City of Port Colborne
Water and Stormwater Master Servicing Plan
Volume 3 – Water

November 2026



Agile
INFRASTRUCTURE

Submission Details and Version Control

City of Port Colborne
Water and Stormwater Master Servicing Plan
Volume 3 – Water
November 2026

Agile Project No. P01.002.01

Version	Date Submitted	Author	Reviewer
Draft	April 16, 2026	Michelle Klaver	Julien Bell
Final Draft	June 10, 2026	Michelle Klaver	Lindsay Currie, Julien Bell
Final	November 2026	Michelle Klaver	Lindsay Currie, Julien Bell

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Table of Contents

1 Introduction 6
1.1 Background 6
1.2 Master Servicing Plan 6
1.3 Master Servicing Plan Objectives 7
1.4 Master Servicing Plan Documentation Layout 8
2 Water System Performance Objectives 10
2.1 Water Use Design Criteria 10
2.2 Hydraulic Performance Criteria 13
2.3 Water Use Design Criteria and Level of Service Summary 15
2.4 Capital Cost Projections 15
3 Planning and Growth Projections 17
4 Existing Water System 20
4.1 Existing Water Infrastructure 20
4.2 System Demands 29
4.3 Hydraulic Water Model 29
4.4 Facility Details, System Control Narrative, and SCADA Validation 31
5 Assessment of Existing Water Infrastructure 32
5.1 Facility Capacity 32
5.2 System Performance 32
5.3 Opportunities and Constraints 36
6 Water Servicing Alternatives and Evaluation 38
6.1 Servicing Strategy Development 38
6.2 Existing System Upgrades 38
6.3 Alternatives Evaluation 43
7 Preferred Water Servicing Strategy 45
7.1 Preferred Water Servicing Strategy Overview 45
7.2 Future System Performance 48
7.3 Capital Program 52
8 Implementation Plan 59

8.1 Project Timing and Triggers 60
8.2 Growth Area Servicing Plans 60
8.3 Local Servicing Upgrades 68
8.4 Operation and Condition Program 71

List of Tables

Table 2-1: Port Colborne Historic Water Billing Review 10
Table 2-2 Port Colborne WTP - Historic Water Production 11
Table 2-3 Port Colborne Non-Revenue Water Review 12
Table 2-4 Historic Water System Per Capita Demands 12
Table 2-5 Master Servicing Plan Fire Flow Criteria 14
Table 2-6: Water Design Criteria and Level of Service 15
Table 3-1: Buildout Scenario of Growth in Water Demand and Area Requiring Stormwater Servicing 18
Table 3-2: 2051 Scenario of Growth in Water Demand and Area Requiring Stormwater Servicing 18
Table 4-1: City-Owned Watermain Diameter 22
Table 4-2: City-Owned Watermain Material 22
Table 4-3: City-Owned Watermain Age 23
Table 4-4: Port Colborne Water Treatment Plant Overview 25
Table 4-5: Region Pumping Stations Overview 25
Table 4-6: Region Storage Facilities Overview 26
Table 4-7: 2021 Regional MSP Update Project for City of Port Colborne 27
Table 4-8: System Demands 29
Table 6-1: Alternatives Evaluation 44
Table 7-1: Minimum System Pressures 48
Table 7-2: Fire Flow Deficiencies 49
Table 7-3: Capital Program Summary by Project Type 52
Table 7-4: Benefit to Existing Summary 52
Table 7-5: Watermain Rehabilitation Capital Program Summary 53
Table 7-6: Watermain Capital Program Summary 55
Table 8-1: East Employment Lands Projects 62
Table 8-2: South Residential Lands Projects 63
Table 8-3: Southwest Residential Lands Projects 64
Table 8-4: West Residential Lands Projects 66
Table 8-5: Northwest Residential Lands Projects 67

Table 8-6: Northeast Side Employment Lands Projects 68
Table 8-7: Cast Iron Rehabilitation Projects 69
Table 8-8: Water Capital Program Costing Details 74
Table 8-9: Watermain Rehabilitation Capital Program Costing Details 78

List of Figures

Figure 3-1 Anticipated Development 19
Figure 4-1 City's Existing Water System 21
Figure 4-2 City's Existing Capital Program 24
Figure 4-3 Region Capital Program 28
Figure 4-4: Updated Diurnal Curve Compared to Previously Modelled Diurnal Curves 31
Figure 5-1 Existing System Pressures 34
Figure 5-2 Existing Fire Flow Deficiencies 35
Figure 5-3 Opportunities and Constraints 37
Figure 6-1: Buildout Capital Program 39
Figure 6-2: Cast Iron Replacement 40
Figure 6-3: Sub-Trunk Loops 41
Figure 6-4: Sub-Trunk Loops & Target Upgrades 42
Figure 7-1 Capital Program 47
Figure 7-2 Buildout System Pressures 50
Figure 7-3 Buildout Fire Flow Deficiencies 51
Figure 8-1: East Employment Lands Growth Area 62
Figure 8-2: South Residential Lands Growth Area 63
Figure 8-3: Southwest Residential Lands Growth Area 64
Figure 8-4: West Residential Lands Growth Area 65
Figure 8-5: Northwest Residential Lands Growth Area 66
Figure 8-6: Northeast Side Employment Lands Growth Area 68

List of Appendices

Appendix A – Fire Flow Review 72
Appendix B – Capital Program 73

1 Introduction

1.1 Background

The City of Port Colborne (City) is located in southern Ontario along the north shore of Lake Erie and is bisected by the Welland Canal. It is part of the Niagara Region (Region) and is adjacent to the Town of Wainfleet, Town of Fort Erie, and City of Welland.

Water servicing within the City operates under a two-tier system. The Region is responsible for water treatment, storage facilities, pumping stations, and major trunk infrastructure, while the City owns and operates the local water distribution system, including trunk and distribution watermains. The system is supplied by the Port Colborne Water Treatment Plant (WTP), which is a conventional surface water treatment facility that draws raw water from Lake Erie via the Welland Canal. Treated water is distributed through a network of watermains and storage facilities within a single pressure zone.

The City owns, maintains and operates the majority of the stormwater collection and management infrastructure, including catch basins, storm sewers, ditches, culverts, stormwater management facilities, and other related structures. Stormwater runoff is conveyed through a combination of minor and major systems and ultimately discharges to local receiving watercourses and Lake Erie.

Reliable and accessible public infrastructure is critical to supporting existing and future communities. Coordinated infrastructure planning, land use planning, and investment are required to deliver efficient, safe, and cost-effective water and stormwater services.

The Master Servicing Plan (MSP) provides a comprehensive review of existing systems and identifies growth-related servicing strategies, with consideration for long-term sustainability and optimization of existing infrastructure.

1.2 Master Servicing Plan

The City is undertaking a Water and Stormwater Master Servicing Plan to develop a comprehensive strategy and vision for the City's short- and long-term water and stormwater infrastructure needs. The MSP reviews existing system conditions and performance, considers the impacts of growth, and identifies strategies to meet current and future servicing requirements.

The Study establishes a long-term management strategy to guide water and stormwater infrastructure planning through 2051 and beyond and includes an actionable Capital Program and Implementation Plan to support the strategy. The MSP will provide the framework for system capacity allocations, infrastructure upgrades, and financial planning, supporting the City's continued growth and sustainable management of its water and stormwater systems.

1.3 Master Servicing Plan Objectives

The MSP is designed to deliver a strategic, integrated framework for the management, enhancement, and expansion of the City's water distribution and stormwater management systems through 2051 and beyond. This MSP addresses the needs of both systems to ensure reliable service delivery, environmental protection, and support for the City's growth aspirations. The key objectives of the MSP are as follows:

- **Provide Safe and Reliable Services**: Ensure a consistent supply of potable water that complies with the Safe Drinking Water Act, 2002, and effective stormwater management to safeguard public health, property, and infrastructure under current and future conditions.
- **Accommodate Growth**: Evaluate and plan infrastructure capacity to support projected population increases, seasonal tourism demands, and potential industrial development, particularly along the Welland Canal, in accordance with the City's Official Plan.
- **Enhance System Resilience**: Develop adaptive strategies to mitigate the impacts of climate change, including increased storm intensity and fluctuations in Lake Erie water levels, ensuring the longevity and reliability of water and stormwater systems.
- **Meet Regulatory Standards**: Adhere to provincial legislation, Ministry of the Environment, Conservation and Parks (MECP) guidelines, Niagara Region policies, and Niagara Peninsula Conservation Authority (NPCA) requirements, while fulfilling the Municipal Class Environmental Assessment (EA) process.
- **Optimize Infrastructure Performance**: Identify opportunities to reduce non-revenue water losses, improve stormwater conveyance efficiency, and leverage existing assets to deliver cost-effective, sustainable solutions.
- **Protect Environmental Quality**: Minimize impacts on Lake Erie and local watercourses by enhancing stormwater quality, controlling runoff volumes, and incorporating low-impact development (LID) practices where feasible.
- **Foster Collaboration**: Engage residents, businesses, Niagara Region, NPCA, and other stakeholders to align the MSP with community needs, regional priorities, and environmental goals.

These objectives underpin a holistic servicing strategy that ensures Port Colborne's water and stormwater systems are robust, sustainable, and capable of supporting the community's long-term prosperity.

1.4 Master Servicing Plan Documentation Layout

The MSP Report, including all supporting volumes, is the documentation placed on public record for the prescribed minimum 30-day review period. The documentation, in its entirety, describes all required phases of the planning process and incorporates the procedure considered essential for compliance with the Environmental Assessment Act.

The MSP Report is organized into 5 volumes as described below.

1.4.1 Volume 1 - Executive Summary

Volume 1 provides a brief overview of the MSP. It summarizes the information contained in Volume 2, 3, 4 and 5, including the problem statement, purpose of the study, significant planning, environmental and technical considerations, and description of the preferred water and stormwater servicing strategies including depiction of the projects and documentation of the capital programs.

1.4.2 Volume 2 – Plan & Policy

Volume 2 details the master planning process including the Master Plan Class EA process, related studies, legislative and policy planning context, water and stormwater servicing performance objectives, population, and employment growth forecasts, existing environmental and servicing conditions, and future considerations.

1.4.3 Volume 3 – Water Master Plan

Volume 3 consists of the principal document summarizing the study objectives, approach, methodologies, technical analyses, evaluation, and selection of the preferred water servicing strategy. This volume contains baseline water system data and performance information. This volume also documents the water servicing strategy development with detailed information on the projects and capital program associated with the preferred water servicing strategy and implementation plan.

1.4.4 Volume 4 – Stormwater Master Plan

Volume 4 consists of the principal document summarizing the study objectives, approach, methodologies, technical analyses, evaluation, and selection of the preferred stormwater servicing strategy. This volume contains baseline stormwater system data and performance information. This volume also documents the stormwater servicing strategy development with detailed information on the projects and capital program associated with the preferred stormwater servicing strategy and implementation plan.

1.4.5 Volume 5 – Indigenous, Public, and Agency Consultation

Volume 5 contains all relevant documentation of the public consultation process including notifications, comments and responses, and distribution information. Presentation material from the Public Information Centre (PIC) held during the process is included. Other presentation material and discussion information from workshops held with relevant agencies, approval bodies and other stakeholders are also included.

2 Water System Performance Objectives

To ensure the City's water system operates efficiently and that it's performance can meet existing and future needs of the system's users, clear system performance criteria must be established. As part of this MSP, the design criteria and hydraulic performance criteria were reviewed to confirm that system performance objectives appropriately inform the sizing and timing of future infrastructure, such as watermains, while also supporting the identification and planning of upgrades required to address system deficiencies.

This MSP's Level of Service and Performance Criteria recommendations are based on the following:

- The City's Design and Development Manual;
- Niagara Region's 2021 Water and Wastewater Master Servicing Plan Update (MSPU);
- Review of Ministry and other agency requirements;
- Review of available historic reports; and,
- Assessment of existing system performance.

2.1 Water Use Design Criteria

The existing water distribution system demands were determined through a review of the City's water billing records, SCADA data from the Region, and Non-Revenue Water (NRW) estimation.

2.1.1 Billing Data Review

Table 2-1 summarizes the City's average annual water billing records from 2022 to 2024.

Table 2-1: Port Colborne Historic Water Billing Review

Year	Water Billing (m^3)			Water Billing (MLD)			%	
	Total	Res	Emp	Total	Res	Emp	Res	Emp
2022	1,659,507	825,113	834,394	4.55	2.26	2.29	50%	50%
2023	1,590,847	819,448	771,399	4.36	2.25	2.11	52%	48%
2024	1,632,993	901,930	731,063	4.47	2.47	2.00	55%	45%
Average	**1,627,782**	**848,830**	**778,952**	**4.46**	**2.33**	**2.13**	**52%**	**48%**

The 2022 - 2024 water billing records demonstrate a generally consistent consumption trend of 4.5 MLD, which is generally split between 52% residential demand and 48% employment demand.

2.1.2 Water Treatment Plant Review

Table 2-2 summarizes the treated water supplied to the Port Colborne system. The 2011 to 2020 values are from the Region's 2021 Master Servicing Plan Update Report. The 2022 to 2024 period was calculated using the Region's SCADA records.

Table 2-2 Port Colborne WTP - Historic Water Production

Year	Average Day Demand (MLD)	Max Day Demand (MLD)	Peaking Factor
2011	8.2	11.8	1.45
2012	7.9	12.3	1.55
2013	7.9	12.0	1.52
2014	8.6	14.0	1.64
2015	9.0	14.9	1.65
2016	7.7	11.4	1.47
2017	8.7	14.2	1.62
2018	8.8	14.2	1.60
5-Year Average	**8.6**	**13.7**	**1.60**
5-Year Peak	**9.0**	**14.9**	**1.65**
2019	7.3	12.4	1.71
2020	6.8	10.5	1.53
2022[1]	7.0	16.1/9.5	2.31/1.36
2023	7.5	10.7	1.42
2024	8.0	11.2	1.40
5-Year Average	**7.3**	**12.2/10.8**	**1.67/1.48**
5-Year Peak	**8.0**	**16.1/12.4**	**2.31/1.71**

1 – Peak Day demand in 2022 occurred on January 23, likely due to a watermain break and/or operational issue. Summer Max Day demand was 9.5 MLD.

The Port Colborne system has experienced a moderate decrease in system demands compared to the Region's 2021 MSPU baseline. For the purposes of the City's MSP, the 5-year average demand of 7.3 MLD will be used.

The highest system MDD peaking factor was observed in 2022, where the MDD occurred in January and where the peaking factor was 2.31, which was 35% higher than the next highest peaking factor observed since 2011. The 5-year average peaking factor is 1.67, including the 2022 MDD, and 1.48 when using the summer MDD for 2022. The City's design manual recommended a peaking factor 1.57, which is approximately the midpoint between the two calculated 5-year averages. The MSP proposes using the City's design manual MDD peaking factor of 1.57.

2.1.3 Non-Revenue Water Demands

Table 2-3 summarizes the total water supplied by the Port Colborne Water Treatment Plant (WTP) compared to billed water consumption from 2022 to 2024.

Table 2-3 Port Colborne Non-Revenue Water Review

Year	Demand (MLD)		Non-Revenue Water %
	Billed	Production	
2022	4.55	6.95	35%
2023	4.36	7.51	42%
2024	4.47	8.02	44%
Average	**4.46**	**7.49**	**40%**

The City's non-revenue water has been calculated at 40%, which aligns with the Region's 2021 MSPU estimate of 41%.

2.1.4 Per Capita Demand

Table 2-4 shows the estimated residential and employment per capita demand, with and without non-revenue water.

Table 2-4 Historic Water System Per Capita Demands

Year	Estimated Population		L/cap/d (365 day) Billing (non NRW)		L/cap/d (365 day) Production (with NRW)		L/cap/d (365 day) Billing + 25% NRW	
	Res	Non-Res	Res	Non-Res	Res	Non-Res	Res	Non-Res
2022	18,271	4,800	124	476	189	728	165	635
2023	18,381	4,823	122	438	210	755	163	584
2024	18,491	4,847	134	413	240	743	178	551
Average			**127**	**443**	**213**	**742**	**169**	**590**

The system's average per capita demands using billing data are substantially lower than the Region's and City's 240 L/cap/day for residential use, however, they are substantially higher than 270 L/cap/day for employment use. This is a function of the types of industry that are active within the City and which represent a high percentage of the overall water usage. Further, due to the system's high non-revenue water, the system's total production demands are substantially higher than the Region's and City's demand criteria.

Growth related per capita rates of 240 L/cap/day for residential and 270 L/cap/day for employment were recommended for the following reasons:

- The recommended per capita rates are in line with the Region's and City's established design criteria, maintaining consistency with broader planning assumptions and provides a conservative yet defensible benchmark that reflects long-term average conditions.

- The recommended residential per capita rate remains above the observed historic per capita rates outlined in **Table 2-4**; providing reasonable flexibility within the criteria to accommodate potential changes in future usage patterns, recognizing that current lower residential demands may reflect temporary conservation trends or short-term system conditions.
- The recommended employment per capita rate is lower than the observed historic per capita rates; however, employment demands within the City are influenced by water-intensive industrial activity. The use of the established employment rate provides a stable basis for long-term forecasting.

2.1.4.1 Demand Projection Methodology

For the purposes of this Master Servicing Plan, the following methodology was used for estimating existing and future demands:

- Existing Demands: The Starting Point Methodology was used. Existing system demands and maximum day peaking factor for the Port Colborne distribution system were calculated using customer billing records and historic SCADA production data.
    - Average system demands and peaking factors were estimated using three years of SCADA records (2022 to 2024).
    - Local allocation of system demands and non-revenue water was based on three years of billing records (2022 to 2024).
- Future Demands: Future demands will be added to existing demands using the estimated growth and applying per capita criteria.

2.2 Hydraulic Performance Criteria

2.2.1 Regional Facilities

Niagara Region is responsible for system treatment, pumping, and storage; accordingly, in the servicing analysis, it was assumed that there is sufficient Regional treatment, pumping, and storage capacity to meet the assessed growth scenarios. Further, it is assumed that the City and Region will coordinate to ensure key Region treatment, pumping, and storage capacity upgrades are implemented in line with growth.

2.2.2 System Pressures

System pressure objectives are consistent with the City's Design manual, Region MSPU criteria and MECP guidelines as follows:

- Maintain system pressures between 40-100 psi under average day demand (ADD), maximum day demand (MDD), and peak hour demand (PHD) scenarios
- Preferred system pressures are 50-70 psi
- Maintain system pressures above 20 psi under MDD + fire flow conditions

2.2.3 Fire Flow

The recommended process of defining fire flow targets is as follows:

- FUS and land use-based approach; and,
- Fire flow at a hydrant is governed by land use with the highest fire flow target.

The City's design guidelines outline the following minimum fire flow requirements for new developments:

- Residential Detached – 100 L/s
- Residential Townhouse – 150 L/s
- Employment, high-rise and stacked townhouse – to be determined in accordance with FUS and/or AWWA requirements.

A desktop review of various city neighbourhoods was conducted to estimate appropriate Fire Underwriters Survey (FUS) fire flows. A representative construction type was selected for analysis, and fire flow requirements were calculated based on FUS criteria. **Appendix A** provides a detailed calculation for each assessed property and the corresponding results.

Table 2-5 summarizes the fire flow criteria that will be used after reviewing the local FUS calculations and local municipal criteria.

Table 2-5 Master Servicing Plan Fire Flow Criteria

Land Use	City Criteria	FUS Review	Recommendation
Dead End Residential	100	50	50
Single/Semi	100	109	100
Townhouse/Row House	150	134	150
Multi Family	FUS Review	214	200
Commercial		150	175
Institutional		201	200
Industrial		414	250

The recommended land use base fire flow criteria generally align with the estimated FUS for various existing properties and are consistent with the approach used by other neighbouring communities. It is noted that the City has several larger industrial properties that have very high estimated FUS fire flow requirements. For the purposes of this MSP, fire flow requirements

will be limited to 250 L/s, consistent with the City's recent approach with other large industrial developments and with the Region's trunk watermain sizing philosophy.

2.3 Water Use Design Criteria and Level of Service Summary

As presented in the above sections, the water demand criteria updated as part of the MSP are summarized in **Table 2-6**.

Table 2-6: Water Design Criteria and Level of Service

Description			Criteria
Water Demand	Per Capita Rate	Residential	240 LPCD
		Employment	270 LPCD
	Peaking Factor	Max Day	1.57
		Peak Hour	1.5 – 2.0 times Max Day Demand
System Performance	Fire Flow		Land use/FUS-lite approach
	Pressure	Max Day Demand	Preferred 345 – 480 kPa (50 – 70 psi) Allowable 275 – 550 Kpa (40 – 80 psi) Max allowable 700kPa (100psi)
		Peak Hour Demand	
		Average Day Demand	
		Min Hour Demand	
		Max Day + Fire	>140 kPa (20 psi)

2.4 Capital Cost Projections

Cost estimates for all projects identified in this MSP have been developed in accordance with the cost classification framework outlined in the *Guide to Costing* (Treasury Board of Canada Secretariat, May 2023) and the classification system of the Association for the Advancement of Cost Engineering (AACE). These classification systems define the appropriate estimating methodology, expected level of accuracy, and associated risk at various stages of project planning and design. For the purposes of this MSP, the estimates have been prepared consistent with a Class 4 level estimate, reflecting the current stage of planning and establishing the range of accuracy that can be expected as projects advance toward detailed design.

The cost estimating strategy was developed to provide a consistent, transparent, and reliable basis for project budgeting and prioritization. The approach includes the development of a standardized estimating algorithm and benchmarking against recent project costs to provide perspective on estimate accuracy.

The cost estimating methodology consists of four key steps:

- **Step 1 – Unit Costs and Baseline Construction Costs:** Establishment of unit costs for linear infrastructure (watermains and storm sewers) using a first-principles analysis, lump sum costing for stormwater management ponds based on size, and volumetric unit costs for LID infrastructure. Baseline construction costs are derived by applying these unit costs to the planned infrastructure quantities.
- **Step 2 – Adjustments for Scope and Complexity:** Modification of baseline construction costs to reflect project-specific factors and current market conditions, including road restoration, construction overhead, site complexity, special conditions, market and inflation adjustments, and unique project elements.
- **Step 3 – Inclusion of Non-Construction (Soft) Costs:** Addition of allowances for land acquisition, supporting studies and investigations, design and contract administration services, and City-related project management and permitting costs.
- **Step 4 – Overall Project Contingency:** Application of a contingency allowance to account for uncertainty, scope refinement, and unforeseen conditions at this stage of planning.

Detailed costing sheets were developed to support the financial analysis and provide transparency with respect to quantities, assumptions, and adjustment factors applied to each project. **Appendix A** in **Volume 2** provides a memo outlining the detailed costing methodology and associated assumptions.

3 Planning and Growth Projections

Section 7 in **Volume 2** summarizes the various historical and current growth forecasts that have been prepared over the past decade, providing context for the growth assumptions adopted in this MSP. These forecasts inform the future system modelling and the development of infrastructure improvement strategies intended to address the long-term servicing needs of the City. Key background documents reviewed include the 2013 Official Plan (growth to 2031), the 2023 Growth Analysis Review (Dillon Consulting), the 2024 Development Charges Background Study (Watson & Associates), the 2024 East Side Employment Lands Servicing Review (GEI), and the ongoing Pollution Prevention Control Plan project.

For the purposes of this MSP, two planning scenarios were developed to evaluate future servicing requirements:

- **Buildout Scenario:** Represents full development within the existing urban boundary, including additional employment lands along the Welland Canal. This scenario is used to identify ultimate long-term servicing needs and to appropriately size major infrastructure upgrades. Growth assumptions are based on parcel-level development status, incorporating densities and servicing information from the Growth Analysis Review and the PPCP, as well as proponent-specific information for industrial and mixed-use lands.
- **2051 Growth Scenario:** Represents the City's most likely development outlook to 2051 and forms the basis of the recommended capital program. This scenario prioritizes development based on status (Development Review and Development Database parcels, Future Development Areas, Pipeline Lands, and Vacant Lands) and applies reasonable completion factors to establish a realistic estimate of population, employment, water demand, and impervious area growth by 2051.

The Buildout Scenario establishes the City's ultimate servicing envelope, while the 2051 Growth Scenario defines the infrastructure upgrades required within the planning horizon. Detailed assumptions and summarized results for each scenario are provided in **Table 3-1** and **Table 3-2**, with corresponding mapping included in **Figure 3-1**.

Table 3-1: Buildout Scenario of Growth in Water Demand and Area Requiring Stormwater Servicing

Development Status	Residential Growth	Residential Average Day Demand Growth (L/s)	Employment Growth	Employment Average Day Demand Growth (L/s)[1]	Total Average Day Demand (L/s)	Area (ha)
Development Database	1,043	3			3	11
Development Review	6,132	17	10,271	173	190	526
INS Future Development Area	787	2			2	11
INS Pipeline Lands	4,149	12			12	112
INS Vacant Lands	7,057	20			20	114
Total	**19,167**	**53**	**10,271**	**173**	**226**	**774**

1 - Includes Process-Based Flows for 4 industrial parcels.
MDD for process flows, non-process flows based on Peaking Factors

Table 3-2: 2051 Scenario of Growth in Water Demand and Area Requiring Stormwater Servicing

Status	% Complete by 2051	2051 Forecasted Values					
		Residential Growth	Residential Average Day Demand Growth (L/s)	Employment Growth	Employment Average Day Demand Growth (L/s)	Total Average Day Demand (L/s)	Area (ha)
Development Database	100%	1,043	3	0	0	3	11
Development Review	100%	6,132	17	10,271	173	190	526
INS Future Development Area	100%	787	2	0	0	2	11
INS Pipeline Lands	50%	2,075	6	0	0	6	56
INS Vacant Lands	20%	1,411	4	0	0	4	23
Total		**11,447**	**32**	**10,271**	**173**	**204**	**627**

1 - Includes Process-Based Flows for 4 industrial parcels.
MDD for process flows, non-process flows based on Peaking Factors

City of Port Colborne

Water and Stormwater Master Plan

Growth Areas
- Development Database
- Development Review
- INS Future Development Area
- INS Pipeline Lands
- INS Vacant Lands

Zoning
- Commercial
- Farm
- Government
- Industrial
- Institutional
- Land
- Residential
- Special Purpose

General Features
- Municipal Boundary Area
- Urban Area Boundary
- Parks
- NPCA Approximate Regulation Lands
- Waterbody

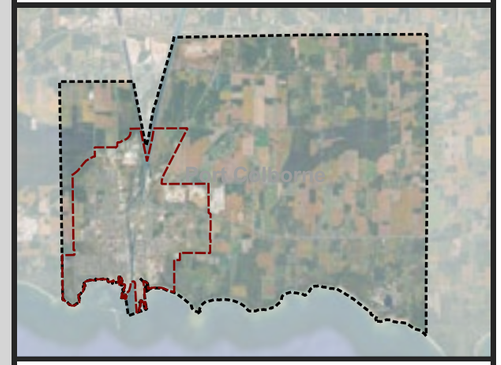

Figure 3-1
Anticipated Development

Agile Infrastructure

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4 Existing Water System

4.1 Existing Water Infrastructure

The City's water system comprises of a two-tier management, with Niagara Region responsible for supply, treatment, storage, pumping, and transmissions, and the City responsible for local distributions. Due to the two-tier management, the system performance and capacity are highly influenced by the operation of the Region's infrastructure.

Figure 4-1 highlights the City's water system. The Region-owned Port Colborne WTP supplies the City's water system. The water system operates under a single pressure zone, with floating storage provided by a single elevated tank (ET), the Barrick Road ET, that generally manages the system pressures. The Fielden Avenue Reservoir and Pump Station provides additional peak and emergency storage needs.

While the system is generally well looped within the local distribution system, the major constraint is the Welland Canal, which bisects the system in two. There are only two (2) Welland Canal crossings, one Region and one City, interconnecting the treatment and storage on the west side to the east side (and significant growth areas to the east). The Region is currently constructing a second canal crossing, completing a transmission loop, which is anticipated to be constructed by Q3 2027. While the water system primarily services the existing urban boundary, there are extensions that service properties and businesses outside the urban boundary.

PORT COLBORNE

City of Port Colborne

Water and Stormwater Master Plan

Existing Watermains
- < 150 mm
- 150 mm
- 200 - 250 mm
- > 300 mm
- Region Watermains

Existing Facilities
- PS
- Storage
- WTP

General Features
- Municipal Boundary Area
- Urban Area Boundary
- Waterbody

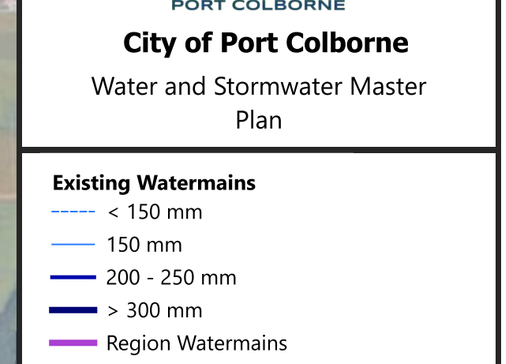

Figure 4-1
Existing Water System

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Barrick Rd ET
Fielden Ave Res and PS
Port Colborne WTP
Third Concession Road
Second Concession Road
Main Street East
Killaly Street East
Killaly Street West
Main Street West
Barrick Road
West Side Road
Minor Road
Elm Street
Steele Street
Welland Street
Clarence Street
King Street
Durham Street
Sugarloaf Street
Highway 140
Chippawa Road
Carl Road
Miller Road
White Road
Reuter Road
Lorraine Road
Weaver Road
Pinecrest Road
Lakeshore Road East
0
0.75
1.5 km

4.1.1 City Water Infrastructure

The City owns and operates approximately 112 kilometres of watermain. **Table 4-1** to **Table 4-3** summarize the materials, diameters, and age of the existing City-owned water distribution system.

Table 4-1: City-Owned Watermain Diameter

Diameter (mm)	Length (m)	Percent by Length (%)
< 50	813	0.73
100	349	0.31
150	55,309	49.5
200	23,551	21
250	7,315	6.5
300	15,326	13.7
350	105	0.1
400	7,402	6.6
450	51	0.1
500	737	0.6
600	278	0.2

Table 4-2: City-Owned Watermain Material

Material	Length (m)	Percent by Length (%)
Asbestos Cement	4,681	4.2
Cast Iron	34,734	31.1
Ductile Iron	3,754	3.4
Copper	93	0.1
High Density Polyethylene	136	0.1
Polyethylene	469	0.4
Polyvinyl Chloride	64,814	58.0
Concrete/Cement	279	0.2
Steel	2,675	2.4
Unknown	93	0.1

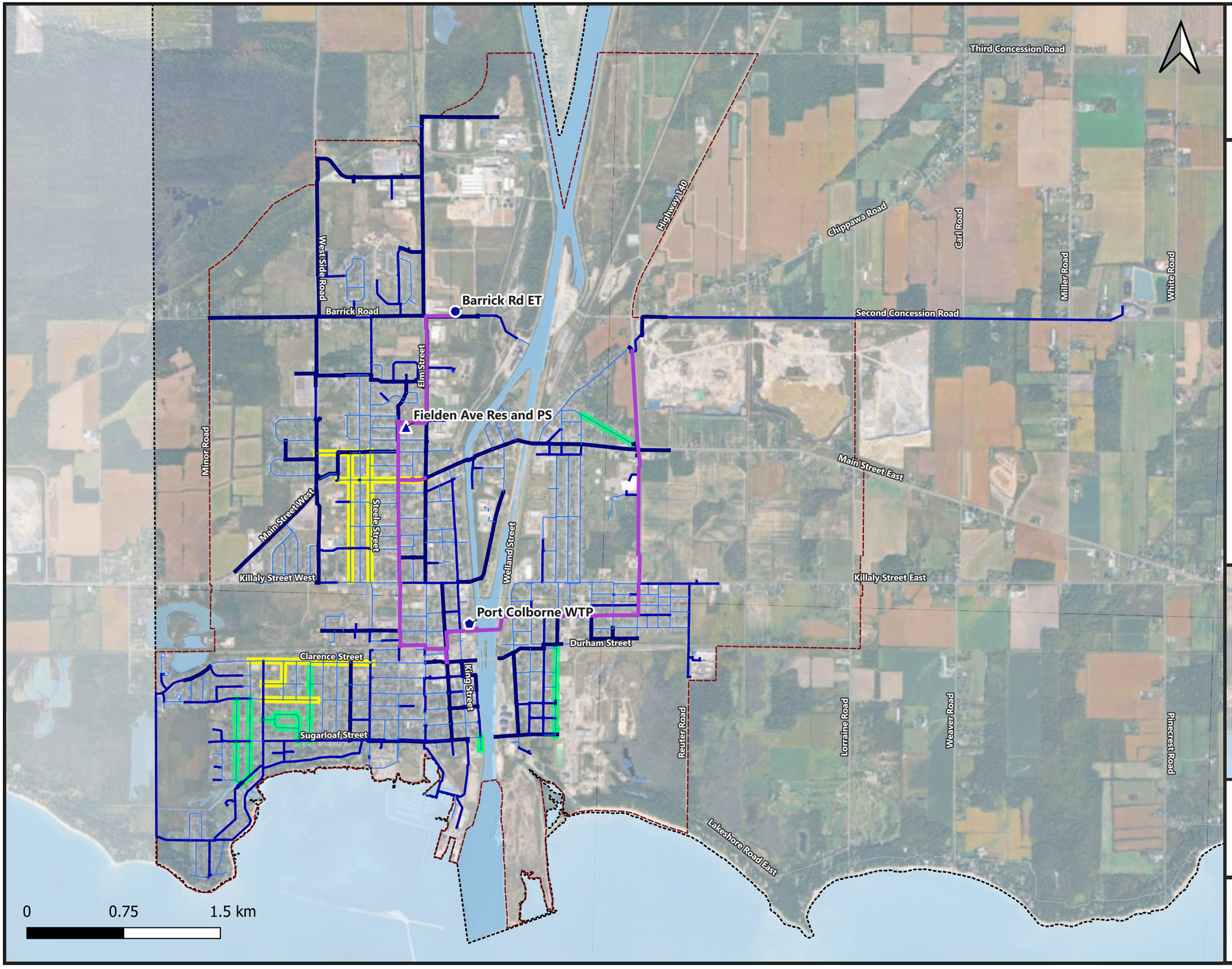
Table 4-3: City-Owned Watermain Age

Install Year	Length (m)	Percent by Length (%)
> 1950	11,192	10.0
1950 - 1960	16,525	14.8
1960 - 1970	7,744	6.9
1970 - 1980	12,676	11.3
1980 - 1990	24,504	21.9
1990 - 2000	20,809	18.6
2000 - 2010	7,655	6.9
2010 - 2020	9,716	8.7
2020 - 2023	859	0.8
Unknown	49	0.0

4.1.1.1 City's Capital Program and Watermain Lining Program

The City's existing Capital Program is primarily focused on the rehabilitation of aging watermains through a watermain lining program targeting cast iron (CI) and asbestos cement (AC) pipes. Projects are prioritized based on condition, including historical break data and observed deterioration. The program, as illustrated in **Figure 4-2**, includes works completed in 2024 and 2025, as well as planned projects for 2026 to 2028.

For the purposes of this implementation plan, we have assumed that the City will continue with the rehabilitation of the City's remaining cast iron watermains, with completion by 2041. The implementation plan includes recommendations to prioritize the lining/replacement of watermains that support growth areas and/or have a history of breaks. Ultimately, the City will continue to review and prioritize the watermain replacement/lining based on a review of corridor needs and other infrastructure and community priorities. This phased approach supports the continued renewal of aging infrastructure, improving system reliability and reducing the risk of future watermain failures.



City of Port Colborne

Water and Stormwater Master Plan

City Watermain Lining Projects
- Completed (2024-2025)
- Proposed (2026-2028)

Existing Watermains
- < 150 mm
- 150 mm
- 200 - 250 mm
- > 300 mm
- Region Watermains

Existing Facilities
- PS
- Storage
- WTP

General Features
- Municipal Boundary Area
- Urban Area Boundary
- Waterbody

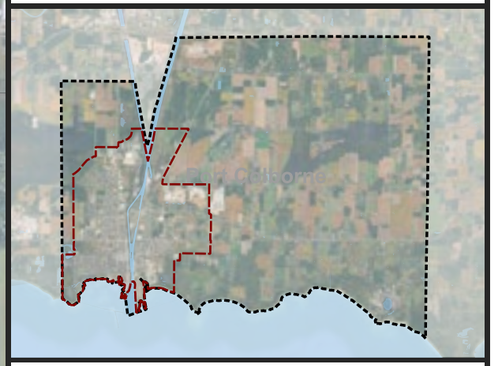


Figure 4-2
City's Watermain Rehabilitation Program

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4.1.1.2 Watermain Breaks

The City maintains records of watermain breaks dating from 1974 to present, which has been used to assess system performance and inform infrastructure planning. This data indicates that breaks are generally concentrated in older cast iron and asbestos cement watermains.

Break history has been a factor in prioritizing projects within the City's existing watermain lining Capital Program. As outlined in **Section 4.1.1.1**,The City continues to use watermain break records to support ongoing decision-making to manage the operation and maintenance of the water distribution system.

For the purposes of this Master Plan, watermain break data has been incorporated into the analysis and used as a key factor in determining project costing. While it is understood that it is the City's preference to line cast iron watermains if feasible, for the purposes of the Implementation Plan, watermains with break history have been assumed to require full replacement, while watermains without a break history are assumed to be candidates for lining. Prior to construction/or lining, the City will ultimately need to review and assess the condition of the existing watermain and confirm its suitability for lining.

4.1.2 Regional Water Infrastructure

Table 4-4 to **Table 4-6** summarize the Region-owned trunk infrastructure capacity supporting the City of Port Colborne.

Table 4-4: Port Colborne Water Treatment Plant Overview

Facility Name	Port Colborne Water Treatment Plant
Permit	Drinking Water Works Permit No. 007-201 (Issue 6, August 2, 2019)
Source Water	Lake Erie via Welland Canal
Rated Capacity	36.0 MLD (Maximum Day Demand)
Key Treatment Processes	Zebra mussel control, travelling screens, coagulation, flocculation, sedimentation, filtration, disinfection

Table 4-5: Region Pumping Stations Overview

Station Name	No. of Pumps (Firm)	Installed Capacity (MLD)	Firm Capacity (MLD)	Total Dynamic Head (m)
Port Colborne WTP High Lift Station	5 (4 firm)	51.2	36.1	48.8
Fielden Avenue BPS	2 (1 firm)	9.0	4.5	61.0

Table 4-6: Region Storage Facilities Overview

Facility Name	Type	Volume (ML)	Usable Volume (ML)	Top Water Level (m)
Port Colborne WTP	Pumped Reservoir	3.8	3.1[1]	178.6
Fielden Avenue Reservoir	Pumped Reservoir	4.6	4.6	179.5
Barrick Road Elevated Tank	Elevated Tank	6.0	6.1	223.0

1 – Usable volume limited by MECP contact time – Region's 2021 MSPU estimated 0.7 MLD of contact volume is required at a system MDD of 12.1 MLD

4.1.2.1 Trunk Watermain

The Region owns and operates approximately eight kilometres of transmission watermains within the City of Port Colborne, varying from 300 mm to 750 mm, to convey water from the WTP to the City's distribution system. There are 22 interconnections between the City and Region watermains.

4.1.2.2 Region Water Servicing Strategy and Upgrade Plans

The Region's 2021 MSPU identifies the preferred water servicing strategy for the City of Port Colborne to accommodate projected growth beyond 2051 while optimizing system performance and reducing long-term lifecycle costs.

The MSP system findings are as follows:

- The Port Colborne Water Treatment Plant has sufficient capacity to support growth beyond 2051;
- The components of the Port Colborne water strategy are focused on providing additional storage for the growth in the area while optimizing the storage/pumping relationship to reduce long-term lifecycle costs;
- The Fielden Reservoir and Pumping Station will be investigated for potential decommissioning to address existing operational issues, reduce long-term life cycle costs, and maximize the use of surplus pumping and treatment capacity at the WTP;
- An additional trunk watermain crossing the Canal to support growth on the East and West sides of Port Colborne; and,
- New, or additional elevated storage post-2051 is recommended to support long-term growth needs – preferred location to be determined in a separate study. For the purposes of this MSP analysis, the new elevated storage was assumed to be next to the existing Barrick Road ET.

Table 4-7 and **Figure 4-3** summarize the MSPU's long-term strategy, which includes system upgrades, potential facility decommissioning, and strategic planning for future storage and supply reliability. Note that the Region's upgrades were based on the 2051 growth projection at the time of the MSPU and may not reflect the City's latest 2051 growth projections.

Table 4-7: 2021 Regional MSP Update Project for City of Port Colborne

Project ID	Type	Description
W-S-012	Storage	Construction of a new 9.0 ML elevated tank after 2051 to meet long-term storage needs. Proposed at the Barrick Road Elevated Tank site as a twin ET, but final location to be determined through a dedicated Environmental Assessment (EA).
W-D-007	Decommissioning	Decommission the Fielden Avenue Reservoir and Pumping Station to streamline system operations, reduce energy consumption, and rely on existing surplus capacity at the WTP.
W-M-002	Regional Watermains	Construct a 450 mm watermain across the Welland Canal to improve the redundancy and reliability of water supply to the eastern portion of the city.
Studies and Special Programs		• The elevated tank project is included in the Region's capital program to provide project visibility, allow for early planning, and address potential land acquisition requirements. • The City and Region should implement a non-revenue water reduction program targeting current inefficiencies. • A Region-wide reservoir volume study is recommended to evaluate compliance with Contact Time volume requirements and overall system storage adequacy.

It should be noted that the Region's 2021 MSPU recommendations were based on a net growth of 6,097 people and jobs by 2051. The City's current 2051 growth projections account for 21,718 equivalent people and jobs (when converting known high water use industrial developments into an equivalent number of jobs-based flow rate). As the City's new 2051 growth projections are substantially higher than those reviewed in the Region's 2021 MSPU, it is anticipated that additional Regional upgrades may be required to support the City's 2051 growth.

PORT COLBORNE

City of Port Colborne

Water and Stormwater Master Plan

Region MSP Projects
- Decommission Fielden Ave Res and PS
- New ET
- New 450 mm Watermain

Existing Watermains
- < 150 mm
- 150 mm
- 200 - 250 mm
- > 300 mm
- Region Watermains

Existing Facilities
- PS
- Storage
- WTP

General Features
- Municipal Boundary Area
- Urban Area Boundary
- Waterbody

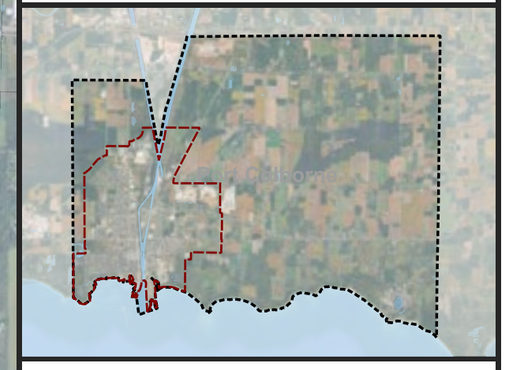

Figure 4-3
Region Capital Program

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4.2 System Demands

The population and employment projections presented in **Table 3-1**, along with the Level of Service criteria presented in **Table 2-6**, were used to determine the growth average day demand (ADD) and the maximum day demand (MDD). Buildout system demands were calculated using the previously described starting point methodology. The total projected ADD and MDD are summarized in **Table 4-8**.

Table 4-8: System Demands

		2025	Buildout
ADD (L/s)	Residential	26.1	79.4
	Employment	25.5	198
	NRW[1]	34.8	34.8
	Total	**86.4**	**312.1**
MDD (L/s)	Residential	41.0	124.6
	Employment	40.0	310.9
	NRW[1]	34.8	34.8
	Total	**115.8**	**470.2**

1 - It is assumed that the City will continue to undertake activities to reduce system NRW rates with the goal of reducing total NRW below 25%. For the purposes of the MSP and infrastructure sizing, the conservative assumption of maintaining existing NRW was used.

4.3 Hydraulic Water Model

The City and Region provided a copy of the existing InfoWater model of the City's water system, which was used as the basis for the model update and master plan analysis. Based on previous updates completed as part of the Region's master plan studies, no fundamentally significant modifications to the model structure were required.

The model update was completed using the following approach:

- Review of the system based on available facilities drawings, SCADA and GIS data.
- Direct GIS to model link for pipes, valves, and hydrants.
- Demand analysis and allocation using billing data and plant production records.
- Extended Period Simulation (EPS) validation through SCADA.
- Development of model scenarios (ADD, MDD, MDD+FF).

4.3.1 Network Development

System updates, including watermains, were incorporated into the model using the City's GIS water infrastructure data. Prior to import, the GIS network and existing model were reviewed

for discrepancies in watermain diameter and material, with the appropriate data source confirmed in each case.

Junction elevations were assigned based on the City's ground surface contours.

4.3.2 Facility Development

The review confirmed that the hydraulic representation of each facility is consistent with the expected capacities outlined in **Section 4.1.2**. The scope of the facility updates included:

- Reviewing and refining the network configuration surrounding each facility.
- Updating system pumps and associated pump curves.
- Reviewing storage elements and defining storage geometry.

4.3.3 System Demand Analysis

The system water demands, summarized in **Table 2-2**, were evaluated using SCADA and billing data. This analysis supports:

- Determination of average system demands, including non-revenue water.
- Spatial allocation of demands across the network.
- Assessment of temporal variations and peaking factors.

4.3.3.1 Demand Allocation

Using billing data, the ADD was spatially allocated to model nodes by assigning each parcel's average demand to the nearest node. NRW from 2022–2024 billing data was similarly distributed across the nodes and remains constant for all scenarios.

4.3.3.2 Diurnal Demand

System demands on an hourly basis were calculated based on the flow rates from the Port Colborne WTP, Fielden Avenue Pumping Station, and the Barrick ET and Fielden Reservoir by converting the flow and storage levels to a change in volume per hour. A diurnal curve was created to reflect an average day's varied consumption in 1-hour intervals over a 24-hour period. **Figure 4-4** presents the updated diurnal curve (for the average and maximum weeks), compared with the previously modelled diurnal curves (2016 and 2021).

The 2021 modelled diurnal curves have similar peak factors compared to the updated curves based on 2020 – 2024 SCADA data.

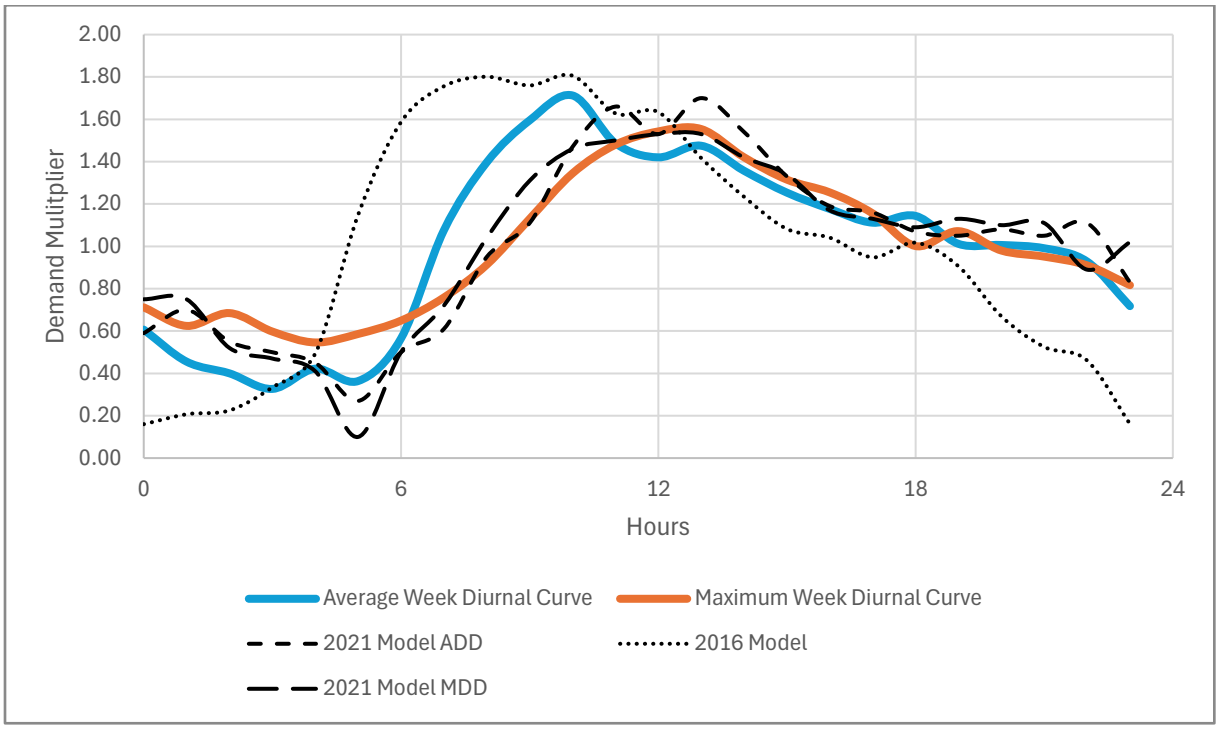

Figure 4-4: Updated Diurnal Curve Compared to Previously Modelled Diurnal Curves

4.4 Facility Details, System Control Narrative, and SCADA Validation

SCADA data was used to review the system control narrative and validate model controls. The model was calibrated by comparing SCADA measurements with model EPS over a seven-day period during an average week, considering operations and pump curves. This comparison ensured the model accurately represents WTP flow rates, storage levels and cycles, pump operation, and overall system performance.

Calibration is a necessary step before using the model for capital works analysis or other applications, including water quality, operations, or energy management studies. Benefits of calibration include identifying and correcting discrepancies in the model data and, in some cases, uncovering issues in the field.

5 Assessment of Existing Water Infrastructure

A key step in the master planning process is assessing the existing infrastructure to establish baseline system conditions, which form the basis for the MSP recommendations. Once the current conditions were determined through a detailed analysis, the impacts of future growth on the system were evaluated to inform recommended servicing strategies.

The following sections outline current opportunities and constraints within the water system and assess its ability to accommodate projected demands.

5.1 Facility Capacity

Regional infrastructure considered in this assessment includes the Water Treatment Plant, Fielden Reservoir and Pumping Station, and Barrick Elevated Tank.

The water system is supplied by Regional infrastructure, and overall system performance is largely governed by Regional facility operations. For the purposes of this Master Plan, Regional facility capacity is assumed to be sufficient to accommodate projected growth. Adequate capacity for treatment, storage, and pumping is assumed to be available. Existing Regional operations and control strategies are maintained under a single pressure zone.

5.2 System Performance

The City's hydraulic water model was used to support the assessment of the water system's watermains capacity.

5.2.1 Transmission (Trunk Watermains)

The Regional trunk watermain system provides the primary conveyance of treated water to the City system. For the purposes of this Master Plan, trunk watermain capacity is assumed to be sufficient to accommodate projected growth, including the construction of the proposed canal crossing.

Trunk system operation is assumed to remain consistent with existing Regional control strategies and system configuration.

5.2.2 System Pressures

Figure 5-1 presents the existing system performance, based on existing system configuration and capacities.

In general, minimum system pressures fall within the acceptable pressure range of 40 to 100 psi under maximum day demand, with most pressures between the preferred 50 to 70 psi. Most pressures fall between 50 and 60 psi, with some localized areas experiencing pressures below 50 psi, but above the required 40 psi which are concentrated in small diameter cast iron (CI) watermains and higher elevation dead-ends. Pressures less than 40 psi are experienced at

the far east extremity of the system on Second Concession Road due to the long dead-end watermain.

The City has an existing water service agreement with the Pinty's Factory which is serviced from a dedicated 3.6 km 200 mm watermain along Second Concession Road which requires:

- Peak flow of 18.41 L/s per day
- Sustain an operating pressure of 40 psi along Chippawa Road and service pressure of 23.5 psi at the Pinty's Site
- Peak pressures at Chippawa Road should not exceed 60 psi

Under existing and buildout conditions, the pressure meets the 23.5 psi.

5.2.3 System Fire Flows

Fire flow deficiencies were identified using a land-use based approach, where the governing land-use, at the closest fire hydrant, determined the fire flow target identified in **Section 2.2.3**. **Figure 5-2** presents the fire flow deficiencies under existing conditions.

There is a high concentration of fire flow deficiencies in CI watermains, and along dead-end watermains with high industrial fire flow targets. Some examples of these areas include:

- Cast iron watermains:
    - Southwest residential area, including along Sugarloaf Street and Clarence Street and the area in between;
    - The Island area, both north and south of Main Street West;
- Industrial dead-end watermains:
    - Invertose Drive (PVC watermain);
    - Lake Road (PVC watermain).

PORT COLBORNE

City of Port Colborne

Water and Stormwater Master Plan

Minimum System Pressures (psi)
- < 40
- 40 - 50
- 50 - 80
- 80 - 100
- > 100

Existing Watermains
- < 150 mm
- 150 mm
- 200 - 250 mm
- > 300 mm
- Region Watermains

Existing Facilities
- PS
- Storage
- WTP

General Features
- Municipal Boundary Area
- Urban Area Boundary
- Waterbody

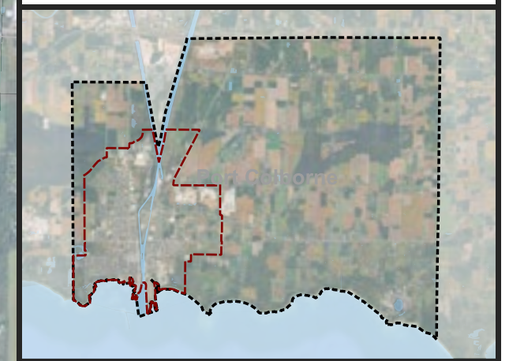

Figure 5-1
Existing System Pressures

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0 0.75 1.5 km

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City of Port Colborne

Water and Stormwater Master Plan

Fire Flow Deficiencies
- Does not meet land-use based fire flow target
- Meets land use based fire flow target

Existing Watermains
- < 150 mm
- 150 mm
- 200 - 250 mm
- > 300 mm
- Region Watermains

Existing Facilities
- PS
- Storage
- WTP

General Features
- Municipal Boundary Area
- Urban Area Boundary
- Waterbody

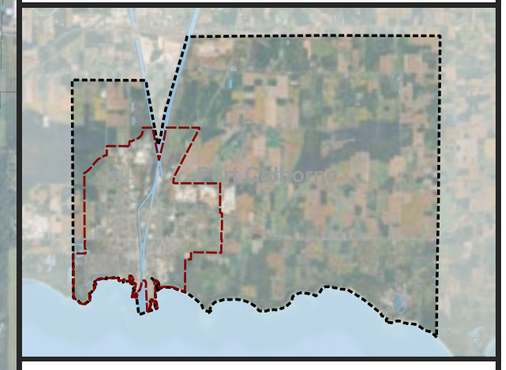

Figure 5-2
Existing Fire Flow Deficiencies

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5.3 Opportunities and Constraints

Existing and future water opportunities and constraints were identified through discussions with City staff and through hydraulic analyses. **Figure 5-3** highlights the existing opportunities and constraints.

System Supply and Capacity

- Water system supplied by the Region, with system performance largely influenced by Regional operations.
- Regional treatment, storage, and pumping capacity are assumed to expand as required to support future growth.
- The system is currently operated as a single pressure zone, which is expected to be maintained.

Based on a review of existing system conditions and projected demands, the following key constraints and opportunities were identified.

Constraints

- Aging cast-iron and asbestos cement watermains.
- Areas with lower available fire flow.
- High water loss.
- Localized lower pressures at higher elevations (generally still above minimum targets).

Opportunities

- Improve system looping and fire flow capacity in future growth areas.
- Coordinate water system improvements with planned Regional wastewater projects.
- Continue watermain lining in areas with a history of breaks and higher leakage.
- Planned Regional projects (e.g. new canal crossing, new ET, Fielden reservoir decommissioning) to support system reliability and expansion.

System Characteristics:

- Supplied by Region; system pressure and flows impacted Regional operations
- Assumed Regional treatment, storage, and pumping will expand to meet growth
- Single pressure zone maintained

Watermain condition & material – signification aging cast-iron and asbestos cement watermains with a history of breaks

High concentration of lower fire flow in areas with cast-iron watermains

2021 Region MSP Projects:

- New canal crossing
- New Elevated Tank
- Fielden Reservoir decommissioning

Lower pressures in areas with higher elevation; pressures remain above minimum pressure targets.

Future growth areas provide opportunity for system looping, leading to improved fire flow capacity

Opportunity to coordinate with wastewater projects identified through the Pollution Prevention Control Plan (PPCP)

Barrick Rd ET

Fielden Ave Res and PS

Port Colborne WTP

Welland

Third Concession Road

Second Concession Road

Chippawa Road

Miller Road

White Road

Main Street West

Killaly Street West

Killaly Street East

Durham Street

Clarence Street

Sugarloaf Street

Lakeshore Road East

Weaver Road

Pleasant Road

Lorraine Road

Kinnear Road

Elm Street

King Street

William Street

Minor Road

0 0.75 1.5 km

PORT COLBORNE

City of Port Colborne

Water and Stormwater Master Plan

Existing Watermains

- < 150 mm
- 150 mm
- 200 - 250 mm
- > 300 mm
- Region Watermains

Existing Facilities

- PS
- Storage
- WTP

Growth Areas

- Growth Areas

General Features

- Municipal Boundary Area
- Urban Area Boundary
- Waterbody
- NPCA Approximate Regulation Lands
- Parks

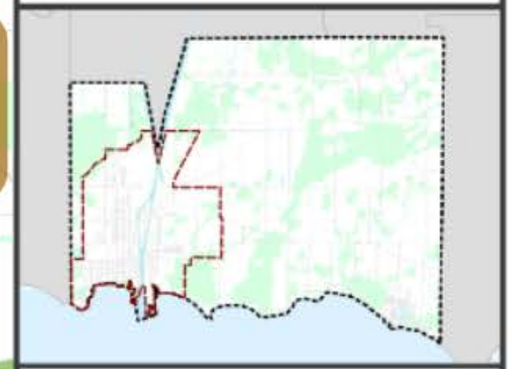

Figure 5-3
Opportunities and Constraints

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6 Water Servicing Alternatives and Evaluation

Water servicing alternatives were developed in the context of identifying servicing alternatives to address both system-wide and local opportunities and constraints. These alternatives focus on the existing water system while still accommodating growth.

6.1 Servicing Strategy Development

As part of this MSP, water concepts were evaluated for existing and future growth areas to guide the selection of servicing strategies that:

- Incorporate the City's ongoing planned Capital Program and watermain lining program.
- Optimize the use of existing infrastructure to reduce the need for new construction where possible.
- Minimize costs associated with new infrastructure.
- Account for operation and maintenance costs to support long-term financial sustainability.
- Ensure the long-term reliability and security of the water system.
- Enhance system resilience to climate change.
- Avoid or minimize environmental disruptions, including watercourse and habitat crossings, wherever feasible.
- Limit impacts in areas where disturbances could pose a significant drinking water threat.

6.2 Existing System Upgrades

To address existing and growth-related fire flow and watermain condition needs, a variety of concepts were reviewed prior to determining four optimized system concepts. The following servicing concepts were evaluated:

- **A:** Buildout Capital Program
- **B:** Cast Iron Replacement
- **C:** Sub-Trunk Loops
- **C+B:** Sub-Trunk Loops and Target Upgrades (including Capital Program)

6.2.1 Concept A: Buildout Capital Program

Buildout Capital Program (Concept A) is highlighted in **Figure 6-1**, and represents the City's current short-term watermain rehabilitation and upgrade plan, which is focused on implementing the City's planned watermain replacement program. This concept prioritizes renewal of watermains with a history of frequent breaks or ongoing operational issues and aligns upgrades with planned municipal construction projects to improve efficiency.

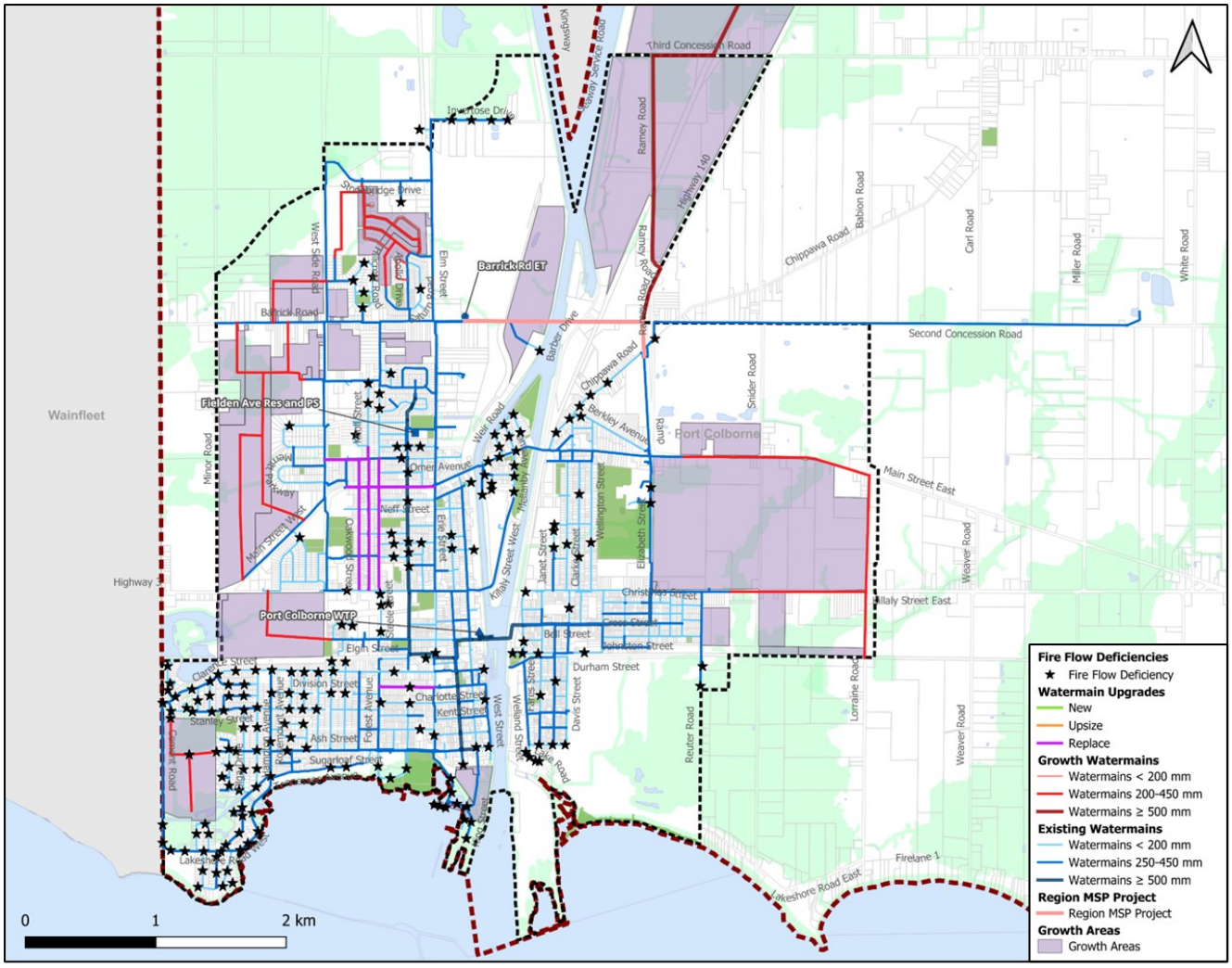

Figure 6-1: Buildout Capital Program

6.2.2 Concept B: Cast Iron Replacement

Cast Iron Replacement (Concept B), shown in **Figure 6-2**, represents an approach that builds on the City's Capital Program by replacing/lining all cast iron watermains across the system. This concept focuses on localized renewal in areas with frequent watermain breaks and aligns closely with historical break patterns. While it captures the majority of fire flow deficiencies, it has limited impact on overall system hydraulics.

This approach requires a significant extent of watermain replacement, and some limitations remain, including the presence of dead-end watermains in areas with higher fire flow requirements.

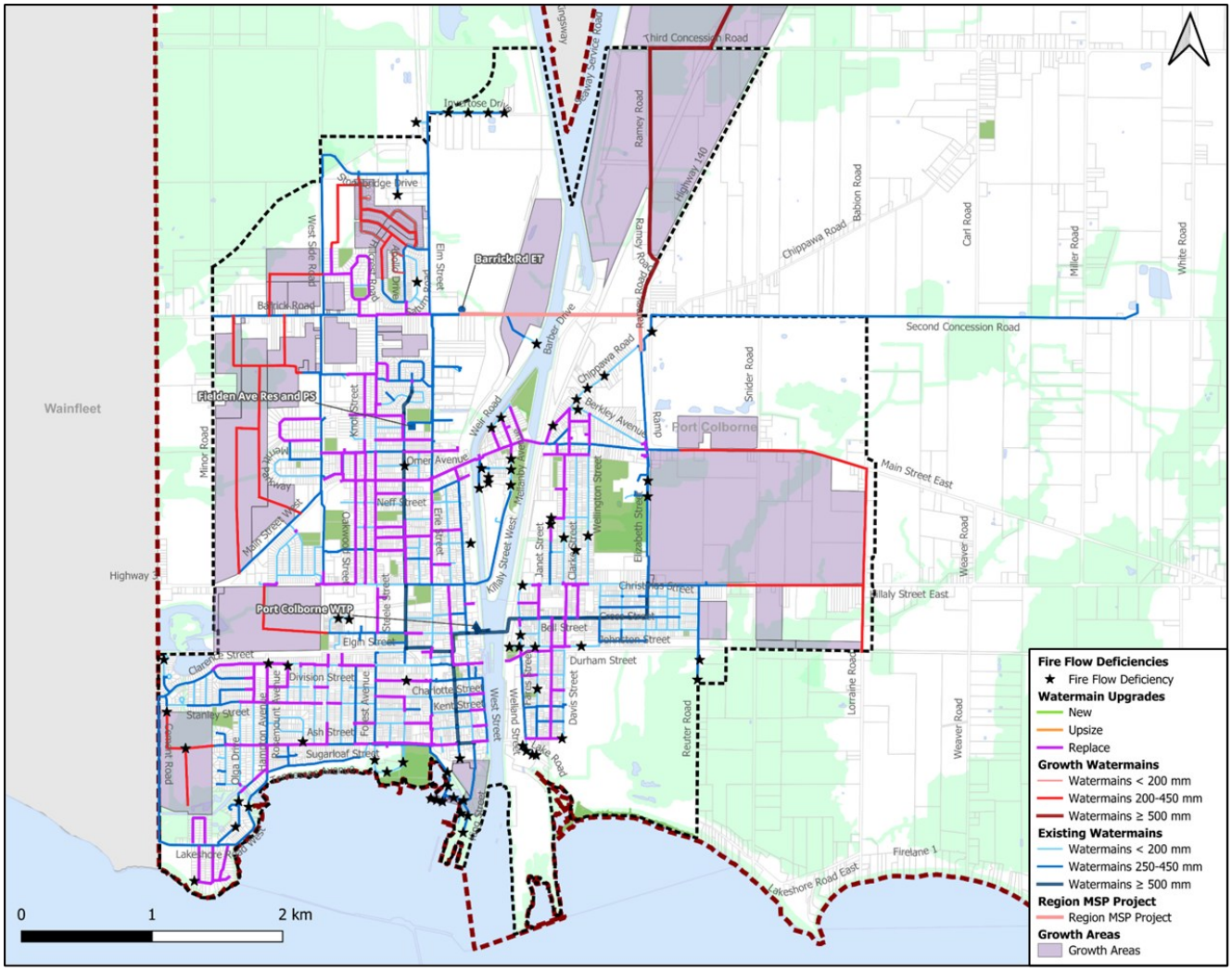

Figure 6-2: Cast Iron Replacement

6.2.3 Concept C: Sub-Trunk Loops

Sub-Trunk Loops (Concept C) is highlighted in **Figure 6-3** and represents an approach focused on improving system performance through the addition of new sub-trunk watermains, while minimizing the extent of watermain replacement. This concept enhances fire flow capacity and requires significantly less replacement compared to a full cast iron renewal program.

This approach captures approximately half of the existing fire flow deficiencies and does not specifically target cast iron watermains or known problem areas. As a result, a high concentration of deficiencies remains within cast iron pipes, and dead-end watermains with higher fire flow requirements. Increasing the size of sub-trunk loops was also found to provide minimal additional benefit from a fire flow perspective.

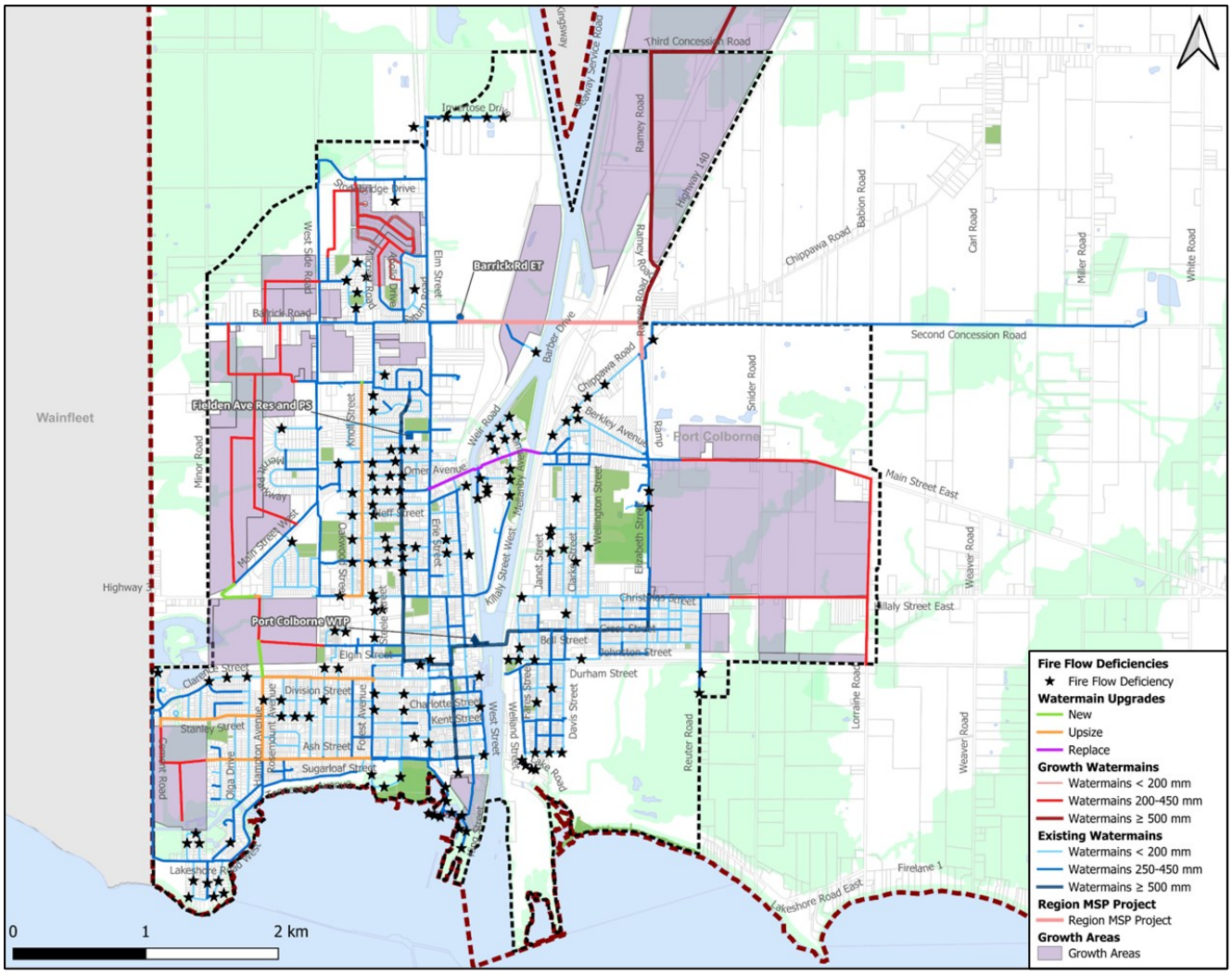

Figure 6-3: Sub-Trunk Loops

6.2.4 Concept C+B: Sub-Trunk Loops & Target Upgrades

Sub-Trunk Loops & Target Upgrades (Concept C+B), shown in **Figure 6-4**, represents a combined approach that integrates new system looping with targeted replacement of undersized watermains. Building on the City's Capital Program, this concept focuses on system reliability and the reduction of fire flow deficiencies, while aligning with areas of cast iron watermains and historical break patterns.

By targeting only the cast iron watermains associated with fire flow deficiencies, this approach reduces the overall length of replacement compared to a full system-wide renewal, while still capturing the majority of deficiencies. However, some limitations remain, including the presence of dead-end watermains in areas with higher fire flow requirements.

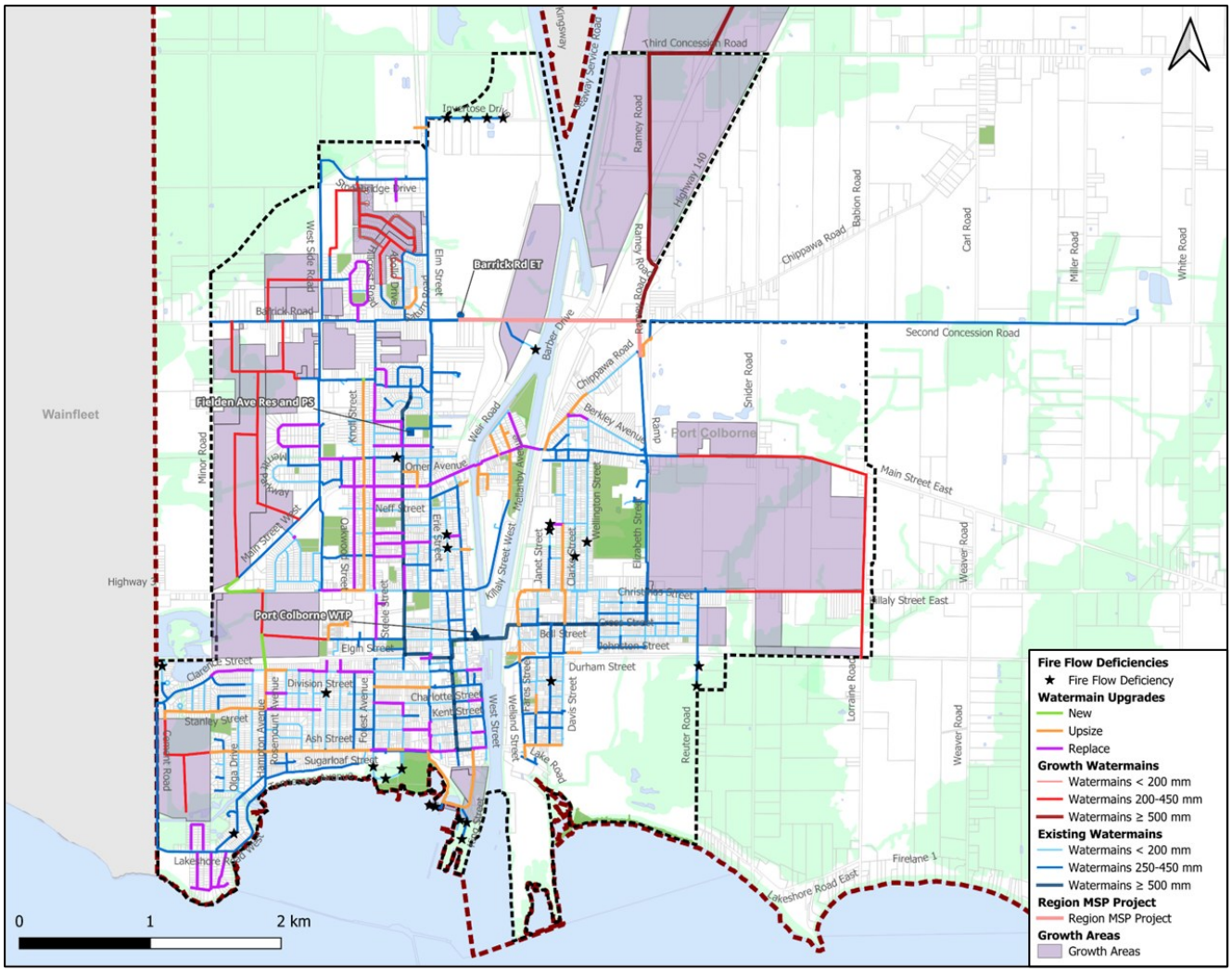

Figure 6-4: Sub-Trunk Loops & Target Upgrades

6.3 Alternatives Evaluation

Table 6-1 represents the four concepts along with their advantages and disadvantages.

Through discussion with City staff and based on the relative advantages and disadvantages of the alternatives, Concept C+B – Sub-Trunk Loops & Target Upgrades is the preferred servicing strategy as the looping provides additional system resiliency and target upgrades address watermain break issues and fire flow deficiencies.

Table 6-1: Alternatives Evaluation

		A: Buildout Capital Program			B: Cast Iron Replacement (including Capital Program)			C: Sub-Trunk Loops (no Capital Program)			C+B: Sub-Trunk Loops and Target Upgrades (including Capital Program)		
Advantage		• Significant fire flow improvement • Targets critical areas including high watermain break areas • Opportunity to include as first step in stepped approach • Coordinates upgrades with planned municipal construction			• Replaces old cast iron mains; reduces breaks, and enhances water quality • Includes City's Capital Program • Long-term reliability and reduced maintenance costs			• Adds new sub-trunk watermains to enhance fire flow capacity with minimal watermain replacement • Improves hydraulic looping and provides better system redundancy • Moderate capital cost compared to full replacement • Majority of trunk loop upgrades are Cast Iron			• Aligned with Cast Iron watermains and watermain breaks • Strong balance; combines new looping with replacement of undersized watermains • Opportunity for stepped approach, starting with capital program or looping, followed by targeted areas • Focuses on system reliability and addressing fire flow deficiencies • Strategic targeting provides highest benefit		
Disadvantage		• A lot of remaining cast iron watermains in system • Potential ongoing issues with cast iron watermains			• Large upfront costs due to full replacement program • Focused on localized renewal • Limited impact on overall system hydraulics • Requires significant capital planning and financing			• Still a lot of cast iron watermains in system (potential ongoing issues) • Potential land acquisition for new looping watermains in undeveloped lands			• Highest cost • Long time until complete implementation • Potential land acquisition for new looping watermains in undeveloped lands		
Watermain Length Replaced		4.5 km			30.9 km			6.9 km			26.1 km[1]		
Total System Fire Flow Deficiencies		31%			11%			23%			5%		
Financial	**Capital Cost ($M)**	$26 M			$92M			$30 M			$106 M		
	O&M Cost (%)	Medium			Low			Medium			Low		
Evaluation		**Technical**	**Environ-mental**	**Social Cultural**	**Technical**	**Environ-mental**	**Social Cultural**	**Technical**	**Environ-mental**	**Social Cultural**	**Technical**	**Environ-mental**	**Social Cultural**
		Medium	High	High	Low	High	Medium	Medium	High	Medium	High	High	Medium
Recommended Alternative		**Not Recommended:** Does not address large portion of fire flow deficiencies. To be included as part of overall upgrade plan (Sub-Trunk Loops and Target Upgrades)			**Not Recommended:** Provides no additional system resiliency and does not address all of the fire flow deficiencies.			**Not Recommended:** Does not address large portion of fire flow deficiencies or watermain break issues. To be included as part of overall upgrade plan (Sub-Trunk Loops and Target Upgrades)			**Recommended:** Looping provides additional system resiliency and target upgrades address watermain break issues and fire flow deficiencies.		

1 – The watermain length replaced differ from the Capital Program in **Section 7.3**, as they exclude new watermains associated with growth, as well as remaining cast iron and watermain break replacement projects included in the final Capital program

7 Preferred Water Servicing Strategy

7.1 Preferred Water Servicing Strategy Overview

The City's preferred water servicing strategy to address system growth and hydraulic performance requirements is Concept C+B: Sub-Trunk Loops & Targeted Upgrades. However, in acknowledgement that the City still needed to address rehabilitation and/or replacement of all its cast iron watermain to address ongoing watermain break and water loss issues, the final capital program also includes the full replacement/lining of all remaining cast iron watermains.

Figure 7-1, presents the final watermain upgrade and rehabilitation program consisting of a combined approach that integrates new system looping with targeted replacement of undersized watermains. Building on the City's Capital Program, this concept focuses on improving system reliability and reducing fire flow deficiencies, while aligning upgrades with areas of cast iron watermains and historical watermain breaks. While the recommended program largely addresses the identified system deficiencies, some limitations remain, including the presence of dead-end watermains in areas with higher fire flow requirements.

Key elements of the preferred servicing strategy include:

- **Balanced Approach:** Provides a mix of system resiliency through sub-trunk looping while addressing fire flow deficiencies across the system.
- **Targeted Investment:** Focuses on both deficient areas and loop connectivity to maximize effectiveness of upgrades.
- **Flexibility in Implementation:** Supports a phased approach, allowing Capital Program upgrades to proceed first, followed by looping and localized upgrades as needed.
- **Meets Requirements:** Achieves fire flow criteria for more than 95% of the system.
- **Optimized System Performance:** Enhances system reliability and redundancy while mitigating localized deficiencies.
- **Cost Efficiency:** Targeted upgrades reduce overall watermain replacement compared to full cast iron replacement, helping to manage long-term lifecycle costs.

The preferred servicing strategy is based on the following key assumptions and design considerations:

- **Watermain Sizing Basis & Replacement vs. Lining**
    - Watermains with a documented history of breaks are assumed to be replaced as part of the planning analysis; however, these segments should be further inspected to confirm their condition and determine whether lining may be viable as an alternative to full replacement.
    - Lining is considered for watermains with acceptable hydraulic capacity and no performance related issues.
- **Fire Flow Requirements**
    - Fire flow demands are based on City criteria and validated through hydraulic analysis.
    - Sub-trunk looping improves redundancy while mitigating localized deficiencies.
- **Break History and Condition**
    - Replacement priorities are guided by historical break frequency, known cast iron segments, and critical service areas such as schools, hospitals, and high fire flow zones.
- **Future Flexibility**
    - The combined looping and targeted upgrades approach allows incremental improvements as future development proceeds, helping defer major capital costs.
- **System Coordination**
    - Aligns with the City's Capital Program to coordinate upgrades with planned municipal construction, including stormwater and wastewater infrastructure, where possible.

PORT COLBORNE

City of Port Colborne

Water and Stormwater Master Plan

Capital Program Projects

W-M-01	W-M-10	W-M-19
W-M-02	W-M-11	W-M-20
W-M-03	W-M-12	W-M-21
W-M-04	W-M-13	W-M-22
W-M-05	W-M-14	W-M-23
W-M-06	W-M-15	W-M-24
W-M-07	W-M-16	W-M-25
W-M-08	W-M-17	W-M-26
W-M-09	W-M-18	W-M-27

Buildout Infrastructure

- < 150 mm
- 150 mm
- 200 - 250 mm
- > 300 mm
- Region Watermains
- Storage
- WTP

Growth Areas

- Growth Areas

General Features

- Municipal Boundary
- Area Urban Area Boundary
- Waterbody

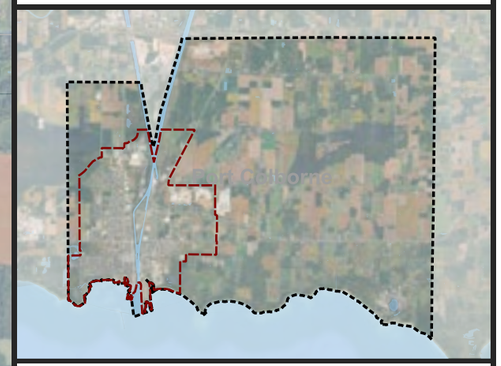

Figure 7-1
Water Capital Program

Agile INFRASTRUCTURE

April 2026
P01.002.01
EPSG:26917

0 0.75 1.5 km

7.2 Future System Performance

Figure 7-2 presents the future system performance, based on the preferred servicing strategy upgrades. In general, minimum system pressures fall within the acceptable range of 40 to 100 psi under maximum day demand. Most pressures fall between 50 and 60 psi, with some localized areas experiencing pressures between 40 and 50 psi due to the ground elevation. Pressures less than 40 psi are experienced at the far east extremity of the system on Second Concession Road due to the long dead-end watermain.

Table 7-1 provides a summary comparing minimum system pressures under the 2025 existing conditions and buildout. Under 2025 conditions, a portion of the system operates marginally above 50 psi, resulting in a larger proportion of pressures within the 50 to 80 psi range. Under buildout conditions, with increased system demands resulting in an increase in distribution losses, a portion of pressures shift to marginally below 50 psi, resulting in more locations falling within the 40 to 50 psi range.

Table 7-1: Minimum System Pressures

Minimum Pressure	2025	Buildout[1]
<40 psi	<1%	2%
40 – 50 psi	3%	31%
50 – 80 psi	96%	68%
80 – 100 psi	0%	0%
>100 psi	0%	0%

1 – Buildout assumes proposed Capital Program upgrades have been implemented

Figure 7-3 presents the available fire flow under future conditions based on the preferred servicing strategy. In general, the majority of the system meets the City's fire flow requirements, with more than 95% of locations achieving the target criteria.

Remaining fire flow deficiencies are generally minor, with many locations achieving >90% of the required fire flow. In identified locations, upgrades were not recommended for one or more of the following reasons:

- Watermains are relatively new (e.g., PVC) and no history of watermain breaks.
- Adequate fire flow capacity is available from adjacent streets servicing the same properties. For example, Niagara Health requires has a target fire flow of 200 L/s. Along Sugarloaf Road, more than 300 L/s is available. Along Fielden Avenue/Northland Point Service Road, 150-175 L/s is available from the 150 mm PVC watermain, which provides partial coverage; however, this is still shown as a deficiency because the available fire flow does not fully meet the 200 L/s target for this site.

- Deficiencies occur on dead-end watermains with higher fire flow requirements, where looping is not currently provided.

These remaining deficiencies are typically limited in extent and may be addressed in the future as part of system expansion or redevelopment.

A summary table comparing fire flow performance under 2025 existing conditions and buildout is provided below, showing the percentage of the system meeting the fire flow criteria as well as the remaining system deficiencies.

Table 7-2: Fire Flow Deficiencies

	2025	Buildout[1]
<80% Fire Flow Criteria	27%	2%
80-90% Fire Flow Criteria	6%	1%
90-100% Fire Flow Criteria	6%	3%
Total System Deficiencies	**39%**	**5%**

1 – Buildout assumes proposed Capital Program upgrades have been implemented

PORT COLBORNE

City of Port Colborne

Water and Stormwater Master Plan

Minimum System Pressures (psi)
- < 40
- 40 - 50
- 50 - 80
- 80 - 100
- > 100

Buildout Infrastructure
- < 150 mm
- 150 mm
- 200 - 250 mm
- > 300 mm
- Region Watermains
- Storage
- WTP

Growth Areas
- Growth Areas

General Features
- Municipal Boundary Area
- Urban Area Boundary
- Waterbody

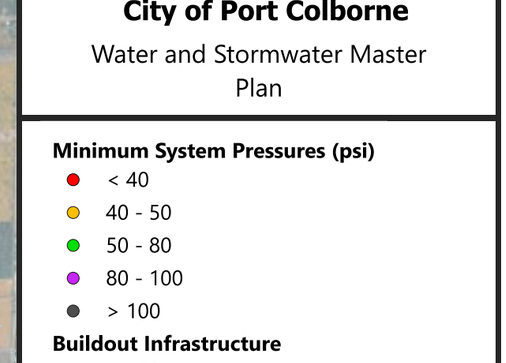

Figure 7-2
Buildout System Pressures

Agile INFRASTRUCTURE

April 2026
P01.002.01
EPSG:26917

0 0.75 1.5 km

PORT COLBORNE

City of Port Colborne

Water and Stormwater Master Plan

Fire Flow Deficiencies
- Does not meet land-use based fire flow target
- Meets land use based fire flow target

Buildout Infrastructure
- < 150 mm
- 150 mm
- 200 - 250 mm
- > 300 mm
- Region Watermains
- Storage
- WTP

Growth Areas
- Growth Areas

General Features
- Municipal Boundary Area
- Urban Area Boundary
- Waterbody

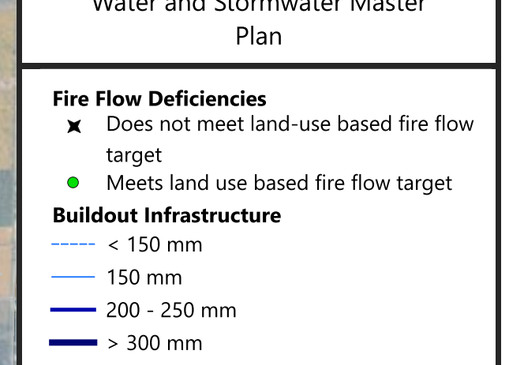

Figure 7-3
Buildout Fire Flow Deficiencies

Agile INFRASTRUCTURE

April 2026
P01.002.01
EPSG:26917

0 0.75 1.5 km

7.3 Capital Program

The preferred water servicing strategy has been developed to support the servicing needs of the existing and future growth areas within the City of Port Colborne. The capital costs for each project of the Preferred Strategy were estimated according to the costing methodology within **Volume 2**. A detailed listing of all projects, including individual project numbers, is provided in **Table 7-5**. **Table 7-3** summarizes the projects by type (i.e. new watermains, lining of existing watermains, upsizing of existing watermains, and watermain replacement/potential lining). **Table 7-4** further summarizes the capital program by Benefit to Existing classification, distinguishing projects that primarily address existing system needs from those required to support growth-related servicing requirements.

Table 7-3: Capital Program Summary by Project Type

	Length (m)	Estimated Cost ($)
New Watermains including Growth Areas	19,224	$ 80,019,000
Line Existing Watermains	21,865	$ 46,649,000
Upsize Existing Watermains	11,665	$ 39,273,000
Watermain Replacements (potential lining)	4,936	$ 17,187,000
Total	**57,690**	**$ 183,128,000**

Table 7-4: Benefit to Existing Summary

	% DC Eligible Cost	Length (m)	Estimated Cost ($)
BE-1	100	8,095	$ 37,731,000
BE-2	90	6,721	$ 26,530,000
BE-3	70	1,494	$ 5,608,000
BE-4	50	7,869	$ 28,482,000
BE-5	20	5,788	$ 14,951,000
BE-6	0	23,889	$ 56,002,000
Dev	0	3,834	$ 13,824,000
Total		**57,690**	**$ 183,128,000**

7.3.1 Collaboration with Region

Acknowledging that the water system is jointly owned and operated by the Region and the City of Port Colborne, the continued operation and expansion of the water system to support existing users and accommodate projected growth relies upon the cooperation of the upper and lower tier municipalities.

Table 7-5: Watermain Rehabilitation Capital Program Summary

Description			Scope			Total Cost Summary		Cost Allocation		
Project	Project Letter	Project Description	Project Type	Length (m)	Diameter (mm)	Total Project Cost	Priority	Total BTE Cost	Total DC Cost	Total Developer Cost
W-M-01	A	Lining of 137 m of 150 mm watermain along Cedar Street.	Watermain CIPP Rehab	137	150	$256,000	Low	$256,000	$0	$0
W-M-01	C	Lining of 153 m of 150 mm watermain along Orchard Drive.	Watermain CIPP Rehab	153	150	$285,000	Low	$285,000	$0	$0
W-M-01	D	Lining of 125 m of 200 mm watermain along Oakridge Crescent.	Watermain CIPP Rehab	125	200	$251,000	Low	$251,000	$0	$0
W-M-01	F	Lining of 28 m of 200 mm watermain along Walnut Street.	Watermain CIPP Rehab	28	200	$57,000	Low	$57,000	$0	$0
W-M-01	G	Lining of 45 m of 150 mm watermain along Oakridge Crescent.	Watermain CIPP Rehab	45	150	$86,000	Low	$86,000	$0	$0
W-M-01	H	Lining of 79 m of 150 mm watermain along Lakewood Crescent.	Watermain CIPP Rehab	79	150	$149,000	Low	$149,000	$0	$0
W-M-01	I	Lining of 120 m of 150 mm watermain along Oakridge Crescent.	Watermain CIPP Rehab	120	150	$224,000	Low	$224,000	$0	$0
W-M-01	K	Lining of 20 m of 150 mm watermain along Oakridge Crescent.	Watermain CIPP Rehab	20	150	$38,000	Low	$38,000	$0	$0
W-M-01	L	Lining of 249 m of 150 mm watermain along Rose Avenue.	Watermain CIPP Rehab	249	150	$462,000	Low	$462,000	$0	$0
W-M-01	M	Lining of 212 m of 150 mm watermain along Gaspare Drive.	Watermain CIPP Rehab	212	150	$394,000	Low	$394,000	$0	$0
W-M-04	A	Lining of 326 m of 150 mm watermain along Clarence Street.	Watermain CIPP Rehab	326	150	$604,000	High	$604,000	$0	$0
W-M-04	B	Lining of 76 m of 150 mm watermain along Linwood Avenue.	Watermain CIPP Rehab	76	150	$142,000	Low	$142,000	$0	$0
W-M-04	C	Lining of 83 m of 150 mm watermain along Clare Avenue.	Watermain CIPP Rehab	83	150	$155,000	Low	$155,000	$0	$0
W-M-06	A	Lining of 32 m of 200 mm watermain along Sugarloaf Street.	Watermain CIPP Rehab	32	200	$65,000	High	$32,500	$32,500	$0
W-M-06	C	Lining of 23 m of 200 mm watermain along Sugarloaf Street.	Watermain CIPP Rehab	23	200	$48,000	High	$24,000	$24,000	$0
W-M-06	E	Lining of 401 m of 200 mm watermain along Sugarloaf Street.	Watermain CIPP Rehab	401	200	$805,000	High	$402,500	$402,500	$0
W-M-06	F	Lining of 97 m of 150 mm watermain along Sugarloaf Street.	Watermain CIPP Rehab	97	150	$181,000	Medium	$181,000	$0	$0
W-M-06	G	Lining of 3 m of 200 mm watermain along Park Street.	Watermain CIPP Rehab	3	200	$7,000	Low	$7,000	$0	$0
W-M-06	H	Lining of 199 m of 150 mm watermain along Ash Street.	Watermain CIPP Rehab	199	150	$370,000	Medium	$296,000	$74,000	$0
W-M-06	I	Lining of 126 m of 200 mm watermain along Elm Street.	Watermain CIPP Rehab	126	200	$255,000	Medium	$204,000	$51,000	$0
W-M-06	J	Lining of 114 m of 150 mm watermain along Elm Street.	Watermain CIPP Rehab	114	150	$212,000	Medium	$169,600	$42,400	$0
W-M-06	K	Lining of 15 m of 150 mm watermain along Kent Street.	Watermain CIPP Rehab	15	150	$29,000	Medium	$29,000	$0	$0
W-M-06	O	Lining of 103 m of 150 mm watermain along Kent Street.	Watermain CIPP Rehab	103	150	$193,000	Medium	$193,000	$0	$0
W-M-06	P	Lining of 65 m of 150 mm watermain along Park Street.	Watermain CIPP Rehab	65	150	$121,000	Medium	$121,000	$0	$0
W-M-06	Q	Lining of 35 m of 150 mm watermain along Elm Street.	Watermain CIPP Rehab	35	150	$66,000	Medium	$66,000	$0	$0
W-M-07	A	Lining of 271 m of 150 mm watermain along Steele Street.	Watermain CIPP Rehab	271	150	$502,000	Low	$502,000	$0	$0
W-M-07	R	Lining of 11 m of 150 mm watermain along Brady Street.	Watermain CIPP Rehab	11	150	$22,000	Low	$22,000	$0	$0
W-M-07	T	Lining of 17 m of 150 mm watermain along Brady Street.	Watermain CIPP Rehab	17	150	$33,000	Low	$33,000	$0	$0
W-M-07	W	Lining of 99 m of 150 mm watermain along Fielden Avenue.	Watermain CIPP Rehab	99	150	$184,000	Medium	$147,200	$36,800	$0
W-M-07	X	Lining of 202 m of 150 mm watermain along McCain Street.	Watermain CIPP Rehab	202	150	$375,000	Medium	$375,000	$0	$0
W-M-07	Z	Lining of 87 m of 150 mm watermain along Charles Street.	Watermain CIPP Rehab	87	150	$163,000	Medium	$130,400	$32,600	$0
W-M-07	AA	Lining of 7 m of 150 mm watermain along First Avenue.	Watermain CIPP Rehab	7	150	$14,000	Medium	$14,000	$0	$0
W-M-07	B	Lining of 63 m of 150 mm watermain along Brock Street.	Watermain CIPP Rehab	63	150	$118,000	Medium	$118,000	$0	$0
W-M-07	E	Lining of 187 m of 150 mm watermain along Steele Street.	Watermain CIPP Rehab	187	150	$348,000	High	$348,000	$0	$0
W-M-07	G	Lining of 7 m of 150 mm watermain along Steele Street.	Watermain CIPP Rehab	7	150	$14,000	High	$11,200	$2,800	$0
W-M-07	H	Lining of 6 m of 150 mm watermain along Steele Street.	Watermain CIPP Rehab	6	150	$13,000	High	$13,000	$0	$0
W-M-07	J	Lining of 81 m of 150 mm watermain along Steele Street.	Watermain CIPP Rehab	81	150	$151,000	High	$151,000	$0	$0
W-M-07	L	Lining of 12 m of 150 mm watermain along Helen Street.	Watermain CIPP Rehab	12	150	$23,000	Medium	$23,000	$0	$0

Description			Scope			Total Cost Summary		Cost Allocation		
Project	Project Letter	Project Description	Project Type	Length (m)	Diameter (mm)	Total Project Cost	Priority	Total BTE Cost	Total DC Cost	Total Developer Cost
W-M-07	N	Lining of 116 m of 150 mm watermain along Helen Street.	Watermain CIPP Rehab	116	150	$217,000	Medium	$217,000	$0	$0
W-M-07	O	Lining of 116 m of 150 mm watermain along McCain Street.	Watermain CIPP Rehab	116	150	$217,000	Medium	$217,000	$0	$0
W-M-07	Q	Lining of 14 m of 150 mm watermain along McCain Street.	Watermain CIPP Rehab	14	150	$28,000	Medium	$28,000	$0	$0
W-M-09	A	Lining of 96 m of 150 mm watermain along Main Street West.	Watermain CIPP Rehab	96	150	$179,000	High	$179,000	$0	$0
W-M-09	C	Lining of 499 m of 150 mm watermain along Main Street West.	Watermain CIPP Rehab	499	150	$924,000	High	$739,200	$184,800	$0
W-M-09	D	Lining of 62 m of 300 mm watermain along Main Street West.	Watermain CIPP Rehab	62	300	$144,000	High	$115,200	$28,800	$0
W-M-09	F	Lining of 727 m of 300 mm watermain along Main Street West.	Watermain CIPP Rehab	727	300	$5,133,000	High	$2,566,500	$2,566,500	$0
W-M-10	X	Lining of 205 m of 150 mm watermain along Donlea Drive.	Watermain CIPP Rehab	205	150	$380,000	Low	$380,000	$0	$0
W-M-10	B	Lining of 249 m of 150 mm watermain along Coronation Drive.	Watermain CIPP Rehab	249	150	$462,000	Low	$462,000	$0	$0
W-M-10	C	Lining of 7 m of 150 mm watermain along Coronation Drive.	Watermain CIPP Rehab	7	150	$14,000	Low	$14,000	$0	$0
W-M-10	D	Lining of 7 m of 150 mm watermain along Omer Avenue.	Watermain CIPP Rehab	7	150	$14,000	Low	$7,000	$7,000	$0
W-M-10	E	Lining of 6 m of 150 mm watermain along Steele Street.	Watermain CIPP Rehab	6	150	$13,000	High	$13,000	$0	$0
W-M-10	G	Lining of 3 m of 150 mm watermain along Steele Street.	Watermain CIPP Rehab	3	150	$7,000	High	$7,000	$0	$0
W-M-10	I	Lining of 12 m of 150 mm watermain along Steele Street.	Watermain CIPP Rehab	12	150	$23,000	High	$23,000	$0	$0
W-M-10	L	Lining of 9 m of 150 mm watermain along Borden Avenue.	Watermain CIPP Rehab	9	150	$19,000	High	$19,000	$0	$0
W-M-10	N	Lining of 93 m of 150 mm watermain along Borden Avenue.	Watermain CIPP Rehab	93	150	$174,000	High	$87,000	$87,000	$0
W-M-10	P	Lining of 141 m of 200 mm watermain along Fielden Avenue.	Watermain CIPP Rehab	141	200	$283,000	Low	$141,500	$141,500	$0
W-M-10	Q	Lining of 51 m of 150 mm watermain along Fielden Avenue.	Watermain CIPP Rehab	51	150	$96,000	Low	$48,000	$48,000	$0
W-M-10	S	Lining of 11 m of 150 mm watermain along Franklin Avenue.	Watermain CIPP Rehab	11	150	$22,000	Low	$11,000	$11,000	$0
W-M-10	T	Lining of 5 m of 150 mm watermain along Steele Street.	Watermain CIPP Rehab	5	150	$11,000	High	$8,800	$2,200	$0
W-M-10	V	Lining of 15 m of 150 mm watermain along Steele Street.	Watermain CIPP Rehab	15	150	$29,000	High	$23,200	$5,800	$0
W-M-10	W	Lining of 2 m of 400 mm watermain along Royal Road.	Watermain CIPP Rehab	2	400	$6,000	Low	$4,800	$1,200	$0
W-M-11	A	Lining of 120 m of 200 mm watermain along Hawthorne Boulevard.	Watermain CIPP Rehab	120	200	$242,000	Low	$242,000	$0	$0
W-M-11	C	Lining of 18 m of 150 mm watermain along Runnymede Road.	Watermain CIPP Rehab	18	150	$35,000	Low	$35,000	$0	$0
W-M-11	E	Lining of 160 m of 150 mm watermain along Runnymede Road.	Watermain CIPP Rehab	160	150	$297,000	Low	$297,000	$0	$0
W-M-11	G	Lining of 260 m of 150 mm watermain along Thorncrest Road.	Watermain CIPP Rehab	260	150	$482,000	Low	$482,000	$0	$0
W-M-12	F	Lining of 271 m of 150 mm watermain along Ramey Avenue.	Watermain CIPP Rehab	271	150	$502,000	Low	$502,000	$0	$0
W-M-13	B	Lining of 158 m of 150 mm watermain along Berkley Avenue.	Watermain CIPP Rehab	158	150	$295,000	Low	$295,000	$0	$0
W-M-14	A	Lining of 16 m of 150 mm watermain along Crescent Avenue.	Watermain CIPP Rehab	16	150	$32,000	Low	$32,000	$0	$0
W-M-24	A	Lining of 1533 m of 150 mm watermain along Clarence Street, Ridgewood Avenue, Division Street and Stanley Street.	Watermain CIPP Rehab	1,533	150	$2,836,000	High	$2,836,000	$0	$0
W-M-24	B	Lining of 158 m of 200 mm watermain along Clarence Street, Ridgewood Avenue, Division Street and Stanley Street.	Watermain CIPP Rehab	158	200	$319,000	High	$319,000	$0	$0
W-M-25	A	Lining of 1325 m of 150 mm watermain along Omer Avenue and Oakwood Street.	Watermain CIPP Rehab	1,325	150	$2,452,000	High	$1,961,600	$490,400	$0
W-M-26	A	Lining of 5494 m of 150 mm cast iron watermain.	Watermain CIPP Rehab	5,494	150	$10,161,000	Low	$10,161,000	$0	$0
W-M-26	B	Lining of 1466 m of 200 mm cast iron watermain.	Watermain CIPP Rehab	1,466	200	$2,939,000	Low	$2,939,000	$0	$0
W-M-26	C	Lining of 1510 m of 250 mm cast iron watermain.	Watermain CIPP Rehab	1,510	250	$3,260,000	Low	$3,260,000	$0	$0
W-M-26	D	Lining of 2909 m of 300 mm cast iron watermain.	Watermain CIPP Rehab	2,909	300	$6,727,000	Low	$6,727,000	$0	$0
W-M-26	E	Lining of 105 m of 350 mm cast iron watermain.	Watermain CIPP Rehab	105	350	$260,000	Low	$260,000	$0	$0

Table 7-6: Watermain Capital Program Summary

Description			Scope				Total Cost Summary		Cost Allocation			
Project	Project Letter	Project Description	Pipe Type	Type	Length (m)	Diameter (mm)	Total Project Cost	Priority	Total BTE Cost	Total DC Cost	Total Developer Cost	Council Project Type
W-M-01	B	Replacement of 132 m of 150 mm watermain along Cedar Street.	Watermain	Replacement	132	150	$397,000	Low	$397,000	$0	$0	Replacement
W-M-01	E	Replacement of 123 m of 200 mm watermain along Walnut Street.	Watermain	Replacement	123	200	$371,000	Low	$371,000	$0	$0	Replacement
W-M-01	J	Replacement of 124 m of 150 mm watermain along Oakridge Crescent.	Watermain	Replacement	124	150	$389,000	Low	$389,000	$0	$0	Replacement
W-M-02	A	Upsizing of 1225 m of 300 mm watermain along Sugarloaf Street.	Watermain	Upsizing	1,225	300	$4,982,000	High	$2,491,000	$2,491,000	$0	Looping
W-M-03	A	Upsizing of 1125 m of 300 mm watermain along Stanley Street.	Watermain	Upsizing	1,125	300	$3,824,000	Low	$1,912,000	$1,912,000	$0	Looping
W-M-05	A	Upsizing of 1076 m of 300 mm watermain along Marina Drive.	Watermain	Upsizing	1,076	300	$3,971,000	High	$1,191,300	$2,779,700	$0	Growth
W-M-06	B	Replacement of 77 m of 200 mm watermain along Sugarloaf Street.	Watermain	Replacement	77	200	$247,000	High	$123,500	$123,500	$0	Growth
W-M-06	D	Upsizing of 111 m of 200 mm watermain along Sugarloaf Street.	Watermain	Upsizing	111	200	$355,000	High	$177,500	$177,500	$0	Growth
W-M-06	L	Replacement of 208 m of 150 mm watermain along Kent Street.	Watermain	Replacement	208	150	$663,000	Medium	$663,000	$0	$0	Replacement
W-M-06	M	Replacement of 109 m of 300 mm watermain along Clarence Street.	Watermain	Replacement	109	300	$382,000	Medium	$382,000	$0	$0	Replacement
W-M-06	N	Upsizing of 450 m of 200 mm watermain along Charlotte Street.	Watermain	Upsizing	450	200	$1,430,000	Medium	$1,144,000	$286,000	$0	Looping
W-M-07	C	Replacement of 64 m of 150 mm watermain along Steele Street.	Watermain	Replacement	64	150	$205,000	Low	$205,000	$0	$0	Replacement
W-M-07	D	Replacement of 234 m of 150 mm watermain along Steele Street.	Watermain	Replacement	234	150	$745,000	Low	$745,000	$0	$0	Replacement
W-M-07	F	Replacement of 150 m of 150 mm watermain along Steele Street.	Watermain	Replacement	150	150	$478,000	Low	$382,400	$95,600	$0	Replacement
W-M-07	I	Upsizing of 65 m of 150 mm watermain along Steele Street.	Watermain	Upsizing	65	150	$207,000	Low	$207,000	$0	$0	Replacement
W-M-07	K	Replacement of 27 m of 150 mm watermain along Steele Street.	Watermain	Replacement	27	150	$88,000	Low	$88,000	$0	$0	Replacement
W-M-07	M	Replacement of 103 m of 150 mm watermain along Helen Street.	Watermain	Replacement	103	150	$311,000	Low	$311,000	$0	$0	Replacement
W-M-07	P	Replacement of 99 m of 150 mm watermain along McCain Street.	Watermain	Replacement	99	150	$298,000	Low	$298,000	$0	$0	Growth
W-M-07	S	Replacement of 200 m of 150 mm watermain along Brady Street.	Watermain	Replacement	200	150	$601,000	Low	$601,000	$0	$0	Replacement
W-M-07	U	Replacement of 199 m of 150 mm watermain along Neff Street.	Watermain	Replacement	199	150	$598,000	Low	$598,000	$0	$0	Replacement

Description			Scope				Total Cost Summary		Cost Allocation			
Project	Project Letter	Project Description	Pipe Type	Type	Length (m)	Diameter (mm)	Total Project Cost	Priority	Total BTE Cost	Total DC Cost	Total Developer Cost	Council Project Type
W-M-07	V	Replacement of 170 m of 150 mm watermain along Fielden Avenue.	Watermain	Replacement	170	150	$541,000	Low	$541,000	$0	$0	Replacement
W-M-07	Y	Replacement of 65 m of 200 mm watermain along Union Street.	Watermain	Replacement	65	200	$197,000	Low	$197,000	$0	$0	Replacement
W-M-08	A	Upsizing of 1935 m of 200 mm watermain along Knoll Street.	Watermain	Upsizing	1,935	200	$5,977,000	Low	$4,781,600	$1,195,400	$0	Looping
W-M-09	B	Replacement of 67 m of 150 mm watermain along Main Street West.	Watermain	Replacement	67	150	$214,000	High	$214,000	$0	$0	Replacement
W-M-09	E	Replacement of 118 m of 300 mm watermain along Main Street West.	Watermain	Replacement	118	300	$414,000	Low	$207,000	$207,000	$0	Looping
W-M-10	A	Replacement of 256 m of 150 mm watermain along Coronation Drive.	Watermain	Replacement	256	150	$770,000	Low	$770,000	$0	$0	Replacement
W-M-10	F	Replacement of 103 m of 150 mm watermain along Steele Street.	Watermain	Replacement	103	150	$329,000	Low	$329,000	$0	$0	Replacement
W-M-10	H	Replacement of 98 m of 150 mm watermain along Steele Street.	Watermain	Replacement	98	150	$313,000	Low	$313,000	$0	$0	Replacement
W-M-10	J	Upsizing of 107 m of 200 mm watermain along Wallace Avenue.	Watermain	Upsizing	107	200	$322,000	Low	$322,000	$0	$0	Replacement
W-M-10	K	Upsizing of 113 m of 200 mm watermain along Oak Street.	Watermain	Upsizing	113	200	$341,000	Low	$341,000	$0	$0	Replacement
W-M-10	M	Replacement of 215 m of 150 mm watermain along Borden Avenue.	Watermain	Replacement	215	150	$665,000	Low	$665,000	$0	$0	Replacement
W-M-10	O	Replacement of 103 m of 150 mm watermain along Borden Avenue.	Watermain	Replacement	103	150	$320,000	Low	$160,000	$160,000	$0	Growth
W-M-10	R	Replacement of 192 m of 150 mm watermain along Franklin Avenue.	Watermain	Replacement	192	150	$578,000	Low	$289,000	$289,000	$0	Replacement
W-M-10	U	Replacement of 257 m of 150 mm watermain along Steele Street.	Watermain	Replacement	257	150	$817,000	Low	$653,600	$163,400	$0	Growth
W-M-11	B	Replacement of 144 m of 150 mm watermain along Runnymede Road.	Watermain	Replacement	144	150	$433,000	Low	$433,000	$0	$0	Replacement
W-M-11	D	Replacement of 110 m of 150 mm watermain along Runnymede Road.	Watermain	Replacement	110	150	$332,000	Low	$332,000	$0	$0	Replacement
W-M-11	F	Replacement of 161 m of 150 mm watermain along Thorncrest Road.	Watermain	Replacement	161	150	$486,000	Low	$486,000	$0	$0	Replacement
W-M-11	H	Upsizing of 199 m of 200 mm watermain along Saturn Road.	Watermain	Upsizing	199	200	$598,000	Low	$598,000	$0	$0	Replacement
W-M-12	A	Upsizing of 230 m of 250 mm watermain along Canal Bank Road.	Watermain	Upsizing	230	250	$756,000	Low	$604,800	$151,200	$0	Growth
W-M-12	B	Upsizing of 72 m of 250 mm watermain along Amelia Street.	Watermain	Upsizing	72	250	$239,000	Low	$191,200	$47,800	$0	Growth
W-M-12	C	Upsizing of 112 m of 250 mm watermain along Port Colborne Drive.	Watermain	Upsizing	112	250	$370,000	Low	$185,000	$185,000	$0	Growth

Description			Scope				Total Cost Summary		Cost Allocation			
Project	Project Letter	Project Description	Pipe Type	Type	Length (m)	Diameter (mm)	Total Project Cost	Priority	Total BTE Cost	Total DC Cost	Total Developer Cost	Council Project Type
W-M-12	D	Upsizing of 565 m of 200 mm watermain along Mellanby Avenue.	Watermain	Upsizing	565	200	$1,796,000	Low	$1,796,000	$0	$0	Replacement
W-M-12	E	Upsizing of 162 m of 200 mm watermain along Church Street.	Watermain	Upsizing	162	200	$488,000	Low	$488,000	$0	$0	Replacement
W-M-12	G	Upsizing of 32 m of 150 mm watermain along Christian Stoner Str.	Watermain	Upsizing	32	150	$97,000	Low	$97,000	$0	$0	Replacement
W-M-13	A	Upsizing of 539 m of 200 mm watermain along Chippawa Road.	Watermain	Upsizing	539	200	$1,666,000	Low	$833,000	$833,000	$0	Growth
W-M-13	C	Upsizing of 212 m of 250 mm watermain along Ramey Road.	Watermain	Upsizing	212	250	$697,000	Low	$697,000	$0	$0	Replacement
W-M-14	B	Upsizing of 270 m of 200 mm watermain along Welland Street.	Watermain	Upsizing	270	200	$858,000	Medium	$429,000	$429,000	$0	Growth
W-M-14	C	Upsizing of 221 m of 200 mm watermain along Killaly Street East.	Watermain	Upsizing	221	200	$703,000	Medium	$351,500	$351,500	$0	Growth
W-M-14	D	Upsizing of 1265 m of 250 mm watermain along Clarke Street.	Watermain	Upsizing	1,265	250	$4,039,000	High	$2,019,500	$2,019,500	$0	Looping
W-M-15	A	Upsizing of 154 m of 200 mm watermain along Welland Street.	Watermain	Upsizing	154	200	$490,000	Low	$392,000	$98,000	$0	Replacement
W-M-15	B	Upsizing of 89 m of 250 mm watermain along Fraser Street.	Watermain	Upsizing	89	250	$278,000	Low	$139,000	$139,000	$0	Growth
W-M-15	C	Upsizing of 108 m of 200 mm watermain along Fraser Street.	Watermain	Upsizing	108	200	$325,000	Low	$325,000	$0	$0	Replacement
W-M-15	D	Upsizing of 93 m of 200 mm watermain along Fraser Street.	Watermain	Upsizing	93	200	$297,000	Low	$297,000	$0	$0	Replacement
W-M-15	E	Upsizing of 134 m of 250 mm watermain along Fares Street.	Watermain	Upsizing	134	250	$441,000	Low	$220,500	$220,500	$0	Growth
W-M-15	F	Upsizing of 280 m of 250 mm watermain along Rodney Street.	Watermain	Upsizing	280	250	$996,000	Low	$996,000	$0	$0	Replacement
W-M-15	G	Upsizing of 75 m of 200 mm watermain along Welland Street.	Watermain	Upsizing	75	200	$260,000	Medium	$260,000	$0	$0	Replacement
W-M-16	A	626 m of new 300 mm watermain along Sugarloaf Street and Lancaster Drive.	Watermain	Growth	626	300	$2,473,000	Low	$0	$0	$2,473,000	Looping
W-M-16	B	430 m of new 200 mm watermain along south of Sugarloaf Street.	Watermain	Growth	430	200	$1,544,000	Low	$0	$0	$1,544,000	Growth
W-M-17	A	608 m of new 300 mm watermain along Extension of Rosemount Avenue, Elgin Street and Killaly Street West.	Watermain	Growth	608	300	$3,154,000	Low	$315,400	$2,838,600	$0	Looping
W-M-17	B	488 m of new 300 mm watermain along Extension of Rosemount Avenue, Elgin Street and Killaly Street West.	Watermain - Open Cut	Growth	488	300	$1,928,000	Low	$192,800	$1,735,200	$0	Looping
W-M-18	A	Upsizing of 36 m of 300 mm watermain along Killaly Street West.	Watermain	Upsizing	36	300	$128,000	Low	$38,400	$89,600	$0	Looping

Description			Scope				Total Cost Summary		Cost Allocation			
Project	Project Letter	Project Description	Pipe Type	Type	Length (m)	Diameter (mm)	Total Project Cost	Priority	Total BTE Cost	Total DC Cost	Total Developer Cost	Council Project Type
W-M-18	B	382 m of new 300 mm watermain along Killaly Street West and Main Street West.	Watermain	Growth	382	300	$1,509,000	Low	$452,700	$1,056,300	$0	Looping
W-M-19	A	2344 m of new 300 mm watermain along Main Street West to Barrick Road.	Watermain	Growth	2,344	300	$9,255,000	Low	$925,500	$8,329,500	$0	Looping
W-M-19	B	1607 m of new 200 mm watermain along Main Street West to Barrick Road.	Watermain	Growth	1,607	200	$5,763,000	Low	$576,300	$5,186,700	$0	Growth
W-M-20	A	727 m of new 300 mm watermain along Barrick Road to West Side Road.	Watermain	Growth	727	300	$2,871,000	Low	$0	$0	$2,871,000	Growth
W-M-21	A	802 m of new 200 mm watermain along Oxford Boulevard to Parkside Drive.	Watermain	Growth	802	200	$2,767,000	Low	$1,383,500	$1,383,500	$0	Growth
W-M-21	B	733 m of new 300 mm watermain along Parkside Drive and Meadowlark Drive.	Watermain	Growth	733	300	$2,631,000	Low	$0	$0	$2,631,000	Growth
W-M-21	C	61 m of new 150 mm watermain along Westfield Place.	Watermain	Growth	61	150	$201,000	Low	$0	$0	$201,000	Growth
W-M-21	D	66 m of new 150 mm watermain along Aintree Place.	Watermain	Growth	66	150	$217,000	Low	$0	$0	$217,000	Growth
W-M-21	E	578 m of new 200 mm watermain along Sherwood Drive and Springside Drive.	Watermain	Growth	578	200	$1,886,000	Low	$0	$0	$1,886,000	Growth
W-M-21	F	321 m of new 150 mm watermain along Springside Drive.	Watermain	Growth	321	150	$1,048,000	Low	$0	$0	$1,048,000	Growth
W-M-21	G	292 m of new 150 mm watermain along Parkside Drive.	Watermain	Growth	292	150	$953,000	Low	$0	$0	$953,000	Growth
W-M-22	A	1443 m of new 300 mm watermain along Main Street East.	Watermain	Growth	1,443	300	$5,698,000	Low	$0	$5,698,000	$0	Growth
W-M-22	B	892 m of new 300 mm watermain along Lorraine Road.	Watermain	Growth	892	300	$3,327,000	Low	$0	$3,327,000	$0	Growth
W-M-22	C	507 m of new 200 mm watermain along Lorraine Road.	Watermain	Growth	507	200	$1,654,000	Low	$0	$1,654,000	$0	Growth
W-M-22	D	1036 m of new 300 mm watermain along Killaly Street East.	Watermain	Growth	1,036	300	$3,978,000	Low	$397,800	$3,580,200	$0	Growth
W-M-22	E	Upsizing of 610 m of 300 mm watermain along Killaly Street East.	Watermain	Upsizing	610	300	$2,342,000	Low	$234,200	$2,107,800	$0	Growth
W-M-22	F	28 m of new 300 mm watermain connecting existing Elizabeth Street Region watermain to East growth lands.	Watermain	Growth	28	300	$110,000	Low	$11,000	$99,000	$0	Growth
W-M-23	A	5253 m of new 500 mm watermain along ESEL Lands.	Watermain	Growth	5,253	500	$27,052,000	Low	$0	$27,052,000	$0	Growth
W-M-27	B	Replacement of 588 m of 200 mm watermain along for watermain breaks.	Watermain	Replacement	588	200	$2,522,000	Low	$2,522,000	$0	$0	Growth
W-M-27	C	Replacement of 232 m of 250 mm watermain along for watermain breaks.	Watermain	Replacement	232	250	$1,262,000	Low	$1,262,000	$0	$0	Growth
W-M-27	D	Replacement of 208 m of 300 mm watermain along for watermain breaks.	Watermain	Replacement	208	300	$1,221,000	Low	$1,221,000	$0	$0	Growth

8 Implementation Plan

As outlined in **Section 2** of **Volume 2**, the MSP fulfills the requirements of Approach 1 under the MEA Class EA process. The Preferred Water Servicing Strategy supports the City of Port Colborne's growth to 2051 and beyond and will be implemented in accordance with the applicable Class EA schedules.

Class EA requirements for each project are identified within the Capital Program. Schedule A and A+ projects may proceed directly to design and construction, with A+ projects requiring public notification prior to implementation in accordance with the MEA Class EA process. Schedule B (or equivalent) projects identified within the Preferred Water Servicing Strategy will be addressed through developer-led local servicing plans under the Planning Act municipal development review process, or through separate Class EA studies prior to design and construction. No Schedule C projects were identified as part of the preferred strategy.

All required supporting studies (e.g., environmental impact, cultural heritage, and archaeological) should be completed by qualified professionals as early as possible in the planning process for Schedule B projects.

During implementation, particularly at the detailed design stage, the following should be considered:

- Finalization of property and right-of-way requirements;
- Refinement of infrastructure alignments;
- Identification of preferred construction methodologies;
- Completion of additional supporting investigations (e.g., geotechnical, hydrogeological);
- Review and mitigation of potential construction-related impacts; and
- Fulfillment of all provincial, municipal, and conservation authority approval requirements.

For planning and budgeting purposes, the recommended capital program provides a high-level baseline for the City's capital budget. Project cost estimates will be further refined as individual projects advance and more detailed information becomes available.

Project timing should be aligned with projected population and employment growth within the City. The water program has also been coordinated with wastewater and stormwater programs to align projects where possible. Given the growth-related nature of the servicing strategies, the water capital program forms the basis for the water component of the City of Port Colborne's Development Charges By-law.

8.1 Project Timing and Triggers

The timing of the recommended water infrastructure projects has been developed to reflect system priorities, growth-related needs, and opportunities for coordination with other municipal works. The Capital Program is intended to provide a flexible, risk-based framework that supports both immediate system needs and long-term servicing objectives.

Project prioritization is guided by the following:

- Priority projects focus on system looping to improve overall system redundancy and reliability.
- Remaining projects are grouped by neighbourhood and categorized as either existing system improvements or growth-related system upgrades.
- Projects are sequenced to align with planned roadway, stormwater, and wastewater projects, where feasible, to optimize construction efficiency and minimize disruption.
- Watermain replacement is prioritized where it can be coordinated with other infrastructure projects.
- The City will continue to advance planned Capital Program watermain lining projects as currently proposed.
- Projects with identified needs but lower urgency may be deferred to coincide with future road reconstruction or corridor upgrades.

Project implementation may be influenced by the following key triggers:

- Upstream development and associated servicing requirements;
- Planned roadway reconstruction or corridor improvements; and,
- Opportunities identified through ongoing operational review and asset management planning.

The Capital Program is structured to provide flexibility, with a long-term servicing vision supported by periodic updates through the City's capital planning process.

It is recognized that project timing may be subject to change due to external factors such as coordination with Regional infrastructure, updates to growth projects and funding availability.

8.2 Growth Area Servicing Plans

The following sections outline the trunk servicing needs, triggers and overall servicing requirements for each "development area" with the objective of providing direction on the project timing and triggers in terms of municipal servicing. These improvements are growth-related and are anticipated to be triggered by development, with implementation aligned with the timing of build-out in the area. The watermain sizes presented reflect the requirements to

achieve the fire flow criteria noted for each growth area; if the actual type of development differs or fire flow requirements vary, the recommended watermain will need to be reassessed during detailed design.

8.2.1 2051 and Buildout Considerations

The servicing requirements presented within this section are generally based on the 2051 Growth Scenario, which reflects the City's anticipated development horizon and forms the basis of the Capital Program. It is assumed that all identified growth areas are included within the 2051 scenario, and the overall level of development and associated water demand is lower than that represented under the Buildout Scenario.

The Buildout Scenario represents a higher ultimate demand condition and is used to confirm that the proposed servicing strategy can accommodate long-term development. The 2051 Growth Scenario directs project timing and the Buildout Scenario defines the ultimate design condition for infrastructure sizing and ensures that recommended trunk upgrades are sufficient under full development conditions.

8.2.2 East Employment Lands

Water system upgrades are required to support development within the East Side Employment Lands and to meet applicable fire flow requirements. A new 300 mm loop along Main Street East, Lorraine Road, and Killaly Street East are required to achieve the Multi-Family Residential fire flow target of 200 L/s. In addition, a new 200 mm watermain is required along Lorraine Road south of Killaly Street East.

Figure 8-1 presents the proposed trunk watermain infrastructure and the associated growth area. The exact alignment of these watermains will be determined during detailed design; the MSP identifies the required size and looping configuration rather than final routing.

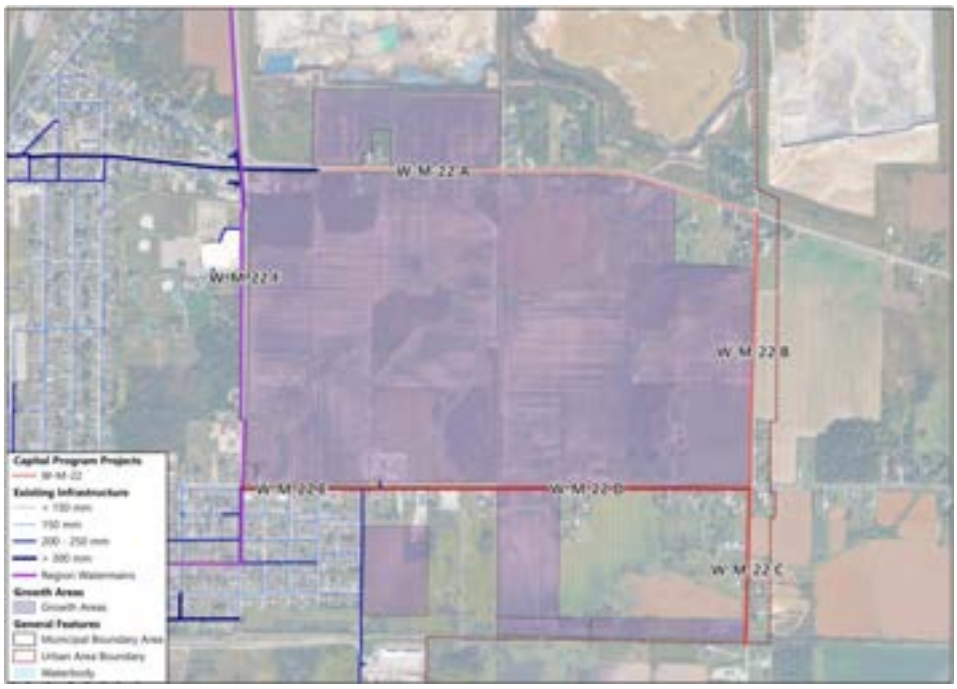

Figure 8-1: East Employment Lands Growth Area

A summary of all projects supporting this development block, including local watermain upgrades as well as other system improvements required to support servicing of the area, are provided in **Table 8-1**.

Table 8-1: East Employment Lands Projects

Project Number		Project Description	Benefit to Existing
W-M-22	A	1,443 m of new 300 mm watermain along Main Street East.	BE-1
	B	892 m of new 300 mm watermain along Lorraine Road.	BE-1
	C	507 m of new 200 mm watermain along Lorraine Road.	BE-1
	D	1,036 m of new 300 mm watermain along Killaly Street East.	BE-2
	E	Upsizing of 610 m of 300 mm watermain along Killaly Street East.	BE-2
	F	28 m of new 300 mm watermain connecting existing Elizabeth Street Region watermain to East growth lands.	BE-2

8.2.3 South Residential Lands

Water system upgrades are identified within the South Residential Lands to address existing fire flow deficiencies, which persist under both existing and buildout conditions and are not a result of growth. These deficiencies are associated with higher industrial fire flow requirements in the area. To improve available fire flow, upsizing of watermains along Marina Drive and King Street to 300 mm is required.

Localized deficiencies at dead-end watermains are expected to remain due to the high fire flow requirements; however, further upsizing is not recommended at this time given the limited benefit and extent of these areas.

Figure 8-2 presents the proposed trunk watermain infrastructure generally following the existing alignment; however, the exact alignment will be confirmed during detailed design.



Figure 8-2: South Residential Lands Growth Area

A summary of all projects supporting this development block, including local watermain upgrades as well as other system improvements required to support servicing of the area, are provided in **Table 8-2**.

Table 8-2: South Residential Lands Projects

Project Number		Project Description	Benefit to Existing
W-M-05	A	Upsizing of 1,076 m of 300 mm watermain along Marina Drive.	BE-3
W-M-02	A	Upsizing of 1,225 m of 300 mm watermain along Sugarloaf Street.	BE-4
W-M-06	A	Lining of 32 m of 200 mm watermain along Sugarloaf Street.	BE-4
	B	Replacement of 77 m of 200 mm watermain along Sugarloaf Street.	BE-4
	C	Lining of 23 m of 200 mm watermain along Sugarloaf Street.	BE-4
	D	Upsizing of 111 m of 200 mm watermain along Sugarloaf Street.	BE-4
	E	Lining of 401 m of 200 mm watermain along Sugarloaf Street.	BE-4

8.2.4 Southwest Residential Lands

Servicing for the Southwest Residential lands will require watermain extensions. To achieve the Multi-Family Residential fire flow target of 200 L/s, a 300 mm watermain extension along

Sugarloaf Street to Lancaster Drive is recommended as an extension to the proposed upgrade loop. A 200 mm watermain extending south will be sufficient to meet servicing requirements.

Figure 8-3 presents the proposed trunk watermain infrastructure and the associated growth area. The exact alignment will be determined during detailed design.



Figure 8-3: Southwest Residential Lands Growth Area

A summary of all projects supporting this development block, including local watermain upgrades as well as other system improvements required to support servicing of the area, are provided in **Table 8-3**.

Table 8-3: Southwest Residential Lands Projects

Project Number		Project Description	Benefit to Existing
W-M-16	A	626 m of new 300 mm watermain along Sugarloaf Street and Lancaster Drive.	BE-1
	B	430 m of new 200 mm watermain along south of Sugarloaf Street.	BE-1
W-M-02	A	Upsizing of 1,225 m of 300 mm watermain along Sugarloaf Street.	BE-4
W-M-03	A	Upsizing of 1,125 m of 300 mm watermain along Stanley Street.	BE-4
W-M-24	A	Lining of 1,533 m of 150 mm watermain along Clarence Street, Ridgewood Avenue, Division Street and Stanley Street.	BE-6
	B	Lining of 158 m of 200 mm watermain along Clarence Street, Ridgewood Avenue, Division Street and Stanley Street.	BE-6

8.2.5 West Residential Lands

Servicing for the West Residential Lands requires watermain extensions to meet Multi-Family Residential fire flow requirements. A 300 mm watermain is required from Main Street West to Barrick Road to achieve the target fire flow of 200 L/s, while 200 mm watermains are sufficient to service the remaining development. The new 300 mm watermain also completes a loop connection south to Clarence Street, improving system redundancy and reliability.

Figure 8-4 presents the proposed trunk watermain infrastructure and the associated growth area. The exact alignment will be determined during detailed design.

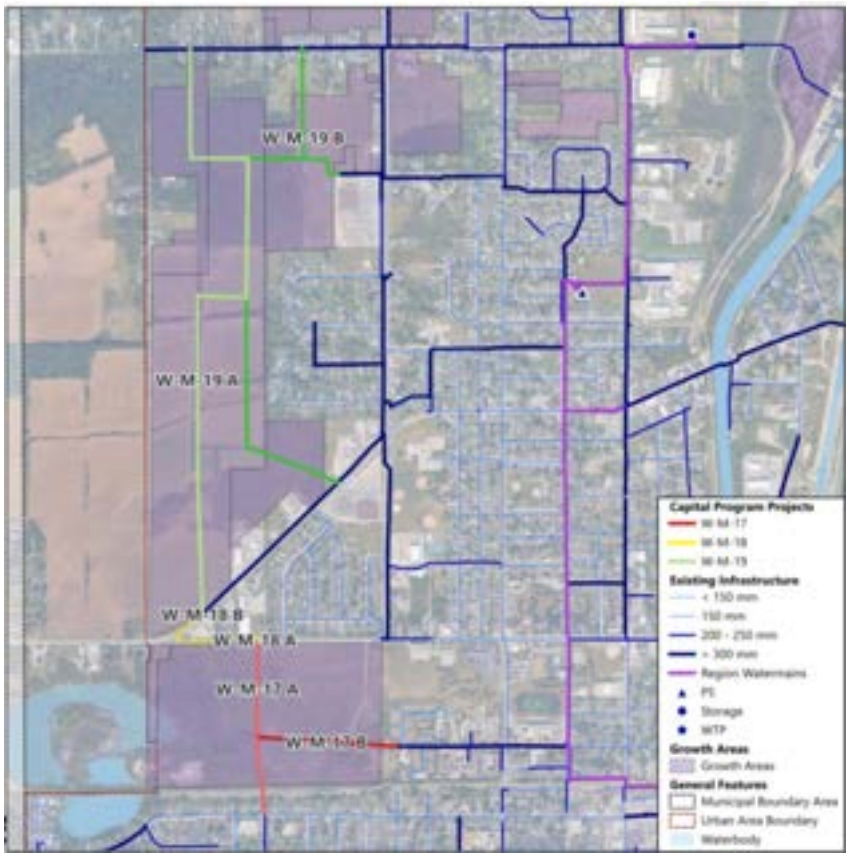

Figure 8-4: West Residential Lands Growth Area

A summary of all projects supporting this development block, including local watermain upgrades as well as other system improvements required to support servicing of the area, are provided in **Table 8-4**.

Table 8-4: West Residential Lands Projects

Project Number		Project Description	Benefit to Existing
W-M-17	A	608 m of new 300 mm watermain along Extension of Rosemount Avenue, Elgin Street West and Killaly Street West.	BE-2
	B	488 m of new 300 mm watermain along Extension of Rosemount Avenue, Elgin Street West and Killaly Street West.	BE-2
W-M-18	A	Upsizing of 36 m of 300 mm watermain along Killaly Street West.	BE-3
	B	382 m of new 300 mm watermain along Killaly Street West and Main Street West.	BE-3
W-M-19	A	2344 m of new 300 mm watermain along Main Street West to Barrick Road.	BE-2
	B	1607 m of new 200 mm watermain along Main Street West to Barrick Road.	BE-2

8.2.6 Northwest Residential Lands

Watermain extensions are required to service the Northwest Residential Lands. For the block northwest of Barrick Road and West Side Road, a 300 mm watermain is required to meet a 200 L/s fire flow target. For the residential block southwest of Stonebridge Drive and Elm Street, watermain sizes range from 150-300 mm to provide looping within the growth area, which is sufficient to meet the fire flow requirements.

Figure 8-5 presents the proposed watermains and the associated growth areas. The exact alignment will be determined during detailed design.

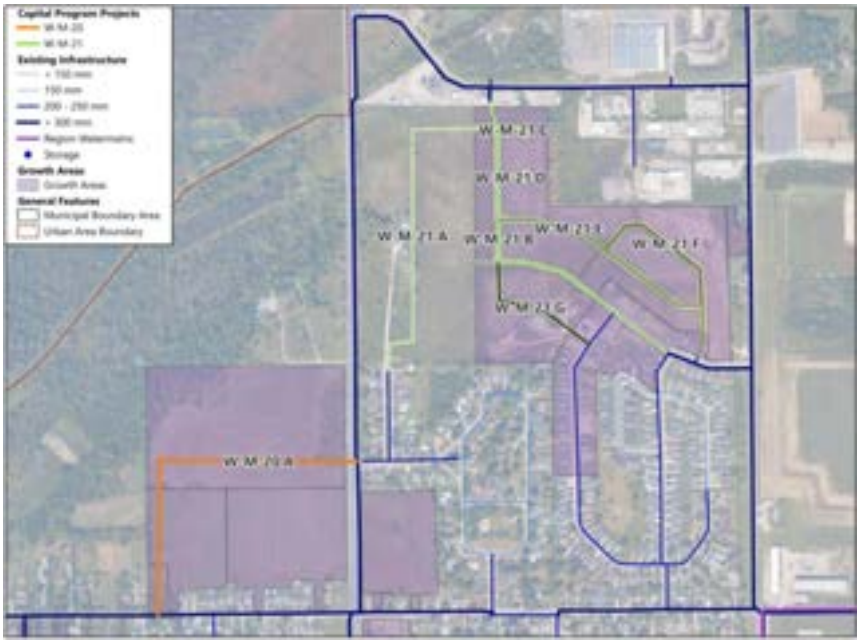

Figure 8-5: Northwest Residential Lands Growth Area

A summary of all projects supporting this development block, including local watermain upgrades as well as other system improvements required to support servicing of the area, are provided in **Table 8-5**.

Table 8-5: Northwest Residential Lands Projects

Project Number		Project Description	Benefit to Existing
W-M-20	A	727 m of new 300 mm watermain along Barrick Road to West Side Road.	BE-1
W-M-21	A	802 m of new 200 mm watermain along Oxford Boulevard to Parkside Drive.	BE-4
	B	733 m of new 300 mm watermain along Parkside Drive and Meadowlark Drive.	BE-1
	C	61 m of new 150 mm watermain along Westfield Place.	BE-1
	D	66 m of new 150 mm watermain along Aintree Place.	BE-1
	E	578 m of new 200 mm watermain along Sherwood Drive and Springside Drive.	BE-1
	F	321 m of new 150 mm watermain along Springside Drive.	BE-1
	G	292 m of new 150 mm watermain along Parkside Drive.	BE-1
	H	365 m of new 250 mm watermain along Hillcrest Road.	BE-1
	I	307 m of new 150 mm watermain along Oriole Crescent.	BE-1

8.2.7 Northeast Side Employment Lands

Watermain extensions are required to service the East Side Employment Lands. Previous reviews completed by GEI Consultants and Agile Infrastructure indicate that a 500 mm watermain through the industrial developments, extending from Second Concession Road and connecting to the new Regional 500 mm watermain, is sufficient to meet the applicable fire flow requirements.

Figure 8-6 presents the proposed watermain alignment and the associated growth areas. The exact routing and connections will be finalized during detailed design.

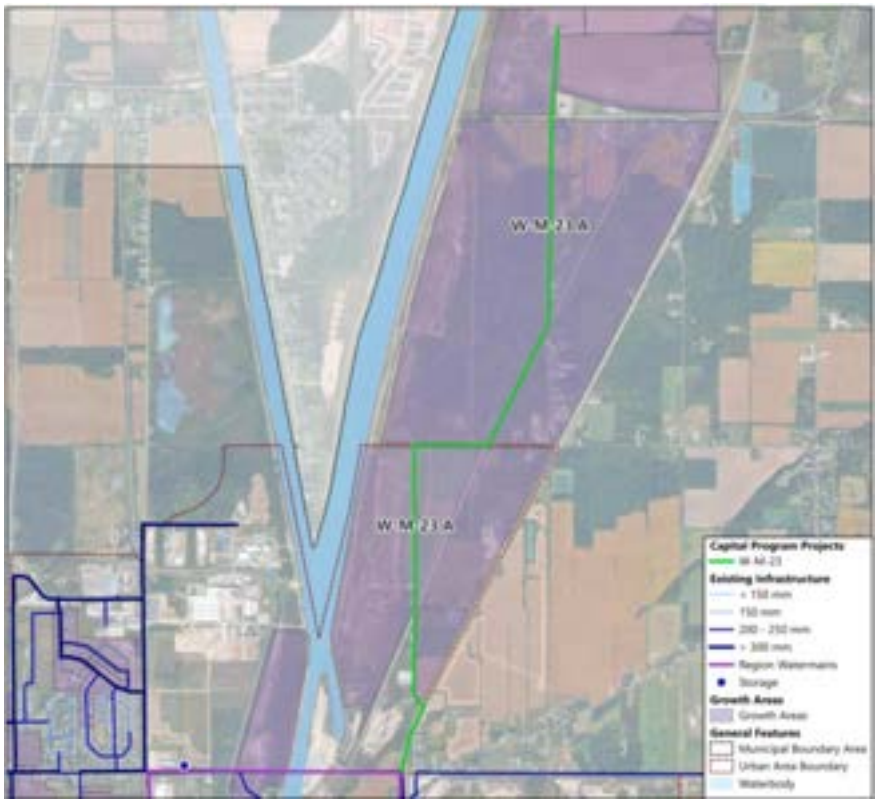

Figure 8-6: Northeast Side Employment Lands Growth Area

A summary of all projects supporting this development block, including local watermain upgrades as well as other system improvements required to support servicing of the area, are provided in **Table 8-6**.

Table 8-6: Northeast Side Employment Lands Projects

Project Number		Project Description	Benefit to Existing
W-M-23	A	5253 m of new 500 mm watermain along ESEL Lands.	BE-1

8.3 Local Servicing Upgrades

A number of local servicing projects have been identified to address system constraints, aging infrastructure, and localized servicing deficiencies. These projects generally consist of watermain upgrades within established areas and are intended to improve system performance, reliability, and hydraulic capacity. In several cases, these works also provide broader system benefits by supporting adjacent areas, improving network hydraulic capacity, or addressing known operational limitations.

For planning-level costing purposes, projects have been categorized as either watermain lining or replacement based on the available information. This is intended to provide a conservative estimate of capital costs; however, the preferred approach for each project should be confirmed at the time of design based on detailed condition assessments and local considerations.

The timing of these local servicing projects will be guided by coordination with other municipal programs and development activity. Key implementation triggers include:

- Road reconstruction projects;
- Sewer replacement or rehabilitation works;
- Neighbourhood-level watermain lining or renewal programs;
- Redevelopment or intensification within existing areas; and
- Asset condition or operational performance considerations identified through ongoing monitoring and asset management practices.

8.3.1 Cast Iron Replacement Program

In acknowledgement that the City still needs to address rehabilitation and/or replacement of all its cast iron watermains to address ongoing watermain break and water loss issues, the final capital program also includes the full replacement/lining of all remaining cast iron watermains. **Table 8-7** outlines the capital program projects that represent the remaining cast iron watermain program projects that do not directly support an identified growth area or address an existing system performance issue. While it is understood that it is the City's preference to line cast iron watermains if feasible, for the purposes of the Implementation Plan, watermains with break history have been assumed to require full replacement, while watermains without a break history are assumed to be candidates for lining. Prior to construction/or lining, the City will ultimately need to review and assess the condition of the existing watermain and confirm its suitability for lining.

Table 8-7: Cast Iron Rehabilitation Projects

Project Number		Project Description	Benefit to Existing
W-M-26	A	Lining of 5494 m of 150 mm cast iron watermain.	BE-6
W-M-26	B	Lining of 1466 m of 200 mm cast iron watermain.	BE-6
W-M-26	C	Lining of 1510 m of 250 mm cast iron watermain.	BE-6
W-M-26	D	Lining of 2909 m of 300 mm cast iron watermain.	BE-6
W-M-26	E	Lining of 105 m of 350 mm cast iron watermain.	BE-6
W-M-27	B	Replacement of 588 m of 200 mm watermain along for watermain breaks.	BE-6

W-M-27	C	Replacement of 232 m of 250 mm watermain along for watermain breaks.	BE-6
W-M-27	D	Replacement of 208 m of 300 mm watermain along for watermain breaks.	BE-6

For the purposes of this implementation plan, we have assumed that the City will continue with the rehabilitation of the City's remaining cast iron watermains, with completion by 2041. The implementation plan includes recommendations to prioritize the lining/replacement of watermains that support growth areas and/or have a history of breaks. Ultimately, the City will continue to review and prioritize the watermain replacement/lining based on a review of corridor needs and other infrastructure and community priorities. This phased approach supports the continued renewal of aging infrastructure, improving system reliability and reducing the risk of future watermain failures.

The projects are identified as a low priority project and should be coordinated with other infrastructure priorities.

8.4 Operation and Condition Program

8.4.1 Non-Revenue Water Reduction Program

The City should implement a targeted NRW reduction program to address existing high NRW rates. The NRW was calculated for the system and was presented in **Section 2.1.3**. Based on the existing NRW rate of 40%, NRW reduction should be completed across the entire system with the goal of minimizing NRW as much as possible. For the purpose of the MSP, the analysis assumed a NRW of 25%; however, the City should aim to reduce NRW as much as possible.

The program activities may include but are not limited to:

- Enhancement to the water metering program including:
    - Continue meter replacement program
    - Expand real-time monitoring of large water users
- Continue and expand on existing leak detection program for watermains,
- Continue with watermain lining and replacement program,
- Improve tracking of unbilled authorized users and development of demand reduction strategies:
    - Fire department
    - Watermain flushing
    - Facility usage,
- Development of bulk water user strategy and potential construction of additional bulk water station, and
- Improved monitoring and enforcement of new construction water users.

Appendix A – Fire Flow Review

Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	176 Charlotte Street
Notes:	Single Family House

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.5 - Type V - Wood Frame Construction						1.5	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						103.2	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2	
4	Determine Effective Floor area							206.4	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							5,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	4,250
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					No	0%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	Direction	Exposure Distance	Exposed Length	Exposed Stories	h Height Fa	Building Class		
		N	Greater than 30 m	7	2	0-20	Type V-W	0%	
		E	3.1 m to 10 m	14.2	2	21-40	Type V-W	16%	
		S	0 m to 3 m	6.9	2	0-20	Type V-W	20%	
		W	3.1 m to 10 m	14.3	2	21-40	Type V-W	16%	
		Total Exposure Charge						52%	2,210
9	Determined Final Required Fire Flow	Total Required Fire Flow (L/min) - Rounded to Nearest 100L							6,000
		Total Required Fire Flow (L/s)							100
		Required Fire Flow Duration (hrs)							2.0
		Required Fire Flow Volume (cu.m)							720





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	262 Mitchell Street
Notes:	Single Family House

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.5 - Type V - Wood Frame Construction						1.5	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						127.4	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2	
4	Determine Effective Floor area							254.8	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							5,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	4,250
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					No	0%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	3.1 m to 10 m	15.4	2	21-40	Type V-W	16%	
		E	Greater than 30 m	8.7	2	0-20	Type V-W	0%	
		S	3.1 m to 10 m	14.7	2	21-40	Type V-W	16%	
		W	0 m to 3 m	10.1	2	21-40	Type V-W	21%	
		Total Exposure Charge						53%	2,253
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**7,000**
		Total Required Fire Flow (L/s)							**117**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**840**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	29 Catharine Street
Notes:	Single Family House

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.5 - Type V - Wood Frame Construction						1.5	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						160.8	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2	
4	Determine Effective Floor area							321.6	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							6,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	5,100
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					No	0%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	15.4	2	21-40	Type V-W	0%	
		E	10.1 m to 20 m	10.3	2	21-40	Type V-W	11%	
		S	3.1 m to 10 m	15.4	2	21-40	Type V-W	16%	
		W	Greater than 30 m	10.6	2	21-40	Type V-W	0%	
		Total Exposure Charge						27%	1,377
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**6,000**
		Total Required Fire Flow (L/s)							**100**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**720**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	57 Elgin Street
Notes:	Single Family House

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.5 - Type V - Wood Frame Construction						1.5	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						121.3	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2	
4	Determine Effective Floor area							242.6	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							5,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	4,250
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					No	0%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	10.1 m to 20 m	9.5	2	0-20	Type V-W	10%	
		E	3.1 m to 10 m	13.1	2	21-40	Type V-W	16%	
		S	Greater than 30 m	9.4	2	0-20	Type V-W	0%	
		W	10.1 m to 20 m	12.7	2	21-40	Type V-W	11%	
		Total Exposure Charge						37%	1,573
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**6,000**
		Total Required Fire Flow (L/s)							**100**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**720**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	6 Hillcrest Road
Notes:	Single Family House

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.5 - Type V - Wood Frame Construction						1.5	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						159.8	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1.5	
4	Determine Effective Floor area							239.7	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							5,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	4,250
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					No	0%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	12.6	1.5	0-20	Type V-W	0%	
		E	0 m to 3 m	12.6	1.5	0-20	Type V-W	20%	
		S	Greater than 30 m	12.9	1.5	0-20	Type V-W	0%	
		W	0 m to 3 m	12.6	1	0-20	Type V-W	20%	
		Total Exposure Charge						40%	1,700
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**6,000**
		Total Required Fire Flow (L/s)							**100**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**720**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	708 Clarence Street
Notes:	Single Family House

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.5 - Type V - Wood Frame Construction						1.5	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						270.5	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1.5	
4	Determine Effective Floor area							405.75	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							7,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	5,950
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					No	0%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	13	1.5	0-20	Type V-W	0%	
		E	0 m to 3 m	20.4	1.5	21-40	Type V-W	21%	
		S	Greater than 30 m	13.3	1.5	0-20	Type V-W	0%	
		W	0 m to 3 m	20.7	1.5	21-40	Type V-W	21%	
		Total Exposure Charge						42%	2,499
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**8,000**
		Total Required Fire Flow (L/s)							**134**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**960**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	21 Bartok Crescent
Notes:	Single Family House

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.5 - Type V - Wood Frame Construction						1.5	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						246.9	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1.5	
4	Determine Effective Floor area							370.35	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							6,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	5,100
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					No	0%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	0 m to 3 m	18.3	1.5	21-40	Type V-W	21%	
		E	Greater than 30 m	13.6	1.5	21-40	Type V-W	0%	
		S	0 m to 3 m	18	1.5	21-40	Type V-W	21%	
		W	Greater than 30 m	13.7	1.5	21-40	Type V-W	0%	
		Total Exposure Charge						42%	2,142
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**7,000**
		Total Required Fire Flow (L/s)							**117**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**840**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	36 Bayview Lane
Notes:	Single Family House

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.5 - Type V - Wood Frame Construction						1.5	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						195.3	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1.5	
4	Determine Effective Floor area							292.95	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							6,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	5,100
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					No	0%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	14.4	1.5	21-40	Type V-W	0%	
		E	20.1 m to 30 m	13.3	1.5	0-20	Type V-W	0%	
		S	0 m to 3 m	15.4	1.5	21-40	Type V-W	21%	
		W	Greater than 30 m	13	1.5	0-20	Type V-W	0%	
		Total Exposure Charge						21%	1,071
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**6,000**
		Total Required Fire Flow (L/s)							**100**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**720**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	266 Rosemount Avenue
Notes:	St. Patrick's Catholic Elementary School

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	0.8 Type II Nonconsbustible Construction						0.8	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						1403.5	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2	
4	Determine Effective Floor area							2807	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							9,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	7,650
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						-10%	- 765
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	63.1	2	Over 100	Type II-W	0%	
		E	Greater than 30 m	26	1	21-40	Type II-W	0%	
		S	10.1 m to 20 m	63.1	2	Over 100	Type II-W	8%	
		W	Greater than 30 m	26.6	2	41-60	Type II-W	0%	
		Total Exposure Charge						8%	612
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**7,000**
		Total Required Fire Flow (L/s)							**117**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**840**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	211 Elgin Street
Notes:	Port Colborne High School

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	0.8 Type II Nonconsbustible Construction						0.8	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						8317.8	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						3	
4	Determine Effective Floor area							24953.4	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							28,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	23,800
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Yes	-30%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						-40%	- 9,520
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	168.3	3	Over 100	Type II-W	0%	
		E	Greater than 30 m	84.1	3	Over 100	Type II-W	0%	
		S	Greater than 30 m	170.0	3	Over 100	Type II-W	0%	
		W	Greater than 30 m	37.5	3	Over 100	Type II-W	0%	
		Total Exposure Charge						0%	-
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**14,000**
		Total Required Fire Flow (L/s)							**234**
		Required Fire Flow Duration (hrs)							**3.0**
		Required Fire Flow Volume (cu.m)							**2,520**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	550 Elizabeth Street
Notes:	Vale Health & Wellness Centre

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	0.8 Type II Nonconsbustible Construction						0.8	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						11089.8	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						3	
4	Determine Effective Floor area							33269.4	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							32,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	27,200
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Yes	-30%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						-40%	- 10,880
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	125.0	3	Over 100	Type II-W	0%	
		E	Greater than 30 m	125.3	3	Over 100	Type II-W	0%	
		S	Greater than 30 m	124.5	3	Over 100	Type II-W	0%	
		W	Greater than 30 m	71.1	3	Over 100	Type II-W	0%	
		Total Exposure Charge						0%	-
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**16,000**
		Total Required Fire Flow (L/s)							**267**
		Required Fire Flow Duration (hrs)							**3.5**
		Required Fire Flow Volume (cu.m)							**3,360**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	223 Bell Street
Notes:	Italian Canadian Cultural Centre

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						1482.5	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1.5	
4	Determine Effective Floor area							2223.75	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							10,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	8,500
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					Unknown	0%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	20.1 m to 30 m	40.2	1.5	61-80	Type III-W	3%	
		E	3.1 m to 10 m	37.1	1.5	41-60	Type III-W	12%	
		S	Greater than 30 m	40.9	1.5	61-80	Type III-W	0%	
		W	3.1 m to 10 m	36	1.5	41-60	Type III-W	12%	
		Total Exposure Charge						27%	2,295
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**11,000**
		Total Required Fire Flow (L/s)							**184**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**1,320**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	124 Clarence Street
Notes:	Food Basics

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	0.8 Type II Nonconsbustible Construction						0.8	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						2770.3	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1.5	
4	Determine Effective Floor area							4155.45	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							11,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	9,350
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						-10%	- 935
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	54.8	1.5	81-100	Type II-W	0%	
		E	Greater than 30 m	55.4	1.5	81-100	Type II-W	0%	
		S	20.1 m to 30 m	54.4	1.5	81-100	Type II-W	3%	
		W	10.1 m to 20 m	55.1	1.5	81-100	Type II-W	7%	
		Total Exposure Charge						10%	935
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**9,000**
		Total Required Fire Flow (L/s)							**150**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**1,080**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	182 West Street
Notes:	The Lockwood Fired Pizza

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.5 - Type V - Wood Frame Construction						1.5	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						239.9	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2	
4	Determine Effective Floor area							479.8	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							7,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	5,950
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					No	0%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	3.1 m to 10 m	23.8	2	41-60	Type V-W	17%	
		E	Greater than 30 m	10.8	2	21-40	Type V-W	0%	
		S	3.1 m to 10 m	23.7	2	41-60	Type V-W	17%	
		W	10.1 m to 20 m	9.5	2	0-20	Type V-W	10%	
		Total Exposure Charge						44%	2,618
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**9,000**
		Total Required Fire Flow (L/s)							**150**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**1,080**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	77 Clarence Street
Notes:	Shoppers Drug Mart

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		Without Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						1753.2	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2	
4	Determine Effective Floor area							3506.4	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							13,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	11,050
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						-10%	- 1,105
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	3.1 m to 10 m	38.8	2	61-80	Type III-WO	6%	
		E	20.1 m to 30 m	48.8	2	81-100	Type III-WO	2%	
		S	20.1 m to 30 m	38.8	2	61-80	Type III-WO	1%	
		W	0 m to 3 m	48.8	2	81-100	Type III-WO	9%	
		Total Exposure Charge						18%	1,989
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**12,000**
		Total Required Fire Flow (L/s)							**200**
		Required Fire Flow Duration (hrs)							**2.5**
		Required Fire Flow Volume (cu.m)							**1,800**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	344 King Street
Notes:	Backroad Barbecue Company

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						496	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1.5	
4	Determine Effective Floor area							744	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							6,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	5,100
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					No	0%	
		Total Sprinkler Coverage						-10%	- 510
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	3.1 m to 10 m	29.9	1.5	41-60	Type III-W	12%	
		E	Greater than 30 m	17	1.5	21-40	Type III-W	0%	
		S	10.1 m to 20 m	29.5	1.5	41-60	Type III-W	7%	
		W	20.1 m to 30 m	16.4	1.5	21-40	Type III-W	1%	
		Total Exposure Charge						20%	1,020
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**6,000**
		Total Required Fire Flow (L/s)							**100**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**720**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	287 West Side Road
Notes:	Commercial Box Stores (Canadian Tire, Sobeys, etc)

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	0.8 Type II Nonconsbustible Construction						0.8	
		Without Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						12081.2	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1	
4	Determine Effective Floor area							12081.2	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							19,000
6	Determine Occupancy Charge	+15% Free Burning Contents						0.15	21,850
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Yes	-30%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-40%	- 8,740
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	10.1 m to 20 m	68	1	61-80	Type II-WO	1%	
		E	20.1 m to 30 m	199.5	1	Over 100	Type II-WO	0%	
		S	Greater than 30 m	53.2	1	41-60	Type II-WO	0%	
		W	Greater than 30 m	177.4	1	Over 100	Type II-WO	0%	
		Total Exposure Charge						1%	219
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**13,000**
		Total Required Fire Flow (L/s)							**217**
		Required Fire Flow Duration (hrs)							**2.5**
		Required Fire Flow Volume (cu.m)							**1,950**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	569 Main Street West
Notes:	McDonalds

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						541.7	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1	
4	Determine Effective Floor area							541.7	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							5,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	4,250
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 425
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	16.1	1	0-20	Type III-W	0%	
		E	Greater than 30 m	33.1	1	21-40	Type III-W	0%	
		S	Greater than 30 m	17.1	1	0-20	Type III-W	0%	
		W	Greater than 30 m	32.1	1	21-40	Type III-W	0%	
		Total Exposure Charge						0%	-
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**4,000**
		Total Required Fire Flow (L/s)							**67**
		Required Fire Flow Duration (hrs)							**1.5**
		Required Fire Flow Volume (cu.m)							**360**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	197 Main Street East
Notes:	Tim Hortons

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						301.5	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1	
4	Determine Effective Floor area							301.5	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							4,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	3,400
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 340
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	18.8	1	0-20	Type III-W	0%	
		E	Greater than 30 m	15.2	1	0-20	Type III-W	0%	
		S	20.1 m to 30 m	19.1	1	0-20	Type III-W	0%	
		W	Greater than 30 m	15.5	1	0-20	Type III-W	0%	
		Total Exposure Charge						0%	-
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**3,000**
		Total Required Fire Flow (L/s)							**50**
		Required Fire Flow Duration (hrs)							**1.3**
		Required Fire Flow Volume (cu.m)							**225**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	73 Main Street East
Notes:	Dairy Queen

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						94.6	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1	
4	Determine Effective Floor area							94.6	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							2,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	1,700
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Unknown	0%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	20.1 m to 30 m	7.5	1	0-20	Type III-W	0%	
		E	10.1 m to 20 m	12.4	1	0-20	Type III-W	5%	
		S	Greater than 30 m	7.7	1	0-20	Type III-W	0%	
		W	10.1 m to 20 m	12.5	1	0-20	Type III-W	5%	
		Total Exposure Charge						10%	170
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**2,000**
		Total Required Fire Flow (L/s)							**34**
		Required Fire Flow Duration (hrs)							**1.0**
		Required Fire Flow Volume (cu.m)							**120**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	313-327 Elgin Street West
Notes:	Townhouse Block

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						938	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2	
4	Determine Effective Floor area							1876	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							10,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	8,500
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Unknown	0%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	20.1 m to 30 m	53	2	Over 100	Type III-W	5%	
		E	20.1 m to 30 m	17.2	2	21-40	Type III-W	1%	
		S	Greater than 30 m	53.6	2	Over 100	Type III-W	0%	
		W	3.1 m to 10 m	18	2	21-40	Type III-W	11%	
		Total Exposure Charge						17%	1,445
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**10,000**
		Total Required Fire Flow (L/s)							**167**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**1,200**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	41 Amelia Street
Notes:	Townhouses. Semi-Detached

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						272.5	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2.5	
4	Determine Effective Floor area							681.25	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							6,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	5,100
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Unknown	0%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						0%	-
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	29.4	2.5	61-80	Type III-W	0%	
		E	10.1 m to 20 m	9.3	2.5	21-40	Type III-W	6%	
		S	20.1 m to 30 m	29.4	2.5	61-80	Type III-W	3%	
		W	20.1 m to 30 m	9.3	2.5	21-40	Type III-W	1%	
		Total Exposure Charge						10%	510
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**6,000**
		Total Required Fire Flow (L/s)							**100**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**720**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	300-302 Elgin Street
Notes:	Portal Village Retirement Community

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	0.6 Type I Fire Resistive Construction						0.6	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						6302.8	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2.5	
4	Determine Effective Floor area							15757	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							17,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	14,450
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 1,445
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	138.6	2.5	Over 100	Type I-W	0%	
		E	Greater than 30 m	98.4	2.5	Over 100	Type I-W	0%	
		S	Greater than 30 m	141.4	2.5	Over 100	Type I-W	0%	
		W	10.1 m to 20 m	58.5	2.5	Over 100	Type I-W	8%	
		Total Exposure Charge						8%	1,156
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**14,000**
		Total Required Fire Flow (L/s)							**234**
		Required Fire Flow Duration (hrs)							**3.0**
		Required Fire Flow Volume (cu.m)							**2,520**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	176 Ash Street
Notes:	Princess Bay Apartments

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						1186.6	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						5	
4	Determine Effective Floor area							5933	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							17,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	14,450
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 1,445
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	26.1	5	Over 100	Type III-W	0%	
		E	Greater than 30 m	58.6	5	Over 100	Type III-W	0%	
		S	20.1 m to 30 m	13.2	5	61-80	Type III-W	3%	
		W	10.1 m to 20 m	58.6	5	Over 100	Type III-W	10%	
		Total Exposure Charge						13%	1,879
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**15,000**
		Total Required Fire Flow (L/s)							**250**
		Required Fire Flow Duration (hrs)							**3.0**
		Required Fire Flow Volume (cu.m)							**2,700**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	340 Wellington Street
Notes:	Apartment Building. South Niagara Gateway Family

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						1179.1	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						5	
4	Determine Effective Floor area							5895.5	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							17,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	14,450
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 1,445
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	54.5	5	Over 100	Type III-W	0%	
		E	Greater than 30 m	22.4	5	Over 100	Type III-W	0%	
		S	Greater than 30 m	54.5	5	Over 100	Type III-W	0%	
		W	Greater than 30 m	22.3	5	Over 100	Type III-W	0%	
		Total Exposure Charge						0%	-
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**13,000**
		Total Required Fire Flow (L/s)							**217**
		Required Fire Flow Duration (hrs)							**2.5**
		Required Fire Flow Volume (cu.m)							**1,950**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	303 Elgin Street
Notes:	Apartment Building. Gilead Manor

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						1630.9	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						2	
4	Determine Effective Floor area							3261.8	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							13,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	11,050
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 1,105
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	57.1	2	Over 100	Type III-W	0%	
		E	Greater than 30 m	71.9	2	Over 100	Type III-W	0%	
		S	Greater than 30 m	20.5	2	41-60	Type III-W	0%	
		W	Greater than 30 m	42.3	2	81-100	Type III-W	0%	
		Total Exposure Charge						0%	-
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**10,000**
		Total Required Fire Flow (L/s)							**167**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**1,200**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	400 Steele Street
Notes:	Apartment Building. Portal Village

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						1305.6	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						6	
4	Determine Effective Floor area							7833.6	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							19,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	16,150
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 1,615
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	19.1	6	Over 100	Type III-W	0%	
		E	Greater than 30 m	70.8	6	Over 100	Type III-W	0%	
		S	Greater than 30 m	20.1	6	Over 100	Type III-W	0%	
		W	Greater than 30 m	70.9	6	Over 100	Type III-W	0%	
		Total Exposure Charge						0%	-
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**15,000**
		Total Required Fire Flow (L/s)							**250**
		Required Fire Flow Duration (hrs)							**3.0**
		Required Fire Flow Volume (cu.m)							**2,700**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	2 Fielden Avenue
Notes:	Nursing Home. Northland Pointe

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	0.6 Type I Fire Resistive Construction						0.6	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						3432	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						3	
4	Determine Effective Floor area							10296	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							13,000
6	Determine Occupancy Charge	0% Combustible Contents						0	13,000
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Yes	-30%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-40%	- 5,200
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	0 m to 3 m	145.5	3	Over 100	Type I-W	15%	
		E	Greater than 30 m	61.9	3	Over 100	Type I-W	0%	
		S	Greater than 30 m	145.9	3	Over 100	Type I-W	0%	
		W	Greater than 30 m	62.4	3	Over 100	Type I-W	0%	
		Total Exposure Charge						15%	1,950
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**10,000**
		Total Required Fire Flow (L/s)							**167**
		Required Fire Flow Duration (hrs)							**2.0**
		Required Fire Flow Volume (cu.m)							**1,200**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	1555 Elm Street
Notes:	Biotechnology company. Jungbunzlauer Canada

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						9697.8	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1	
4	Determine Effective Floor area							9697.8	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							22,000
6	Determine Occupancy Charge	+15% Free Burning Contents						0.15	25,300
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Yes	-30%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-40%	- 10,120
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	20.1 m to 30 m	133.6	1	Over 100	Type III-W	5%	
		E	Greater than 30 m	82.6	1	81-100	Type III-W	0%	
		S	Greater than 30 m	105.8	1	Over 100	Type III-W	0%	
		W	0 m to 3 m	88.7	1	81-100	Type III-W	19%	
		Total Exposure Charge						24%	6,072
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**21,000**
		Total Required Fire Flow (L/s)							**350**
		Required Fire Flow Duration (hrs)							**4.5**
		Required Fire Flow Volume (cu.m)							**5,670**



Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	33 Stonebridge Drive
Notes:	Claire's Delivery & Transporation

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						9739.5	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1	
4	Determine Effective Floor area							9739.5	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							22,000
6	Determine Occupancy Charge	0% Combustible Contents						0	22,000
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					No	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 2,200
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	110.6	1	Over 100	Type III-W	0%	
		E	Greater than 30 m	89.1	1	81-100	Type III-W	0%	
		S	Greater than 30 m	110.2	1	Over 100	Type III-W	0%	
		W	Greater than 30 m	87.3	1	81-100	Type III-W	0%	
		Total Exposure Charge						0%	-
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**20,000**
		Total Required Fire Flow (L/s)							**334**
		Required Fire Flow Duration (hrs)							**4.5**
		Required Fire Flow Volume (cu.m)							**5,400**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	1 Lake Road
Notes:	Harvest Supply Canada / Allied Marine and Industrial

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						3475.9	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1	
4	Determine Effective Floor area							3475.9	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							13,000
6	Determine Occupancy Charge	0% Combustible Contents						0	13,000
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 1,300
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	Greater than 30 m	43.8	1	41-60	Type III-W	0%	
		E	10.1 m to 20 m	79.5	1	61-80	Type III-W	8%	
		S	Greater than 30 m	47.4	1	41-60	Type III-W	0%	
		W	Greater than 30 m	79.6	1	61-80	Type III-W	0%	
		Total Exposure Charge						8%	1,040
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**13,000**
		Total Required Fire Flow (L/s)							**217**
		Required Fire Flow Duration (hrs)							**2.5**
		Required Fire Flow Volume (cu.m)							**1,950**





Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	1 King Street
Notes:	Warehouse. ADM Milling

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						3450	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						8	
4	Determine Effective Floor area							27600	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							37,000
6	Determine Occupancy Charge	0% Combustible Contents						0	37,000
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 3,700
8	Determine Increase for Exposure	Direction	Exposure Distance	Exposed Length	Exposed Stories	Lenth Height Factor	Building Class		
		N	3.1 m to 10 m	18.8	8	Over 100	Type III-W	15%	
		E	Greater than 30 m	233.8	8	Over 100	Type III-W	0%	
		S	Greater than 30 m	55.5	8	Over 100	Type III-W	0%	
		W	Greater than 30 m	234.2	8	Over 100	Type III-W	0%	
		Total Exposure Charge						15%	5,550
9	Determined Final Required Fire Flow	Total Required Fire Flow (L/min) - Rounded to Nearest 100L							39,000
		Total Required Fire Flow (L/s)							650
		Required Fire Flow Duration (hrs)							9.0
		Required Fire Flow Volume (cu.m)							21,060



Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	2 Sherwood Forest Lane
Notes:	London Agricultural Commodities

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						2245	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						9	
4	Determine Effective Floor area							20205	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							31,000
6	Determine Occupancy Charge	0% Combustible Contents						0	31,000
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 3,100
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	0 m to 3 m	12	10	Over 100	Type III-W	20%	
		E	Greater than 30 m	264.1	10	Over 100	Type III-W	0%	
		S	Greater than 30 m	16.6	10	Over 100	Type III-W	0%	
		W	Greater than 30 m	264.1	10	Over 100	Type III-W	0%	
		Total Exposure Charge						20%	6,200
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**34,000**
		Total Required Fire Flow (L/s)							**567**
		Required Fire Flow Duration (hrs)							**8.0**
		Required Fire Flow Volume (cu.m)							**16,320**



Fire Flow Calculation Sheet

Client:	City of Port Colborne
Project:	Port Colborne Master Plan Level of Service
Date:	01-Apr-25
Property Address:	187 Davis Street
Notes:	Vale Canada

Step	Task	Notes						Value	Required Fire Flow
1	Determined Type of Construction	1.0 Type III Ordinary Construction						1	
		With Unprotected Openings							
2	Determine Floor Area	Does not include Floors Below Grade or Open Attic Space For Construction Coefficient 1.0 to 1.5 - Use Total Floor Area For Construction Coefficient Below 1.0 - With Unprotected Vertical Openings - Use Two largest Floors + 50% of all floors above up to 8 - With protected vertical openings - Use Largest Floor + 25% of each of the two adjoin floors						9571.6	
3	Determine Number of Stories	Single Stories exceeding 3 m - Calculated equivalent stories if used for were housing						1	
4	Determine Effective Floor area							9571.6	
5	Determine Required Fire Flow	F = 220xCxA^1/2 - to Nearest 100 L/min							22,000
6	Determine Occupancy Charge	-15% Limited Combustible Contents						-0.15	18,700
7	Determine Sprinkler Reduction	30% Automatic Sprinkler Protection					Unknown	0%	
		10% Water Supply is Standard					Yes	-10%	
		10% Fully Supervised System					Unknown	0%	
		Total Sprinkler Coverage						-10%	- 1,870
8	Determine Increase for Exposure	**Direction**	**Exposure Distance**	**Exposed Length**	**Exposed Stories**	**Lenth Height Factor**	**Building Class**		
		N	10.1 m to 20 m	98.6	2	Over 100	Type III-W	10%	
		E	10.1 m to 20 m	174.8	2	Over 100	Type III-W	10%	
		S	Greater than 30 m	116.2	2	Over 100	Type III-W	0%	
		W	20.1 m to 30 m	97.5	2	Over 100	Type III-W	5%	
		Total Exposure Charge						25%	4,675
9	Determined Final Required Fire Flow	**Total Required Fire Flow (L/min) - Rounded to Nearest 100L**							**22,000**
		Total Required Fire Flow (L/s)							**367**
		Required Fire Flow Duration (hrs)							**5.0**
		Required Fire Flow Volume (cu.m)							**6,600**





Appendix B – Capital Program

Table 8-8: Water Capital Program Costing Details

Description					Scope						Hard Cost Allowances															Total Construction Cost
											General Construction Overhead			Site Complexity			Special Conditions			Market and Inflation Adjustment			Special Activities				
Project	Project Letter	Project Description	Benefit to Existing	Class EA Project	Project Type	Length (m)	Diameter (mm)	Street	Base Unit Cost	Base Construction Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Activity 1	Cost	Activity 2	Cost	
W-M-01	A	Lining of 137 m of 150 mm watermain along Cedar Street.	BE-6	Schedule A	Watermain CIPP Rehab	137	150	Cedar Street	1,200	$164,400	Low	15%	$24,660	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$190,000
W-M-01	C	Lining of 153 m of 150 mm watermain along Orchard Drive.	BE-6	Schedule A	Watermain CIPP Rehab	153	150	Orchard Drive	1,200	$183,600	Low	15%	$27,540	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$212,000
W-M-01	D	Lining of 125 m of 200 mm watermain along Oakridge Crescent.	BE-6	Schedule A	Watermain CIPP Rehab	125	200	Oakridge Crescent	1,300	$162,500	Low	15%	$24,375	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$187,000
W-M-01	F	Lining of 28 m of 200 mm watermain along Walnut Street.	BE-6	Schedule A	Watermain CIPP Rehab	28	200	Walnut Street	1,300	$36,400	Low	15%	$5,460	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$42,000
W-M-01	G	Lining of 45 m of 150 mm watermain along Oakridge Crescent.	BE-6	Schedule A	Watermain CIPP Rehab	45	150	Oakridge Crescent	1,200	$54,000	Low	15%	$8,100	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$63,000
W-M-01	H	Lining of 79 m of 150 mm watermain along Lakewood Crescent.	BE-6	Schedule A	Watermain CIPP Rehab	79	150	Lakewood Crescent	1,200	$94,800	Low	15%	$14,220	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$110,000
W-M-01	I	Lining of 120 m of 150 mm watermain along Oakridge Crescent.	BE-6	Schedule A	Watermain CIPP Rehab	120	150	Oakridge Crescent	1,200	$144,000	Low	15%	$21,600	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$166,000
W-M-01	K	Lining of 20 m of 150 mm watermain along Oakridge Crescent.	BE-6	Schedule A	Watermain CIPP Rehab	20	150	Oakridge Crescent	1,200	$24,000	Low	15%	$3,600	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$28,000
W-M-01	L	Lining of 249 m of 150 mm watermain along Rose Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	249	150	Rose Avenue	1,200	$298,800	Low	15%	$44,820	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$344,000
W-M-01	M	Lining of 212 m of 150 mm watermain along Gaspare Drive.	BE-6	Schedule A	Watermain CIPP Rehab	212	150	Gaspare Drive	1,200	$254,400	Low	15%	$38,160	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$293,000
W-M-04	A	Lining of 326 m of 150 mm watermain along Clarence Street.	BE-6	Schedule A	Watermain CIPP Rehab	326	150	Clarence Street	1,200	$391,200	Low	15%	$58,680	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$450,000
W-M-04	B	Lining of 76 m of 150 mm watermain along Linwood Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	76	150	Linwood Avenue	1,200	$91,200	Low	15%	$13,680	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$105,000
W-M-04	C	Lining of 83 m of 150 mm watermain along Clare Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	83	150	Clare Avenue	1,200	$99,600	Low	15%	$14,940	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$115,000
W-M-06	A	Lining of 32 m of 200 mm watermain along Sugarloaf Street.	BE-4	Schedule A	Watermain CIPP Rehab	32	200	Sugarloaf Street	1,300	$41,600	Low	15%	$6,240	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$48,000
W-M-06	C	Lining of 23 m of 200 mm watermain along Sugarloaf Street.	BE-4	Schedule A	Watermain CIPP Rehab	23	200	Sugarloaf Street	1,300	$29,900	Low	15%	$4,485	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$35,000
W-M-06	E	Lining of 401 m of 200 mm watermain along Sugarloaf Street.	BE-4	Schedule A	Watermain CIPP Rehab	401	200	Sugarloaf Street	1,300	$521,300	Low	15%	$78,195	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$600,000
W-M-06	F	Lining of 97 m of 150 mm watermain along Sugarloaf Street.	BE-6	Schedule A	Watermain CIPP Rehab	97	150	Sugarloaf Street	1,200	$116,400	Low	15%	$17,460	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$134,000
W-M-06	G	Lining of 3 m of 200 mm watermain along Park Street.	BE-6	Schedule A	Watermain CIPP Rehab	3	200	Park Street	1,300	$3,900	Low	15%	$585	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$5,000
W-M-06	H	Lining of 199 m of 150 mm watermain along Ash Street.	BE-5	Schedule A	Watermain CIPP Rehab	199	150	Ash Street	1,200	$238,800	Low	15%	$35,820	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$275,000
W-M-06	I	Lining of 126 m of 200 mm watermain along Elm Street.	BE-5	Schedule A	Watermain CIPP Rehab	126	200	Elm Street	1,300	$163,800	Low	15%	$24,570	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$189,000
W-M-06	J	Lining of 114 m of 150 mm watermain along Elm Street.	BE-5	Schedule A	Watermain CIPP Rehab	114	150	Elm Street	1,200	$136,800	Low	15%	$20,520	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$158,000
W-M-06	K	Lining of 15 m of 150 mm watermain along Kent Street.	BE-6	Schedule A	Watermain CIPP Rehab	15	150	Kent Street	1,200	$18,000	Low	15%	$2,700	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$21,000

Description					Scope						Hard Cost Allowances														Total Construction Cost
											General Construction Overhead			Site Complexity			Special Conditions			Market and Inflation Adjustment			Special Activities				
Project	Project Letter	Project Description	Benefit to Existing	Class EA Project	Project Type	Length (m)	Diameter (mm)	Street	Base Unit Cost	Base Construction Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Activity 1	Cost	Activity 2	Cost	
W-M-06	O	Lining of 103 m of 150 mm watermain along Kent Street.	BE-6	Schedule A	Watermain CIPP Rehab	103	150	Kent Street	1,200	$123,600	Low	15%	$18,540	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$143,000
W-M-06	P	Lining of 65 m of 150 mm watermain along Park Street.	BE-6	Schedule A	Watermain CIPP Rehab	65	150	Park Street	1,200	$78,000	Low	15%	$11,700	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$90,000
W-M-06	Q	Lining of 35 m of 150 mm watermain along Elm Street.	BE-6	Schedule A	Watermain CIPP Rehab	35	150	Elm Street	1,200	$42,000	Low	15%	$6,300	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$49,000
W-M-07	A	Lining of 271 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	271	150	Steele Street	1,200	$325,200	Low	15%	$48,780	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$374,000
W-M-07	R	Lining of 11 m of 150 mm watermain along Brady Street.	BE-6	Schedule A	Watermain CIPP Rehab	11	150	Brady Street	1,200	$13,200	Low	15%	$1,980	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$16,000
W-M-07	T	Lining of 17 m of 150 mm watermain along Brady Street.	BE-6	Schedule A	Watermain CIPP Rehab	17	150	Brady Street	1,200	$20,400	Low	15%	$3,060	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$24,000
W-M-07	W	Lining of 99 m of 150 mm watermain along Fielden Avenue.	BE-5	Schedule A	Watermain CIPP Rehab	99	150	Fielden Avenue	1,200	$118,800	Low	15%	$17,820	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$137,000
W-M-07	X	Lining of 202 m of 150 mm watermain along McCain Street.	BE-6	Schedule A	Watermain CIPP Rehab	202	150	McCain Street	1,200	$242,400	Low	15%	$36,360	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$279,000
W-M-07	Z	Lining of 87 m of 150 mm watermain along Charles Street.	BE-5	Schedule A	Watermain CIPP Rehab	87	150	Charles Street	1,200	$104,400	Low	15%	$15,660	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$121,000
W-M-07	AA	Lining of 7 m of 150 mm watermain along First Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	7	150	First Avenue	1,200	$8,400	Low	15%	$1,260	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$10,000
W-M-07	B	Lining of 63 m of 150 mm watermain along Brock Street.	BE-6	Schedule A	Watermain CIPP Rehab	63	150	Brock Street	1,200	$75,600	Low	15%	$11,340	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$87,000
W-M-07	E	Lining of 187 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	187	150	Steele Street	1,200	$224,400	Low	15%	$33,660	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$259,000
W-M-07	G	Lining of 7 m of 150 mm watermain along Steele Street.	BE-5	Schedule A	Watermain CIPP Rehab	7	150	Steele Street	1,200	$8,400	Low	15%	$1,260	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$10,000
W-M-07	H	Lining of 6 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	6	150	Steele Street	1,200	$7,200	Low	15%	$1,080	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$9,000
W-M-07	J	Lining of 81 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	81	150	Steele Street	1,200	$97,200	Low	15%	$14,580	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$112,000
W-M-07	L	Lining of 12 m of 150 mm watermain along Helen Street.	BE-6	Schedule A	Watermain CIPP Rehab	12	150	Helen Street	1,200	$14,400	Low	15%	$2,160	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$17,000
W-M-07	N	Lining of 116 m of 150 mm watermain along Helen Street.	BE-6	Schedule A	Watermain CIPP Rehab	116	150	Helen Street	1,200	$139,200	Low	15%	$20,880	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$161,000
W-M-07	O	Lining of 116 m of 150 mm watermain along McCain Street.	BE-6	Schedule A	Watermain CIPP Rehab	116	150	McCain Street	1,200	$139,200	Low	15%	$20,880	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$161,000
W-M-07	Q	Lining of 14 m of 150 mm watermain along McCain Street.	BE-6	Schedule A	Watermain CIPP Rehab	14	150	McCain Street	1,200	$16,800	Low	15%	$2,520	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$20,000
W-M-09	A	Lining of 96 m of 150 mm watermain along Main Street West.	BE-6	Schedule A	Watermain CIPP Rehab	96	150	Main Street West	1,200	$115,200	Low	15%	$17,280	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$133,000
W-M-09	C	Lining of 499 m of 150 mm watermain along Main Street West.	BE-5	Schedule A	Watermain CIPP Rehab	499	150	Main Street West	1,200	$598,800	Low	15%	$89,820	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$689,000
W-M-09	D	Lining of 62 m of 300 mm watermain along Main Street West.	BE-5	Schedule A	Watermain CIPP Rehab	62	300	Main Street West	1,500	$93,000	Low	15%	$13,950	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$107,000
W-M-09	F	Lining of 727 m of 300 mm watermain along Main Street West.	BE-4	Schedule A	Watermain CIPP Rehab	727	300	Main Street West	1,500	$1,090,500	Low	15%	$163,575	Low	0%	$0	Low	0%	$0	Low	0%	$0	Large River Crossing	$3,000,000		$0	$4,255,000

Description					Scope						Hard Cost Allowances														Total Construction Cost
											General Construction Overhead			Site Complexity			Special Conditions			Market and Inflation Adjustment			Special Activities				
Project	Project Letter	Project Description	Benefit to Existing	Class EA Project	Project Type	Length (m)	Diameter (mm)	Street	Base Unit Cost	Base Construction Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Activity 1	Cost	Activity 2	Cost	
W-M-10	X	Lining of 205 m of 150 mm watermain along Donlea Drive.	BE-6	Schedule A	Watermain CIPP Rehab	205	150	Donlea Drive	1,200	$246,000	Low	15%	$36,900	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$283,000
W-M-10	B	Lining of 249 m of 150 mm watermain along Coronation Drive.	BE-6	Schedule A	Watermain CIPP Rehab	249	150	Coronation Drive	1,200	$298,800	Low	15%	$44,820	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$344,000
W-M-10	C	Lining of 7 m of 150 mm watermain along Coronation Drive.	BE-6	Schedule A	Watermain CIPP Rehab	7	150	Coronation Drive	1,200	$8,400	Low	15%	$1,260	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$10,000
W-M-10	D	Lining of 7 m of 150 mm watermain along Omer Avenue.	BE-4	Schedule A	Watermain CIPP Rehab	7	150	Omer Avenue	1,200	$8,400	Low	15%	$1,260	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$10,000
W-M-10	E	Lining of 6 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	6	150	Steele Street	1,200	$7,200	Low	15%	$1,080	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$9,000
W-M-10	G	Lining of 3 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	3	150	Steele Street	1,200	$3,600	Low	15%	$540	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$5,000
W-M-10	I	Lining of 12 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	12	150	Steele Street	1,200	$14,400	Low	15%	$2,160	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$17,000
W-M-10	L	Lining of 9 m of 150 mm watermain along Borden Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	9	150	Borden Avenue	1,200	$10,800	Low	15%	$1,620	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$13,000
W-M-10	N	Lining of 93 m of 150 mm watermain along Borden Avenue.	BE-4	Schedule A	Watermain CIPP Rehab	93	150	Borden Avenue	1,200	$111,600	Low	15%	$16,740	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$129,000
W-M-10	P	Lining of 141 m of 200 mm watermain along Fielden Avenue.	BE-4	Schedule A	Watermain CIPP Rehab	141	200	Fielden Avenue	1,300	$183,300	Low	15%	$27,495	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$211,000
W-M-10	Q	Lining of 51 m of 150 mm watermain along Fielden Avenue.	BE-4	Schedule A	Watermain CIPP Rehab	51	150	Fielden Avenue	1,200	$61,200	Low	15%	$9,180	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$71,000
W-M-10	S	Lining of 11 m of 150 mm watermain along Franklin Avenue.	BE-4	Schedule A	Watermain CIPP Rehab	11	150	Franklin Avenue	1,200	$13,200	Low	15%	$1,980	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$16,000
W-M-10	T	Lining of 5 m of 150 mm watermain along Steele Street.	BE-5	Schedule A	Watermain CIPP Rehab	5	150	Steele Street	1,200	$6,000	Low	15%	$900	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$7,000
W-M-10	V	Lining of 15 m of 150 mm watermain along Steele Street.	BE-5	Schedule A	Watermain CIPP Rehab	15	150	Steele Street	1,200	$18,000	Low	15%	$2,700	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$21,000
W-M-10	W	Lining of 2 m of 400 mm watermain along Royal Road.	BE-5	Schedule A	Watermain CIPP Rehab	2	400	Royal Road	1,700	$3,400	Low	15%	$510	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$4,000
W-M-11	A	Lining of 120 m of 200 mm watermain along Hawthorne Boulevard.	BE-6	Schedule A	Watermain CIPP Rehab	120	200	Hawthorne Boulevard	1,300	$156,000	Low	15%	$23,400	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$180,000
W-M-11	C	Lining of 18 m of 150 mm watermain along Runnymede Road.	BE-6	Schedule A	Watermain CIPP Rehab	18	150	Runnymede Road	1,200	$21,600	Low	15%	$3,240	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$25,000
W-M-11	E	Lining of 160 m of 150 mm watermain along Runnymede Road.	BE-6	Schedule A	Watermain CIPP Rehab	160	150	Runnymede Road	1,200	$192,000	Low	15%	$28,800	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$221,000
W-M-11	G	Lining of 260 m of 150 mm watermain along Thorncrest Road.	BE-6	Schedule A	Watermain CIPP Rehab	260	150	Thorncrest Road	1,200	$312,000	Low	15%	$46,800	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$359,000
W-M-12	F	Lining of 271 m of 150 mm watermain along Ramey Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	271	150	Ramey Avenue	1,200	$325,200	Low	15%	$48,780	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$374,000
W-M-13	B	Lining of 158 m of 150 mm watermain along Berkley Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	158	150	Berkley Avenue	1,200	$189,600	Low	15%	$28,440	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$219,000
W-M-14	A	Lining of 16 m of 150 mm watermain along Crescent Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	16	150	Crescent Avenue	1,200	$19,200	Low	15%	$2,880	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$23,000

Description					Scope						Hard Cost Allowances															Total Construction Cost
											General Construction Overhead			Site Complexity			Special Conditions			Market and Inflation Adjustment			Special Activities				
Project	Project Letter	Project Description	Benefit to Existing	Class EA Project	Project Type	Length (m)	Diameter (mm)	Street	Base Unit Cost	Base Construction Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Cost Factor	Uplift %	Uplift Cost	Activity 1	Cost	Activity 2	Cost	
W-M-24	A	Lining of 1533 m of 150 mm watermain along Clarence Street, Ridgewood Avenue, Division Street and Stanley Street.	BE-6	Schedule A	Watermain CIPP Rehab	1,533	150	Clarence Street, Ridgewood Avenue, Division Street and Stanley Street	1,200	$1,839,600	Low	15%	$275,940	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$2,116,000
W-M-24	B	Lining of 158 m of 200 mm watermain along Clarence Street, Ridgewood Avenue, Division Street and Stanley Street.	BE-6	Schedule A	Watermain CIPP Rehab	158	200	Clarence Street, Ridgewood Avenue, Division Street and Stanley Street	1,300	$205,400	Low	15%	$30,810	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$237,000
W-M-25	A	Lining of 1325 m of 150 mm watermain along Omer Avenue and Oakwood Street.	BE-5	Schedule A	Watermain CIPP Rehab	1,325	150	Omer Avenue and Oakwood Street	1,200	$1,590,000	Low	15%	$238,500	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$1,829,000
W-M-26	A	Lining of 5494 m of 150 mm cast iron watermain.	BE-6	Schedule A	Watermain CIPP Rehab	5,494	150		1,200	$6,592,800	Low	15%	$988,920	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$7,582,000
W-M-26	B	Lining of 1466 m of 200 mm cast iron watermain.	BE-6	Schedule A	Watermain CIPP Rehab	1,466	200		1,300	$1,905,800	Low	15%	$285,870	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$2,192,000
W-M-26	C	Lining of 1510 m of 250 mm cast iron watermain.	BE-6	Schedule A	Watermain CIPP Rehab	1,510	250		1,400	$2,114,000	Low	15%	$317,100	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$2,432,000
W-M-26	D	Lining of 2909 m of 300 mm cast iron watermain.	BE-6	Schedule A	Watermain CIPP Rehab	2,909	300		1,500	$4,363,500	Low	15%	$654,525	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$5,019,000
W-M-26	E	Lining of 105 m of 350 mm cast iron watermain.	BE-6	Schedule A	Watermain CIPP Rehab	105	350		1,600	$168,000	Low	15%	$25,200	Low	0%	$0	Low	0%	$0	Low	0%	$0		$0		$0	$194,000

Table 8-9: Watermain Rehabilitation Capital Program Costing Details

Description					Scope						Soft Cost Allowances												Total Non-Construction 'Soft' Costs	Project Contingency Allowances			Total Cost Summary					Cost Allocation		
											Land Acquisition Needs			Preceding Engineering and Study Cost			Design, Contract Administration and Inspection			Internal Cost Allowance													
Project	Project Letter	Project Description	Benefit to Existing	Class EA Project	Project Type	Length (m)	Diameter (mm)	Street	Base Unit Cost	Base Construction Cost	Cost Factor	Uplift %	Land Acquisition Needs	Cost Factor	Uplift %	Engineering and Study Costs	Cost Factor	Uplift %	Contract Administration	Cost Factor	Uplift %	City-Related Costs		Cost Factor	Uplift %	Project Contingency	Total Project Cost	Growth	Deadend	Other Projects	Priority	Total BTE Cost	Total DC Cost	Total Developer Cost
W-M-01	A	Lining of 137 m of 150 mm watermain along Cedar Street.	BE-6	Schedule A	Watermain CIPP Rehab	137	150	Cedar Street	1,200	$164,400	Low	0%	$0	Low	3%	$4,932	Low	8%	$13,152	Low	8%	$13,152	$32,000	Medium	15%	$33,300	$256,000	Existing	Non Dead-end		Low	$256,000	$0	$0
W-M-01	C	Lining of 153 m of 150 mm watermain along Orchard Drive.	BE-6	Schedule A	Watermain CIPP Rehab	153	150	Orchard Drive	1,200	$183,600	Low	0%	$0	Low	3%	$5,508	Low	8%	$14,688	Low	8%	$14,688	$35,000	Medium	15%	$37,050	$285,000	Existing	Deadend		Low	$285,000	$0	$0
W-M-01	D	Lining of 125 m of 200 mm watermain along Oakridge Crescent.	BE-6	Schedule A	Watermain CIPP Rehab	125	200	Oakridge Crescent	1,300	$162,500	Low	0%	$0	Low	3%	$4,875	Low	8%	$13,000	Low	8%	$13,000	$31,000	Medium	15%	$32,700	$251,000	Existing	Non Dead-end		Low	$251,000	$0	$0
W-M-01	F	Lining of 28 m of 200 mm watermain along Walnut Street.	BE-6	Schedule A	Watermain CIPP Rehab	28	200	Walnut Street	1,300	$36,400	Low	0%	$0	Low	3%	$1,092	Low	8%	$2,912	Low	8%	$2,912	$7,000	Medium	15%	$7,350	$57,000	Existing	Non Dead-end		Low	$57,000	$0	$0
W-M-01	G	Lining of 45 m of 150 mm watermain along Oakridge Crescent.	BE-6	Schedule A	Watermain CIPP Rehab	45	150	Oakridge Crescent	1,200	$54,000	Low	0%	$0	Low	3%	$1,620	Low	8%	$4,320	Low	8%	$4,320	$11,000	Medium	15%	$11,100	$86,000	Existing	Non Dead-end		Low	$86,000	$0	$0
W-M-01	H	Lining of 79 m of 150 mm watermain along Lakewood Crescent.	BE-6	Schedule A	Watermain CIPP Rehab	79	150	Lakewood Crescent	1,200	$94,800	Low	0%	$0	Low	3%	$2,844	Low	8%	$7,584	Low	8%	$7,584	$19,000	Medium	15%	$19,350	$149,000	Existing	Deadend		Low	$149,000	$0	$0
W-M-01	I	Lining of 120 m of 150 mm watermain along Oakridge Crescent.	BE-6	Schedule A	Watermain CIPP Rehab	120	150	Oakridge Crescent	1,200	$144,000	Low	0%	$0	Low	3%	$4,320	Low	8%	$11,520	Low	8%	$11,520	$28,000	Medium	15%	$29,100	$224,000	Existing	Non Dead-end		Low	$224,000	$0	$0
W-M-01	K	Lining of 20 m of 150 mm watermain along Oakridge Crescent.	BE-6	Schedule A	Watermain CIPP Rehab	20	150	Oakridge Crescent	1,200	$24,000	Low	0%	$0	Low	3%	$720	Low	8%	$1,920	Low	8%	$1,920	$5,000	Medium	15%	$4,950	$38,000	Existing	Non Dead-end		Low	$38,000	$0	$0
W-M-01	L	Lining of 249 m of 150 mm watermain along Rose Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	249	150	Rose Avenue	1,200	$298,800	Low	0%	$0	Low	3%	$8,964	Low	8%	$23,904	Low	8%	$23,904	$57,000	Medium	15%	$60,150	$462,000	Existing	Non Dead-end		Low	$462,000	$0	$0
W-M-01	M	Lining of 212 m of 150 mm watermain along Gaspare Drive.	BE-6	Schedule A	Watermain CIPP Rehab	212	150	Gaspare Drive	1,200	$254,400	Low	0%	$0	Low	3%	$7,632	Low	8%	$20,352	Low	8%	$20,352	$49,000	Medium	15%	$51,300	$394,000	Existing	Non Dead-end		Low	$394,000	$0	$0
W-M-04	A	Lining of 326 m of 150 mm watermain along Clarence Street.	BE-6	Schedule A	Watermain CIPP Rehab	326	150	Clarence Street	1,200	$391,200	Low	0%	$0	Low	3%	$11,736	Low	8%	$31,296	Low	8%	$31,296	$75,000	Medium	15%	$78,750	$604,000	Existing	Non Dead-end		High	$604,000	$0	$0
W-M-04	B	Lining of 76 m of 150 mm watermain along Linwood Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	76	150	Linwood Avenue	1,200	$91,200	Low	0%	$0	Low	3%	$2,736	Low	8%	$7,296	Low	8%	$7,296	$18,000	Medium	15%	$18,450	$142,000	Existing	Deadend		Low	$142,000	$0	$0
W-M-04	C	Lining of 83 m of 150 mm watermain along Clare Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	83	150	Clare Avenue	1,200	$99,600	Low	0%	$0	Low	3%	$2,988	Low	8%	$7,968	Low	8%	$7,968	$19,000	Medium	15%	$20,100	$155,000	Existing	Deadend		Low	$155,000	$0	$0
W-M-06	A	Lining of 32 m of 200 mm watermain along	BE-4	Schedule A	Watermain CIPP Rehab	32	200	Sugarloaf Street	1,300	$41,600	Low	0%	$0	Low	3%	$1,248	Low	8%	$3,328	Low	8%	$3,328	$8,000	Medium	15%	$8,400	$65,000	Supports Growth	Non Dead-end	Partial SW (SW_45)	High	$32,500	$32,500	$0

		Sugarloaf Street.																														
W-M-06	C	Lining of 23 m of 200 mm watermain along Sugarloaf Street.	BE-4	Schedule A	Watermain CIPP Rehab	23	200	Sugarloaf Street	1,300	$29,900	Low	0%	$0	Low	3%	$897	Low	8%	$2,392	Low	8%	$2,392	$6,000	Medium	15%	$6,150	$48,000	Supports Growth	Non Dead-end		High	$24,000	$24,000	$0
W-M-06	E	Lining of 401 m of 200 mm watermain along Sugarloaf Street.	BE-4	Schedule A	Watermain CIPP Rehab	401	200	Sugarloaf Street	1,300	$521,300	Low	0%	$0	Low	3%	$15,639	Low	8%	$41,704	Low	8%	$41,704	$100,000	Medium	15%	$105,000	$805,000	Supports Growth	Non Dead-end		High	$402,500	$402,500	$0
W-M-06	F	Lining of 97 m of 150 mm watermain along Sugarloaf Street.	BE-6	Schedule A	Watermain CIPP Rehab	97	150	Sugarloaf Street	1,200	$116,400	Low	0%	$0	Low	3%	$3,492	Low	8%	$9,312	Low	8%	$9,312	$23,000	Medium	15%	$23,550	$181,000	Existing	Non Dead-end		Medium	$181,000	$0	$0
W-M-06	G	Lining of 3 m of 200 mm watermain along Park Street.	BE-6	Schedule A	Watermain CIPP Rehab	3	200	Park Street	1,300	$3,900	Low	0%	$0	Low	3%	$117	Low	8%	$312	Low	8%	$312	$1,000	Medium	15%	$900	$7,000	Existing	Deadend		Low	$7,000	$0	$0
W-M-06	H	Lining of 199 m of 150 mm watermain along Ash Street.	BE-5	Schedule A	Watermain CIPP Rehab	199	150	Ash Street	1,200	$238,800	Low	0%	$0	Low	3%	$7,164	Low	8%	$19,104	Low	8%	$19,104	$46,000	Medium	15%	$48,150	$370,000	Supports Growth	Non Dead-end	Full SW (SW_39)	Medium	$296,000	$74,000	$0
W-M-06	I	Lining of 126 m of 200 mm watermain along Elm Street.	BE-5	Schedule A	Watermain CIPP Rehab	126	200	Elm Street	1,300	$163,800	Low	0%	$0	Low	3%	$4,914	Low	8%	$13,104	Low	8%	$13,104	$32,000	Medium	15%	$33,150	$255,000	Existing	Non Dead-end		Medium	$204,000	$51,000	$0
W-M-06	J	Lining of 114 m of 150 mm watermain along Elm Street.	BE-5	Schedule A	Watermain CIPP Rehab	114	150	Elm Street	1,200	$136,800	Low	0%	$0	Low	3%	$4,104	Low	8%	$10,944	Low	8%	$10,944	$26,000	Medium	15%	$27,600	$212,000	Existing	Non Dead-end		Medium	$169,600	$42,400	$0
W-M-06	K	Lining of 15 m of 150 mm watermain along Kent Street.	BE-6	Schedule A	Watermain CIPP Rehab	15	150	Kent Street	1,200	$18,000	Low	0%	$0	Low	3%	$540	Low	8%	$1,440	Low	8%	$1,440	$4,000	Medium	15%	$3,750	$29,000	Existing	Non Dead-end		Medium	$29,000	$0	$0
W-M-06	O	Lining of 103 m of 150 mm watermain along Kent Street.	BE-6	Schedule A	Watermain CIPP Rehab	103	150	Kent Street	1,200	$123,600	Low	0%	$0	Low	3%	$3,708	Low	8%	$9,888	Low	8%	$9,888	$24,000	Medium	15%	$25,050	$193,000	Existing	Non Dead-end	Partial SW (SW_27)	Medium	$193,000	$0	$0
W-M-06	P	Lining of 65 m of 150 mm watermain along Park Street.	BE-6	Schedule A	Watermain CIPP Rehab	65	150	Park Street	1,200	$78,000	Low	0%	$0	Low	3%	$2,340	Low	8%	$6,240	Low	8%	$6,240	$15,000	Medium	15%	$15,750	$121,000	Existing	Deadend		Medium	$121,000	$0	$0
W-M-06	Q	Lining of 35 m of 150 mm watermain along Elm Street.	BE-6	Schedule A	Watermain CIPP Rehab	35	150	Elm Street	1,200	$42,000	Low	0%	$0	Low	3%	$1,260	Low	8%	$3,360	Low	8%	$3,360	$8,000	Medium	15%	$8,550	$66,000	Existing	Non Dead-end		Medium	$66,000	$0	$0
W-M-07	A	Lining of 271 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	271	150	Steele Street	1,200	$325,200	Low	0%	$0	Low	3%	$9,756	Low	8%	$26,016	Low	8%	$26,016	$62,000	Medium	15%	$65,400	$502,000	Existing	Non Dead-end		Low	$502,000	$0	$0
W-M-07	R	Lining of 11 m of 150 mm watermain along Brady Street.	BE-6	Schedule A	Watermain CIPP Rehab	11	150	Brady Street	1,200	$13,200	Low	0%	$0	Low	3%	$396	Low	8%	$1,056	Low	8%	$1,056	$3,000	Medium	15%	$2,850	$22,000	Existing	Non Dead-end		Low	$22,000	$0	$0
W-M-07	T	Lining of 17 m of 150 mm watermain along Brady Street.	BE-6	Schedule A	Watermain CIPP Rehab	17	150	Brady Street	1,200	$20,400	Low	0%	$0	Low	3%	$612	Low	8%	$1,632	Low	8%	$1,632	$4,000	Medium	15%	$4,200	$33,000	Existing	Non Dead-end		Low	$33,000	$0	$0
W-M-07	W	Lining of 99 m of 150 mm watermain along Fielden Avenue.	BE-5	Schedule A	Watermain CIPP Rehab	99	150	Fielden Avenue	1,200	$118,800	Low	0%	$0	Low	3%	$3,564	Low	8%	$9,504	Low	8%	$9,504	$23,000	Medium	15%	$24,000	$184,000	Supports Growth	Non Dead-end		Medium	$147,200	$36,800	$0
W-M-07	X	Lining of 202 m of 150 mm watermain along McCain Street.	BE-6	Schedule A	Watermain CIPP Rehab	202	150	McCain Street	1,200	$242,400	Low	0%	$0	Low	3%	$7,272	Low	8%	$19,392	Low	8%	$19,392	$47,000	Medium	15%	$48,900	$375,000	Existing	Non Dead-end		Medium	$375,000	$0	$0
W-M-07	Z	Lining of 87 m of 150 mm watermain	BE-5	Schedule A	Watermain CIPP Rehab	87	150	Charles Street	1,200	$104,400	Low	0%	$0	Low	3%	$3,132	Low	8%	$8,352	Low	8%	$8,352	$20,000	Medium	15%	$21,150	$163,000	Supports Growth	Non Dead-end	Full SW (SW_37)	Medium	$130,400	$32,600	$0

		along Charles Street.																															
W-M-07	AA	Lining of 7 m of 150 mm watermain along First Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	7	150	First Avenue	1,200	$8,400	Low	0%	$0	Low	3%	$252	Low	8%	$672	Low	8%	$672	$2,000	Medium	15%	$1,800	$14,000	Existing	Deadend		Medium	$14,000	$0	$0
W-M-07	B	Lining of 63 m of 150 mm watermain along Brock Street.	BE-6	Schedule A	Watermain CIPP Rehab	63	150	Brock Street	1,200	$75,600	Low	0%	$0	Low	3%	$2,268	Low	8%	$6,048	Low	8%	$6,048	$15,000	Medium	15%	$15,300	$118,000	Existing	Deadend		Medium	$118,000	$0	$0
W-M-07	E	Lining of 187 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	187	150	Steele Street	1,200	$224,400	Low	0%	$0	Low	3%	$6,732	Low	8%	$17,952	Low	8%	$17,952	$43,000	Medium	15%	$45,300	$348,000	Existing	Non Dead-end		High	$348,000	$0	$0
W-M-07	G	Lining of 7 m of 150 mm watermain along Steele Street.	BE-5	Schedule A	Watermain CIPP Rehab	7	150	Steele Street	1,200	$8,400	Low	0%	$0	Low	3%	$252	Low	8%	$672	Low	8%	$672	$2,000	Medium	15%	$1,800	$14,000	Supports Growth	Non Dead-end		High	$11,200	$2,800	$0
W-M-07	H	Lining of 6 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	6	150	Steele Street	1,200	$7,200	Low	0%	$0	Low	3%	$216	Low	8%	$576	Low	8%	$576	$2,000	Medium	15%	$1,650	$13,000	Existing	Non Dead-end		High	$13,000	$0	$0
W-M-07	J	Lining of 81 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	81	150	Steele Street	1,200	$97,200	Low	0%	$0	Low	3%	$2,916	Low	8%	$7,776	Low	8%	$7,776	$19,000	Medium	15%	$19,650	$151,000	Existing	Non Dead-end		High	$151,000	$0	$0
W-M-07	L	Lining of 12 m of 150 mm watermain along Helen Street.	BE-6	Schedule A	Watermain CIPP Rehab	12	150	Helen Street	1,200	$14,400	Low	0%	$0	Low	3%	$432	Low	8%	$1,152	Low	8%	$1,152	$3,000	Medium	15%	$3,000	$23,000	Existing	Non Dead-end		Medium	$23,000	$0	$0
W-M-07	N	Lining of 116 m of 150 mm watermain along Helen Street.	BE-6	Schedule A	Watermain CIPP Rehab	116	150	Helen Street	1,200	$139,200	Low	0%	$0	Low	3%	$4,176	Low	8%	$11,136	Low	8%	$11,136	$27,000	Medium	15%	$28,200	$217,000	Existing	Non Dead-end		Medium	$217,000	$0	$0
W-M-07	O	Lining of 116 m of 150 mm watermain along McCain Street.	BE-6	Schedule A	Watermain CIPP Rehab	116	150	McCain Street	1,200	$139,200	Low	0%	$0	Low	3%	$4,176	Low	8%	$11,136	Low	8%	$11,136	$27,000	Medium	15%	$28,200	$217,000	Existing	Non Dead-end		Medium	$217,000	$0	$0
W-M-07	Q	Lining of 14 m of 150 mm watermain along McCain Street.	BE-6	Schedule A	Watermain CIPP Rehab	14	150	McCain Street	1,200	$16,800	Low	0%	$0	Low	3%	$504	Low	8%	$1,344	Low	8%	$1,344	$4,000	Medium	15%	$3,600	$28,000	Existing	Non Dead-end		Medium	$28,000	$0	$0
W-M-09	A	Lining of 96 m of 150 mm watermain along Main Street West.	BE-6	Schedule A	Watermain CIPP Rehab	96	150	Main Street West	1,200	$115,200	Low	0%	$0	Low	3%	$3,456	Low	8%	$9,216	Low	8%	$9,216	$22,000	Medium	15%	$23,250	$179,000	Existing	Non Dead-end		High	$179,000	$0	$0
W-M-09	C	Lining of 499 m of 150 mm watermain along Main Street West.	BE-5	Schedule A	Watermain CIPP Rehab	499	150	Main Street West	1,200	$598,800	Low	0%	$0	Low	3%	$17,964	Low	8%	$47,904	Low	8%	$47,904	$114,000	Medium	15%	$120,450	$924,000	Supports Growth	Non Dead-end		High	$739,200	$184,800	$0
W-M-09	D	Lining of 62 m of 300 mm watermain along Main Street West.	BE-5	Schedule A	Watermain CIPP Rehab	62	300	Main Street West	1,500	$93,000	Low	0%	$0	Low	3%	$2,790	Low	8%	$7,440	Low	8%	$7,440	$18,000	Medium	15%	$18,750	$144,000	Supports Growth	Non Dead-end		High	$115,200	$28,800	$0
W-M-09	F	Lining of 727 m of 300 mm watermain along Main Street West.	BE-4	Schedule A	Watermain CIPP Rehab	727	300	Main Street West	1,500	$1,090,500	Low	0%	$0	Low	3%	$32,715	Low	8%	$87,240	Low	8%	$87,240	$208,000	Medium	15%	$669,450	$5,133,000	Supports Growth	Non Dead-end		High	$2,566,500	$2,566,500	$0
W-M-10	X	Lining of 205 m of 150 mm watermain along Donlea Drive.	BE-6	Schedule A	Watermain CIPP Rehab	205	150	Donlea Drive	1,200	$246,000	Low	0%	$0	Low	3%	$7,380	Low	8%	$19,680	Low	8%	$19,680	$47,000	Medium	15%	$49,500	$380,000	Existing	Non Dead-end		Low	$380,000	$0	$0
W-M-10	B	Lining of 249 m of 150 mm watermain along Coronation Drive.	BE-6	Schedule A	Watermain CIPP Rehab	249	150	Coronation Drive	1,200	$298,800	Low	0%	$0	Low	3%	$8,964	Low	8%	$23,904	Low	8%	$23,904	$57,000	Medium	15%	$60,150	$462,000	Existing	Non Dead-end		Low	$462,000	$0	$0
W-M-10	C	Lining of 7 m of 150 mm watermain along Coronation Drive.	BE-6	Schedule A	Watermain CIPP Rehab	7	150	Coronation Drive	1,200	$8,400	Low	0%	$0	Low	3%	$252	Low	8%	$672	Low	8%	$672	$2,000	Medium	15%	$1,800	$14,000	Existing	Non Dead-end		Low	$14,000	$0	$0

W-M-10	D	Lining of 7 m of 150 mm watermain along Omer Avenue.	BE-4	Schedule A	Watermain CIPP Rehab	7	150	Omer Avenue	1,200	$8,400	Low	0%	$0	Low	3%	$252	Low	8%	$672	Low	8%	$672	$2,000	Medium	15%	$1,800	$14,000	Supports Growth	Non Dead-end	Full SW (SW_15)	Low	$7,000	$7,000	$0
W-M-10	E	Lining of 6 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	6	150	Steele Street	1,200	$7,200	Low	0%	$0	Low	3%	$216	Low	8%	$576	Low	8%	$576	$2,000	Medium	15%	$1,650	$13,000	Existing	Non Dead-end		High	$13,000	$0	$0
W-M-10	G	Lining of 3 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	3	150	Steele Street	1,200	$3,600	Low	0%	$0	Low	3%	$108	Low	8%	$288	Low	8%	$288	$1,000	Medium	15%	$900	$7,000	Existing	Non Dead-end		High	$7,000	$0	$0
W-M-10	I	Lining of 12 m of 150 mm watermain along Steele Street.	BE-6	Schedule A	Watermain CIPP Rehab	12	150	Steele Street	1,200	$14,400	Low	0%	$0	Low	3%	$432	Low	8%	$1,152	Low	8%	$1,152	$3,000	Medium	15%	$3,000	$23,000	Existing	Non Dead-end		High	$23,000	$0	$0
W-M-10	L	Lining of 9 m of 150 mm watermain along Borden Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	9	150	Borden Avenue	1,200	$10,800	Low	0%	$0	Low	3%	$324	Low	8%	$864	Low	8%	$864	$3,000	Medium	15%	$2,400	$19,000	Existing	Non Dead-end		High	$19,000	$0	$0
W-M-10	N	Lining of 93 m of 150 mm watermain along Borden Avenue.	BE-4	Schedule A	Watermain CIPP Rehab	93	150	Borden Avenue	1,200	$111,600	Low	0%	$0	Low	3%	$3,348	Low	8%	$8,928	Low	8%	$8,928	$22,000	Medium	15%	$22,650	$174,000	Supports Growth	Non Dead-end	Full WW (POCO_8)	High	$87,000	$87,000	$0
W-M-10	P	Lining of 141 m of 200 mm watermain along Fielden Avenue.	BE-4	Schedule A	Watermain CIPP Rehab	141	200	Fielden Avenue	1,300	$183,300	Low	0%	$0	Low	3%	$5,499	Low	8%	$14,664	Low	8%	$14,664	$35,000	Medium	15%	$36,900	$283,000	Supports Growth	Non Dead-end	Full - Some WW (POCO_8) and some SW (SW_18)	Low	$141,500	$141,500	$0
W-M-10	Q	Lining of 51 m of 150 mm watermain along Fielden Avenue.	BE-4	Schedule A	Watermain CIPP Rehab	51	150	Fielden Avenue	1,200	$61,200	Low	0%	$0	Low	3%	$1,836	Low	8%	$4,896	Low	8%	$4,896	$12,000	Medium	15%	$12,450	$96,000	Supports Growth	Non Dead-end	Full SW (SW_18)	Low	$48,000	$48,000	$0
W-M-10	S	Lining of 11 m of 150 mm watermain along Franklin Avenue.	BE-4	Schedule A	Watermain CIPP Rehab	11	150	Franklin Avenue	1,200	$13,200	Low	0%	$0	Low	3%	$396	Low	8%	$1,056	Low	8%	$1,056	$3,000	Medium	15%	$2,850	$22,000	Existing	Non Dead-end		Low	$11,000	$11,000	$0
W-M-10	T	Lining of 5 m of 150 mm watermain along Steele Street.	BE-5	Schedule A	Watermain CIPP Rehab	5	150	Steele Street	1,200	$6,000	Low	0%	$0	Low	3%	$180	Low	8%	$480	Low	8%	$480	$2,000	Medium	15%	$1,350	$11,000	Supports Growth	Non Dead-end		High	$8,800	$2,200	$0
W-M-10	V	Lining of 15 m of 150 mm watermain along Steele Street.	BE-5	Schedule A	Watermain CIPP Rehab	15	150	Steele Street	1,200	$18,000	Low	0%	$0	Low	3%	$540	Low	8%	$1,440	Low	8%	$1,440	$4,000	Medium	15%	$3,750	$29,000	Supports Growth	Non Dead-end		High	$23,200	$5,800	$0
W-M-10	W	Lining of 2 m of 400 mm watermain along Royal Road.	BE-5	Schedule A	Watermain CIPP Rehab	2	400	Royal Road	1,700	$3,400	Low	0%	$0	Low	3%	$102	Low	8%	$272	Low	8%	$272	$1,000	Medium	15%	$750	$6,000	Supports Growth	Non Dead-end		Low	$4,800	$1,200	$0
W-M-11	A	Lining of 120 m of 200 mm watermain along Hawthorne Boulevard.	BE-6	Schedule A	Watermain CIPP Rehab	120	200	Hawthorne Boulevard	1,300	$156,000	Low	0%	$0	Low	3%	$4,680	Low	8%	$12,480	Low	8%	$12,480	$30,000	Medium	15%	$31,500	$242,000	Existing	Non Dead-end		Low	$242,000	$0	$0
W-M-11	C	Lining of 18 m of 150 mm watermain along Runnymede Road.	BE-6	Schedule A	Watermain CIPP Rehab	18	150	Runnymede Road	1,200	$21,600	Low	0%	$0	Low	3%	$648	Low	8%	$1,728	Low	8%	$1,728	$5,000	Medium	15%	$4,500	$35,000	Existing	Non Dead-end		Low	$35,000	$0	$0
W-M-11	E	Lining of 160 m of 150 mm watermain along Runnymede Road.	BE-6	Schedule A	Watermain CIPP Rehab	160	150	Runnymede Road	1,200	$192,000	Low	0%	$0	Low	3%	$5,760	Low	8%	$15,360	Low	8%	$15,360	$37,000	Medium	15%	$38,700	$297,000	Existing	Non Dead-end		Low	$297,000	$0	$0
W-M-11	G	Lining of 260 m of 150 mm watermain along Thorncrest Road.	BE-6	Schedule A	Watermain CIPP Rehab	260	150	Thorncrest Road	1,200	$312,000	Low	0%	$0	Low	3%	$9,360	Low	8%	$24,960	Low	8%	$24,960	$60,000	Medium	15%	$62,850	$482,000	Existing	Non Dead-end		Low	$482,000	$0	$0
W-M-12	F	Lining of 271 m of 150 mm watermain	BE-6	Schedule A	Watermain CIPP Rehab	271	150	Ramey Avenue	1,200	$325,200	Low	0%	$0	Low	3%	$9,756	Low	8%	$26,016	Low	8%	$26,016	$62,000	Medium	15%	$65,400	$502,000	Existing	Non Dead-end		Low	$502,000	$0	$0

		along Ramey Avenue.																															
W-M-13	B	Lining of 158 m of 150 mm watermain along Berkley Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	158	150	Berkley Avenue	1,200	$189,600	Low	0%	$0	Low	3%	$5,688	Low	8%	$15,168	Low	8%	$15,168	$37,000	Medium	15%	$38,400	$295,000	Existing	Non Dead-end	Partial SW (SW_7)	Low	$295,000	$0	$0
W-M-14	A	Lining of 16 m of 150 mm watermain along Crescent Avenue.	BE-6	Schedule A	Watermain CIPP Rehab	16	150	Crescent Avenue	1,200	$19,200	Low	0%	$0	Low	3%	$576	Low	8%	$1,536	Low	8%	$1,536	$4,000	Medium	15%	$4,050	$32,000	Existing	Non Dead-end		Low	$32,000	$0	$0
W-M-24	A	Lining of 1533 m of 150 mm watermain along Clarence Street, Ridgewood Avenue, Division Street and Stanley Street.	BE-6	Schedule A	Watermain CIPP Rehab	1,533	150	Clarence Street, Ridgewood Avenue, Division Street and Stanley Street	1,200	$1,839,600	Low	0%	$0	Low	3%	$55,188	Low	8%	$147,168	Low	8%	$147,168	$350,000	Medium	15%	$369,900	$2,836,000	Existing	Non Dead-end		High	$2,836,000	$0	$0
W-M-24	B	Lining of 158 m of 200 mm watermain along Clarence Street, Ridgewood Avenue, Division Street and Stanley Street.	BE-6	Schedule A	Watermain CIPP Rehab	158	200	Clarence Street, Ridgewood Avenue, Division Street and Stanley Street	1,300	$205,400	Low	0%	$0	Low	3%	$6,162	Low	8%	$16,432	Low	8%	$16,432	$40,000	Medium	15%	$41,550	$319,000	Existing	Non Dead-end		High	$319,000	$0	$0
W-M-25	A	Lining of 1325 m of 150 mm watermain along Omer Avenue and Oakwood Street.	BE-5	Schedule A	Watermain CIPP Rehab	1,325	150	Omer Avenue and Oakwood Street	1,200	$1,590,000	Low	0%	$0	Low	3%	$47,700	Low	8%	$127,200	Low	8%	$127,200	$303,000	Medium	15%	$319,800	$2,452,000	Existing	Non Dead-end		High	$1,961,600	$490,400	$0
W-M-26	A	Lining of 5494 m of 150 mm cast iron watermain.	BE-6	Schedule A	Watermain CIPP Rehab	5,494	150		1,200	$6,592,800	Low	0%	$0	Low	3%	$197,784	Low	8%	$527,424	Low	8%	$527,424	$1,253,000	Medium	15%	$1,325,250	$10,161,000	Existing	Non Dead-end		Low	$10,161,000	$0	$0
W-M-26	B	Lining of 1466 m of 200 mm cast iron watermain.	BE-6	Schedule A	Watermain CIPP Rehab	1,466	200		1,300	$1,905,800	Low	0%	$0	Low	3%	$57,174	Low	8%	$152,464	Low	8%	$152,464	$363,000	Medium	15%	$383,250	$2,939,000	Existing	Non Dead-end		Low	$2,939,000	$0	$0
W-M-26	C	Lining of 1510 m of 250 mm cast iron watermain.	BE-6	Schedule A	Watermain CIPP Rehab	1,510	250		1,400	$2,114,000	Low	0%	$0	Low	3%	$63,420	Low	8%	$169,120	Low	8%	$169,120	$402,000	Medium	15%	$425,100	$3,260,000	Existing	Non Dead-end		Low	$3,260,000	$0	$0
W-M-26	D	Lining of 2909 m of 300 mm cast iron watermain.	BE-6	Schedule A	Watermain CIPP Rehab	2,909	300		1,500	$4,363,500	Low	0%	$0	Low	3%	$130,905	Low	8%	$349,080	Low	8%	$349,080	$830,000	Medium	15%	$877,350	$6,727,000	Existing	Non Dead-end		Low	$6,727,000	$0	$0
W-M-26	E	Lining of 105 m of 350 mm cast iron watermain.	BE-6	Schedule A	Watermain CIPP Rehab	105	350		1,600	$168,000	Low	0%	$0	Low	3%	$5,040	Low	8%	$13,440	Low	8%	$13,440	$32,000	Medium	15%	$33,900	$260,000	Existing	Non Dead-end		Low	$260,000	$0	$0