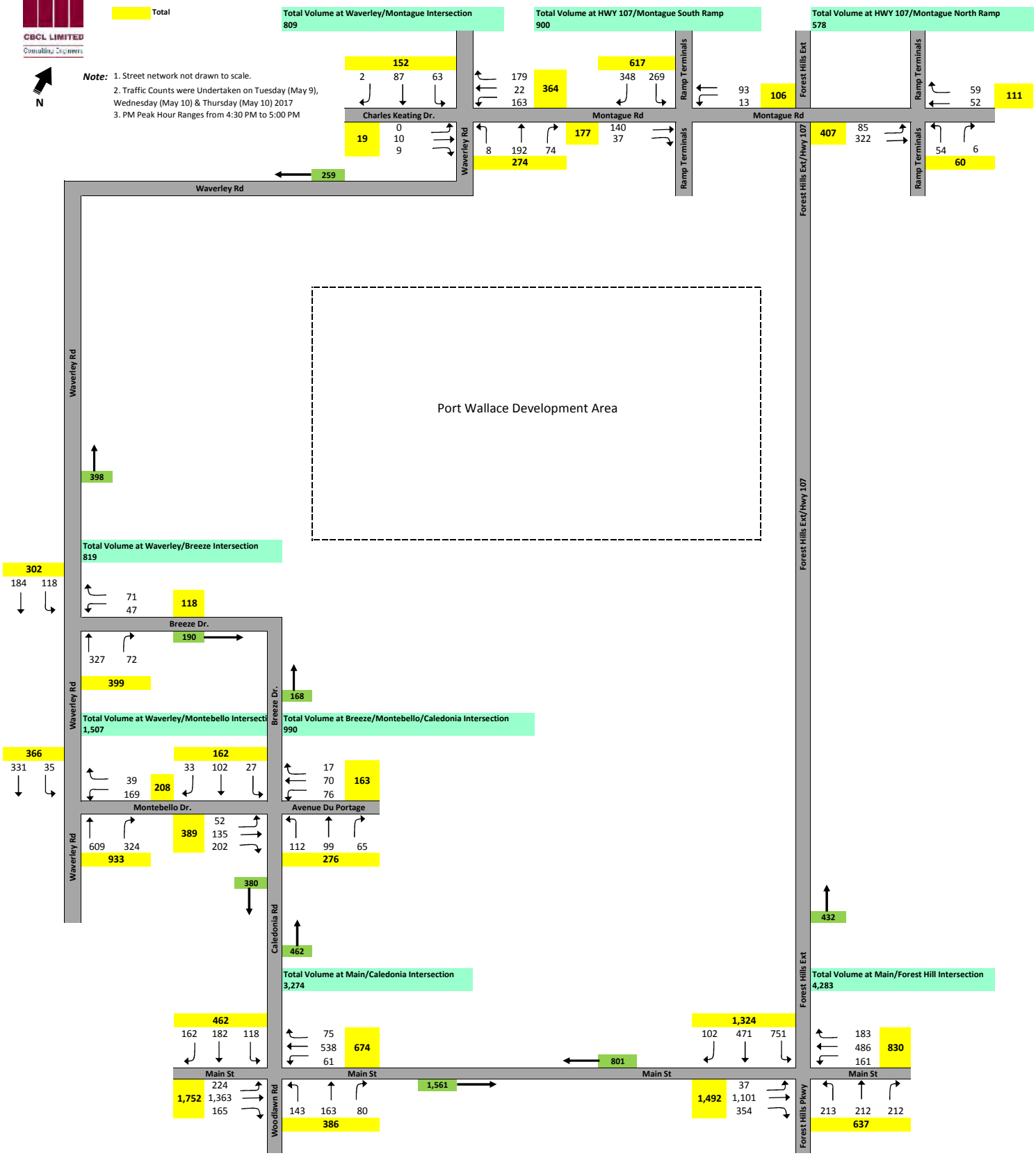
Run ID 2

CBCL LIMITED
Consulting Engineers

Total

Note:
1. Street network not drawn to scale.
2. Traffic Counts were Undertaken on Tuesday (May 9), Wednesday (May 10) & Thursday (May 10) 2017
3. PM Peak Hour Ranges from 4:30 PM to 5:00 PM

N



APPENDIX B – Trip Reduction Rates

Port Wallace Master Plan - Infrastructure Study - 171013.00
2031-Scene 1

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Clayton						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
987 Dwelling Units	Rate	Entering	Exiting	Trips Ent	Trips Ex	Total Trips
AM Peak Hour of Adjacent Street	0.75	25%	75%	186	556	**742**
PM Peak Hour of Adjacent Street	1.00	63%	37%	622	366	**988**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Clayton						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
176 Dwelling Units	Rate	Entering	Exiting	Trips Ent	Trips Ex	Total Trips
AM Peak Hour of Adjacent Street	0.44	17%	83%	14	65	**79**
PM Peak Hour of Adjacent Street	0.52	67%	33%	62	31	**93**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Clayton						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
1,582 Dwelling Units	Rate	Entering	Exiting	Trips Ent	Trips Ex	Total Trips
AM Peak Hour of Adjacent Street	0.51	20%	80%	162	646	**808**
PM Peak Hour of Adjacent Street	0.62	65%	35%	638	344	**982**

Port Wallace Master Plan - Infrastructure Study (Commercial)-Clayton						
ITE Land Use Code 820 (Shopping Center) pages 1562 and 1563						
152,000 sq.ft.	Rate	Entering	Exiting	Trips Ent	Trips Ex	Total Trips
AM Peak Hour of Adjacent Street	0.96	62%	38%	90	55	**146**
PM Peak Hour of Adjacent Street	3.71	48%	52%	271	293	**564**

Port Wallace Master Plan - Infrastructure Study (Institutional)-Clayton						
ITE Land Use Code 520 (Elementary School) pages 988 and 989						
37,674 sq.ft	Rate	Entering	Exiting	Trips Ent	Trips Ex	Total Trips
AM Peak Hour of Adjacent Street	5.20	56%	44%	110	86	**196**
PM Peak Hour of Adjacent Street	1.21	45%	55%	21	25	**46**

Port Wallace Master Plan - Infrastructure Study (Combined Trips)						
ITE Land Use Codes (as shown above)						
	Rate	Entering	Exiting	Trips Ent	Trips Ex	Total Trips
AM Peak Hour of Adjacent Street				**562**	**1409**	**1971**
PM Peak Hour of Adjacent Street				**1613**	**1059**	**2673**
					Check	1971
						2673

Option 1

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in AM Peak Hour	Exiting Trip Reductions in AM Peak Hour	Entering Trips in AM Peak Hour after Reduction				Exiting Trips in AM Peak Hour after Reduction				Total Trips in AM Peak Hour after Reduction
Internal Trips	10%	57	141	407				1027				
Walking/cycling mode share	3%	19	47	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	
Transit mode share	7%	38	94	216	29	163	0	545	72	411	0	1436
Retired residents	2%	12	29									
Working from home	5%	29	71									
Total	27%	155	382									

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in PM Peak Hour	Exiting Trip Reductions in PM Peak Hour	Entering Trips in PM Peak Hour after Reduction				Exiting Trips in PM Peak Hour after Reduction				Total Trips in PM Peak Hour after Reduction
Internal Trips	10%	162	106	1175				771				
Walking/cycling mode share	3%	54	36	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	
Transit mode share	7%	108	71	623	83	471	0	409	54	309	0	1949
Retired residents	2%	33	22									
Working from home	5%	81	53									
Total	27%	438	288									

Option 1A

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in AM Peak Hour	Exiting Trip Reductions in AM Peak Hour	Entering Trips in AM Peak Hour after Reduction				Exiting Trips in AM Peak Hour after Reduction				Total Trips in AM Peak Hour after Reduction
Internal Trips	10%	57	141	407				1027				
Walking/cycling mode share	3%	19	47	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	
Transit mode share	7%	38	94	204	29	155	21	514	72	391	52	1438
Retired residents	2%	12	29									
Working from home	5%	29	71									
Total	27%	155	382									

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in PM Peak Hour	Exiting Trip Reductions in PM Peak Hour	Entering Trips in PM Peak Hour after Reduction				Exiting Trips in PM Peak Hour after Reduction				Total Trips in PM Peak Hour after Reduction
Internal Trips	10%	162	106	1175				771				
Walking/cycling mode share	3%	54	36	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	
Transit mode share	7%	108	71	588	83	447	59	386	54	294	39	1950
Retired residents	2%	33	22									
Working from home	5%	81	53									
Total	27%	438	288									

Port Wallace Master Plan - Infrastructure Study - 171013.00
2047-Scene 2

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Clayton						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
987 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	186	556	**742**
PM Peak Hour of Adjacent Street	1.00	63%	37%	622	366	**988**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Unia Estates						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
64 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	12	36	**48**
PM Peak Hour of Adjacent Street	1.00	63%	37%	41	24	**65**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Whebbys						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
175 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	33	99	**132**
PM Peak Hour of Adjacent Street	1.00	63%	37%	111	65	**176**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-All Developers Total						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
1,226 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				231	691	**922**
PM Peak Hour of Adjacent Street				774	455	**1229**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Clayton						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
176 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	14	65	**79**
PM Peak Hour of Adjacent Street	0.52	67%	33%	62	31	**93**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Conrad						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
28 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	3	11	**14**
PM Peak Hour of Adjacent Street	0.52	67%	33%	10	5	**15**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Unia Estates						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
40 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	3	15	**18**
PM Peak Hour of Adjacent Street	0.52	67%	33%	14	7	**21**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-All Developers Total						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
244 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				20	91	**111**
PM Peak Hour of Adjacent Street				86	43	**129**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Clayton						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
1,582 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	162	646	**808**
PM Peak Hour of Adjacent Street	0.62	65%	35%	638	344	**982**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Conrad						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
468 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	48	191	**239**
PM Peak Hour of Adjacent Street	0.62	65%	35%	189	102	**291**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Unia Estates						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
224 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	23	92	**115**
PM Peak Hour of Adjacent Street	0.62	65%	35%	91	49	**140**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-All Developers Total						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
2,274 **Dwelling Units**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				233	929	**1162**
PM Peak Hour of Adjacent Street				918	495	**1413**

Port Wallace Master Plan - Infrastructure Study (Commercial)-Clayton						
ITE Land Use Code 820 (Shopping Center) pages 1562 and 1563						
152,000 **sq.ft.**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.96	62%	38%	90	55	**146**
PM Peak Hour of Adjacent Street	3.71	48%	52%	271	293	**564**

Port Wallace Master Plan - Infrastructure Study (Institutional)-Clayton						
ITE Land Use Code 520 (Elementary School) pages 988 and 989						
37,674 **sq.ft**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	5.20	56%	44%	110	86	**196**
PM Peak Hour of Adjacent Street	1.21	45%	55%	21	25	**46**

Port Wallace Master Plan - Infrastructure Study (Industrial)						
ITE Land Use Code 110 (General Light Industrial) pages 114 and 113-Fitted Curve						
184 **Acres**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street		85%	15%	689	122	**810**
PM Peak Hour of Adjacent Street		22%	78%	175	620	**795**

Port Wallace Master Plan - Infrastructure Study (Park)-Unia Estates						
ITE Land Use Code 411 (Park) page 693						
3 **Acres**	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	1.89	50%	50%	3	3	**6**
PM Peak Hour of Adjacent Street	1.89	50%	50%	3	3	**6**

Port Wallace Master Plan - Infrastructure Study (Combined Trips)						
ITE Land Use Codes (as shown above)						
	Rate	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				**1376**	**1977**	**3353**
PM Peak Hour of Adjacent Street				**2247**	**1934**	**4182**
					Check	3353
						4182

Option 1

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in AM Peak Hour	Exiting Trip Reductions in AM Peak Hour	Entering Trips in AM Peak Hour after Reduction				Exiting Trips in AM Peak Hour after Reduction				Total Trips in AM Peak Hour after Reduction
Internal Trips	10%	138	198	1003				1442				
Walking/cycling mode share	3%	46	66	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	
Transit mode share	7%	92	132	532	71	402	0	765	101	577	0	2448
Retired residents	2%	28	40									
Working from home	5%	69	99									
Total	**27%**	**373**	**535**									

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in PM Peak Hour	Exiting Trip Reductions in PM Peak Hour	Entering Trips in PM Peak Hour after Reduction				Exiting Trips in PM Peak Hour after Reduction				Total Trips in PM Peak Hour after Reduction
Internal Trips	10%	225	194	1639				1410				
Walking/cycling mode share	3%	75	65	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	
Transit mode share	7%	150	129	869	115	656	0	748	99	565	0	3052
Retired residents	2%	45	39									
Working from home	5%	113	97									
Total	**27%**	**608**	**524**									

Option 1A

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in AM Peak Hour	Exiting Trip Reductions in AM Peak Hour	Entering Trips in AM Peak Hour after Reduction				Exiting Trips in AM Peak Hour after Reduction				Total Trips in AM Peak Hour after Reduction
Internal Trips	10%	138	198	1003				1442				
Walking/cycling mode share	3%	46	66	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	
Transit mode share	7%	92	132	502	71	382	51	722	101	549	73	2451
Retired residents	2%	28	40									
Working from home	5%	69	99									
Total	**27%**	**373**	**535**									

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in PM Peak Hour	Exiting Trip Reductions in PM Peak Hour	Entering Trips in PM Peak Hour after Reduction				Exiting Trips in PM Peak Hour after Reduction				Total Trips in PM Peak Hour after Reduction
Internal Trips	10%	225	194	1639				1410				
Walking/cycling mode share	3%	75	65	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	
Transit mode share	7%	150	129	820	115	623	82	706	99	536	71	3052
Retired residents	2%	45	39									
Working from home	5%	113	97									
Total	**27%**	**608**	**524**									

Option 2

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in AM Peak Hour	Exiting Trip Reductions in AM Peak Hour	Entering Trips in AM Peak Hour after Reduction				Exiting Trips in AM Peak Hour after Reduction				Total Trips in AM Peak Hour after Reduction
Internal Trips	10%	138	198	1003				1442				
Walking/cycling mode share	3%	46	66	Waverley-EW-43%	Waverley-NS-7%	Main St-35%	Forest Hills-15%	Waverley-EW-43%	Waverley-NS-7%	Main St-35%	Forest Hills-15%	
Transit mode share	7%	92	132	432	71	351	151	621	101	505	217	2449
Retired residents	2%	28	40									
Working from home	5%	69	99									
Total	**27%**	**373**	**535**									

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in PM Peak Hour	Exiting Trip Reductions in PM Peak Hour	Entering Trips in PM Peak Hour after Reduction				Exiting Trips in PM Peak Hour after Reduction				Total Trips in PM Peak Hour after Reduction
Internal Trips	10%	225	194	1639				1410				
Walking/cycling mode share	3%	75	65	Waverley-EW-43%	Waverley-NS-7%	Main St-35%	Forest Hills-15%	Waverley-EW-43%	Waverley-NS-7%	Main St-35%	Forest Hills-15%	
Transit mode share	7%	150	129	705	115	574	246	607	99	494	212	3052
Retired residents	2%	45	39									
Working from home	5%	113	97									
Total	**27%**	**608**	**524**									

Port Wallace Master Plan - Infrastructure Study - 171013.00
2047- Scene 3

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Clayton						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
987 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	186	556	**742**
PM Peak Hour of Adjacent Street	1.00	63%	37%	622	366	**988**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Unia Estates						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
64 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	12	36	**48**
PM Peak Hour of Adjacent Street	1.00	63%	37%	41	24	**65**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Whebbys						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
175 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	33	99	**132**
PM Peak Hour of Adjacent Street	1.00	63%	37%	111	65	**176**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-All Developers Total						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
1,226 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				231	691	**922**
PM Peak Hour of Adjacent Street				774	455	**1229**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Clayton						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
176 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	14	65	**79**
PM Peak Hour of Adjacent Street	0.52	67%	33%	62	31	**93**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Conrad						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
28 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	3	11	**14**
PM Peak Hour of Adjacent Street	0.52	67%	33%	10	5	**15**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Unia Estates						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
40 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	3	15	**18**
PM Peak Hour of Adjacent Street	0.52	67%	33%	14	7	**21**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-All Developers Total						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
244 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				20	91	**111**
PM Peak Hour of Adjacent Street				86	43	**129**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Clayton						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
1,582 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	162	646	**808**
PM Peak Hour of Adjacent Street	0.62	65%	35%	638	344	**982**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Conrad						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
468 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	48	191	**239**
PM Peak Hour of Adjacent Street	0.62	65%	35%	189	102	**291**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Unia Estates						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
224 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	23	92	**115**
PM Peak Hour of Adjacent Street	0.62	65%	35%	91	49	**140**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-All Developers Total						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
2,274 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				233	929	**1162**
PM Peak Hour of Adjacent Street				918	495	**1413**

Port Wallace Master Plan - Infrastructure Study (Commercial)-Clayton						
ITE Land Use Code 820 (Shopping Center) pages 1562 and 1563						
152,000 sq.ft.	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.96	62%	38%	90	55	**146**
PM Peak Hour of Adjacent Street	3.71	48%	52%	271	293	**564**

Port Wallace Master Plan - Infrastructure Study (Institutional)-Clayton						
ITE Land Use Code 520 (Elementary School) pages 988 and 989						
87,674 sq.ft	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	5.20	56%	44%	110	86	**196**
PM Peak Hour of Adjacent Street	1.21	45%	55%	21	25	**46**

Port Wallace Master Plan - Infrastructure Study (Industrial)						
ITE Land Use Code 110 (General Light Industrial) pages 114 and 113-Fitted Curve						
184 Acres	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street		85%	15%	689	122	**810**
PM Peak Hour of Adjacent Street		22%	78%	175	620	**795**

Port Wallace Master Plan - Infrastructure Study (Park)-Unia Estates						
ITE Land Use Code 411 (Park) page 693						
3 Acres	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	1.89	50%	50%	3	3	**6**
PM Peak Hour of Adjacent Street	1.89	50%	50%	3	3	**6**

Port Wallace Master Plan - Infrastructure Study (Combined Trips)						
ITE Land Use Codes (as shown above)						
	Rate	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				**1376**	**1977**	**3353**
PM Peak Hour of Adjacent Street				**2247**	**1934**	**4182**

Check	3353
	4182

Option 1

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in AM Peak Hour	Exiting Trip Reductions in AM Peak Hour	Entering Trips in AM Peak Hour after Reduction				Exiting Trips in AM Peak Hour after Reduction				Total Trips in AM Peak Hour after Reduction
Internal Trips	10%	138	198	865				1244				
Walking/cycling mode share	7%	92	132	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	
Transit mode share	13%	184	264	459	61	346	0	660	88	498	0	2112
Retired residents	2%	28	40									
Working from home	5%	69	99									
Total	**37%**	**511**	**733**									

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in PM Peak Hour	Exiting Trip Reductions in PM Peak Hour	Entering Trips in PM Peak Hour after Reduction				Exiting Trips in PM Peak Hour after Reduction				Total Trips in PM Peak Hour after Reduction
Internal Trips	10%	225	194	1414				1217				
Walking/cycling mode share	7%	150	129	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	Waverley-EW-53%	Waverley-NS-7%	Main St-40%	Forest Hills-0%	
Transit mode share	13%	300	258	750	99	566	0	646	86	487	0	2634
Retired residents	2%	45	39									
Working from home	5%	113	97									
Total	**37%**	**833**	**717**									

Option 1A

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in AM Peak Hour	Exiting Trip Reductions in AM Peak Hour	Entering Trips in AM Peak Hour after Reduction				Exiting Trips in AM Peak Hour after Reduction				Total Trips in AM Peak Hour after Reduction
Internal Trips	10%	138	198	865				1244				
Walking/cycling mode share	7%	92	132	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	
Transit mode share	13%	184	264	433	61	329	44	623	88	473	63	2114
Retired residents	2%	28	40									
Working from home	5%	69	99									
Total	**37%**	**511**	**733**									

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in PM Peak Hour	Exiting Trip Reductions in PM Peak Hour	Entering Trips in PM Peak Hour after Reduction				Exiting Trips in PM Peak Hour after Reduction				Total Trips in PM Peak Hour after Reduction
Internal Trips	10%	225	194	1414				1217				
Walking/cycling mode share	7%	150	129	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	Waverley-EW-50%	Waverley-NS-7%	Main St-38%	Forest Hills-5%	
Transit mode share	13%	300	258	708	99	538	71	609	86	463	61	2635
Retired residents	2%	45	39									
Working from home	5%	113	97									
Total	**37%**	**833**	**717**									

Option 2

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in AM Peak Hour	Exiting Trip Reductions in AM Peak Hour	Entering Trips in AM Peak Hour after Reduction				Exiting Trips in AM Peak Hour after Reduction				Total Trips in AM Peak Hour after Reduction
Internal Trips	10%	138	198	865				1244				
Walking/cycling mode share	7%	92	132	Waverley-EW-43%	Waverley-NS-7%	Main St-35%	Forest Hills-15%	Waverley-EW-43%	Waverley-NS-7%	Main St-35%	Forest Hills-15%	
Transit mode share	13%	184	264	372	61	303	130	535	88	436	187	2112
Retired residents	2%	28	40									
Working from home	5%	69	99									
Total	**37%**	**511**	**733**									

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in PM Peak Hour	Exiting Trip Reductions in PM Peak Hour	Entering Trips in PM Peak Hour after Reduction				Exiting Trips in PM Peak Hour after Reduction				Total Trips in PM Peak Hour after Reduction
Internal Trips	10%	225	194	1414				1217				
Walking/cycling mode share	7%	150	129	Waverley-EW-43%	Waverley-NS-7%	Main St-35%	Forest Hills-15%	Waverley-EW-43%	Waverley-NS-7%	Main St-35%	Forest Hills-15%	
Transit mode share	13%	300	258	609	99	495	213	524	86	427	183	2636
Retired residents	2%	45	39									
Working from home	5%	113	97									
Total	**37%**	**833**	**717**									

Port Wallace Master Plan - Infrastructure Study - 171013.00
2047- Scene 4

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Clayton						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
987 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	186	556	**742**
PM Peak Hour of Adjacent Street	1.00	63%	37%	622	366	**988**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Unia Estates						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
64 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	12	36	**48**
PM Peak Hour of Adjacent Street	1.00	63%	37%	41	24	**65**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Whebbys						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
175 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	33	99	**132**
PM Peak Hour of Adjacent Street	1.00	63%	37%	111	65	**176**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-All Developers Total						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
1,226 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				231	691	**922**
PM Peak Hour of Adjacent Street				774	455	**1229**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Clayton						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
176 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	14	65	**79**
PM Peak Hour of Adjacent Street	0.52	67%	33%	62	31	**93**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Conrad						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
28 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	3	11	**14**
PM Peak Hour of Adjacent Street	0.52	67%	33%	10	5	**15**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Unia Estates						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
40 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	3	15	**18**
PM Peak Hour of Adjacent Street	0.52	67%	33%	14	7	**21**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-All Developers Total						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
244 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				20	91	**111**
PM Peak Hour of Adjacent Street				86	43	**129**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Clayton						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
1,582 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	162	646	**808**
PM Peak Hour of Adjacent Street	0.62	65%	35%	638	344	**982**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Conrad						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
468 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	48	191	**239**
PM Peak Hour of Adjacent Street	0.62	65%	35%	189	102	**291**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Unia Estates						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
224 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	23	92	**115**
PM Peak Hour of Adjacent Street	0.62	65%	35%	91	49	**140**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-All Developers Total						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
2,274 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				233	929	**1162**
PM Peak Hour of Adjacent Street				918	495	**1413**

Port Wallace Master Plan - Infrastructure Study (Commercial)-Clayton						
ITE Land Use Code 820 (Shopping Center) pages 1562 and 1563						
152,000 sq.ft.	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.96	62%	38%	90	55	**146**
PM Peak Hour of Adjacent Street	3.71	48%	52%	271	293	**564**

Port Wallace Master Plan - Infrastructure Study (Institutional)-Clayton						
ITE Land Use Code 520 (Elementary School) pages 988 and 989						
87,674 sq.ft	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	5.20	56%	44%	110	86	**196**
PM Peak Hour of Adjacent Street	1.21	45%	55%	21	25	**46**

Port Wallace Master Plan - Infrastructure Study (Industrial)						
ITE Land Use Code 110 (General Light Industrial) pages 114 and 113-Fitted Curve						
184 Acres	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street		85%	15%	689	122	**810**
PM Peak Hour of Adjacent Street		22%	78%	175	620	**795**

Port Wallace Master Plan - Infrastructure Study (Park)-Unia Estates						
ITE Land Use Code 411 (Park) page 693						
3 Acres	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	1.89	50%	50%	3	3	**6**
PM Peak Hour of Adjacent Street	1.89	50%	50%	3	3	**6**

Port Wallace Master Plan - Infrastructure Study (Combined Trips)						
ITE Land Use Codes (as shown above)						
	Rate	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				**1376**	**1977**	**3353**
PM Peak Hour of Adjacent Street				**2247**	**1934**	**4182**

Check	3353
	4182

Option 3A

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in AM Peak Hour	Exiting Trip Reductions in AM Peak Hour	Entering Trips in AM Peak Hour after Reduction				Exiting Trips in AM Peak Hour after Reduction				Total Trips in AM Peak Hour after Reduction
Internal Trips	10%	138	198	1003				1442				
Walking/cycling mode share	3%	46	66	Waverley-EW-50%	Waverley-NS-10%	Main St-40%	Forest Hills-0%	Waverley-EW-50%	Waverley-NS-10%	Main St-40%	Forest Hills-0%	
Transit mode share	7%	92	132	502	101	402	0	722	145	577	0	2449
Retired residents	2%	28	40									
Working from home	5%	69	99									
Total	27%	373	535									

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in PM Peak Hour	Exiting Trip Reductions in PM Peak Hour	Entering Trips in PM Peak Hour after Reduction				Exiting Trips in PM Peak Hour after Reduction				Total Trips in PM Peak Hour after Reduction
Internal Trips	10%	225	194	1639				1410				
Walking/cycling mode share	3%	75	65	Waverley-EW-50%	Waverley-NS-10%	Main St-40%	Forest Hills-0%	Waverley-EW-50%	Waverley-NS-10%	Main St-40%	Forest Hills-0%	
Transit mode share	7%	150	129	820	164	656	0	706	142	565	0	3053
Retired residents	2%	45	39									
Working from home	5%	113	97									
Total	27%	608	524									

Port Wallace Master Plan - Infrastructure Study - 171013.00
2047-Scene 5

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Clayton						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
987 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	186	556	**742**
PM Peak Hour of Adjacent Street	1.00	63%	37%	622	366	**988**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Unia Estates						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
64 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	12	36	**48**
PM Peak Hour of Adjacent Street	1.00	63%	37%	41	24	**65**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-Whebbys						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
175 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.75	25%	75%	33	99	**132**
PM Peak Hour of Adjacent Street	1.00	63%	37%	111	65	**176**

Port Wallace Master Plan - Infrastructure Study (Residential-Single Unit)-All Developers Total						
ITE Land Use Code 210 (Single-family Detached Housing) pages 297 and 298						
1,226 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				231	691	**922**
PM Peak Hour of Adjacent Street				774	455	**1229**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Clayton						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
176 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	14	65	**79**
PM Peak Hour of Adjacent Street	0.52	67%	33%	62	31	**93**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Conrad						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
28 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	3	11	**14**
PM Peak Hour of Adjacent Street	0.52	67%	33%	10	5	**15**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-Unia Estates						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
40 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.44	17%	83%	3	15	**18**
PM Peak Hour of Adjacent Street	0.52	67%	33%	14	7	**21**

Port Wallace Master Plan - Infrastructure Study (Residential-Town House)-All Developers Total						
ITE Land Use Code 230 (Residential Condominium/Townhouse) pages 395 and 396						
244 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				20	91	**111**
PM Peak Hour of Adjacent Street				86	43	**129**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Clayton						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
1,582 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	162	646	**808**
PM Peak Hour of Adjacent Street	0.62	65%	35%	638	344	**982**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Conrad						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
468 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	48	191	**239**
PM Peak Hour of Adjacent Street	0.62	65%	35%	189	102	**291**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-Unia Estates						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
224 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.51	20%	80%	23	92	**115**
PM Peak Hour of Adjacent Street	0.62	65%	35%	91	49	**140**

Port Wallace Master Plan - Infrastructure Study (Residential-Multi Unit)-All Developers Total						
ITE Land Use Code 220 (Apartment) pages 334 and 335						
2,274 Dwelling Units	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				233	929	**1162**
PM Peak Hour of Adjacent Street				918	495	**1413**

Port Wallace Master Plan - Infrastructure Study (Commercial)-Clayton						
ITE Land Use Code 820 (Shopping Center) pages 1562 and 1563						
152,000 sq.ft.	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	0.96	62%	38%	90	55	**146**
PM Peak Hour of Adjacent Street	3.71	48%	52%	271	293	**564**

Port Wallace Master Plan - Infrastructure Study (Institutional)-Clayton						
ITE Land Use Code 520 (Elementary School) pages 988 and 989						
87,674 sq.ft	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	5.20	56%	44%	110	86	**196**
PM Peak Hour of Adjacent Street	1.21	45%	55%	21	25	**46**

Port Wallace Master Plan - Infrastructure Study (Industrial)						
ITE Land Use Code 110 (General Light Industrial) pages 114 and 113-Fitted Curve						
184 Acres	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street		85%	15%	689	122	**810**
PM Peak Hour of Adjacent Street		22%	78%	175	620	**795**

Port Wallace Master Plan - Infrastructure Study (Park)-Unia Estates						
ITE Land Use Code 411 (Park) page 693						
3 Acres	**Rate**	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street	1.89	50%	50%	3	3	**6**
PM Peak Hour of Adjacent Street	1.89	50%	50%	3	3	**6**

Port Wallace Master Plan - Infrastructure Study (Combined Trips)						
ITE Land Use Codes (as shown above)						
	Rate	**Entering**	**Exiting**	**Trips Ent**	**Trips Ex**	**Total Trips**
AM Peak Hour of Adjacent Street				**1376**	**1977**	**3353**
PM Peak Hour of Adjacent Street				**2247**	**1934**	**4182**

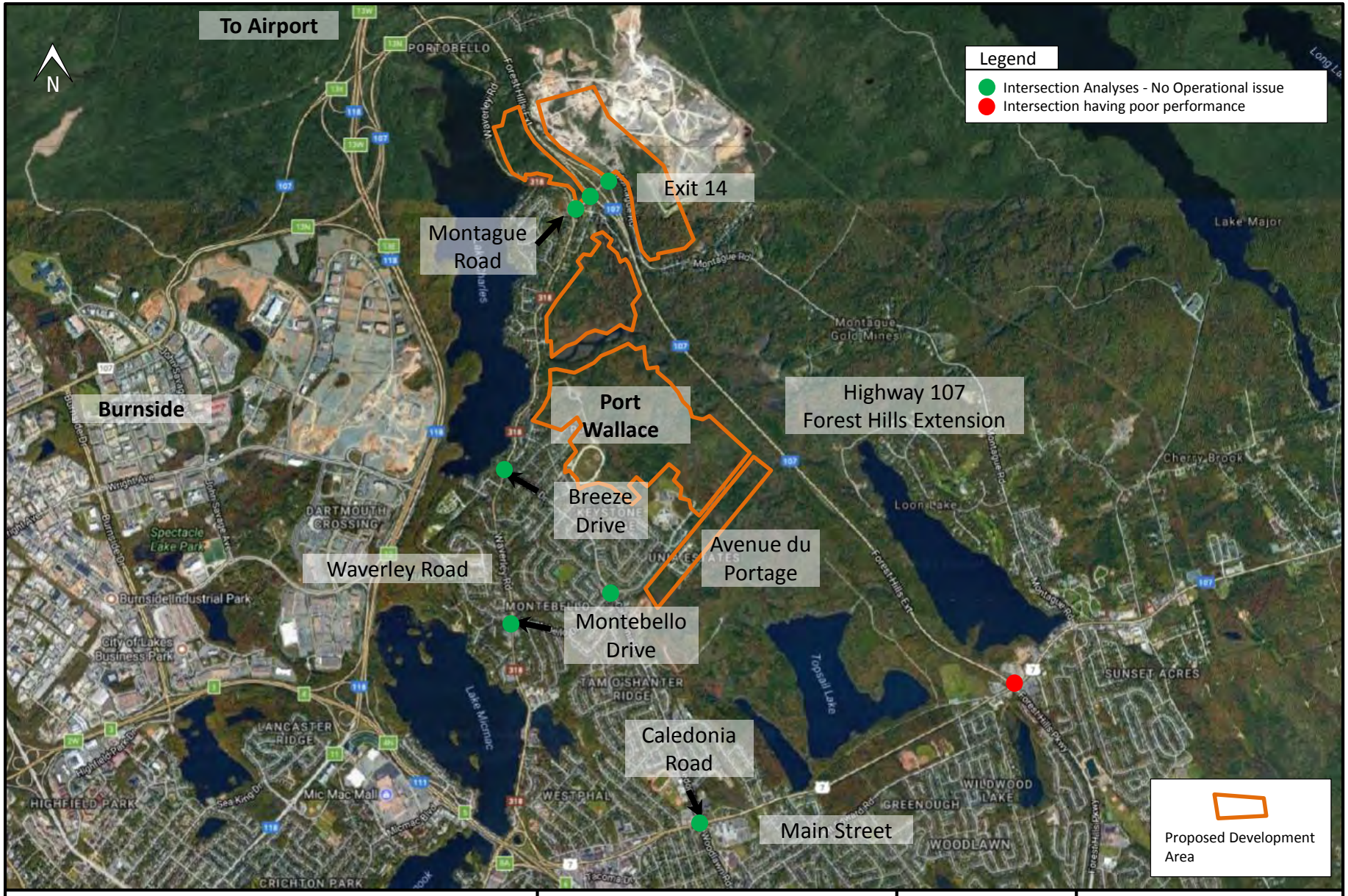
Check	3353
	4182

Option 3B

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in AM Peak Hour	Exiting Trip Reductions in AM Peak Hour	Entering Trips in AM Peak Hour after Reduction				Exiting Trips in AM Peak Hour after Reduction				Total Trips in AM Peak Hour after Reduction
Internal Trips	10%	138	198	1003				1442				
Walking/cycling mode share	3%	46	66	Waverley-EW-35%	Waverley-NS-10%	Main St-35%	Forest Hills-20%	Waverley-EW-35%	Waverley-NS-10%	Main St-35%	Forest Hills-20%	
Transit mode share	7%	92	132	351	101	351	201	505	145	505	289	2448
Retired residents	2%	28	40									
Working from home	5%	69	99									
Total	27%	373	535									

Anticipated Trip Reduction Category	Trip Reduction Rates	Entering Trip Reductions in PM Peak Hour	Exiting Trip Reductions in PM Peak Hour	Entering Trips in PM Peak Hour after Reduction				Exiting Trips in PM Peak Hour after Reduction				Total Trips in PM Peak Hour after Reduction
Internal Trips	10%	225	194	1639				1410				
Walking/cycling mode share	3%	75	65	Waverley-EW-35%	Waverley-NS-10%	Main St-35%	Forest Hills-20%	Waverley-EW-35%	Waverley-NS-10%	Main St-35%	Forest Hills-20%	
Transit mode share	7%	150	129	574	164	574	328	494	142	494	283	3053
Retired residents	2%	45	39									
Working from home	5%	113	97									
Total	27%	608	524									

APPENDIX C – Level of Service (LoS) Analysis



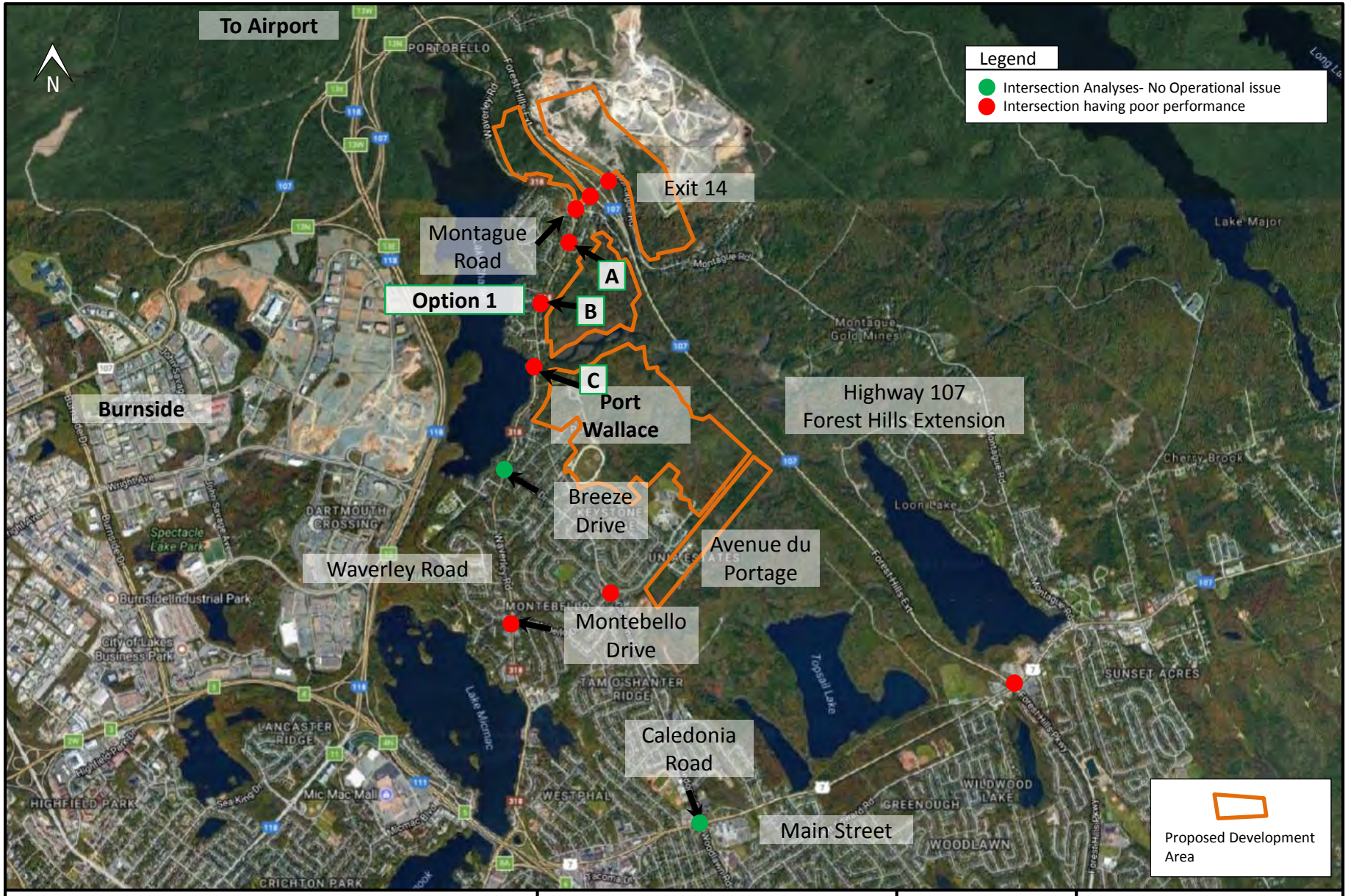
CBCL LIMITED
Consulting Engineers
ISO 9001 CERTIFIED

HALIFAX

Port Wallace Master Plan
Final Report

Project No.: 171013.00
Date: November 2017

Figure C1
LOS Table 1
2017 - Existing



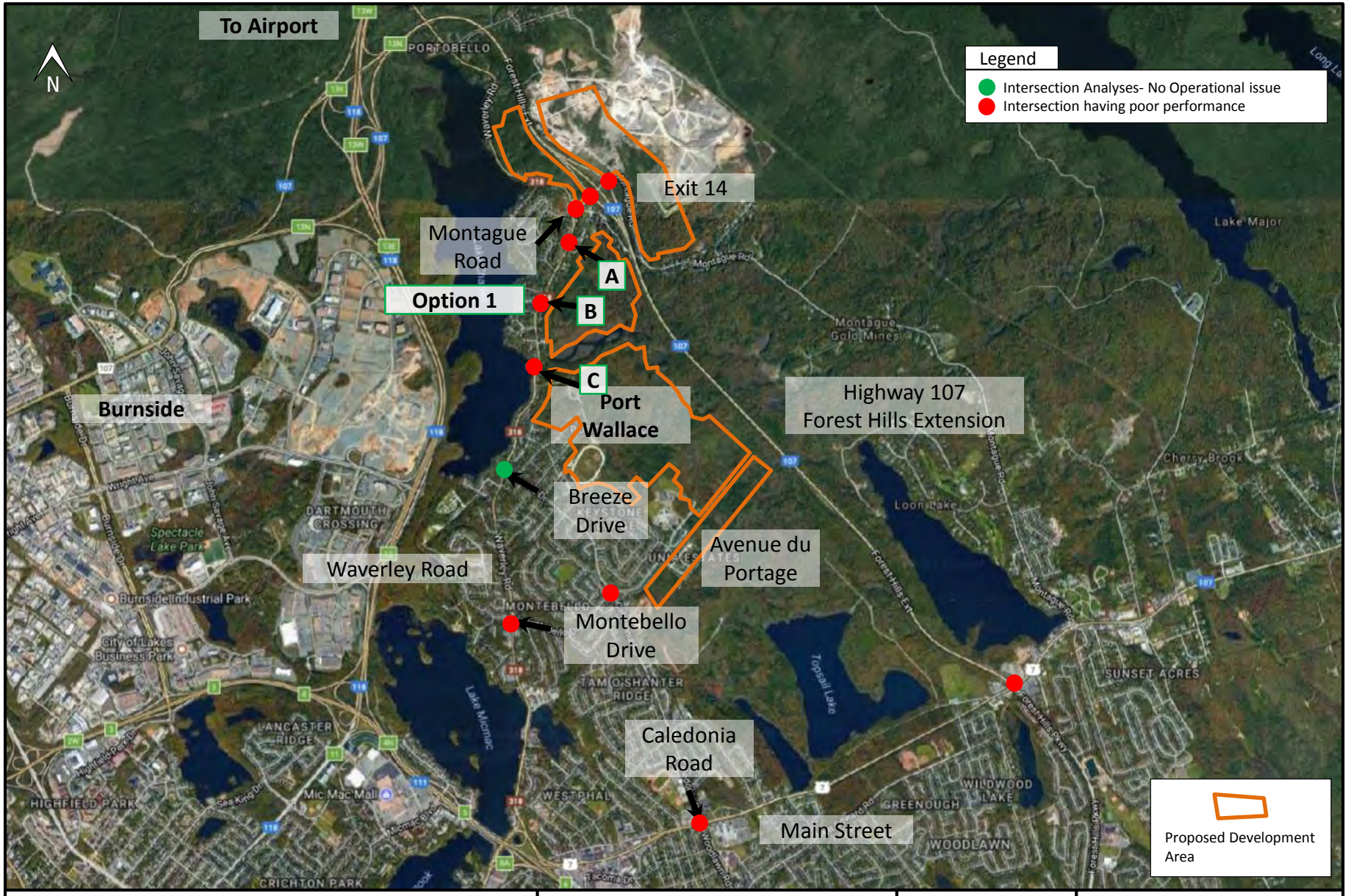
CBCL LIMITED
Consulting Engineers
ISO 9001 CERTIFIED

HALIFAX

Port Wallace Master Plan
Final Report

Project No.: 171013.00
Date: November 2017

Figure C2
LOS Table 2
2031 - 1% GR - Option 1-
50% Buildout - 10% NAMC



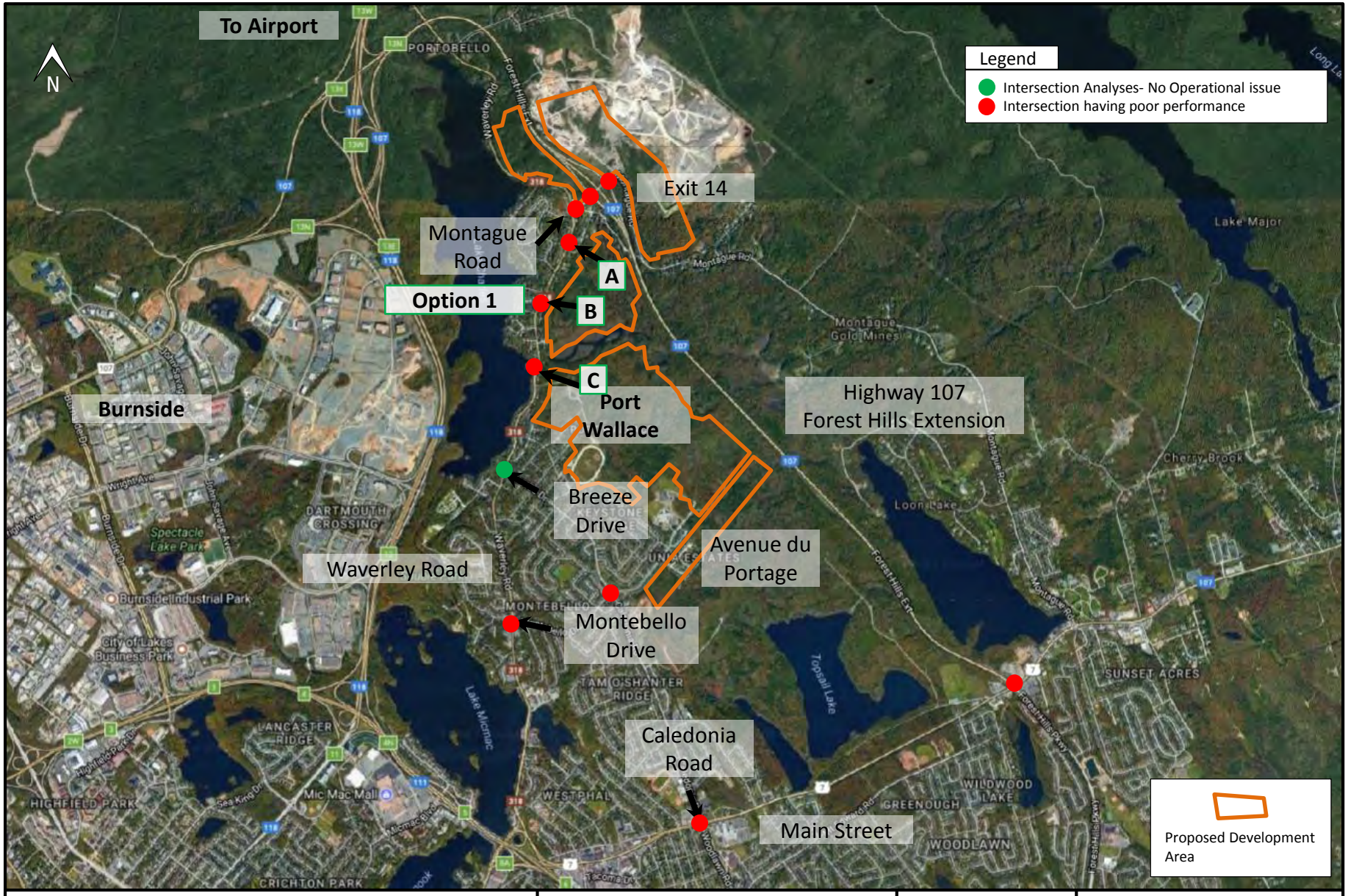
CBCL LIMITED
Consulting Engineers
ISO 9001 CERTIFIED

HALIFAX

Port Wallace Master Plan
Final Report

Project No.: 171013.00
Date: November 2017

Figure C3
LOS Table 4
2047 - 0.75% GR - Option 1-
Full Buildout - 10% NAMC



CBCL LIMITED
Consulting Engineers
ISO 9001 CERTIFIED

HALIFAX

Port Wallace Master Plan
Final Report

Project No.: 171013.00
Date: November 2017

Figure C4
LOS Table 7
2047 - 0.75% GR - Option 1-
Full Buildout - 20% NAMC

APPENDIX D – Synchro and Arcady Model Outputs

Table 1 - Synchro Analysis Results: 2017 Baseline Volumes & Existing Street Network

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	9.1	0.30	9.7	A	1.4	0.07	7.6	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	5.6	0.21	22.6	C	4.2	0.16	15.1	C
	Overall			**4.7**	**A**			**2.7**	**A**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right								
	WB Left/Thru	0.7	0.02	8.2	A	0.0	0.01	7.6	A
	SB Left/Thru/Right	4.2	0.16	12.1	B	70.7	0.85	29.0	D
	Overall			**2.2**	**A**			**20.0**	**C**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	2.8	0.13	18.1	C	0.7	0.04	11.6	B
	WB Left/Thru	9.8	0.33	23.8	C	17.5	0.48	20.7	C
	WB Right	1.4	0.05	9.3	A	7.0	0.25	11.1	B
	NB Left/Thru/Right	0.0	0.00	7.6	A	0.0	0.01	7.4	A
	SB Left	3.5	0.14	8.2	A	1.4	0.06	8.0	A
	SB Thru/Right				A				A
	Overall			**6.1**	**A**			**8.2**	**A**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	9.8	0.33	14.2	B	9.1	0.31	17.5	C
	NB Thru/Right				A				A
	SB Left/Thru	1.4	0.06	7.7	A	2.8	0.12	8.7	A
	Overall			**4.8**	**A**			**3.8**	**A**
Montebello & Waverley [24] (Signalized)	WB Left	86.8	0.68	21.0	C	50.0	0.60	38.0	D
	WB Right	5.7	0.07	4.9	A	8.1	0.13	10.8	B
	NB Thru/Right	47.9	0.52	14.5	B	234.2	0.89	22.1	C
	SB Left	8.5	0.12	13.4	B	9.1	0.29	12.9	B
	SB Thru	91.5	0.78	24.9	C	38.3	0.30	6.8	A
	Overall			**20.2**	**C**			**20.0**	**B**
Main & Forest Hills [56] (Signalized)	EB Left	49.6	0.69	42.6	D	11.8	0.11	19.3	B
	EB Thru	51.3	0.25	29.7	C	226.8	1.02	74.3	E
	EB Right	0.0	0.11	0.7	A	0.0	0.25	0.4	A
	WB Left	19.1	0.13	20.4	C	54.2	0.76	48.5	D
	WB Thru	176.5	0.79	44.6	D	69.3	0.38	30.0	C
	WB Right	0.0	0.37	0.7	A	0.0	0.13	0.2	A
	NB Left	71.8	0.48	46.2	D	42.8	0.50	56.3	E
	NB Thru	237.5	1.07	109.1	F	107.4	0.92	94.1	F
	NB Right	0.0	0.06	0.1	A	0.0	0.15	0.2	A
	SB Left	23.6	0.28	59.3	E	151.6	0.97	73.0	E
	SB Thru	62.9	0.71	79.5	E	223.5	1.12	124.6	F
	SB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	Overall			**43.2**	**D**			**58.5**	**E**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	22.2	0.52	20.1	C	40.8	0.45	12.3	B
	EB Thru	53.6	0.28	19.5	B	210.9	0.75	25.7	C
	EB Right	0.0	0.12	0.2	A	0.0	0.11	0.1	A
	WB Left	32.4	0.33	12.1	B	12.8	0.35	15.2	B
	WB Thru	184.2	0.73	28.1	C	70.3	0.33	20.6	C
	WB Right	0.0	0.06	0.1	A	0.0	0.05	0.1	A
	NB Left	76.4	0.82	58.8	E	47.7	0.60	46.6	D
	NB Thru	43.5	0.27	36.5	D	64.1	0.62	59.8	E
	NB Right	0.0	0.03	0.0	A	0.0	0.06	0.1	A
	SB Left	40.5	0.53	60.4	E	40.1	0.46	40.9	D
	SB Thru	72.1	0.70	65.2	E	71.4	0.70	64.3	E
	SB Right	0.0	0.13	0.2	A	0.0	0.11	0.1	A
	Overall			**26.9**	**C**			**25.3**	**C**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	2.5	0.47	14.7	B	35.7	0.67	19.2	C
	WB Left/Thru/Right	3.9	0.60	18.6	C	9.8	0.32	12.4	B
	NB Left/Thru/Right	3.5	0.57	17.6	C	21.0	0.52	15.6	C
	SB Left/Thru/Right	2.2	0.44	14.6	B	9.8	0.32	12.3	B
	Overall			**16.6**	**C**			**15.9**	**C**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access A & Waverley [87] (Unsignalized)	WB Left/Right				A				A
	NB Thru/Right				A				A
	SB Left/Thru				A				A
	Overall				**A**				**A**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 12 - Synchro Analysis Results: 2031 Volumes & Existing Street Network, 1% Growth, No Developement

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	11.9	0.37	10.5	B	1.4	0.08	7.7	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	9.1	0.32	32.1	D	5.6	0.21	17.4	C
	Overall			**5.5**	**A**			**2.9**	**A**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right								
	WB Left/Thru	0.7	0.02	8.4	A	0.0	0.01	7.7	A
	SB Left/Thru/Right	5.6	0.20	13.1	B	126.7	1.02	60.4	F
	Overall			**2.4**	**A**			**41.5**	**E**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	4.2	0.17	21.5	C	0.7	0.05	12.3	B
	WB Left/Thru	16.1	0.47	34.2	D	28.0	0.62	28.9	D
	WB Right	1.4	0.06	9.4	A	9.1	0.31	11.9	B
	NB Left/Thru/Right	0.0	0.00	7.6	A	0.0	0.01	7.5	A
	SB Left	4.2	0.16	8.4	A	1.4	0.07	8.2	A
	SB Thru/Right				A				A
	Overall			**7.6**	**A**			**10.2**	**B**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	14.0	0.42	16.7	C	14.7	0.43	22.6	C
	NB Thru/Right				A				A
	SB Left/Thru	1.4	0.07	7.8	A	3.5	0.14	9.0	A
	Overall			**5.5**	**A**			**4.6**	**A**
Montebello & Waverley [24] (Signalized)	WB Left	133.1	0.73	25.6	C	57.2	0.72	48.4	D
	WB Right	6.7	0.07	5.3	A	8.9	0.15	10.1	B
	NB Thru/Right	56.5	0.58	17.0	B	295.0	0.96	32.3	C
	SB Left	9.3	0.16	14.3	B	22.8	0.53	37.2	D
	SB Thru	109.4	0.87	33.0	C	44.8	0.33	7.0	A
	Overall			**25.3**	**C**			**28.1**	**C**
Main & Forest Hills [56] (Signalized)	EB Left	72.1	0.83	64.6	E	13.4	0.14	19.7	B
	EB Thru	59.5	0.30	32.1	C	278.7	1.20	137.4	F
	EB Right	0.0	0.13	0.2	A	0.0	0.29	0.5	A
	WB Left	21.4	0.17	21.1	C	72.7	0.83	57.0	E
	WB Thru	228.8	0.94	57.0	E	80.6	0.44	31.1	C
	WB Right	0.0	0.42	0.8	A	0.0	0.15	0.2	A
	NB Left	82.7	0.55	47.8	D	48.5	0.56	57.8	E
	NB Thru	287.4	1.23	163.1	F	129.4	1.04	120.2	F
	NB Right	0.0	0.07	0.1	A	0.0	0.17	0.2	A
	SB Left	26.3	0.30	59.0	E	187.0	1.12	115.9	F
	SB Thru	71.7	0.77	83.5	F	268.0	1.30	190.3	F
	SB Right	0.0	0.05	0.1	A	0.0	0.08	0.1	A
	Overall			**55.7**	**E**			**91.3**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	42.5	0.70	44.0	D	49.7	0.57	15.4	B
	EB Thru	62.2	0.33	20.9	C	299.3	0.89	34.0	C
	EB Right	0.0	0.13	0.2	A	0.0	0.13	0.2	A
	WB Left	37.1	0.42	14.0	B	21.7	0.45	25.6	C
	WB Thru	246.6	0.87	35.4	D	88.1	0.40	24.0	C
	WB Right	0.0	0.07	0.1	A	0.0	0.06	0.1	A
	NB Left	106.6	0.97	87.7	F	52.6	0.70	50.9	D
	NB Thru	49.5	0.30	36.0	D	71.7	0.65	59.2	E
	NB Right	0.0	0.04	0.0	A	0.0	0.06	0.1	A
	SB Left	45.4	0.57	60.8	E	44.1	0.54	41.9	D
	SB Thru	82.8	0.75	66.2	E	79.8	0.73	63.9	E
	SB Right	0.0	0.15	0.2	A	0.0	0.13	0.2	A
	Overall			**32.7**	**C**			**29.9**	**C**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	31.5	0.64	22.7	C	65.1	0.85	35.2	E
	WB Left/Thru/Right	51.1	0.79	33.7	D	14.0	0.42	15.2	C
	NB Left/Thru/Right	46.9	0.76	31.0	D	34.3	0.66	22.4	C
	SB Left/Thru/Right	25.9	0.59	21.4	C	14.0	0.41	15.2	C
	Overall			**27.9**	**D**			**25.1**	**D**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access A & Waverley [87] (Unsignalized)	WB Left/Right				A				A
	NB Thru/Right				A				A
	SB Left/Thru				A				A
	Overall				**A**				**A**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Level of Service Table - HCM 2010

Level of Service	Average Delay per Vehicle (sec)	
	Signalized	Unisignalized
A	<10	<10
B	>10 and <20	>10 and <15
C	>20 and <35	>15 and <25
D	>35 and <55	>25 and <35
E	>55 and <80	>35 and <50
F	>80	>50

Legend

Queue Length > 100m

V/C > 0.85

LOS E

LOS F

Port Wallace Master Plan-Infrastructure Study
CBCL Limited 171013.00
2-Aug-17

Table 1 - Synchro Analysis Results: 2017 Baseline Volumes & Existing Street Network

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	9.1	0.30	9.7	A	1.4	0.07	7.6	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	5.6	0.21	22.6	C	4.2	0.16	15.1	C
	Overall			**4.7**	**A**			**2.7**	**A**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right								
	WB Left/Thru	0.7	0.02	8.2	A	0.0	0.01	7.6	A
	SB Left/Thru/Right	4.2	0.16	12.1	B	70.7	0.85	29.0	D
	Overall			**2.2**	**A**			**20.0**	**C**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	2.8	0.13	18.1	C	0.7	0.04	11.6	B
	WB Left/Thru	9.8	0.33	23.8	C	17.5	0.48	20.7	C
	WB Right	1.4	0.05	9.3	A	7.0	0.25	11.1	B
	NB Left/Thru/Right	0.0	0.00	7.6	A	0.0	0.01	7.4	A
	SB Left	3.5	0.14	8.2	A	1.4	0.06	8.0	A
	SB Thru/Right				A				A
	Overall			**6.1**	**A**			**8.2**	**A**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	9.8	0.33	14.2	B	9.1	0.31	17.5	C
	NB Thru/Right				A				A
	SB Left/Thru	1.4	0.06	7.7	A	2.8	0.12	8.7	A
	Overall			**4.8**	**A**			**3.8**	**A**
Montebello & Waverley [24] (Signalized)	WB Left	86.8	0.68	21.0	C	50.0	0.60	38.0	D
	WB Right	5.7	0.07	4.9	A	8.1	0.13	10.8	B
	NB Thru/Right	47.9	0.52	14.5	B	234.2	0.89	22.1	C
	SB Left	8.5	0.12	13.4	B	9.1	0.29	12.9	B
	SB Thru	91.5	0.78	24.9	C	38.3	0.30	6.8	A
	Overall			**20.2**	**C**			**20.0**	**B**
Main & Forest Hills [56] (Signalized)	EB Left	49.6	0.69	42.6	D	11.8	0.11	19.3	B
	EB Thru	51.3	0.25	29.7	C	226.8	1.02	74.3	E
	EB Right	0.0	0.11	0.7	A	0.0	0.25	0.4	A
	WB Left	19.1	0.13	20.4	C	54.2	0.76	48.5	D
	WB Thru	176.5	0.79	44.6	D	69.3	0.38	30.0	C
	WB Right	0.0	0.37	0.7	A	0.0	0.13	0.2	A
	NB Left	71.8	0.48	46.2	D	42.8	0.50	56.3	E
	NB Thru	237.5	1.07	103.1	F	107.4	0.92	94.1	F
	NB Right	0.0	0.06	0.1	A	0.0	0.15	0.2	A
	SB Left	23.6	0.28	59.3	E	151.6	0.97	73.0	E
	SB Thru	62.9	0.71	79.5	E	223.5	1.12	124.6	F
	SB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	Overall			**43.2**	**D**			**58.5**	**E**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	22.2	0.52	20.1	C	40.8	0.45	12.3	B
	EB Thru	53.6	0.28	19.5	B	210.9	0.75	25.7	C
	EB Right	0.0	0.12	0.2	A	0.0	0.11	0.1	A
	WB Left	32.4	0.33	12.1	B	12.8	0.35	15.2	B
	WB Thru	184.2	0.73	28.1	C	70.3	0.33	20.6	C
	WB Right	0.0	0.06	0.1	A	0.0	0.05	0.1	A
	NB Left	76.4	0.82	58.8	E	47.7	0.60	46.6	D
	NB Thru	43.5	0.27	36.5	D	64.1	0.62	59.8	E
	NB Right	0.0	0.03	0.0	A	0.0	0.06	0.1	A
	SB Left	40.5	0.53	60.4	E	40.1	0.46	40.9	D
	SB Thru	72.1	0.70	65.2	E	71.4	0.70	64.3	E
	SB Right	0.0	0.13	0.2	A	0.0	0.11	0.1	A
	Overall			**26.9**	**C**			**25.3**	**C**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	2.5	0.47	14.7	B	35.7	0.67	19.2	C
	WB Left/Thru/Right	3.9	0.60	18.6	C	9.8	0.32	12.4	B
	NB Left/Thru/Right	3.5	0.57	17.6	C	21.0	0.52	15.6	C
	SB Left/Thru/Right	2.2	0.44	14.6	B	9.8	0.32	12.3	B
	Overall			**16.6**	**C**			**15.9**	**C**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access A & Waverley [87] (Unsignalized)	WB Left/Right				A				A
	NB Thru/Right				A				A
	SB Left/Thru				A				A
	Overall				**A**				**A**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 2 - Synchro Analysis Results: 2031, 1% growth, Opt 1, 50% build-out, 10% NAMC, 7% Nth

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	71.4	0.84	23.4	C	9.8	0.33	8.7	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	63.0	5.66	2769.5	F	36.4	0.97	185.2	F
	Overall			**123.6**	**F**			**16.6**	**C**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right								
	WB Left/Thru	0.7	0.03	10.2	B	0.7	0.02	8.7	A
	SB Left/Thru/Right	23.8	0.56	19.5	C	609.7	1.95	447.6	F
	Overall			**4.5**	**A**			**290.7**	**F**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	10.5	0.36	47.9	E	1.4	0.07	16.1	C
	WB Left/Thru	182.0	2.42	721.5	F	476.0	2.85	868.5	F
	WB Right	2.1	0.08	11.2	B	12.6	0.39	14.9	B
	NB Left/Thru/Right	0.0	0.00	7.6	A	0.0	0.01	7.5	A
	SB Left	7.0	0.25	10.6	B	2.1	0.09	9.4	A
	SB Thru/Right				A				A
	Overall			**138.9**	**F**			**353.9**	**F**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	24.5	0.58	27.2	D	32.9	0.72	56.1	F
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.08	8.0	A	4.2	0.18	10.1	B
	Overall			**6.1**	**A**			**7.0**	**A**
Montebello & Waverley [24] (Signalized)	WB Left	184.6	0.87	44.3	D	57.2	0.72	48.4	D
	WB Right	8.6	0.09	7.6	A	8.9	0.15	10.1	B
	NB Thru/Right	70.0	0.56	15.3	B	387.1	1.14	91.1	F
	SB Left	8.7	0.13	11.6	B	22.8	0.53	37.2	D
	SB Thru	165.0	0.91	34.3	C	67.4	0.45	8.2	A
	Overall			**31.1**	**C**			**63.7**	**E**
Main & Forest Hills [56] (Signalized)	EB Left	72.1	0.83	64.6	E	13.4	0.17	20.1	C
	EB Thru	81.5	0.41	33.9	C	319.6	1.32	187.6	F
	EB Right	0.0	0.13	0.2	A	0.0	0.29	0.5	A
	WB Left	21.4	0.21	21.5	C	72.7	0.83	57.0	E
	WB Thru	255.4	1.00	69.5	E	100.2	0.53	32.9	C
	WB Right	0.0	0.42	0.8	A	0.0	0.15	0.2	A
	NB Left	82.7	0.55	47.8	D	48.5	0.56	57.8	E
	NB Thru	287.4	1.23	163.1	F	129.4	1.04	120.2	F
	NB Right	0.0	0.07	0.1	A	0.0	0.17	0.2	A
	SB Left	26.3	0.30	59.0	E	187.0	1.12	115.9	F
	SB Thru	71.7	0.77	83.5	F	268.0	1.30	190.3	F
	SB Right	0.0	0.05	0.1	A	0.0	0.08	0.1	A
	Overall			**58.8**	**E**			**104.9**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	102.8	1.15	142.6	F	246.1	1.13	99.7	F
	EB Thru	62.2	0.35	22.6	C	299.3	0.89	34.0	C
	EB Right	0.0	0.13	0.2	A	0.0	0.13	0.2	A
	WB Left	37.1	0.45	15.8	B	17.6	0.45	24.9	C
	WB Thru	246.6	0.93	44.2	D	90.4	0.52	33.8	C
	WB Right	0.0	0.13	0.2	A	0.0	0.14	0.2	A
	NB Left	98.1	0.84	57.4	E	52.6	0.70	51.1	D
	NB Thru	49.5	0.27	33.7	C	71.7	0.65	59.5	E
	NB Right	0.0	0.04	0.0	A	0.0	0.06	0.1	A
	SB Left	130.1	1.11	138.7	F	111.6	1.05	108.0	F
	SB Thru	82.8	0.63	56.4	E	79.8	0.73	63.9	E
	SB Right	0.0	0.35	0.6	A	0.0	0.26	0.4	A
	Overall			**41.7**	**D**			**43.7**	**D**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	5.5	0.99	40.7	E	97.3	1.56	122.5	F
	WB Left/Thru/Right	52.6	2.04	453.7	F	137.9	1.72	190.7	F
	NB Left/Thru/Right	18.2	1.54	150.2	F	368.2	2.13	457.9	F
	SB Left/Thru/Right	4.5	0.92	37.3	E	21.0	0.80	32.8	D
	Overall			**245.9**	**F**			**269.4**	**F**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	9.7	A	0.0	0.00	10.8	B
	WB Left/Thru/Right	7.7	0.28	11.1	B	6.3	0.24	11.9	B
	NB Left/Thru/Right	16.8	0.46	12.6	B	142.1	1.06	78.7	F
	SB Left/Thru/Right	71.4	0.85	30.3	D	88.9	0.95	43.5	E
	Overall			**22.3**	**C**			**58.1**	**F**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	10.0	A	0.0	0.00	11.1	B
	WB Left/Thru/Right	8.4	0.29	11.5	B	0.9	0.25	12.2	B
	NB Left/Thru/Right	28.7	0.61	16.2	C	22.6	1.14	94.3	F
	SB Left/Thru/Right	74.9	0.87	33.1	D	19.7	1.11	80.2	F
	Overall			**24.2**	**C**			**81.5**	**F**
Access A & Waverley [87] (Unsignalized)	WB Left/Right	30.1	0.63	20.2	C	17.5	0.54	17.5	C
	NB Thru/Right	70.0	0.89	38.3	E	199.5	1.39	155.2	F
	SB Left/Thru	121.1	1.04	77.0	F	308.0	1.59	255.1	F
	Overall			**50.3**	**F**			**184.2**	**F**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 3 - Synchro Analysis Results: 2031, 1% growth, Opt 1A, 50% build-out, 10% NAMC, 7% Nth

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	65.1	0.81	21.6	C	9.8	0.31	8.6	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	60.9	4.44	2093.0	F	28.7	0.77	114.1	F
	Overall			**96.7**	**F**			**11.7**	**B**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right								
	WB Left/Thru	0.7	0.03	10.1	B	0.7	0.02	8.7	A
	SB Left/Thru/Right	21.7	0.54	18.8	C	583.1	1.90	424.1	F
	Overall			**4.3**	**A**			**275.9**	**F**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	9.8	0.34	45.1	E	1.4	0.07	15.9	C
	WB Left/Thru	170.8	2.26	646.1	F	448.0	2.70	801.2	F
	WB Right	2.1	0.08	11.1	B	12.6	0.38	14.7	B
	NB Left/Thru/Right	0.0	0.00	7.6	A	0.0	0.01	7.5	A
	SB Left	6.3	0.24	10.5	B	2.1	0.09	9.3	A
	SB Thru/Right				A				A
	Overall			**123.6**	**F**			**322.7**	**F**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	29.4	0.65	33.2	D	31.5	0.70	52.6	F
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.08	8.0	A	4.2	0.17	10.0	A
	Overall			**7.4**	**A**			**6.7**	**A**
Montebello & Waverley [24] (Signalized)	WB Left	184.6	0.87	43.4	D	57.2	0.72	48.4	D
	WB Right	8.6	0.09	7.6	A	8.9	0.15	10.1	B
	NB Thru/Right	69.0	0.56	15.3	B	382.2	1.13	87.2	F
	SB Left	8.7	0.13	11.6	B	22.8	0.53	37.2	D
	SB Thru	161.1	0.91	33.8	C	65.9	0.44	8.1	A
	Overall			**30.6**	**C**			**61.3**	**E**
Main & Forest Hills [56] (Signalized)	EB Left	72.1	0.83	64.6	E	13.4	0.17	20.1	C
	EB Thru	80.6	0.40	33.8	C	317.4	1.32	184.8	F
	EB Right	0.0	0.13	0.2	A	0.0	0.29	0.5	A
	WB Left	253.8	1.00	68.6	E	99.4	0.53	32.8	C
	WB Thru	287.4	1.23	163.1	F	129.4	1.04	120.2	F
	WB Right	0.0	0.42	0.8	A	0.0	0.15	0.2	A
	NB Left	82.7	0.55	47.8	D	48.5	0.56	57.8	E
	NB Thru	287.4	1.23	163.1	F	129.4	1.04	120.2	F
	NB Right	0.0	0.07	0.1	A	0.0	0.17	0.2	A
	SB Left	36.4	0.44	61.8	E	199.4	1.17	134.2	F
	SB Thru	71.7	0.77	83.5	F	268.0	1.30	190.3	F
	SB Right	0.0	0.05	0.1	A	0.0	0.08	0.1	A
	Overall			**58.7**	**E**			**107.3**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	100.1	1.13	134.1	F	234.8	1.09	87.5	F
	EB Thru	62.2	0.35	22.6	C	299.3	0.89	34.0	C
	EB Right	0.0	0.13	0.2	A	0.0	0.13	0.2	A
	WB Left	37.1	0.45	15.8	B	17.6	0.45	24.9	C
	WB Thru	246.6	0.93	44.2	D	90.4	0.52	33.8	C
	WB Right	0.0	0.13	0.2	A	0.0	0.14	0.2	A
	NB Left	98.1	0.84	57.4	E	52.6	0.70	51.1	D
	NB Thru	49.5	0.27	33.7	C	71.7	0.65	59.5	E
	NB Right	0.0	0.04	0.0	A	0.0	0.06	0.1	A
	SB Left	126.4	1.08	130.2	F	106.0	1.02	101.6	F
	SB Thru	82.8	0.63	56.4	E	79.8	0.73	63.9	E
	SB Right	0.0	0.34	0.6	A	0.0	0.25	0.4	A
	Overall			**40.7**	**D**			**41.6**	**D**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	38.5	0.97	40.0	E	98.7	2.04	430.3	F
	WB Left/Thru/Right	352.8	1.96	430.6	F	129.5	1.54	120.3	F
	NB Left/Thru/Right	123.9	1.49	142.4	F	350.7	1.64	173.3	F
	SB Left/Thru/Right	31.5	0.90	36.6	E	21.0	0.78	32.0	D
	Overall			**231.9**	**F**			**251.3**	**F**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	9.7	A	0.0	0.00	10.7	B
	WB Left/Thru/Right	7.0	0.26	10.9	B	5.6	0.23	11.6	B
	NB Left/Thru/Right	16.1	0.45	12.3	B	131.6	1.03	69.5	F
	SB Left/Thru/Right	66.5	0.83	27.9	D	81.2	0.93	38.5	E
	Overall			**20.9**	**C**			**51.6**	**F**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	9.9	A	0.0	0.00	11.0	B
	WB Left/Thru/Right	7.7	0.27	11.3	B	6.3	0.24	12.0	B
	NB Left/Thru/Right	27.3	0.59	15.5	C	146.3	1.11	83.5	F
	SB Left/Thru/Right	69.3	0.85	30.1	D	129.5	1.06	72.5	F
	Overall			**22.5**	**C**			**73.1**	**F**
Access A & Waverley [87] (Unsignalized)	WB Left/Right	27.3	0.59	18.8	C	16.1	0.51	16.7	C
	NB Thru/Right	64.4	0.85	34.4	D	186.9	1.33	140.0	F
	SB Left/Thru	109.2	1.01	64.9	F	284.9	1.52	229.8	F
	Overall			**43.8**	**E**			**166.4**	**F**
Forest Hills Ext [89] (Unsignalised)	EB Right	1.4	0.07	9.8	A	3.5	0.15	19.5	C
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall			**0.3**	**A**			**0.4**	**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Intersection [Arcady Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	51.9		30.6	D	3.9		4.2	A
	WB Thru/Right	137.6		115.8	F	1.1		3.8	A
	NB Left/Thru/Right	0.4		3.6	A	0.4		2.1	A
	Overall			**61.7**	**F**			**3.9**	**A**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right	277.83		134.06	F	16.59		14.4	B
	WB Left/Thru	0.3		1.3	A	0.4		1.4	A
	SB Left/Thru/Right	1.3		2.0	A	373.5		129.7	F
	Overall			**92.8**	**F**			**88.5**	**F**

Notes:
Analysis by CBCL Limited using Arcady 8
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Level of Service Table - HCM 2010

Level of Service	Average Delay per Vehicle (sec)	
	Signalized	Unisignalized
A	<10	<10
B	>10 and <20	>10 and <15
C	>20 and <35	>15 and <25
D	>35 and <55	>25 and <35
E	>55 and <80	>35 and <50
F	>80	>50

Legend

Queue Length > 100m
V/C > 0.85
LOS E
LOS F

Port Wallace Master Plan-Infrastructure Study
CBCL Limited 171013.00
2-Aug-17

Table 1 - Synchro Analysis Results: 2017 Baseline Volumes & Existing Street Network

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	9.1	0.30	9.7	A	1.4	0.07	7.6	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	5.6	0.21	22.6	C	4.2	0.16	15.1	C
	Overall			**4.7**	**A**			**2.7**	**A**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right								
	WB Left/Thru	0.7	0.02	8.2	A	0.0	0.01	7.6	A
	SB Left/Thru/Right	4.2	0.16	12.1	B	70.7	0.85	29.0	D
	Overall			**2.2**	**A**			**20.0**	**C**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	2.8	0.13	18.1	C	0.7	0.04	11.6	B
	WB Left/Thru	9.8	0.33	23.8	C	17.5	0.48	20.7	C
	WB Right	1.4	0.05	9.3	A	7.0	0.25	11.1	B
	NB Left/Thru/Right	0.0	0.00	7.6	A	0.0	0.01	7.4	A
	SB Left	3.5	0.14	8.2	A	1.4	0.06	8.0	A
	SB Thru/Right				A				A
	Overall			**6.1**	**A**			**8.2**	**A**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	9.8	0.33	14.2	B	9.1	0.31	17.5	C
	NB Thru/Right				A				A
	SB Left/Thru	1.4	0.06	7.7	A	2.8	0.12	8.7	A
	Overall			**4.8**	**A**			**3.8**	**A**
Montebello & Waverley [24] (Signalized)	WB Left	86.8	0.68	21.0	C	50.0	0.60	38.0	D
	WB Right	5.7	0.07	4.9	A	8.1	0.13	10.8	B
	NB Thru/Right	47.9	0.52	14.5	B	234.2	0.89	22.1	C
	SB Left	8.5	0.12	13.4	B	9.1	0.29	12.9	B
	SB Thru	91.5	0.78	24.9	C	38.3	0.30	6.8	A
	Overall			**20.2**	**C**			**20.0**	**B**
Main & Forest Hills [56] (Signalized)	EB Left	49.6	0.69	42.6	D	11.8	0.11	19.3	B
	EB Thru	51.3	0.25	29.7	C	226.8	1.02	74.3	E
	EB Right	0.0	0.11	0.7	A	0.0	0.25	0.4	A
	WB Left	19.1	0.13	20.4	C	54.2	0.76	48.5	D
	WB Thru	176.5	0.79	44.6	D	69.3	0.38	30.0	C
	WB Right	0.0	0.37	0.7	A	0.0	0.13	0.2	A
	NB Left	71.8	0.48	46.2	D	42.8	0.50	56.3	E
	NB Thru	237.5	1.07	109.1	F	107.4	0.92	94.1	F
	NB Right	0.0	0.06	0.1	A	0.0	0.15	0.2	A
	SB Left	23.6	0.28	59.3	E	151.6	0.97	73.0	E
	SB Thru	62.9	0.71	79.5	E	223.5	1.12	124.6	F
	SB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	Overall			**43.2**	**D**			**58.5**	**E**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	22.2	0.52	20.1	C	40.8	0.45	12.3	B
	EB Thru	53.6	0.28	19.5	B	210.9	0.75	25.7	C
	EB Right	0.0	0.12	0.2	A	0.0	0.11	0.1	A
	WB Left	32.4	0.33	12.1	B	12.8	0.35	15.2	B
	WB Thru	184.2	0.73	28.1	C	70.3	0.33	20.6	C
	WB Right	0.0	0.06	0.1	A	0.0	0.05	0.1	A
	NB Left	76.4	0.82	58.8	E	47.7	0.60	46.6	D
	NB Thru	43.5	0.27	36.5	D	64.1	0.62	59.8	E
	NB Right	0.0	0.03	0.0	A	0.0	0.06	0.1	A
	SB Left	40.5	0.53	60.4	E	40.1	0.46	40.9	D
	SB Thru	72.1	0.70	65.2	E	71.4	0.70	64.3	E
	SB Right	0.0	0.13	0.2	A	0.0	0.11	0.1	A
	Overall			**26.9**	**C**			**25.3**	**C**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	2.5	0.47	14.7	B	35.7	0.67	19.2	C
	WB Left/Thru/Right	3.9	0.60	18.6	C	9.8	0.32	12.4	B
	NB Left/Thru/Right	3.5	0.57	17.6	C	21.0	0.52	15.6	C
	SB Left/Thru/Right	2.2	0.44	14.6	B	9.8	0.32	12.3	B
	Overall			**16.6**	**C**			**15.9**	**C**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access A & Waverley [87] (Unsignalized)	WB Left/Right				A				A
	NB Thru/Right				A				A
	SB Left/Thru				A				A
	Overall				**A**				**A**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 13 - Synchro Analysis Results: 2047 Volumes & Existing Street Network, 0.75% Growth, No Development

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	14.7	0.41	11.2	B	2.1	0.08	7.8	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	14.7	0.47	50.5	F	7.0	0.25	19.4	C
	Overall			**6.8**	**A**			**3.2**	**A**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right								
	WB Left/Thru	0.7	0.03	8.5	A	0.0	0.01	7.8	A
	SB Left/Thru/Right	6.3	0.24	14.0	B	179.9	1.14	100.2	F
	Overall			**2.5**	**A**			**68.9**	**F**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	5.6	0.22	25.0	C	1.4	0.06	13.0	B
	WB Left/Thru	23.8	0.61	49.1	E	41.3	0.75	41.6	E
	WB Right	1.4	0.07	9.5	A	10.5	0.34	12.6	B
	NB Left/Thru/Right	0.0	0.00	7.7	A	0.0	0.01	7.5	A
	SB Left	4.9	0.18	8.5	A	1.4	0.07	8.3	A
	SB Thru/Right				A				A
	Overall			**9.6**	**A**			**13.3**	**B**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	18.2	0.49	19.2	C	19.6	0.52	28.3	D
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.08	7.8	A	4.2	0.16	9.3	A
	Overall			**6.2**	**A**			**5.4**	**A**
Montebello & Waverley [24] (Signalized)	WB Left	165.1	0.83	33.8	C	62.0	0.75	50.0	D
	WB Right	8.2	0.09	6.5	A	9.2	0.16	9.8	A
	NB Thru/Right	62.0	0.59	16.7	B	336.9	1.05	58.0	E
	SB Left	10.1	0.17	14.0	B	25.5	0.58	43.3	D
	SB Thru	122.6	0.88	33.2	C	49.9	0.36	7.5	A
	Overall			**28.0**	**C**			**44.4**	**D**
Main & Forest Hills [56] (Signalized)	EB Left	81.4	0.89	74.8	E	14.2	0.16	20.0	B
	EB Thru	64.9	0.33	33.2	C	312.6	1.32	186.9	F
	EB Right	0.0	0.14	0.2	A	0.0	0.31	0.5	A
	WB Left	22.8	0.19	21.6	C	83.2	0.87	62.8	E
	WB Thru	263.1	1.04	79.9	E	88.7	0.48	31.8	C
	WB Right	0.0	0.46	1.0	A	0.0	0.16	0.2	A
	NB Left	90.7	0.60	49.0	D	52.6	0.62	59.3	E
	NB Thru	320.9	1.34	205.7	F	143.3	1.13	144.3	F
	NB Right	0.0	0.08	0.1	A	0.0	0.19	0.3	A
	SB Left	28.1	0.32	58.8	E	211.3	1.22	153.1	F
	SB Thru	82.0	0.80	85.6	F	298.6	1.42	236.5	F
	SB Right	0.0	0.05	0.1	A	0.0	0.09	0.1	A
	Overall			**69.0**	**E**			**117.2**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	50.0	0.74	47.8	D	55.3	0.65	18.4	B
	EB Thru	68.2	0.36	21.8	C	347.0	1.01	55.9	E
	EB Right	0.0	0.15	0.2	A	0.0	0.14	0.2	A
	WB Left	40.1	0.49	15.5	B	23.8	0.48	28.1	C
	WB Thru	285.6	0.96	46.1	D	99.6	0.45	26.3	C
	WB Right	0.0	0.08	0.1	A	0.0	0.07	0.1	A
	NB Left	110.0	1.09	116.7	F	58.3	0.78	57.6	E
	NB Thru	53.5	0.32	36.0	D	77.2	0.67	59.4	E
	NB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	SB Left	50.3	0.62	63.0	E	47.5	0.59	43.4	D
	SB Thru	90.2	0.79	68.7	E	86.3	0.75	64.3	E
	SB Right	0.0	0.16	0.2	A	0.0	0.14	0.2	A
	Overall			**40.1**	**D**			**40.0**	**D**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	53.2	0.82	41.3	E	99.4	1.00	65.1	F
	WB Left/Thru/Right	88.2	1.00	75.8	F	18.9	0.50	18.5	C
	NB Left/Thru/Right	79.1	0.96	65.1	F	49.0	0.78	32.1	D
	SB Left/Thru/Right	43.4	0.76	35.7	E	18.9	0.50	18.4	C
	Overall			**56.6**	**F**			**40.6**	**E**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access A & Waverley [87] (Unsignalized)	WB Left/Right				A				A
	NB Thru/Right				A				A
	SB Left/Thru				A				A
	Overall				**A**				**A**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Level of Service Table - HCM 2010

Level of Service	Average Delay per Vehicle (sec)	
	Signalized	Unisignalized
A	<10	<10
B	>10 and <20	>10 and <15
C	>20 and <35	>15 and <25
D	>35 and <55	>25 and <35
E	>55 and <80	>35 and <50
F	>80	>50

Legend

Queue Length > 100m
V/C > 0.85
LOS E
LOS F

Port Wallace Master Plan-Infrastructure Study
CBCL Limited 171013.00
2-Aug-17

Table 1 - Synchro Analysis Results: 2017 Baseline Volumes & Existing Street Network

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	9.1	0.30	9.7	A	1.4	0.07	7.6	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	5.6	0.21	22.6	C	4.2	0.16	15.1	C
	Overall			**4.7**	**A**			**2.7**	**A**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right				A				A
	WB Left/Thru	0.7	0.02	8.2	A	0.0	0.01	7.6	A
	SB Left/Thru/Right	4.2	0.16	12.1	B	70.7	0.85	29.0	D
	Overall			**2.2**	**A**			**20.0**	**C**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	2.8	0.13	18.1	C	0.7	0.04	11.6	B
	WB Left/Thru	9.8	0.33	23.8	C	17.5	0.48	20.7	C
	WB Right	1.4	0.05	9.3	A	7.0	0.25	11.1	B
	NB Left/Thru/Right	0.0	0.00	7.6	A	0.0	0.01	7.4	A
	SB Left	3.5	0.14	8.2	A	1.4	0.06	8.0	A
	SB Thru/Right				A				A
	Overall			**6.1**	**A**			**8.2**	**A**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	9.8	0.33	14.2	B	9.1	0.31	17.5	C
	NB Thru/Right				A				A
	SB Left/Thru	1.4	0.06	7.7	A	2.8	0.12	8.7	A
	Overall			**4.8**	**A**			**3.8**	**A**
Montebello & Waverley [24] (Signalized)	WB Left	86.8	0.68	21.0	C	50.0	0.60	38.0	D
	WB Right	5.7	0.07	4.9	A	8.1	0.13	10.8	B
	NB Thru/Right	47.9	0.52	14.5	B	234.2	0.89	22.1	C
	SB Left	8.5	0.12	13.4	B	9.1	0.29	12.9	B
	SB Thru	91.5	0.78	24.9	C	38.3	0.30	6.8	A
	Overall			**20.2**	**C**			**20.0**	**B**
Main & Forest Hills [56] (Signalized)	EB Left	49.6	0.69	42.6	D	11.8	0.11	19.3	B
	EB Thru	51.3	0.25	29.7	C	226.8	1.02	74.3	E
	EB Right	0.0	0.11	0.7	A	0.0	0.25	0.4	A
	WB Left	19.1	0.13	20.4	C	54.2	0.76	48.5	D
	WB Thru	176.5	0.79	44.6	D	69.3	0.38	30.0	C
	WB Right	0.0	0.37	0.7	A	0.0	0.13	0.2	A
	NB Left	71.8	0.48	46.2	D	42.8	0.50	56.3	E
	NB Thru	237.5	1.07	109.1	F	107.4	0.92	94.1	F
	NB Right	0.0	0.06	0.1	A	0.0	0.15	0.2	A
	SB Left	23.6	0.28	59.3	E	151.6	0.97	73.0	E
	SB Thru	62.9	0.71	79.5	E	223.5	1.12	124.6	F
	SB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	Overall			**43.2**	**D**			**58.5**	**E**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	22.2	0.52	20.1	C	40.8	0.45	12.3	B
	EB Thru	53.6	0.28	19.5	B	210.9	0.75	25.7	C
	EB Right	0.0	0.12	0.2	A	0.0	0.11	0.1	A
	WB Left	32.4	0.33	12.1	B	12.8	0.35	15.2	B
	WB Thru	184.2	0.73	28.1	C	70.3	0.33	20.6	C
	WB Right	0.0	0.06	0.1	A	0.0	0.05	0.1	A
	NB Left	76.4	0.82	58.8	E	47.7	0.97	46.6	D
	NB Thru	43.5	0.27	36.5	D	64.1	0.62	59.8	E
	NB Right	0.0	0.03	0.0	A	0.0	0.06	0.1	A
	SB Left	40.5	0.53	60.4	E	40.1	0.46	40.9	D
	SB Thru	72.1	0.70	65.2	E	71.4	0.70	64.3	E
	SB Right	0.0	0.13	0.2	A	0.0	0.11	0.1	A
	Overall			**26.9**	**C**			**25.3**	**C**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	2.5	0.47	14.7	B	35.7	0.67	19.2	C
	WB Left/Thru/Right	3.9	0.60	18.6	C	9.8	0.32	12.4	B
	NB Left/Thru/Right	3.5	0.57	17.6	C	21.0	0.52	15.6	C
	SB Left/Thru/Right	2.2	0.44	14.6	B	9.8	0.32	12.3	B
	Overall			**16.6**	**C**			**15.9**	**C**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access A & Waverley [87] (Unsignalized)	WB Left/Right				A				A
	NB Thru/Right				A				A
	SB Left/Thru				A				A
	Overall				**A**				**A**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 4 - Synchro Analysis Results: 2047, 0.75% growth, Opt 1, 100% build-out, 10% NAMC, 7% Nth

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	191.1	1.10	80.1	F	23.8	0.55	10.5	B
	WB Thru/Right				A				A
	NB Left/Thru/Right	1.4	0.07	9.1	A	78.4	4.97	2236.4	F
	Overall			**47.2**	**E**			**134.7**	**F**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right				A				A
	WB Left/Thru	0.7	0.05	11.4	B	0.7	0.02	9.9	A
	SB Left/Thru/Right	113.4	1.03	73.4	F	1006.6	3.20	1013.1	F
	Overall			**22.9**	**C**			**615.0**	**F**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	20.3	0.64	108.0	F	2.8	0.13	24.0	C
	WB Left/Thru	479.5	9.43	3918.9	F	759.5	5.56	2100.9	F
	WB Right	2.1	0.10	12.3	B	21.0	0.53	20.9	C
	NB Left/Thru/Right	0.0	0.00	7.7	A	0.0	0.01	7.5	A
	SB Left	9.8	0.32	12.6	B	2.8	0.13	11.1	B
	SB Thru/Right				A				A
	Overall			**1080.7**	**F**			**845.8**	**F**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	56.0	0.90	74.8	F	70.0	1.23	215.1	F
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.10	8.4	A	5.6	0.22	11.0	B
	Overall			**13.6**	**B**			**21.3**	**C**
Montebello & Waverley [24] (Signalized)	WB Left	206.9	1.07	93.2	F	62.0	0.75	50.0	D
	WB Right	9.7	0.11	9.0	A	902.0	0.16	9.8	A
	NB Thru/Right	107.2	0.65	17.2	B	463.4	1.31	164.2	F
	SB Left	10.1	0.18	11.8	B	25.5	0.58	43.3	D
	SB Thru	248.1	0.95	38.5	D	99.0	0.58	10.4	B
	Overall			**45.2**	**D**			**106.8**	**F**
Main & Forest Hills [56] (Signalized)	EB Left	81.4	0.89	74.8	E	14.2	0.21	20.8	C
	EB Thru	97.5	0.49	36.0	D	388.4	1.55	265.9	F
	EB Right	0.0	0.14	0.2	A	0.0	0.31	0.5	A
	WB Left	22.8	0.25	22.4	C	83.2	0.87	62.8	E
	WB Thru	328.0	1.20	137.7	F	117.8	0.61	34.7	C
	WB Right	0.0	0.46	1.0	A	0.0	0.16	0.2	A
	NB Left	90.7	0.60	49.0	D	52.6	0.62	59.3	E
	NB Thru	320.9	1.34	205.7	F	143.3	1.13	144.3	F
	NB Right	0.0	0.08	0.1	A	0.0	0.19	0.3	A
	SB Left	28.1	0.32	58.8	E	211.3	1.22	153.1	F
	SB Thru	82.0	0.80	85.6	F	286.5	1.42	236.5	F
	SB Right	0.0	0.05	0.1	A	0.0	0.09	0.1	A
	Overall			**86.0**	**F**			**145.8**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	184.7	1.92	454.7	F	363.6	1.53	270.7	F
	EB Thru	68.2	0.38	23.1	C	347.0	1.01	55.9	E
	EB Right	0.0	0.15	0.2	A	0.0	0.14	0.2	A
	WB Left	40.1	0.52	17.2	B	19.5	0.48	26.1	C
	WB Thru	285.6	1.02	61.0	E	99.6	0.57	34.8	C
	WB Right	0.0	0.21	0.3	A	0.0	0.18	0.3	A
	NB Left	122.3	0.97	81.0	F	58.3	0.78	57.6	E
	NB Thru	53.5	0.29	34.1	C	77.2	0.67	59.4	E
	NB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	SB Left	173.0	1.43	254.2	F	207.7	1.54	292.6	F
	SB Thru	90.2	0.69	59.1	E	86.3	0.75	64.3	E
	SB Right	0.0	0.44	0.9	A	0.0	0.37	0.7	A
	Overall			**79.7**	**E**			**90.3**	**F**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	42.0	1.54	66.1	F	99.4	2.38	185.7	F
	WB Left/Thru/Right	476.0	2.32	735.6	F	262.1	3.13	525.7	F
	NB Left/Thru/Right	284.2	2.70	459.6	F	466.2	3.22	718.2	F
	SB Left/Thru/Right	35.0	1.41	58.9	F	23.1	1.27	50.3	F
	Overall			**474.3**	**F**			**497.5**	**F**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	11.2	B	0.0	0.00	12.6	B
	WB Left/Thru/Right	14.7	0.45	14.7	B	15.4	0.49	16.3	C
	NB Left/Thru/Right	44.1	0.77	24.2	C	252.0	1.45	196.0	F
	SB Left/Thru/Right	199.5	1.21	121.4	F	217.0	1.39	168.8	F
	Overall			**81.0**	**F**			**162.5**	**F**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	11.8	B	0.0	0.00	13.2	B
	WB Left/Thru/Right	15.4	0.47	15.5	C	15.4	0.51	16.9	C
	NB Left/Thru/Right	77.0	0.96	41.7	E	308.7	1.64	256.9	F
	SB Left/Thru/Right	246.4	1.32	180.1	F	300.3	1.64	253.4	F
	Overall			**108.2**	**F**			**229.0**	**F**
Access A & Waverley [87] (Unsignalized)	WB Left/Right	67.2	1.05	48.3	E	59.5	1.12	46.7	E
	NB Thru/Right	178.5	1.45	168.8	F	394.8	2.33	445.2	F
	SB Left/Thru	375.9	1.85	374.2	F	520.1	2.56	580.5	F
	Overall			**232.2**	**F**			**435.0**	**F**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 5 - Synchro Analysis Results: 2047, 0.75% growth, Opt 1A, 100% build-out, 10% NAMC, 7% Nth

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	170.1	1.07	68.3	F	22.4	0.52	10.2	B
	WB Thru/Right				A				A
	NB Left/Thru/Right	1.4	0.07	9.1	A	75.6	4.02	1735.0	F
	Overall			**39.8**	**E**			**107.7**	**F**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right				A				A
	WB Left/Thru	0.7	0.04	11.2	B	0.7	0.02	9.8	A
	SB Left/Thru/Right	98.0	0.98	59.9	F	918.4	2.77	818.4	F
	Overall			**18.5**	**C**			**498.9**	**F**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	19.6	0.61	90.0	F	2.8	0.12	23.0	C
	WB Left/Thru	455.0	8.38	3437.3	F	720.3	5.18	1928.7	F
	WB Right	2.1	0.10	12.1	B	20.3	0.52	20.2	C
	NB Left/Thru/Right	0.0	0.00	7.7	A	0.0	0.01	7.5	A
	SB Left	9.1	0.31	12.3	B	2.8	0.13	10.9	B
	SB Thru/Right				A				A
	Overall			**935.4**	**F**			**768.7**	**F**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	53.2	0.88	68.2	F	66.5	1.18	193.0	F
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.09	8.4	A	5.6	0.21	10.9	B
	Overall			**12.7**	**B**			**19.5**	**C**
Montebello & Waverley [24] (Signalized)	WB Left	206.9	1.06	88.8	F	62.0	0.75	50.0	D
	WB Right	9.7	0.11	9.0	A	9.2	0.16	9.8	A
	NB Thru/Right	134.2	0.65	17.1	B	467.9	1.30	170.3	F
	SB Left	10.0	0.18	11.8	B	25.5	0.58	43.3	D
	SB Thru	241.9	0.94	37.7	D	95.9	0.57	10.2	B
	Overall			**43.9**	**D**			**104.0**	**F**
Main & Forest Hills [56] (Signalized)	EB Left	81.4	0.89	74.8	E	14.2	0.20	20.8	C
	EB Thru	95.8	0.48	35.9	D	384.3	1.54	262.7	F
	EB Right	0.0	0.14	0.2	A	0.0	0.31	0.5	A
	WB Left	22.8	0.25	22.4	C	83.2	0.87	62.8	E
	WB Thru	324.6	0.19	134.4	F	118.0	0.60	34.5	C
	WB Right	0.0	0.46	1.0	A	0.0	0.16	0.2	A
	NB Left	90.7	0.60	49.0	D	52.6	0.62	59.3	E
	NB Thru	320.9	1.34	205.7	F	143.3	1.13	144.3	F
	NB Right	0.0	0.08	0.1	A	0.0	0.19	0.3	A
	SB Left	42.5	0.51	62.8	E	233.5	1.32	170.2	F
	SB Thru	82.0	0.80	85.6	F	286.5	1.42	236.5	F
	SB Right	0.0	0.05	0.1	A	0.0	0.09	0.1	A
	Overall			**84.8**	**F**			**150.8**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	188.7	1.86	432.6	F	347.4	1.48	249.0	F
	EB Thru	68.2	0.38	23.1	C	347.0	1.01	55.9	E
	EB Right	0.0	0.15	0.2	A	0.0	0.14	0.2	A
	WB Left	40.1	0.52	17.2	B	19.5	0.48	26.1	C
	WB Thru	285.6	1.02	61.0	E	99.6	0.57	34.8	C
	WB Right	0.0	0.21	0.3	A	0.0	0.18	0.3	A
	NB Left	122.3	0.97	81.0	F	58.3	0.78	57.6	E
	NB Thru	53.5	0.29	34.1	C	77.2	0.67	59.4	E
	NB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	SB Left	107.1	1.39	237.3	F	200.8	1.50	273.1	F
	SB Thru	90.2	0.69	59.1	E	86.3	0.75	64.3	E
	SB Right	0.0	0.43	0.8	A	0.0	0.36	0.6	A
	Overall			**76.3**	**E**			**85.0**	**F**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	42.7	1.49	64.5	F	101.5	2.27	183.7	F
	WB Left/Thru/Right	459.9	3.03	703.5	F	268.8	2.94	492.2	F
	NB Left/Thru/Right	275.1	2.63	437.6	F	450.1	3.13	681.7	F
	SB Left/Thru/Right	35.7	1.37	57.6	F	23.1	1.22	48.6	E
	Overall			**449.5**	**F**			**467.9**	**F**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	11.0	B	0.0	0.00	12.3	B
	WB Left/Thru/Right	13.3	0.42	14.0	B	14.0	0.46	15.7	C
	NB Left/Thru/Right	37.8	0.72	20.8	C	237.3	1.41	179.4	F
	SB Left/Thru/Right	179.9	1.16	114.0	F	200.9	1.35	150.7	F
	Overall			**69.7**	**F**			**147.9**	**F**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	11.6	B	0.0	0.00	12.9	B
	WB Left/Thru/Right	14.0	0.44	14.9	B	14.0	0.48	16.2	C
	NB Left/Thru/Right	70.0	0.92	36.5	E	291.9	1.59	239.3	F
	SB Left/Thru/Right	225.4	1.27	158.7	F	280.0	1.56	229.4	F
	Overall			**95.9**	**F**			**209.7**	**F**
Access A & Waverley [87] (Unsignalized)	WB Left/Right	58.8	0.98	40.9	E	54.6	1.05	41.9	E
	NB Thru/Right	162.4	1.37	144.7	F	376.6	2.22	412.0	F
	SB Left/Thru	354.9	1.76	342.0	F	490.0	2.38	533.3	F
	Overall			**209.5**	**F**			**401.8**	**F**
Forest Hills Ext Access [89] (Unsignalised)	EB Right	2.1	0.11	10.2	B	9.1	0.31	25.3	D
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall			**0.4**	**A**			**0.8**	**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 6 - Synchro Analysis Results: 2047, 0.75% growth, Opt 2, 100% build-out, 10% NAMC, 7% Nth

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	128.1	0.99	46.4	E	18.2	0.47	9.7	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	1.4	0.07	9.1	A	68.6	2.64	1005.5	F
	Overall			**26.3**	**D**			**67.5**	**F**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right				A				A
	WB Left/Thru	0.7	0.04	10.8	B	0.7	0.02	9.4	A
	SB Left/Thru/Right	70.7	0.88	40.1	E	823.2	2.52	705.9	F
	Overall			**12.1**	**B**			**433.3**	**F**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	16.8	0.53	78.9	F	2.8	0.11	21.0	C
	WB Left/Thru	396.9	6.33	2502.3	F	629.3	4.35	1551.2	F
	WB Right	2.1	0.09	11.7	B	18.9	0.49	18.8	C
	NB Left/Thru/Right	0.0	0.00	7.7	A	0.0	0.01	7.5	A
	SB Left	8.4	0.29	11.6	B	2.8	0.18	10.5	B
	SB Thru/Right				A				A
	Overall			**658.0**	**F**			**603.2**	**F**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	46.2	0.81	54.2	F	58.1	1.04	140.7	F
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.09	8.3	A	5.6	0.21	10.7	B
	Overall			**10.7**	**B**			**15.1**	**C**
Montebello & Waverley [24] (Signalized)	WB Left	206.9	1.03	79.3	E	62.0	0.75	50.0	D
	WB Right	9.7	0.10	9.0	A	9.2	0.16	9.8	A
	NB Thru/Right	98.0	0.64	17.0	B	442.8	1.27	156.0	F
	SB Left	9.9	0.17	11.8	B	25.5	0.58	43.3	D
	SB Thru	202.5	0.93	36.2	D	88.8	0.54	9.8	A
	Overall			**41.1**	**D**			**96.2**	**F**
Main & Forest Hills [56] (Signalized)	EB Left	81.4	0.89	74.8	E	14.2	0.20	20.7	C
	EB Thru	93.2	0.47	35.6	D	379.0	1.53	273.5	F
	EB Right	0.0	0.14	0.2	A	0.0	0.31	0.5	A
	WB Left	22.8	0.24	22.3	C	83.2	0.87	62.8	E
	WB Thru	320.3	1.18	129.9	F	114.0	0.59	34.3	C
	WB Right	0.0	0.49	1.1	A	0.0	0.21	0.3	A
	NB Left	90.7	0.60	49.0	D	52.6	0.62	59.3	E
	NB Thru	320.9	1.34	205.7	F	143.3	1.13	144.3	F
	NB Right	0.0	0.08	0.1	A	0.0	0.19	0.3	A
	SB Left	41.0	0.49	62.3	E	231.0	1.31	156.5	F
	SB Thru	82.0	0.80	85.6	F	286.5	1.42	236.5	F
	SB Right	0.0	0.05	0.1	A	0.0	0.09	0.1	A
	Overall			**82.6**	**F**			**145.9**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	176.8	1.77	389.2	F	324.7	1.41	217.5	F
	EB Thru	68.2	0.38	23.1	C	347.0	1.01	55.9	E
	EB Right	0.0	0.15	0.2	A	0.0	0.14	0.2	A
	WB Left	40.1	0.52	17.2	B	19.5	0.48	26.1	C
	WB Thru	285.6	1.02	61.0	E	99.6	0.57	34.8	C
	WB Right	0.0	0.20	0.3	A	0.0	0.17	0.2	A
	NB Left	122.3	0.97	81.0	F	58.3	0.78	57.6	E
	NB Thru	53.5	0.29	34.1	C	77.2	0.67	59.4	E
	NB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	SB Left	158.1	1.32	212.5	F	188.8	1.20	243.5	F
	SB Thru	90.2	0.69	59.1	E	86.3	0.75	64.3	E
	SB Right	0.0	0.40	0.8	A	0.0	0.34	0.6	A
	Overall			**71.1**	**E**			**77.4**	**E**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	43.4	1.43	62.1	F	105.0	2.17	180.7	F
	WB Left/Thru/Right	452.5	2.78	647.3	F	249.2	2.70	439.4	F
	NB Left/Thru/Right	261.1	2.44	403.2	F	424.2	2.94	627.2	F
	SB Left/Thru/Right	35.7	1.32	55.3	F	23.1	1.15	46.1	E
	Overall			**410.6**	**F**			**425.0**	**F**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	10.6	B	0.0	0.00	11.9	B
	WB Left/Thru/Right	10.5	0.36	12.8	B	11.2	0.40	14.4	B
	NB Left/Thru/Right	31.5	0.65	17.7	C	206.5	1.30	145.0	F
	SB Left/Thru/Right	143.5	1.06	80.0	F	164.5	1.22	111.9	F
	Overall			**51.2**	**F**			**116.5**	**F**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	11.0	B	0.0	0.00	12.3	B
	WB Left/Thru/Right	11.2	0.37	13.4	B	11.2	0.41	14.8	B
	NB Left/Thru/Right	52.5	0.82	26.2	D	252.7	1.45	191.2	F
	SB Left/Thru/Right	179.9	1.15	113.5	F	229.6	1.41	174.7	F
	Overall			**69.8**	**F**			**166.2**	**F**
Access A & Waverley [87] (Unsignalized)	WB Left/Right	43.4	0.83	29.3	D	39.9	0.90	30.6	D
	NB Thru/Right	123.2	1.19	92.7	F	334.6	1.92	336.0	F
	SB Left/Thru	301.7	1.56	269.3	F	422.1	2.08	426.4	F
	Overall			**159.2**	**F**			**326.0**	**F**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Level of Service Table - HCM 2010

Level of Service	Average Delay per Vehicle (sec)	
	Signalized	Unsignalized
A	<10	<10
B	>10 and <20	>10 and <15
C	>20 and <35	>15 and <25
D	>35 and <55	>25 and <35
E	>55 and <80	>35 and <50
F	>80	>50

Legend

Queue Length > 100m

V/C > 0.85

LOS E

LOS F

Port Wallace Master Plan-Infrastructure Study
CBCL Limited 171013.00
2-Aug-17

Table 1 - Synchro Analysis Results: 2017 Baseline Volumes & Existing Street Network

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	9.1	0.30	9.7	A	1.4	0.07	7.6	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	5.6	0.21	22.6	C	4.2	0.16	15.1	C
	Overall			**4.7**	**A**			**2.7**	**A**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right				A				A
	WB Left/Thru	0.7	0.02	8.2	A	0.0	0.01	7.6	A
	SB Left/Thru/Right	4.2	0.16	12.1	B	70.7	0.85	29.0	D
	Overall			**2.2**	**A**			**20.0**	**C**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	2.8	0.13	18.1	C	0.7	0.04	11.6	B
	WB Left/Thru	9.8	0.33	23.8	C	17.5	0.48	20.7	C
	WB Right	1.4	0.05	9.3	A	7.0	0.25	11.1	B
	NB Left/Thru/Right	0.0	0.00	7.6	A	0.0	0.01	7.4	A
	SB Left	3.5	0.14	8.2	A	1.4	0.06	8.0	A
	SB Thru/Right				A				A
	Overall			**6.1**	**A**			**8.2**	**A**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	9.8	0.33	14.2	B	9.1	0.31	17.5	C
	NB Thru/Right				A				A
	SB Left/Thru	1.4	0.06	7.7	A	2.8	0.12	8.7	A
	Overall			**4.8**	**A**			**3.8**	**A**
Montebello & Waverley [24] (Signalized)	WB Left	86.8	0.68	21.0	C	50.0	0.60	38.0	D
	WB Right	5.7	0.07	4.9	A	8.1	0.13	10.8	B
	NB Thru/Right	47.9	0.52	14.5	B	234.2	0.89	22.1	C
	SB Left	8.5	0.12	13.4	B	9.1	0.29	12.9	B
	SB Thru	91.5	0.78	24.9	C	38.3	0.30	6.8	A
	Overall			**20.2**	**C**			**20.0**	**B**
Main & Forest Hills [56] (Signalized)	EB Left	49.6	0.69	42.6	D	11.8	0.11	19.3	B
	EB Thru	51.3	0.25	29.7	C	226.8	1.02	74.3	E
	EB Right	0.0	0.11	0.7	A	0.0	0.25	0.4	A
	WB Left	19.1	0.13	20.4	C	54.2	0.76	48.5	D
	WB Thru	176.5	0.79	44.6	D	69.3	0.38	30.0	C
	WB Right	0.0	0.37	0.7	A	0.0	0.13	0.2	A
	NB Left	71.8	0.48	46.2	D	42.8	0.50	56.3	E
	NB Thru	237.5	1.07	109.1	F	107.4	0.92	94.1	F
	NB Right	0.0	0.06	0.1	A	0.0	0.15	0.2	A
	SB Left	23.6	0.28	59.3	E	151.6	0.97	73.0	E
	SB Thru	62.9	0.71	79.5	E	223.3	1.12	124.6	F
	SB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	Overall			**43.2**	**D**			**58.5**	**E**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	22.2	0.52	20.1	C	40.8	0.45	12.3	B
	EB Thru	53.6	0.28	19.5	B	21.0	0.75	25.7	C
	EB Right	0.0	0.12	0.2	A	0.0	0.11	0.1	A
	WB Left	32.4	0.33	12.1	B	12.8	0.35	15.2	B
	WB Thru	184.2	0.73	28.1	C	70.3	0.33	20.6	C
	WB Right	0.0	0.06	0.1	A	0.0	0.05	0.1	A
	NB Left	76.4	0.82	58.8	E	47.7	0.60	46.6	D
	NB Thru	43.5	0.27	36.5	D	64.1	0.62	59.8	E
	NB Right	0.0	0.03	0.0	A	0.0	0.06	0.1	A
	SB Left	40.5	0.53	60.4	E	40.1	0.46	40.9	D
	SB Thru	72.1	0.70	65.2	E	71.4	0.70	64.3	E
	SB Right	0.0	0.13	0.2	A	0.0	0.11	0.1	A
	Overall			**26.9**	**C**			**25.3**	**C**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	2.5	0.47	14.7	B	35.7	0.67	19.2	C
	WB Left/Thru/Right	3.9	0.60	18.6	C	9.8	0.32	12.4	B
	NB Left/Thru/Right	3.5	0.57	17.6	C	21.0	0.52	15.6	C
	SB Left/Thru/Right	2.2	0.44	14.6	B	9.8	0.32	12.3	B
	Overall			**16.6**	**C**			**15.9**	**C**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access A & Waverley [87] (Unsignalized)	WB Left/Right				A				A
	NB Thru/Right				A				A
	SB Left/Thru				A				A
	Overall				**A**				**A**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume/d-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 7 - Synchro Analysis Results: 2047, 0.75% growth, Opt 1, 100% build-out, 20% NAMC, 7% Nth

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	137.9	1.01	51.3	F	18.9	0.48	9.9	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	1.4	0.07	9.1	A	70.7	2.91	1149.0	F
	Overall			**29.3**	**D**			**75.6**	**F**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right				A				A
	WB Left/Thru	0.7	0.04	10.9	B	0.7	0.02	9.4	A
	SB Left/Thru/Right	76.3	0.90	43.8	E	835.8	2.52	706.1	F
	Overall			**13.3**	**B**			**438.2**	**F**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	17.5	0.54	81.0	F	2.8	0.11	21.0	C
	WB Left/Thru	410.2	6.67	2654.3	F	652.4	4.54	1639.9	F
	WB Right	2.1	0.10	11.8	B	18.9	0.50	19.2	C
	NB Left/Thru/Right	0.0	0.00	7.7	A	0.0	0.01	7.5	A
	SB Left	8.4	0.30	11.7	B	2.8	0.12	10.6	B
	SB Thru/Right				A				A
	Overall			**704.0**	**F**			**641.7**	**F**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	47.6	0.83	56.9	F	60.2	1.08	153.4	F
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.09	8.3	A	5.6	0.21	10.7	B
	Overall			**11.1**	**B**			**16.2**	**C**
Montebello & Waverley [24] (Signalized)	WB Left	206.9	1.04	81.6	F	62.0	0.75	50.0	D
	WB Right	9.7	0.10	9.0	A	9.2	0.16	9.8	A
	NB Thru/Right	99.5	0.64	17.0	B	446.3	1.28	1401.1	F
	SB Left	10.0	0.17	11.8	B	25.5	0.58	43.3	D
	SB Thru	208.7	0.94	36.7	D	90.7	0.55	9.9	A
	Overall			**41.8**	**D**			**98.0**	**F**
Main & Forest Hills [56] (Signalized)	EB Left	81.4	0.89	74.8	E	14.2	0.20	20.7	C
	EB Thru	92.6	0.45	35.6	D	376.1	1.52	272.2	F
	EB Right	0.0	0.14	0.2	A	0.0	0.31	0.5	A
	WB Left	22.8	0.24	22.3	C	83.2	0.87	62.8	E
	WB Thru	318.7	1.18	123.7	F	113.4	0.59	34.3	C
	WB Right	0.0	0.46	1.0	A	0.0	0.16	0.2	A
	NB Left	90.7	0.60	49.0	D	52.6	0.62	59.3	E
	NB Thru	320.9	1.34	205.7	F	143.3	1.13	144.3	F
	NB Right	0.0	0.08	0.1	A	0.0	0.19	0.3	A
	SB Left	28.1	0.32	35.6	D	211.3	1.22	153.1	F
	SB Thru	82.0	0.80	85.6	F	286.6	1.42	236.5	F
	SB Right	0.0	0.05	0.1	A	0.0	0.09	0.1	A
	Overall			**83.2**	**F**			**141.6**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	175.7	1.76	384.9	F	320.9	1.39	212.1	F
	EB Thru	68.2	0.38	23.1	C	347.0	1.01	55.9	E
	EB Right	0.0	0.15	0.2	A	0.0	0.14	0.2	A
	WB Left	40.1	0.52	17.2	B	19.5	0.48	26.1	C
	WB Thru	285.6	1.02	61.0	E	99.6	0.57	34.8	C
	WB Right	0.0	0.20	0.3	A	0.0	0.17	0.2	A
	NB Left	122.3	1.00	81.0	F	58.3	0.78	57.6	E
	NB Thru	53.5	0.29	34.1	C	77.2	0.67	59.4	E
	NB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	SB Left	156.0	1.30	200.0	F	186.5	1.41	237.7	F
	SB Thru	90.2	0.69	59.1	E	86.3	0.75	64.8	E
	SB Right	0.0	0.40	0.8	A	0.0	0.34	0.6	A
	Overall			**70.3**	**E**			**76.0**	**E**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	43.4	1.41	61.7	F	105.7	2.13	180.2	F
	WB Left/Thru/Right	426.4	2.78	638.5	F	245.7	2.70	430.9	F
	NB Left/Thru/Right	259.0	2.44	397.4	F	419.3	2.86	618.3	F
	SB Left/Thru/Right	36.4	1.30	54.9	F	23.1	1.14	45.8	E
	Overall			**404.3**	**F**			**418.0**	**F**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	10.7	B	0.0	0.00	12.0	B
	WB Left/Thru/Right	11.2	0.38	13.2	B	11.9	0.41	14.7	B
	NB Left/Thru/Right	35.0	0.69	19.8	C	213.5	1.32	152.9	F
	SB Left/Thru/Right	155.4	1.10	91.0	F	173.6	1.25	121.5	F
	Overall			**57.4**	**F**			**124.0**	**F**
Access B /Applewood lane & Waverley [84] (Unignalized)	EB Left/Thru/Right	0.0	0.00	11.2	B	0.0	0.00	12.5	B
	WB Left/Thru/Right	11.9	0.39	13.7	B	11.9	0.43	15.2	C
	NB Left/Thru/Right	55.3	0.84	27.9	D	276.5	1.52	222.2	F
	SB Left/Thru/Right	191.8	1.18	124.4	F	240.8	1.45	188.4	F
	Overall			**75.9**	**F**			**186.1**	**F**
Access A & Waverley [87] (Unsignalized)	WB Left/Right	46.2	0.87	31.1	D	43.4	0.94	33.1	D
	NB Thru/Right	133.0	1.23	105.2	F	346.5	2.00	355.7	F
	SB Left/Thru	315.7	1.59	286.4	F	440.3	2.17	453.7	F
	Overall			**171.2**	**F**			**345.4**	**F**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 8 - Synchro Analysis Results: 2047, 0.75% growth, Opt 1A, 100% build-out, 20% NAMC, 7% Nth

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	123.9	0.98	44.3	E	17.5	0.46	9.7	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	1.4	0.07	9.1	A	67.9	2.56	963.5	F
	Overall			**25.0**	**C**			**65.2**	**F**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right				A				A
	WB Left/Thru	0.7	0.04	10.8	B	0.7	0.02	9.4	A
	SB Left/Thru/Right	67.9	0.86	38.1	E	812.7	2.50	694.5	F
	Overall			**11.5**	**B**			**426.6**	**F**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	16.1	0.52	75.0	F	2.8	0.11	21.0	C
	WB Left/Thru	388.5	6.02	2360.1	F	620.2	4.28	1519.9	F
	WB Right	2.1	0.09	11.7	B	18.9	0.49	18.7	C
	NB Left/Thru/Right	0.0	0.00	7.7	A	0.0	0.01	7.5	A
	SB Left	8.4	0.29	11.5	B	2.8	0.12	10.5	B
	SB Thru/Right				A				A
	Overall			**617.6**	**F**			**589.3**	**F**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	45.5	0.80	52.6	F	57.4	1.03	138.3	F
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.09	8.3	A	5.6	0.21	10.7	B
	Overall			**10.4**	**B**			**14.9**	**B**
Montebello & Waverley [24] (Signalized)	WB Left	206.9	1.03	77.9	E	62.0	0.75	50.0	D
	WB Right	9.7	0.10	9.0	A	9.2	0.16	9.8	A
	NB Thru/Right	97.4	0.64	17.0	B	441.3	1.26	1414.6	F
	SB Left	9.9	0.17	11.9	B	25.5	0.58	43.3	D
	SB Thru	200.4	0.93	36.0	D	88.5	0.54	9.7	A
	Overall			**40.7**	**D**			**95.4**	**F**
Main & Forest Hills [56] (Signalized)	EB Left	81.4	0.89	74.8	E	14.2	0.20	20.6	C
	EB Thru	91.2	0.46	35.5	D	375.0	1.51	269.1	F
	EB Right	0.0	0.14	0.2	A	0.0	0.31	0.5	A
	WB Left	22.8	0.24	22.2	C	83.2	0.87	62.8	E
	WB Thru	317.5	1.14	122.2	F	112.3	0.59	34.1	C
	WB Right	0.0	0.46	1.0	A	0.0	0.16	0.2	A
	NB Left	90.7	0.60	49.0	D	52.6	0.62	59.3	E
	NB Thru	320.9	1.34	205.7	F	143.3	1.13	144.3	F
	NB Right	0.0	0.08	0.1	A	0.0	0.19	0.3	A
	SB Left	40.5	0.48	62.1	E	230.4	1.30	184.9	F
	SB Thru	82.0	0.80	85.6	F	286.6	1.42	236.5	F
	SB Right	0.0	0.05	0.1	A	0.0	0.09	0.1	A
	Overall			**82.6**	**F**			**146.0**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	170.3	1.71	363.3	F	307.4	1.35	194.6	F
	EB Thru	68.2	0.38	23.1	C	347.0	1.01	55.9	E
	EB Right	0.0	0.15	0.2	A	0.0	0.14	0.2	A
	WB Left	40.1	0.52	17.2	B	19.5	0.48	26.1	C
	WB Thru	285.6	1.02	61.0	E	99.6	0.57	34.8	C
	WB Right	0.0	0.19	0.3	A	0.0	0.16	0.2	A
	NB Left	122.3	0.97	81.0	F	58.3	0.78	57.6	E
	NB Thru	53.5	0.29	34.1	C	77.2	0.67	59.4	E
	NB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	SB Left	131.2	1.27	193.2	F	180.1	1.37	221.7	F
	SB Thru	90.2	0.69	59.1	E	86.3	0.75	64.8	E
	SB Right	0.0	0.39	0.7	A	0.0	0.33	0.6	A
	Overall			**67.7**	**E**			**72.1**	**E**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	43.4	1.39	60.5	F	107.8	2.08	178.2	F
	WB Left/Thru/Right	413.0	2.70	608.0	F	234.5	2.56	402.0	F
	NB Left/Thru/Right	250.6	2.33	378.6	F	403.9	2.78	586.8	F
	SB Left/Thru/Right	36.4	1.27	53.7	F	23.1	1.10	44.3	E
	Overall			**382.9**	**F**			**393.8**	**F**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	10.5	B	0.0	0.00	11.8	B
	WB Left/Thru/Right	10.5	0.35	12.6	B	11.2	0.39	14.2	B
	NB Left/Thru/Right	30.8	0.65	17.4	C	202.3	1.28	140.5	F
	SB Left/Thru/Right	140.0	1.05	75.2	F	159.6	1.20	106.7	F
	Overall			**49.1**	**E**			**112.3**	**F**
Access B /Applewood lane & Waverley [84] (Unignalized)	EB Left/Thru/Right	0.0	0.00	11.0	B	0.0	0.00	12.1	B
	WB Left/Thru/Right	10.5	0.37	13.2	B	11.2	0.40	14.7	B
	NB Left/Thru/Right	51.1	0.81	25.4	D	247.8	1.43	186.1	F
	SB Left/Thru/Right	174.3	1.14	108.2	F	224.0	1.39	168.4	F
	Overall			**66.9**	**F**			**161.2**	**F**
Access A & Waverley [87] (Unsignalized)	WB Left/Right	42.0	0.81	28.4	D	38.5	0.88	29.5	D
	NB Thru/Right	119.0	1.18	88.0	F	329.0	1.92	326.6	F
	SB Left/Thru	295.4	1.54	269.4	F	412.3	2.04	412.9	F
	Overall			**154.0**	**F**			**316.5**	**F**
Forest Hills Ext Access [89] (Unsignalised)	EB Right	2.1	0.09	10.1	B	7.0	0.26	23.9	C
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall			**0.3**	**A**			**0.6**	**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 9 - Synchro Analysis Results: 2047, 0.75% growth, Opt 2, 100% build-out, 20% NAMC, 7% Nth

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	94.5	0.91	31.9	D	14.7	0.42	9.3	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	72.8	22.22	11879.2	F	58.8	1.80	567.6	F
	Overall			**496.2**	**F**			**41.8**	**E**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right				A				A
	WB Left/Thru	0.7	0.04	10.4	B	0.7	0.02	9.2	A
	SB Left/Thru/Right	50.4	0.78	28.9	D	774.2	2.51	700.0	F
	Overall			**8.5**	**A**			**433.5**	**F**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	14.0	0.47	83.0	F	2.1	0.10	19.0	C
	WB Left/Thru	338.1	4.81	1805.2	F	541.1	3.64	1232.8	F
	WB Right	2.1	0.09	11.4	B	17.5	0.47	17.6	C
	NB Left/Thru/Right	0.0	0.00	7.7	A	0.0	0.01	7.5	A
	SB Left	7.7	0.27	11.0	B	2.8	0.11	10.1	B
	SB Thru/Right				A				A
	Overall			**455.4**	**F**			**466.1**	**F**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	51.8	0.86	65.2	F	51.1	0.95	107.9	F
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.09	8.2	A	4.9	0.20	10.5	B
	Overall			**13.3**	**B**			**12.3**	**B**
Montebello & Waverley [24] (Signalized)	WB Left	206.9	1.00	68.8	E	62.0	0.75	50.0	D
	WB Right	9.7	0.10	8.8	A	9.2	0.16	9.8	A
	NB Thru/Right	92.4	0.64	17.1	B	426.3	1.24	1310.0	F
	SB Left	9.9	0.17	12.1	B	25.5	0.58	43.3	D
	SB Thru	187.3	0.93	35.7	D	82.4	0.52	9.4	A
	Overall			**38.4**	**D**			**88.6**	**F**
Main & Forest Hills [56] (Signalized)	EB Left	81.4	0.89	74.8	E	14.2	0.19	20.6	C
	EB Thru	89.2	0.45	35.3	D	370.2	1.50	261.8	F
	EB Right	0.0	0.14	0.2	A	0.0	0.31	0.5	A
	WB Left	22.8	0.24	22.2	C	83.2	0.87	62.8	E
	WB Thru	312.2	1.16	122.1	F	110.1	0.58	33.9	C
	WB Right	0.0	0.49	1.1	A	0.0	0.20	0.3	A
	NB Left	90.7	0.60	49.0	D	52.6	0.62	59.3	E
	NB Thru	320.9	1.34	205.7	F	143.3	1.13	144.0	F
	NB Right	0.0	0.08	0.1	A	0.0	0.19	0.3	A
	SB Left	39.3	0.46	61.7	E	228.8	1.30	182.1	F
	SB Thru	82.0	0.80	85.6	F	296.6	1.42	236.5	F
	SB Right	0.0	0.05	0.1	A	0.0	0.09	0.1	A
	Overall			**80.4**	**F**			**142.1**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	169.6	1.62	328.9	F	287.4	1.29	167.5	F
	EB Thru	68.2	0.38	23.1	C	347.0	1.01	55.9	E
	EB Right	0.0	0.15	0.2	A	0.0	0.14	0.2	A
	WB Left	40.1	0.52	17.2	B	19.5	0.48	26.1	C
	WB Thru	285.6	1.02	61.0	E	99.6	0.57	34.8	C
	WB Right	0.0	0.18	0.3	A	0.0	0.15	0.2	A
	NB Left	122.3	0.97	81.0	F	58.3	0.78	57.6	E
	NB Thru	53.5	0.29	34.1	C	77.2	0.67	59.4	E
	NB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	SB Left	142.1	1.21	171.8	F	163.8	1.31	197.5	F
	SB Thru	90.2	0.69	59.1	E	86.3	0.75	64.3	E
	SB Right	0.0	0.37	0.7	A	0.0	0.32	0.5	A
	Overall			**63.6**	**E**			**66.2**	**E**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	44.1	1.33	58.5	F	111.3	1.96	175.2	F
	WB Left/Thru/Right	389.9	2.56	563.2	F	216.3	2.38	357.7	F
	NB Left/Thru/Right	238.7	2.22	350.2	F	380.1	2.56	538.3	F
	SB Left/Thru/Right	36.4	1.22	52.0	F	23.1	1.04	42.0	E
	Overall			**351.5**	**F**			**357.1**	**F**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	10.3	B	0.0	0.00	11.4	B
	WB Left/Thru/Right	8.4	0.30	11.9	B	9.1	0.33	13.3	B
	NB Left/Thru/Right	27.3	0.60	16.0	C	177.1	1.19	114.1	F
	SB Left/Thru/Right	111.3	0.99	54.4	F	130.9	1.11	78.4	F
	Overall			**36.6**	**E**			**88.6**	**F**
Access B /Applewood lane & Waverley [84] (Unignalized)	EB Left/Thru/Right	0.0	0.00	10.7	B	0.0	0.00	11.8	B
	WB Left/Thru/Right	9.1	0.31	12.4	B	9.1	0.35	13.7	B
	NB Left/Thru/Right	44.8	0.76	23.0	C	213.5	1.32	149.1	F
	SB Left/Thru/Right	141.4	1.07	78.7	F	163.4	1.27	128.0	F
	Overall			**51.1**	**F**			**126.3**	**F**
Access A & Waverley [87] (Unsignalized)	WB Left/Right	30.1	0.69	21.9	C	29.4	0.75	23.8	C
	NB Thru/Right	89.6	1.03	55.3	F	289.1	1.70	264.8	F
	SB Left/Thru	249.9	1.37	201.9	F	348.6	1.82	325.6	F
	Overall			**117.0**	**F**			**254.5**	**F**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Level of Service Table - HCM 2010

Level of Service	Average Delay per Vehicle (sec)	
	Signalized	Unsignalized
A	<10	<10
B	>10 and <20	>10 and <15
C	>20 and <35	>15 and <25

Port Wallace Master Plan-Infrastructure Study
CBCL Limited 171013.00
2-Aug-17

Table 1 - Synchro Analysis Results: 2017 Baseline Volumes & Existing Street Network

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	9.1	0.30	9.7	A	1.4	0.07	7.6	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	5.6	0.21	22.6	C	4.2	0.16	15.1	C
	Overall			**4.7**	**A**			**2.7**	**A**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right								
	WB Left/Thru	0.7	0.02	8.2	A	0.0	0.01	7.6	A
	SB Left/Thru/Right	4.2	0.16	12.1	B	70.7	0.85	29.0	D
	Overall			**2.2**	**A**			**20.0**	**C**
Montague/Charles Keating & Waverley [12] (Unsignalized)	EB Left/Thru/Right	2.8	0.13	18.1	C	0.7	0.04	11.6	B
	WB Left/Thru	9.8	0.33	23.8	C	17.5	0.48	20.7	C
	WB Right	1.4	0.05	9.3	A	7.0	0.25	11.1	B
	NB Left/Thru/Right	0.0	0.00	7.6	A	0.0	0.01	7.4	A
	SB Left	3.5	0.14	8.2	A	1.4	0.06	8.0	A
	SB Thru/Right				A				A
	Overall			**6.1**	**A**			**8.2**	**A**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	9.8	0.33	14.2	B	9.1	0.31	17.5	C
	NB Thru/Right				A				A
	SB Left/Thru	1.4	0.06	7.7	A	2.8	0.12	8.7	A
	Overall			**4.8**	**A**			**3.8**	**A**
Montebello & Waverley [24] (Signalized)	WB Left	86.8	0.68	21.0	C	50.0	0.60	38.0	D
	WB Right	5.7	0.07	4.9	A	8.1	0.13	10.8	B
	NB Thru/Right	47.9	0.52	14.5	B	234.2	0.89	22.1	C
	SB Left	8.5	0.12	13.4	B	9.1	0.29	12.9	B
	SB Thru	91.5	0.78	24.9	C	38.3	0.30	6.8	A
	Overall			**20.2**	**C**			**20.0**	**B**
Main & Forest Hills [56] (Signalized)	EB Left	49.6	0.69	42.6	D	11.8	0.11	19.3	B
	EB Thru	51.3	0.25	29.7	C	226.8	1.02	74.3	E
	EB Right	0.0	0.11	0.7	A	0.0	0.25	0.4	A
	WB Left	19.1	0.13	20.4	C	54.2	0.76	48.5	D
	WB Thru	176.5	0.79	44.6	D	69.3	0.38	30.0	C
	WB Right	0.0	0.37	0.7	A	0.0	0.13	0.2	A
	NB Left	71.8	0.48	46.2	D	42.8	0.50	56.3	E
	NB Thru	237.5	1.07	109.1	F	107.4	0.92	94.1	F
	NB Right	0.0	0.06	0.1	A	0.0	0.15	0.2	A
	SB Left	23.6	0.28	59.3	E	151.6	0.97	73.0	E
	SB Thru	62.9	0.71	79.5	E	223.5	1.12	124.6	F
	SB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	Overall			**43.2**	**D**			**58.5**	**E**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	22.2	0.52	20.1	C	40.8	0.45	12.3	B
	EB Thru	53.6	0.28	19.5	B	210.9	0.75	25.7	C
	EB Right	0.0	0.12	0.2	A	0.0	0.11	0.1	A
	WB Left	32.4	0.33	12.1	B	12.8	0.35	15.2	B
	WB Thru	184.2	0.73	28.1	C	70.3	0.33	20.6	C
	WB Right	0.0	0.06	0.1	A	0.0	0.05	0.1	A
	NB Left	76.4	0.82	58.8	E	47.7	0.60	46.6	D
	NB Thru	43.5	0.27	36.5	D	64.1	0.62	59.8	E
	NB Right	0.0	0.03	0.0	A	0.0	0.06	0.1	A
	SB Left	40.5	0.53	60.4	E	40.1	0.46	40.9	D
	SB Thru	72.1	0.70	65.2	E	71.4	0.70	64.3	E
	SB Right	0.0	0.13	0.2	A	0.0	0.11	0.1	A
	Overall			**26.9**	**C**			**25.3**	**C**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	2.5	0.47	14.7	B	35.7	0.67	19.2	C
	WB Left/Thru/Right	3.9	0.60	18.6	C	9.8	0.32	12.4	B
	NB Left/Thru/Right	3.5	0.57	17.6	C	21.0	0.52	15.6	C
	SB Left/Thru/Right	2.2	0.44	14.6	B	9.8	0.32	12.3	B
	Overall			**16.6**	**C**			**15.9**	**C**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access B /Applewood lane & Waverley [84] (Unsignalized)	EB Left/Thru/Right				A				A
	WB Left/Thru/Right				A				A
	NB Left/Thru/Right				A				A
	SB Left/Thru/Right				A				A
	Overall				**A**				**A**
Access A & Waverley [87] (Unsignalized)	WB Left/Right				A				A
	NB Thru/Right				A				A
	SB Left/Thru				A				A
	Overall				**A**				**A**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 10 - Synchro Analysis Results: 2047, 0.75% growth, Opt 3A, 100% build-out, 10% NAMC, 10% Nth

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	191.1	1.10	80.1	F	24.5	0.55	10.5	B
	WB Thru/Right				A				A
	NB Left/Thru/Right	1.4	0.07	9.1	A	78.4	4.97	2236.4	F
	Overall			**47.2**	**E**			**134.6**	**F**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right				A				A
	WB Left/Thru	0.7	0.05	11.4	B	0.7	0.02	9.9	A
	SB Left/Thru/Right	113.4	1.03	73.4	F	958.3	2.88	866.3	F
	Overall			**22.8**	**C**			**525.7**	**F**
Montague/Charles Keating & Waverley [12] (Unignalized)	EB Left/Thru/Right	20.3	0.64	105.0	F	2.8	0.13	24.0	C
	WB Left/Thru	479.5	9.43	3918.9	F	761.6	5.59	2114.8	F
	WB Right	2.1	0.10	12.3	B	21.0	0.53	21.0	C
	NB Left/Thru/Right	0.0	0.00	7.7	A	0.0	0.01	7.5	A
	SB Left	9.8	0.32	12.6	B	2.8	0.13	11.1	B
	SB Thru/Right				A				A
	Overall			**1080.7**	**F**			**851.1**	**F**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	56.0	0.91	75.7	F	70.0	1.23	215.1	F
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.10	8.4	A	5.6	0.22	11.0	B
	Overall			**13.8**	**B**			**21.3**	**C**
Montebello & Waverley [24] (Signalized)	WB Left	206.9	1.07	93.2	F	62.0	0.75	50.0	D
	WB Right	9.7	0.11	9.0	A	9.2	0.16	9.8	A
	NB Thru/Right	107.2	0.65	17.2	B	463.4	1.31	164.2	F
	SB Left	10.1	0.18	11.8	B	25.5	0.58	43.3	D
	SB Thru	248.1	0.95	38.5	D	99.1	0.58	10.4	B
	Overall			**45.2**	**D**			**106.8**	**F**
Main & Forest Hills [56] (Signalized)	EB Left	81.4	0.89	74.8	E	14.2	0.21	20.8	C
	EB Thru	97.5	0.49	36.0	D	388.3	1.55	285.9	F
	EB Right	0.0	0.14	0.2	A	0.0	0.31	0.5	A
	WB Left	22.8	0.25	22.4	C	83.2	0.87	62.8	E
	WB Thru	328.0	1.20	137.7	F	117.8	0.61	34.7	C
	WB Right	0.0	0.46	1.0	A	0.0	0.16	0.2	A
	NB Left	90.7	0.60	49.0	D	52.6	0.62	59.3	E
	NB Thru	320.9	1.34	205.7	F	143.3	1.13	144.3	F
	NB Right	0.0	0.08	0.1	A	0.0	0.19	0.3	A
	SB Left	28.1	0.32	58.8	E	211.3	1.22	153.1	F
	SB Thru	82.0	0.80	85.6	F	298.6	1.42	236.5	F
	SB Right	0.0	0.05	0.1	A	0.0	0.09	0.1	A
	Overall			**86.0**	**F**			**145.8**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	194.7	1.92	454.7	F	363.6	1.53	270.7	F
	EB Thru	68.2	0.38	23.1	C	347.0	1.01	55.9	E
	EB Right	0.0	0.15	0.2	A	0.0	0.14	0.2	A
	WB Left	40.1	0.52	17.2	B	19.5	0.48	26.1	C
	WB Thru	285.6	1.02	61.0	E	99.6	0.57	34.8	C
	WB Right	0.0	0.21	0.3	A	0.0	0.18	0.3	A
	NB Left	122.3	0.97	81.0	F	58.3	0.78	57.6	E
	NB Thru	53.5	0.29	34.1	C	77.2	0.67	59.4	E
	NB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	SB Left	173.0	1.43	254.2	F	207.7	1.54	292.6	F
	SB Thru	90.2	0.69	59.1	E	86.3	0.75	64.3	E
	SB Right	0.0	0.44	0.9	A	0.0	0.37	0.7	A
	Overall			**110.6**	**F**			**90.3**	**F**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	42.0	1.54	66.1	F	99.4	2.38	185.7	F
	WB Left/Thru/Right	476.0	3.12	735.6	F	282.1	3.13	525.7	F
	NB Left/Thru/Right	284.2	2.70	459.6	F	466.2	3.22	718.2	F
	SB Left/Thru/Right	35.0	1.41	58.9	F	23.1	1.27	50.3	F
	Overall			**474.3**	**F**			**497.5**	**F**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	11.2	B	0.0	0.00	12.6	B
	WB Left/Thru/Right	14.7	0.45	14.6	B	15.4	0.49	16.3	C
	NB Left/Thru/Right	40.6	0.74	22.2	C	252.0	1.12	196.0	F
	SB Left/Thru/Right	197.4	1.21	130.9	F	217.0	1.39	169.0	F
	Overall			**79.0**	**F**			**162.7**	**F**
Access B /Applewood lane & Waverley [84] (Unignalized)	EB Left/Thru/Right	0.0	0.00	11.8	B	0.0	0.00	13.2	B
	WB Left/Thru/Right	15.4	0.47	15.5	C	15.4	0.51	16.9	C
	NB Left/Thru/Right	77.0	0.96	41.7	E	308.7	1.64	256.9	F
	SB Left/Thru/Right	246.4	1.32	180.1	F	300.3	1.64	253.4	F
	Overall			**108.2**	**F**			**229.0**	**F**
Access A & Waverley [87] (Unsignalized)	WB Left/Right	67.9	1.05	48.6	E	59.5	1.12	46.8	E
	NB Thru/Right	178.5	1.45	169.2	F	396.2	2.32	446.6	F
	SB Left/Thru	375.9	1.85	374.6	F	520.1	2.56	580.9	F
	Overall			**232.5**	**F**			**435.8**	**F**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Table 11 - Synchro Analysis Results: 2047, 0.75% growth, Opt 3B, 100% build-out, 10% NAMC, 10% Nth

Intersection [Synchro Node No.]	Lane / Movement	AM Peak Hour				PM Peak Hour			
		95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]	95th % Q[1] (m)	V/C Ratio[2]	Average Delay[3] (s)	LOS[4]
Montague Rd & Ramp Terminal (North) [5] (Unsignalized)	EB Left/Thru	89.6	0.90	30.3	D	15.4	0.43	9.4	A
	WB Thru/Right				A				A
	NB Left/Thru/Right	72.8	22.22	11879.2	F	62.3	2.01	677.6	F
	Overall			**498.7**	**F**			**48.4**	**E**
Montague Rd & Ramp Terminal (South) [6] (Unsignalized)	EB Thru/Right				A				A
	WB Left/Thru	0.7	0.04	10.4	B	0.7	0.02	9.2	A
	SB Left/Thru/Right	39.2	0.70	25.0	C	756.0	2.36	631.1	F
	Overall			**6.7**	**A**			**389.9**	**F**
Montague/Charles Keating & Waverley [12] (Unignalized)	EB Left/Thru/Right	14.0	0.46	61.7	F	2.1	0.10	20.1	C
	WB Left/Thru	280.7	4.01	1444.0	F	566.3	3.85	1327.6	F
	WB Right	2.1	0.09	11.3	B	17.5	0.48	17.9	C
	NB Left/Thru/Right	0.0	0.00	7.7	A	0.0	0.01	7.5	A
	SB Left	7.7	0.27	10.9	B	2.8	0.11	10.2	B
	SB Thru/Right				A				A
	Overall			**328.2**	**F**			**506.0**	**F**
Breeze & Waverley [18] (Unsignalized)	WB Left/Right	37.1	0.72	39.6	E	53.2	0.97	117.0	F
	NB Thru/Right				A				A
	SB Left/Thru	2.1	0.09	8.1	A	4.9	0.20	10.5	B
	Overall			**8.6**	**A**			**13.1**	**B**
Montebello & Waverley [24] (Signalized)	WB Left	206.9	0.99	67.2	E	62.0	0.75	50.0	D
	WB Right	9.7	0.10	8.7	A	9.2	0.16	9.8	A
	NB Thru/Right	85.7	0.61	16.4	B	431.6	1.25	136.1	F
	SB Left	9.7	0.16	11.8	B	25.5	0.58	43.3	D
	SB Thru	185.5	0.93	35.7	D	84.3	0.52	9.5	A
	Overall			**38.0**	**D**			**90.4**	**F**
Main & Forest Hills [56] (Signalized)	EB Left	81.4	0.89	74.8	E	14.2	0.20	20.7	C
	EB Thru	137.6	0.65	40.1	D	379.0	1.53	273.3	F
	EB Right	0.0	0.14	0.2	A	0.0	0.31	0.5	A
	WB Left	22.8	0.34	24.4	C	83.2	0.87	62.8	E
	WB Thru	320.3	1.18	129.9	F	114.0	0.59	34.3	C
	WB Right	0.0	0.50	1.1	A	0.0	0.23	0.3	A
	NB Left	90.7	0.60	49.0	D	52.6	0.62	59.3	E
	NB Thru	320.9	1.34	205.7	F	143.3	1.13	144.3	F
	NB Right	0.0	0.08	0.1	A	0.0	0.19	0.3	A
	SB Left	45.2	0.54	63.7	E	237.9	1.34	197.8	F
	SB Thru	82.0	0.80	85.6	F	298.6	1.42	236.5	F
	SB Right	0.0	0.05	0.1	A	0.0	0.09	0.1	A
	Overall			**81.0**	**F**			**147.5**	**F**
Main & Caledonia/ Woodlawn [71] (Signalized)	EB Left	176.8	1.77	389.2	F	324.7	1.41	217.5	F
	EB Thru	68.2	0.38	23.1	C	347.0	1.01	55.9	E
	EB Right	0.0	0.15	0.2	A	0.0	0.14	0.2	A
	WB Left	40.1	0.52	17.2	B	19.5	0.48	26.1	C
	WB Thru	285.6	1.02	61.0	E	99.6	0.57	34.8	C
	WB Right	0.0	0.20	0.3	A	0.0	0.17	0.2	A
	NB Left	122.3	0.97	81.0	F	58.3	0.78	57.6	E
	NB Thru	53.5	0.29	34.1	C	77.2	0.67	59.4	E
	NB Right	0.0	0.04	0.1	A	0.0	0.07	0.1	A
	SB Left	158.1	1.32	212.5	F	18.6	1.42	243.5	F
	SB Thru	90.2	0.69	59.1	E	86.3	0.75	64.3	E
	SB Right	0.0	0.40	0.8	A	0.0	0.34	0.6	A
	Overall			**71.1**	**E**			**77.4**	**E**
Montebello/Avenue Du Portage & Caledonia/ Breeze [30] (Unsignalized)	EB Left/Thru/Right	43.4	1.43	62.1	F	105.0	2.17	180.7	F
	WB Left/Thru/Right	432.6	2.78	647.1	F	249.2	2.70	439.4	F
	NB Left/Thru/Right	261.1	2.44	403.2	F	424.2	2.94	627.2	F
	SB Left/Thru/Right	35.7	1.32	55.3	F	23.1	1.15	46.1	E
	Overall			**410.6**	**F**			**425.0**	**F**
Access C/ Meadow Walk & Waverley [81] (Unsignalized)	EB Left/Thru/Right	0.0	0.00	10.1	B	0.0	0.00	11.5	B
	WB Left/Thru/Right	8.4	0.29	11.5	B	9.8	0.35	13.6	B
	NB Left/Thru/Right	23.1	0.55	14.6	B	187.6	1.22	124.2	F
	SB Left/Thru/Right	96.6	0.94	44.3	E	139.3	1.14	86.4	F
	Overall			**30.8**	**D**			**96.6**	**F**
Access B /Applewood lane & Waverley [84] (Unignalized)	EB Left/Thru/Right	0.0	0.00	10.4	B	0.0	0.00	11.9	B
	WB Left/Thru/Right	8.4	0.30	12.1	B	9.8	0.36	13.9	B
	NB Left/Thru/Right	38.5	0.69	19.6	C	223.3	1.35	159.4	F
	SB Left/Thru/Right	114.1	1.00	57.3	F	195.3	1.30	138.0	F
	Overall			**38.5**	**E**			**136.1**	**F**
Access A & Waverley [87] (Unsignalized)	WB Left/Right	28.7	0.65	20.5	C	32.2	0.79	25.3	D
	NB Thru/Right	80.5	0.97	46.7	E	301.7	1.75	283.4	F
	SB Left/Thru	197.4	1.25	148.5	F	367.5	1.89	350.9	F
	Overall			**87.5**	**F**			**272.8**	**F**
Forest Hills Ext Access [89] (Unsignalised)	EB Right				A				A
	NB thru				A				A
	SB Thru				A				A
	SB Thru/Right				A				A
	Overall				**A**				**A**

Notes:
Analysis by CBCL Limited using Synchro 9.0
1. 95% Queue - 95th percentile queue [highlighted if >100m or if available storage is exceeded]
2. V/C Ratio - Volume-to-Capacity ratio [highlighted if >0.85]
3. Average Delay - average total delay per vehicle [highlighted for LOS E or F]
4. LOS - Level of Service [highlighted for LOS E or F]

Level of Service Table - HCM 2010

Level of Service	Average Delay per Vehicle (sec)	
	Signalized	Unisignalized
A	<10	<10
B	>10 and <20	>10 and <15
C	>20 and <35	>15 and <25
D	>35 and <55	>25 and <35
E	>55 and <80	>35 and <50
F	>80	>50

Legend

Queue Length > 100m
V/C > 0.85
LOS E
LOS F

APPENDIX E – Cost Estimate

CBCL LIMITED
Consulting Engineers

OPINION PROBABLE CONSTRUCTION COST
MASTER PLAN PORT WALLACE
1.0 - WATER SERVICE
Halifax / Dartmouth, NS

DATE:	18/01/2017
CBCL FILE No.:	171013.00
EST. DESCRIPTION:	Class D
PREPARED BY:	CBCL

						Cost Sharing Mechanism				Notes
						HRM/HW Charges Area Portion		Developer Charge Area Portion		
1.0 WATER SYSTEM INFRASTRUCTURE		**Unit**	**Est Qty**	**Unit Rate**	**Total**	**%**	**$**	**%**	**$**	
1.2a	400mm Diameter Primary Watermain Upsize	m	2,700	$ 300	$ 810,000	0%		100%	$ 810,000	Shared Cost Among Developers
1.2b	400mm Diameter Watermain to Conrad Lands Upsize	m	420	$ 300	$ 126,000	0%		100%	$ 126,000	Shared Cost Among Developers
1.2c	400mm Diameter Watermain from Caledonia Rd to parallel existing 300 mm	m	770	$ 1,300	$ 1,001,000	0%		100%	$ 1,001,000	Shared Cost Among Developers
1.3a	300mm Diameter Mains from Waverly Road			Base Cost						Base Cost not evaluated
1.4a	300mm Diameter Watermain within Conrad Lands			Base Cost						Base Cost not evaluated
1.4b	300mm Diameter Watermain off Waverly Rd			Base Cost						Base Cost not evaluated
1.5	300mm Diameter Watermain Connection to Spider Lake			Base Cost						Base Cost not evaluated
ESTIMATED TOTAL CONSTRUCTION COST (Including General Conditions & Contingencies)					**$ 2,000,000**		**$ -**		**$ 2,000,000**	
11.0	**CONTINGENCIES and ALLOWANCES**			Included in Units						
A	Design Development Contingency - **Note 2**			Included in Units						
B	Construction Contingency - **Note 3**			Included in Units						
C	Escalation / Inflation **(Based on 2017 Dollars)**			Included in Units						
D	Location Factor - **Note 4**			Included in Units						
ESTIMATED TOTAL CONSTRUCTION COST without HST					**$ 2,000,000**					

Note 1 The summary only provide costs, allowances, contingencies & factors related to construction. Engineering fees not included.
Note 2 A Design Development Cont. is to allow so that the necessary design changes can be made as the design is developed.
Note 3 A Construction Contingency is to allow for the cost of additional work that is over and above the original contract price.
Note 4 Location Factor is to account for difference in costs at project location and location of historical cost data.

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORESEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Form CBCL 034.Rev 0

CBCL LIMITED
Consulting Engineers

OPINION PROBABLE CONSTRUCTION COST
MASTER PLAN PORT WALLACE
2.0 - WASTEWATER SERVICES
Halifax / Dartmouth, NS

DATE:	30/10/2017
CBCL FILE No.:	171013.00
EST. DESCRIPTION:	Class D
PREPARED BY:	CBCL

						Cost Sharing Mechanism				Notes
						HRM/HW Charges Area Portion		Developer Charge Area Portion		
2.0 WASTEWATER INFRASTRUCTURE		**Unit**	**Est Qty**	**Unit Rate**	**Total**	**%**	**$**	**%**	**$**	
2.1	Forcemain- Sanitary Line c/w Rd Reinstatement from 390 Waverly Rd PS to North Dartmouth - Wright Ave	m	3,200	$ 1,616	$ 5,180,000	30%	$ 1,554,000	70%	$ 3,626,000	Shared between developer and HW
	Shubie Canal & Highway 118 Crossing not included see Item 3.0 Below									
2.2	**390 Waverly Road Pump Station**	Ea	1	$ 3,407,801	$ 3,410,000	30%	$ 1,023,000	70%	$ 2,387,000	Shared between developer and HW
	.1 Civil Earthworks, Excavation, Site Finishes	LS	1	$ 611,566						
	.2 Concrete Work	LS	1	$ 802,364						
	.3 Building Structure	LS	1	$ 242,494						
	.4 Pump Equipment & Piping3	LS	1	$ 1,194,336						
	.5 Building Mechanical & Piping	m2	125	$ 177,206						
	.6 Building Electrical & Instrumentation	LS	1	$ 359,040						
3.1 & 3.2	Crossing of canal and highway	LS	1	$ 4,700,000	$ 4,700,000	30%	$ 1,410,000	70%	$ 3,290,000	
	See separate broken out cost estimate									
ESTIMATED TOTAL CONSTRUCTION COST (Including General Conditions & Contingencies)					**$ 13,300,000**		**$ 4,000,000**		**$ 9,400,000**	
11.0	**CONTINGENCIES and ALLOWANCES**			Included in Units						
A	Design Development Contingency - **Note 2**			Included in Units						
B	Construction Contingency - **Note 3**			Included in Units						
C	Escalation / Inflation **(Based on 2017 Dollars)**			Included in Units						
D	Location Factor - **Note 4**			Included in Units						

ESTIMATED TOTAL CONSTRUCTION COST without HST $ 13,300,000

Note 1	The summary only provide costs, allowances, contingencies & factors related to construction. Engineering fees not included.
Note 2	A Design Development Cont. is to allow so that the necessary design changes can be made as the design is developed.
Note 3	A Construction Contingency is to allow for the cost of additional work that is over and above the original contract price.
Note 4	Location Factor is to account for difference in costs at project location and location of historical cost data.

CBCL LIMITED
Consulting Engineers

OPINION PROBABLE CONSTRUCTION COST
MASTER PLAN PORT WALLACE
3.0 - JOINT UTILITY TRENCHLESS CROSSINGS
Halifax / Dartmouth, NS

DATE:	30/10/2017
CBCL FILE No.:	171013.00
EST. DESCRIPTION:	Class D
PREPARED BY:	CBCL

						Cost Sharing Mechanism				Notes
						Water portion of costs		Sanitary Portion of Costs		
3.0 JOINT UTILITY CROSSINGS - TRENCHLESS		**Unit**	**Est Qty**	**Unit Rate**	**Total**	**%**	**$**	**%**	**$**	
3.1	Trenchless Shubie Canal Crossing (1 x600mm Dia Water & 2 x 525mm Dia Sanitary Joint Crossing)*	m	40	$ 40,500	$ 1,620,000	33%	$ 534,600	67%	$ 1,085,400	
3.2	Trenchless Highway 118 Crossing (1 x600mm Dia Water & 2 x 525mm Dia Sanitary Joint Crossing)*	m	150	$ 35,000	$ 5,250,000	33%	$ 1,732,500	67%	$ 3,517,500	
ESTIMATED TOTAL CONSTRUCTION COST (Including General Conditions & Contingencies)					**$ 6,900,000**		**$ 2,300,000**		**$ 4,700,000**	
11.0	**CONTINGENCIES and ALLOWANCES**			Included in Units						
A	Design Development Contingency - **Note 2**			Included in Units						
B	Construction Contingency - **Note 3**			Included in Units						
C	Escalation / Inflation **(Based on 2017 Dollars)**			Included in Units						
D	Location Factor - **Note 4**			Included in Units						
ESTIMATED TOTAL CONSTRUCTION COST without HST					**$ 6,900,000**					

Note 1 The summary only provide costs, allowances, contingencies & factors related to construction. Engineering fees not included.
Note 2 A Design Development Cont. is to allow so that the necessary design changes can be made as the design is developed.
Note 3 A Construction Contingency is to allow for the cost of additional work that is over and above the original contract price.
Note 4 Location Factor is to account for difference in costs at project location and location of historical cost data.

Form CBCL 034.Rev 0

CBCL LIMITED
Consulting Engineers

OPINION PROBABLE CONSTRUCTION COST

MASTER PLAN PORT WALLACE
4.0 - TRANSPORTATION
Halifax / Dartmouth, NS

DATE:	10/01/2018
CBCL FILE No.:	171013.00
EST. DESCRIPTION:	Class D
PREPARED BY:	CBCL

						Cost Sharing Mechanism				Notes
						HRM/HW Charges Area Portion		Developer Charge Area Portion		
4.0 INTERSECTIONS - PROPOSED UPGRADES		**Unit**	**Est Qty**	**Unit Rate**	**Total**	**%**	**$**	**%**	**$**	
4.1	Cono Drive (Access F)	LS	1	$ 2,404,000	$ 2,404,000	55%	$ 1,322,200	45%	$ 1,081,800	
4.2	Montague Rd & Ramp Terminal (North)	LS	1	$ 2,404,000	$ 2,404,000	55%	$ 1,322,200	45%	$ 1,081,800	
4.3	Montague Rd & Ramp Terminal (South)	LS	1	$ 2,404,000	$ 2,404,000	65%	$ 1,562,600	35%	$ 841,400	
4.4	Montague/ Charles Keating & Waverley	LS	1	$ 2,404,000	$ 2,404,000	60%	$ 1,442,400	40%	$ 961,600	
5.1	Breeze & Waverly	LS	1	$ 680,000	$ 680,000	50%	$ 340,000	50%	$ 340,000	
5.2	Montebello & Waverley	LS	1	$ 344,000	$ 344,000	70%	$ 240,800	30%	$ 103,200	
6.1	Main & Forest	LS	1	$ 10,044,000	$ 10,044,000	95%	$ 9,541,800	5%	$ 502,200	
7.1	Montebello/ Avenue du Portage	LS	1	$ 350,000	$ 350,000	55%	$ 192,500	45%	$ 157,500	
8.1	Main and Caledonia	LS	1	$ 20,000	$ 20,000	75%	$ 15,000	25%	$ 5,000	
ESTIMATED TOTAL CONSTRUCTION COST (Including General Conditions & Contingencies)					**$ 21,100,000**		**$ 16,000,000**		**$ 5,100,000**	
11.0	**CONTINGENCIES and ALLOWANCES**									
A	Design Development Contingency - **Note 2**			Included in Units						
B	Construction Contingency - **Note 3**			Included in Units						
C	Escalation / Inflation **(Based on 2017 Dollars)**			Included in Units						
D	Location Factor - **Note 4**			Included in Units						

ESTIMATED TOTAL CONSTRUCTION COST without HST $ 21,100,000

Note 1	The summary only provide costs, allowances, contingencies & factors related to construction. Engineering fees not included.
Note 2	A Design Development Cont. is to allow so that the necessary design changes can be made as the design is developed.
Note 3	A Construction Contingency is to allow for the cost of additional work that is over and above the original contract price.
Note 4	Location Factor is to account for difference in costs at project location and location of historical cost data.

Form CBCL 034.Rev 1

APPENDIX F – Sanitary Calculations

200 Waverley Road PS Drawdown Test

Pump Station Dimension 1 (m): 6.6
Pump Station Dimension 2 (m): 3.88
Pump Station Inside Area (m^2): 25.608

Action	Time (s)	Start WL (m)	End WL (m)	Change in WL (m)	Flow (L/s)
Pumps OFF	850	1.250	2.200	+0.950	28.6
P1 ON	230	2.200	1.250	-0.950	**134.4**
Pumps OFF	905	1.250	2.268	+1.018	28.8
P2 ON	230	2.268	1.250	-1.018	**142.1**
Pumps OFF	855	1.250	2.200	+0.950	28.5
P3 ON	215	2.200	1.250	-0.950	**141.6**
Pumps OFF	850	1.250	2.200	+0.950	28.6
P1 & P2 ON	125	2.200	1.250	-0.950	**223.2**

Automatic Controls
P1 startup depth @ 2.20m
P1 & P2 startup depth @ 2.50m
Pumps off @ 1.25m

Notes
-Drawdown test started on 19/Jun/2017 at approximately 11:30am and ended at approximately 12:45pm.
-All three pumps are used in rotation.

390 Waverley Road PS System

Existing Conditions

Pipe	U/S Manhole	D/S Manhole	Area (ha)	Total Area (ha)	Single Unit Houses (units)	Town Houses (units)	Multi-Unit Houses (units)	Population (people)	Total Population (people)	Average DWF (L/s)	Peaking Factor	I/I Allowance (L/s)	Design Flow (L/s)	Total Design Flow: Res (L/s)	Total Design Flow: ICI (L/s)	Total Design Flow (L/s)	Pipe Capacity (Percent Full)	Ramaining Capacity (L/s)
P46816	MH20743	MH20744	8.866	8.866	54	0	0	180.9	180.9	0.628	4.16	2.48	5.75	5.75	0.00	**5.75**	**12.5%**	**168**
P46817	MH20744	MH19872	0.494	9.361	2	0	0	6.7	187.6	0.651	4.16	2.62	6.01	6.007	0.000	**6.01**	**12.5%**	**173**
P45255	MH19872	MH19873	3.214	12.575	21	0	0	70.35	257.95	0.896	4.11	3.52	8.12	8.117	0.000	**8.12**	**15.9%**	**141**
P45256	MH19873	MH19874	0.108	12.683	1	0	0	3.35	261.3	0.907	4.10	3.55	8.20	8.205	0.000	**8.20**	**16.3%**	**134**
P45257	MH19874	MH19875	1.006	13.688	1	0	0	3.35	264.65	0.919	4.10	3.83	8.54	8.544	0.000	**8.54**	**18.1%**	**111**
P45258	MH19875	MH19876	1.892	15.580	11	0	0	36.85	301.5	1.047	4.08	4.36	9.70	9.698	0.000	**9.70**	**13.6%**	**233**
P45259	MH19876	MH19877	0.060	15.640	0	0	0	0	301.5	1.047	4.08	4.38	9.71	9.715	0.000	**9.71**	**13.7%**	**231**
P45260	MH19877	MH19878	1.625	17.265	10	0	0	33.5	335	1.163	4.06	4.83	10.73	10.734	0.000	**10.73**	**14.5%**	**226**
P45261	MH19878	MH19879	1.662	18.927	11	0	0	36.85	371.85	1.291	4.04	5.30	11.81	11.815	0.000	**11.81**	**15.2%**	**226**
P45262	MH19879	MH19880	0.872	19.798	0	0	0	0	371.85	1.291	4.04	5.54	12.06	12.059	0.000	**12.06**	**15.4%**	**224**
P45288	MH19880	MH19896	1.607	21.405	10	0	0	33.5	405.35	1.407	4.02	5.99	13.06	13.065	0.000	**13.06**	**15.9%**	**225**
P47186	MH19896	MH20896	1.680	23.085	8	0	0	26.8	432.15	1.501	4.01	6.46	13.98	13.978	0.000	**13.98**	**18.5%**	**173**
P47187	MH20896	MH19897	0.840	23.925	5	0	0	16.75	448.9	1.559	4.00	6.70	14.49	14.488	0.000	**14.49**	**15.3%**	**271**
P45290	MH19897	MH19901	20.165	44.090	140	0	0	469	917.9	3.187	3.82	12.35	27.58	27.579	0.000	**27.58**	**23.5%**	**200**
P45291	MH19901	MH19902	1.312	45.403	7	0	0	23.45	941.35	3.269	3.82	12.71	28.31	28.307	0.000	**28.31**	**23.7%**	**202**
P45301	MH19902	MH19904	6.536	51.938	51	0	0	170.85	1112.2	3.862	3.77	14.54	32.74	32.740	0.000	**32.74**	**25.2%**	**203**
P45302	MH19904	MH19905	0.332	52.270	3	0	0	10.05	1122.25	3.897	3.77	14.64	32.98	32.985	0.000	**32.98**	**23.7%**	**235**
P45303	MH19905	MH19906	0.663	52.932	5	0	0	16.75	1139	3.955	3.76	14.82	33.42	33.423	0.000	**33.42**	**26.2%**	**189**
P45304	MH19906	MH19907	1.170	54.102	7	0	0	23.45	1162.45	4.036	3.76	15.15	34.10	34.103	0.000	**34.10**	**25.3%**	**209**
P45305	MH19907	MH19908	0.909	55.012	4	0	0	13.4	1175.85	4.083	3.75	15.40	34.56	34.559	0.000	**34.56**	**25.5%**	**208**
P45306	MH19908	MH19909	4.256	59.267	25	0	0	83.75	1259.6	4.374	3.73	16.59	37.00	37.004	0.000	**37.00**	**26.4%**	**205**
P45307	MH19909	MH19910	0.583	59.850	1	0	0	3.35	1262.95	4.385	3.73	16.76	37.22	37.217	0.000	**37.22**	**27.1%**	**195**
P45308	MH19910	MH19911	1.986	61.836	10	0	0	33.5	1296.45	4.502	3.72	17.31	38.27	38.272	0.000	**38.27**	**26.5%**	**210**
P45309	MH19911	MH19912	0.873	62.710	6	0	0	20.1	1316.55	4.571	3.72	17.56	38.81	38.814	0.000	**38.81**	**19.0%**	**455**
P45310	MH19912	MH19913	0.196	62.906	1	0	0	3.35	1319.9	4.583	3.72	17.61	38.92	38.919	0.000	**38.92**	**19.0%**	**457**
P45311	MH19913	MH19914	0.897	63.803	4	0	0	13.4	1333.3	4.630	3.72	17.86	39.37	39.369	0.000	**39.37**	**24.3%**	**265**
P45312	MH19914	MH19915	0.390	64.193	0	0	0	0	1333.3	4.630	3.72	17.97	39.48	39.478	0.000	**39.48**	**24.0%**	**273**
P45313	MH19915	MH19916	0.699	64.891	1	0	0	3.35	1336.65	4.641	3.72	18.17	39.72	39.723	0.000	**39.72**	**19.0%**	**461**
P517347	MH19916	MH23876	0.910	65.802	2	0	0	6.7	1343.35	4.664	3.71	18.42	40.08	40.077	0.000	**40.08**	**19.2%**	**456**
P517348	MH23876	MH23875	0.264	66.065	1	0	0	3.35	1346.7	4.676	3.71	18.50	40.20	40.201	0.000	**40.20**	**19.5%**	**445**
P5173427	MH23875	MH23874	0.383	66.449	3	0	0	10.05	1356.75	4.711	3.71	18.61	40.46	40.456	0.000	**40.46**	**18.9%**	**480**
P517326	MH23874	MH23873	0.234	66.683	2	0	0	6.7	1363.45	4.734	3.71	18.67	40.62	40.621	0.000	**40.62**	**19.3%**	**456**
P517324	MH23873	MH23872	0.451	67.133	5	0	0	16.75	1380.2	4.792	3.71	18.80	40.99	40.994	0.000	**40.99**	**19.7%**	**444**
P517325	MH23872	MH23871	0.319	67.453	3	0	0	10.05	1390.25	4.827	3.70	18.89	41.23	41.232	0.000	**41.23**	**19.5%**	**455**
P517334	MH23871	Waverley Ro	9.878	77.331	78	0	0	261.3	1651.55	5.735	3.65	21.65	47.81	47.809	0.000	**47.81**	**12.5%**	**1394**
390 Waverley Road PS														47.809	0.000	**47.81**	**FULL**	**0**

205 68 420

200 Waverley Road PS System

Pipe	U/S Manhole	D/S Manhole	Area (ha)	Total Area (ha)	Single Unit Houses (units)	Town Houses (units)	Multi-Unit Houses (units)	Population (people)	Total Population (people)	Average DWF (L/s)	Peaking Factor	I/I Allowance (L/s)	Design Flow (L/s)	Total Design Flow: Res (L/s)	Total Design Flow: ICI (L/s)	Total Design Flow (L/s)	Pipe Capacity (Percent Full)	Ramaining Capacity (L/s)
P518354	MH19605	MH19599	37.547	114.878	195	0	0	653.25	2304.8	8.003	3.54	32.17	33.77	33.774	0.000	**33.77**	**47.0%**	**41**
P45427	MH19599	MH19600	0.000	114.878	0	0	0	0	2304.8	8.003	3.54	32.17	33.77	34.541	0.000	**34.54**	**41.8%**	**60**
			1.374	1.374	6	0	0	20.1	20.1	0.070	4.38	0.38	0.77					
P518355	MH19600	MH28701	0.000	114.878	0	0	0	0	2304.8	8.003	3.54	32.17	33.77	36.090	0.000	**36.09**	**42.8%**	**58**
			1.576	2.950	18	0	0	60.3	80.4	0.279	4.27	0.83	2.32					
P518356	MH28701	MH28702	0.000	114.878	0	0	0	0	2304.8	8.003	3.54	32.17	33.77	79.166	0.000	**79.17**	**68.9%**	**17**
			59.263	62.213	457	0	74	1697.45	1777.85	6.173	3.62	17.42	45.39					
P518370	MH28702	MH28710	0.000	114.878	0	0	0	0	2304.8	8.003	3.54	32.17	33.77	79.436	0.000	**79.44**	**59.2%**	**41**
			0.623	62.836	2	0	0	6.7	1784.55	6.196	3.62	17.59	45.66					
P518371	MH28710	MH28703	0.656	178.370	1	0	0	3.35	4092.7	14.211	3.32	49.94	109.00	108.997	0.000	**109.00**	**61.7%**	**47**
P518357	MH28703	MH19573	2.845	181.215	5	0	0	16.75	4109.45	14.269	3.32	50.74	110.01	110.006	0.000	**110.01**	**52.8%**	**91**
P518375	MH19573	MH28712	13.576	194.791	28	44	38	326.7	4436.15	15.403	3.29	54.54	117.94	117.940	2.272	**120.21**	**59.7%**	**60**
			2.438	2.438	-	-	-	212	212	0.848	1.50	0.68	2.27					
P518376	MH28712	MH19557	22.449	217.240	202	0	0	676.7	5112.85	17.753	3.24	60.83	132.64	132.638	2.272	**134.91**	**65.0%**	**43**
P518358	MH19557	MH28704	0.625	217.865	4	0	0	13.4	5126.25	17.799	3.23	61.00	132.98	132.978	2.272	**135.25**	**59.1%**	**71**
P518359	MH28704	MH28705	0.728	218.593	6	0	0	20.1	5146.35	17.869	3.23	61.21	133.43	133.428	2.272	**135.70**	**59.0%**	**72**
P518360	MH28705	MH19567	0.957	219.550	5	0	0	16.75	5163.1	17.927	3.23	61.47	133.90	133.902	2.272	**136.17**	**43.0%**	**218**
P518361	MH19567	MH28706	3.370	222.920	16	0	0	53.6	5216.7	18.114	3.23	62.42	135.50	135.503	2.272	**137.78**	**42.7%**	**226**
P518362	MH28706	MH19208	1.671	224.591	5	0	0	16.75	5233.45	18.172	3.23	62.89	136.18	136.176	2.272	**138.45**	**46.1%**	**180**
P47672	MH19208	MH20986	54.529	279.120	342	242	0	1956.4	7189.85	24.965	3.10	78.15	174.75	174.748	13.467	**188.21**	**38.4%**	**415**
			5.220	5.220	-	-	-	660	660	2.634	1.50	1.46	6.40					
			5.940	5.940	-	-	-	418	418	1.670	1.50	1.66	4.79					
P47452	MH20986	MH20987	0.342	279.461	2	0	0	6.7	7196.55	24.988	3.09	78.25	174.92	174.921	13.653	**188.57**	**29.8%**	**787**
			0.291	0.291	-	-	-	40	40	0.042	2.00	0.08	0.19					
P47453	MH20987	MH20988	0.267	279.728	0	0	0	0	7196.55	24.988	3.09	78.32	175.00	174.996	15.309	**190.30**	**44.6%**	**274**
			0.183	0.183	-	-	-	50	50	0.052	2.00	0.05	0.18					
			0.641	0.641	-	-	-	130	130	0.518	2.00	0.18	1.47					
P47454	MH20988	MH20989	0.160	279.888	1	0	0	3.35	7199.9	25.000	3.09	78.37	175.08	175.079	15.309	**190.39**	**50.2%**	**188**
P47455	MH20989	MH20990	22.343	302.231	136	6	50	588.2	7788.1	27.042	3.06	84.62	188.12	188.116	16.120	**204.24**	**59.4%**	**104**
			1.966	1.966	-	-	-	100	100	0.104	2.00	0.55	0.81					
P47456	MH20990	MH20991	1.402	303.633	1	0	0	3.35	7791.45	27.054	3.06	85.02	188.55	188.547	16.120	**204.67**	**57.7%**	**119**
P47457	MH20991	MH20992	1.814	305.447	17	0	0	56.95	7848.4	27.251	3.06	85.53	189.71	189.706	16.822	**206.53**	**73.8%**	**24**
			0.646	0.646	-	-	-	200	200	0.208	2.00	0.18	0.70					
P47458	MH20992	MH20993	0.176	305.623	0	0	0	0	7848.4	27.251	3.06	85.57	189.76	189.755	16.822	**206.58**	**57.6%**	**121**
P47459	MH20993	MH20972	1.301	306.924	1	0	0	3.35	7851.75	27.263	3.06	85.94	190.16	190.158	16.822	**206.98**	**65.0%**	**67**
P455700	MH20972	MH40500	38.859	345.783	366	0	0	1226.1	9077.85	31.520	3.00	96.82	214.87	214.875	20.144	**235.02**	**65.2%**	**75**
			1.784	1.784	-	-	-	377	377	1.505	1.50	0.50	3.32					
P455701	MH40500	MH40501	1.703	347.486	2	0	0	6.7	9084.55	31.544	3.00	97.30	215.43	215.426	24.947	**240.37**	**68.5%**	**55**
			0.252	0.252	-	-	-	96	96	0.756	4.00	0.07	3.85					
			1.085	1.085	-	-	-	250	250	0.260	2.00	0.30	0.95					

P455702	MH40501	MH40502	0.308	347.794	1	0	0	3.35	9087.9	31.555	3.00	97.38	215.55	215.550	25.407	**240.96**	**54.4%**	**178**
			0.452	0.452	-	-	-	288	288	0.067	4.00	0.13	0.46					
P455703	MH40502	Waverley Ro	0.287	348.080	0	0	0	0	9087.9	31.555	3.00	97.46	215.63	215.630	25.407	**241.04**	**55.5%**	**164**
200 Waverley Road PS			0.000	348.080	0	0	0	0	9087.9	31.555	3.00	97.46	215.63	215.630	25.407	**241.04**	**FULL**	**0**
P518366	MH19605	MH28707	0.000	114.878	0	0	0	0	2304.8	8.003	3.54	32.17	33.77	33.774	0.000	**33.77**	**45.3%**	**46**
P518367	MH28707	MH28708	0.000	114.878	0	0	0	0	2304.8	8.003	3.54	32.17	33.77	33.774	0.000	**33.77**	**42.7%**	**55**
P518368	MH28708	MH28709	0.000	114.878	0	0	0	0	2304.8	8.003	3.54	32.17	33.77	33.774	0.000	**33.77**	**42.8%**	**55**
P518369	MH28709	MH28710	0.000	114.878	0	0	0	0	2304.8	8.003	3.54	32.17	33.77	33.774	0.000	**33.77**	**45.7%**	**45**

CBCL LIMITED

Consulting Engineers

www.CBCL.ca

Nova Scotia: Halifax, Sydney
Prince Edward Island: Charlottetown
New Brunswick: Saint John, Fredericton, Moncton
Newfoundland & Labrador: St. John's, Happy Valley-Goose Bay

ITEM #6
June 21, 2018
ATTACHMENT C

NORTH

SPIDER LAKE RD.
HIGHWAY 118
LAKE CHARLES
WAVERLEY RD.
MONTAGUE RD.
BARRY'S RUN
FUTURE 107 BYPASS
FOREST HILLS PARKWAY EXTENSION
BREEZE DR.
WRIGHT AVE.
BURNSIDE DRIVE
CALEDONIA RD.
AVE. DU PORTAGE EXT.
AVE. DU PORTAGE
BURNSIDE INDUSTRIAL PARK
DARTMOUTH CROSSING
SHUBIE PARK
LAKE MIC MAC
LAKE LOON
TOPSAIL LAKE
WHEBBY RACE-TRACK LANDS
UNIA LANDS
CONRAD LANDS
PORT WALLACE HOLDINGS LTD.

EX. AKERLEY RESERVOIR
TWL: 119 m (390 FT)

MAXIMUM GROUND ELEVATION WITHIN CONRAD LANDS NO HIGHER THAN 70 m (229 FT)
PROP. PORT WALLACE DEVELOPMENT BOUNDARY
PROP. 300ø WATERMAIN
EXISTING 400ø HIGHWAY CROSSING
FUTURE CHECK VALVE (TYP.)
ASSUMED FUTURE REDUCED ZONE BOUNDARY
FUTURE CLOSED VALVE (TYP.)
FUTURE PRV ASSUMED HGL = 340 FT
TRENCHLESS CROSSING
FUTURE. 600ø TRANSMISSION MAIN TWINNING FOR REGIONAL SERVICING
CONNECT PROP. 400ø TO EX. 600ø AT CALEDONIA RD.
EX. 300ø TO REMAIN
EX. 600ø
FUTURE 600ø

PW–1 PW–2 PW–3 PW–4 PW–5 PW–6 PW–7 PW–8 PW–9 PW–10

1.1a 1.1b 1.2a 1.2b 1.2c 1.3a 1.4a 1.4b 1.5

LEGEND

- PROP. WATERMAIN (300ø & LARGER)
- PROP. WATERMAIN (250ø & LESS)
- EX. WATERMAIN (LESS THAN 350ø)
- EX. WATERMAIN (350ø & GREATER)
- EX. WATERMAIN (1050ø & GREATER)

No.	Description	Date	By
D	REVISED FOR REISSUED FINAL RPT	15 JAN/18	JAB
C	REVISED FOR FINAL REPORT	27 OCT/17	JAB
B	RE-ISSUED FOR FINAL DRAFT	30 AUG/17	JAB
A	ISSUED FOR DRAFT REPORT	16 AUG/17	JAB

Revision or Issue

HALIFAX

PORT WALLACE MASTER PLAN INFRASTRUCTURE STUDY

WATER SYSTEM MASTER PLAN

HALIFAX

CBCL LIMITED
Consulting Engineers

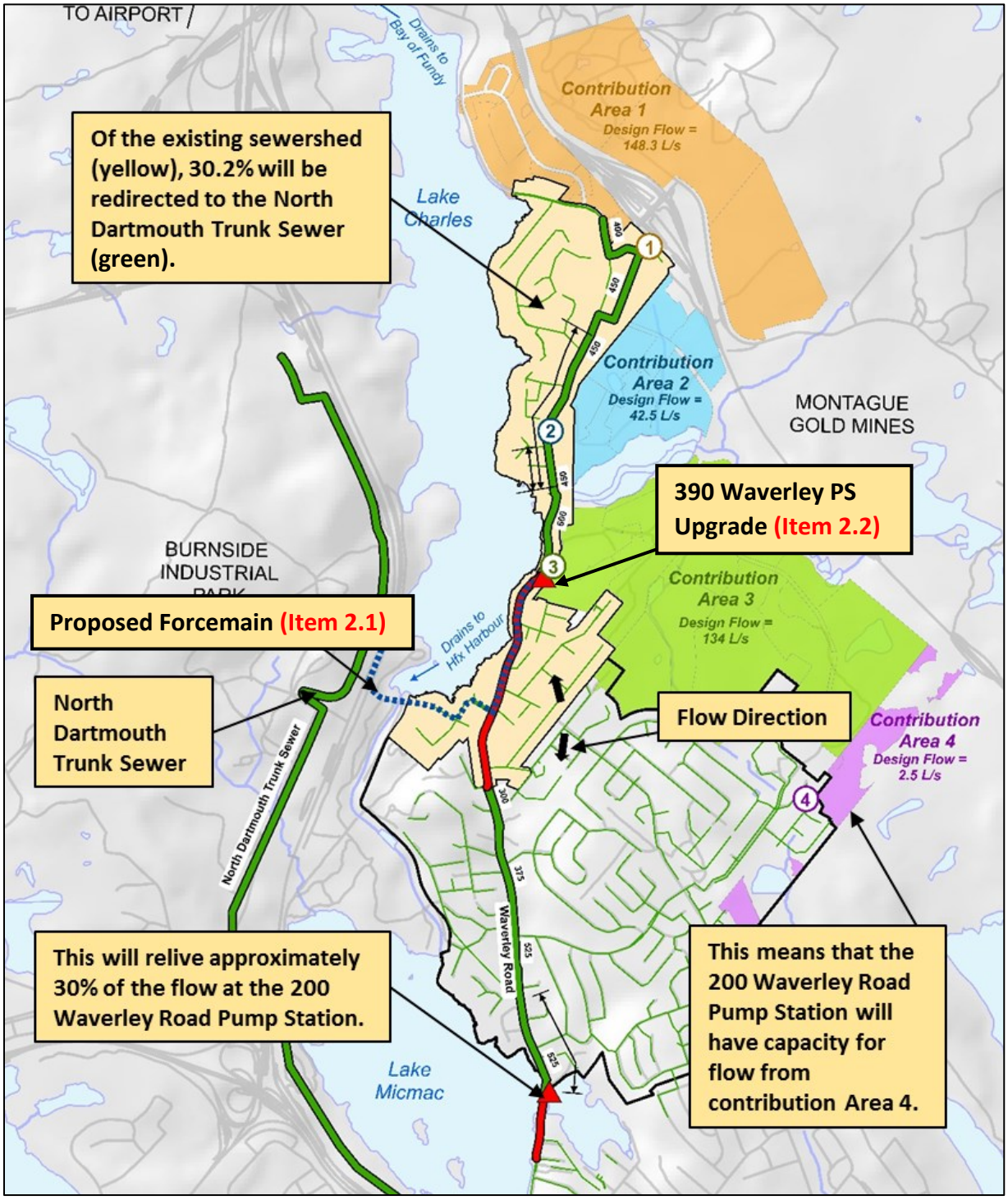
CBCL No	Contract No	Date	Scale
171013.00		AUG 2017	N.T.S.

Designed	Drawn
JC	BWM
Checked	Approved
	JAB

Sheet No 1 of 1

Drawing No 18

DRAWING NAME: K:\PROJECTS\171013.00 PORT WALLACE MASTER PLAN INFRASTRUCTURE STUDY\20 CAD\01 CIVIL\ARTF WATER\171013.00 - BASEPLAN-ARCHD.JC.DWG LAYOUT NAME: 6.2 PLOT DATE: January-19-18 3:21:32 PM CAD OPERATOR: JCAIR



Item #	Item Name	Development Trigger	Cost
2.1	Forcemain – Sanitary Line c/w Rd Reinstatement from 390 Waverley PD to North Dartmouth – Wright Ave	0%	$ 3,626,000
2.2	390 Waverley Rd PS	0%	$ 2,387,000

Figure: Proposed Rerouting of Wastewater Flow from 390 Waverley Road Pump Station to North Dartmouth Trunk Sewer.

CBCL LIMITED
Consulting Engineers

OPINION PROBABLE CONSTRUCTION COST
MASTER PLAN PORT WALLACE
1.0 - WATER SERVICE
Halifax / Dartmouth, NS

DATE:	18/01/2017
CBCL FILE No.:	171013.00
EST. DESCRIPTION:	Class D
PREPARED BY:	CBCL

						Cost Sharing Mechanism				Notes
						HRM/HW Charges Area Portion		Developer Charge Area Portion		
1.0 WATER SYSTEM INFRASTRUCTURE		**Unit**	**Est Qty**	**Unit Rate**	**Total**	**%**	**$**	**%**	**$**	
1.2a	400mm Diameter Primary Watermain Upsize	m	2,700	$ 300	$ 810,000	0%		100%	$ 810,000	Shared Cost Among Developers
1.2b	400mm Diameter Watermain to Conrad Lands Upsize	m	420	$ 300	$ 126,000	0%		100%	$ 126,000	Shared Cost Among Developers
1.2c	400mm Diameter Watermain from Caledonia Rd to parallel existing 300 mm	m	770	$ 1,300	$ 1,001,000	0%		100%	$ 1,001,000	Shared Cost Among Developers
1.3a	300mm Diameter Mains from Waverly Road			Base Cost						Base Cost not evaluated
1.4a	300mm Diameter Watermain within Conrad Lands			Base Cost						Base Cost not evaluated
1.4b	300mm Diameter Watermain off Waverly Rd			Base Cost						Base Cost not evaluated
1.5	300mm Diameter Watermain Connection to Spider Lake			Base Cost						Base Cost not evaluated
ESTIMATED TOTAL CONSTRUCTION COST (Including General Conditions & Contingencies)					**$ 2,000,000**		**$ -**		**$ 2,000,000**	
11.0	**CONTINGENCIES and ALLOWANCES**			Included in Units						
A	Design Development Contingency - **Note 2**			Included in Units						
B	Construction Contingency - **Note 3**			Included in Units						
C	Escalation / Inflation **(Based on 2017 Dollars)**			Included in Units						
D	Location Factor - **Note 4**			Included in Units						

ESTIMATED TOTAL CONSTRUCTION COST without HST $ 2,000,000

Note 1	The summary only provide costs, allowances, contingencies & factors related to construction. Engineering fees not included.
Note 2	A Design Development Cont. is to allow so that the necessary design changes can be made as the design is developed.
Note 3	A Construction Contingency is to allow for the cost of additional work that is over and above the original contract price.
Note 4	Location Factor is to account for difference in costs at project location and location of historical cost data.

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORESEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Form CBCL 034.Rev 0

CBCL LIMITED
Consulting Engineers

OPINION PROBABLE CONSTRUCTION COST
MASTER PLAN PORT WALLACE
2.0 - WASTEWATER SERVICES
Halifax / Dartmouth, NS

DATE:	30/10/2017
CBCL FILE No.:	171013.00
EST. DESCRIPTION:	Class D
PREPARED BY:	CBCL

							Cost Sharing Mechanism				Notes
							HRM/HW Charges Area Portion		Developer Charge Area Portion		
2.0 WASTEWATER INFRASTRUCTURE		**Unit**	**Est Qty**	**Unit Rate**	**Total**		**%**	**$**	**%**	**$**	
2.1	Forcemain- Sanitary Line c/w Rd Reinstatement from 390 Waverly Rd PS to North Dartmouth - Wright Ave	m	3,200	$ 1,616	$ 5,180,000		30%	$ 1,554,000	70%	$ 3,626,000	Shared between developer and HW
	Shubie Canal & Highway 118 Crossing not included see Item 3.0 Below										
2.2	**390 Waverly Road Pump Station**	Ea	1	$ 3,407,801	$ 3,410,000		30%	$ 1,023,000	70%	$ 2,387,000	Shared between developer and HW
	.1 Civil Earthworks, Excavation, Site Finishes	LS	1	$ 611,566							
	.2 Concrete Work	LS	1	$ 802,364							
	.3 Building Structure	LS	1	$ 242,494							
	.4 Pump Equipment & Piping3	LS	1	$ 1,194,336							
	.5 Building Mechanical & Piping	m2	125	$ 177,206							
	.6 Building Electrical & Instrumentation	LS	1	$ 359,040							
3.1 & 3.2	Crossing of canal and highway	LS	1	$ 4,700,000	$ 4,700,000		30%	$ 1,410,000	70%	$ 3,290,000	
	See separate broken out cost estimate										
ESTIMATED TOTAL CONSTRUCTION COST (Including General Conditions & Contingencies)					**$ 13,300,000**			**$ 4,000,000**		**$ 9,400,000**	
11.0	**CONTINGENCIES and ALLOWANCES**			Included in Units							
A	Design Development Contingency - **Note 2**			Included in Units							
B	Construction Contingency - **Note 3**			Included in Units							
C	Escalation / Inflation **(Based on 2017 Dollars)**			Included in Units							
D	Location Factor - **Note 4**			Included in Units							
ESTIMATED TOTAL CONSTRUCTION COST without HST $ 13,300,000											

Note 1 The summary only provide costs, allowances, contingencies & factors related to construction. Engineering fees not included.
Note 2 A Design Development Cont. is to allow so that the necessary design changes can be made as the design is developed.
Note 3 A Construction Contingency is to allow for the cost of additional work that is over and above the original contract price.
Note 4 Location Factor is to account for difference in costs at project location and location of historical cost data.

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORESEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

Form CBCL 034.Rev 0

HALIFAX WATER

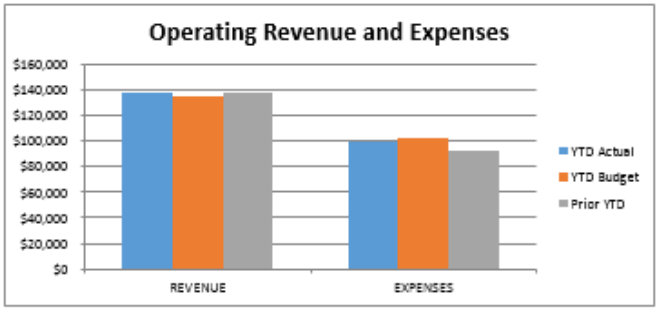
Capital Cost Contribution Report

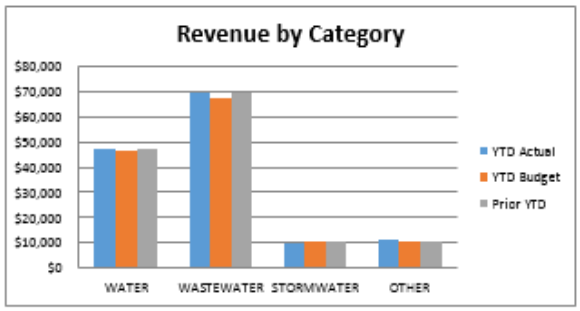
Summary to March 31, 2017

Capital Cost Contribution Area		Receivables	Disbursements	Cumulative
Beaverbank		$1,332,814	($1,762,046)	($429,232)
Bedford South - Water		$3,093,299	($2,074,291)	$1,019,007
Bedford South - Wastewater		$2,239,457	($1,022,796)	$1,216,661
Bedford West - Water		$4,163,855	($4,435,592)	($271,738)
Bedford West - Wastewater		$8,125,285	($16,374,194)	($8,248,909)
Birch Cove North - Water		$1,986,386	($2,187,869)	($201,482)
Herring Cove		$1,385,726	($698,579)	$687,148
Lakeside Timberlea		$741,708	($1,264,654)	($522,946)
Morris Russell Lake		$1,128,095	($363,291)	$764,804
Northgate		$585,772	($788,960)	($203,188)
Sackville Lively		$400,096	($567,455)	($167,359)
Geizer Hill		$967,154	($1,504,806)	($537,652)
Grand Total		**$26,149,646**	**($33,044,532)**	**($6,894,886)**

FINANCIAL

HALIFAX WATER
UNAUDITED FINANCIAL INFORMATION
APRIL 1/17 - MARCH 31/18 (12 MONTHS)
'000



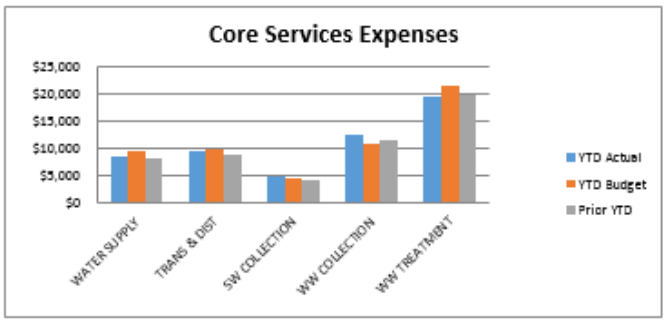


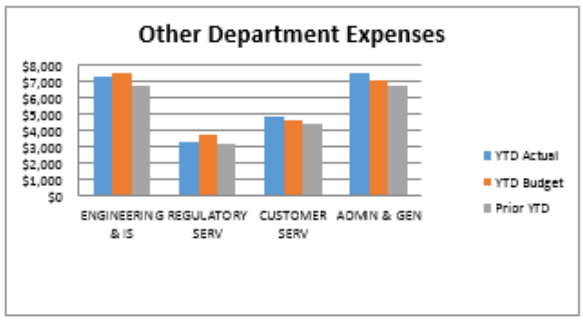
OPERATING REVENUE AND EXPENSES

	YTD Actual	YTD Budget	Prior YTD	% of Budget
REVENUE	$138,145	$135,587	$137,997	101.89%
EXPENSES	$99,437	$101,883	$92,822	97.60%
	$38,708	**$33,704**	**$45,175**	**114.85%**

REVENUE BY CATEGORY

	YTD Actual	YTD Budget	Prior YTD
WATER	$47,220	$46,610	$47,183
WASTEWATER	$69,394	$67,756	$69,475
STORMWATER	$10,015	$10,582	$10,542
OTHER	$10,316	$10,639	$10,797
	$138,145	**$135,587**	**$137,997**



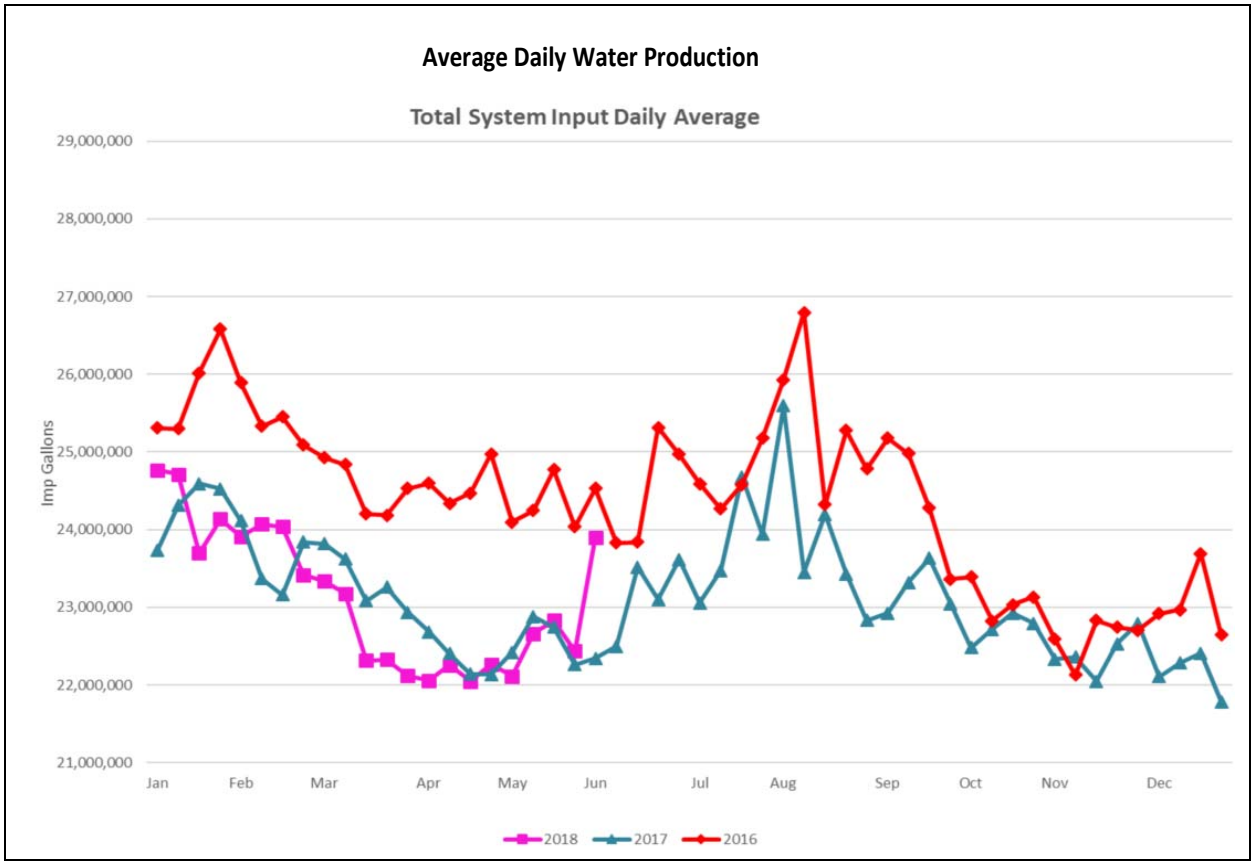


CORE SERVICES EXPENSES

	YTD Actual	YTD Budget	Prior YTD	% of Budget
WATER SUPPLY	$8,646	$9,638	$8,050	89.70%
TRANS & DIST	$3,410	$9,842	$8,997	95.61%
SW COLLECTION	$4,842	$4,620	$4,097	104.81%
WW COLLECTION	$12,642	$10,959	$11,639	115.36%
WW TREATMENT	$19,647	$21,349	$19,794	92.03%
	$55,186	**$56,407**	**$52,576**	**97.84%**

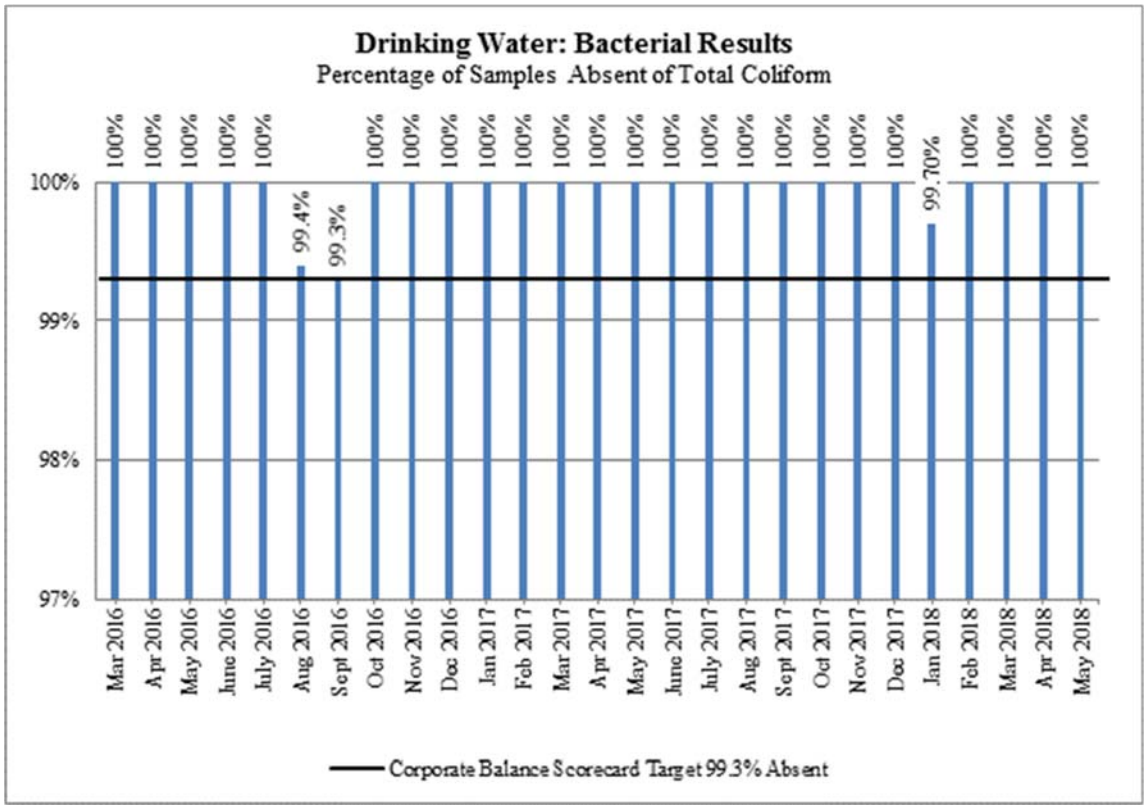
OTHER DEPARTMENT EXPENSES

	YTD Actual	YTD Budget	Prior YTD
ENGINEERING & IS	$7,265	$7,504	$6,725
REGULATORY SERV	$3,291	$3,710	$3,207
CUSTOMER SERV	$4,896	$4,626	$4,431
ADMIN & GEN	$7,538	$7,096	$6,782
	$22,989	**$22,938**	**$21,146**



Regional Water Main Break/Leak Data		
Year	**Total Breaks/Leaks**	**Current 12 Month Rolling Total *(up to May31, 2018)***
2017/18	206	192
2016/17	216	
2015/16	226	
2014/15	210	
2013/14	213	
Total	**1071**	
Yr. Avg.	**214.2**	

Water Accountability
Losses per Service Connection/Day (International Water Association Standard)
Period Ending March 31, 2018
Real Losses: 199 litres CBS Target: 180



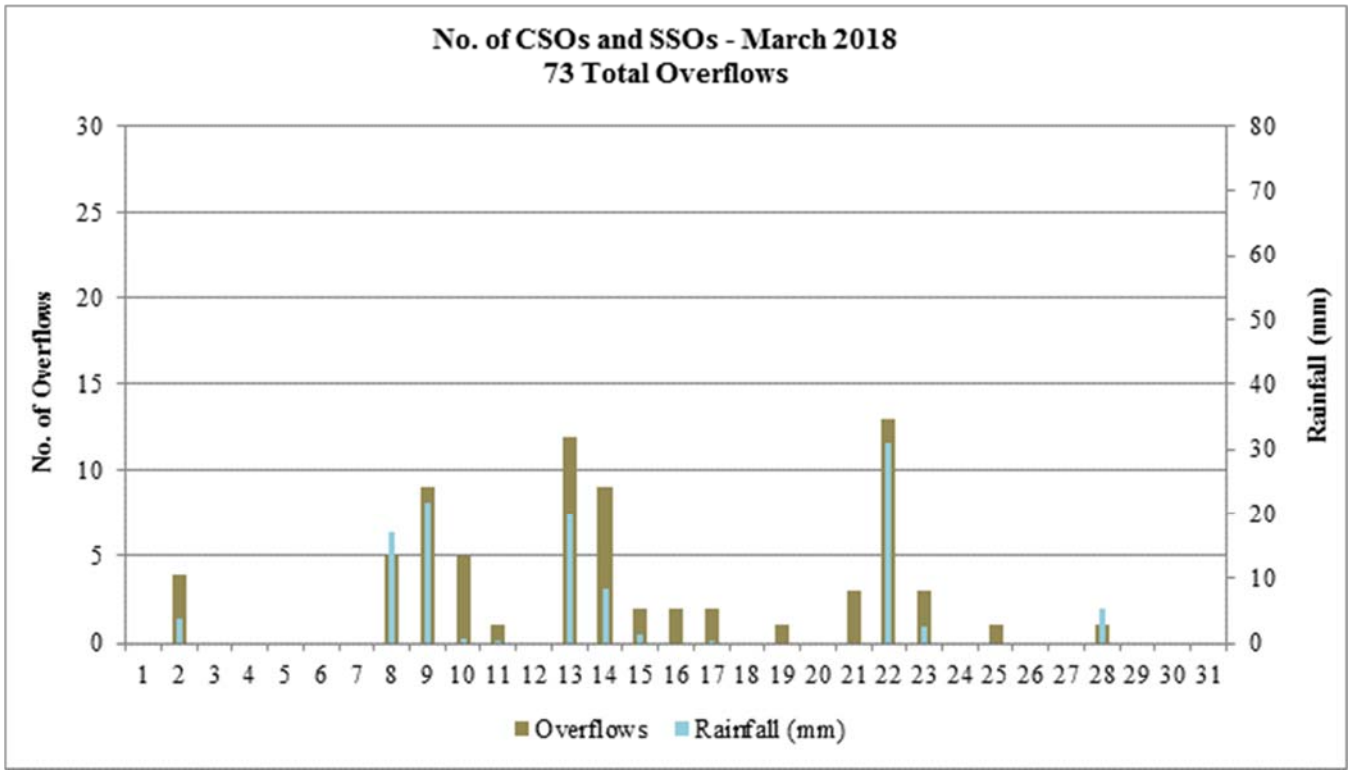
Water Quality Master Plan Objectives 2017-2018 Q4				
Objective	Total Sites	% of Sites Achieving Target	All Sites: 90th Percentile < 15 µg/L	CBSC Awarded Points
Disinfection	64	92%	---	12
Total Trihalomethanes	25	100%	---	20
Haloacetic Acids	21	100%	---	20
Particle Removal	5	95%	---	15
Corrosion Control	69	---	5.59	20
TOTAL				87

In this report each facility is assessed using monthly or quarterly averages, depending on the averaging period specified in its Approval to Operate.

Wastewater Treatment Facility	**Wastewater Treatment Facility Compliance Summary** Rolling Averages - March, April and May 2018																Toxicity	Trend
	$CBOD_5$ (mg/L)		TSS (mg/L)		E. coli (counts/ 100mL)		pH		Ammonia (mg/L)		Phosphorous (mg/L)		TRC (mg/L)		Dissolved Oxygen (mg/L)			
	NSE Limit	Avg.	NSE Limit	Avg.	NSE Limit	Avg.	NSE Limit	Avg.	NSE Limit	Avg.	NSE Limit	Avg.	NSE Limit	Avg.	NSE Limit	Avg.		
Halifax	50	46	40	23	5000	480	6-9	6.9	-		-		-		-		Not acutely lethal	Continued
Dartmouth	50	26	40	36	5000	183	6-9	6.9	-		-		-		-		Not acutely lethal	Continued
Herring Cove	50	24	40	21	5000	11	6-9	6.9	-		-		-				Not acutely lethal	Continued
Eastern Passage	25	5	25	6	200	4	6-9	7.1	-		-		-		-		Not acutely lethal	Continued
Mill Cove	25	11	25	18	200	15	6-9	6.7	-		-		-		-		Not acutely lethal	Continued
Springfield	20	5	20	19	200	14	6-9	6.7	-		-		-		-		-	Continued
Frame	20	5	20	1	200	10	6-9	6.7	-		-		-		-		-	Continued
Middle Musq.	20	12	20	15	200	100	6-9	8.1	-		-		-		-		-	Improved
Uplands	20	5	20	6	200	10	6-9	6.2	-		-		-		-		-	Continued
Aerotech	5	6	5	10	200	42	6-9	7.1	5.7 W 1.2 S	14.3	0.5	2.0	-		6.5	6.8	Not acutely lethal	Improved
North Preston	10	10	10	48	200	10	6-9	6.8	3	0.4	1.5	1.0	-		-		-	Continued
Lockview	20	4	20	4	200	16	6.5-9	7.3	8.0 S	5.0	1.2 S	0.3	-		-		-	Continued
Steeves (Wellington)	20	2	20	1	200	10	6.5-9	7.5	14.4 S	0.1	1.0 S	0.1	-		-		-	Continued
BLT	15	5	20	20	200	12	6-9	7.2	5 W 3 S	5	3 W 1 S	2	0.02 *	0.10	-		Not acutely lethal	Improved
Avg. of all Facilities	12		16		65		7.0		4.9		1.0		0.18		6.8			

NOTES & ACRONYMS:
$CBOD_5$ - Carbonaceous 5-Day Biochemical Oxygen Demand
TSS - Total Suspended Solids
* TRC - Total Residual Chlorine - Maxxam can only measure 0.10 mg/L residual; results of 0.1 mg/L are compliant
W / S - Winter / Summer compliance limits
NSE requires monthly averages be less than the NSE Compliance Limit for each parameter (Dartmouth, Eastern Passage, Halifax, Herring Cove, Mill Cove)
NSE requires quarterly averages be less than the NSE Compliance Limit for each parameter (Aerotech, Lockview, Mid. Musq., Frame, BLT, Uplands, North Preston, Steeves, Springfield)
Continued - All parameters remain essentially unchanged since the last report
Improved - One or more parameter(s) became compliant since the last report
Declined - One or more parameters(s) became non-compliant since the last report

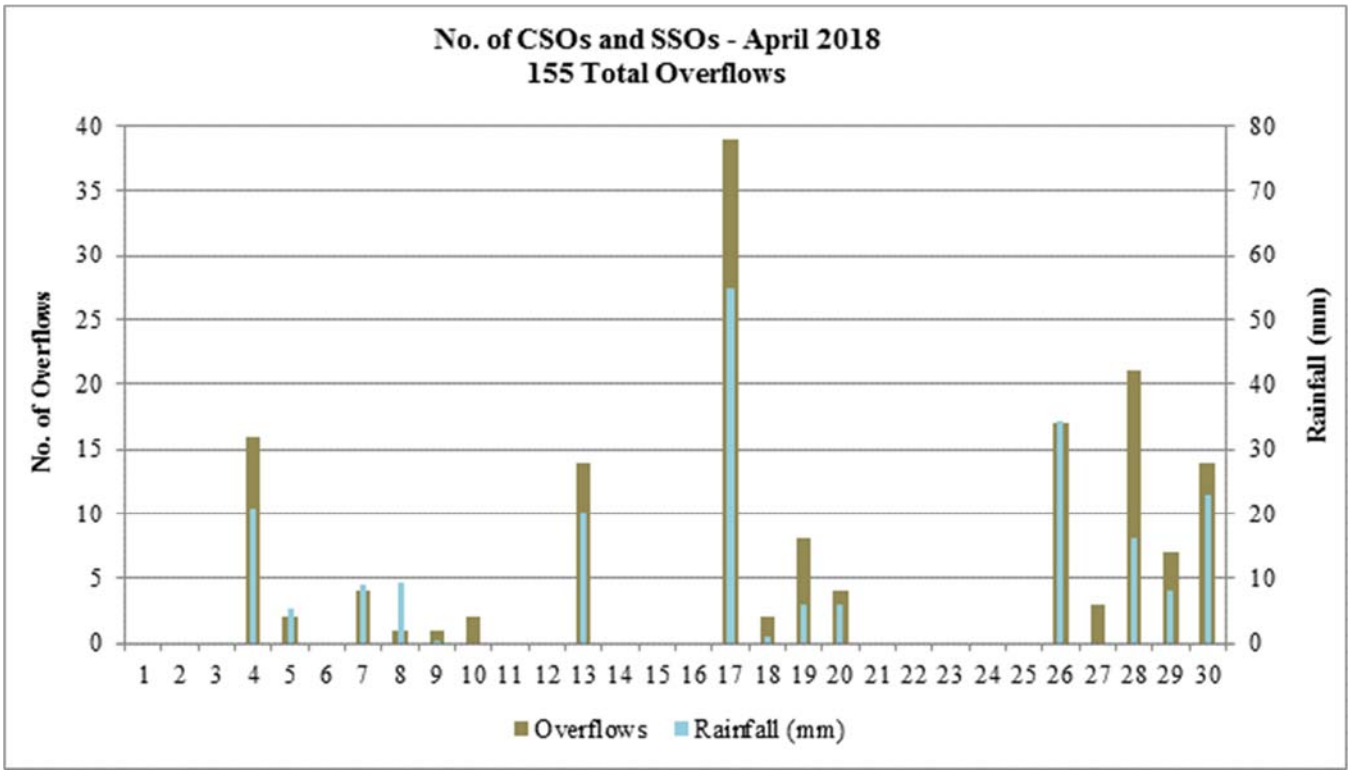
LEGEND
NSE Compliant
NSE Non-Compliant



NOTES & ACRONYMS: CSO - Combined Sewer Overflow SSO - Sanitary Sewer Overflow

- Rainfall data is from Halifax Water's rain gauge at the Halifax WWTF.
- There were seven overflows on days when there was no recorded rainfall, as follows:

1. March 16: The CSO at the Park Ave PS & CSO was due to blockages caused by debris. The SSO at the Amos Walter PS was caused by excessive inflow from a connection of a lateral into a wet area. Operations is in the process of repairing it.
2. March 19: The CSO at the Chain Rock PS & CSO was due to a partial obstruction in regulating valve that lead to a temporary (1 hour) CSO.
3. March 21: The CSOs at the Ferguson Rd CSO, Grove St CSO and Wallace St CSO were the result of a flow reduction to Jamieson St PS & CSO in order to facilitate maintenance.
4. March 25: The SSO at the Amos Walter PS was caused by excessive inflow from a connection of a lateral into a wet area. Operations is in the process of repairing it.

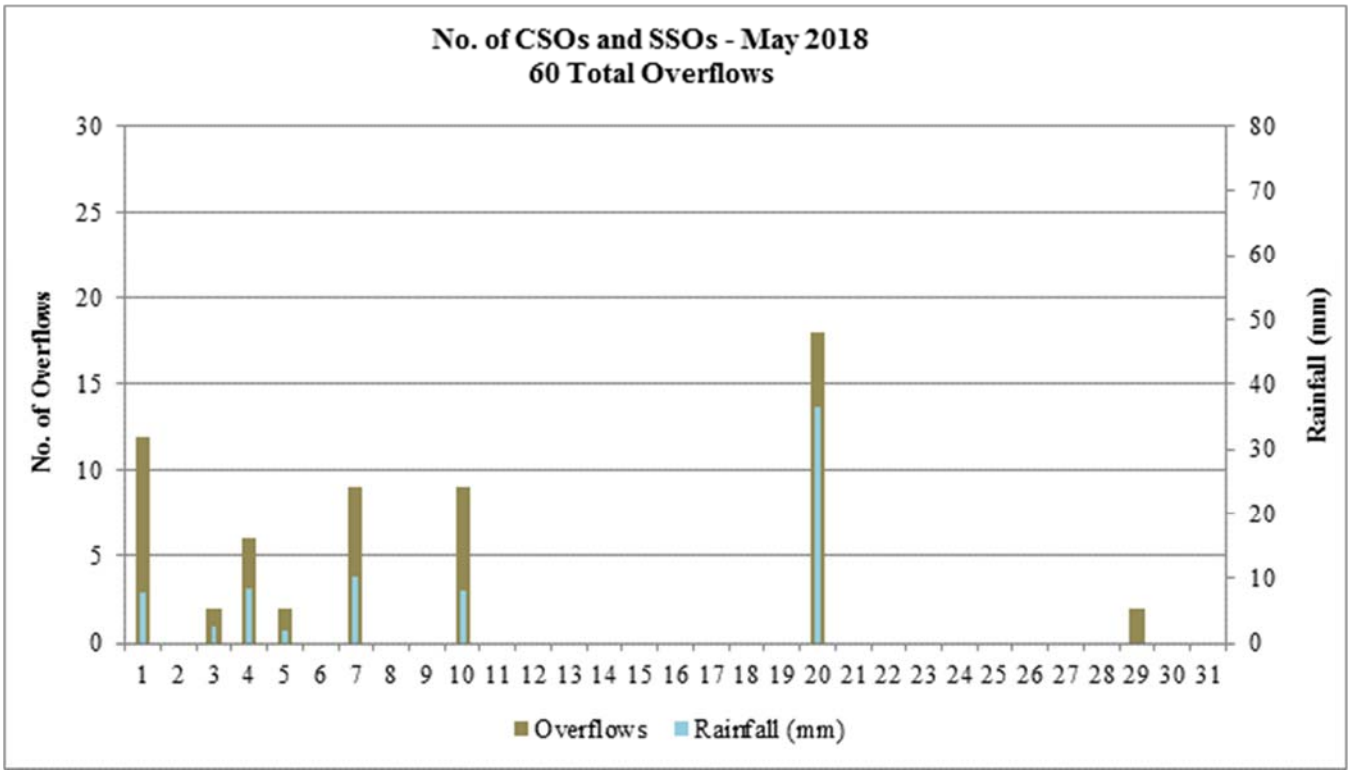


NOTES & ACRONYMS: CSO - Combined Sewer Overflow SSO - Sanitary Sewer Overflow

- Rainfall data is from Halifax Water's rain gauge at the Halifax WWTF.
- There were five overflows on days when there was no recorded rainfall, as follows:

    1. April 10: The CSOs at the Lyle St CSO and Park Ave PS & CSO were due to problems with the level transmitter at the Park Ave CSO which caused levels to rise for a short time in the system.

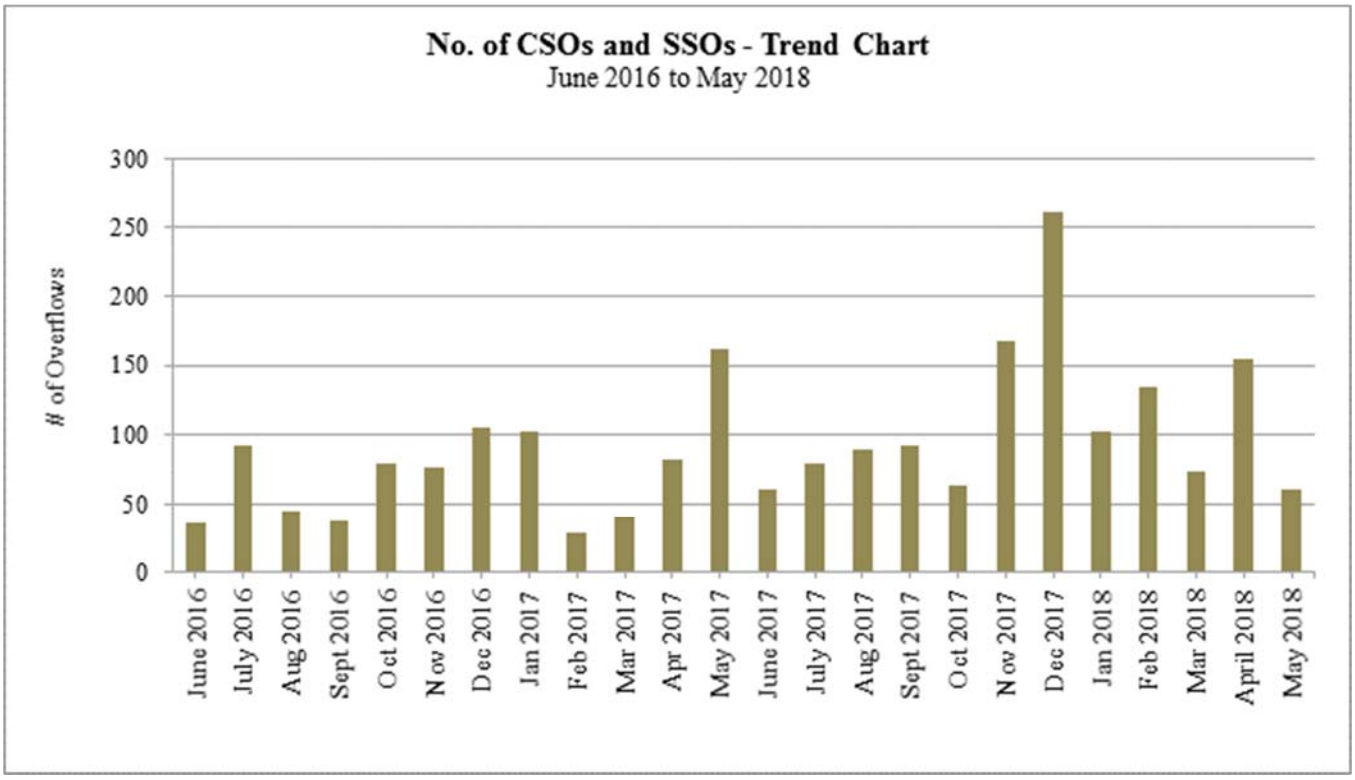
    2. April 27: The CSOs at the Duffus St PS, North St CSO and Pier A PS & CSO were all due to excessive rain on the previous day.

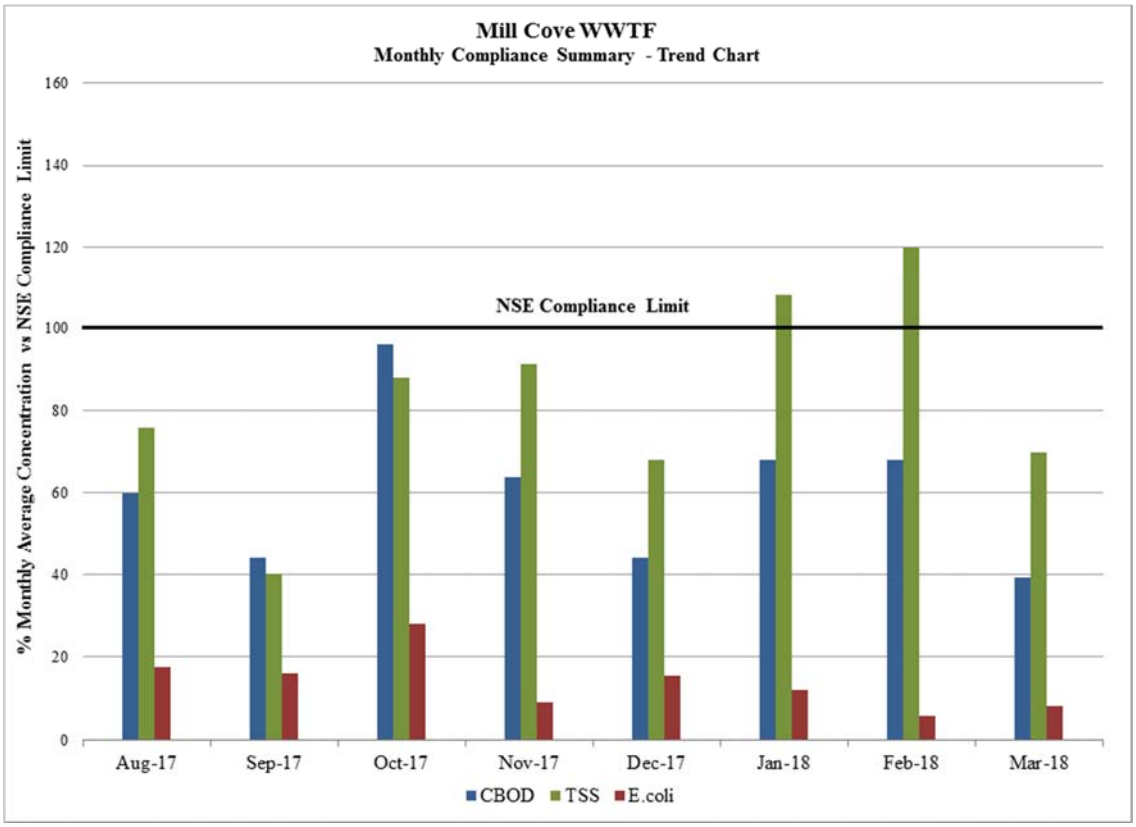


NOTES & ACRONYMS: CSO - Combined Sewer Overflow SSO - Sanitary Sewer Overflow

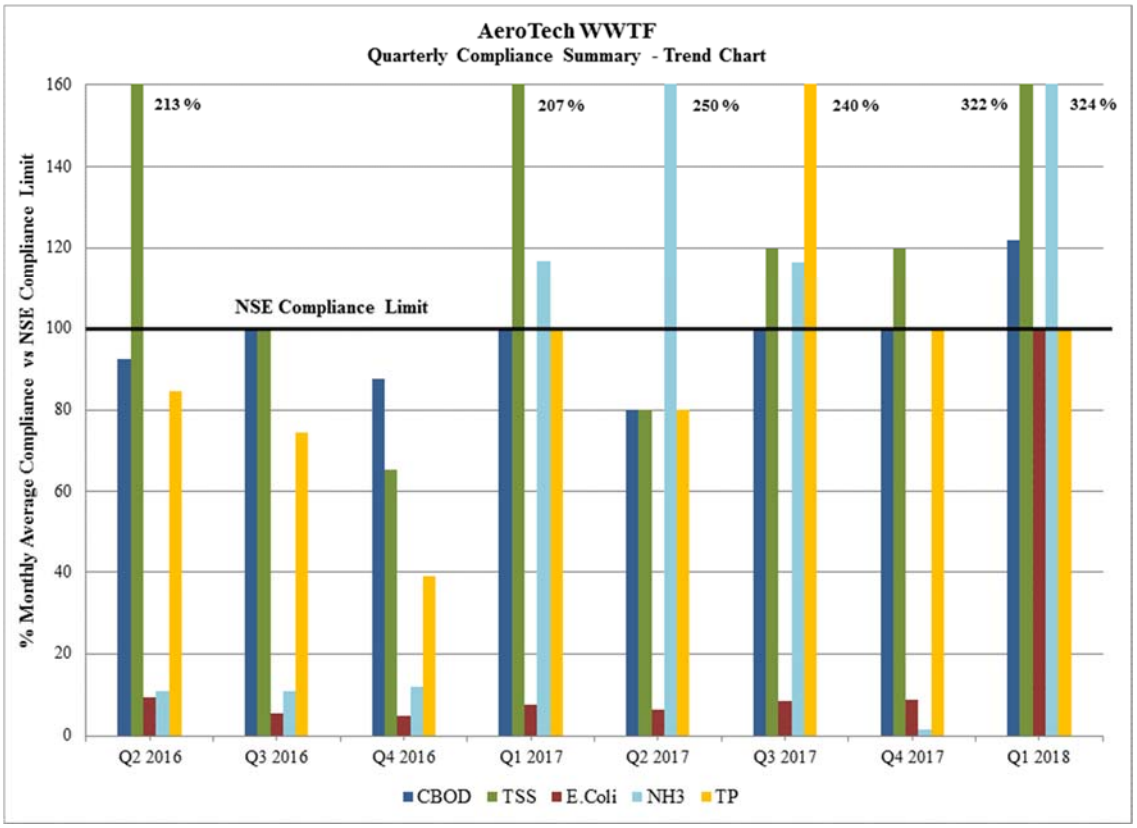
- Rainfall data is from Halifax Water's rain gauge at the Halifax WWTF.
- There were two overflows on days when there was no recorded rainfall, as follows:

    1. May 29: The CSOs at the Melva St PS & CSO and Lyle St CSO were both due to mechanical issues. The issues at these locations were fixed within a few hours.

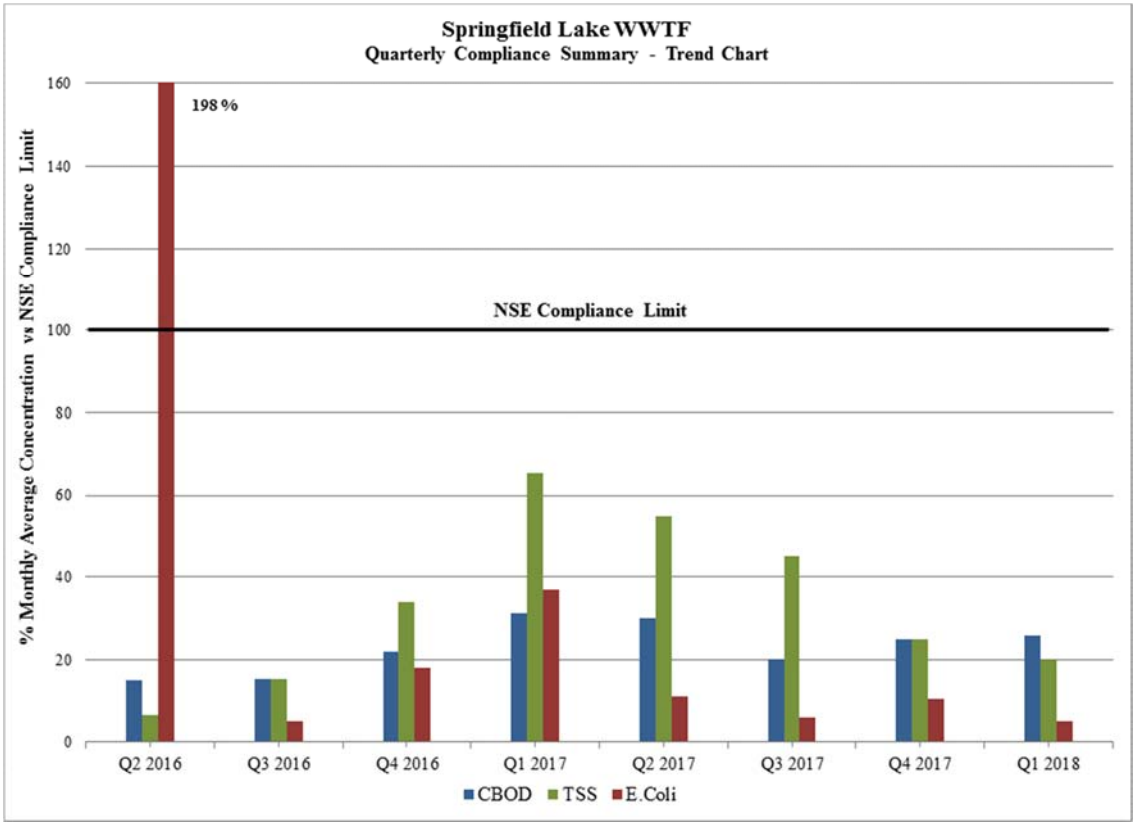




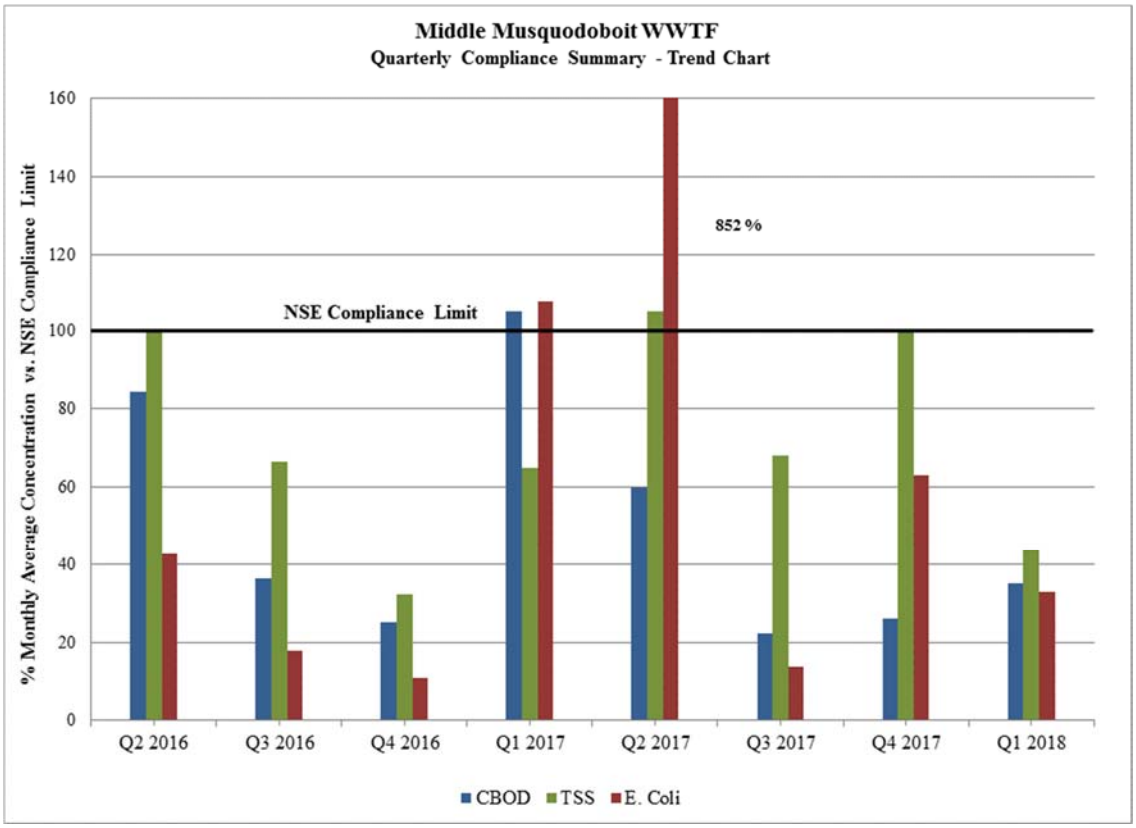
Lower numbers represent better performance.



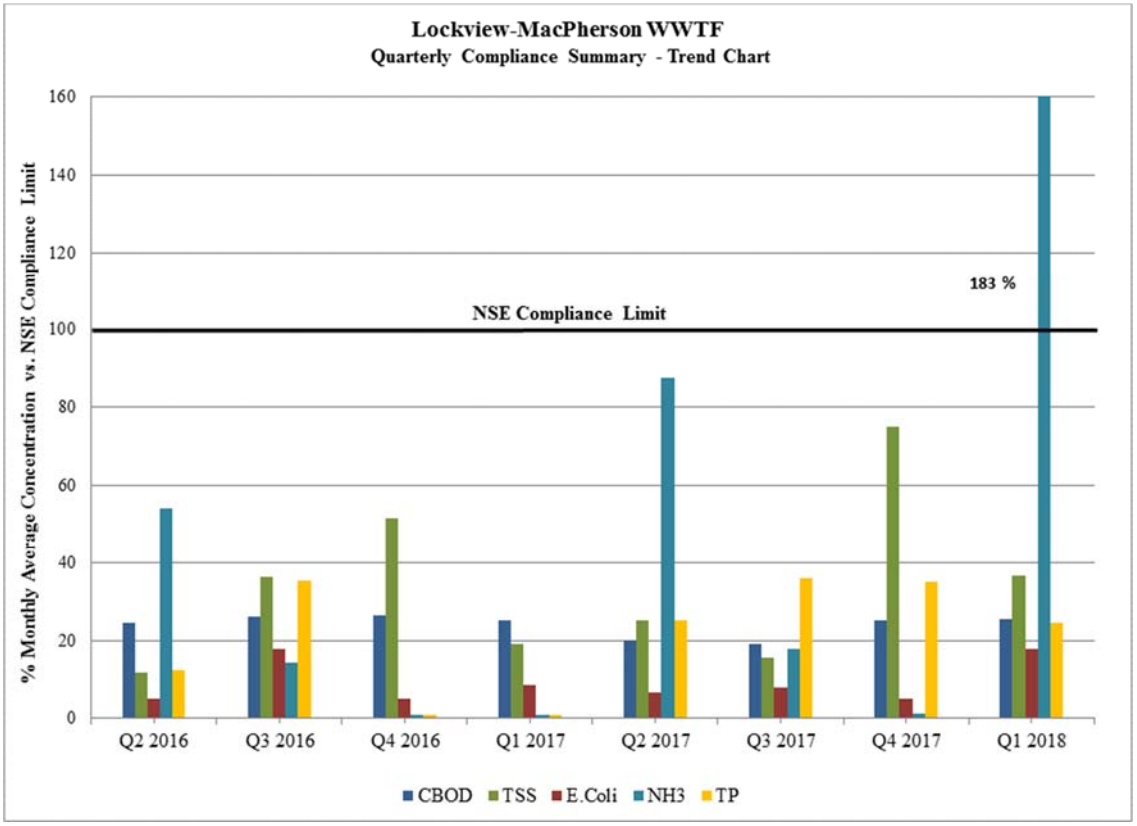
Lower numbers represent better performance.



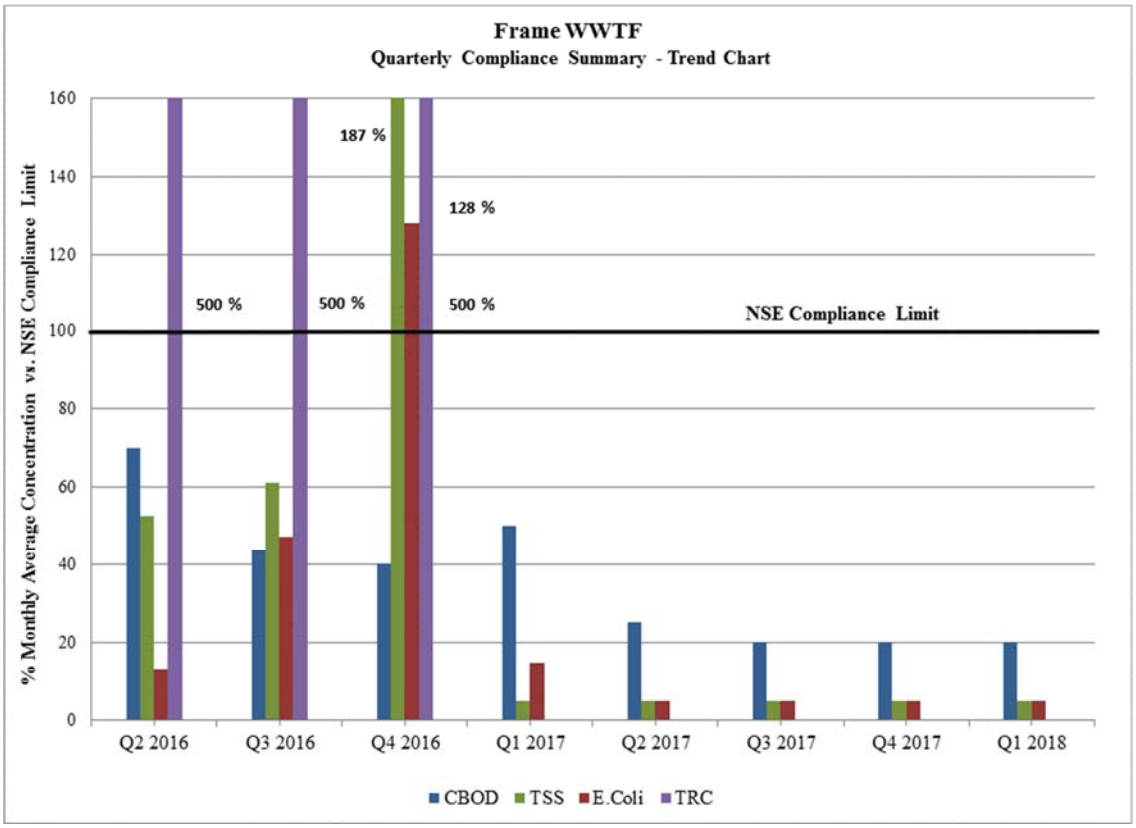
Lower numbers represent better performance.



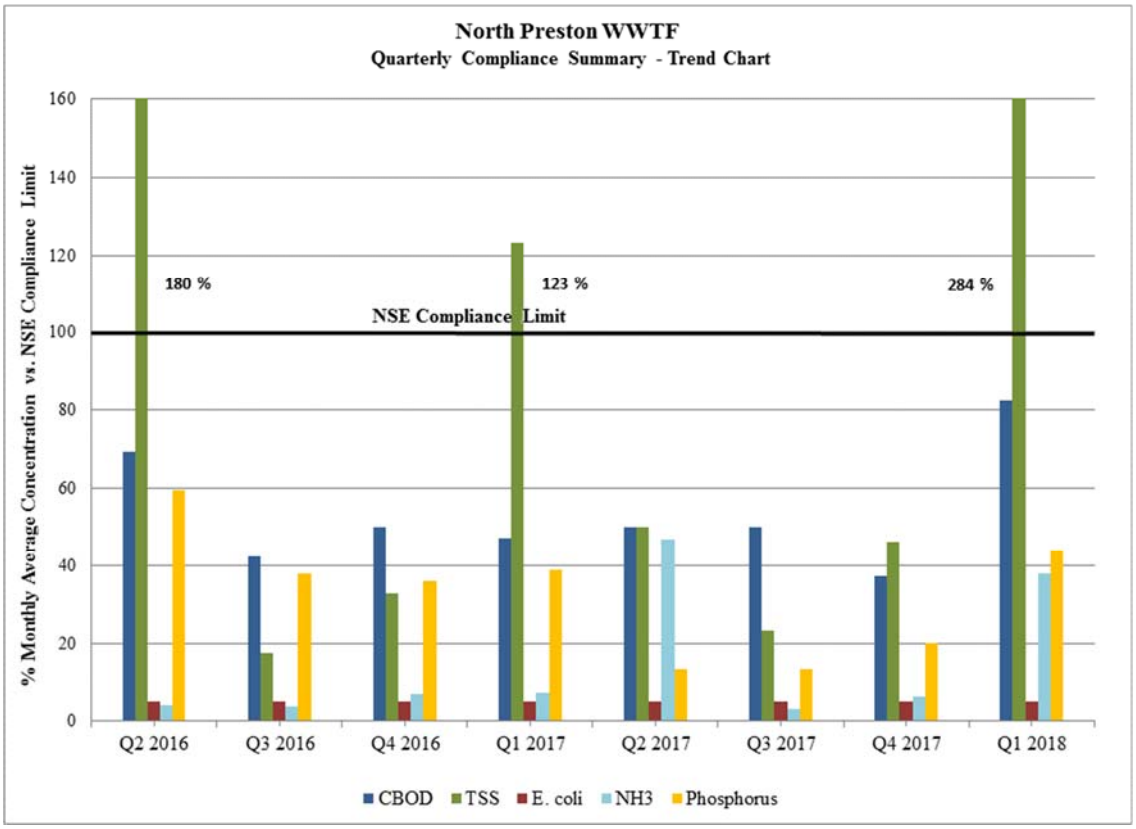
Lower numbers represent better performance.



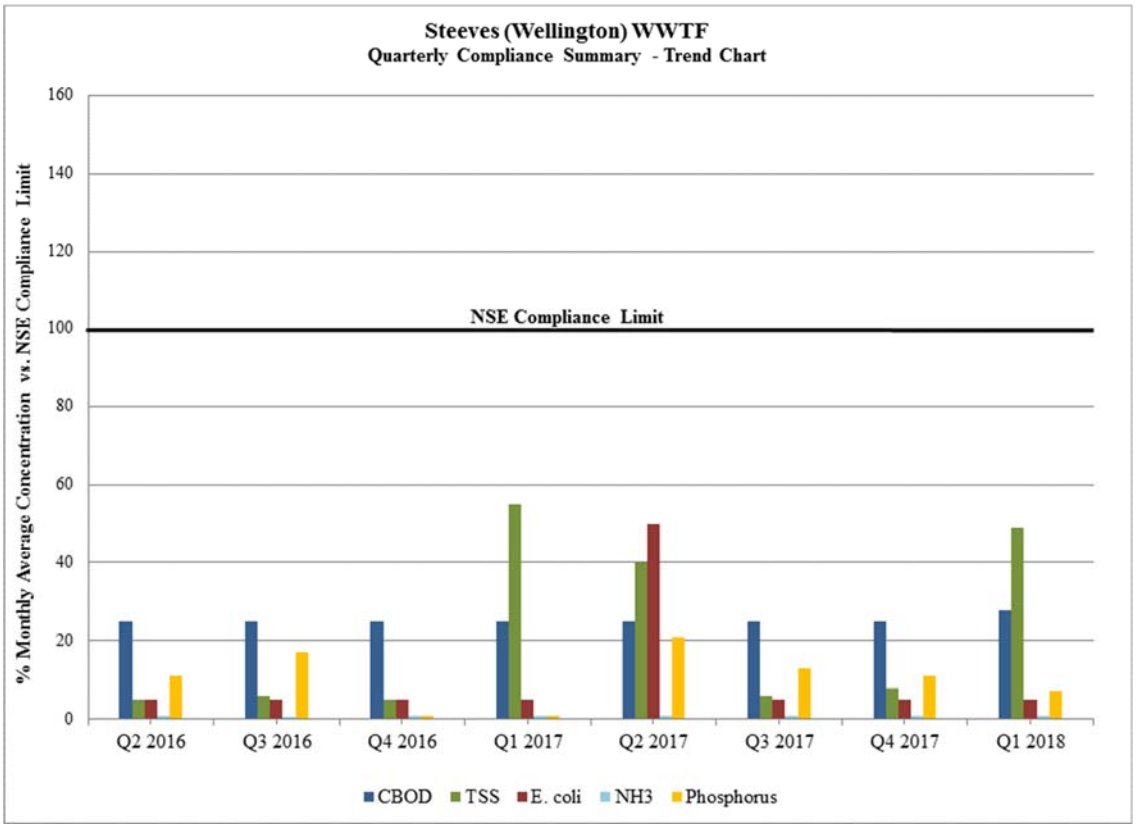
Lower numbers represent better performance



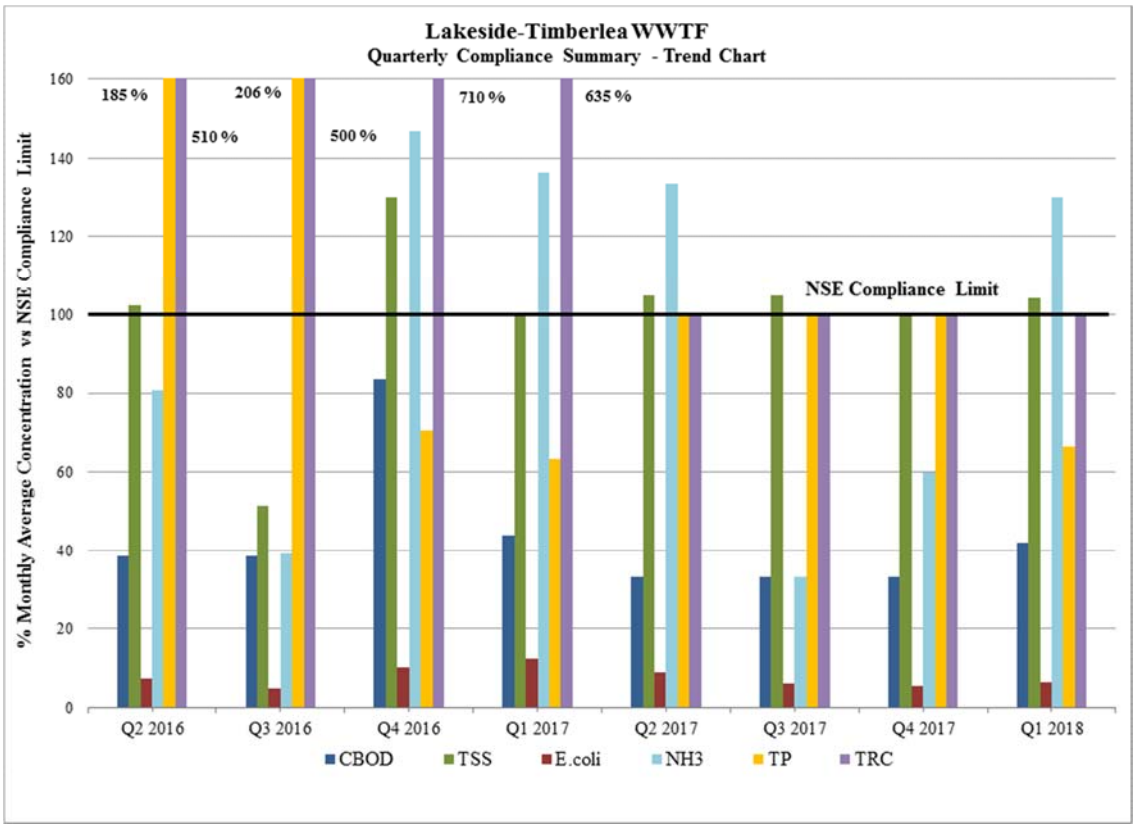
Lower numbers represent better performance.



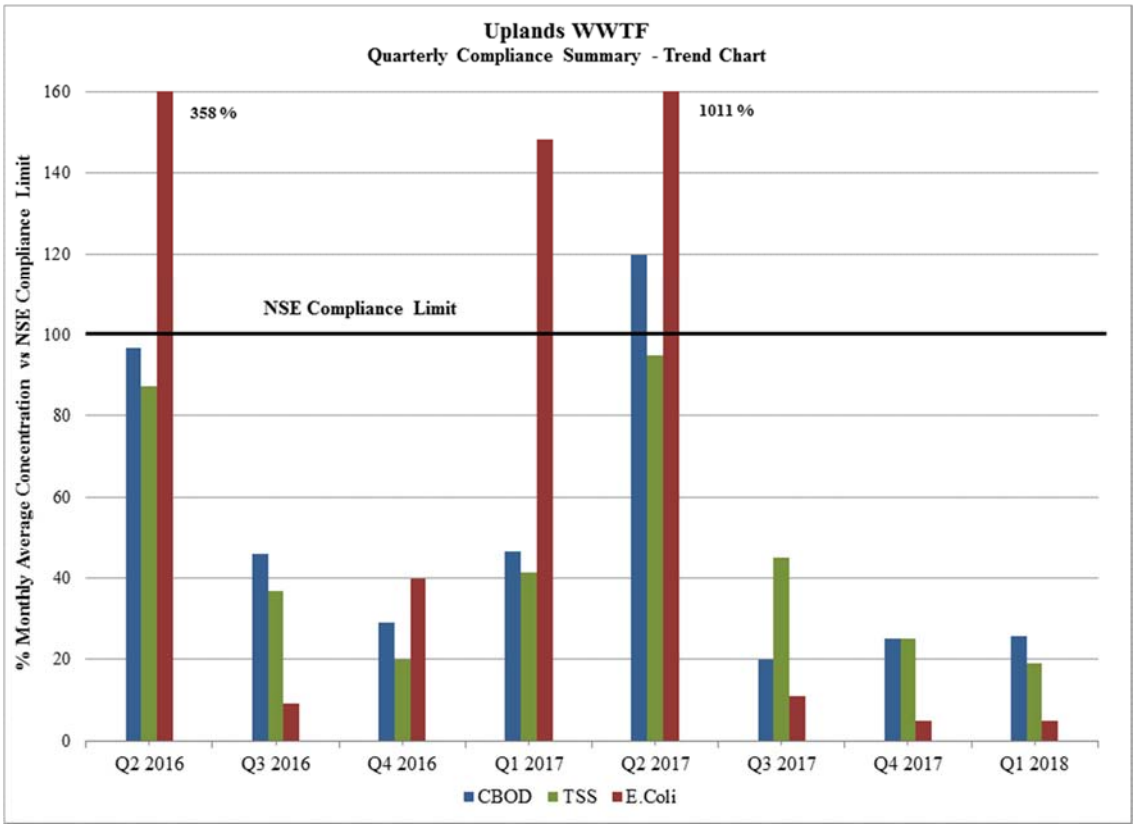
Lower numbers represent better performance.



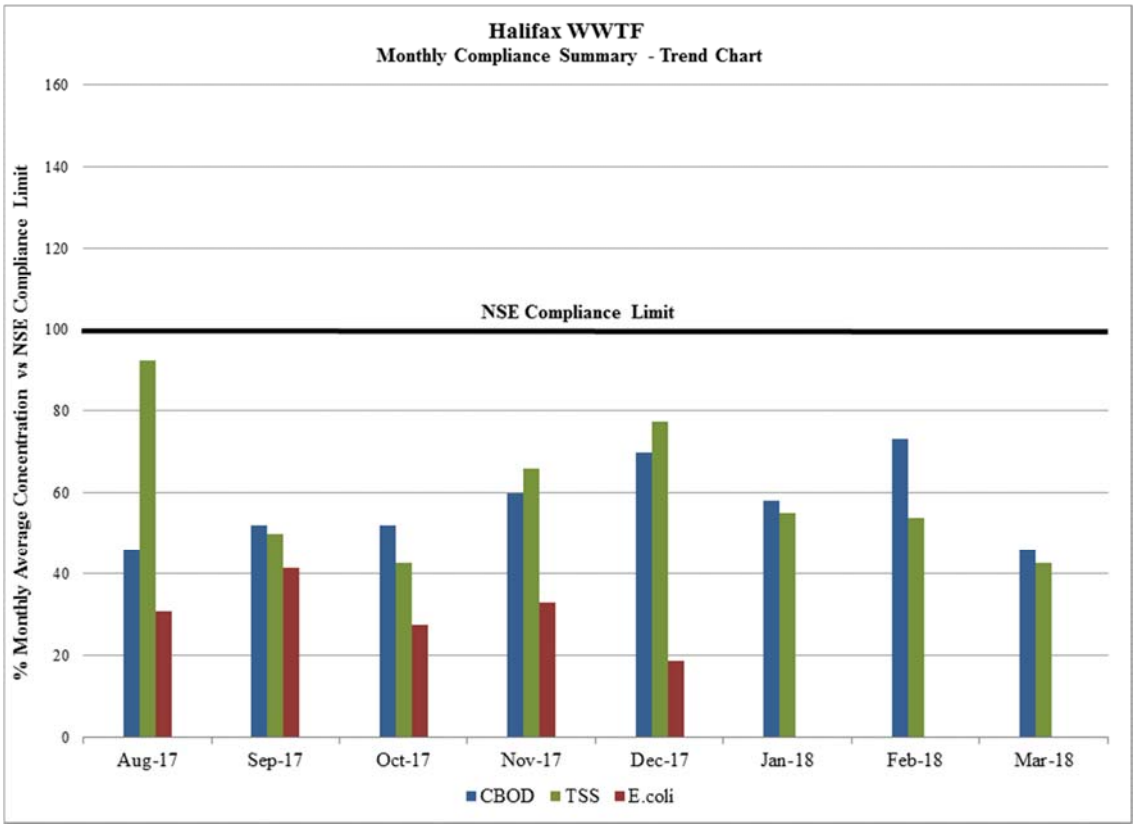
Lower numbers represent better performance.



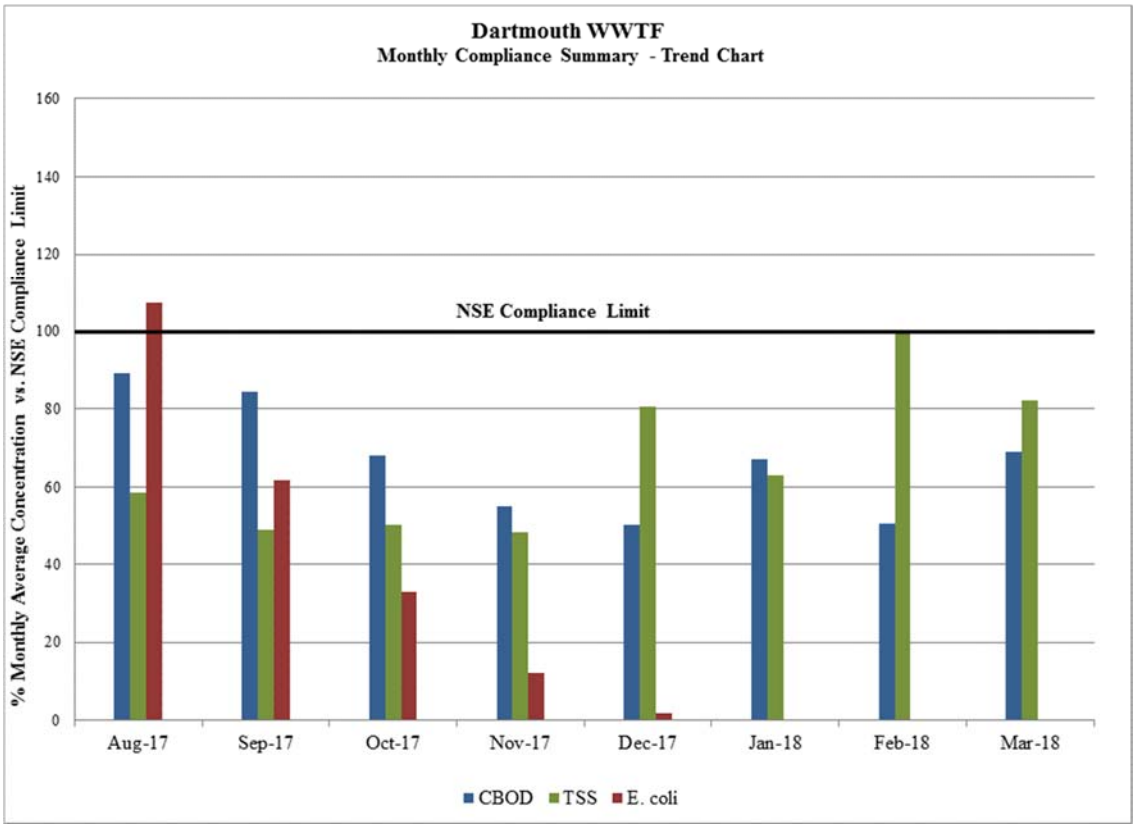
Lower numbers represent better performance



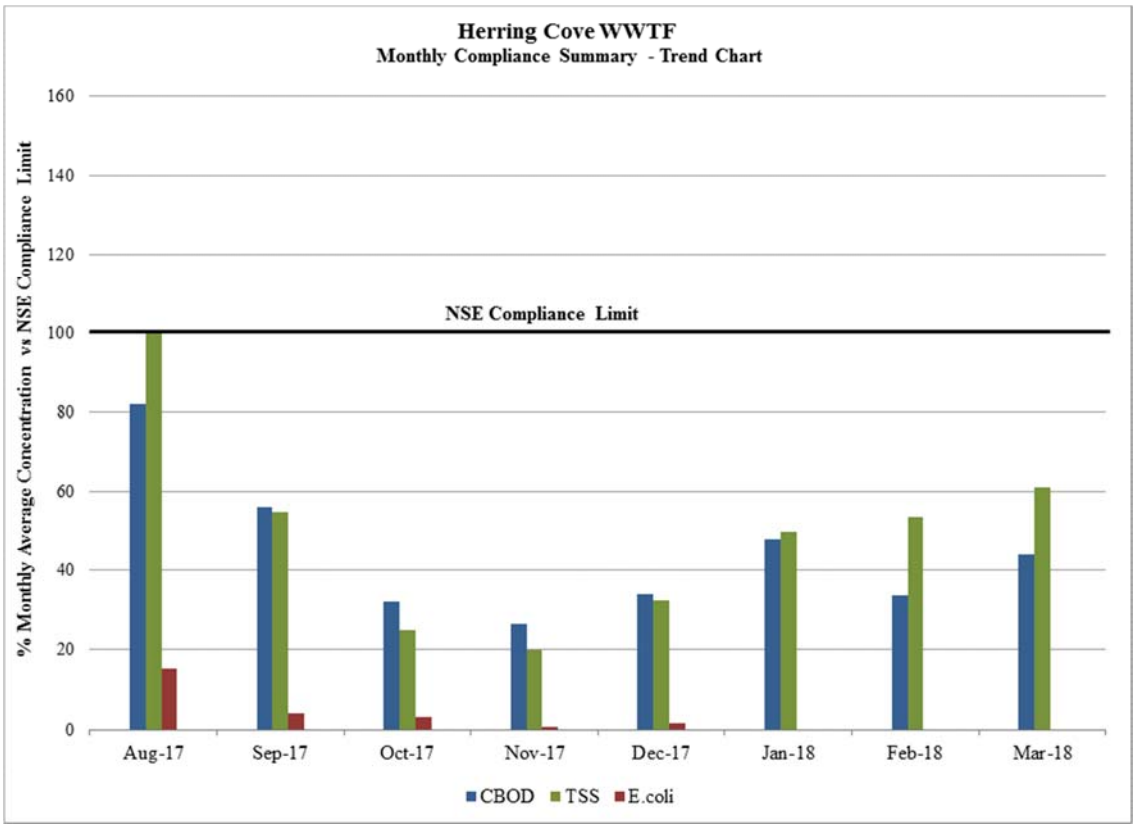
Lower numbers represent better performance.



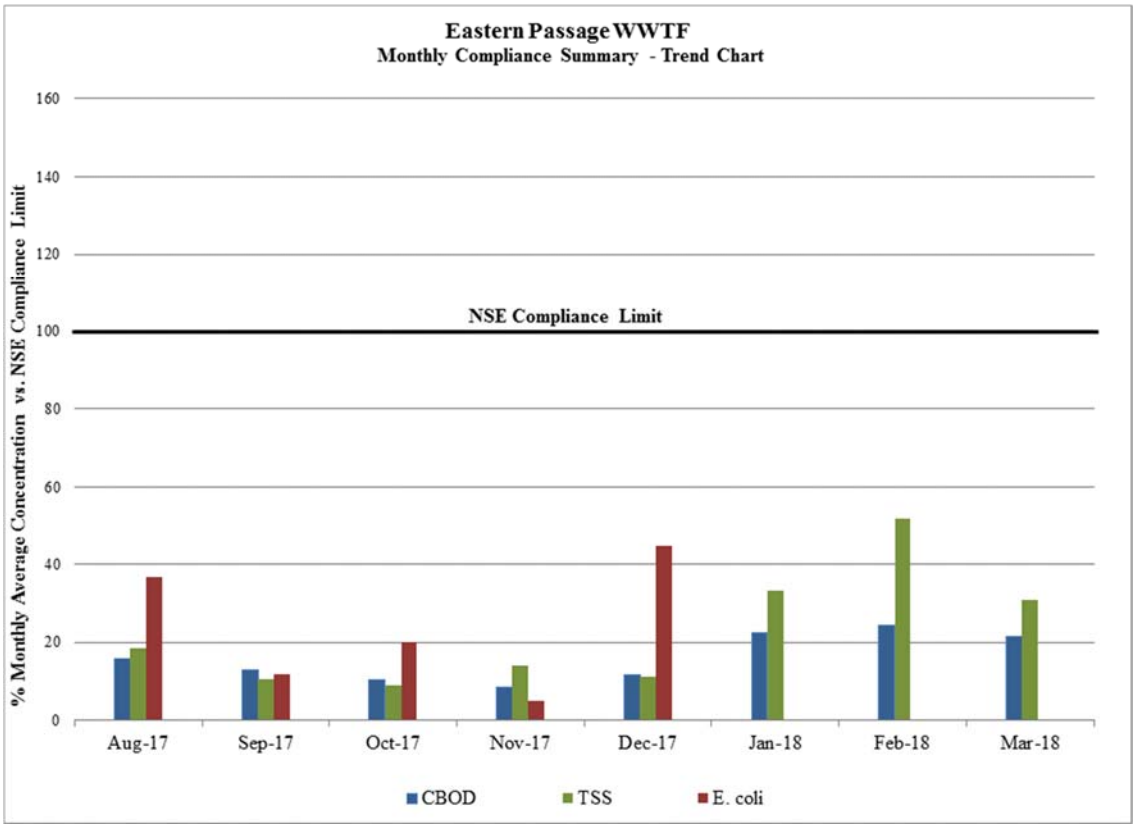
Lower numbers represent better performance.



Lower numbers represent better performance.



Lower numbers represent better performance.


Eastern Passage WWTF
Monthly Compliance Summary - Trend Chart
% Monthly Average Concentration vs. NSE Compliance Limit
160
140
120
NSE Compliance Limit
100
80
60
40
20
0
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
CBOD
TSS
E. coli

-

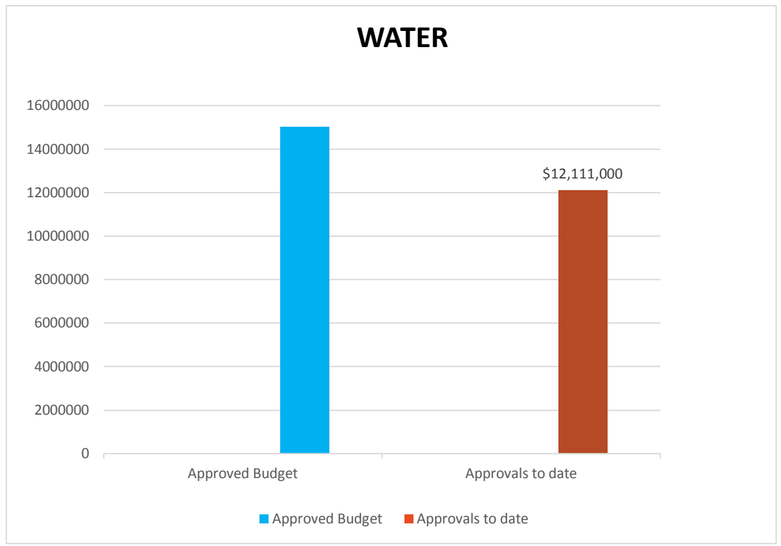
Halifax Water
Halifax Regional Water Commission

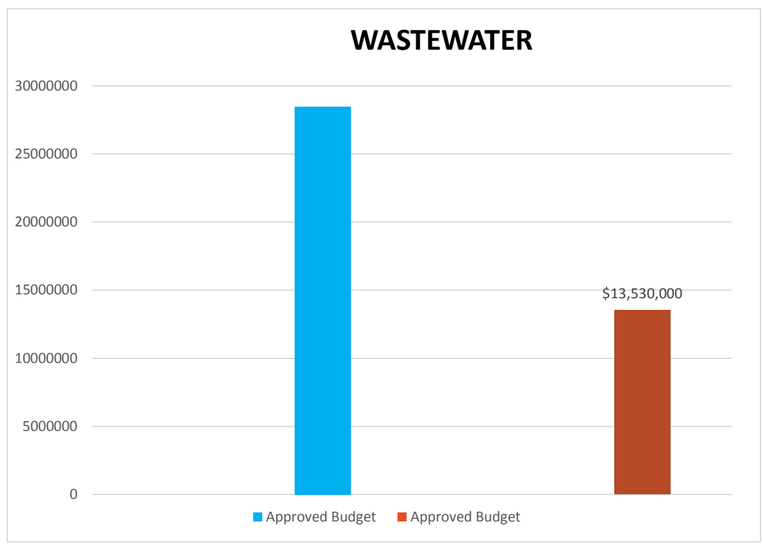
ITEM 2-I

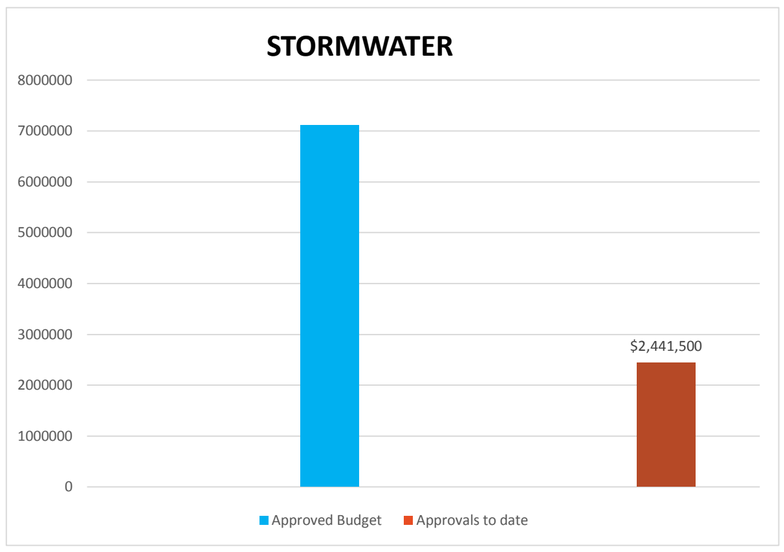
HRWC Board

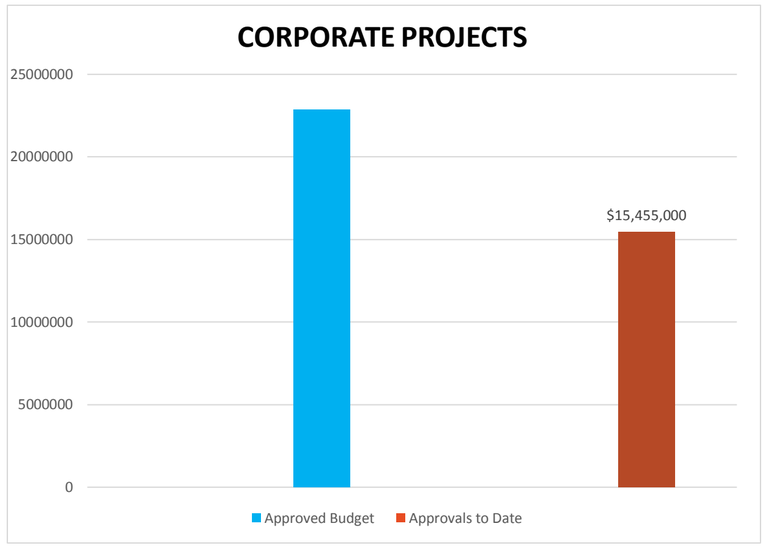
June 21, 2018

CAPITAL BUDGET APPROVALS TO DATE - 2018 - 2019









WATER

Approved Budget	**$15,011,000**
Approvals to date	**$12,111,000**

WASTEWATER

Approved Budget	**$28,471,000**
Approvals to date	**$13,530,000**

STORMWATER

Approved Budget	**$7,111,000**
Approvals to date	**$2,441,500**

CORPORATE PROJECTS

Approved Budget	**$22,855,000**
Approvals to date	**$15,455,000**

Total Budget:	**$73,448,000**
Total To Date:	**$43,537,500**
Total % to date	**59%**

Original Signed By: 15-Jun-18

Report Approved: **Date**

Jamie Hannam

HRWC Board Report 2- I - 2018/2019
Capital Budget Approvals to Date

Category	Sum of Total	Net Impact on 2018/2019	Final Approval
Water			
Distribution			
Water Distribution Main Renewal Program	$3,696,350	$3,500,000	4/5/2018
Valve Renewals	$125,000	$125,000	4/25/2018
Hydrant Renewals	$75,000	$75,000	4/25/2018
Service Line Renewals	$100,000	$100,000	4/25/2018
Lead Service Line Replacement Program	$600,000	$600,000	4/25/2018
Automated Flushing Program	$20,000	$20,000	2/20/2018
Water Sampling Station Relocation Program	$30,000	$30,000	2/23/2018
Energy			
JD Kline WSP - 2nd Boiler Replacement	$100,000	$100,000	2/6/2018
Lake Major WSP - Process Area HVAC Upgrades			
Equipment			
Miscellaneous Equipment Replacement	$50,000	$50,000	4/23/2018
Facilities			
JD Kline WSP Underdrains and Filter Media Replacement Program	$4,100,000	$4,100,000	1/19/2018
JD Kline WSP Raw Water Intake Travelling Screen Replacement Program	$100,000	$100,000	4/17/2018
JD Kline WSP Replace Filter Isolation Gates	$50,000	$50,000	2/23/2018
JD Kline WSP Storage Building Improvements	$76,000	$76,000	2/23/2018
JD Kline WSP Purchase New Boat for Lake sampling	$32,000	$32,000	2/20/2018
JD Kline WSP Replace Existing 4160 Transformer in Low lift Station	$26,000	$26,000	2/23/2018
JD Kline WSP New Grounding Bar for Crane	$17,000	$17,000	3/5/2018
JD Kline WSP Caustic Tank liner Replacements	$13,000	$13,000	2/20/2018
JD Kline WSP Effluent Valve Actuator Replacement Program	$100,000	$100,000	2/20/2018
JD Kline WSP Replace CO2 Feeders	$70,000	$70,000	2/23/2018
JD Kline WSP Upgrades to the Process Wastewater Lagoons	$20,000	$20,000	2/23/2018
JD Kline WSP Replace Turbidity Meters	$50,000	$50,000	2/23/2018
JD Kline WSP Ampgard III to Vacuum Contactor Conversion	$40,000	$40,000	2/20/2018
JD Kline WSP Filter Gallery Electrical Wiring Upgrades	$55,000	$55,000	2/23/2018
JD Kline WSP Pilot Plant PLC Upgrade	$19,000	$19,000	2/20/2018
Lake Major WSP - Replace Raw Water Pumping Station Design	$250,000	$250,000	5/1/2018
Lake Major WSP - Replace Contactors in the MCC	$34,000	$34,000	2/23/2018
Lake Major WSP - Butterfly valve replacement program	$100,000	$100,000	2/28/2018
Lake Major WSP - Clarifier Repair			
Lake Major WSP - New Alum and Fluoride Tanks	$145,000	$145,000	3/5/2018
Lake Major WSP - Improved access to pipe gallery	$50,000	$50,000	3/5/2018
Lake Major WSP - Purchase H-frame for fall arrest system	$9,000	$9,000	2/23/2018
Lake Major WSP - Pre-Oxidation Strategy Study	$120,000	$120,000	3/5/2018
Lake Major WSP - Yard Drainage and Parking Area Improvements	$160,000	$160,000	2/23/2018
Lake Major WSP - East Lake Dam Repairs	$65,000	$65,000	3/5/2018
Lake Major WSP - Dechlorination System Design	$75,000	$75,000	3/5/2018
Lake Major WSP - Motor Protection Relays	$60,000	$60,000	3/5/2018
Bennery Lake WSP - Access Road Improvements Study Phase Only	$130,000	$130,000	2/20/2018
Bennery Lake WSP - Sludge Valve Replacement Program	$7,000	$7,000	2/20/2018
Bennery Lake WSP - New Low Lift VFD pump Replacement Program	$110,000	$110,000	2/20/2018
Bennery Lake WSP - Manganese Removal Strategy Study	$60,000	$60,000	2/20/2018
NON-URBAN Core WSP			
Miller Lake Small System - Supply Treatment Improvements			
Miller Lake Small System - Water storage Tank			
Collins Park WSP - Air Exchange System	$26,000	$26,000	2/20/2018
Lake Lamont - Replace Suction Piping and Chlorine Injection	$72,000	$72,000	6/6/2018
Chlorine Analyzer Replacement Program	$23,000	$23,000	2/20/2018
JD Kline WSP Replace Westinghouse Electrical Panel	$5,000	$5,000	2/23/2018

Category	Sum of Total	Net Impact on 2018/2019	Final Approval
Bennery Lake WSP - Actuator for Backwash Control Valve	$13,000	$13,000	2/20/2018
Collin's Park WSP Ventilation System Upgrades	$35,000	$0	5/9/2018
Collins Park WSP Raw Water Intake Strainer Replacement	$16,000	$0	5/1/2018
Land			
Watershed Land Acquisition			
Security			
Security Upgrades			
Structures			
Beaver Bank Reservoir Meter Upgrade	$35,000	$35,000	2/20/2018
Bedford South (Hemlock) Reservoir CCC	$250,000	$250,000	4/17/2018
Bluewater PRV Chamber CSE Retrofit	$76,000	$76,000	2/20/2018
Brunello Booster Station - Pump Control Modifications	$27,000	$27,000	2/20/2018
Cowie Hill Reservoir Rehabilitation			
Eaglewood Pumping Station - Upgrades	$9,000	$9,000	2/20/2018
Golf View Drive PRV Chamber Rehabilitation	$18,000	$18,000	2/20/2018
Leiblin Drive Booster Station - Replacement of Diesel Fire Pump			
Lyle Street Pumping Station Upgrades	$235,000	$235,000	3/5/2018
Main Control Chamber Annubar Meter Replacement	$55,000	$55,000	3/5/2018
Parkdale Booster Station Decommissioning	$22,000	$22,000	2/23/2018
Ritcey Crescent PRV - New Meter	$11,000	$11,000	2/23/2018
Robie 2 Emergency Pump - Pump Control Review and Optimization	$105,000	$105,000	2/23/2018
Sampson and Stokil Reservoirs Rechlorination System	$40,000	$40,000	4/23/2018
Steel Reservoir Inspection and Assessment Study	$175,000	$175,000	2/20/2018
Bulk Fill Service Connection for the Cowie Hill Operations Depot	$51,000	$51,000	2/20/2018
Macdonald PRV Chamber - Confined Space Entry Retrofit	$110,000	$0	3/5/2018
AMI - SAP Integration additional Funding	$220,000	$0	2/26/2018
Transmission			
Critical Valve Replacement Program - Gottingen Street			
Port Wallace Transmission Main Caledonia Section	$120,000	$120,000	5/23/2018
Bedford West CCC - Various Phases			
Regional Development Charge Studies			
Structure			
Concrete Gunite Reservoir Assessment	$110,000	$0	4/5/2018
North End Feeder Replacement Conecept Design Route Selection	$75,000	$0	4/6/2018
Governor's Brook Phase 3 oversizing	$116,000	$0	4/10/2018
Geizer 158 Reservoir Tank Shark Pilot $40K	$40,000	$0	4/23/2018
AMI - SAP Integration additional	$20,000	$0	4/5/2018
Water Total	**$13,049,350**	**$12,111,000**	**6/1/9937**
Wastewater			
Collection System			
Regional Development Charge Studies			
Integrated Wastewater Projects - Program	$1,915,000	$1,915,000	4/5/2018
Wastewater System - Trenchless Rehabilitation Program	$1,535,000	$1,490,000	4/18/2018
Fairview Clayton Park Bridgeview I/I Reduction	$2,880,000	$2,880,000	4/18/2018
Inglis Street Sewer/Pier A PS Ventilation/Odour Control Modifications			
Wanda Lane Sanitary Sewer Replacement			
Auburn Avenue Sanitary Sewer	$25,000	$25,000	5/4/2018
Glendale Drive to Sackville Trunk Sewer - System Upgrade	$500,000	$400,000	4/16/2018
Manhole Renewals WW	$25,000	$25,000	4/23/2018
Lateral Replacements WW (non tree roots)	$1,650,000	$1,650,000	4/23/2018
Lateral Replacements WW (tree roots)	$520,000	$520,000	4/23/2018
Wet weather management program	$225,000	$225,000	6/4/2018
Bedford West Collection System CCC			
Young Street Sewer Separation			
Kempt Road Phase 1 - Sewer Separation			
Bayer's Road Phase 1 Sewer Separation			
Joseph Howe Drive Sewer Separation			
Romans Federal Avenues Sewer Separation			
Gottingen/North Flow Split - Alteration to Combined Sewer	$50,000	$50,000	3/5/2018
Wastewater Lateral Lining	$2,305,000	$2,100,000	5/2/2018
High Street WW IP 2018/19 and High Street SW IP 2018/19	$26,000	$0	5/1/2018
Glendale Drive to Sackville Trunk Sewer WWS Updgrade Funding Increase	$246,000	$0	6/5/2018
Energy			
Pump Station HVAC Retro-Commissioning Program			
Wastewater Pump Stations - NSPI Meter Relocations	$50,000	$50,000	2/12/2018
HHSP - BAS-HVAC Recommissioning			
Dartmouth WWTF - UV Channel/Densadeg Gate Actuators			

Category	Sum of Total	Net Impact on 2018/2019	Final Approval
Halifax WWTF - UV Channel/Densadeg Gate Actuators	$80,000	$80,000	1/31/2018
Halifax Harbour Solutions Plants (HHSPS) Main Wastewater Influent GateActuators	$80,000	$80,000	1/31/2018
Equipment			
Miscellaneous Equipment Replacement	$70,000	$70,000	4/23/2018
Forcemains			
Security			
Security Upgrade Program			
Structures			
Emergency Pumping Station Pump Replacements	$250,000	$250,000	
Wastewater Pumping Station Component Replacement Program - East Region			
Wastewater Pumping Station Component Replacement Program - Central Region			
Weybridge Lane Pump Station CCC			
Bissett PS Component Upgrade			
PS Control Panel/Electrical Replacement	$100,000	$100,000	5/14/2018
CSO Upgrade Program			
Treatment Facilities			
Plant Optimization Audit Program	$15,000	$15,000	5/22/2018
Emergency Wastewater Treatment Facility equipment replacements			
HWWTF - Duct Work Replacements	$50,000	$50,000	5/9/2018
HWWTF - New Raw Water Pumps			
DWWTF - Duct Work Replacement	$25,000	$25,000	5/9/2018
HCWWTF - Duct Work Replacement Program	$25,000	$25,000	5/9/2018
HCWWTF - Densadeg Flow Meters	$20,000	$20,000	5/11/2018
Mill Cove WWTF - Civil Asset Condition Assessment			
Mill Cove WWTF - Compactor/Conveyor Replacement	$375,000	$300,000	5/25/2018
Mill Cove WWTF - RAS Piping Replacement	$245,000	$200,000	3/5/2018
Mill Cove WWTF - Process Upgrade Conceptual Design			
Eastern Passage WWTF - Process Upgrade Program			
Eastern Passage WWTF - Secondary Launder Covers			
Aerotech WWTF - Process Upgrade Program			
Timberlea WWTF - Asset Renewal Program			
Uplands WWTF - New Screening Facility			
Fall River/Lockview WWTF Waterline Replacement			
Fall River/Lockview WWTF Driveway Replacement			
Biosolids Processing Facility - Asset Renewal Program			
Biosolids Processing Facility - Dryer Bypass Conveyor			
Timberlea Wastewater Treatment Facility Rotating Bilogical Contactor (RBC)Repairs	$120,000	$0	2/23/2018
HHSP & Eastern Passage Surge Suppersion System Installation	$150,000	$0	3/29/2018
Trunk Sewer			
Kearney Lake Road Wastewater Sewer Upgrades			
Bedford to Halifax Trunk Sewer Upgrade			
Northwest Arm Sewer Rehabilitation Additional work	$119,702	$0	5/29/2018
Structure			
Bissett Forcemain Replacement - AC Pipe Removal	$150,000	$0	4/11/2018
Roach's Pump Station Catwalk Stair Replacement	$90,000	$0	5/30/2018
Wastewater Total	**$14,901,702**	**$13,530,000**	**1/5/5804**
Stormwater			
Culverts/Ditches			
Driveway Culvert Replacements			
Street Specific Culvert Replacements:			
St. Margarets Bay Road 2797			
Lake Major Road 190			
Clarence St near civic 4			
Windgate Dr near civic 107			
Nottingham Drive near civic 53	$90,000	$90,000	6/6/2018
Penny Lane at Windsor Drive			

Category	Sum of Total	Net Impact on 2018/2019	Final Approval
Knight Bridge Drive at Buckingham Drive	$81,000	$81,000	6/6/2018
Allenby Drive near civic 34	$83,000	$83,000	6/6/2018
Allenby Dr near civic 2	$83,000	$83,000	6/6/2018
Minna Drive near civic 6	$85,000	$85,000	6/6/2018
St. Margarets Bay Road near civic 2916	$91,000	$91,000	6/6/2018
Stella Crt near civic 1			
Ramar Dr near civic 6			
St. Margarets Bay Road near Second Chain Lake	$91,000	$91,000	6/6/2018
Ross Road near civic 241	$74,000	$74,000	6/6/2018
Clarence Avenue at Howard Ave			
Clarence Avenue near Morris Avenue			
Braeside Ave near civic 2	$105,000	$105,000	6/6/2018
Cow Bay Road near civic 1174	$48,500	$48,500	5/14/2018
Shore Rd near civic 1796			
Hines Road near civic 195	$82,000	$82,000	6/6/2018
Ritcey Cres near civic 1			
Orchard Dr near civic 32			
Pipes			
Doyle Street Storm Sewer			
Integrated Stormwater Projects - Program	$1,442,000	$1,442,000	4/5/2018
Manhole Renewals SW	$21,000	$21,000	4/23/2018
Catchbasin Renewals SW	$50,000	$50,000	4/23/2018
Lateral Replacements SW	$15,000	$15,000	4/23/2018
Drainage Remediation Program - Survey/Studies			
White Birch Drive SW IP 2017/18 (additional funding $100,000)	$100,000	$0	5/1/2018
Chalamont Drive SW IP 2018/19	$50,000	$0	5/1/2018
Structure			
Ellenvale Run Retaining Wall System - Replacement			
Ellenvale Run Retaining Wall System Structure funding from 2017/18	$846,000	$0	4/19/2018
Culvert/Ditches			
Rhondora Drive Cross Culvert Replacement and Ditching Project	$57,500	$0	3/19/2018
Stormwater Total	**$3,495,000**	**$2,441,500**	**2/4/4149**
Corporate Projects			
Information Technology			
Host Static Website Project (2016/17)	$100,000	$0	5/4/2018
Corporate Projects Total	**$100,000**	**$0**	
Corporate			
Asset Management			
Integrated Resource Plan Update			
Sewer Condition Assessment			
Storm Sewer Condition Assessment			
Driveway Culvert Data Collection Program	$80,000	$80,000	3/22/2018
Corporate Flow Monitoring Program	$1,700,000	$1,700,000	4/16/2018
Hydraulic Water Model Build			
450 - 455 Cowie Hill Road Office Space Additional work stations	$25,000	$0	4/25/2018
Facility			
East/Central Regional Operational Facility			
Building Capital Improvements			
Fleet			
Fleet Upgrade Program - stormwater	$271,000	$271,000	4/23/2018
Fleet Upgrade Program - wastewater	$1,084,000	$1,084,000	4/23/2018
Fleet Upgrade Program - water	$755,000	$755,000	4/23/2018
GIS			
GIS Application Support Program			
Dashboard Replacement			
Data Governance			
GIS Upgrade/Cityworks Upgrade			
Desktop Progression Plan			
GIS Data Build - Services			
CAD Drawing Database			
Information Technology			
Desktop Computer Replacement Program	$290,000	$290,000	4/23/2018
Network Infrastructure Upgrades	$220,000	$220,000	4/23/2018
Document Management Program			
Computerized Maintenance Management System Enhancements			
SharePoint Implementation			

Category	Sum of Total	Net Impact on 2018/2019	Final Approval
AMI/ARM Meter System Upgrades	$9,730,000	$9,730,000	4/28/2016
SAP Rate Structure Support			
Asset Registry Build	$50,000	$50,000	4/6/2018
Halifax Water Website	$268,500	$268,500	5/4/2018
Wi-Fi Design and Build			
Cayenta Optimization			
Telephony			
Intranet			
Permit Approvals			
Stormwater Billing Support			
Analytics and Dashboards			
Portfolio and Project Lifecycle (50,000 + 330,000) Portfolio and Project Lifecycle Project Execution of Project	$380,000	$380,000	4/16/2018
IT Foundations ($71,000)Helpdesk Replacement Project - Planning Phase($45,500)	$2,000,000	$116,500	5/30/2018
SCADA & Other Equipment			
GPS Units - Replacement	$42,000	$42,000	2/28/2018
Large and New Customer Meters	$460,000	$460,000	4/23/2018
GNSS Receiver for Asset Management Data Collection	$8,000	$8,000	4/6/2018
Structure			
Mill Cove WWTF - PS Siding and Asphalt	$50,000	$0	4/27/2018
Corporate Total	**$17,413,500**	**$15,455,000**	**2/12/3909**
Grand Total	**$48,959,552**	**$43,537,500**	

Item 3-I

13-Jul-18

FINANCIAL REPORT

Consolidated balance of the four operating accounts maintained by the Commission as of:	13-Jul-18	$54,390,781
Rate of interest on the above balance -		$54,390,781.31
Investment Rate of Return	0.148%	

ITEM # 4-I
HRWC Board
June 21, 2018

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

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

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

DATE: June 5, 2018

SUBJECT: **2017/18 Cost Containment**

INFORMATION REPORT

ORIGIN

The Cost Containment Process (Item #6) as approved by the Halifax Regional Water Commission (HRWC) Board, October 3, 2013.

April 14, 2015, NSUARB Decision- HRWC General Rate Application (M06540).

BACKGROUND

The process for cost containment as approved by the HRWC Board on October 3, 2013, called for the implementation of a number of recommended actions that would assist HRWC in addressing the Nova Scotia Utility and Review Board's (NSUARB) request for a more rigorous approach to cost containment as an organization. One key recommendation was the establishment of a reporting structure whereby, "*on a quarterly basis, the monthly financial report of the HRWC Board will also include an update on Cost Containment Initiatives*".

In the Decision on the 2015 Rate Hearing, the NSUARB directed HRWC to file annual reports on its efforts to contain operating costs of the utility, with this report to be filed no later than June 30 of each year. Within the Decision, the NSUARB expressed its appreciation in receiving HRWC's first cost containment report, and HRWC's initiatives to contain its operating costs.

DISCUSSION

A Summary Report-Cost Containment Initiatives for 2017/18 is attached, with updated information as at June 6, 2018. This report shows the cost containment initiatives effecting operations for 2017/18 as a result of new initiatives implemented thus far during the year, along with amounts of an ongoing nature from 2013/14 to 2016/17 inclusive. The inclusion of initiatives and amounts from prior years reflects an intentional focus on sustainable results over the long term. The projected cost savings for 2017/18 is $6.6 million as outlined by category in Figure #1 below:

Figure #1

Procurement Strategies	**$1,224,554**	**18%**
Human Resource Strategies	**$2,884,176**	**43%**
Information Technology (IT) Strategies	**$108,700**	**2%**
Facilities/ Process Strategies	**$2,278,201**	**34%**
Reduce Paper and Printing Costs	**$27,479**	**0%**
Technology and Business Process Changes	**$112,138**	**2%**
	$6,635,247	

As shown above, cost containment initiatives are impacted most in the areas of Human Resource and Facilities/ Process Strategies. Under Human Resource Strategies, the effects of pension plan re-design initiated in 2015/16 is one of the main contributors to cost containment savings in the current year. Annual savings related to pension plan re-design approximates $1.7 million, which represents 59% of the savings within Human Resource Strategies and 26% of the total projected cost savings for 2017/18. Employer contributions on pensionable earnings decreased in 2016 from 12.95% to 9.85%, with employees experiencing a similar decrease from 12.95% to 10.65%. In addition, special payments made by the HRWC to fund the unfunded liability of the pension plan were reduced from $3.0 million to $0.8 million on an annual basis. Savings of $20.2 million for the employer was projected over a 14 year period, with a 50% likelihood the plan would be fully funded within 10 years.

Facilities/ Process Strategies contain initiatives of varying nature, however one of the main contributors in this category is Halifax Water's Energy Efficiency Program. Projects under this program account for approximately $1.1 million of projected savings for the current year, representing 50% of savings within the category and 17% of the total projected savings for 2017/18.

Chemical costs are key to the operations of Halifax Water, in both water and wastewater services. Through its Procurement Strategies, staff continues to negotiate the best product and pricing to enable the facilities to operate in an efficient manner. This is evident in 2017/18 where savings related to chemical purchasing amounted to an estimated $0.4 million.

New cost containment initiatives implemented during the 2017/18 fiscal year resulted in cost savings amounting to $1.9 million. These initiatives are highlighted for ease of reference on the Summary Report-Cost Containment Initiatives attached. Cost savings resulting from these new initiatives fall within the following categories, ranked in order of cost savings: Facilities/ Process Strategies ($0.7 million), Human Resource Strategies ($0.6 million), and Procurement Strategies ($0.5 million).

BUDGET IMPLICATIONS

Available information on cost containment initiatives were taken into consideration when the 2017/18 budgets were developed. Initiatives that impact future fiscal periods (not annual or one-time occurrences only) will be incorporated into budget cycles and processes of these future periods.

ATTACHMENTS

Summary Report – Cost Containment Initiatives

Report Prepared by: *Original Signed By:*

Allan Campbell, B.Comm, CPA, CMA
Manager, Finance

#	Initiative	Comments	Year Initiated	2017/18 Cost Savings
1	**General Budget Strategies**			
	Sub-total			$0
2	**Procurement Strategies**			
	Insurance adjustment services - sole source relationship over a 10 year period	HW participated in a joint tender with HRM. Costs will be approximately 20% lower.	2013/14	$5,460
	Standardized uniforms and clothing	Issuance of a bulk tender; centralization of purchasing and distribution function; possible policy change to "as required" rather than a quota system	2013/14	$20,000
	Standardized boots	Issuance of a bulk tender; centralization of purchasing and distribution function; possible policy change to "as required" rather than a quota system	2013/14	$5,000
	Mobile devices - switched supplier and carrier	HW participated in a joint tender with HRM	2013/14	$51,624
	Customer account collections	Coordination of collection services related to closed customer accounts in conjunction with the Provincial Public Procurement Act, rather than outsourcing to private organizations	2014/15	$10,000
	Lab Testing	Savings as a result of contract tendering	2013/14	$60,000
	NSPI rate reclassification	Eastern Passage WWTF	2014/15	$16,000
	NSPI rate reclassification	Duffus Street Pumping Station	2015/16	$15,000
	Chemical purchasing	Able to purchase a corrosion inhibitor with a higher concentration of active ingredient, thus foregoing additional costs that would have resulted under current dosage requirements	2015/16	$400,000
	Replacement of wireless headsets for CCC staff	Wireless headsets were not performing as expected, therefore a switch was made to wired headsets which resulted in savings on a per unit cost basis, and also savings regarding the frequency and cost of replacement associated with the wired headsets.	2015/16	$1,500
	Mobile devices - switched supplier and carrier	HW leveraged the mobility contract of the Province of Nova Scotia	2016/17	$48,000
	Garbage collection - JD Kline Plant	An RFP was put out to consolidate the garbage collection, which resulted in a cost savings with respect to internal man-hours and use of HW vehicles.	2016/17	$1,370
	Utilizing HW staff to setup excavations sites	Using trained HW staff as TWS for job sites, unless outside traffic control personal are required	2016/17	$50,000
	RFP for biosolids transport	As a result of a recent RFP, the is expected to be an approximate 33% cost reduction related to transporting biosolids from the Halifax, Dartmouth, Herring Cove and Eastern Passage WWTP	2017/18	$110,000
	Bridge Lease	The new water line for the MacDonald bridge was not in service, resulting in a reduced bridge lease charge	2017/18	$30,000
	Inspection fees (Water Operations - Regional)	The Sahara inspection for the transmission main as budgeted in not required during the current fiscal year	2017/18	$250,000
	Deferral	Maintenance on the gabion wall at the Lake Major facility is deferred until 2018/19 due to environmental permitting	2017/18	$100,000
	Safety showers	Using an alternative source, cost savings were found in the purchase of mandatory safety showers for the Lake Major water treatment plant	2017/18	$600
	Traffic control	Using trained HW staff for the purposes of traffic control while working on HW excavations sites will result in cost savings of $750/day. This is based on an 8 hour day, including setup costs typically paid to the contractor.	2017/18	$50,000
	Sub-total			$1,224,554
3	**Human Resource Strategies**			
	Corporate ID Badges	updating the corporate ID badges to be deferred from the 2013/14 fiscal year to 2014/15 for existing employees	2013/14	$3,200
	Heavy Truck and Equipment Service	the addition of a new Heavy Equipment Technician provides in-house maintenance service capabilities for the HW fleet.	2013/14	$100,000
	Beeper Pay	Elimination of an inconsistency between Water and Wastewater Services, as Water Services staff do not receive beeper pay. This involves 10 non-union staff in total.	2013/14	$75,000
	Annual service awards banquet	Changed the venue and the cost of the meal	2014/15	$15,000
	Accessing on-line training opportunities	More use of on-line training versus the traditional methods, including WHMIS and TDG renewals	2014/15	$2,241
	Background Checks	Out-sourced background checks to a new contractor.	2015/16	$654
	Workload, labour force assessment	A reduction in number of staff in Development Approvals. The volume of work did not warrant 6 planning technologists, and as a result this number has been reduced to 4.	2015/16	$140,000

Pension plan re-design	Through the collective bargaining process, HW was able to negotiate pension plan re-design to make the plan more sustainable. It is estimated the employer's share contributions will decrease from the current 12.95% to 9.85% effective January 1, 2015.	2015/16	$1,700,000
Re-structuring within the organization to create a new "Corporate Services" sector	January 1, 2016 saw the elimination of two (2) full time positions and a re-design of several other jobs.	2015/16	$35,000
Workload, labour force assessment	January 1, 2016 saw the elimination the administrative assistant within Regulatory Services.	2015/16	$57,000
Workload, labour force assessment	November, 2016 saw the elimination of a Compliance Sampling position as a result of a reduction in sampling requirements.	2016/17	$81,966
Hiring at Lake Major plant	Summer student not hired	2016/17	$9,800
Overtime reductions	Overtime has been reduced at the Harbour Solutions Plants with respect to sick leaves, vacation, etc. when weather conditions allow and operational needs are met. Also, Halifax WWTP staff are responding to after hours calls at the Dartmouth and Herring Cove facilities in an effort to minimize the need for overtime call-outs.	2016/17	$40,000
Staff changeover	Pre-planning for an upcoming retirement resulted in a cost reduction, as the overlap period typically required for training purposes was of a shorter duration	2017/18	$30,000
Overtime reductions	Overtime was reduced through the utilization of float technicians at the Halifax, Dartmouth and Herring Cove WWTF, and on-site dewatering at the Mill Cove WWTF	2017/18	$156,648
Hiring deferment (Water Quality Manager)	The position of Water Quality Manager was not backfilled while waiting for the replacement to start	2017/18	$66,000
Hiring deferment (Operator -Water Services)	The new Operator at the Lake Major facility did not start their position until September 1	2017/18	$15,000
Hiring deferment (Operator -Water Services)	The new Operator at the Pockwock facility did not start their position until September 1	2017/18	$15,000
Hiring deferment (Water Quality)	The new Supervisor and Inspector did not start until Q2; the Data Analyst did not start until Q3	2017/18	$80,000
Hiring deferment (SCADA)	The new Supervisor position will not start until Q3 at the earliest	2017/18	$50,000
Hiring deferment (Water Operations - Regional)	The two (2) new Utility Locators did not start until September 1	2017/18	$53,000
Change in benefit provider	The selection of a new benefit provider for life and LTD resulted in significant cost savings over the next three (3) years…2018-2021	2017/18	$125,000
Hiring deferment (Engineering - Wastewater Infrastructure)	As a result of maternity leave, staff resourcing was compared against project demands for 2018 and it was decided the position would not be backfilled.	2017/18	$16,667
Hiring deferment (Engineering - Wastewater Infrastructure)	the vacant position of capital project assistant was not backfilled, resulting in approximately 3 months savings.	2017/18	$17,000
Sub-total			$2,884,176
4 Information Technology (IT) Strategies			
Xerox managed print solutions	Rationalization and replacement of photocopiers and printers	2013/14	$20,000
Network	Change in cost model by Eastlink, giving HW the new pricing	2013/14	$80,000
Telephone land lines	Rationalization of services and eliminate duplication of resources as required	2013/14	$8,700
Sub-total			$108,700
5 Facilities/ Process Strategies			
Chlorine Utilization - Pockwock	Discontinuation of the pre-chlorination process	2013/14	$40,000
Lab Testing	Price benefits from purchasing product from a different source mainly affecting the Harbour Solution Plants	2013/14	$105,000
Pumper Truck Utilization	pilot project to be scheduled initially for stormwater customers only as a test	2013/14	$130,000
Waste oil boiler system - Herring Cove WWTF	new system to allow the use of waste oil from Metro Transit as an alternative heating source	2014/15	$13,250
System sampling for HPC's	sampling was reduced from weekly to monthly	2014/15	$8,025
NSE system assessments	Assessment reports are being completed in-house rather that being outsourced	2014/15	$25,000
Decommissioning of the Bedford South pumping station	The developer driven system expansion will permit the use of gravity and pressure reduction rather than the pumping station	2014/15	$15,000
Lighting upgrades - Bennery Lake WSP		2014/15	$4,793
Insulation upgrades - Bennery Lake WSP		2014/15	$36,000
Lighting upgrades - Eastern Passage WWTF		2014/15	$7,880
Lighting upgrades - Dartmouth WWTF		2014/15	$22,542
Lighting upgrades - Herring Cove WWTF		2014/15	$13,744
Lighting upgrades - Halifax WWTF		2014/15	$29,845
Lighting upgrades - Aerotech BPF		2014/15	$19,109

HVAC upgrades - Eastern Passage WWTF		2014/15	$20,711
HVAC upgrades - Roach's Pond pumping station		2014/15	$13,500
MCC 190 cooling and heat recovery - Halifax WWTF		2014/15	$13,164
Aeration system upgrades - Eastern Passage WWTF		2014/15	$76,382
Orchard Park in-line turbine project		2014/15	$31,494
Wind farm - Pockwock WSP		2014/15	$130,399
Biogas CHP system - Mill Cove		2014/15	$86,000
Disposal of water treatment plant solid residual material	A new location for the disposal of the residual material was found	2014/15	$36,000
Advanced investigative tool for leaks and structural condition of pipes	The current program has been halted as a cost containment initiative and as a result of the information received.	2014/15	$150,000
E-delivery	Transitioning from traditional billing methods to e-delivery	2014/15	$20,000
Change in Recycling Pickups	By changing the schedule for recycling pickups from bi-weekly to every three (3) weeks, the anticipated annual savings will range from $2,500 to $2,700.	2015/16	$2,700
Highway #7 Booster Station Upgrade	Expected energy savings	2015/16	$14,300
Dartmouth WWTF - UV Channel Isolation	Expected energy savings	2015/16	$59,460
Halifax WWTF - Fixed Compressed Air Leaks	Expected energy savings	2015/16	$2,293
Halifax WWTF - UV Channel Isolation	Expected energy savings	2015/16	$62,115
Herring Cove WWTF - MCC 190 Cooling/Heat Recovery	Expected energy savings	2015/16	$8,496
Herring Cove WWTF - Ventilation Air Heat Recovery	Expected energy savings	2015/16	$28,300
Sampling	Using internal staff at the Mill Cove facility to perform the required daily sampling at the facility, rather than the compliance staff, limiting their site visits to once a week.	2015/16	$4,160
Staff utilization	Using trained HW staff for traffic control on HW job sites unless contractors are required.	2015/16	$50,000
Process alternative	A centrifuge was rented for the Mill Cove WWTF (with the option to purchase) on a trial basis to dewater liquid sludge that typically would be transported to the Aerotech WWTF. The transport of the liquid sludge resulted overtime costs, as well as reducing the time available for HW truck to service other facilities. This process assisted the Aerotech in reaching its compliance goals and reduced overtime costs by an estimated 50%. This equipment will enable HW proceed with a digester clean out project, which would otherwise be sub-contracted at a cost of $200,000.	2015/16	$40,000
Process change	It was decided that flanges for meter sizes greater than 2" would be the responsibility of the customer, since when meters are replaced, the flanges are not replaced.	2015/16	$4,854
UV disinfection shutdown - HHSP and Eastern Passage WWTFs	Annual shutdown of UV disinfection system resulted in cost savings associated with electrical energy savings, peak demand reduction,	2016/17	$166,232
Halifax WWTF - Ventilation Air Heat Recovery System	Implemented October, 2016	2016/17	$32,300
Halifax WWTF - Carbon Scrubber By-Pass	Implemented April, 2016	2016/17	$9,465
Tools developed internally	Tools developed internally to install new operating nuts on buried valves. Previously nuts were lost on buried valves resulting in a need to excavate the valve and install new nuts. Cost savings are achieved regarding excavation and reinstatement.	2016/17	$20,000
Boiler Replacement - JD Kline Plant	Anticipated savings related to oil usage and pricing resulting from the replacement of the old boiler.	2016/17	$3,800
Spruce Hill transmission main	Two long term leaks were discovered in the transmission main resulting in cost savings from the perspective of water loss control.	2016/17	$3,000
Utilization of industrial water	A new filter system was installed at the Eastern Passage WWTP that provides the capability to use the current industrial water system rather than potable water to deliver water to the polymer feed systems.	2016/17	$26,000
Carbon Consumption	Through effective monitoring at the Halifax and Dartmouth WWTF, there will be a saving with respect to carbon purchases during the current fiscal year.	2017/18	$92,922
Cost reductions (electricity)	Electrical costs reduced as a result of reduced plant production at the Lake Major facility	2017/18	$90,000
Cost reductions (electricity)	Electrical costs reduced as a result of reduced plant production at the Pockwock facility	2017/18	$50,000
Cost reductions (chemicals)	Chemical costs reduced as a result of reduced plant production at the Pockwock facility	2017/18	$200,000
Cost reductions (chemicals)	Chemical costs reduced as a result of reduced plant production at the Lake Major facility	2017/18	$100,000
Cost reductions (material transport)	Modifications to the screening/grit skip eliminated the need to purchase 2 new screening compactors, which also resulted in the amount of material transported of approximately 28 metric tonnes.	2017/18	$2,000
Herring Cove WWTF - Carbon Scrubber By-Pass	Implemented April, 2017	2017/18	$9,465

	Mill Cove WWTF - Bedford Pump Station upgrade	Expected energy savings - Implemented Summer, 2017	2017/18	$13,021
	Mill Cove WWTF - UV Disinfection System upgrade	Expected energy savings - Implemented May, 2017	2017/18	$128,057
	Dartmouth WWTF - Ventilation Air Heat recovery	Expected energy savings - Implemented March, 2018	2017/18	$2,524
	Re-purposing existing inventory	Used a salvaged CV hydrant to replace an old #2 hydrant during an maintenance project. Cost savings included forgoing the purchase of a new hydrant plus excavation costs associated with the contractor.	2017/18	$3,350
	Process change	It was decided to dig away from the main which was located 7' under the sidewalk to repair a low pressure issue. The main stop was cleared using a cable and fish tap. Savings included the cost of concrete reinstatement, sods and the overall inconvenience to the public.	2017/18	$1,550
		Sub-total		$2,278,201
6	**Reduce Paper and Printing Costs**			
	Electronic HRWC Board Packages	Send Board packages out electronically rather than issuing hard copies	2013/14	$7,500
	Paperless Office within the HR Department	Creating electronic workflow	2013/14	$4,804
	Stewardship Report	The Stewardship Report will be published electronically only, with no hard copies	2013/14	$3,000
	Changes to document archiving	Transitioning file storage from outside contractor to public resources	2013/14	$3,175
	Changes to document archiving	Transitioning file storage from outside contractor to public resources	2016/17	$9,000
		Sub-total		$27,479
7	**Technology and Business Process Changes**			
	Workload, labour force assessment	Through the utilization of technology, such as a Customer Relationship Management (CRM) system, a budgeted addition (customer service representative) has been removed.	2015/16	$47,605
	Workload, labour force assessment	Re-structuring by management within the AMI project as a result of technological efficiencies anticipated.	2015/16	$64,533
		Sub-total		$112,138
				$6,635,247

Halifax Water
Halifax Regional Water Commission

ITEM #5-I
HRWC Board
June 21, 2018

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

SUBMITTED BY: *Original Signed By:*
Jamie Hannam, P. Eng.
Director, Engineering & Information Services

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

DATE: June 5, 2018

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

INFORMATION REPORT

ORIGIN

Approval of 2018/19 Capital Budget

BACKGROUND

The annual capital budget for 2018/19 was approved by the Halifax Water Board on January 31, 2018 and the Nova Scotia Utility and Review Board on April 15, 2018. The approved capital budget contains a series of proposed projects and purchases required for the ongoing operation and enhancement of the utilities operations. The capital programs helps ensure the utility meets its desired level of service and covers the core drivers of asset renewal, compliance and growth.

To reinforce the importance of the implementation of the capital budget programs, the Halifax Water Corporate Balanced Score Card (CBS) includes a performance indicator under the category of Asset Renewal entitled Optimization of Capital Budget Spend. The 2018/2019 target range as per the CBS is to ***spend 85 to 95 % of the Capital Budget derived from Rate Regulated Funding.***

The Engineering & Information Services (EIS) department has the corporate responsibility to manage and monitor the total capital expenditure plan. To help ensure the optimization of the capital expenditure, EIS staff regularly review the projected annual capital spending variance and optimize capital funding re-allocation opportunities. This report summarizes the first capital budget variance review of 2018/19 and identifies the opportunities for capital funding re-allocation to specific alternative projects.

DISCUSSION

Subsequent to the development of the 2018/19 capital budget plan, EIS staff have developed an implementation plan for the identified projects. This plan generally includes the identification of the portfolio of projects assigned to each senior manager within EIS and the Operations departments as well as the individual Project Managers assigned to each project along with the scope of work, budget and schedule.

Based on actual results from project development and delivery as of mid-June 2018, staff have reviewed all proposed projects and identified the existence and magnitude of variances in the following categories:

- Projects projected to be completed under budget, and
- Projects that will be cancelled or deferred to future years

Table 1 – 2018/19 Capital Budget Variance Analysis (Appendix A) includes the results of the current variance analysis as defined above.

The funding approved for projects that are tracking to carry-over into 2019/20 will stay with the project and not be subject to re-allocation. The aggregated funding amount that is tracking to be under spent due to under budget or cancelled/deferred projects will be considered for re-allocation. The re-allocation opportunities will be developed with consideration for the following:

- Funding for identified current over-budget projects
- Funding for additional priority projects from within the same asset class.

Table 2 – 2018/19 Funding Re-allocation Opportunities (Appendix 2) identifies the specific projects or purchases that are identified as current priorities for implementation within 2018/19 that were not within the approved budget.

The subset of opportunity projects from Table 2 that have Project Costs estimated at $250,000 or less, will be the subject of near term funding reports subject to the approval of the General Manager, followed by implementation.

For the opportunity projects that have an estimated cost over $250,000, a project approval and funding request report will be brought to the Halifax Board with a recommendation for approval. These specific projects will be subject to approval by the Nova Scotia Utility and Review Board (NSUARB), consistent with the Public utilities Act.

In conformance with this process, the Ellenvale Run Retaining Wall System Replacement Project is included in the June 21, 2018 Halifax Water Board agenda.

BUDGET IMPLICATIONS

This is an Information Report and has no direct budget implications. The capital budget review process is intended to help optimize the total capital expenditure for the fiscal year consistent with the Corporate Balance Scorecard target.

2018/19 Projected Capital Underspend		**2018/19 Potential Reallocations**	
Water	$997,000	Water	$652,000
Wastewater	$3,082,000	Wastewater	$1,931,000
Stormwater	$0	Stormwater	$1,162,000
Total:	$4,079,000	Total:	$3,745,000

Funding re-allocations made within fiscal year 2018/19 will cause shifts in future year budgets for debt servicing and depreciation expense in Water, Wastewater and Stormwater. Funding re-allocations will be reviewed to ensure source of funding is appropriate for the type of project. Halifax Water will maximize depreciation as a funding source within a fiscal year within each service, as depreciation funding cannot be reallocated amongst services. Reallocations between capital budgets for each service area will be reflected as a changed allocation of debt financing.

As 2018/19 is not a test year, there is no linkage to current rates and there is more flexibility to make adjustments than in a rate application test year as new debt servicing and depreciation expense for 2018/19 have not yet been reflected in rates.

ATTACHMENTS

Table 1 – 2018/19 Capital Budget Project Cost Variance Analysis – June 15, 2018
Table 2 - 2018/19 Capital Funding Re-allocation Opportunities – June 15, 2018

Report Prepared By: *Original Signed By:*

Jamie Hannam, P. Eng., MBA,
Director Engineering & Information Services, (902) 490-4804

Financial Approved by: *Original Signed By:*

Cathie O'Toole, MBA, CPA, CGA, Director, Corporate Services
(902) 490-3685

TABLE 1

2018/19 Capital Budget Project Cost Variance Analysis – June 15, 2018

2018/2019 Capital Project	Projected Underspend
WATER	
Water Distribution – Main Renewal Program • The proposed watermain renewal projects on Chadwick Street and Percy/Andrew Street have been deferred to 2019 construction due to deferral of the HRM Streets program at these same locations.	**$925,000**
Lake Lamont – Replace Suction Piping and Chlorine Injection • This project is no longer an operational priority and will not be proceeding at this time.	**$72,000**
WASTEWATER	
Weybridge Lane Pumping Station • Pumping Station proposed to support continued development within West Bedford. Project timeline delayed several years due to timing of achievement of minimum flows required for upgrade. The project is 90% CCC and 10% rate Based due to benefit to existing customers. $500,000 is the 10% BTE allocation.	**$500,000**
Integrated Wastewater Projects – Program • Funds in the amount of $1,915,000 were approved for this project and included in this was $497,000 to undertake integrated wastewater renewals on Chadwick Street. HRM manages these integrated projects and they have advised that this project has been deferred to 2019.	**$497,000**
Gottingen/North Flow Split – Alterations to Combined Sewer • Project design budgeted at $50,000. Design work is in progress and revised estimated cost is $10,000	**$40,000**
Bissett PS Component Upgrade • This project has been deferred to allow the current Infrastructure Master Plan to better inform scope of required work.	**$50,000**
Windmill Road PS Replacement • The location for the proposed pumping station has been determined to be on DND lands. They report the required land acquisition looks	**$1,455,000**

achievable, however, the federal process for land sale will push the construction phase to 2019.	
Wastewater System – Trenchless Program • Funds in the amount of $1,535,000 were approved for this project. The project contract has been awarded and, based on a 5% construction contingency; the final project cost is projected to be $1,420,000. Thus, a $115,000 surplus is projected.	**$115,000**
Halifax WWTF – UV Channel/Densadeg Gate Actuators • Project recommend for cancellation by Operations staff due to operability issues.	**$120,000**
Dartmouth WWTF – UV Channel/Densadeg Gate Actuators • Project recommend for cancellation by Operations staff due to operability issues.	**$155,000**
Eastern Passage WWTF – Secondary Launder Covers • Project recommended for cancellation by Operations staff due to change in process management.	**$150,000**
TOTAL	**$4,079,000**

TABLE 2

2018/19 Capital Funding Re-allocation Opportunities - June 15, 2018

2018/19 Capital Project	Project Cost
WATER	
Parkmoor Watermain Renewal • Highest priority renewal outside of potential integrated program.	**$250,000**
Catamaran Watermain Renewal • Highest priority renewal outside of potential integrated program.	**$200,000**
Wright Street Watermain Renewal • Highest priority renewal outside of potential integrated program.	**$100,000**
Lake Major WSP – Butterfly Valve Replacement • Operational priority to accelerate the replacement program with four additional valves	**$72,000**
Middle Musquodoboit WSP HVAC • Prioritized based on historical building cooling issues.	**$30,000**
WASTEWATER	
Harbour Solutions Plant, Main Wastewater Effluent Gate Actuators • Prioritized for improvements to system redundancy	**$80,000**
Mill Cove WWTF Secondary Clarifier Component Protection • Prioritized due to rapid degradation of steel components.	**$150,000**
Middle Musquodoboit WWTF UV • Reaction to current regulatory issues.	**$15,000**
Dartmouth WWTF Densadeg Flow Meters • Priority project from Comprehensive Performance Assessment	**$75,000**
Halifax WWTF Densadeg Flow Meters • Priority project from Comprehensive Performance Assessment	**$75,000**

Roach's Pumping Station Stairwell • The stairwell is in poor structural shape and needs to be replaced. (gm report done in May)	**$90,000**
Additional Funding – Glendale Drive to Sackville Trunk Sewer • Tenders recently closed for this project and the total project cost has increased by $246,000	**$246,000**
Additional Scope – Wastewater Lateral Replacements • Propose to add additional lateral replacements to replace no-corrode lateral on Coronation Street in advance of trenchless rehab.	**$100,000**
Trenchless Phase 1 – Additional Scope • Staff have identified additional scope that can be added to the contract for this project. The estimated value of this additional scope is $300,000.	**$300,000**
Additional Funding - Aerotech WWTF Upgrade and Expansion	**$800,000**
STORMWATER	
Ellenvale Run Retaining Wall System Replacement Additional Funding • 2017/18 Ellenvale project tender came in over budget and the additional funding was provided from the 2018/19 Ellenvale project. Thus, the current 2018/19 project is $682,000 under funded based on the detailed design.	**$682,000**
Celtic Drive Storm Sewer Renewal • Near term capital renewal required due to recent structural failure of existing storm sewer.	**$250,000**
Stormwater Culvert Replacements Additional Scope • Add the next three priority culvert renewals from the Culvert Asset Renewal Plan.	**$230,000**
TOTAL	**$3,745,000**

Halifax Water
Halifax Regional Water Commission

ITEM #6-I

HRWC Board

June 21, 2018

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

SUBMITTED BY: *Original Signed By:*
Jamie Hannam, P. Eng., Director, Engineering & IS

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

DATE: June 8, 2018

SUBJECT: **Cogswell Redevelopment Project**

INFORMATION REPORT

ORIGIN

Halifax Regional Municipality Cogswell Redevelopment project initiation.

BACKGROUND

The Halifax Regional Municipality is currently planning the redevelopment of the existing Cogswell Interchange area located in downtown Halifax. The Municipality is well underway with the Cogswell Redevelopment project having completed their 60% design submission to Regional Council On June 5, and on track to complete the 90% design submission in the fall of 2018.

Halifax Water is engaged in this project in two distinct areas. Firstly, Halifax Water is proposing the installation and operation of a District Energy System within the new Cogswell area; and secondly, Halifax Water has a significant volume of existing and proposed water, wastewater and stormwater infrastructure to be relocated or constructed within the project limits.

DISCUSSION

District Energy System:

A Feasibility Study was completed in June 2016 to determine the feasibility of an Ambient Temperature District Energy System (ATDES) for the Cogswell area. This feasibility study looked at the technical feasibility of an ambient temperature system versus more traditional high temperature systems, utility ownership options, regulatory considerations, and the preliminary business case for such a system. The study concluded that an ATDES would be the most economical and energy efficient system, with sufficient capacity to provide heating and cooling to the proposed new developments within the Cogswell redevelopment area of downtown Halifax.

As a natural progression from this earlier feasibility study, and to keep pace with the Cogswell Redevelopment 60% and 90% design work, Halifax Water is undertaking the preliminary and detailed designs for the linear infrastructure (ATDES piping and building interconnection stations), completing a Municipal By-Law Review, and developing an ATDES information document to be used to promote the project. The estimated total cost for the full detailed design of the District Energy System is $1,600,000.

Funding for the project is being sought from a number of Federal agencies. To date, applications have been made to the Federation of Canadian Municipalities (FCM) Green Municipal Fund (GMF), and Canada's *Low Carbon Economy Challenge Fund (LCECF)*. The initial FCM GMF application was made in July 2017, but is currently on hold, pending HRMs final approval (i.e. construction approval) to move forward with the Cogswell Redevelopment Project. Total funding to be sought from the FCM GMF is $10,000,000. The Expression of Interest to the LCECF was submitted in May 2018, and is currently under review. A response is expected from the FCECF by mid to late summer 2018. Total funding sought from the LCECF was $7,900,000. Additional funding sources are being considered. For instance, Canada's Green Infrastructure Fund is another possible source of potential federal funding for the project.

The current work for the DES component of the Cogswell project, being undertaken by the Halifax Water consultant team Pinchin/WSP, includes:

> Preliminary Design - The 60% design for the underground linear infrastructure (ATDES piping and building interconnection stations) has been completed and fully integrated into HRM's 60% design submission for the overall Cogswell Redevelopment project. Following on the 60% linear infrastructure design work, the original ATDES financial model from May 25, 2016 has been updated to include any capital cost changes from the 60% design. All other inputs and assumptions have been held constant and are as documented in the June 16, 2016 feasibility study report. The net capital cost increase of $514,000 represents a 4% increase in total capital cost of the utility owned ATDES infrastructure (including the DPS, EC, and building mechanical rooms). This results in a small increase in depreciation expense of $20,000 per year and small increase in cost of capital of $24,000 per year.

A slight increase (2% by year 10) in operation & maintenance expense is also observed. See Attachment A for further details.

Municipal By-Law Review - Complete a review of other Canadian municipal DES projects to determine how other municipalities and/or utilities have developed, integrated and completed DES projects into their local communities. The focus includes how regulatory mechanisms such as by-laws, development agreements, restrictive covenants, etc. have been used to ensure project success, mitigate risks for DES utilities, developers, customers and residents, and how mandatory connection requirements have been used versus other risk mitigation strategies. The by-law review has started, with potential municipalities/projects being identified for follow up interviews. It is expected these interviews will take place in June and July 2018, with a final report to follow shortly thereafter.

ATDES Information Package Development - Develop an information package, which will be utilized to educate stakeholders on DESs in general, and specifically ATDESs, and communicate the many benefits of an ATDES (e.g. socio-economic, environmental, energy security, community, etc.) for the Cogswell project. Stakeholders include Provincial and Municipal governments, potential commercial and residential developers, potential tenants and residents, local businesses and related service providers, other utilities (e.g. electrical, natural gas), and the public at large. The Information Package document, will be finalized after the Municipal By-Law Review have been completed. It is expected this work will be complete in early Fall 2018.

The business case for Halifax Water proceeding with the DES project includes the ability to establish mandatory connection to the DES within the Cogswell project limits. This assumption is fundamental to the business case and is a best practice within the industry in Canada. To facilitate this requirement, the Province recently approved legislation to this effect with amendments to HRM's Charter.

On June 5, 2018, HRM Regional Council approved the following motion:

1. Approve the 60% Design Plan for Cogswell District Redevelopment attached to the staff report dated May 2, 2018 as Attachment A and authorize staff to release a Request for Qualifications (RFQ) for Constructor services based on the 60% design plan.
2. Direct the Chief Administrative Officer (CAO) to complete negotiations with landowners for land associated with the proposed Granville Square, Valour Way roundabout, and the proposed park area adjacent the wastewater treatment facility.
3. Direct the CAO to complete the 90% design development and present the final detailed public realm design elements in advance of proceeding to procure Constructor services for the Redevelopment.

4. Initiate the process to consider amendments to the Downtown Halifax Municipal Planning Strategy and Land Use By-law to incorporate necessary changes to address building design requirements within the Cogswell District and follow the public participation program adopted by Council on February 25, 1997 (Attachment F), including additional public engagement to incorporate a collaborative process lead by HRM staff involving key stakeholders, the community, and potentially external design experts, that will result in recommendations for Council respecting the final district public realm design and detailed land use policy.
5. Direct the CAO to provide a report and recommendation through the Audit and Finance Standing Committee which identifies a funding source for flood mitigation measures adjacent to the Karlson's Wharf area, once project scope and budget have been finalized, such that the measures can be implemented in conjunction with the Cogswell District Redevelopment.

As a direct follow up from the positive direction from Regional Council, the next steps from Halifax Water's perspective, include:

1. Detailed Design of the ATDES Linear Infrastructure - Based on the existing Cogswell Redevelopment plans, and under the current scope of work awarded for the Preliminary Design (60%) assignment, develop the detailed (90%) design for the underground linear infrastructure (ATDES piping and building interconnection stations) for the ATDES to service the identified future building loads. Collaborate with the municipality prime design consultants [WSP] assigned to complete work on the underground municipal infrastructure (i.e. water, wastewater, natural gas, telecommunications, electrical, etc.) for the Cogswell redevelopment project, leading to the successful integration of the ATDES underground infrastructure into the overall Cogswell redevelopment plan and project. Costs to complete the 90% detailed design are estimated to be approximately $60,000 including net HST and overheads. This amount was included in the original RFP submission by our design consultants (Pinchin/WSP) in November 2017.
2. Update the Business Case – Along with the detailed design assignment, revise the business case to include any updated cost information coming from the completion of the 90% design.
3. Preliminary & Detailed Design for the Remaining ATDES Components – Release a Request for Proposal (RFP) for the preliminary and detailed design work on the Energy Center, Energy Transfer Stations, Building Mechanical Rooms, development of the required building specifications, and business case updates as required.
4. Regulatory Development and Formation – Continue discussions around the development and formation of the regulatory models for the new ATDES Utility.

5. Utility Development and Formation – Continue discussions around the development and formation of the proposed ATDES Utility, seeking HW Board and/or NSUARB approvals as necessary.
6. Cost of Service/Rate Structure – Begin discussions around the development of a base/energy cost of service model, and setting of the required base and energy consumption rates for the ATDES.

Infrastructure Relocations:

The municipality, via their consultant WSP, has completed preliminary designs for all water, wastewater and stormwater infrastructure relocations and/or new installations required to facilitate the Cogswell project as part of the 60% design process. Halifax Water staff are currently formally reviewing the engineering drawings and meeting with the municipal team to reach agreement on the scope of work. The outcome of the review will clarify the required infrastructure and identify financial responsibility for the various components.

Consistent with standard municipal subdivision processes, the municipality will be responsible for net new water, wastewater or stormwater infrastructure required to service new streets and building lots. The municipality has advised Halifax Water that all existing water, wastewater and stormwater infrastructure required to be relocated due to street realignment (vertical or horizontal) will be Halifax Water's financial responsibility in accordance with the provisions of the Municipal Street By-Law.

Halifax Water is currently finalizing these requirements; however, preliminary estimates are that these relocations will cost approximately $5M for water infrastructure and $3M for Wastewater/Stormwater infrastructure.

Within the Upper Water Street area of the Cogswell project, storm based street flooding is experienced during significant rain events. These rain events surcharge the existing combined sewer and water ponds on the street and occasionally overflow towards the adjacent DND lands. This flooding problem has been identified as a priority issue with the recently completed National Disaster Mitigation Program (NDMP) study. Halifax Water and municipal staff are coordinating a review to ensure that an appropriate resolution to the issue is developed and coordinated with the construction of the Cogswell project when it proceeds.

BUDGET IMPLICATIONS

The overall feasibility for the DES project is contingent on the development of a positive business case, approval of the Halifax Water Board, and regulatory oversight by the NS Utility and Review Board. If the project does not proceed, any soft costs for work completed will not qualify as regulated capital as there will be no resulting addition to plant

in service. If this occurs, the soft costs would result in an unbudgeted unregulated operating expense in the year it becomes apparent that the project is not proceeding. The total expenditures to date are: $60,756.06.

The required Halifax Water cost for infrastructure relocations will be finalized as the project proceeds and would affect the 2019/20 and 2020/21 capital budgets, with no anticipated impact on the current 2018/19 capital budget.

ALTERNATIVES

N/A

ATTACHMENTS

Attachment A – Pinchin Memo of May 8, 2018 - Cogswell ATDES – Financial Model Update – DPS Costs

Report Prepared by: *Original Signed By:*

Jamie Hannam, P. Eng. Director of Engineering & IS, 902-490-4804

May 8, 2018

Halifax Water
450 Cowie Hill Rd
Halifax, NS B3P 2V3

E-mail: jeffreyk@halifaxwater.ca

Attention: Jeffrey Knapp
Manager, Energy and Wastewater

Re: Cogswell ATDES – Financial Model Update – DPS Costs
Halifax, NS
Pinchin File: 0212064.000 - DRAFT

The financial model for the Cogswell Ambient Temperature District Energy System (ATDES), originally issued May 25, 2016, has been updated with the latest cost estimate for the distribution piping system (DPS).

The DPS cost estimate, provided by WSP and reviewed by Pinchin, is based on the 60% detailed design package for the Cogswell Redevelopment as well as the 60% detailed mechanical design package for the proposed Cogswell ATDES. The WSP capital cost estimate for the DPS is included as Appendix A to this memo.

1.0 DPS COST CHANGES

The DPS cost has been updated based on the latest design package. The DPS total length was estimated at 600m trench length in the June 2016 feasibility study concept design. The current design for the DPS has a longer trench length and larger pipe sizes for the following reasons:

- The DPS mains along Barrington Street have been oversized (by approximately one pipe size) to allow for additional capacity beyond the six core Cogswell buildings identified in the feasibility study.
- The proposed Energy Centre (EC) location has moved from the southeast end of the wastewater treatment facility (WWTF) to the north corner of the WWTF. This change adds approximately 100m of 600mm DPS mains to the trench length of the system.
- The DPS design has been updated to include stub out tees with valves for future extension along Proctor and Cogswell Streets. These extensions add approximately 60m to the trench length of the DPS.

- The DPS design has been updated to continue along Barrington Street towards downtown Halifax. This extension adds approximately 75m of 400mm DPS mains to the trench length of the system.

Distribution piping systems cost estimates are prepared to a Class C level of accuracy. A 25% contingency is recommended for budgeting purposes, but is not included in the financial model.

Table 1: DPS Cost Updates

($000's)	May '16 Estimate	Updated Estimate	Change
DPS Cost (up to property line)	$1,219	$2,016	+$797
Future Services (from property line into ETS room)	$107	$107	--
Total DPS	$1,326	$2,123	+$797

Note: Costs include engineering fees (16%), owner's overhead (1%), and general contractor overhead and profit (10%). Contingency is not included.

2.0 OTHER COST CHANGES

As a result of relocating the EC to the north corner of the WWTF, the cost of the wastewater effluent conveyance piping from the WWTF outfall location to the EC has been reduced.

Table 2: Energy Centre Cost Updates

($000's)	May '16 Estimate	Updated Estimate	Change
Energy Centre Cost	$3,955	$3,672	-$283

Note: Costs include engineering fees (16%), owner's overhead (1%), and general contractor overhead and profit (10%). Contingency is not included.

3.0 FINANCIAL MODEL UPDATE

The ATDES financial model (May 25, 2016) has been updated to include the above capital cost changes. All other inputs and assumptions have been held constant and are as documented in the June 16, 2016 feasibility study report.

The net capital cost increase of $514,000 represents a 4% increase in total capital cost of the utility-owned ATDES infrastructure (including the DPS, EC, and building mechanical rooms). This results in a

small increase in depreciation expense of $20,000 per year and small increase in cost of capital of $24,000 per year. A slight increase (2% by year 10) in operation & maintenance expense is also observed.

The increased revenue requirements due to increased cost of service result in a starting DES thermal energy rate of $81/MWh. This is an increase over the starting rate of $79/MWh proposed in the feasibility study. With this rate, the financial model estimates a 5.6% internal rate of return for the project (5.7% previously) and a net present value of expected cash flow of $2.39 million (increased from $2.28 million previously).

Should you have any questions or concerns regarding the contents of this letter, please contact the undersigned.

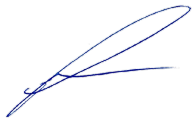
Yours truly,

Pinchin Ltd.

Prepared by:

Andrew Byrnes, P.Eng.
Project Manager, Alternative Energy
604.238.2977
abyrnes@pinchin.com

Reviewed by:



James Spooner, GSI
Operations Manager, Mechanical Engineering
604.238.2931
jspooner@pinchin.com

Enclosure: Appendix A – DPS Capital Cost Estimate (2018-05-07)

X:\ProjectDrawings\2018\D18-002 - Cogswell DESS Detailed Design\Reports\Financial Model Update Memo\180508 Financial Model Update Memo.docx

Template: Master Letter Template, December 13, 2017

Cogswell District Energy System
ESTIMATE OF PROBABLE COSTS

PROJECT NO.	181-02739
DATE:	May 7, 2018
CLIENT:	HALIFAX WATER
CONSULTANT:	WSP
UNIT PRICE SOURCE:	WSP
NOTE: HST NOT INCLUDED	

This estimate of probable construction cost is approximate only. Actual cost may vary significantly from this estimate due to market conditions such as material and labour costs, time of year, industry workload, competition, etc. This estimate has been prepared based on our experience with similar projects. This estimate has not been prepared by obtaining any estimates or quotes from contractors. Due to the uncertainties of what contractors bid, WSP cannot make any assurances that this estimate will be within a reasonable range of the tendered low bid. When assessing this project for business feasibility purposes this estimate should not be relied upon without considering these factors.

	DES SYSTEM				
1	**Pipe**				
	100mm dia. HDPE DR17	m	10	$150.00	$1,500.00
	200mm dia. HDPE DR17	m	50	$400.00	$20,000.00
	250mm dia. HDPE DR17	m	263	$480.00	$126,240.00
	300mm dia. HDPE DR17	m	33	$800.00	$26,400.00
	350mm dia. HDPE DR17	m	42	$850.00	$35,700.00
	400mm dia. HDPE DR17	m	150	$900.00	$135,000.00
	450mm dia. HDPE DR17	m	98	$950.00	$93,100.00
	500mm dia. HDPE DR17	m	166	$1,000.00	$166,000.00
	600mm dia. HDPE DR17	m	770	$1,050.00	$808,500.00
2	**Valves**				
	100mm dia. GATE	each	2	$1,000.00	$2,000.00
	200mm dia. GATE	each	2	$1,800.00	$3,600.00
	250mm dia. GATE	each	18	$2,500.00	$45,000.00
	300mm dia. GATE	each	4	$2,400.00	$9,600.00
	350mm dia. BUTTERFLY	each	2	$3,200.00	$6,400.00
	400mm dia. BUTTERFLY	each	2	$4,300.00	$8,600.00
	500mm dia. BUTTERFLY	each	2	$5,400.00	$10,800.00
	600mm dia. BUTTERFLY	each	2	$7,000.00	$14,000.00
3	**ARV**	each	1	$10,000.00	$10,000.00
4	**Comms/controls/conduit**				
	2 - 50mm dia.	m	780	$80.00	$62,400.00
	Junction Box	each	6	$500.00	$3,000.00

Sub Total	**$1,587,840.00**

Owner's Overhead (1%)	**$15,878.40**
Engineering (16%)	**$254,054.40**
General Contractor Overhead and Profit (10%)	**$158,784.00**
Sub-Total of Soft Cost	**$428,716.80**

Contingency 25% (Soft Cost + Hard Cost)	**$504,139.20**
TOTAL	**$2,520,696.00**

Halifax Water
Halifax Regional Water Commission

ITEM # 7-I
HRWC Board
June 21, 2018

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

SUBMITTED BY: *Original Signed By:*
Reid Campbell, P. Eng., Director Water Services

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

DATE: June 8, 2018

SUBJECT: **2017/2018 Lead Service Line Replacement Program**

INFORMATION REPORT

ORIGIN

August 22nd, 2017 NSUARB Decision - HRWC Lead Service Line (LSL) Replacement Program (M07891)

BACKGROUND

In October 2016, the Halifax Water Board approved a business plan for a new approach to LSL replacement, consistent with the National Drinking Water Advisory Council (NDWAC) recommendations to the USEPA. On August 22, 2017, the Nova Scotia Utility and Review Board issued an order granting Halifax Water authority to undertake emergency LSL renewals to the water meter at utility cost and to provide a 25% rebate (up to a maximum of $2500) to homeowners undertaking an LSL replacement. This report provides an annual update to the Halifax Water Board and the Nova Scotia Utility and Review Board on the LSL replacement program.

DISCUSSION

Halifax Water's new approach to manage its customer's exposure to lead is designed to be consistent with the NDWAC recommendations, which have been endorsed by the American Water Works Association, to the degree they can be applied in Canada and do

not conflict with local regulatory requirements. The five pillars of the new approach and progress made towards these goals are described below:

1) Lead Service Line Inventory

Halifax Water is currently working to consolidate all exiting records pertaining to service line composition in an effort to identify all lead service lines. There are 25,851 service connections within the lead boundary area, 17,011 in Halifax and 8,840 in Dartmouth. To date, efforts have been focused on the following tasks:

- **Digitizing existing service card records for electronic access;**
  Approximately 5000 of 17,011 records within the lead service line boundary have been digitized as of June 1st, 2018.

- **Creating a LSL Information Database:**
  This will allow for a streamlined way to incorporate all pertinent service line material information, enable data querying, in addition to enhancing data integrity and interpretation. This is a long term project and is currently in the planning stages to ensure proposed updates meet the requirements.

- **Advanced Meter Installations:** As part of the Customer Connect Advanced Meter Installations (AMI) project, Neptune staff will document service line material adjacent to the meter at each of the 83,000 service connections. We are using the AMI project as an opportunity to obtain information on private service material in the home. This data will be incorporated into the digital database once improvements have been made. As of June 8st, 2018 there have been a total of 347 lead service lines identified by meter installation visits, although we are just beginning to work in the areas with the highest probability of encountering LSL's as shown in Figure 1. It is anticipated that by the end of 2018, the majority of connections within the lead boundary area will be completed.

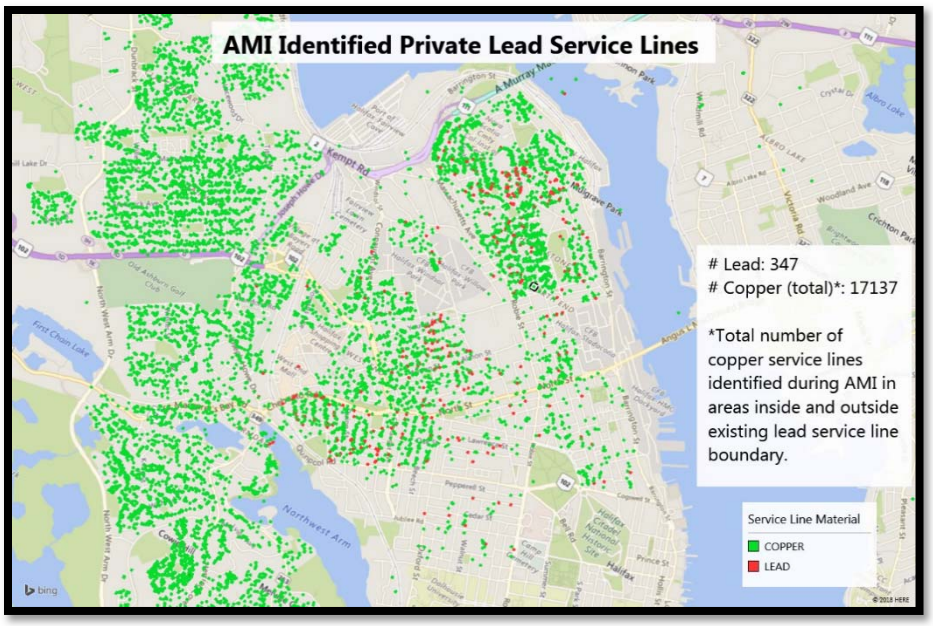


Figure 1 – *Lead service lines identified in the home as part of the Customer Connect Advanced Metering Installation project.*

2) Lead Service Line Replacement

Halifax Water is working to increase both public and private replacements by:

- Removing barriers to private replacement, which involves informing the public about the health implications of lead service lines, simplifying the process for homeowners, and providing financial assistance mechanisms.

- Engaging in capital projects, meter replacement projects, and HRM paving projects and by increasing customer engagement.

- Emergency Full Renewals –There were three emergency renewals conducted in the 2017 fiscal year. Two were the result of a leak on the public service line resulting in a disturbance of a private lead service line. The third renewal was initiated by service box maintenance.

- Halifax Water is working to reduce an inventory of approximately 200 customers who have a public lead line but copper private line.

- Figure 1 shows the number of replacements that have occurred as part of the program since 2011/12. There was a reduction in public LSL replacements from 2013/2014 to 2015/2016 because a moratorium was placed on conducting partial replacements due to research showing this practice can increase lead exposure. In 2016/17, we began tendering for private contractors who were authorized to replace the public portion of a LSL if the private portion was already being replaced. This program allows for the entire LSL to be replaced in a single day. The green bars in Figure 2 show there has been good uptake of this program.

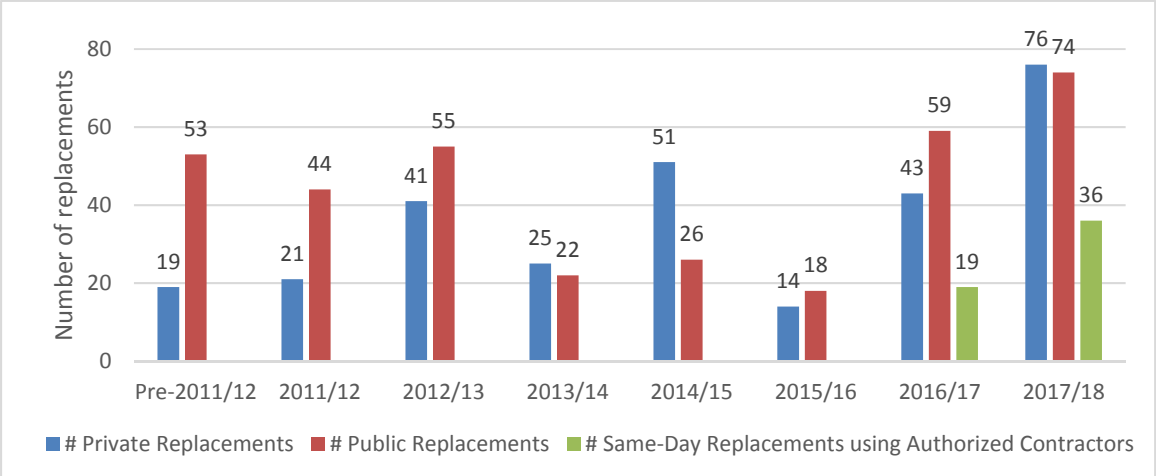


Figure 2 *– Number of public and private lead service line replacements from 2011/2012 to 2017/2018.*

3) Public Outreach

Halifax Water is currently working to engage the public in response to the NSUARB August 22nd, 2017 decision, and the health implications of lead and human health. This is being achieved the following ways:

- Halifax Water implemented the LSL rebate program immediately after the NSUARB Order of August 22, 2018. In 2017/18, there were 18 customers that took part in this program for a total rebate cost of $14,108. The mean rebate cost was $738, with a min. and max. of $201 and $1,565, respectively. As of June 1, 2018, 9 customers have received rebates this year for a total of $7,732.
- Upon application by a homeowner for a LSL renewal, they are contacted by program staff. At this time, they are advised of sampling programs, provided with information on the renewal, post renewal maintenance and with a NSF certified pitcher filter for temporary use for cooking and drinking. They are also provided with 7 replacement filters. Filter kits are also provided when Customer Connect installations (see below) require a new or repaired connection on a lead service line.

Table 1 *– Number of filter kits provided to residents either as part of LSL replacement or the AMI program.*

	2016/17	2017/18	Aug 22 2017-Mar 31 2018	2018/19 (as of May 21 2018)
Number of LSL Renewal Filter Kits Provided	8	138	85	23
AMI Filter Kits Provided	-	2	2	9

- Halifax Water has created a LSL program identity, consistent with Halifax Water's brand identity. The brand identity will be used on all information and promotion material for the LSL program.
- An improved web page has been created on Halifax Water's website.
- Three videos are available to view on the LSL program website. These videos include information on how to test your water for lead, how to identify a lead service line, and how to replace your lead service line.
- A web application was created (see inventory for further details) which allows for customers to determine if they are in the lead boundary area. This application has been posted on the lead website.
- If a lead line is present during meter upgrades as part of the Customer Connect installation, contractor staff leave a letter which informs the customer of line material, provides information on lead and our programs, and provides flushing instructions.
- Between the NSUARB decision on August 22nd, 2017 and March 31, 2018, we received 263 lead inquiries from homeowners or tenants. As of May 21st 2018, 49 inquiries from homeowners or tenants have been made this year.

4) Corrosion Control and Water Quality Monitoring

Halifax Water and Dalhousie University continue to conduct research to optimize and monitor corrosion control treatment. Outcomes of research have led to greater effectiveness and reduced cost for corrosion control treatment at both JD Kline and Lake Major treatment plants. Further research is also being conducted into seasonal optimization of corrosion control and the use of less expensive, bulk commodity chemicals for corrosion control.

5) Customer Sampling

Halifax Water has several customer sampling programs for lead in drinking water. These programs are outlined below:

- **Customer Request Lead Sampling**
  Halifax Water provides complimentary lead testing for customers who have a known or suspected lead service line, and who live in a house built prior to 1960 within the lead service boundary, consistent with Health Canada protocols. Results are sent to the customer once they are available. Figure 3 describes the number of customer request kits that have been analyzed since 2016.

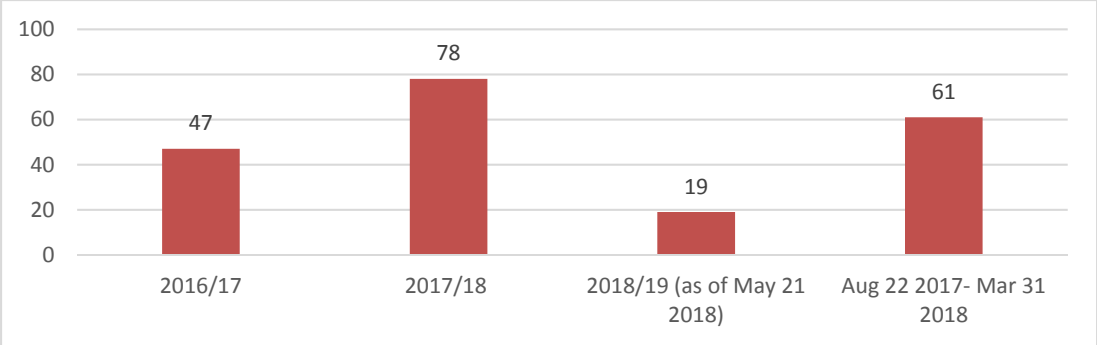


Figure 3 *– Customer request lead sample kits analyzed since 2016.*

- ***Lead Service Line Replacement Monitoring program***
  This program monitors lead levels prior to and after a lead service line replacement. Samples are taken prior to replacement and following replacement at 72 hours, 1, 3, and 6 months. Homeowners are encouraged to participate in the monitoring program following a service line replacement. This allows them to have a better understanding of the lead levels in their home. When a permit is issued for a private lead service renewal, the homeowner is contacted by email or phone to encourage their participation in the LSL monitoring program and inform them of the Filter Program (see Public Involvement above). There was 27% uptake in this monitoring program in 2017/18.

- ***Annual Health Canada Residential Monitoring Program***
  Halifax Water conducts an annual residential sampling program to monitor the effectiveness of the corrosion control program by sampling lead and copper levels in customers' homes throughout the distribution system as per Health Canada protocol. Once per year, 100 homes are tested on a volunteer basis.

- **Water Research Foundation Project 4713**
  This project aims to understand the impacts of, and develop an optimized protocol for conducting high velocity flushing after lead service line replacement to minimize lead exposure. Halifax Water has committed to conducting in depth sampling for 10 full service line replacement this year as a partner in this project

- **Nova Scotia Environment/Dalhousie University Lead Survey**
  Halifax Water will be participating in a lead survey being conducted on behalf of Nova Scotia Environment by Dalhousie University. Halifax Water will arrange for 60 samples along with 6 other communities across Nova Scotia.

Financial

Table 2 – Summary of money spent on aspects of the lead program in Fiscal year 2017/18 and since the UARB decision on August 22, 2017

	2017/2018
Customer Request Lead Sampling	$4,914
LSL Replacement Monitoring Program	$12,285
Pitcher Filter Kits	$10,271
Communications	$11,900
Staff	$148,758
Public Lead Service Line Replacement*	$550,112
Lead Service Line Rebate	$14,107
Total	**$752,347**

* *The cost of public lead service line replacement is likely a slight underestimate as some contractors have not yet invoiced for all lead service line replacements conducted in 2017/18.*

Summary

Table 3 - Summary of the statistics of the lead program for 2017/18.

	Number
Public replacements	74
Private replacements	76
Rebates	18
Emergency replacements to the meter	3
Lead program inquiries[1]	263
Filter kits issued	140
Customer request lead sample kits analyzed	78
	Average cost
Public replacement[2]	$8,067
Private replacement (based on rebates)	$3,188
Rebate	$738
Emergency replacement[3]	$12,200
	Total Cost
Public replacement	$550,112
Private replacement[4]	$88,318
Rebate	$14,108
Emergency replacement[5]	$12,000

[1] *This number is for inquires between August 22nd 2017 and March 31st 2018*

[2] *Only one of three invoices have been received for emergency full replacement to date so this number is only for one property.*

[3] *Based on review of 48 contractor invoices*

[4] *Total cost of private replacement for 18 customers who applied for rebate, no information available for remaining private replacement costs. 75% of this cost is paid by homeowner and 25% by Halifax Water as per the rebate program.*

[5] *This is the cost of only one of the three emergency full replacements as two of them have not yet been invoiced by the contractor. The invoice for the one emergency renewal that has been paid does not include the final reinstatement fees, so this cost is an estimate but should be within $200.*

Report Prepared by: *Original Signed By:*

Wendy Krkosek, Water Quality Manager – 902-483-4432

Halifax Water
Halifax Regional Water Commission

ITEM # 8-I
HRWC Board
June 21, 2018

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

SUBMITTED BY: *Original Signed By:*
Susheel Arora, M.A.Sc., P.Eng.,
Director, Wastewater & Stormwater Services

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

DATE: June 13, 2018

SUBJECT: **Rodent Control**

INFORMATION REPORT

ORIGIN

Commissioner request for information at Halifax Water Board meeting of March 29, 2018.

BACKGROUND

The issue of rodent control has been under active review since 2016 through the West Community Council whereby a staff report on rodent control was requested via a motion on June 28, 2016. The staff report was brought to Community Council on January 17, 2017 and further discussed at HRM Council on February 7, 2017. This report outlined the Halifax Water (HW) practice of conducting rodent control activities on HW projects which aligns with the recent concept of a municipal policy to control rodents during development activity.

DISCUSSION

The issue of rodent control has been actively discussed with Halifax Regional Municipality (HRM) staff on several occasions over the past two years. As part of the discussion, it was acknowledged that rodents are abundant near port facilities and are

disturbed by construction activity; the grain elevators in the south end of Halifax further compound the problem. Generally, the HW sewer system on peninsula Halifax is not a habitat for rodents considering the frequent occurrence of flows during rain storms or snow melts. Notwithstanding this situation, once a habitat is disturbed by development or construction activity, it is possible that rodents will temporarily escape into the catch basins or adjacent buildings.

During discussions on rodent control, there has been questions as to why HW does not simply bait catch basins on a regular basis. HW does not bait catch basins as the sewer system is not the prime habit for rodents and there are significant environmental implications. The bait used is highly poisonous and can be carried to the nearest water body during runoff from a rain or snow melt event which occurs frequently. Some catch basins are connected to the storm system that directly discharges to nearby rivers, lakes or Halifax harbour. HW staff have confirmed with HRM staff that the Construction Management Plan (CMP) requirements have been amended to include rodent control activities. HW reviews its construction projects for the requirements of pest control and engages the services of pest control contractors, as required.

In addition, HRM and HW call centers have agreed on protocols to triage complaints from residents in relation to rodents. Recognizing that the majority of rats are associated with development activity, HRM is the lead agency to triage rat complaints. Recognizing that HW has prime responsibility for stormwater and expertise in relation to beaver control, HW is the lead agency to triage complaints in regards to beavers. Both call centres were recently reminded of the protocols for triaging complaints regarding rats. Some additional examples and scenarios were discussed to help staff triage the calls correctly.

Report Prepared by: *Original Signed By:*

Susheel Arora, M.A.Sc., P.Eng.,
Director, Wastewater & Stormwater Services, (902) 490-6254

Halifax Water
Halifax Regional Water Commission

ITEM #9-I
HRWC Board
June 21, 2018

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

SUBMITTED BY: *Original Signed By:*
James Campbell, Communications and PR Coordinator

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

DATE: June 7, 2018

SUBJECT: **Corporate Balanced Scorecard - 2017/18 Results**

INFORMATION REPORT

ORIGIN

Annual Corporate Performance Measurement.

BACKGROUND

Halifax Water has been utilizing a corporate balanced scorecard (CBS) to measure performance since 2001. With the merger in 2007, Halifax Water developed an expanded CBS to include wastewater and stormwater measurements. As well, this provided an opportunity to refine measurements related to water service delivery. This report provides a reconciliation of final results for the 2017/18 fiscal year.

As part of the CBS refinement in 2007, staff developed new mission and vision statements, as follows:

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 the 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.

With the vision statement entrenched, Halifax Water staff defined eight Critical Success Factors (CSFs) derived from the vision statement as follows:

1. High Quality Drinking Water
2. Service Excellence
3. Responsible Financial Management
4. Effective Asset Management
5. Workplace Safety and Security
6. Regulatory Compliance
7. Environmental Stewardship
8. Motivated and Satisfied Employees

DISCUSSION

Under each of the CSFs, staff developed organizational indicators to track performance and allow for the establishment of targets. The following lists the CSFs and corresponding results for the organizational indicators [OI]s] under each category.

High Quality Drinking Water

Under the category of High Quality Drinking Water, we are continuing to seek adherence to five key objectives associated with our Water Quality Masterplan. Performance was measured through our ability to maintain a disinfection residual throughout the distribution system, control disinfection byproducts like trihalomethanes and haloacetic acids, ensure particle removal through our filtration systems, and ensure corrosion control in the distribution system, as measured by the level of lead at the customers' taps. Our results in these five categories scored 0.87 out of a total maximum score of 1.00, a reduction from last year's result of .94.

As for water safety, our bacteriological test results were 99.97%, a slight increase from last year's 99.9%, and above our target of 99.3% of our samples free of total coliform for the fiscal year.

Results from our annual customer survey indicate that 85% of our customers rated their drinking water quality as good to excellent, down slightly from last year's figure of 88%, meeting the top end of the target of 80%-85%.

Service Excellence

Under the Service Excellence CSF, the annual customer survey indicated that 96% of our customers are satisfied or very satisfied with our overall service, surpassing the target of 90%, and on par with last year's result of 95%.

In terms of service outage for water and wastewater services, overall results were up compared to last year, particularly for water, with outages of 361 connection hours per 1,000 customers this year compared to 149 connection hours per 1,000 customers for water service last year, with a target of 200. Wastewater results improved from 4.6 to 2.7 connection hours per 1,000 customers, as compared to a target of 8 connection hours per 1,000 customers, remaining well below the target.

Also under Service Excellence, our call centre had an average call wait time of 84 seconds, compared with the target of 80 seconds. This represents an increase from last year's number of 51 seconds. Increased call volumes in March 2018 from stormwater only customers played a large role in this overall result.

Responsible Financial Management

Under Responsible Financial Management, the expense to revenue ratio was recorded as 0.716, compared to the benchmark of 0.748 for the fiscal year. Also tied to the theme of Responsible Financial Management is the annual cost per connection for water and wastewater service. For water, the annual cost per connection increased to $439 from $407 in 2016/17, compared to a target of $458. For wastewater, the annual cost increased to $653 from $625 per connection, remaining below the target of $667.

Effective Asset Management

The leakage performance measure for 2017/18 was 199 litres per service connection per day, a decrease from 227 last year and just above the target range of 180 - 190 litres per connection per day.

On the wastewater side, reduction of inflow and infiltration is a key measurement of performance, and as such, 1,100 inspections were carried out on private property, up from 904 last year, and well above the target of 600 inspections.

Updating our GIS database is crucial to our Asset Management Program. Results for this OI were excellent again last year with 99.3% of linear infrastructure embedded in GIS compared to a target range of 98-99%. This is up from 96.9% last year.

Also under Effective Asset Management is Capital Budget Expenditures, recognizing that we need to maximize the annual funds approved by the NSUARB. This year saw an improvement to 63.7% of funds spent, compared to 46% last year but still well below target. The target for this OI is 80%-90%. A revised OI is in place for 2018/19 as well as a new business process to optimize spending derived from rate base funding.

Workplace Safety and Security

Under the theme of Workplace Safety and Security, the organization saw two labour infractions resulting in a written warning. The target range for this OI is 0 - 2. While this is up from one labour infraction last year, it continues to indicate that a culture of safety remains embedded and implemented into every aspect of our operation.

With regard to lost-time accidents, which are a key indicator for workplace safety, the organization saw 2.81 accidents per 100 employees as compared to a target of 3.0-4.0 (with a maximum of 4.5) per 100 employees, which is an improvement from the 2016/17 figure of 3.4 accidents per 100 employees. This OI is a Gateway Indicator for the Organizational Performance Award program.

Halifax Water has a large fleet to support service delivery. Accordingly, the organization tracks the number of traffic accidents per million kilometers driven. For 2017/18, 4.38 traffic accidents per million km were recorded. This is a reduction from 2016/2017's number of 4.84, and falls within the target range of 4 to 5.

Regulatory Compliance

Under the critical success factor of Regulatory Compliance, 2017/18 saw one written warning from NS Environment, up from zero for 2016/2017. The target for this Indicator is a maximum of two.

Also under regulatory compliance, we tracked the percentage of wastewater treatment facilities meeting discharge requirements of their operating permits for the 2017/18 fiscal year. Our wastewater treatment facilities met their discharge requirements 94.6% of the time, up from 91.4% and exceeding the target range of 85-90%. Compliance with federal wastewater system effluent regulations [WSER] is a key aspect of our strategic plan and shows a continued focus on stewardship of the environment.

Environmental Stewardship

During the 2017/18 fiscal year, our Pollution Prevention division of Regulatory Services inspected 507 businesses in the Halifax municipality, a slight decrease from 528 in 2016/17. The target for this OI was 400.

We also continued to improve on energy management associated with our water and wastewater treatment facilities with an energy reduction of 7.1% in 2017/2018 with associated capital projects. This figure significantly exceeds the target of 2.0% and is a

marked improvement over the 2016/17 number of 3.8%. As one of the Utility's largest expenses, these on-going energy reductions represent real savings, as well as reduction in our environmental foot print.

Under biosolids residuals handling, 98.3% of the biosolids residuals met the desired solids concentration, as compared to a target of 97%. This result is down slightly from the 2016/17 figure of 99.4%.

Motivated and Satisfied Employees

There are several organizational indicators under this category, including filling jobs with Halifax Water incumbents. For the 2017/18 fiscal year, 62% of jobs were filled from within as compared to a target of 80%. This is a reduction from the 2016/17 figure of 71%.

To promote harmonious labour management relations, an organizational indicator was chosen to recognize the number of grievances and arbitrations throughout the fiscal year. There were a total of 12 grievances filed during the 2017/18 fiscal year, with 1 arbitration as compared to 18 grievances and 0 arbitrations for 2016/17.

The Corporate Balanced Scorecard also includes an indicator of employee satisfaction which is derived from a survey that is carried out in the fall of the year. The 2017/18 survey result was a B+, matching our previous high of B+ in 2013. The 2016/17 survey result was a B. The target for this OI is an A-.

The number of days of absenteeism for employees is also a measure of satisfaction and motivation. Accordingly, the average number of days that an employee was absent this year stood at 7.35, down marginally from 7.51 in 2016/17, and just above the target of less than 7 days. This result compares favourably with the private sector.

Organizational Award Program

Similar to previous years, 12 organizational indicators were incorporated into an Organizational Award Program. The selected organizational indicators are determined to be the most objective and outward looking to the customers and environment we serve. The following is a summary of our organizational indicators and corresponding award point values for the 2017/18 fiscal year:

Organizational Indicator	**2017/18 Results**
Water Quality Master Plan Objectives	0.87
Customer Water Quality Survey Results	1.0
Customer Service Survey Results	1.0
Operating Expense/Revenue Ratio **(Gateway Indicator)**	1.0
Water Loss Control Reduction	0.0
Inflow & Infiltration Reduction	1.0
Percentage of Network on GIS	1.0
# of Lost Time Accidents per 100 Employees **(Gateway Indicator)**	1.0
# of Accidents per 1,000,000 kms driven	0.60
Percentage of WWTFs Compliant with NS Environment Permits	1.0
Energy Management - Water & Wastewater	1.0
Biosolids Residuals Handling	1.0
***TOTAL SCORE**	**10.47**

*The maximum attainable score is 12.0

In accordance with the Organizational Award Program criteria, eligible employees received $947 each in recognition of the good performance.

BUDGET IMPLICATIONS

With the operating expense-to-revenue ratio less than the target, funds were available within the 2017/18 operations budget for the Organizational Award Program.

ATTACHMENT

Presentation - 2017-18 Corporate Balanced Scorecard – Final Results, June 21, 2018

Report Prepared by: *Original Signed By:*

James Campbell, Communications and PR Coordinator
902-490-4604

Halifax Water

2017-18 Corporate Balanced Scorecard

Final Results

STRAIGHT from the SOURCE

2

CSF: High Quality Drinking Water

Organizational Indicator:

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

Objective	Total Sites	Result to March 31/18 (% of Sites Achieving Target)	Target	Distrib. Pts.
Disinfection – Chlorine Residual	**64**	**92%**	**80 – 100%**	**12/20**
Disinfection By-products (THMs)	**25**	**100%**	**< 80 ug/l**	**20/20**
Disinfection By-products (HAAs)	**21**	**100%**	**< 60 ug/l**	**20/20**
Particle Removal	**5**	**95%**	**<0.2 &< 1.0 NTU**	**15/20**
Corrosion Control	**n/a**	**5.59 ug/L**	**Lead; <15 ug/l**	**20/20**
Summary Total				**87/100**

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

3

CSF: High Quality Drinking Water

Organizational Indicator:

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

	% Samples Free of Coliform	Target
2017/18	**99.97%**	**99.3%**

4

CSF: High Quality Drinking Water

*

Organizational Indicator:

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

	Survey Results(actual)	Target
From Fall 2017 Survey	85%	80% - 85%

5

CSF: Service Excellence

*

Organizational Indicator:

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

	Survey Result (actual)	Target
From Fall 2017 Survey	96%	85% - 90%

6

CSF: Service Excellence

Organizational Indicator:

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

	Hours (actual)	Target
2017/18	361	200

7

CSF: Service Excellence

Organizational Indicator:

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

	Hours (actual)	Target
2017/18	2.70	8

8

CSF: Service Excellence

Organizational Indicator:

- Average call wait time over the year

	Seconds	Target
2017/18	84	80

9

CSF: Responsible Financial Management

Organizational Indicator: *

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

	Exp/Rev ratio (actual)	Target
2017/18	0.716	0.748

10

CSF: Responsible Financial Management

Organizational Indicator:

- Annual Cost per Customer Connection [Water]

	Cost/connection	Target
2017/18	$439	$458

11

CSF: Responsible Financial Management

Organizational Indicator:

- Annual Cost per Customer Connection [Wastewater]

	Cost/connection	Target
2017/18	$653	$667

12

CSF: Effective Asset Management

Organizational Indicator:

*

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

	Leakage Actual	Target
2017/18	199	180 - 190

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

13

CSF: Effective Asset Management

Organizational Indicator:

*

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

	I&I Inspections	Target
2017/18	1,100	600

14

CSF: Effective Asset Management

*

Organizational Indicator:

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

	% Available	Target
2017/18	99.3%	98.0% - 99.0%

15

CSF: Effective Asset Management

- Organizational Indicator
  - Capital Budget Expenditures – Maximize spend of funds approved by Halifax Water Board by March 31, 2018

	Maximize Annual Capital Budget Expenditures	Target
2017/18	63.7%	80% to 90% spent

16

CSF: Workplace Safety & Security

Organizational Indicator:

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

	Labour Infractions	Target
2017/18	2	0 - 2 (max.)

17

CSF: Workplace Safety & Security

*

Organizational Indicator:

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

	Lost time accidents	Target
2017/18	2.81	3.0 – 4.0 per 100 employees (with a maximum of 4.5)

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

18

CSF: Workplace Safety & Security

*

Organizational Indicator:

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

	Traffic Accidents/1,000,000 Kms	Target
2017/18	4.38	4.0 per 1,000,000 km (maximum of 5)

19

CSF: Workplace Safety & Security

Organizational Indicator:

- Employees are retrained or recertified before due date

	% of Employees Retrained or Recertified Before Due Date	Target
2017/18	77%	80 - 90%

CSF: Workplace Safety & Security

Organizational Indicator:

- Supervisors complete weekly or bi-weekly safety talks

	% of Completed Safety Talks	Target
2017/18	82%	80 - 90%

CSF: Regulatory Compliance

Organizational Indicator:

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

	Public Health & Env. Infract.	Target
2017/18	1	0 - 2 (max.)

22

CSF: Regulatory Compliance

*

Organizational Indicator:

- % of WWTFs complying with NSE approval permits.

	% of WWTF samples meeting NSE discharge limits	Target
2017/18	94.6%	85 - 90%

23

CSF: Environmental Stewardship

Organizational Indicator:

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

	Actual Inspected	Target
2017/18	507	400

24

CSF: Environmental Stewardship

Organizational Indicator:

- Energy Management [kwh/m^3] ; % energy reduction associated with capital projects

	% Energy Reduction	Target
2017/18	7.1%	2%

25

CSF: Environmental Stewardship

Organizational Indicator:

- Bio-solid Residuals Handling; % of sludge meeting solids concentration target - 97% of samples meet a minimum solids concentration of:
  - **25% from HHSP plants**
  - **18% from Aerotech Dewatering Facility**

	% Meet Solids Concentration Target	Target
2017/18	98.3%	97.0 %

26

CSF: Motivated and Satisfied Employees

Organizational Indicator:

- # of arbitrations divided by total # of grievances.

	Arbitrations/Grievances	Target
2017/18	1/12	0 Arbitrations

27

CSF: Motivated and Satisfied Employees

Organizational Indicator:

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

	% Jobs filled within	Target
2017/18	62%	80%

28 Halifax Water

CSF: Motivated and Satisfied Employees

Organizational Indicator:

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

	Survey Result (actual)	Target
Survey in Fall 2017	B+	A-

29 Halifax Water

CSF: Motivated and Satisfied Employees

Organizational Indicator:

- Average number of days of absenteeism

	Avg. No. of days absenteeism	Target
2017/18	7.35	< 7 days

2017/18 Organizational Award Final Results

Organizational Indicator	2017/18 Results
Water Quality Master Plan Objectives	0.87
Customer Water Quality Survey Results	1.00
Customer Service Survey Results	1.00
Operating Expense/Revenue Ratio *[Gateway Indicator]*	1.00
Water Loss Control Reduction	0.00
Inflow & Infiltration Reduction	1.00
Percentage of Network on GIS	1.00
Energy Management – Water & Wastewater	1.00
Biosolids Residual Handling	1.00
# of Lost Time Accidents per 100 Employees *[Gateway Indicator]*	1.00
# of Traffic Accidents per 1,000,000 km	0.60
Percentage of WWTFs Compliant with NS Environment Permits	1.00
TOTAL SCORE	**10.47**

ITEM #10-I

HRWC Board

June 21, 2018

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

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

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

DATE: June 21, 2018

SUBJECT: **Stormwater Billing Update**

INFORMATION REPORT

ORIGIN

March 7, 2018, Halifax Council – Item 1 2018/19 Budget Committee Meeting.

BACKGROUND

Stormwater charges have been in place since July 2013. There are two distinct components of the charge – the Site Related Flow Charge and the Right of Way Charge.

DISCUSSION

Changes to the Right of Way Charge:

The ROW charge was increased effective April 1st from $39 per property to $40 per property receiving stormwater service as part of the Halifax budget process. The utility was advised the rate had been changed on May 4th. Four billing cycles in the new fiscal year had already been completed at that point, and the earliest the change can be implemented in SAP is for July 1, 2018. Utility staff met with municipal staff to discuss the best way to implement the increase, and what communications materials were being prepared for the public, 311 and Halifax Water's call centres.
In future, the municipality will provide advance notice of any pending changes in the ROW charge prior to the effective date.

Collections of Unpaid Stormwater Accounts:

Stormwater charges are lienable charges, and the HRWC Act provides the municipality with the authority to establish the lien when Halifax Water determines that an account has arrears or has become uncollectible. Among the stormwater only account holders, approximately 3800 accounts have unpaid stormwater bills. There are approximately 98,000 stormwater customers. Some customers have now accumulated 4 years of charges. As of March 31, 2018, the outstanding revenue (stormwater only accounts) is approximately $1.1 million dollars, and roughly 40% of that are municipal revenues (ROW charge) and 60% are Halifax Water revenues.

The utility is transferring the outstanding accounts to the municipality for collection. Some properties have been sold or transferred in the past four years. Outstanding revenues related to those properties will be written off as bad debt. An exercise is underway between the utility and municipality to verify property ownership changes to identify the accounts for write-off and to verify the business process to be followed when applying a lien on a property as part of the collection process.

The municipality intends to send a final collection bill to outstanding accounts in August, and after that any unpaid amounts will be transferred to the property tax account as a lien. This will protect the municipality and utility from future loss of revenue through write offs and will ensure eventual collection.

BUDGET IMPLICATIONS

Halifax Water budgets for bad debt expense. The actual bad debt expense in 2018/19 may be higher than budget depending upon the results of the property ownership investigation noted above.

ALTERNATIVES

There is no alternative. If the outstanding stormwater charges are not collected, in results in increased expense for other rate payers which would be viewed as an inequity under the Public Utilities Act.

Report Prepared by: *Original Signed By:*
Cathie O'Toole, MBA, CPA, CGA, Director of Corporate Services, 490-3685

Halifax Water
Halifax Regional Water Commission

ITEM #11-I
HRWC Board

June 21, 2018

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

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

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

DATE: June 18, 2018

SUBJECT: **Fit for Duty Policy Update**

INFORMATION REPORT

ORIGIN

Halifax Water staff

BACKGROUND

The Nova Scotia Cannabis Control Act has passed and will come into effect when the federal legislation to legalize cannabis is proclaimed.

DISCUSSION

The purpose of this report is to inform the Board of work initiated to ensure the utility is ready to address challenges which may be created by the legalization of Cannabis. Existing Halifax Water policies and practices were reviewed, and it was determined that there was a need for a policy to ensure all Halifax Water staff are fully aware of the expectation of being fit for duty and to establish clear expectations for employees, managers and supervisors, and contractors working on Halifax Water properties.

The policy will cover all substances, including cannabis, that have altering effects on employees' ability to perform their duties, with safety being paramount.

The Policy will also introduce reasonable grounds testing and the process for self-disclosure by the Employee. This will require training and education to Management staff to ensure they are equipped to recognize signs and be prepared to address appropriately.

The Policy will be provided to the Board at the September 2018 meeting.

BUDGET IMPLICATIONS

The budget implications are minimal and include training and rollout of the new policy, and some costs associated with engaging a vendor to conduct reasonable grounds testing.

Report Prepared by: *Original Signed By:*

Rochelle Bellemare, Manger, Human Resources, 490-4807

Halifax Water
Halifax Regional Water Commission

ITEM # 12-I
HRWC Board
June 21, 2018

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

SUBMITTED BY: *Original Signed By:*
Kenda MacKenzie, P.Eng., Director, Regulatory Services

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

DATE: June 13, 2018

SUBJECT: **Capital Cost Contribution – Financial Status Report for the Fiscal Year ended March 31, 2018.**

INFORMATION REPORT

ORIGIN

Halifax Water and NSUARB approval of various capital cost contribution charges.

BACKGROUND/DISCUSSION

Halifax Water oversees twelve (12) Capital Cost Contribution (CCC) charge areas for oversized water and wastewater infrastructure. The Halifax Water Board and subsequently the NSUARB directly approved eleven (11) area specific CCC charges consistent with our CCC policy, with one being inherited and endorsed at the time of the wastewater/stormwater merger in 2007. The overall CCC policy and the specific charge rates were developed for the equitable facilitation of master water and wastewater infrastructure within new development areas or new service extension areas.

In accordance with the approved policy, Halifax Water is obligated to provide an accounting of all funds received and all costs incurred with respect to the infrastructure improvement. Attached is an annual report showing the cumulative accounting of all CCC funds received and disbursed as of the end of the fiscal year at March 31, 2018. The format provides a detailed entry of each individual debit and credit transaction with a cumulative total to date for each individual charge area from inception to the applicable year-end.

As of March 31, 2018, the results show that seven (7) charge areas are in a negative cash position and five (5) are in a positive cash position. Combined, the net current deficit is $4.0 million with the implementation of $33.9 million in infrastructure projects. The CCC program is anticipated to be cost neutral within each charge area and fulfilling the desired facilitation role within these development areas.

This report will be forwarded to the NSUARB for information in accordance with the policy requirements.

ATTACHMENT

Halifax Water Capital Cost Contribution Report – Summary to March 31, 2018

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

HALIFAX WATER

Capital Cost Contribution Report

Summary to March 31, 2018

Capital Cost Contribution Area		Receipts	Disbursements	Cumulative
Beaverbank		$1,332,814	($1,762,046)	($429,232)
Bedford South - Water		$3,095,890	($2,074,291)	$1,021,598
Bedford South - Wastewater		$2,300,357	($1,022,796)	$1,277,561
Bedford West - Water		$4,688,663	($4,898,751)	($210,088)
Bedford West - Wastewater		$11,011,692	($16,707,647)	($5,695,954)
Birch Cove North - Water		$2,240,790	($2,200,334)	$40,455
Herring Cove		$1,385,726	($698,579)	$687,148
Lakeside Timberlea		$753,946	($1,264,666)	($510,720)
Morris Russell Lake		$1,128,095	($363,291)	$764,804
Northgate		$585,772	($788,960)	($203,188)
Sackville Lively		$408,579	($567,455)	($158,876)
Geizer Hill		$967,154	($1,504,806)	($537,652)
Grand Total		**$29,899,478**	**($33,853,621)**	**($3,954,143)**

HALIFAX WATER

BEAVERBANK - WATER

Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/18	**$1,332,814.04**	**($1,762,045.74)**	**($429,231.70)**

Project Information

Nova Scotia Utility & Review Board Approval Date: March 31, 2000; Revised: December 21, 2000
Total Acreage: 1,302.03
Acreage Developed to Date: 802.85 (61.66%)
Acreage Rate: $1,515.00 (Proposed amendment to $850/acre)
Total Infrastructure Cost: $3,198,896.00
Benefit to Existing HRWC Customer Base - 0%
Benefit to HRM Fire Protection - 37%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 34.6%
Infrastructure to be completed: None
* Based on NSURB review

HALIFAX WATER

BEDFORD SOUTH - WATER

Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/17	**$3,093,298.82**	**($2,074,291.42)**	**$1,019,007.40**
Reduction to pre-existing asset value (1153-194)	$2,590.87		
Fiscal 2018 Yearly Totals	*$2,590.87*	*$0.00*	*$2,590.87*
Balance as of March 31/18	**$3,095,889.69**	**($2,074,291.42)**	**$1,021,598.27**

Project Information

Nova Scotia Utility & Review Board Approval Date: June 19, 1998
Total Acreage: 598.0
Acreage Developed to Date: 498.41 (83.35%)
Acreage Rate: $4,621.00
Total Infrastructure Cost: $6,155,269.00
Benefit to Existing HRWC Customer Base - 21%
Benefit to HRM Fire Protection - 37%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 42%
Infrastructure to be completed: Reservoir

HALIFAX WATER

BEDFORD SOUTH - WASTEWATER / STORMWATER

Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/17	**$2,239,457.08**	**($1,022,795.90)**	**$1,216,661.18**
Wentworth Estates Phase 3 # 20502 WW 19.246 ac	$21,591.81		
Bedford South Ph C6 #20661 WW 5.573 ac	$12,733.63		
Bedford South Ph C5B #20188 WW 6.455 ac	$26,574.53		
Fiscal 2018 Yearly Totals	*$60,899.97*	*$0.00*	*$60,899.97*
Balance as of March 31/18	**$2,300,357.05**	**($1,022,795.90)**	**$1,277,561.15**

Project Information

Nova Scotia Utility & Review Board Approval Date: August 1, 2007
Total Acreage: 624
Acreage Developed to Date: 567.244 (90.90%)
Acreage Rate: $3305.29
Total Infrastructure Cost: $2,273,400.00
Benefit to Existing HRWC Customer Base - 0%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 100%
Infrastructure to be completed: oversized piping

HALIFAX WATER
BEDFORD WEST - WATER
Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/17	**$4,163,854.66**	**($4,435,592.27)**	**($271,737.61)**
West Bedford CCC Bramwell Consolidation - Water	$2,062.22		
West Bedford (7.864 ac) Blocks A, B, E, F	$20,810.26		
West Bedford (2.355 ac) Block WB - 16R4 SA#2	$7,494.81		
West Bedford Water CCC Phase 2-5A (23.987ac)	$77,343.27		
West Bedford Water CCC Phase 2-5B (7.94ac)	$25,601.58		
West Bedford Water CCC Phase 2-6 (6.03ac)	$19,443.02		
West Bedford Water CCC Phase 2-5 #21262	$6,690.59		
West Bedford Water CCC Phase 2-3 B&C (2.229ac)	$21,638.82		
West Bedford (W) CCC Ph 2-R2 Hogan Court (5.955ac)	$29,687.11		
Rec CCC earned rev West Bedford Ph 9A #21121 Water	$65,845.03		
Rec CCC earned rev West Bedford Ph 2-7 #21140 Water	$24,405.34		
Rec CCC earned rev West Bedford Ph 9B #21122 Water 7.252 ac	$19,440.70		
Rec CCC earned rev West Bedford CCC fees Block G - Wastewater 4.61 ac	$11,963.38		
Rec CCC earned rev West Bedford CCC fees LUB - 14 (2.786ac)	$7,229.93		
Rec CCC earned rev West Bedford Water fee Blocks 3-7 & 3-8 (6.076ac)	$16,288.35		
Fire Protection - West Bedford Ph 2-5A	$99,306.81		
Fire Protection - West Bedford Ph 2-B	$28,223.24		
Fire Protection - West Bedford Ph 2-5C	$18,622.71		
Fire Protection - West Bedford Ph 9A	$25,215.85		
Close 3-2653 West Bedford Phase 9A		($68,150.94)	
Halifax Water Capital Budget benefit to existing customers (3-2653)	$2,318.49		
Close 3-2560 West Bedford Phase 2-5C		($50,331.65)	
Halifax Water Capital Budget benefit to existing customers (3-2560)	$1,712.28		
Close 3-2559 West Bedford Phase 2-5B		($76,279.03)	
Halifax Water Capital Budget benefit to existing customers (3-2559)	$2,595.01		
Close 3-2558 West Bedford Phase 2-5A		($268,396.78)	
Halifax Water Capital Budget benefit to existing customers (3-2558)	($9,130.86)		
Fiscal 2018 Yearly Totals	*$524,807.94*	*($463,158.40)*	*$61,649.54*
Balance as of March 31/18	**$4,688,662.60**	**($4,898,750.67)**	**($210,088.07)**

Project Information

Nova Scotia Utility & Review Board Approval Date: September 2012
Total Acreage: 1611.00
Acreage Developed to Date: 615.82 (38.22%)
Acreage Rate: $3,149.83 (2012)
Total Infrastructure Cost: $9,290,316
Benefit to Existing HRWC Customer Base - 5.4%
Benefit to HRM Fire Protection - 37%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 57.6%
Infrastructure to be completed: Proportionate amount of Bedford South Reservior, PRV's, and Pipe Oversizing

HALIFAX WATER

BEDFORD WEST - WASTEWATER / STORMWATER

Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/17	**$8,125,284.63**	**($16,374,194.04)**	**($8,248,909.41)**
West Bedford CCC Bramwell Consolidation - WW	$1,655.21		
West Bedford (7.864 ac) Blocks A, B, E, F	$16,703.08		
West Bedford (2.355 ac) Block WB - 16R4 SA#2	$6,015.61		
West Bedford WW CCC Phase 2-5A (23.987ac)	$62,078.48		
West Bedford WW CCC Phase 2-5B (7.94ac)	$20,548.75		
West Bedford WW CCC Phase 2-6 (6.03ac)	$15,605.66		
West Bedford WW CCC Phase 2-5 #21262	$5,370.11		
West Bedford WW CCC Phase 2-3 B&C (2.229ac)	$17,368.09		
West Bedford WW CCC Ph 2-R2 Hogan Court (5.955ac)	$23,827.94		
Rec CCC earned rev West Bedford Ph 9A #21121 WW	$52,849.59		
Rec CCC earned rev West Bedford Ph 2-7 #21140 WW	$19,588.60		
Rec CCC earned rev West Bedford Ph 9B #21122 WW 7.252 ac	$15,603.81		
Rec CCC earned rev Bedford West CCC - KLTS cost proportion	$2,567,402.14		
Rec CCC earned rev West Bedford CCC fees Block G - Wastewater 4.61 ac	$9,602.24		
Rec CCC earned rev West Bedford CCC fees LUB-14 Water (2.786ac)	$5,803.00		
Rec CCC earned rev West Bedford WW fees Blocks 3-7 & 3-8 (6.076ac)	$13,073.61		
Close 6-1555 West Bedford Block 3-4		($79,784.83)	
Halifax Water Capital Budget benefit to existing customers (6-1555)	$7,970.50		
Close 6-1573 West Bedford Phase 9A		($48,009.34)	
Halifax Water Capital Budget benefit to existing customers (6-1573)	$4,796.13		
Close 6-1558 West Bedford Phase 2-5C		($36,397.78)	
Halifax Water Capital Budget benefit to existing customers (6-1558)	$3,636.14		
Close 6-1557 West Bedford Phase 2-5B		($67,436.38)	
Halifax Water Capital Budget benefit to existing customers (6-1557)	$6,736.89		
Close 6-1556 West Bedford Phase 2-5A		($101,824.46)	
Halifax Water Capital Budget benefit to existing customers (6-1556)	$10,172.26		
Fiscal 2018 Yearly Totals	*$2,886,407.84*	*($333,452.79)*	*$2,552,955.05*
Balance as of March 31/18	**$11,011,692.47**	**($16,707,646.83)**	**($5,695,954.36)**

Project Information

Nova Scotia Utility & Review Board Approval Date: September 2012
Total Acreage: 1611.00
Acreage Developed to Date: 615.82 (38.22%)
Acreage Rate: $10,122.65 (2012)
Total Infrastructure Cost: $20,175319
Benefit to Existing HRWC Customer Base - 9.9%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 90.1%
Infrastructure to be completed: Forcemains, Pumping Stations and Pipe Oversizing

HALIFAX WATER
BIRCH COVE NORTH - WATER
Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/17	**$1,986,386.29**	**($2,187,868.69)**	**($201,482.40)**
Wentworth Estates Phase 3 # 20502 Water 19.246 ac	$97,384.76		
Bedford South Ph C6 #20661 Water 5.573 ac	$22,054.75		
Bedford South Ph C5B #20188 Water 6.455 ac	$32,751.83		
Birch Cove North CCC Fees-Block 4 - R15 Water 20.2 ac	$102,212.00		
Record interest on CCC GLs		($12,465.76)	
Fiscal 2018 Yearly Totals	*$254,403.34*	*($12,465.76)*	*$241,937.58*
Balance as of March 31/18	**$2,240,789.63**	**($2,200,334.45)**	**$40,455.18**

Project Information

Nova Scotia Utility & Review Board Approval Date: September 17, 1999
Total Acreage: 494.0
Acreage Developed to Date:386.834 (78.31%)
Acreage Rate: $5,060.00
Total Infrastructure Cost: $3,717,646.00
Benefit to Existing HRWC Customer Base - 0%
Benefit to HRM Fire Protection - 37%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 63%
Infrastructure to be completed: Reservoir and Pipe Oversizing

HALIFAX WATER
HERRING COVE
Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/18	**$1,385,726.23**	**($698,578.68)**	**$687,147.55**

Project Information

Nova Scotia Utility & Review Board Approval Date: April 10, 2002; Revised: October 26, 2005

Total Acreage: 787.7

Acreage Developed to Date: 311.22 (39.51%)

Acreage Rate: $3,622.00

Total Infrastructure Cost: $4,957,204.00

Benefit to Existing HRWC Customer Base - 0%
Benefit to HRM Fire Protection - 37%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 63%
Infrastructure to be completed: Future Reservoir

HALIFAX WATER
LAKESIDE TIMBERLEA
Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31, 2017	**$741,707.67**	**($1,264,653.54)**	**($522,945.87)**
Record interest on CCC GLs		($12.24)	
Rec CCC earned revenue HRM file #21312 Maple Grove Ave 0.1344 ac	$926.82		
Fire Protection on BLT CCC cost tracking (3-1467)	$11,311.69		
Fiscal 2018 Yearly Totals	*$12,238.51*	*($12.24)*	*$12,226.27*
Balance as of March 31, 2018	**$753,946.18**	**($1,264,665.78)**	**($510,719.60)**

Project Information

Nova Scotia Utility & Review Board Approval Date: December 14, 2012
Overall Acerage 277.79
Acreage Developed to Date: 41.812 (15.1%)
Acreage Rate: $14,926.23
Total Infrastructure Cost: $ 8,062,204.55
Benefit to Existing HRWC Customer Base - 2.7%
Benefit to HRM Fire Protection - 37%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 60.3%
Infrastructure to be completed: Pipe Oversizing

HALIFAX WATER
MORRIS RUSSELL LAKE
Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/18	**$1,128,094.67**	**($363,290.75)**	**$764,803.92**

Project Information

Nova Scotia Utility & Review Board Approval Date: Interim June 10, 2002
Total Acreage: 1,178.7
Acreage Developed to Date: 574.84 (48.77%)
Acreage Rate: $1,300.00
Total Infrastructure Cost: $2,641,851.00
Benefit to Existing HRWC Customer Base - 8.2%
Benefit to HRM Fire Protection - 37%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 54.8%
Infrastructure to be completed: Pipe Oversizing

HALIFAX WATER
NORTHGATE
Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/18	**$585,772.08**	**($788,960.44)**	**($203,188.36)**

Project Information

Nova Scotia Utility & Review Board Approval Date: September 28, 2008
Total Acreage: 485.4 (plus 16.8 acres of adjacent benefitting lands)
Acreage Developed to Date: 188.9 (38.91%)
Acreage Rate: $1,168.00
Total Infrastructure Cost: $900,041.00
Benefit to Existing HRWC Customer Base - 13.4%
Benefit to HRM Fire Protection - 37%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 49.6%
Infrastructure to be completed: Pipe Oversizing

HALIFAX WATER

SACKVILLE LIVELY

Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/17	**$400,096.42**	**($567,455.00)**	**($167,358.58)**
Rec CCC earned rev SACKVILLE DRIVE - LIVELY CCC WATER	$8,482.81		
Fiscal 2018 Yearly Totals	*$8,482.81*	*$0.00*	*$8,482.81*
Balance as of March 31/18	**$408,579.23**	**($567,455.00)**	**($158,875.77)**

Project Information

$6.77

Nova Scotia Utility & Review Board Approval Date: October 29, 2007
Total Acreage: 335.5 acres
Acreage Developed to Date: 206.34 (61.50%)
Acreage Rate: $1,253.00 / acre
Total Infrastructure Cost: $567,455
Benefit to HRWC Existing Customer: $26,133 (25 acres)
Benefit to HRM through LIC: $50,746 (40.5 acres)
Benefit to HRM Fire Protection: $205,972.71
Total Infrastructure of the Project, including financing: $667,497
Percentage of Total Infrastructure Cost to be recovered through CCC Charge:50.2%
Infrastructure to be completed: 0%

HALIFAX WATER

GEIZER HILL

Summary to March 31, 2018

Transaction Description	Receipts	Disbursements	Cumulative
Balance as of March 31/18	**$967,153.88**	**($1,504,805.54)**	**($537,651.66)**

Project Information

Nova Scotia Utility & Review Board Approval Date: 2014
Total Acreage: 99
Acreage Developed to Date: 52.1 (52.63%)
Acreage Rate: $1,253.00
Total Infrastructure Cost: $1,528,000
Benefit to Existing HRWC Customer Base - 0%
Benefit to HRM Fire Protection - 37%
Percentage of Total Infrastructure Cost to be recovered through CCC Charge - 63%
Infrastructure to be completed: Water Main Extension