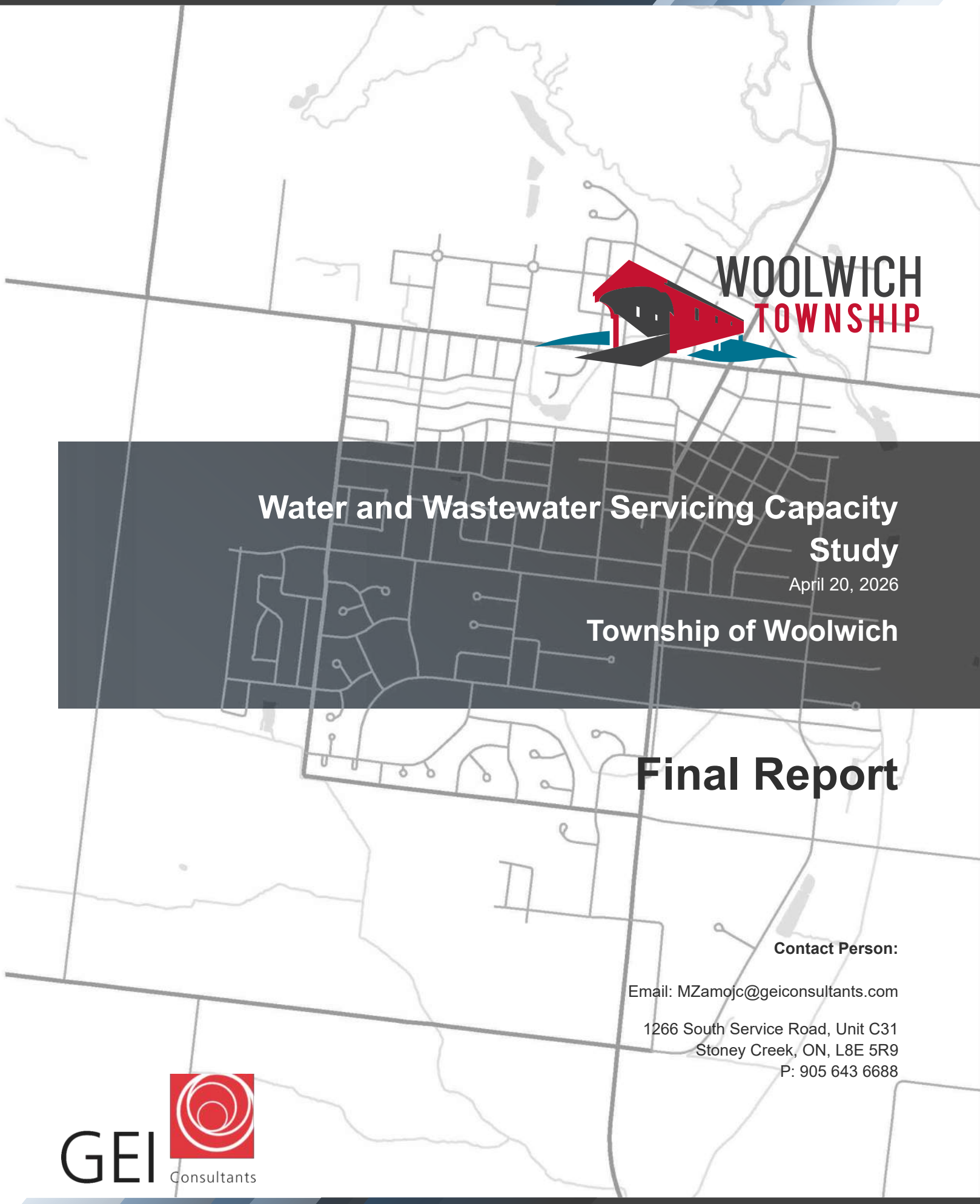


Water and Wastewater Servicing Capacity Study

April 20, 2026

Township of Woolwich

Final Report

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Executive Summary

The Township of Woolwich's Servicing Capacity Study (SCS) evaluates the ability of the existing and planned water and wastewater infrastructure within the Township to efficiently and effectively service the Township's existing users and forecasted growth areas.

The key objectives of the SCS are as follows:

- Develop robust water and wastewater system models, enabling Woolwich to assess the existing and projected capacity and performance of the water and wastewater systems.
- Review and identify expected growth projection, including expected population and employment growth rates, as well as potential growth areas and expected land use types.
- Identify the key level of service priorities, staff resources and financial constraints required to complete ongoing water and wastewater system performance, capacity and upgrades analysis
- Complete a robust criteria evaluation of potential alternatives to identify the preferred servicing solution.
- Develop a comprehensive capital / DC / developer program, along with implementation triggers, to support the existing system needs and long-term growth.

Various sources of planning data were reviewed and utilized to create an Ultimate Buildout Scenario which accounts for all projected growth within the Urban Settlement Boundary areas, as delineated through the Region of Waterloo Official Plan Amendment (ROPA 6) in 2022 and the subsequent Province of Ontario decision on the ROPA 6 in 2023. The Ultimate Buildout Scenario (Post 2051 Growth) with the GO Station sub-option was utilized to assess infrastructure needs and to develop the preferred capital / DC / developer program for the water and wastewater systems. This provided the most conservative assessment of future demands and flows and served as the basis for watermain and sewer infrastructure sizing as summarized in **Appendix J**, **Table 3-1**, and **Table 3-2**.

In order to assess existing and future system performances, level of service criteria was developed through, discussion with Township staff, and aligning with the Region of Waterloo and Area Municipalities 2023 Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS). The water and wastewater level of service criteria are summarized in **Table 5-1** and **Table 7-1** respectively.

The buildout capital / DC / developer program plan was developed to address existing system issues and long-term growth needs. The capital plan identified the estimated cost and timing of each recommended project. Water capital projects were mainly driven by fire flow requirements while wastewater capital projects were mainly driven by sewer surcharging based on the 10-year design storm and exceeding the minimum 1.8 m freeboard. **Table ES1** and **Table ES2** summarizes the water and wastewater capital costs by communities. Detailed water and wastewater project lists can be found in **Table 6-2** and **Table 8-2** respectively.

Table ES1: Summary of Water Capital / DC / Developer Program By Community

Community	Length (km)	Total Project Cost ($2025)(1)	2024 – 2033 Total Project Cost ($2025)(1)	2034 - 2051 Total Project Cost ($2025)(1)	Beyond 2051 Total Project Cost ($2025)(1)
Elmira	14.9	$39,319,308	$22,218,515	$17,100,793	$0
St. Jacobs	2.9	$8,433,803	$1,965,028	$6,468,775	$0
Stockyards	1.9	$5,677,475	$0	$5,677,475	$0
Breslau	33.8	$109,333,675	$57,230,875	$32,018,950	$20,083,850
Conestogo	0.3	$771,825	$771,825	$0	$0
West Montrose	0.0	$0	$0	$0	$0
Maryhill	0.0	$0	$0	$0	$0
Heidelberg	0.0	$0	$0	$0	$0
Total	**53.9**	**$163,536,085**	**$82,186,243**	**$61,265,993**	**$20,083,850**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.

Table ES2: Summary of Wastewater Capital / DC / Developer Program By Community

Community	Length (km)	Total Project Cost ($2025)(1)	2024 – 2033 Total Project Cost ($2025)(1)	2034 – 2051 Total Project Cost ($2025)(1)	Beyond 2051 Total Project Cost ($2025)(1)
Elmira	7.0	$53,746,900	$43,774,675	$9,972,225	$0
St. Jacobs	0.6	$2,409,775	$0	$2,409,775	$0
Stockyards	2.2	$11,000,300	$0	$11,000,300	$0
Breslau(2)	36.7	$287,778,400	$120,558,823	$61,223,533	$105,996,044
Conestogo	0	$0	$0	$0	$0
West Montrose	0	$0	$0	$0	$0
Maryhill	0	$0	$0	$0	$0
Heidelberg	0	$0	$0	$0	$0
Total	45.9	**$354,935,375**	**$164,333,498**	**$84,605,833**	**$105,996,044**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.
(2) Breslau project costs based on East Side Lands EA. Costs are in 2025 dollars.

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1 Introduction

1.1 Background

The Township of Woolwich is one of seven lower tier municipalities in the Regional Municipality of Waterloo, located north and east of the City of Waterloo and City of Kitchener. The Township comprises a 2021 census population of 27,000, with most of the population located within the Township's urban settlement areas of Elmira, St. Jacobs, and Breslau.

Water and wastewater servicing within the Township of Woolwich is operated under a two-tier system. For water servicing the Township is responsible for the distribution of potable water to customers through municipally owned and operated local distribution systems while the Region is responsible for the water treatment, storage, disinfection, and trunk watermain transmission system that delivers water to the local area municipalities. For wastewater servicing the Township is responsible for the sanitary sewer collection system and local sanitary pumping stations while the Region is responsible for the wastewater treatment facilities.

Readily available and accessible public infrastructure is essential to the viability of existing and growing communities. Infrastructure planning, land use planning and infrastructure investment require close integration to ensure efficient, safe, and economically achievable solutions to provide the required water and wastewater infrastructure. To assess the needs of the existing system and future growth, the Township of Woolwich retained GEI Consultants Canada Limited (GEI) to complete the Servicing Capacity Study (SCS) which provides the review and development of water and wastewater servicing strategies within the Township.

1.2 Study Area

The Township of Woolwich is bounded by the Cities of Waterloo, Kitchener, Cambridge, the Townships of Guelph/Eramosa, Centre of Wellington, Mapleton, and Wellesley. The Study Area for the Servicing Capacity Study focuses on the municipally serviced settlements of: Elmira, St. Jacobs, Stockyards, Breslau, Conestogo, West Montrose, Maryhill, and Heidelberg. **Figure 1-1** presents the general study area.

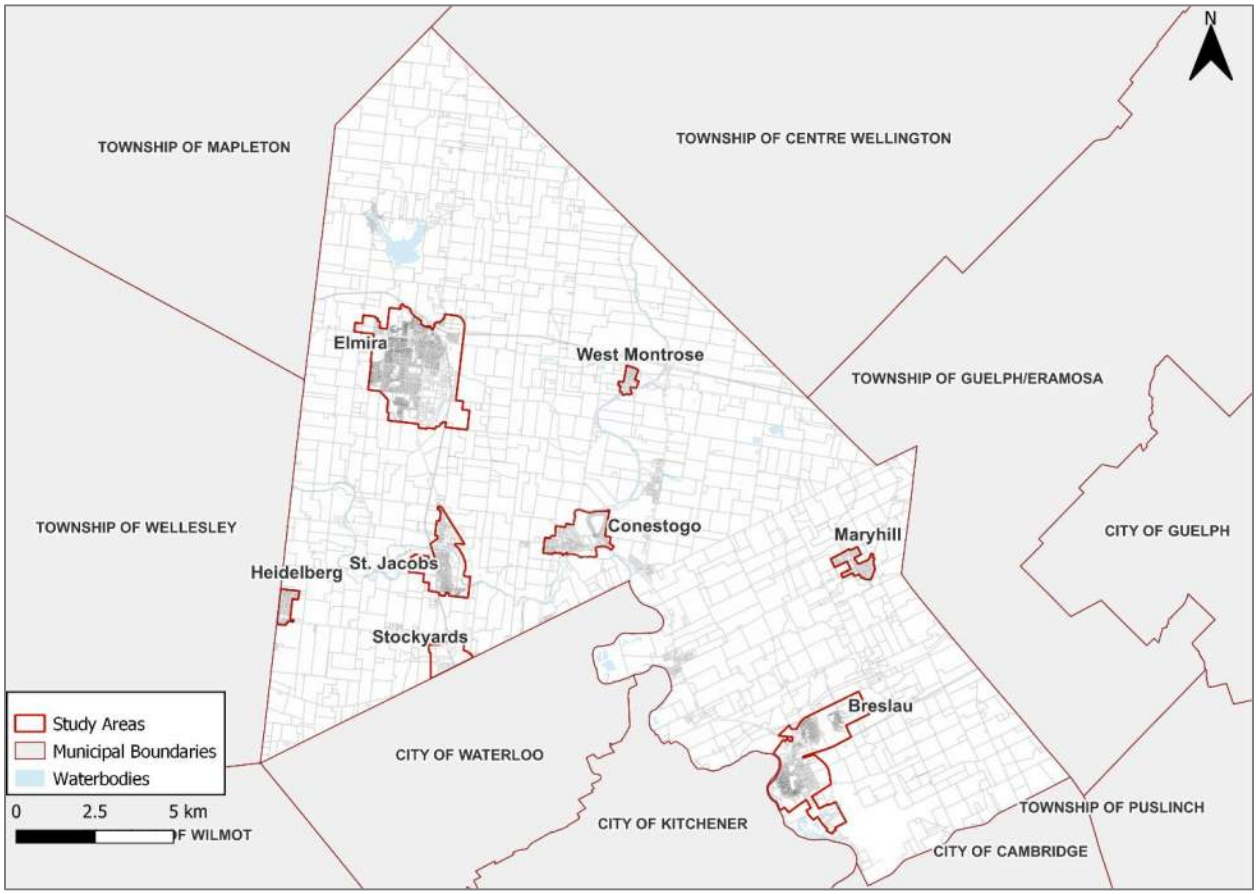


Figure 1-1: Study Area

1.3 Servicing Capacity Study Objectives

The Servicing Capacity Study evaluates the ability of the existing and planned water and wastewater infrastructure within the Township of Woolwich to efficiently and effectively service the Township's existing users and forecasted growth areas.

The key objectives of the Servicing Capacity Study are as follows:

- Develop robust water and wastewater system models, enabling Woolwich to assess the existing and projected capacity and performance of the water and wastewater systems.
- Review and identify expected growth projection, including expected population and employment growth rates, as well as potential growth areas and expected land use types.
- Identify the key level of service priorities, staff resources and financial constraints required to evaluate system needs to document existing system capacity and performance and to identify upgrade needs with detailed trigger timing.
- Complete a robust criteria evaluation of potential alternatives to identify the preferred servicing solution.
- Develop a comprehensive capital / DC / developer program, along with implementation triggers, to support the existing system needs and long-term growth.

2 Data Sources and Supporting Studies

This section summarizes the various data sources that were used to form our basis of understanding for the Township SCS.

2.1 Digital Infrastructure and GIS Data

The Township provided a wide range of detailed water infrastructure data. A summary of the key digital data sources relevant to this study include:

- Municipal utility infrastructure GIS database;
- Official Plan GIS database;
- Baseline Data GIS database, including municipal parcel and land use information;
- Township water billing records;
- Planning and draft plan records

2.2 Planning Data Sources

The following sources of planning data were reviewed for this study:

- Township of Woolwich Official Plan (2022)
    - Based on the Region of Waterloo's Official Plan
    - Official Plan Amendment 6 (ROPA 6) was adopted in August 2022 by the Region. Approval of ROPA 6 was confirmed by the Province in April 2023, with modifications impacting the Township of Woolwich (urban area boundary expansion)
- Development Charges Background Study (2019)
- Additional planning information from the Township Planning department (2022)
    - 2022 – 2051 population projection estimates spreadsheet;
    - Current subdivisions shapefile including the following subdivisions;
        - Empire Homes – Phase 5
        - Valley View – Phase 1
        - Sunset Hills Estate
        - Lunor
        - Hopewell Heights
        - Breslau Properties/Madison Group
        - Empire Homes
        - Southwood 3 and 4
        - Hawkridge
        - Activa
        - Hopewell Crossing
    - Expansion lands shapefile;
    - Breslau Settlement Plan (2015) and
    - Stockyards Secondary Plan (2021).
- Supplementary planning information from Township staff regarding the Stockyards settlement area through the Updated Consolidation of Waterloo North Pressure Zones project (2022)
- Concept plans for various developments within the Township:

- Development in Elmira (Schlegel Urban Developments Concept Plan dated November 2022), northwest of Listowel Road and Arthur Street
- Development in Elmira (MHBC Concept Draft Plan, dated July 2023), 1665 Scotch Line Road
- Development in Breslau (GSP Group Development Concept Plan dated December 2021), west of Victoria Avenue N and Fountain Street North, north of Ebycrest Road
- Development in Breslau (GSP Group Draft Plan Concept dated August 2022), south of Ebycrest Road and north of the Grand River
- Development in Breslau (Polocorp Lotting Plan dated November 2022), west of Fountain Street, south of CN Railway
- Developments in Breslau (MGP Conceptual Development Plan, dated September 2023, 0 Kramp Road and 2590 Victoria Street North
- Development in Breslau (SCS Consulting Preliminary Servicing Alternatives, dated September 2023), 2590 Victoria Street North
- Development in Breslau – Conestoga Meats (Dennis Group Proposed Site Layout Option 1, dated February 2023),
- Development in St. Jacobs (Polocorp Concept Plan, dated June 2023), 51 and 55 Hawkesville Road
- Development in St. Jacobs (MHBC Concept Plan, dated September 2023), 52 Hawkesville Road
- Region of Waterloo Official Plan Amendment (ROPA 6) (2022)
- Province of Ontario Region of Waterloo ROPA 6 Decision (2023)

2.3 Relevant Planning Studies

The following studies were reviewed to support system understanding for the SCS.

- 2015 Region of Waterloo Water Supply and Distribution Operations Master Plan (Stantec, 2015)
- East Side Lands Sanitary Servicing Class EA (Associated Engineering, 2018)
- East Side Lands – Stage 2 Master Environmental Servicing plan & Secondary Plan Study (Technical Appendix Water and Wastewater Servicing and Utilities Assessment) (WSP, 2018)
- Breslau East Connector Road Schedule C Class EA (Associated Engineering, 2022)
- Region of Waterloo Kitchener Pressure Zone 4 Optimization Study (GM BluePlan, 2024)
- Heidelberg Water Supply System Municipal Class EA (Stantec, 2022)
- Heidelberg Long Term Water Servicing Design Brief (GM BluePlan, 2024)
- Maryhill Isley WTP Decommissioning and Maryhill Village Heights WTP Capacity Review (GM BluePlan, 2024)
- St. Jacobs and Elmira Pressure Supply Optimization Study (GM BluePlan, 2018)
- Consolidation of Waterloo North Pressure zones (Stantec, 2016)
- City of Waterloo Water Distribution Master Plan (GM BluePlan, 2017)
- Updated Consolidated of Waterloo North Pressure Zones (GM BluePlan, 2022)
- Design Flow for the North Sanitary Pumping Station, Elmira (MTE, 2021)
- Beisel Lands Subdivision Existing Sanitary Sewer Capacity Assessment (MTE, 2024)

2.4 Water System InfoWater Hydraulic Model

The Region's existing all-pipes model for the Integrated Urban System (IUS) was updated to support the water system analysis and used as the base model for all hydraulic modelling analysis. Separate models for the Maryhill and Heidelberg systems were provided as well. The models were received as follows:

- All-Pipes IUS model (ALL_PIPES_20221104) – received November 22, 2022
- Maryhill model (Maryhil_20160808) – received February 15, 2023
- Heidelberg model (Heidelberg_StClements_Water_Model) – received February 15, 2023

2.5 Wastewater System PCSWMM Hydraulic Model

There was no existing wastewater model for the Township of Woolwich. Using provided Township and Region GIS data, as well as water billing data, a separate model for each serviced community was created.

3 Planning and Growth Projections

Various sources of planning data were reviewed and utilized to create an Ultimate Buildout Scenario which accounts for all projected growth within the Urban Settlement Boundary areas, as delineated through the Region of Waterloo Official Plan Amendment (ROPA 6) in 2022 and the subsequent Province of Ontario decision on the ROPA 6 in 2023. The detailed methodology regarding growth allocation approach, methodology, and assumptions that guide the estimated future system demands and flows is presented the Growth Projections and Allocation Methodology Technical Memo, provided in **Appendix J**.

The Interim Growth Scenario represents growth to 2051, which includes all residential and employment growth within the Township's settlement area boundary prior to the Province of Ontario decision on ROPA 6 in 2023. The Ultimate Buildout Scenario (Post-2051 Growth) represents growth beyond 2051, with no specific date horizon specified, which includes all residential and employment growth within the Township's expanded settlement area boundary, as delineated within the Province of Ontario decision on ROPA 6 in 2023. One additional sub-scenario was added which accounts for a higher population density within Breslau for development areas which are located near the future Breslau GO Station. This represents the most conservative planning scenario, assuming a population density of 80 ppha near the Breslau GO Station and 65 ppha in the remainder of the Breslau growth areas.

Ultimately, the Ultimate Buildout Scenario (Post 2051 Growth) with the GO Station sub-option was utilized to assess infrastructure needs and to develop the preferred capital / DC / developer program for the water and wastewater systems. This provided the most conservative assessment of future demands and flows and served as the basis for watermain and sewer infrastructure sizing. Through discussions with Township project staff, the implementation timing of the recommended capital projects was identified, based on staff knowledge of the Township's development review process and current progress of various growth areas.

The key planning scenario was the Ultimate Buildout Scenario (Post-2051 Growth), as summarized in **Table 3-1** and **Table 3-2**.

Table 3-1: Summary of Growth Projections

Scenario	Community	Residential Growth	Employment Growth	Total Growth
Interim Growth Scenario (Growth to 2051)	Elmira	11,789	5,678	17,467
	Breslau	13,050	4,551	17,601
	St. Jacobs	675	1,109	1,784
	Stockyards	0	4,571	4,571
	Heidelberg	98	0	98
Ultimate Buildout Scenario (Post-2051 Growth)	Elmira	6,652	517	7,169
	Breslau	19,315	25,391	44,706
	St. Jacobs	1,224	294	1,517
Interim Growth Total		25,612	15,909	41,522
Ultimate Buildout Growth Total		52,802	42,111	94,914
Breslau GO Station Option – Interim Growth Total		27,563	15,909	43,472
Breslau GO Station Option – Ultimate Buildout Growth Total		**56,169**	**42,111**	**98,281**

Table 3-2: Proposed Growth Scenario – Total Population

Scenario			Residential	Employment	Total
Total Population	Based on Township's DC Study	2019	26,840	15,061	41,901
		2031 Target	36,500	17,108	53,608
	Based on Growth Projection Methodology	Interim (2051)	54,403	30,970	85,373
		Ultimate Buildout (Post-2051)	**83,009**	**57,172**	**140,182**
Population Growth		2019 to Interim	27,563	15,909	43,472
		2019 to Ultimate Buildout	56,169	42,111	98,281

3.1 Regional Infrastructure Planning

The magnitude of projected growth is significant compared to the size of the existing systems and compared to previously assessed growth scenarios through Township and Region studies. As many of the Regional planning studies are approaching or exceeding 10 years since completion, through the SCS, the system performance and alternatives assessment assumed that the Region will be planning for the same magnitude of growth within the Township and that Regional infrastructure will be managed such that sufficient capacity is available to the Townships for the water and wastewater systems (e.g., water and wastewater treatment facilities, water transmission mains, booster pumping stations, storage facilities, etc.). Further Region of Waterloo studies will be required to confirm the capacities of the water and wastewater systems that consider the Township growth scenarios beyond the Region-Council-endorse Regional Official Plan Amendment Areas.

The focus of this SCS is to ensure that Township infrastructure needs are identified to support growth to the buildout of the settlement area boundary (Post-2051). This study does not provide assessment, or recommendations of Regional infrastructure needs to support the expected growth.

This Study acknowledges the realities of changing growth conditions especially for Post-2051 planning. The proposed infrastructure in this SCS should be reviewed prior to construction to confirm projected growth is occurring as intended.

4 Development of Servicing Concepts and Capital / DC / Developer Program Methodology

Local improvements are needed to address existing and future system capacity. The first step in the detailed analysis of the SCS was to assess the existing infrastructure capacity and conditions. Once the existing system conditions were established, the impacts of future growth demand on the water distribution system were analyzed to develop and evaluate potential servicing alternatives and address potential deficiencies and opportunities. The level of service targets used in the evaluation of system performance are presented in **Section 5.1** and **Section 7.1.**

4.1 Regional Trunk Infrastructure Assumptions

For the purposes of the SCS, the development of local water and wastewater servicing solutions were developed under the assumption that Regional trunk water supply and treatment capacity, in-line with Regional standards, will be made available to support the planning and growth projections. The SCS does identify where upgrades to Regional infrastructure may be needed to support local system needs; however, this was done to help inform and confirm the scope of local system upgrades. It is understood that the Region will be undertaking separate master planning studies to confirm Regional infrastructure needs to support Regional and local growth needs.

4.2 Evaluation of Alternatives

For most areas of existing deficiencies and growth areas, the available options to address the existing and growth needs were limited (e.g., the only option is to upgrade the size of the watermain or sewer). In these instances, the limited available servicing options were presented to Township engineering and operations staff, and the preferred option was selected through discussions, typically based on the following factors:

- Ability to meet technical needs and level of service criteria.
- Impact to recently constructed infrastructure.
    - E.g., if an available option required the reconstruction of a road that had been recently worked on, this option would not be preferred.
- Impact to Regional roads/infrastructure.
    - E.g., if an available option required the crossing of a Regional road, this option was less likely to be preferred.

This streamlined decision-making process was utilized for all servicing alternatives except for the Elmira wastewater trunk sewer upgrades on Oriole Parkway, discussed in **Section 7.4.4.1**. A full in-depth evaluation of servicing alternatives was completed for the Elmira wastewater trunk sewer upgrades as there were several potentially viable options to address the servicing deficiency, which required a more detailed evaluation of alternatives to assess the potential benefits and concerns of each servicing option.

The alternatives for the Elmira wastewater trunk sewer upgrades were evaluated through the reasoned argument approach which provided a clear and thorough rationale of the trade-offs among the various options based on the anticipated impacts caused by various evaluation criteria and factors. The basis of this approach is to qualitatively evaluate the relative advantages, disadvantages, and impacts of each alternative against the established criteria. This process was intended to highlight why the preferred alternative was chosen through evaluation of technical, environmental, social/cultural, and financial criteria.

Individual evaluation of the criteria (Technical Feasibility, Environmental Impacts, Social / Cultural Impacts and Financial Viability) was completed using approach outlined in **Table 4-1**.

Table 4-1: Alternative Evaluation Approach (Reasoned Argument Approach)

Evaluation Indicator	Evaluation Description
	"High" Solution generates beneficial impacts and/or has no substantial technical challenges
	"Medium" Solution to a mix of positive and negative elements with some impacts
	"Low" Solution presents permanent negative impacts and/or presents significant technical challenges

An evaluation matrix was used in selecting the preferred servicing strategy. The servicing alternatives were evaluated in technical, environmental, social/cultural, and financial impacts categories. The detailed criteria within each category are outlined in **Table 4-2**.

Table 4-2: Detailed Evaluation Criteria

Category	Criteria	Definition
Technical Factors	Meets existing and future servicing needs	To assess the alternative's ability to satisfy the project problem and opportunity statements and to achieve the desired system technical level of service objectives. This includes capacity to meet existing level of service and capacity to support future growth.
	Provides a reliable service	To assess the overall system configuration's ability to support flexibility in system operations, redundancy in system supply capacity, minimizes the risk related to single element failure, and adaptation to the potential impacts of climate change. Includes the feasibility and maintenance of implementation (i.e., length of watermain/sewer with associated operation and maintenance factors, additional pumping due to hydraulic conditions, or regular maintenance requirements) and adaptation to increases in system demands or reduction in supply capacity due to climate change.
	Minimizes and manages construction risk	To assess the alternative's constructability including scope of infrastructure upgrades, environmental significance, time required to complete construction, and impact on existing utilities. This also includes assessing the timing and technical suitability of project implementation with the aim of improving the overall flexibility in project phasing and reducing the number of critically dependent components.
	Supports phased expansion of the system	To assess whether the proposed servicing strategy minimizing the length of new sewer/watermain and sewer/watermain upgrades needs, maximizing the capacity/use of existing facilities, providing flexibility in servicing of growth areas.
	Operational complexity	To assess whether the proposed servicing strategy impacts operational complexity of the system. This includes need for operation of additional facilities and/or more complex operational procedures.
	Timing and certainty	To assess the level of certainty that the proposed servicing strategy will address the system needs. For example, if a servicing strategy includes a program to reduce water usage, unaccounted for water, or inflow and infiltration to the wastewater system. These programs generally require longer timelines to implement, and the ultimate impact of the programs may take a longer period to quantify compared to design and construction of a capital project.
	Resiliency to climate change	To assess the alternative's resiliency to maintain the desired system technical level of service objectives based on potential climate change impacts. This includes assessment of system resiliency due to the increase in system demands or reduction in supply capacity, and/or the facility and network vulnerability to climate related failures such as flooding.
Environmental Factors	Protects environment features, wildlife, and species at risk	To assess, monitor and ensure the preservation and protection of all aquatic resources and other natural features within the site location, watermain alignment, and surrounding environment. This includes any impact to wetlands (Locally or Provincially Significant, identified by Conservation Authority and Province), wildlife habitat, or valley lands, which may be identified by Conservation Authorities, Municipalities, or Province.
	Minimizes climate change impacts	Uses technology and best practices, where applicable, to minimize climate change impacts and reduce greenhouse gas contributions. This includes consideration during the construction process, day to day operations, and future maintenance requirements.
Social and Cultural Factors	Protects resident quality of life	To assess that proposed solutions ability to maintain or improve upon the existing level of service. Further, to assess any impacts to existing residents due the long-term operation of any new/modified facilities.
	Manages and minimizes construction impacts	To assess any impact to existing build up areas (residents, businesses) due to construction activities, including creating noise/dust/vibrations, traffic, and traffic flow, limiting access to properties (temporary), or other. This also includes identifying needs to alter timing and scope of the construction practices to minimize impacts.
	Protects cultural heritage features and archaeological features	To assess impacts to a structure, property or district which has been identified to be of cultural heritage value or interest. Impacts may be deemed as temporary (i.e. site access) or permanent (i.e. altering the existing conditions).
Financial Viability	Capital and life-cycle costs	To minimize the capital and lifecycle operational costs of the new infrastructure.
	Operation and maintenance costs	To minimize the operational costs of the new infrastructure and impacts on existing operational and maintenance cost of the existing infrastructure. Life cycle costing to consider greenhouse gas emissions and carbon pricing.
	Aligns with approval and permitting process	To assess the impact any required property/approvals may have on the implementation process (expropriation of land/land purchase, temporary/permanent easements, or land leasing fees) and compatibility with surrounding land use.

4.3 Costing Methodology

A capital cost is provided for all projects proposed as part of this SCS. For the majority of the water and wastewater system projects, a base construction cost was obtained using a unit rate construction cost, based on pipe diameter and other construction costs such as excavation, granular bedding, backfill, etc. as shown in **Table 4-3**. In addition, the construction cost considers several factors specific to each project such as creek, railway and highway crossings, as well as location of construction (greenfield, urban, suburban). Design, administration, contingency, and non-recoverable HST costs were added to arrive at a final project cost as shown in **Table 4-4.**

Table 4-3: Sewer and Watermain Unit Costs

Infrastructure Type	Depth	Diameter (mm)	Unit Cost ($ per m)
Sewer	≤ 5 m	200	977
		250	977
		300	1,005
		375	1,063
		450	1,141
		525	1,216
		675	1,565
	5 – 10 m	250	4,460
		300	4,460
		375	4,579
		450	4,726
		525	4,862
		675	5,762
Watermain		150	957
		200 – 400	1,276
		450	1,382

Table 4-4: Additional Allowances and Project Contingency Percentages

Additional Costs			Percentage
Additional Allowances on Base Cost	Construction Uplift	Rural	0%
		Suburban	20%
		Urban	30%
	Updated Soils Regulation Uplift		2%
	Additional Construction Costs		15%
	Provisional Allowance		10%
Contingency and Soft Costs (Applied to Base Cost + Additional Allowances)	Project Contingency		25%
	Design, CA, PA, Studies		20%
	Non-Recoverable HST		1.76%

4.3.1 Wastewater Specific Project Costing

Costing for the inflow and infiltration (I/I) reduction program was completed using a combination of the following information:

- Base cost for each catchment for:
  - Estimated number of flow monitors required.
    - $5,000 per monitor.
  - Approximate level of sewer investigation required.
    - Estimated percentage of catchment sewer length.
    - $15 per metre of sewer to complete the investigation.
  - Approximate level of property rehabilitation required.
    - Estimated percentage of properties.
    - $15,000 per property.
  - Approximate level of sewer rehab required.
    - Estimated percentage of catchment sewer length.
    - $3,000 per metre of sewer to complete rehab.
  - Approximate level of manhole rehab required.
    - Estimated percentage of number of manholes.
    - $7,500 per manhole to complete rehab.
- Adjustment of total base cost to account for 10% provisional allowance.
- Additional costs:
  - Project contingency costs (25%)
  - Engineering costs (10%)
  - Non-recoverable HST (1.76%)

4.3.2 Development Charges

The Township completed an update to their Development Charges (DC) Background Study in May 2024. The study was completed by Watson & Associates, with support related to the water and wastewater servicing projects provided by GEI. Due to the timing of simultaneous servicing studies including this SCS, and the recently completed East Side Lands Woolwich Sanitary Servicing Class Environmental Assessment (EA) by Associated Engineering, the Township has indicated that they may choose to complete an update to the DC study prior to the next mandated update in 2029. In preparation for this forthcoming DC update, the Township had requested that GEI provide DC related support beginning June 2025. The scope of work includes:

- Develop a simplified approach for determining DC Eligible and Benefit to Existing project splits and provide guidelines for the recommended methodology.
- Apply the recommended methodology to the capital projects that were recommended through the SCS and identify the DC Eligible percentages for all projects, including for the Breslau wastewater system (not previously completed for the 2024 DC study).
- Provide additional clarity on project timing for the capital projects that were recommended through the SCS.

The recommendations of the DC Support will be provided in a separate ongoing technical memo.

5 Water System

Water and wastewater servicing within the Township of Woolwich is operated under a two-tier system. For water servicing the Township is responsible for the distribution of potable water to customers through municipally owned and operated local distribution systems while the Region is responsible for the water treatment, storage, disinfection, and trunk watermain transmission system that delivers water to the local area municipalities.

There are four (4) unique water distribution systems in the Township of Woolwich: Woolwich North (consisting of Elmira, St. Jacobs, Stockyards, Conestogo, and West Montrose), Heidelberg, Maryhill, and Breslau. The Woolwich North settlements are serviced by the Region's IUS, via the water system within the City of Waterloo. Breslau is serviced by the Region's IUS, via the water system within the City of Kitchener. Heidelberg and Maryhill are each serviced via well supply managed by the Region of Waterloo, separate from the IUS.

5.1 Water Design Criteria and Level of Service Objectives

Level of Service objectives are critical elements in the evaluation of existing and future system performance and development of servicing strategies and a capital / DC / developer program. The objectives were identified using the following process:

- Review of the Region of Waterloo and Area Municipalities 2023 Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS);
- In-depth background review to develop a baseline understanding of system performance, capacities, and operations;
- Review of industry standards, and ministry requirements; and,
- A workshop held with Township / Region Staff to confirm system operations and discussion on desired level of service objectives.

Once established, these objectives were used in the evaluation of existing and future, growth related, system performance, and to assess infrastructure needs. **Section 5.1.1** to **Section 5.1.6** present further detail regarding the selection of the water system level of service objectives. **Table 5-1** presents the performance targets that are relevant to Township-owned infrastructure. These performance targets are in line with those used for the 2023 DGSSMS.

Table 5-1: Summary of Water System Level of Service Objectives

Criteria			Performance Target
Water Use	Per Capita Rate		225 L/c/d
	MDD Peaking Factor		Based on SCADA
System Performance	Velocity under MDD		0.5 – 5.0 m/s
	Pressure	Pressure under daily demand	40 – 100 psi
		Pressure under fire flow	20 psi
	Fire Flow(1)	Single Family Dead End	50 L/s
		Residential (Single)	75 L/s
		Residential Multi (Apartments)	150 L/s
		Commercial	150 L/s
		Institutional	150 L/s
		Industrial	250 L/s
		Conestogo – Industrial	150 L/s
		Conestogo – Golf Course (Single Family)	50 L/s
	Water Quality	Age of Water in System	Flag Water Age >7 days
Sizing	Minimum Diameter	Residential	200 mm
		Employment	300 mm

(1) Fire Flow Targets do not apply for Maryhill, Heidelberg, and West Montrose. Refer to text above.

5.1.1 Maximum Day Peaking Factor

Table 5-2 presents the calculated existing MDD peaking factor for each community, using the available SCADA data (2020 – 2022).

Table 5-2: Maximum Day Peaking Factors by Community

	Calculated Max Week Peaking Factor	Calculated Max Day Peaking Factor	Population[(1)]	MECP Peaking Factor	Recommended Peaking Factors for Growth
Elmira	1.32	1.82	10,760	1.9	**1.8**
St. Jacobs	1.87	2.65	1,959	2.5	**2.7**
Stockyards			246		
Conestoga	2.27	2.73	1,272	2.5	**2.7**
West Montrose			245		
Heidelberg	2.11	2.51	640	2.75	**2.5**
Maryhill	1.54	1.79	605	2.75	**1.8**
Breslau	1.24	1.41	5,053	2	**1.4**

(1) 2021 Census Population

The 2015 Region of Waterloo Water Supply and Distribution Operations Master Plan (WSDOMP) noted a peaking factor of 1.42 (max day) and 1.24 (max week) for the IUS. The Region's DGSSMS notes that peaking factors should be determined using historic data where possible. The approach for the SCS analysis aligns with the DGSSMS recommendation of utilizing available historic data to determine peaking factors.

For the SCS analysis, starting point methodology was utilized, meaning that existing demands are based on historic data (local billing records, calculated historic peaking factors, calculated diurnal curves, etc.). Growth was loaded in addition to the existing starting point demands, using the population projections and recommended per capita rates and peaking factors. The last column in **Table 5-2** presents the peaking factors that were utilized to determine future maximum day demand.

5.1.2 Per Capita Rates

Using historic local water billing records from 2020 – 2022 and census populations, per capita rates were calculated, as presented in **Table 5-3** and **Table 5-4**. It should be noted that the values are skewed due to the residential and employment population split. For example, Stockyards and Breslau have significant employment water usage, resulting in a very high per capita usage.

Table 5-5 presents the per capita rates of neighboring municipalities for comparison. In terms of population, County of Brant and City of Stratford are most similar to the Township of Woolwich.

Table 5-3: Overall Water Per Capita Rates by Community

Population	Per Capita Rates Without NRW (L/c/d)	Per Capita Rates Including NRW (L/c/d)
Elmira	304	359
St. Jacobs	234	276
Stockyards	878	1036
Conestoga	197	232
West Montrose	212	250
Heidelberg	176	204
Maryhill	228	247
Breslau	462	559
Average	**336**	**395**
Median	**231**	**263**

Due to the potential difference in per capita rates between residential and employment land uses, the per capita rates were analysed further by community, as presented in **Table 5-4**.

Table 5-4: Water Per Capita Rates by Community and Land Use

Community	Per Capita Rates (L/c/d) Without NRW		Per Capita Rates (L/c/d) With NRW	
	Residential	Non-Residential	Residential	Non-Residential
Elmira	158	267	189	321
St. Jacobs	162	158	195	190
Stockyards	0	2024	0	2429
Conestoga	179	30	214	36
West Montrose	223	2	267	3
Heidelberg	170	5	204	6
Maryhill	118	190	142	228
Breslau	158	564	190	677
Average	**146**	**405**	**175**	**486**
Median	**160**	**174**	**192**	**209**

Table 5-5: Industry Review of Water Per Capita Rates

Municipality	Source	Settlement	Design Criteria Per Capita Rate (L/cap/d)	
			Residential	Employment
Region of Waterloo	DGSSMS	All	225	
	WSDOMP	St. Jacobs/Elmira	303 (Average – Res and ICI) 213 (Residential) 144 (ICI)	
	2022 Water and Wastewater Monitoring Report	Integrated Urban System	247	
		Maryhill	421	
		Maryhill Village Heights	233	
		Heidelberg	140	
Region of Niagara	2021 Master Plan	Region of Niagara	240	270
City of Brantford	2022 Design and Construction Manual	City of Brantford	270	270
County of Brant	2020 Paris Master Plan	County of Brant	300	
City of Hamilton	Master Plan, ongoing	City of Hamilton	300	260
City of Stratford	2018 Water Infrastructure Evaluation and Needs Assessment	City of Stratford	240	
Municipality of Thames Centre	2019 Mater Plan	Municipality of Thames Centre	225	

With the accounting of residential and employment land uses, the residential per capita rates are more reasonable and generally align with typical industry values for the size/type of settlements within the Township. However, the employment per capita usage remains skewed and highly variable across municipalities. Employment water usage can vary significantly across employment types, as demonstrated within the Township. The option to utilize separate residential and non-residential per capita rates was presented to the Township (e.g., 225 L/c/d for residential and a higher option for employment, such as 240 or 270 L/c/d).

Through discussion with the Township and the Region, it was determined that the preferred option was to maintain the single per capita rate for all settlements and for residential/non-residential land uses, primarily due to ease of application. Due to uncertainty of future employment land uses, it was determined that the 225 L/c/d should be maintained and that a level of conservatism is still maintained through the MDD peaking factors, and the inclusion of NRW within the per capita rates. Further, the 225 L/c/d rate aligns with the Region's DGSSMS, maintaining consistency of criteria between the upper and lower tier municipalities.

5.1.3 System Service Pressure Targets

The Region's DGSSMS specifies minimum hour and peak hour pressure targets of 40 psi to 100 psi. Preferred ADD and MDD pressure targets are 50 psi to 80 psi. The minimum pressure criteria for fire or emergency scenarios are 20 psi. These pressure criteria were carried forward within the Township SCS.

5.1.4 Fire Flow Targets

Local watermain sizing is typically driven by required fire flow targets. There are several commonly used methods for determining required fire flow: Fire Underwriters Survey (FUS) and the Ontario Building Code (OBC). The OBC methodology has an upper limit of 150 L/s, while the FUS methodology does not have an upper limit.

An industry review, as presented in **Table 5-6**, and community specific FUS analysis was completed to support the recommendation of land-use based fire flow targets for the Township.

Table 5-6: Brief Industry Review of Fire Flow Targets

Municipality	Dead End Residential	Single Residential	Multi-Family	Commercial	Institutional	Industrial
Town of Fort Erie	50	75	150	175	175	250
City of Waterloo	50	75	150	175	175	250
City of Hamilton	50	75	150	150	150	250
City of Stratford	50	75	100	125	125	150
City of Thorold	50	75/ 100	150	175	175	250
City of Niagara Falls	50	75	150	175	175	250
City of Brantford	50	75/125	150	175	175	250
County of Brant	37.9	37.9	56.8	56.8	56.8	56.8/150
Municipality of Thames Centre	-	76	76	150	150	150

For the FUS analysis, a variety of properties within Woolwich were selected, based on land use and spatial coverage, as presented in **Table 5-7**. Note that the calculated FUS targets are likely conservative as site selection tended to be biased towards larger building footprints.

Table 5-7: Distribution of Properties Reviewed Within the FUS Analysis

Number of Properties Analyzed	Elmira	St. Jacobs	Stockyards	Breslau	Conestogo
Industrial	2	1	-	2	-
Commercial	2	2	2	2	2
Institutional	2	1	-	1	1
Residential (Single)	4	2	-	2	2
Residential (Multi)	3	1	-	3	1
Total	**13**	**7**	**2**	**10**	**6**

Based on the results of the FUS analysis and through discussion with Township and Region staff, the recommended land-use based fire flow targets were finalized, as shown in **Table 5-8**.

Table 5-8: Final Recommended Land-Use Based Fire Flow Targets

Land Use	Average of Minimum FUS Estimates	Average of Maximum FUS Estimates	Average FUS	Typical Industry Review Values	Recommended FUS
Commercial	94	152	119	150	150
Industrial	126	222	174	250	250
Institutional	136	203	170	175	150
Residential (Single)	83	122	102	75	75
Residential (Multi)	159	239	199	150	150

Note that the Maryhill, Heidelberg, and West Montrose systems do not support fire flows through municipal servicing due to limitations in system capacity. Alternative emergency fire procedures are utilized within these settlements.

Further, through discussions with the Township, the fire flow targets within Conestogo were lowered due to limitations within the existing system infrastructure and configuration. The industrial fire flow target was lowered from 250 L/s for other settlements to 150 L/s within Conestogo, and the fire flow target for single family homes along Golf Course Road was lowered from 75 L/s to 50 L/s. Further discussion is presented in **Section 5.8.2**.

5.1.5 Watermain Sizing

Minimum watermain sizing for Township infrastructure is recommended as part of this study. For employment areas, a minimum watermain diameter of 300 mm is recommended, which aligns with the recommendation within the DGSSMS. This larger diameter watermain size will ensure that sufficient capacity can be provided for employment land uses which typically require high fire flow capacity and are more likely to have a higher domestic water usage. For new residential areas, a minimum watermain diameter of 200 mm is recommended. This is greater than the minimum 150 mm watermain size recommendation within the DGSSMS. The rationale for the increased minimum watermain size is due to the increased densities required of new developments as a reaction to market conditions and provincial growth plan targets. It is expected that new residential developments moving forward will include medium to high density residential units (e.g., townhouses, apartments, condominiums), which require a higher fire flow capacity, resulting in the need for minimum watermain sizes of 200 mm.

5.1.6 Watermain Velocity

The DGSSMS specifies a minimum watermain velocity target of 0.5 m/s and a maximum watermain velocity target of 5 m/s. This target was carried forward for the SCS analysis. Within the Township's water system, most average day, and maximum day watermain velocities are less than the minimum velocity target, which is typical of municipal water systems, as watermain sizing tends to be driven by the much higher flows required under fire flow conditions. The maximum velocity target represents the trigger for watermain upsizing, rather than the minimum velocity target.

5.2 Water Hydraulic Model

Detailed information regarding the model update procedure, model validation, and model control narrative can be found in **Appendix A**.

The basis of the assessment of hydraulic performance is the Region of Waterloo IUS InfoWater Pro all-pipes hydraulic water distribution model which was received from the Region in November 2022. The model included the Township settlements which are connected to the IUS (Stockyards, St. Jacobs, Conestogo, West Montrose, Elmira, and Breslau). The Heidelberg and Maryhill systems were added to the IUS model as part of the model update for this study.

Using the Township of Woolwich GIS shapefiles of the existing water system, a water network review was completed to adjust pipe parameters as required, and to incorporate new watermains that have been constructed since the previous hydraulic model update. Model calibration involved the analysis of system demand, water billing, SCADA data, and hydrant testing results.

5.3 Water System Demands

Existing system demands were determined through a review of the Township's water billing records and SCADA records. Projected future demands were calculated using the existing system demands as a historic baseline starting point, and growth demands were then added to the starting point using the design criteria presented in **Section 5.1**.

5.3.1 Existing Demands

Table 5-9 summarizes the water demands by community. Larger population communities such as Elmira and Breslau require greater water supply, yet their non-revenue water percentage is comparable with smaller communities at around 18%. Naturally, the larger communities are responsible for most of the non-revenue water profit losses. Elmira and Breslau account for 82% of total billed demand and 84% of the non-revenue water profit losses.

Table 5-9: Existing Water Demand Analysis

Community	Billed Demand (L/s)	Non-Revenue Water (L/s)	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Average Non-Revenue Water (%)	Existing MDD Peaking Factor	NRW Net Loss in Revenue ($/Yr)(1)
Elmira	38.0	7.0	44.9	56.9	18%	1.32	$216,000
St. Jacobs	5.3	1.0	6.3	10.9	18%	1.87	$30,100
Stockyards	2.5	0.5	2.9	5.1	18%	1.87	$14,000
Breslau	27.0	5.7	32.6	39.0	21%	1.24	$176,100
Conestoga	2.9	0.5	3.4	7.0	18%	2.27	$16,300
West Montrose	0.6	0.1	0.8	1.6	18%	2.27	$3,700
Maryhill	1.6	0.1	1.7	4.7	8%	2.93	$3,900
Heidelberg	1.3	0.2	1.5	2.9	16%	2.11	$6,500
Total	**79.0**	**15.1**	**94.1**	**128.1**	**-**	**-**	**$466,600**

(1) NRW Revenue Loss calculated by the difference between revenue loss from users and wholesale purchase cost from the Region. User Cost based on Township of Woolwich Water Usage Charges dated March 1, 2024. Wholesale cost from Region based on Rates for Cities and Townships dated October 2024. Further detail presented in Appendix A.

5.3.2 Projected Future Demands

The projected water system demands were identified from the projected growth discussed in **Section 3** and the water demand per capita of 225 L/capita/day as presented in **Section 5.1**. **Table 5-10** summarizes the existing and future water system demands. As the settlements of Conestogo, West Montrose and Maryhill are not projected to receive any growth, their future water system demands remain the same.

As discussed in **Section 3**, the final future demand scenario that was carried forward through the analysis was the Ultimate Buildout Scenario (Post 2051 Growth) with the GO Station sub-option. This option provided the most conservative assessment of future demands and flows and served as the basis for watermain and sewer infrastructure sizing.

Table 5-10: Existing and Future System Demands

Settlements	Existing Demand (L/s)		Future Demand (L/s)	
	ADD	MDD	ADD	MDD
Elmira	44.9	56.9	109.1	172.4
St. Jacobs	6.3	10.9	14.9	34.1
Stockyards	2.9	5.1	12.9	32.2
Breslau	32.6	39.0	190.8	260.5
Conestogo	3.4	7.0	3.4	7.0
West Montrose	0.8	1.6	0.8	1.6
Maryhill	1.7	4.7	1.7	4.7
Heidelberg	1.5	2.9	1.5	2.9
Total	**94.1**	**128.1**	**335.1**	**515.4**

5.4 Elmira

5.4.1 Existing Water System Overview

The Elmira water system consists of two pressure zones. Water is transferred to the Elmira system from the IUS (Waterloo pressure zone Wat 4) via the St. Jacobs Reservoir and Pump Station. From the St. Jacobs Pump Station, there is a 600 mm diameter Regional transmission main which supports the Howard Tank and Pump Station. The Howard Pump Station supplies the Elmira West Elevated Tank (ET) and the Elmira West pressure zone. The target HGLs are 405 mASL for the Elmira East pressure zone and 420 mASL for the Elmira West pressure zone. Four pressure reducing valves (PRV) supply the Elmira East pressure zone from Elmira West. Based on available historic SCADA and field testing, the observed HGL within Elmira East is approximately 398 mASL and the observed HGL within Elmira West is approximately 420 mASL. **Figure 5-1** and **Figure 5-2** present the existing system map and schematic.

The Region is in the process of implementing several projects to facilitate the reconfiguration of the Elmira Pressure Zone Boundary. This work was recommended and analysed through several previous studies, including the WSDOMP and the St. Jacobs and Elmira Pressure Supply Optimization Study completed in 2018.

The pressure zone reconfiguration will extend the Elmira East pressure zone boundary and reduce the areas of high pressure which are currently experienced in southeast Elmira. Further, the pressure zone reconfiguration strategy includes additional infrastructure at the Howard Tank and Pump Station to allow the Elmira East pressure zone to be supplied directly from the Howard Tank rather than via the four PRVs transferring flow from the Elmira West pressure zone, which will serve to reduce existing operational efficiencies. The Region is currently completing design and construction for several projects related to the Elmira pressure zone boundary reconfiguration. For the purposes of this study, the Elmira pressure zone reconfiguration was assumed to be completed under the future scenario, but not under the existing conditions.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Watermains
- <=300 mm
- 400-825 mm

Existing Water Facilities
- Pressure Reducing Valve
- Pump Station and Storage
- Storage

Other Features
- Elmira East Existing Pressure Zone
- Elmira East Future Pressure Zone Expansion
- Watercourse
- Parcels
- Settlement Area Boundary
- Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

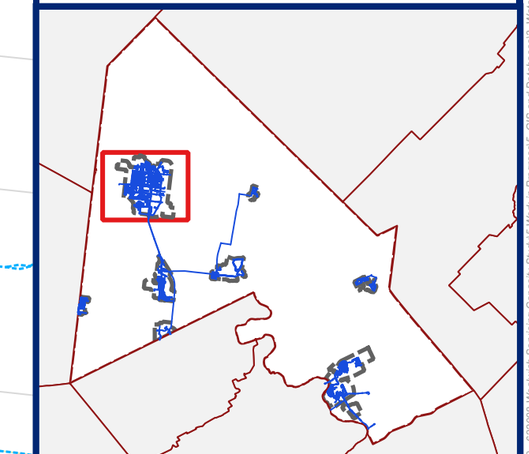


Figure 5-1

Existing Water System

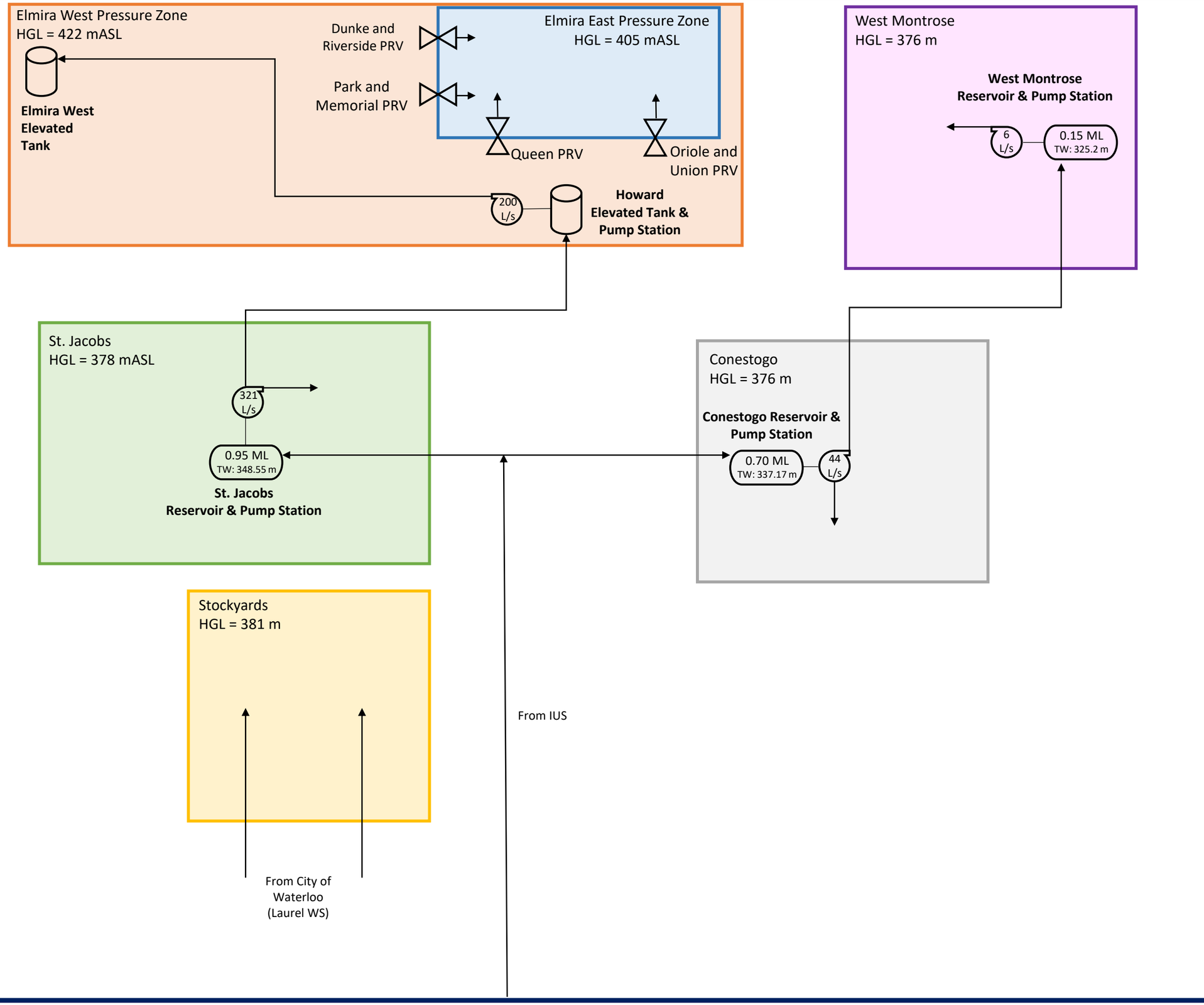
Elmira

GEI Consultants

April, 2025
622098-W-001
Projection EPSG:26917

0 0.7 1.4 km

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Volume TWL — Reservoir

Well

Water Treatment Plant

Firm Capacity — Pump

Existing Treatment Capacity — Water Supply System

Floating Storage

Pressure Reducing Valve

Flow Direction

ZONES

- Elmira West Pressure Zone
- Elmira East Pressure Zone
- St. Jacobs
- Stockyards
- Conestogo
- West Montrose

Elmira, St. Jacobs, Stockyards, Conestogo, and West Montrose

Figure 5-2
Existing Water System Schematic

GEI Consultants

September 2023
622098

5.4.2 Assessment of Existing Township Water Infrastructure

Table 5-11 summarizes the existing system performance within Elmira. System performance mapping is presented in **Appendix B**.

Table 5-11: Summary of Existing System Performance – Elmira

System Performance Metric	Level of Service Target	Existing System Performance
System Pressures	40 – 100 psi	• High pressures in the 90 to >100 psi range in southeast Elmira, to be addressed through Elmira pressure zone boundary reconfiguration. • Pressures generally within 50 – 100 psi range, lower pressures on west side of Elmira.
Available Fire Flow	Fire flow targets by Land Use	• Existing fire flow deficiencies in northeast Elmira (northeast of Church Street East and Arthur Street North), based on industrial land use type. • Existing fire flow deficiencies on dead end residential streets (north of Whippoorwill Drive and south of First Street West). • Existing fire flow deficiencies on dead-end industrial streets (Bonnie Crescent, First Street East, Mill Street).
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.4.3 Assessment of Growth Impacts

Table 5-12 summarizes the future system performance within Elmira.

Table 5-12: Summary of Future System Performance – Elmira

System Performance Metric	Level of Service Target	Future System Performance
System Pressures	40 – 100 psi	• Elmira pressure zone boundary reconfiguration assumed to be completed (Region works are currently ongoing). • Pressures generally within 50 – 100 psi range, lower pressures on west side of Elmira.

Available Fire Flow	Fire flow targets by Land Use	• Existing fire flow deficiencies presented in previous section.
		  ○ Northeast Elmira (northeast of Church Street East and Arthur Street North), based on industrial land use type.
		  ○ Existing fire flow deficiencies on dead end residential streets (north of Whippoorwill Drive and south of First Street West).
		  ○ Existing fire flow deficiencies on dead-end industrial streets (Bonnie Crescent, First Street East, Mill Street).
		• Additional fire flow deficiencies in northeast Elmira based on assumption of future employment land use and at existing dead-ends near future residential and employment growth areas.

Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.4.4 Servicing Alternatives and Evaluation

5.4.4.1 Upgrades to Address Existing and Future Fire Flow Deficiencies

5.4.4.1.1 Northeast Elmira

To address the existing and future fire flow deficiencies in northeast Elmira (north east of Church Street East and Arthur Street North), watermain upgrades to 300 mm are recommended along the following alignments, as shown in **Figure 5-3**:

- Arthur St N from Riverside Dr W to the existing dead-end watermain on Arthur Str N
- Martins Ln from Arthur St. N to High St
- High St from Martins Ln to Church St E
- First St E from Duke St to Union St

Note that some of these alignments serve to complete a continuous 300 mm watermain from the Howard Tank and Pump Station to northeast Elmira along First Street, Union Street, Erb Street, and Duke Street. This will provide increased flow capacity to the growth areas in northeast Elmira. Portions of the existing watermain along this alignment are already 300 mm pipes, however, there are sections of smaller diameter watermain which need to be upgraded to address existing bottlenecks.

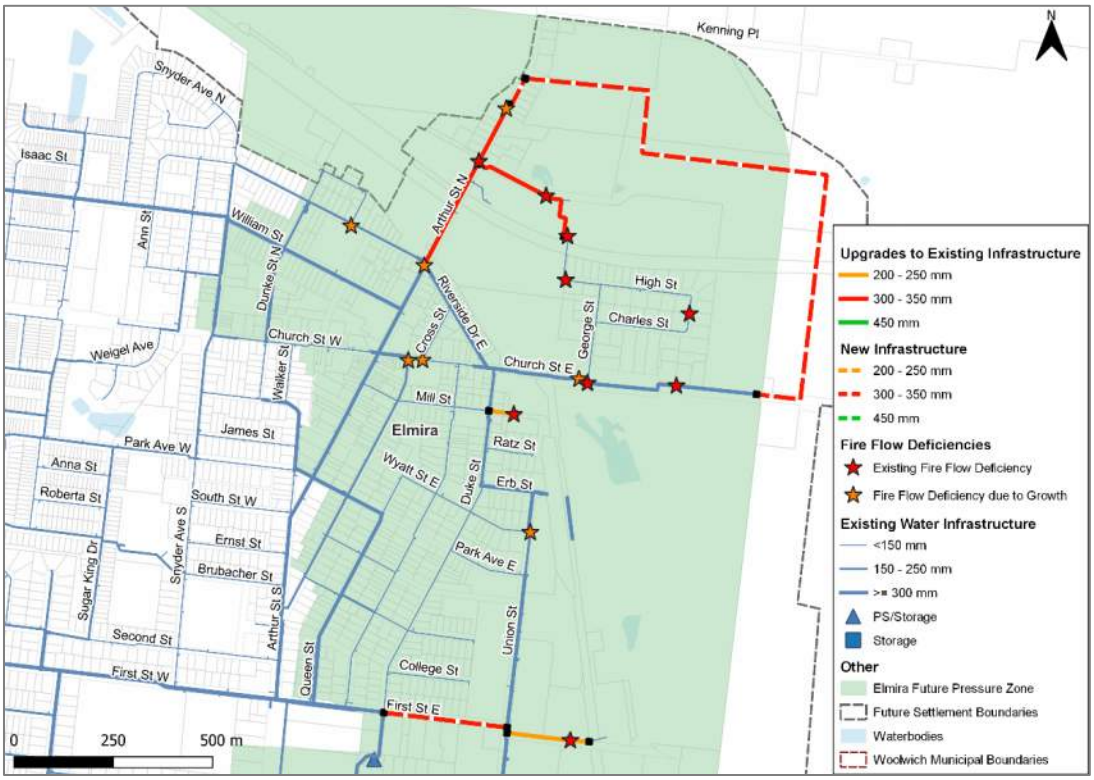


Figure 5-3: Watermain Upgrades to Address Existing and Future Fire Flow Deficiencies in Northeast Elmira

5.4.4.1.2 Dead End Residential Streets

To address the existing fire flow deficiencies on dead end residential streets (north of Whippoorwill Drive and south of First Street West), presented in **Figure 5-4**, the following options were discussed with Township staff.

- **Option 1:** Replace dead-end cast iron watermains with PVC watermains to achieve 75 L/s targets.
- **Option 2:** Decrease residential dead-end fire flow target to 50 L/s.

Through discussion with the Township, Option 2: Decrease residential dead-end fire flow target to 50 L/s was selected to be the preferred option to address existing fire flow deficiencies on dead end residential streets. Reduction of fire flow targets for dead end residential watermains has been adopted by other municipalities in southern Ontario. Cast iron watermains can continue to be replaced through a state of good repair program.

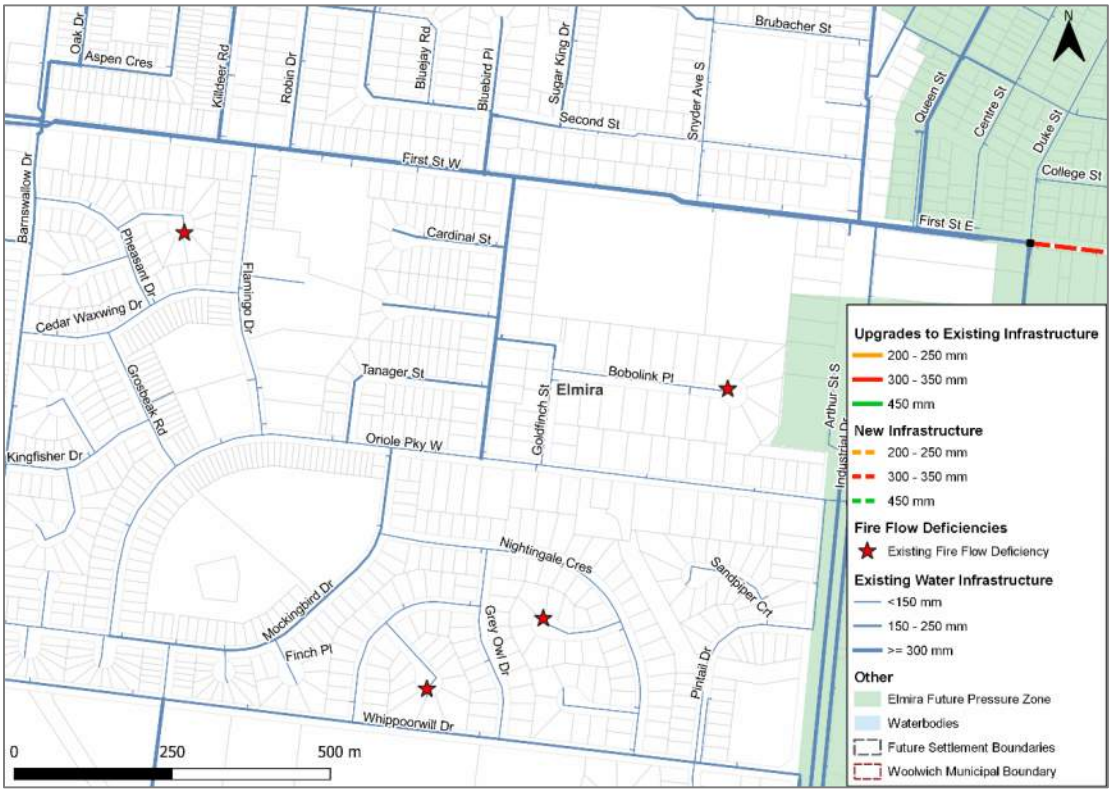


Figure 5-4: Existing Fire Flow Deficiencies on Dead End Residential Watermains

5.4.4.1.3 Dead End Industrial Streets

To address the existing fire flow deficiencies on dead-end industrial streets (Bonnie Crescent, First Street East, Mill Street), the following watermain upgrades are needed, as shown in **Figure 5-5:**

- Upgrade watermain on Mill St from Duke St to dead end on Mill St E to 200 mm.
- Upgrade watermain on Bonnie Cres to 250 mm.
- Upgrade watermain on First St E from Union St to dead end on First St E to 250 mm.



Figure 5-5: Watermain Upgrades to Address Existing Fire Flow Deficiencies in Industrial Areas - Elmira

5.4.4.2 Growth Servicing Strategy

The majority of the large greenfield growth areas are concentrated on the outskirts of the existing built-up area. The west side of the updated urban area boundary consists of large residential greenfield growth areas, while the east side of the updated urban area boundary consists of large employment greenfield growth areas.

Draft plans were not available for all planned future growth areas within the Township. Where draft plans were available, watermains were identified along planned road alignments. Some upgrades and/or extensions to the existing system are required to support the level and locations of planned future growth. Further, for large growth areas, mid-block trunk servicing strategies were identified. The alignments of the mid-block trunk servicing strategies are subject to change through the preliminary and detailed design processes for these developments. The intent of these projects within the SCS is to identify areas of system looping and watermain needs beyond the minimum watermain size that should be implemented to ensure future system resiliency.

Figure 5-6 presents an overview of planned growth areas within Elmira, and the general servicing strategies for the significant greenfield growth areas.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Greenfield Growth within ROPA6 UAB
- Employment
- Residential

Other Land Use
- Official Plan - Open Space Area
- Environmental Protection
- Environmental Restricted Area

Existing Water Infrastructure
- <150 mm
- 150 - 250 mm
- >= 300 mm

Other
- Rail Line
- Watercourse
- ROPA6 Urban Area Boundary (UAB)
- Municipal Boundary
- Potential Water Servicing

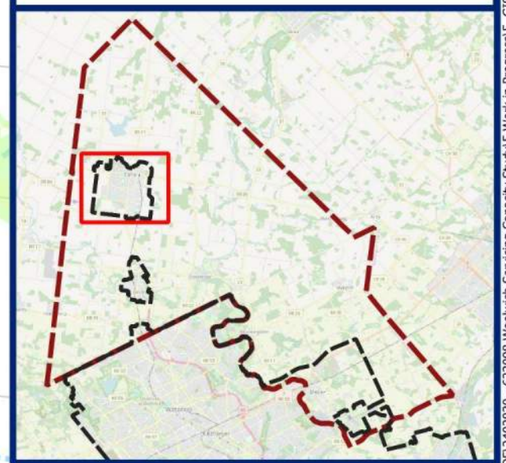


Figure 5-6

Growth Servicing Strategy

Elmira

GEI Consultants

April, 2025
622098-G-001
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5.4.5 Preferred Water Capital / DC / Developer Program

Table 5-13 and **Figure 5-7** present the preferred water capital / DC / developer program for Township infrastructure within Elmira. The alignments presented in the capital / DC / developer program are subject to change based on revised development growth strategies, potential future road alignments, funding allocations, and other factors.

Table 5-13: Preferred Water Capital / DC / Developer Program – Elmira

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
W-M-ELM-001	Upgrade WM along Arthur St N from Riverside Dr W to end of existing Arthur St N	444	300	2024 - 2033	$1,471,900	Addresses Existing Deficiency - Recommend completing before neighboring growth. Align with Region Rd improvements and new sanitary installation.	-
W-M-ELM-002	Upgrade WM along Martins Ln to High St	342	300	2024 - 2033	$1,017,415	Align with new industrial development on Martin's Lane.	-
W-M-ELM-004	New WM along Arthur St N to Northeast Greenfield Growth	89	300	2024 - 2033	$264,450	Site Development application. Internal Servicing Works	With W-M-ELM-005
W-M-ELM-005	New WM in Northeast Greenfield Growth connecting from Arthur St N and Church St E	1,620	300	2034 - 2051	$4,035,425	Site Development application. Internal Servicing Works	With W-M-ELM-004
W-M-ELM-009	New WM along Church St W to service west Greenfield Growth Development	665	300	2024 - 2033	$1,657,425	Flexible Timing – potential timing with Regional Church Street project.	-
W-M-ELM-010	New WM through West Greenfield Growth from Church St W to West Tank	939	300	2024 - 2033	$2,463,075	Site Development application. Internal Servicing Works	After W-M-ELM-009
W-M-ELM-011	New WM in West Greenfield Growth Development from West Tank to South Parkwood Blvd Extension	1,265	300	2034 - 2051	$3,274,875	Site Development application. Internal Servicing Works	After W-M-ELM-010 and -009, or After -012
W-M-ELM-012	New WM Extension along South Parkwood Blvd to West Greenfield Growth	1,022	300	2034 - 2051	$2,670,125	Site Development application. Internal Servicing Works	-
W-M-ELM-014	New WM Connection from Whippoorwill Dr to South Parkwood Blvd	429	200	2034 - 2051	$1,069,075	Site Development application. Internal Servicing Works	-
W-M-ELM-015	New WM extension from Timber Trail Rd and connecting to Greenfield Growth	693	300	2034 - 2051	$1,850,125	Site Development application. Internal Servicing Works	-
W-M-ELM-016	New WM connection from Kingfisher Dr. to west Greenfield Growth WM	342	200	2034 - 2051	$851,775	Site Development application. Internal Servicing Works	-
W-M-ELM-017	New WM along Scotch Line Rd from Arthur St S	1,555	300	2024 - 2033	$3,872,450	Site Development application. Internal Servicing Works	After / In conjunction with W-M-ELM-021 or W-M-ELM-018
W-M-ELM-018	New WM from Scotch Line Rd to Southeast Greenfield Growth Development	1,190	300	2024 - 2033	$2,964,300	Site Development application. Internal Servicing Works	After W-M-ELM-019
W-M-ELM-019	Extension of Southfield Dr WM Eastwards	696	300	2024 - 2033	$2,035,650	Site Development application.	-
W-M-ELM-020	Upgrade WM along First Street East from Duke St to Union St	313	300	2034 - 2051	$932,238	Timing flexible - addresses existing deficiency	-
W-M-ELM-021	Replacement of abandoned WM along Arthur St S	812	300	2024 - 2033	$2,147,375	Site Development application or Region Capital Project	-
W-M-ELM-023	Upgrade WM on Mill St from Duke St to Mill St East Dead End	59	200	2024 - 2033	$174,250	Timing flexible - addresses existing deficiency	-
W-M-ELM-025	Upgrade WM on Bonnie Crescent from Union St to Bonnie Cres Dead End	216	250	2034 - 2051	$642,675	Timing flexible - addresses existing deficiency	-

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)(1)	Project Triggers	Project Dependencies
W-M-ELM-026	Upgrade WM on Howard Ave from Howard Tank Connection to Industrial Dr	155	350	2034 - 2051	$461,455	Timing flexible - addresses existing deficiency	-
W-M-ELM-028	Upgrade WM on First Street E from Union St to First Street East Dead end	292	250	2024 - 2033	$870,225	Timing flexible - addresses existing deficiency	-
W-M-ELM-029	New WM from Listowel Rd to west greenfield growth	477	300	2034 - 2051	$1,313,025	With surrounding developments	After W-M-ELM-015 or W-M-ELM-012
W-M-ELM-030	New WM from Church St W to Eldale Rd dead-end	499	200	2024 – 2033	$1,241,275	Site Development application. Internal Servicing Works	After W-M-ELM-009
W-M-ELM-031	New WM from Eldale Rd looping to Church St W	819	200	2024 – 2033	$2,038,725	Site Development application. Internal Servicing Works	After W-M-ELM-009
	Elmira Total	**14,932**	**-**	**-**	**$39,319,308**	**-**	**-**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Upgrades to Existing Infrastructure
- 200 - 250 mm
- 300 - 350 mm
- 450 mm

New Infrastructure
- 200 - 250 mm
- 300 - 350 mm
- 450 mm

Existing Infrastructure
- <= 300 mm
- > 300 mm

Other Features
- Future Expanded Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

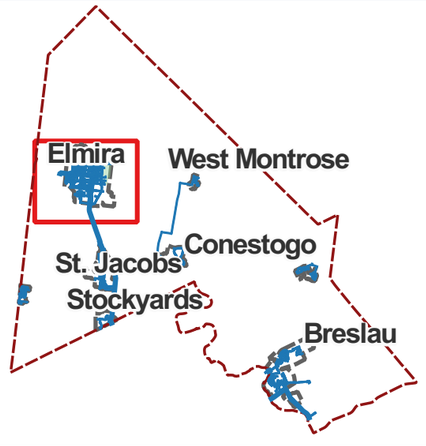


Figure 5-7

Water Capital Program

Elmira

GEI Consultants

April, 2026
622098-W-001
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0 0.9 1.8 km

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5.5 St. Jacobs

5.5.1 Existing Water System Overview

The St. Jacobs water system consists of a single pressure zone. Water is transferred to the St. Jacobs system from the IUS (Waterloo pressure zone Wat 4) via a 600 mm diameter Regional transmission main which supports the St. Jacobs Reservoir and Pump Station. The St. Jacobs Reservoir and Pump Station supply the St. Jacobs pressure zone via PRV on King Street North and also supplies Elmira via Regional transmission main. The target HGL for the St. Jacobs pressure zone is 381 mASL, however, based on available SCADA and field data, the observed HGL is approximately 378 mASL, controlled by the PRV on King Street North. There is an existing connection from the Wat 4 Regional transmission main to the local St. Jacobs system on Old Scout Place, however, this water valve connection is normally closed.

Figure 5-8 and **Figure 5-9** present the existing system map and schematic.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Watermains
- <=300 mm
- 400-825 mm

Existing Water Facilities
- Pressure Reducing Valve
- Pump Station and Storage
- Storage

Other Features
- Elmira East Existing Pressure Zone
- Elmira East Future Pressure Zone Expansion
- Watercourse
- Parcels
- Settlement Area Boundary
- Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

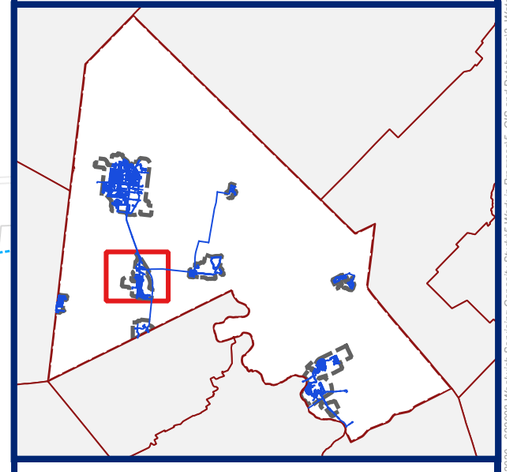


Figure 5-8

Existing Water System

St. Jacobs

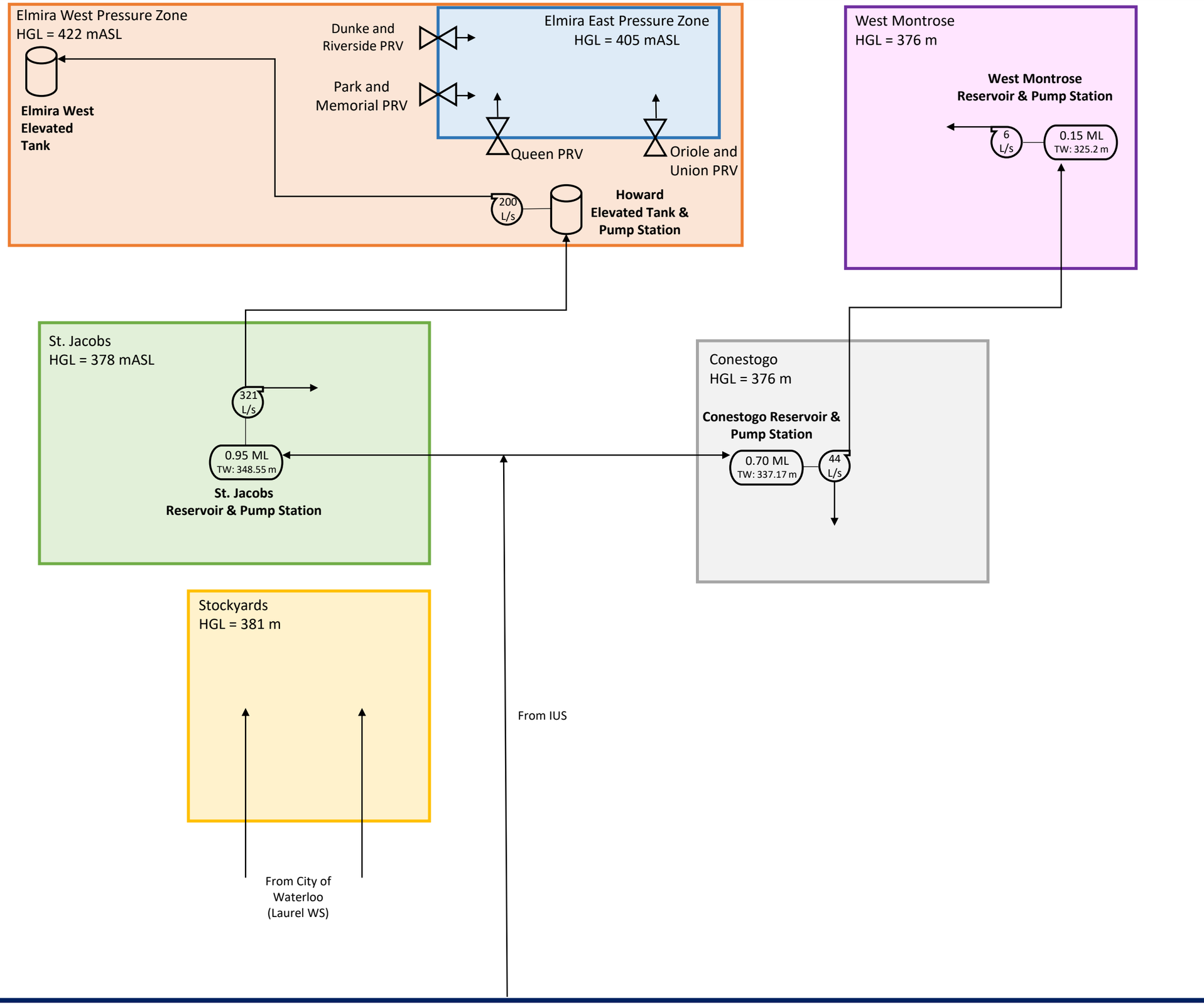
GEI Consultants

April, 2025
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0 0.5 1 km

Hawkesville Rd
Waterloo Central Railway
St Jacobs BPS and RSVR
St Jacobs PRV
Northside Dr
King St N
Sawmill Rd
Sawmill Rd
New Jerusalem Rd
Eby St
Front St
Conestogo River
Three Bridges Rd
Conestogo River
Conestogo River
Henry St
Three Bridges Rd
Bo-De Lane
Queensway Dr
Waterloo Central Railway
Young St
Water St
Maplelawn Dr
Treeview Dr
Parkhaven Dr
Printery Rd
Old Scout Pl
Arthur St S

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Volume TWL — Reservoir
Well
Water Treatment Plant
Firm Capacity — Pump
Existing Treatment Capacity — Water Supply System
Floating Storage
Pressure Reducing Valve
Flow Direction

ZONES

- Elmira West Pressure Zone
- Elmira East Pressure Zone
- St. Jacobs
- Stockyards
- Conestogo
- West Montrose

Elmira, St. Jacobs, Stockyards, Conestogo, and West Montrose

Figure 5-9
Existing Water System Schematic

GEI Consultants

September 2023
622098

5.5.2 Assessment of Existing Township Water Infrastructure

Table 5-14 summarizes the existing system performance within St. Jacobs. System performance mapping is presented in **Appendix B**.

Table 5-14: Summary of Existing System Performance – St. Jacobs

System Performance Metric	Level of Service Target	Existing System Performance
System Pressures	40 – 100 psi	• Lower pressures in the 40 – 50 psi range in the areas north of Conestogo River and the areas south of Abners Lane due to high ground elevations in relation to the system HGL. • Remainder of the St. Jacobs pressure zone is within the 50 – 80 psi range.
Available Fire Flow	Fire flow targets by Land Use	• Existing fire flow deficiencies located on dead-end watermains (King Street North, Sawmill Road at Park Side Drive, Eby Street, Henry Street) – commercial and industrial lands use.
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.5.3 Assessment of Growth Impacts

Table 5-15 summarizes the future system performance within St. Jacobs.

Table 5-15: Summary of Future System Performance – St. Jacobs

System Performance Metric	Level of Service Target	Future System Performance
System Pressures	40 – 100 psi	• Lower pressures in the 40 – 50 psi range in the areas north of Conestogo River and the areas south of Abners Lane due to high ground elevations in relation to the system HGL. • Remainder of the St. Jacobs pressure zone is within the 50 – 80 psi range.
Available Fire Flow	Fire flow targets by Land Use	• Existing fire flow deficiencies presented in previous section. ○ Existing fire flow deficiencies located on dead-end watermains (King Street North, Sawmill Road at Park Side Drive, Eby Street, Henry Street) – commercial and industrial lands use. • No additional fire flow deficiencies noted as a result of proposed growth.
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.5.4 Servicing Alternatives and Evaluation

5.5.4.1 Options to Address Low System Pressures – St. Jacobs

The existing system HGL for the St. Jacobs pressure zone is approximately 378 mASL, which is controlled by the discharge PRV on King Street North, outside of the St. Jacobs Reservoir and Pump Station. System pressures between 40 and 50 psi are experienced within St. Jacobs in the areas north of the Conestogo River and the areas south of Abners Lane due to high ground elevations in relation to the system HGL.

An increase in the system HGL to 385 mASL was recommended for the St. Jacobs pressure zone through the Region's WSDOMP and the Region's St. Jacobs and Elmira Supply Optimization Study. This increase in HGL has not yet been implemented due to concerns of potential high pressures and increased risk of watermain breaks due to the age and condition of watermains within St. Jacobs. This risk is partially mitigated by the watermain connection between the Regional transmission main and the local St. Jacobs system on Old Scout Place, as this would serve as a secondary supply connection to the system in the event of a watermain break on a critical supply watermain (e.g., across the Conestogo River). **Table 5-16** presents the distribution of pressure across model junctions within St. Jacobs under the current 378 mASL HGL and the potential increase to 385 mASL.

Table 5-16: Pressure Comparison of Existing and Increased HGL within St. Jacobs

Pressure Range	Percentage of Model Junctions	
	Existing HGL (378 mASL)	Increased HGL (385 mASL)
< 40 psi	1%	0%
40-50 psi	**51%**	0%
50-80 psi	**47%**	**85%**
80-100 psi	0%	**15%**
>100 psi	0%	0%

Through discussions with SCS project team, including representatives from Township engineering and operations staff and the Region, it was determined that the existing HGL should be maintained. Historic user complaints have not been received within the St. Jacobs community regarding low system pressure. If future complaints are received, the Township and Region may reconsider the option to increase HGL for the system.

5.5.4.2 Upgrades to Address Existing and Future Fire Flow Deficiencies

To address the existing and future fire flow deficiencies within St. Jacobs, a check valve on Old Scout Place was considered to provide additional fire flow capacity from the Regional transmission main on Arthur Street North. A check valve at this location was previously considered by the Township and the Region, however, it was determined that a closed valve would be preferred at this location. This was confirmed by modelling analysis as the HGL within the St. Jacobs system and the Wat 4 system is not significantly different. As such, flow through the check valve would be expected under typical conditions, resulting in a need for an additional boundary meter between the Township and Region systems. Given that the Region of Waterloo owned check valve is not a preferred option, it is recommended that a Standard Operating Procedure (SOP) be developed for the Regional transmission main connection and Region check valve at Old Scout Place, as the opening of this valve under fire flow conditions within St. Jacobs would serve to improve available fire flow capacity under existing and future conditions.

To address the existing and future fire flow deficiency on Sawmill Road at Park Side Drive, the following options were discussed with Township staff, presented in **Figure 5-10**.

- **Option 1:** Upgrade of existing watermains to support 250 L/s fire flow target.
- **Option 2:** Upgrade of existing watermains and new watermain across King Street N to provide additional looping to support the 250 L/s fire flow target.
- **Option 3:** New watermain across King Street N to provide additional looping, and reduction of the fire flow target to 150 L/s based on FUS calculations, as presented in **Table 5-17**.

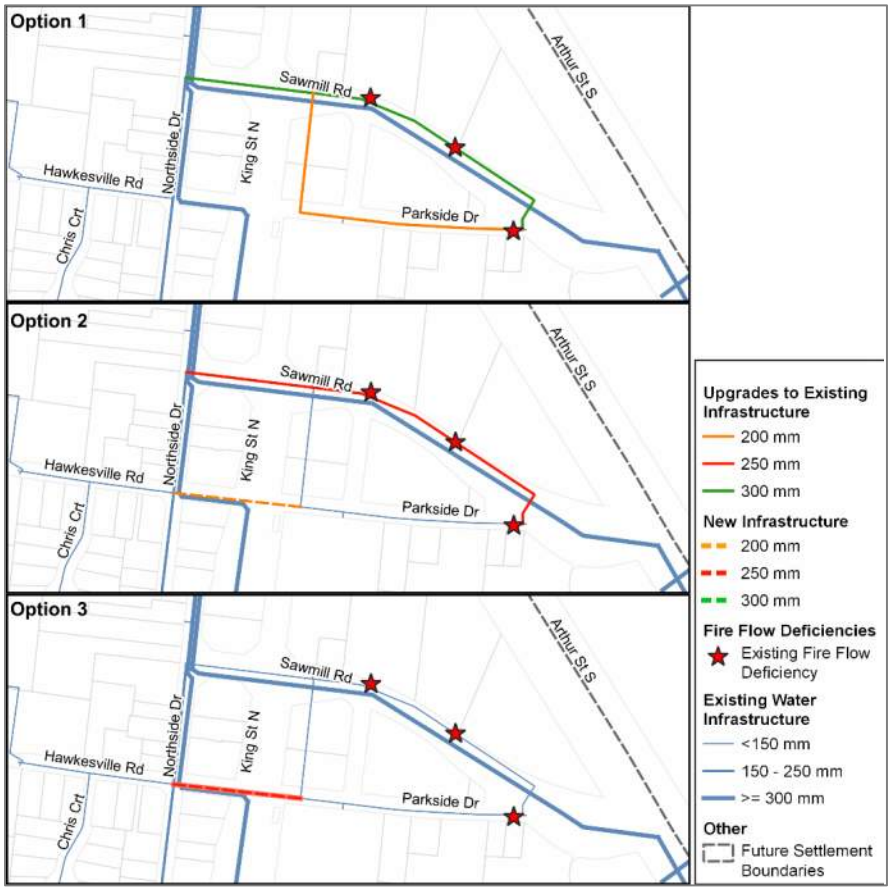


Figure 5-10: Options to Address Fire Flow Deficiencies on Sawmill Road at Park Side Drive

Table 5-17: Sawmill Road FUS Calculations

FUS Fire Flow Calculation	W.K. Dahms (Steel Fabricator)	A&F Souvenir (Wholesaler)	Weber's Fabricating	Pioneer Log Home
Construction Type Coefficient	0.8	0.8	1.0	1.0
Calculation Area (m^2)	2,140	3,000	1,650	650
Baseline Fire Flow (L/min)	8,000	10,000	9,000	6,000
Occupancy Charge/Credit	-15%	0	-15%	-15%
Sprinkler Credit	-30%	-30%	-30%	0%
Exposure Charge	45%	15%	25%	0%
Required Fire Flow (L/min)	7,820	8,500	7,268	5,100
Required Fire Flow (L/s)	**133**	**150**	**117**	**83**

Through discussion with the Township, Option 3: New watermain across King Street N to provide additional looping, and reduction of the fire flow target to 150 L/s was selected to be the preferred option to address the fire flow deficiencies on Sawmill Road at Park Side Drive. A detailed FUS calculation allowed the fire flow target to be reduced, avoiding the need to complete watermain upgrades along the Sawmill Road alignment, which has seen recent construction activities. The detailed FUS calculation can be found in **Appendix H**.

There is an existing fire flow deficiency at the dead-end watermain on Eby Street, which has a fire flow target of 150 L/s (institutional land use). The watermain on Eby Street is recommended to be upgraded to 200 mm to achieve the fire flow target. **Figure 5-11** presents the location of the deficiency on Eby Street and the recommended watermain upgrade.

The existing fire flow deficiencies at the dead-end watermains on King Street N and Henry Street can be addressed through future watermain looping through growth areas, as shown in **Figure 5-12**.

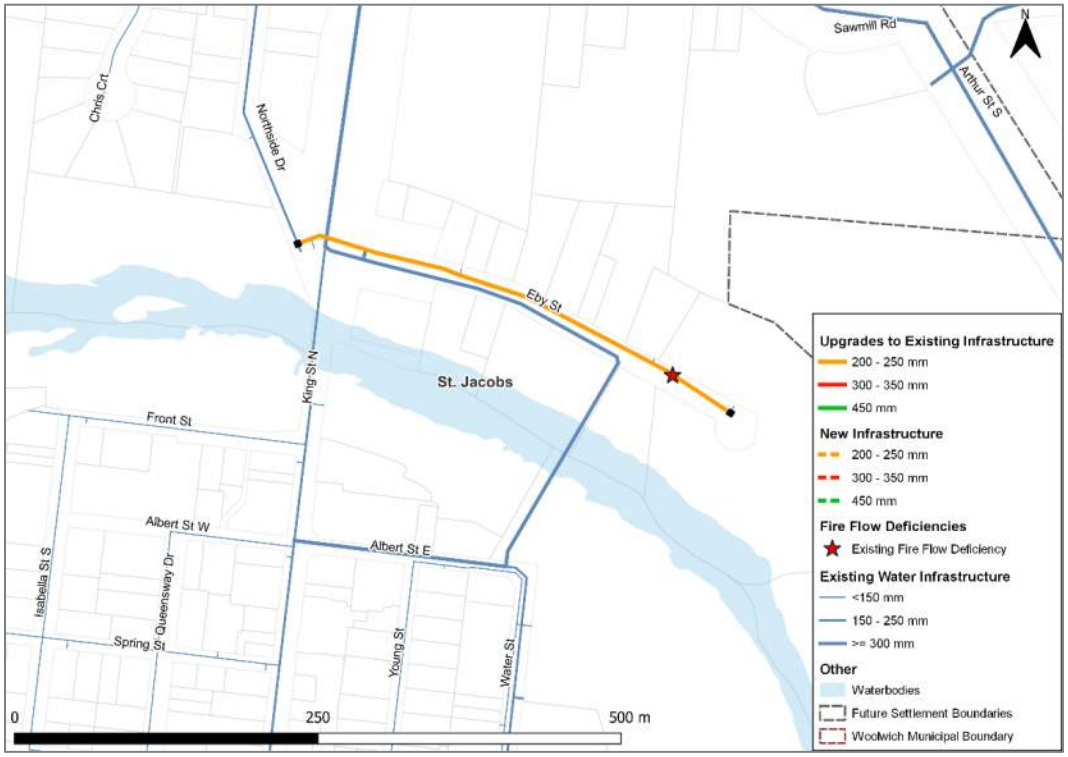


Figure 5-11: Upgrade Recommendation to Address Fire Flow Deficiency on Eby Street

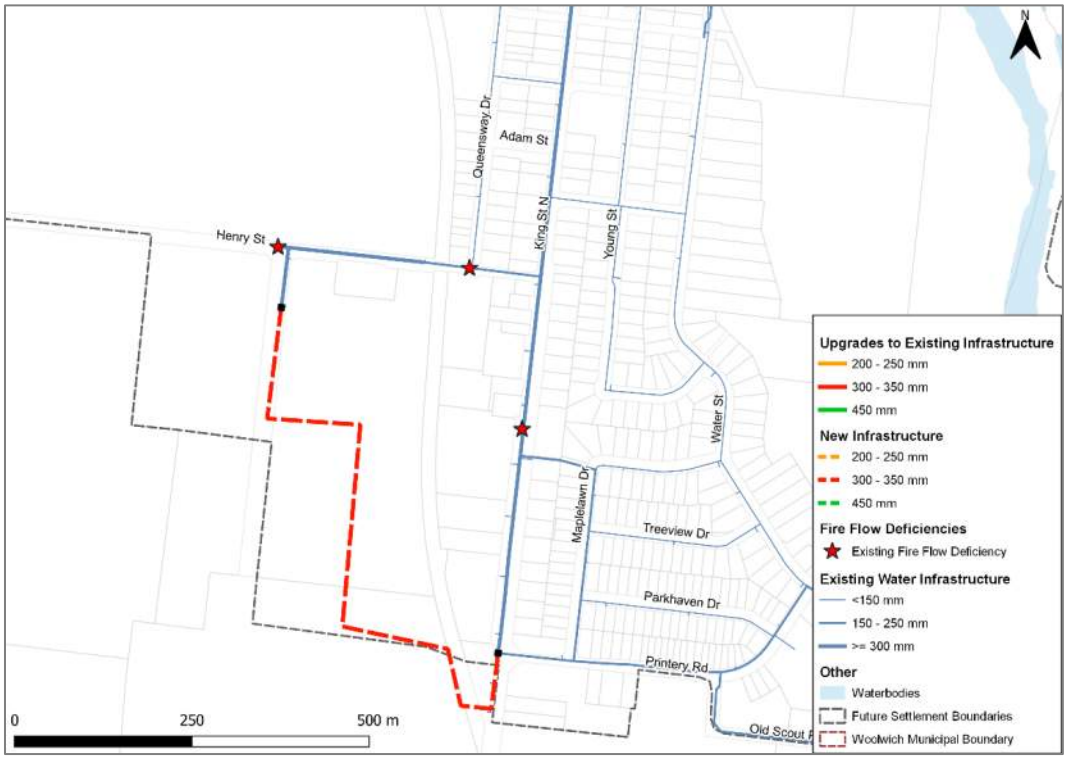


Figure 5-12: Fire Flow Deficiencies on King Street and Henry Street

5.5.4.3 Growth Servicing Strategy

The larger greenfield growth areas are concentrated on the outskirts of the existing built-up area. There is a large residential greenfield area in the northwest of St. Jacobs, and some employment greenfield area in the southwest of St. Jacobs.

Draft plans were not available for all planned future growth areas within the Township. Where draft plans were available, watermains were identified along planned road alignments. Some upgrades and/or extensions to the existing system are required to support the level and locations of planned future growth. Further, for large growth areas, mid-block trunk servicing strategies were identified. The alignments of the mid-block trunk servicing strategies are subject to change through the preliminary and detailed design processes for these developments. The intent of these projects within the SCS is to identify areas of system looping and watermain needs beyond the minimum watermain size that should be implemented to ensure future system resiliency.

Figure 5-13 presents an overview of planned growth areas within St. Jacobs, and the general servicing strategies for the significant greenfield growth areas.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

St. Jacobs Reservoir and BPS

Hawkesville Rd
Waterloo Central Railway
King St N
Northside Dr
Sawmill Rd
Sawmill Rd
New Jerusalem Rd
Eby St
Front St
Conestogo River
Queensway Dr
Arthur St S
Three Bridges Rd
Conestogo River
Conestogo River
Henry St
Waterloo Central Railway
Young St
Water St
Maplelawn Dr
Parkhaven Dr
Printery Rd
Old Scout Pl
Bo-De Lane
Three Bridges Rd

0 0.5 1 km

Greenfield Growth within ROPA6 UAB
- Employment
- Residential

Other Land Use
- Official Plan - Open Space Area
- Environmental Protection
- Environmental Restricted Area

Existing Water Infrastructure
- <150 mm
- 150 - 250 mm
- >= 300 mm

Other
- Rail Line
- Watercourse
- ROPA6 Urban Area Boundary (UAB)
- Municipal Boundary
- Potential Water Servicing

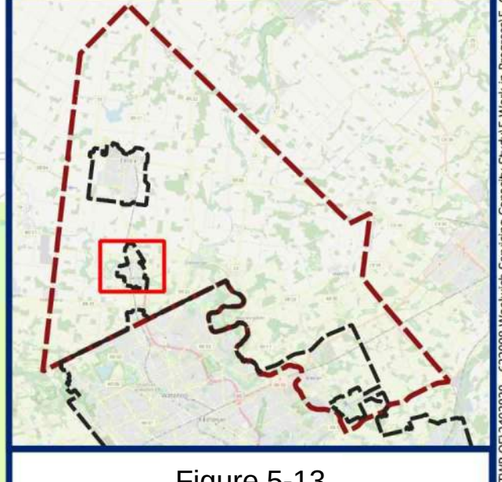


Figure 5-13

Growth Servicing Strategy

St. Jacobs

GEI Consultants

April, 2025
622098-G-001
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5.5.5 Preferred Water Capital / DC / Developer Program

Table 5-18 and **Figure 5-14** present the preferred water capital / DC / developer program for Township infrastructure within St. Jacobs. The alignments presented in the capital / DC / developer program are subject to change based on revised development growth strategies, potential future road alignments, funding allocations, and other factors.

Table 5-18: Preferred Water Capital / DC / Developer Program – St. Jacobs

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
W-M-STJ-001	Upgrade WM along King St N from St Jacobs Rsvr Connection to North King St N	236	200	2034 - 2051	$704,175	Addresses Existing Deficiency - recommend completing before neighboring growth	-
W-M-STJ-002	New WM through Northwest Greenfield Growth	709	200	2034 - 2051	$1,765,050	Site Development application. Internal Servicing Works	In conjunction or after W-M-STJ-003
W-M-STJ-003	Upgrade and extend WM along Hawkesville Rd from Northside Dr to North-West Greenfield Growth	281	200	2034 - 2051	$837,425	Site Development application.	-
W-M-STJ-004	Upgrade WM along Eby St from Northside Dr to Eby St Dead End	338	200	2024 - 2033	$1,005,730	Timing flexible - addresses existing deficiency	-
W-M-STJ-005	New WM through southwest Greenfield Growth Development	1,148	300	2034 - 2051	$3,162,125	1115 King Street North Development. Internal Servicing Works	-
W-M-STJ-006	New WM connection to Parkside Dr from Northside Dr	210	250	2024 - 2033	$959,298	Addresses Existing Deficiency - recommend completing before neighboring growth	-
St. Jacobs Total		**2,922**	**-**	**-**	**$8,433,803**	**-**	**-**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Upgrades to Existing Infrastructure
- 200 - 250 mm
- 300 - 350 mm
- 450 mm

New Infrastructure
- 200 - 250 mm
- 300 - 350 mm
- 450 mm

Existing Infrastructure
- <= 300 mm
- > 300 mm

Other Features
- Future Expanded Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

W-M-STJ-001 (200 mm)
W-M-STJ-002 (200 mm)
St Jacobs BPS and RSVR
St Jacobs PRV
W-M-STJ-003 (200 mm)
W-M-STJ-004 (200 mm)
W-M-STJ-005 (300 mm)
W-M-STJ-006 (250 mm)
King St N
Hawkesville Rd
Sawmill Rd
Front St
Conestogo River
Queensway Dr
Waterloo Central Railway
Young St
Water St
Maplelawn Dr
Parkhaven Dr
Printery Rd
Old Scout Pl
Henry St
Arthur St S
New Jerusalem Rd
Three Bridges Rd
Bo-De Lane

0 0.5 1 km

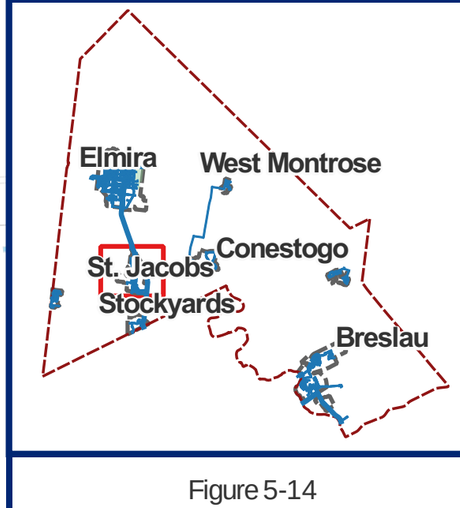


Figure 5-14

Water Capital Program

St. Jacobs

GEI Consultants

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5.6 Stockyards

5.6.1 Existing Water System Overview

The Stockyards water system is a part of the existing Wat 4 pressure zone within the City of Waterloo. Two existing watermain connections across the municipal boundary at Weber Street N and Kumpf Drive support the local Stockyards system. The existing target HGL for the Wat 4 and Stockyards pressure zone is 381 mASL.

Figure 5-15 and **Figure 5-16** present the existing system map and schematic.

The Region has a long-term water system management strategy to integrate the existing pressure zones Wat 4B, Wat 4C, and Wat 5 into a single pressure zone. This work was recommended and analysed through several previous studies, including the Region's 2015 WSDOMP, a Staging and Implementation Plan in 2016, the City of Waterloo's Water Distribution Master Plan in 2017, and the Region's Updated Consolidated of Waterloo North Pressure Zones which was completed in 2022 to reconfirm and update the proposed staging and implementation plan.

The pressure zone reconfiguration will expand the integrated Wat 5 pressure zone such that the Stockyards will be serviced via the Wat 5 pressure zone at a target HGL of 405 mASL rather than the Wat 4 pressure zone (381 mASL). The City of Waterloo and the Region are currently completing design and construction for several projects related to the consolidation of Waterloo north pressure zones. Proposed timing within the Region's 2022 report noted that the last watermain project for the Stockyards/Industrial Lands zone expansion is planned to begin in 2029, however, actual timing is subject to change. For the purposes of this study, the pressure zone reconfiguration was assumed to be completed under the future scenario, but not under the existing conditions.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Watermains
- <=300 mm
- 400-825 mm

Existing Water Facilities
- Pressure Reducing Valve
- Pump Station and Storage
- Storage

Other Features
- Elmira East Existing Pressure Zone
- Elmira East Future Pressure Zone Expansion
- Watercourse
- Parcels
- Settlement Area Boundary
- Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

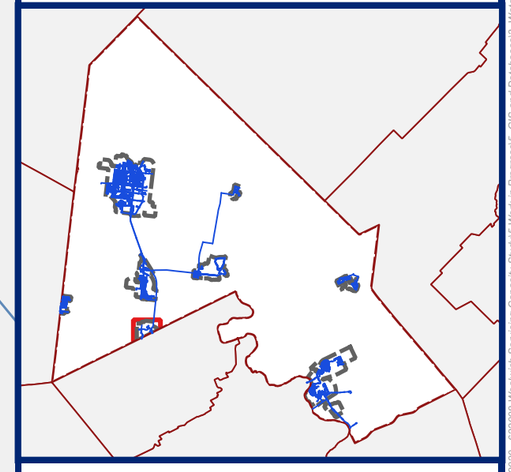


Figure 5-15

Existing Water System

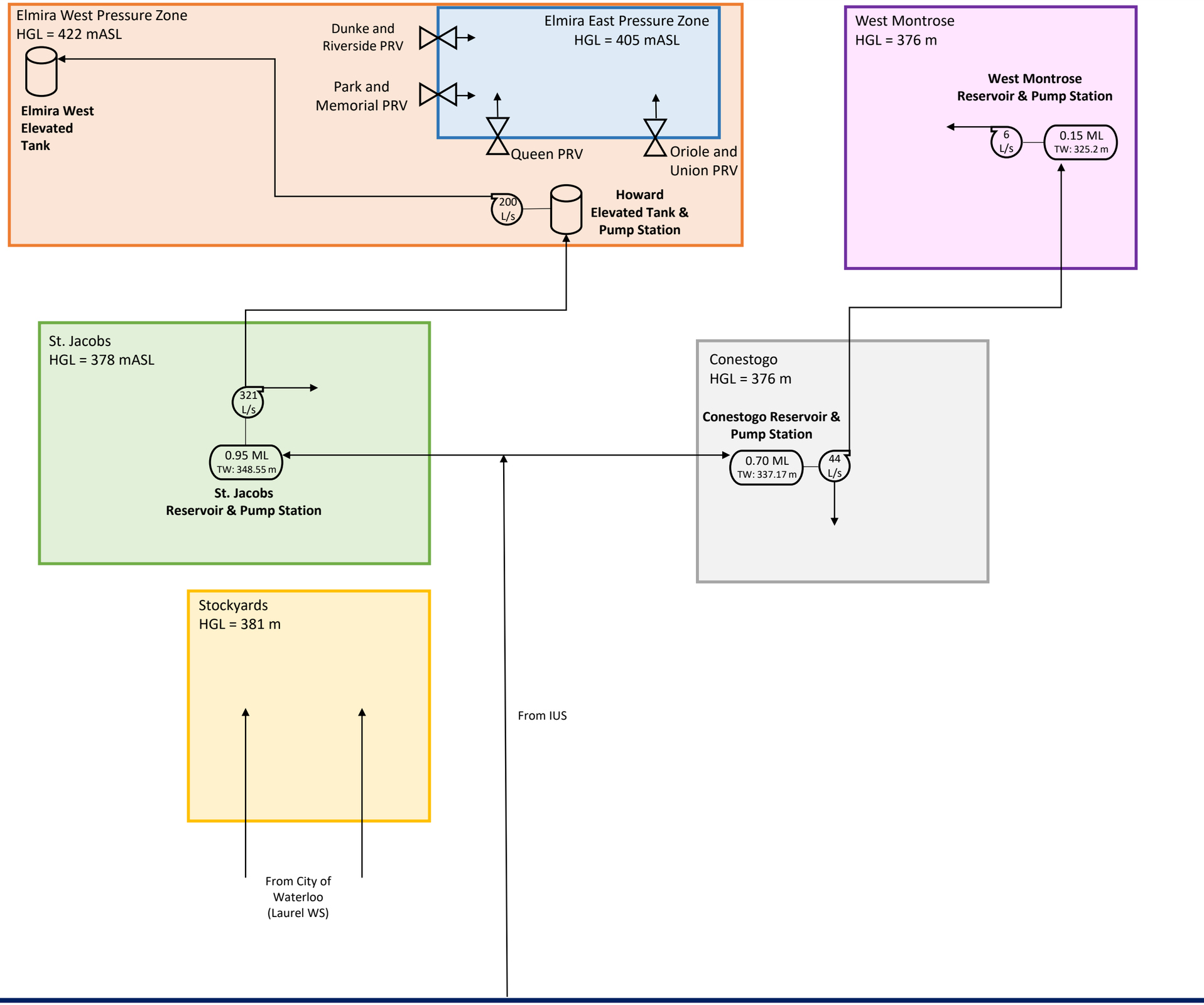
Stockyards

GEI Consultants

April, 2025
622098-W-001
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0 0.2 0.4 km

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Volume TWL — Reservoir

Well

Water Treatment Plant

Firm Capacity — Pump

Existing Treatment Capacity — Water Supply System

Floating Storage

Pressure Reducing Valve

Flow Direction

ZONES

- Elmira West Pressure Zone
- Elmira East Pressure Zone
- St. Jacobs
- Stockyards
- Conestogo
- West Montrose

Elmira, St. Jacobs, Stockyards, Conestogo, and West Montrose

Figure 5-16
Existing Water System Schematic

GEI Consultants

September 2023
622098

5.6.2 Assessment of Existing Township Water Infrastructure

Table 5-19 summarizes the existing system performance within Stockyards. System performance mapping is presented in **Appendix B**.

Table 5-19: Summary of Existing System Performance – Stockyards

System Performance Metric	Level of Service Target	Existing System Performance
System Pressures	40 – 100 psi	• Under ADD conditions, pressures are within the 50 – 80 psi pressure range. • Under MDD conditions, most pressures are within the 50 – 80 psi pressure range with some pressures in the 40 – 50 psi pressure range. • Lower MDD pressures are experienced due to system operations within the Wat 4 pressure zone.
Available Fire Flow	Fire flow targets by Land Use	• There are no existing fire flow deficiencies within the Stockyards.
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.6.3 Assessment of Growth Impacts

Table 5-20 summarizes the future system performance within Stockyards.

Table 5-20: Summary of Future System Performance – Stockyards

System Performance Metric	Level of Service Target	Future System Performance
System Pressures	40 – 100 psi	• Consolidation of Waterloo North pressure zones assumed to be completed. The Stockyards will be serviced off of the higher Wat 5 pressure zone. • Under ADD and MDD conditions, pressures range between 70 and 100 psi.
Available Fire Flow	Fire flow targets by Land Use	• There are no existing or future fire flow deficiencies within the Stockyards.
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.6.4 Servicing Alternatives and Evaluation

5.6.4.1 Existing System Needs

There are no existing system deficiencies within the Stockyards which require review of Township servicing alternatives.

5.6.4.2 Growth Servicing Strategy

Growth areas within the Stockyards area consist of employment land use only. There are two greenfield employment areas west of Weber Street North, and two areas immediately west and east of Highway 95, south of King Street North.

The Stockyards Secondary Plan identified servicing to the Stockyards to the east and west of Highway 85. The linear infrastructure for servicing these developments has an unknown timing as it is likely to occur as development occurs or with Regional capital project implementation.

The West Stockyards, west of Highway 85, will continue to be serviced through the existing feeds from the City of Waterloo at Kumpf Drive and Weber Street North, with extension of the water system to King Street North. Following the expansion of Wat 5, the West Stockyards will be serviced by Wat 5, which will improve system pressures as Wat 5 operates at a higher HGL than Wat 4. This recommendation aligns with the servicing recommendations that were made through the Region's 2022 Updated Consolidated of Waterloo North Pressure Zones study.

Based on the projected demands for the Stockyards area and the expected employment land use for the growth lands, the new watermains to service the growth areas should be sized at 300 mm diameter watermains.

As part of the Stockyards Secondary Plan, the Stockyards east of Highway 85 was planned to be serviced via a watermain extending from Colby Court, across Highway 85 to connect to the current Stockyards feed. Through discussion with the Township, the development east of Highway 85 has an alternative servicing plan with connection to Colby Court, without a watermain crossing of Highway 85. As noted through the Region's 2022 Updated Consolidated of Waterloo North Pressure Zones, there is opportunity to service this development via a local loop by extending the existing watermain in the City of Waterloo along King Street to connect to the Colby Court watermain connection. This option was not selected based on the servicing plan; however, it can be reconsidered in the future if there are plans to extend the watermain further north towards the Township of Woolwich along King Street North from the City of Waterloo.

Figure 7-17 presents an overview of planned growth areas within Stockyards, and the general servicing strategies for the significant greenfield growth areas.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Greenfield Growth within ROPA6 UAB
- Employment
- Residential

Other Land Use
- Official Plan - Open Space Area
- Environmental Protection
- Environmental Restricted Area

Existing Water Infrastructure
- <150 mm
- 150 - 250 mm
- >= 300 mm

Other
- Rail Line
- Watercourse
- ROPA6 Urban Area Boundary (UAB)
- Municipal Boundary
- Potential Water Servicing

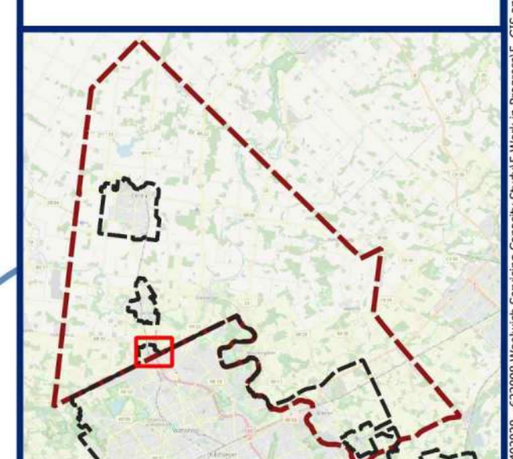


Figure 5-17

Growth Servicing Strategy

Stockyards

GEI Consultants

April, 2025
622098-G-001
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5.6.5 Preferred Water Capital / DC / Developer Program

Table 5-21 and **Figure 5-18** present the preferred water capital / DC / developer program for Township infrastructure within Stockyards. The alignments presented in the capital / DC / developer program are subject to change based on revised development growth strategies, potential future road alignments, funding allocations, and other factors.

Table 5-21: Preferred Water Capital / DC / Developer Program – Stockyards

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
W-M-STY-001	New WM through Weber St N from Benjamin Rd to Farmer's Market Rd	553	300	Post 2034	$1,378,625	With Region Capital Project	-
W-M-STY-002	New WM through Weber St N from Farmer's Market Rd to King St N	427	300	Post 2034	$1,063,950	With Region Capital Project	-
W-M-STY-003	Upgrade WM on Farmer's Market Rd from Weber St N to Benjamin Rd	102	300	Post 2034	$304,425	Site Development application. Internal Servicing Works	-
W-M-STY-004	New WM on Farmer's Market Rd to King St N	155	300	Post 2034	$460,225	Site Development application. Internal Servicing Works	-
W-M-STY-005	New WM along King St N from Weber St N to Farmer's Market Rd	708	300	Post 2034	$2,470,250	Site Development application. Internal Servicing Works	After W-M-STY-002 or W-M-STY-004
	Stockyards Total	**1,945**	**-**	**-**	**$5,677,475**	**-**	**-**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Upgrades to Existing Infrastructure
- 200 - 250 mm
- 300 - 350 mm
- 450 mm

New Infrastructure
- 200 - 250 mm
- 300 - 350 mm
- 450 mm

Existing Infrastructure
- <= 300 mm
- > 300 mm

Other Features
- Future Expanded Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

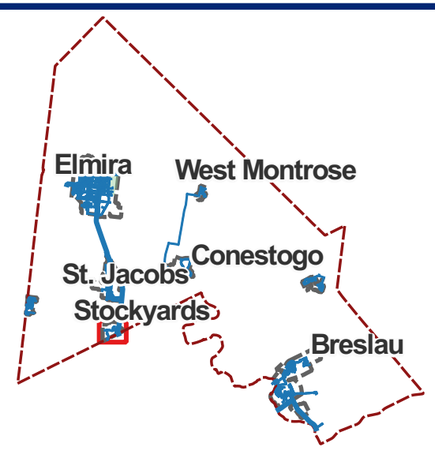


Figure 5-18

Water Capital Program

Stockyards

GEI Consultants

April, 2026
622098-W-001
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5.7 Breslau

5.7.1 Existing Water System Overview

The Breslau water system consists of a single pressure zone at an HGL of approximately 365 mASL. Two existing watermain connections with PRVs support the local Breslau system from the City of Kitchener water system (Kit 4 pressure zone). The Breslau North PRV is located on the 300 mm Regional watermain on Victoria Street and the Breslau South PRV is located on 450 mm Regional watermain that cross the Grand River from Ottawa Street N to Shallow Creek Road. Both PRVs are located on the east side of the Grand River. **Figure 5-19** and **Figure 5-20** present the existing system map and schematic.

The Region has a long-term water system management strategy to consolidate several pressure zones for the East Side Lands (ESL). The consolidated ESL pressure zone will include a small area from the existing Kit 4 pressure zone, Breslau, Cam 2W, and Kit 2E and will have a target HGL of 365 mASL (which aligns with the existing HGL of the Breslau pressure zone). This work was recommended and analysed through several previous studies, including the Region's 2014 Master Environmental Servicing Plan (MESP) for the ESL (Stage 1 Lands), the 2016 MESP for the ESL (Stage 2 Lands), and the Region's 2015 WSDOMP. Further details regarding the specific projects required to support the ESL pressure zone reconfiguration from the Kit 4 pressure zone side are presented in the Region's Kitchener Pressure Zone 4 Optimization study (2024).

While the planned pressure zone consolidation will affect the location of the pressure zone boundary in the future, the modelled future scenario was not updated to include the pressure zone consolidation and all associated infrastructure projects given that the target HGL will remain the same within Breslau for the future pressure zone configuration.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Watermains
- <=300 mm
- 400-825 mm

Existing Water Facilities
- Pressure Reducing Valve
- Pump Station and Storage
- Storage

Other Features
- Elmira East Existing Pressure Zone
- Elmira East Future Pressure Zone Expansion
- Watercourse
- Parcels
- Settlement Area Boundary
- Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

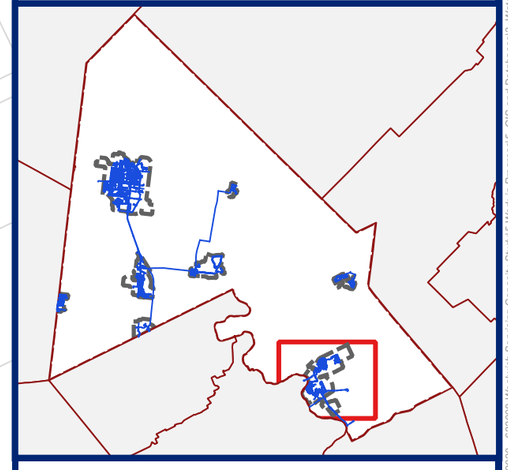


Figure 5-19

Existing Water System

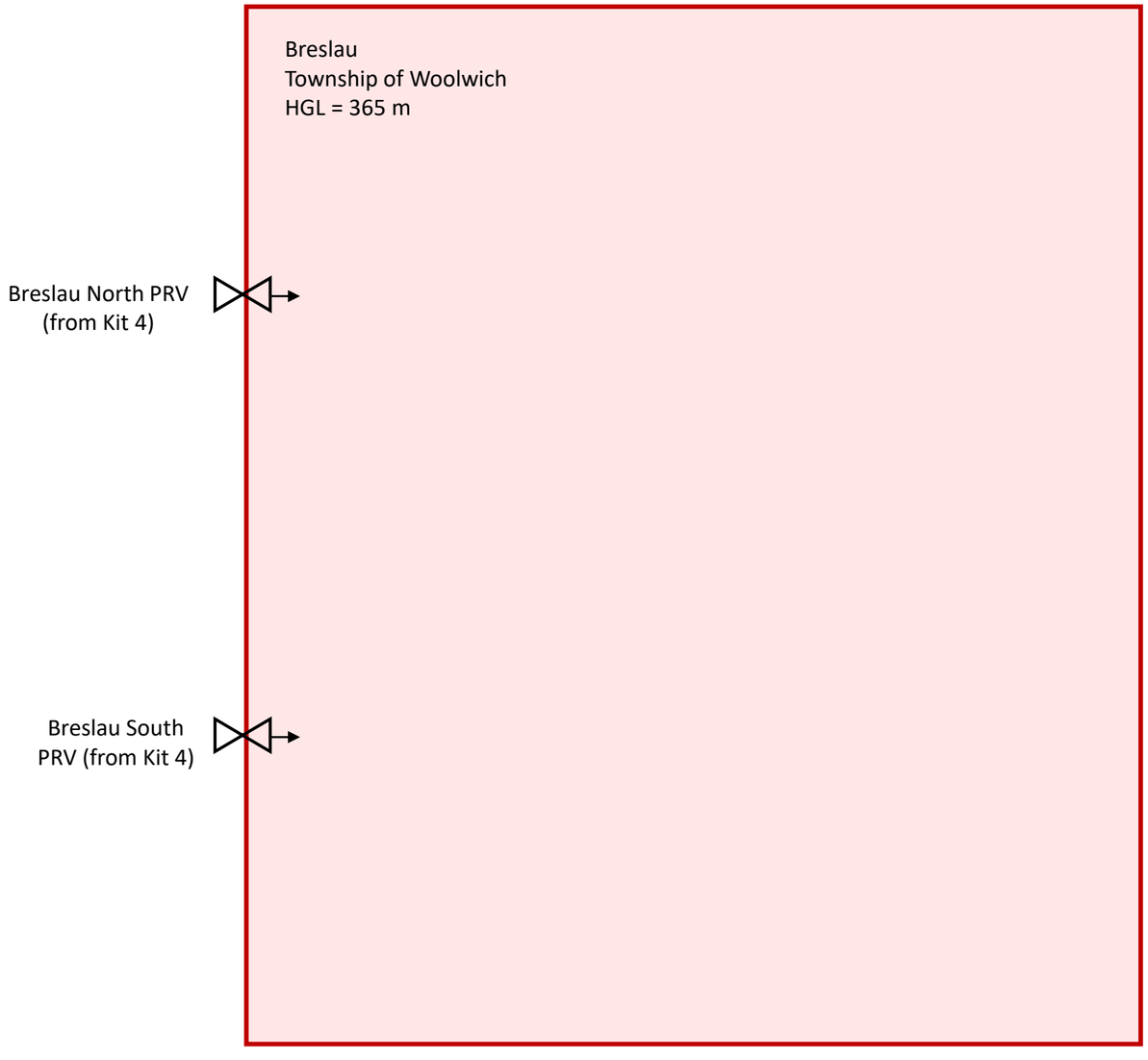
Breslau

GEI Consultants

April, 2025
622098-W-001
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0 0.9 1.8 km

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Volume TWL — Reservoir

Well

Water Treatment Plant

Firm Capacity — Pump

Existing Treatment Capacity — Water Supply System

Floating Storage

Pressure Reducing Valve

Flow Direction

ZONES

Breslau

Breslau

Figure 5-20
Existing Water System Schematic

GEI Consultants

September 2023
622098

5.7.2 Assessment of Existing Township Water Infrastructure

Table 5-22 summarizes the existing system performance within Breslau. Existing system performance mapping is presented in **Appendix B**.

Table 5-22: Summary of Existing System Performance – Breslau

System Performance Metric	Level of Service Target	Existing System Performance
System Pressures	40 – 100 psi	• System pressures generally within 50 – 80 psi range. • Pressures are lower in north Breslau due to higher ground elevations (50 – 60 psi range). • Pressures are higher closer to the Grand River due to lower ground elevations (80 – 90 psi range).
Available Fire Flow	Fire flow targets by Land Use	• Very few fire flow deficiencies within existing Breslau system, located at existing dead-end watermains on Cooper Crescent (residential land use) and on Menno Street (industrial land use)
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.7.3 Assessment of Growth Impacts

Table 5-23 summarizes the future system performance within Breslau.

Table 5-23: Summary of Future System Performance – Breslau

System Performance Metric	Level of Service Target	Future System Performance
System Pressures	40 – 100 psi	• System pressures generally within 40 – 80 psi range. • Pressures are lower in north Breslau due to higher ground elevations (40 – 50 psi range).
Available Fire Flow	Fire flow targets by Land Use	• No additional fire flow deficiencies noted as a result of proposed growth. • Significant growth planned in Breslau in the future, future watermains have been sized to accommodate fire flow needs based on assumed future land use (residential or employment)
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.7.4 Servicing Alternatives and Evaluation

5.7.4.1 Upgrades to Address Existing Fire Flow Deficiencies

Existing fire flow deficiencies within Breslau are located at the existing dead-end watermains on Cooper Street and on Menno Street.

The existing fire flow deficiency on Cooper Street shown in **Figure 5-21** will be addressed through future planned development watermain looping.

The existing deficiency on Menno Street is based on the industrial fire flow target of 250 L/s and is shown in **Figure 5-22.** The user at this location has completed fire flow testing to ensure that their specific fire flow needs are met. As such, upgrades to increase available fire flow at this location are not required or recommended. In the future, the fire flow capacity will be improved with broader system looping planned along Menno Street and upsizing of the 300mm watermain to 450mm along the Ottawa Street Extension from Woolwich St. S to Fountain St. N.

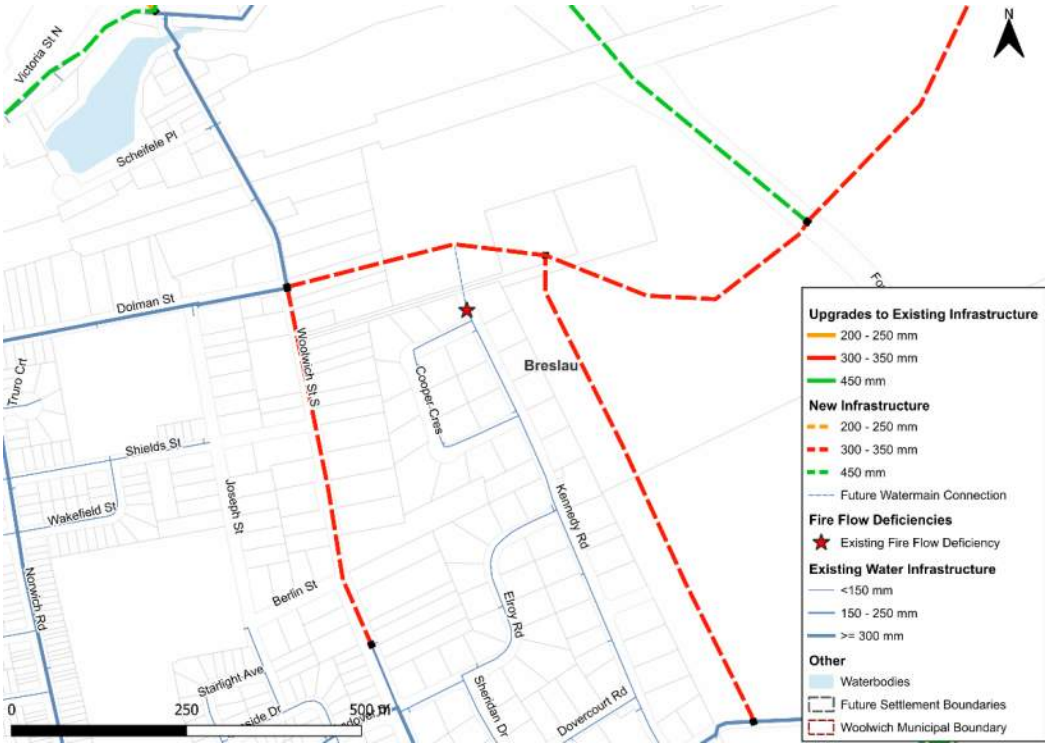


Figure 5-21: Existing Fire Flow Deficiency on Cooper Crescent

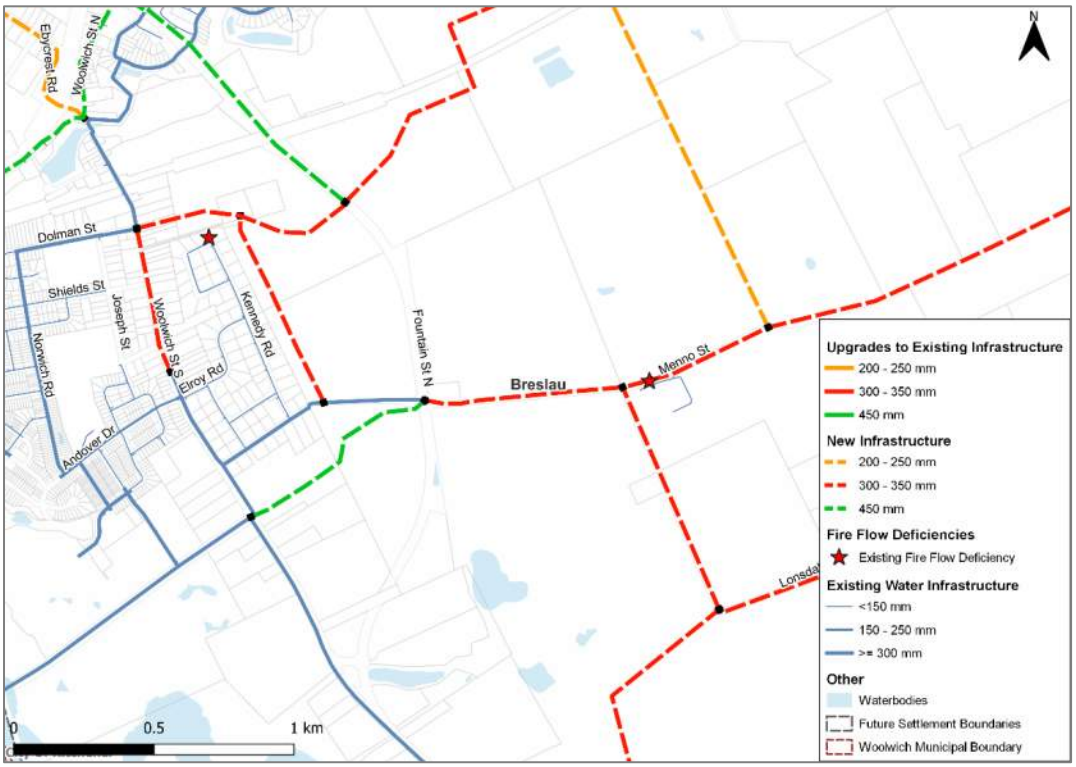


Figure 5-22: Existing Fire Flow Deficiency on Menno Street

5.7.4.2 Growth Servicing Strategy

The majority of the large greenfield growth areas are concentrated on east side of the existing built-up area within Breslau, with some greenfield growth areas along the Grand River as well. Residential greenfield areas are generally located north of Menno Street and employment greenfield areas are generally south, in the areas closer to the Region of Waterloo International Airport.

Draft plans were not available for all planned future growth areas within the Township. Where draft plans were available, watermains were identified along planned road alignments. Some upgrades and/or extensions to the existing system are required to support the level and locations of planned future growth. Further, for large growth areas, mid-block trunk servicing strategies were identified. The alignments of the mid-block trunk servicing strategies are subject to change through the preliminary and detailed design processes for these developments. The intent of these projects within the SCS is to identify areas of system looping and watermain needs beyond the minimum watermain size that should be implemented to ensure future system resiliency.

Figure 5-23 presents an overview of planned growth areas within Breslau, and the general servicing strategies for the significant greenfield growth areas. The following subsections present further detail regarding various growth servicing opportunities.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Greenfield Growth within ROPA6 UAB
- Employment
- Residential

Other Land Use
- Official Plan - Open Space Area
- Environmental Protection
- Environmental Restricted Area

Existing Water Infrastructure
- <150 mm
- 150 - 250 mm
- >= 300 mm

Other
- Rail Line
- Watercourse
- ROPA6 Urban Area Boundary (UAB)
- Municipal Boundary
- Potential Water Servicing

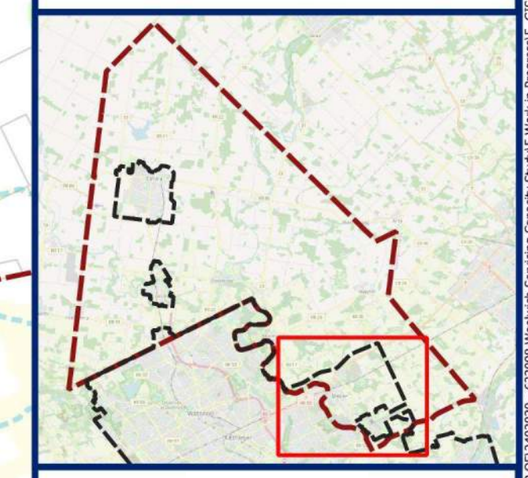


Figure 5-23

Growth Servicing Strategy

Breslau

GEI Consultants

April, 2025
622098-G-001
Projection EPSG:26917

0 1 2 km

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5.7.4.2.1 Watermain Looping to Service Growth Areas and for Future System Resiliency

As discussed in **Section 5.7.1**, the Region has a long-term water system management strategy to consolidate several pressure zones for the ESL. This strategy will include extension of the existing dead-end watermain on Fountain Street North within the Township to the existing dead-end watermain on Fountain Street N in the City of Cambridge. The ESL Stage 2 MESP presented several large diameter (450 mm) watermains to provide future system looping within the Breslau system. Several of these watermain alignments were carried forward as part of the Township's SCS, however, it should be noted that 300 mm watermains are the minimum size required for these projects and have been carried forward as such within the preferred water capital / DC / developer program for the SCS. Increased watermain sizes may serve additional benefit for additional growth beyond the scenarios identified within the SCS. The Township has the option to increase the watermain size beyond 300 mm if needed, however, it is likely that a 400 mm or 450 mm diameter watermain would be considered a Regional or dual ownership watermain due to size and function.

5.7.4.2.2 Options to Address Low Pressures in Future North Growth Areas

Further, as part of the ESL Stage 2 MESP by WSP dated September 2018, the northeast growth areas of Breslau were flagged to have low pressures bordering 40 psi due to high ground elevation in relation to the target HGL of 365 mASL. Several options to address this were provided within this study and are listed below. These options are either Region or Developer led, as such, a preferred option was not identified as part of this study. Further detail can be found in the ESL Stage 2 MESP.

- **Option 1:** Increase PRV setpoints at Victoria Street PRV and Ottawa Street PRV
- **Option 2:** Increase capacity at proposed Briardean BPS that will supply the east side pressure zone from Cam 2E. This may require additional and/or larger mains along the east edge of the ESL to deliver sufficient flows to the northeast corner.
- **Option 3:** Provide a new elevated tank at the northeast cover of the ESL zone for short-term balancing, but only if the Briardean BPS is insufficient.

The Breslau East Connector Road Environmental Assessment (EA) identified the future road alignment between Fountain Street/Future Dolman Street extension and Greenhouse Road. A new local trunk watermain is recommended along this alignment to provide additional system connectivity and to service future developments.

The northwest growth areas of Breslau near Ebycrest Road also experiences low pressures bordering 50 psi due to high ground elevation. Pressures in this area are expected to maintain above the minimum 40 psi servicing pressure. However, if pressures are a concern in this area, several options could include a developer led booster pumping station for the specific development. The described options to address low pressures in the northeast growth areas should also benefit the developments near Ebycrest Road.

5.7.4.2.3 Potential Watermain Near the Region of Waterloo International Airport

Through previous studies and reviews, a potential watermain alignment from Menno Street to Kossuth Road was identified, under the Region of Waterloo International Airport. Through discussion with the Township, it was noted that the Township is not likely to lead this project. For the purposes of this review, the alignment under the airport and along Kossuth Road from Fountain Street North to the airport watermain has been included in this SCS capital / DC / developer program and mapping to present full vision of the potential watermain servicing and looping strategy.

Further, through the East Side Lands Woolwich Sanitary Servicing Class Environmental Assessment, an additional potential alignment for watermain servicing has been identified which would connect the watermain on Fountain Street North to Menno Street, via Otter Court and Lonsdale Road.

5.7.4.2.4 Watermain Upgrades to Strengthen Existing Supply Connections to Breslau

To strengthen the existing connections from the City of Kitchener to Breslau and to support the buildout demands within Breslau, three 450 mm watermain upgrades have been flagged through this analysis, as shown in **Figure 5-24**, on Victoria Street South from the Grand River watermain crossing to Fountain Street North, on Fountain Street North from the Breslau East Connector Road to Woolwich Street North, and new 450 mm watermain at Woolwich Street South to Menno Street. These projects are expected to be Region-led projects due to the large watermain diameter and will need to be confirmed through future studies.

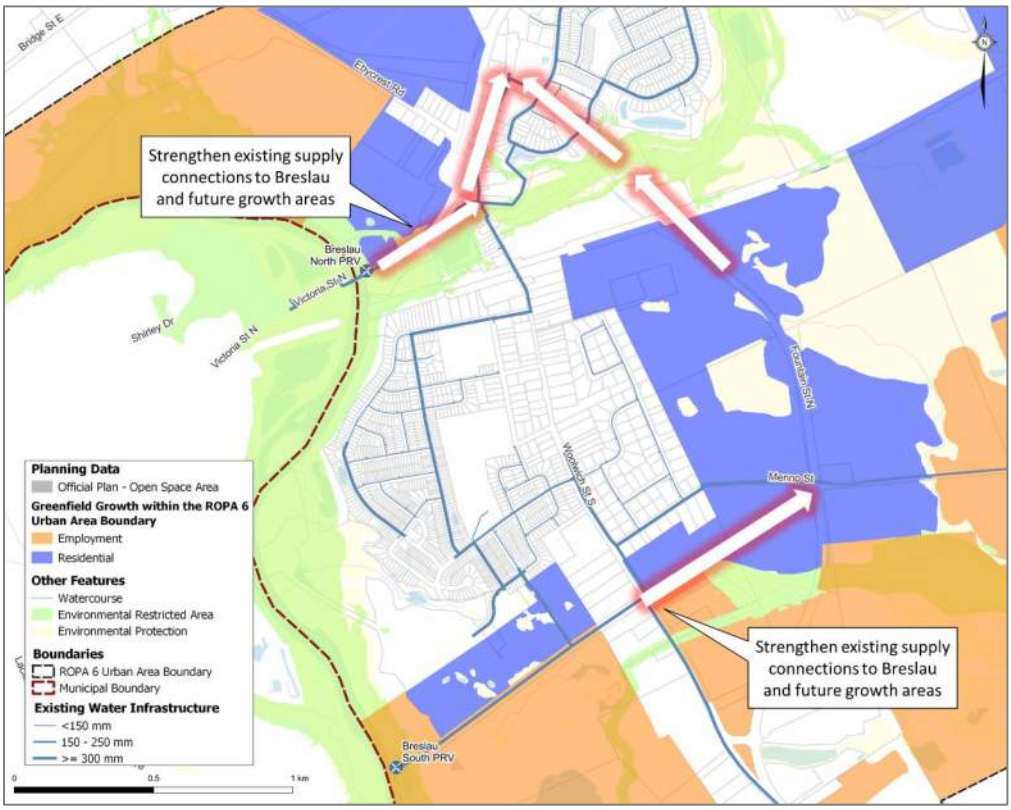


Figure 5-24: Watermain Upgrades to Strengthen Existing Supply Connections to Breslau

5.7.4.2.5 Potential Watermain Connection between Breslau and Bridgeport Pressure Zones

There is developable land west of Woolwich Street North, between the Grand River and Bridge Street East. A new local watermain is recommended on Ebycrest Road from Woolwich Street North to Bridge Street East and on Bridge Street East from Ebycrest Road to the limit of the municipal boundary to support this growth area. Through discussions with the Region and Township, there is opportunity to extend this watermain on Bridge Street East further west to connect to the Bridgeport pressure zone within the City of Kitchener, as shown in **Figure 5-25**. Currently, Bridgeport is serviced via a single PRV connection from the Kit 4 pressure zone. A secondary connection to Bridgeport via Breslau would serve to improve system resiliency for Bridgeport in the event of a critical watermain failure or maintenance need on the single feed watermain to the zone. The target HGLs for the pressure zones are compatible, with both Bridgeport and Breslau targeting an HGL of 365 mASL. A Regional water billing meter would be required at the municipal boundary to track flow between municipalities.

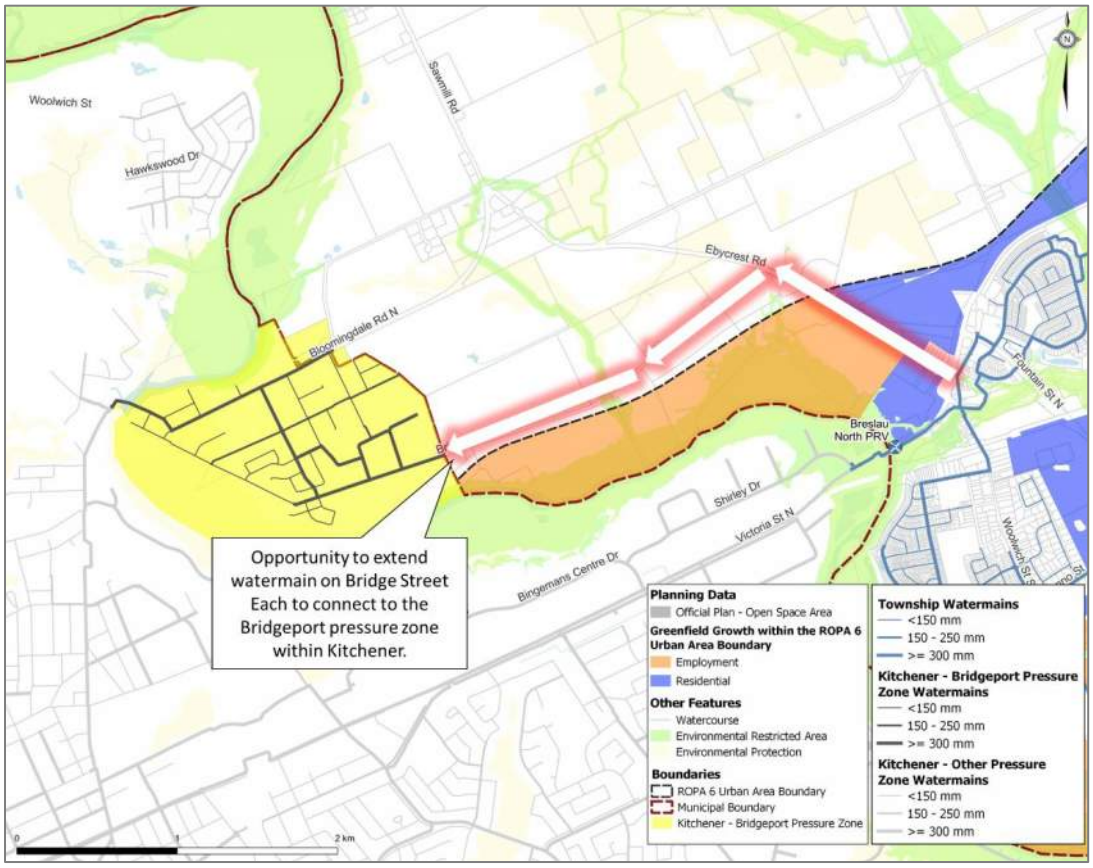


Figure 5-25: Potential Watermain Connection between Breslau and Bridgeport Pressure Zone

5.7.5 Preferred Water Capital / DC / Developer Program

Table 5-24 and **Figure 5-26** present the preferred water capital / DC / developer program for Township infrastructure within Breslau. The alignments presented in the capital / DC / developer program are subject to change based on revised development growth strategies, potential future road alignments, funding allocations, and other factors.

Table 5-24: Preferred Water Capital / DC / Developer Program – Breslau

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
W-M-BRE-001	New WM along Fountain St N from Airport Rd to Kossuth Rd	1,131	450	2024 – 2033	$3,698,200	Region Capital Project from Cambridge or Site Development application.	-
W-M-BRE-002	New WM along Kossuth Rd from Fountain St N to Cober Rd	2,000	350	2034 - 2051	$5,145,500	Site Development application.	After W-M-BRE-001
W-M-BRE-003	New WM Airport Easement through Cober Rd to Lonsdale Rd	3,018	300	2034 - 2051	$9,287,525	Site Development application.	After W-M-BRE-002 and/or W-M-BRE-031
W-M-BRE-004	Upgrade WM along Menno St from Fountain St N to existing east Menno St WM Dead end	575	300	2024 - 2033	$1,555,950	Site Development application	With W-M-BRE-005
W-M-BRE-005	New WM Extension along Menno St to support Greenfield Growth to Shantz Station Rd	2,429	300	2024 - 2033	$6,173,575	Site Development application - Conestoga Meats Project	After W-M-BRE-004 and/or W-M-BRE-031
W-M-BRE-006	New WM along Burkholder St through Madwest subdivision	738	300	2024 - 2033	$1,838,850	Site Development application - Madwest Subdivision	-
W-M-BRE-007	New WM along future Dolman St in the Madwest Subdivision from Woolwich St S to Fountain St N	805	300	2024 - 2033	$2,758,275	Site Development application - Madwest Subdivision	-
W-M-BRE-008	New recommended WM in east greenfield growth area connecting Kramp Rd and Menno St	1,748	250	Beyond 2051	$6,089,525	Site Development application	After W-M-BRE-004 or W-M-BRE-012
W-M-BRE-009	New WM Connection to support Trunk Main along Ottawa St from Woolwich St S to Fountain St N	773	450	2024 - 2033	$9,002,575	Site Development application	-
W-M-BRE-010	New WM along Shantz Station Rd between Kramp Rd and Menno St	1,666	300	Beyond 2051	$4,452,600	Site Development application	After W-M-BRE-005 or W-M-BRE-011
W-M-BRE-011	New WM along Shantz Station Rd between Victoria St N and Kramp Rd	955	300	Beyond 2051	$2,503,050	Site Development application	After W-M-BRE-010, W-M-BRE-029, or W-M-BRE-030
W-M-BRE-012	New WM along Kramp Rd from Greenhouse Rd to Shantz Station Rd	726	300	2024 - 2033	$1,807,075	Site Development application	-
W-M-BRE-013	New WM connecting Victoria St N and Kramp Rd	797	300	2024 - 2033	$1,983,375	Site Development application	After W-M-BRE-012 or W-M-BRE-028
W-M-BRE-014	New WM connection along Fountain St N from Townsend Dr to Madwest Division	1,119	450	2024 - 2033	$7,770,525	Timing flexible - Region to prioritize, supports strengthened connections from Kitchener	-
W-M-BRE-015	Upgrade PRV WM along Victoria St N from Breslau Victoria PRV to Fountain St N	1,127	450	2034 - 2051	$4,470,025	Timing flexible - Region to prioritize, supports strengthened connections from Kitchener	-
W-M-BRE-016	New WM extension for future Fountain St N extension to connect to northwest greenfield growth	377	300	2024 - 2033	$1,063,950	Site Development application	After W-M-BRE-022 or with Region Capital Plan
W-M-BRE-017	New WM extension from Woolwich St S along Ebycrest Rd	776	200	2024 - 2033	$2,553,275	Site Development application	-
W-M-BRE-018	New WM along Ebycrest from Bridge St E to future extension of Fountain St N	908	300	2034 - 2051	$2,386,200	Site Development application	After W-M-BRE-016

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
W-M-BRE-019	New WM in northwest greenfield growth area	2,060	300	2034 - 2051	$5,254,150	Site Development application	After W-M-BRE-018
W-M-BRE-020	New WM connection between Breslau North-West Greenfield Development and Bridgeport	295	300	2034 - 2051	$733,900	Site Development application	After W-M-BRE-019
W-M-BRE-021	New WM along Victoria St N between Fountain St N and Greenhouse Rd	1,804	300	2034 - 2051	$4,741,650	Site Development application	After W-M-BRE-022
W-M-BRE-022	New WM extension of Fountain St N to connect to north-west greenfield growth	113	300	2024 - 2033	$282,900	Site Development application	After W-M-BRE-015
W-M-BRE-024	New Future WM to connect Woolwich St S	520	300	2024 - 2033	$1,549,800	Site Development application - Madwest Subdivision	-
W-M-BRE-025	New Future Breslau EA Connector from Fountain St N to Greenhouse Rd	1,456	300	2024 - 2033	$5,022,500	Site Development application	After W-M-BRE-007
W-M-BRE-026	New WM from Fountain St N to Lonsdale Rd	1,384	300	2024 – 2033	$4,620,700	Site Development application	After W-M-BRE-003 and W-M-BRE-031
W-M-BRE-027	New WM along Greenhouse Rd between Kramp Rd and Victoria St N	794	300	2024 - 2033	$2,514,325	With GO Station Lands	-
W-M-BRE-028	New WM along Victoria St N between Greenhouse Rd and W-M-BRE-013	628	300	Beyond 2051	$1,564,150	Site Development application	After W-M-BRE-021
W-M-BRE-029	New WM along Victoria St N between W-M-BRE-013 and Shantz Station Rd	1,112	300	Beyond 2051	$2,893,575	Site Development application	After W-M-BRE-028
W-M-BRE-030	New WM along Kramp Rd between W-M-BRE-013 and Shantz Station Rd	1,036	300	Beyond 2051	$2,580,950	With surrounding developments	After W-M-BRE-010, W-M-BRE-011, W-M-BRE-012, or W-M-013
W-M-BRE-031	New WM along Lonsdale Rd to Menno St	969	300	2024 - 2033	$3,035,025	Site Development application.	After W-M-BRE-004
Breslau Total		**33,835**	**-**	**-**	**$109,333,675**	**-**	**-**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Upgrades to Existing Infrastructure
- 200 - 250 mm
- 300 - 350 mm
- 450 mm

New Infrastructure
- 200 - 250 mm
- 300 - 350 mm
- 450 mm

Existing Infrastructure
- <= 300 mm
- > 300 mm

Other Features
- Future Expanded Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

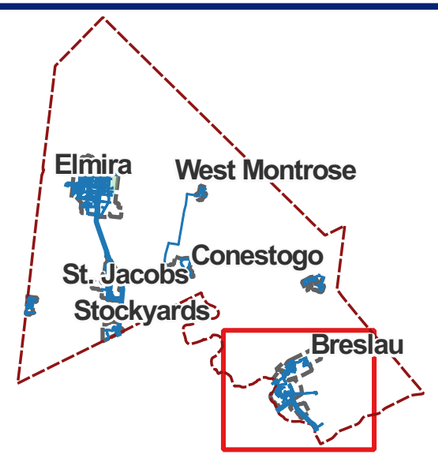


Figure 5-26

Water Capital Program

Breslau

GEI Consultants

April, 2026
622098-W-001
Projection EPSG:26917

Township Of Guelph/eramosa
City Of Kitchener
City Of Cambridge
Sawmill Rd
Hopewell Creek Rd
Spitzig Rd
Hopewell Creek
Victoria St N
Kraft Dr
Bloomingdale Rd N
Ebycrest Rd
Kramp Rd
Goderich-Exeter Railway
Rider Rd
Bridge St E
Grand River
Shirley Dr
Shirley Ave Bingemans Centre Dr
Centennial Rd
Forwell Rd
Kolb Creek
Keewatin Ave
Breslau North PRV
Breslau South PRV
Woolwich St S
Fountain St N
Lonsdale Rd
Menno St
Vance Rd
Ellis Creek (Chilligo Creek, Fisher Mills Creek)
Shantz Station Rd
Cober Rd
Waterloo-Guelph Airport Creek
Kossuth Rd
Speedsville Rd
Lackner Blvd
Zeller Dr
Old Zeller Dr
Fairway Rd N
Riverbank Dr
020 (300 mm)
019 (300 mm)
018 (300 mm)
016 (300 mm)
021 (300 mm)
022 (300 mm)
017 (200 mm)
015 (450 mm)
014 (450 mm)
007 (300 mm)
024 (300 mm)
006 (300 mm)
004 (300 mm)
009 (450 mm)
029 (300 mm)
028 (300 mm)
027 (300 mm)
013 (300 mm)
011 (300 mm)
030 (300 mm)
012 (300 mm)
010 (300 mm)
025 (300 mm)
008 (250 mm)
005 (300 mm)
031 (300 mm)
003 (300 mm)
026 (300 mm)
002 (350 mm)
001 (450 mm)
0
1
2 km

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5.8 Conestogo

5.8.1 Existing Water System Overview

The Conestogo water system consists of a single pressure zone at an HGL of approximately 376 mASL. The system is connected to the IUS via a 600 mm Regional watermain from the City of Waterloo on King Street North and a 300 mm Regional watermain on Sawmill Road which supports the Regionally owned and operated Conestoga Pump Station and Reservoir. The Conestoga Pump Station and Reservoir supply the domestic demand for the settlements of Conestogo and West Montrose. Fire flow capacity is not provided by the facility. Conestogo can be directly fed from the Regional transmission main at Wat 4 pressures, however, under typical conditions, the Conestoga Pump Station and Reservoir is utilized. **Figure 5-27** and **Figure 5-28** present the existing system map and schematic.

The Region is planning to construct a new watermain on Northfield Drive from University Avenue in Waterloo to Sawmill Road in Conestogo. This new watermain was identified within the St. Jacobs and Elmira Pressure Supply Optimization Study completed in 2018. The watermain will provide a second connection to the St. Jacobs, Elmira, Conestogo, and West Montrose water systems from the IUS, improving system resiliency. The final connection location of the new Regional main on Sawmill Road has not yet been finalized (upstream or downstream of the Conestoga Pump Station and Reservoir.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Watermains
- <=300 mm
- 400-825 mm

Existing Water Facilities
- Pressure Reducing Valve
- Pump Station and Storage
- Storage

Other Features
- Elmira East Existing Pressure Zone
- Elmira East Future Pressure Zone Expansion
- Watercourse
- Parcels
- Settlement Area Boundary
- Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

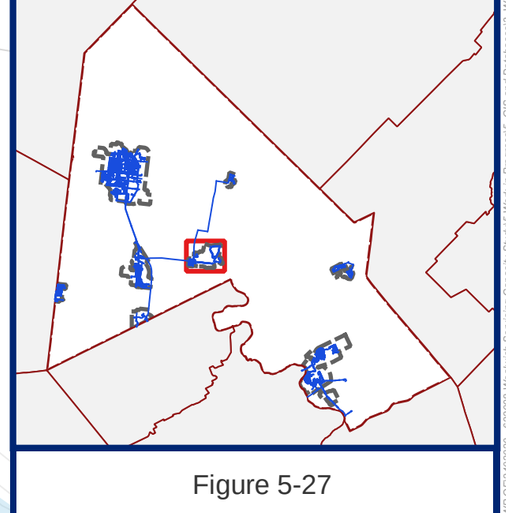


Figure 5-27

Existing Water System

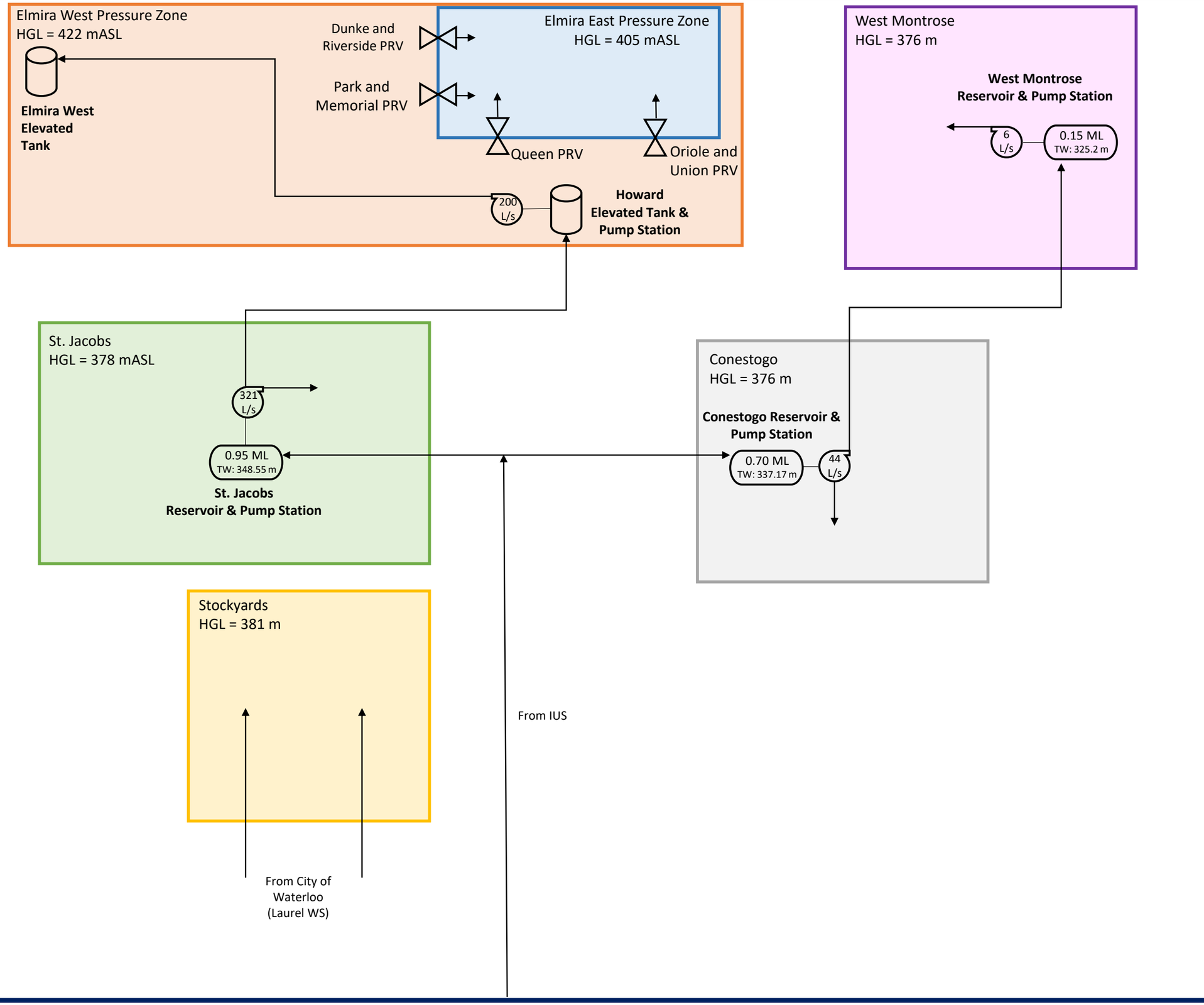
Conestogo

GEI Consultants

April, 2025
622098-W-001
Projection EPSG:26917

Conestoga Creek
Grand River
Grand River
Grand River
Golf Course Rd
Hunsberger Rd
Zaduk Crt
Golf Course Rd
River Run Pl
Misty River Dr
Flax Mill Dr
Sawmill Rd
Elgin St W
Elgin St E
Northfield Dr E
Country Spring Walk
Glasgow St N
Musselman Cres
Weberlyn Cres
Conestogo BPS and RSVR
Conestogo PRV
Glasgow St S
Conestogo River
Conestogo River
Grand River
0
0.3
0.6 km

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Volume TWL — Reservoir

Well

Water Treatment Plant

Firm Capacity — Pump

Existing Treatment Capacity — Water Supply System

Floating Storage

Pressure Reducing Valve

Flow Direction

ZONES

- Elmira West Pressure Zone
- Elmira East Pressure Zone
- St. Jacobs
- Stockyards
- Conestogo
- West Montrose

Elmira, St. Jacobs, Stockyards, Conestogo, and West Montrose

Figure 5-28
Existing Water System Schematic

GEI Consultants

September 2023
622098

5.8.2 Assessment of Existing Township Water Infrastructure

Table 5-25 summarizes the existing system performance within Conestogo. System performance mapping is presented in **Appendix B**.

It should be noted that the fire flow analysis assumes that the Conestogo system is directly supplied by the Regional transmission main from the City of Waterloo. The Conestoga Pump Station and Reservoir does not have fire pumping capacity, and as such, the available fire flow within the system is greater when the station is bypassed and directly fed off of the transmission main. Fire flow deficiencies have been assessed under this assumption. Based on our understanding of the design and current operation of the Conestoga Pump Station and Reservoir, the PLC is programmed such that the isolation valve at the station opens automatically to allow direct feed from the Region transmission main to the local system in the event that downstream pressure drops below a certain threshold under a fire/emergency condition.

Table 5-25: Summary of Existing System Performance – Conestogo

System Performance Metric	Level of Service Target	Existing System Performance
System Pressures	40 – 100 psi	• System pressures are within the 50 – 80 psi range under ADD and MDD.
Available Fire Flow	Fire flow targets by Land Use	• Existing fire flow deficiency at dead-end watermain on Elgin Street West, based on 250 L/s fire flow target for industrial land use. • Existing fire flow deficiencies along Golf Course Road, based on 75 L/s fire flow target for residential land use.
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.8.3 Assessment of Growth Impacts

It should be noted that there is no significant growth planned within the community of Conestogo. As such, for the purposes of the Township's SCS, there are no anticipated growth impacts to the existing system.

5.8.4 Servicing Alternatives and Evaluation

5.8.4.1 Upgrades to Address Existing Fire Flow Deficiencies

To address the existing fire flow deficiencies at Elgin Street West and Evening Star Lane, as shown in **Figure 5-29**, the watermain on Elgin Street W should be upgraded to 200 mm in diameter, and a new 300 mm watermain is required on Evening Star Lane from Sawmill Road to Elgin Street West. These upgrades will increase available fire flow to meet a 150 L/s fire flow target, but not the higher 250 L/s industrial fire flow target. Through discussions with the Township, it was identified that the fire flow target for industrial land use should be reduced to 150 L/s within Conestogo, as the system has capacity limitations due to the nature of the long single feed from the City of Waterloo.

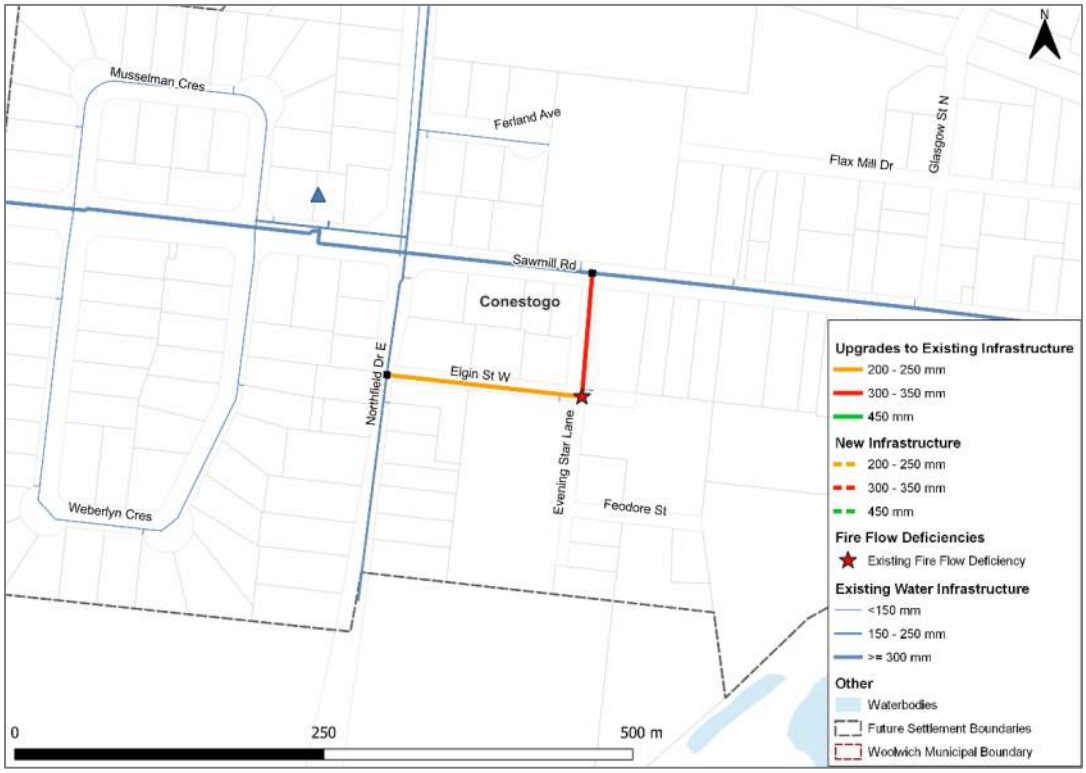


Figure 5-29: Upgrades to Address Fire Flow Deficiency at Elgin St W and Evening Star Lane

Residential properties within Conestogo were assigned a fire flow target of 50 L/s due to the rural nature of the community and available system capacity. The 50 L/s target is achieved along Golf Course Road. There is a slight deficiency in the northeast corner of the subdivision, however, it falls within 5% of the target. As such, no watermain upgrades were recommended for the area.

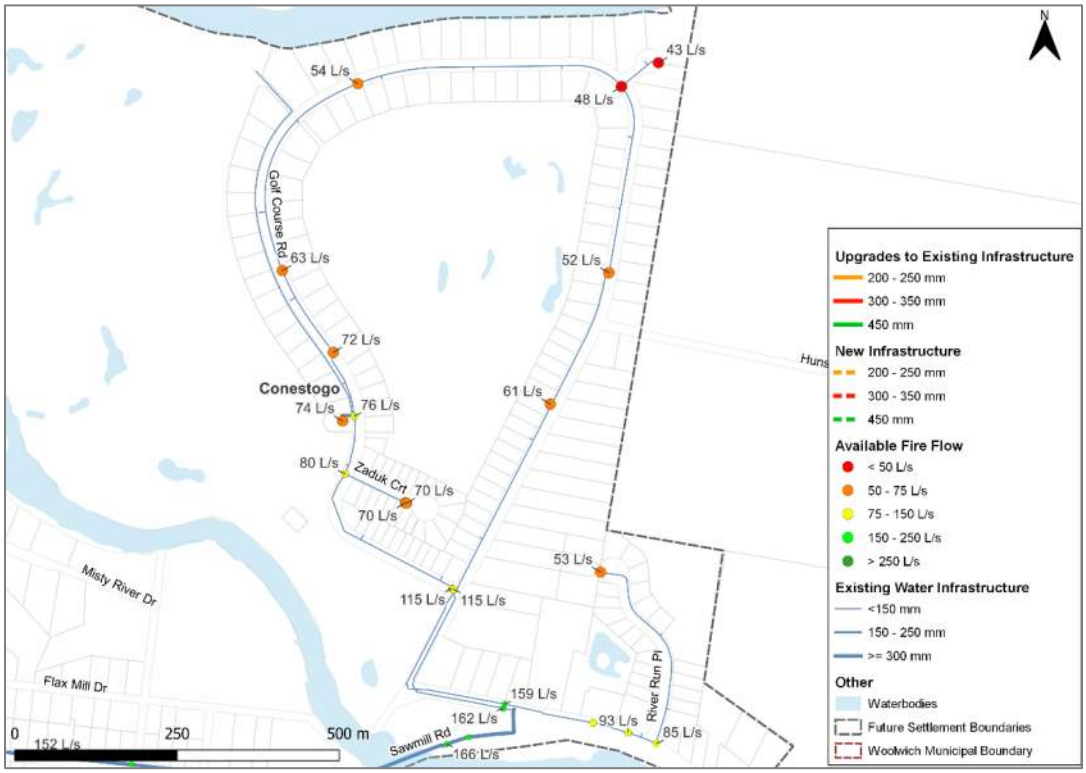


Figure 5-30: Available Fire Flow on Golf Course Road

5.8.5 Preferred Water Capital / DC / Developer Program

Table 5-26 and **Figure 5-31** present the preferred water capital / DC / developer program for Township infrastructure within Conestogo. The alignments presented in the capital / DC / developer program are subject to change based on revised development growth strategies, potential future road alignments, funding allocations, and other factors.

Table 5-26: Preferred Water Capital / DC / Developer Program – Conestogo

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
W-M-CON-001	New WM along Evening Star Lane from Sawmill Rd to Elgin St W	159	300	2024 - 2033	$473,550	Timing flexible - addresses existing deficiency	-
W-M-CON-002	Upgrade WM along Elgin St W from Northfield Dr E to Evening Star Lane	100	200	2024 - 2033	$298,275	Timing flexible - addresses existing deficiency	-
Conestogo Total		**259**	**-**	**-**	**$771,825**	**-**	**-**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025. .

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Upgrades to Existing Infrastructure
- 200 - 250 mm
- 300 - 350 mm
- 450 mm

New Infrastructure
- 200 - 250 mm
- 300 - 350 mm
- 450 mm

Existing Infrastructure
- <= 300 mm
- > 300 mm

Other Features
- Future Expanded Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

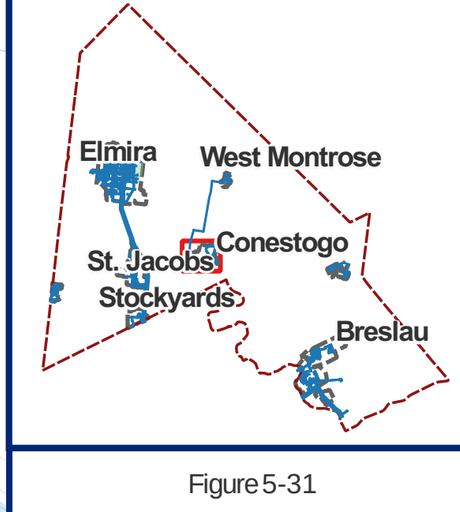


Figure 5-31

Water Capital Program

Conestogo

GEI Consultants

April, 2026
622098-W-001
Projection EPSG:26917

Conestoga Creek
Grand River
Grand River
Grand River
Golf Course Rd
Hunsberger Rd
Zaduk Crt
Golf Course Rd
River Run Pl
Misty River Dr
Flax Mill Dr
Sawmill Rd
Elgin St E
Elgin St W
Glasgow St N
Glasgow St S
Northfield Dr E
Country Spring Walk
Musselman Cres
Weberlyn Cres
Conestogo BPS and RSVR
Conestogo PRV
W-M-CON-001 (300 mm)
W-M-CON-002 (200 mm)
Conestogo River
Conestogo River
0
0.3
0.6 km

5.9 West Montrose

5.9.1 Existing Water System Overview

The West Montrose water system consists of a single pressure zone at an HGL of approximately 376 mASL .The system is connected to the IUS via a 600 mm Regional watermain from the City of Waterloo on King Street North, a 300 mm Regional watermain on Sawmill Road, and a 150 mm Regional watermain along Northfield Drive East and Jigs Hollow Road, which supports the Regionally owned and operated West Montrose Pump Station and Reservoir. The West Montrose Pump Station and Reservoir supply domestic demand for the community of West Montrose. Fire flow capacity is not provided by the facility.

Figure 5-32 and **Figure 5-33** present the existing system map and schematic.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Watermains
- <=300 mm
- 400-825 mm

Existing Water Facilities
- Pressure Reducing Valve
- Pump Station and Storage
- Storage

Other Features
- Elmira East Existing Pressure Zone
- Elmira East Future Pressure Zone Expansion
- Watercourse
- Parcels
- Settlement Area Boundary
- Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

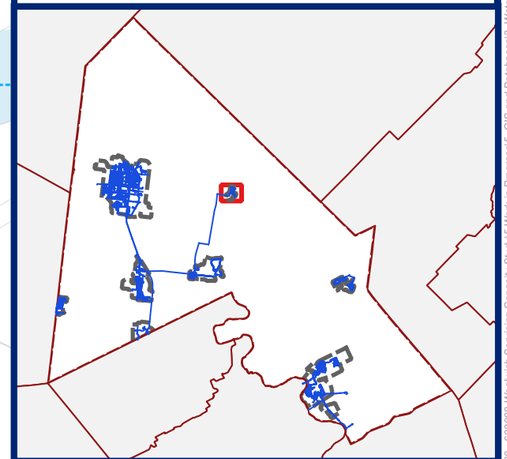


Figure 5-32

Existing Water System

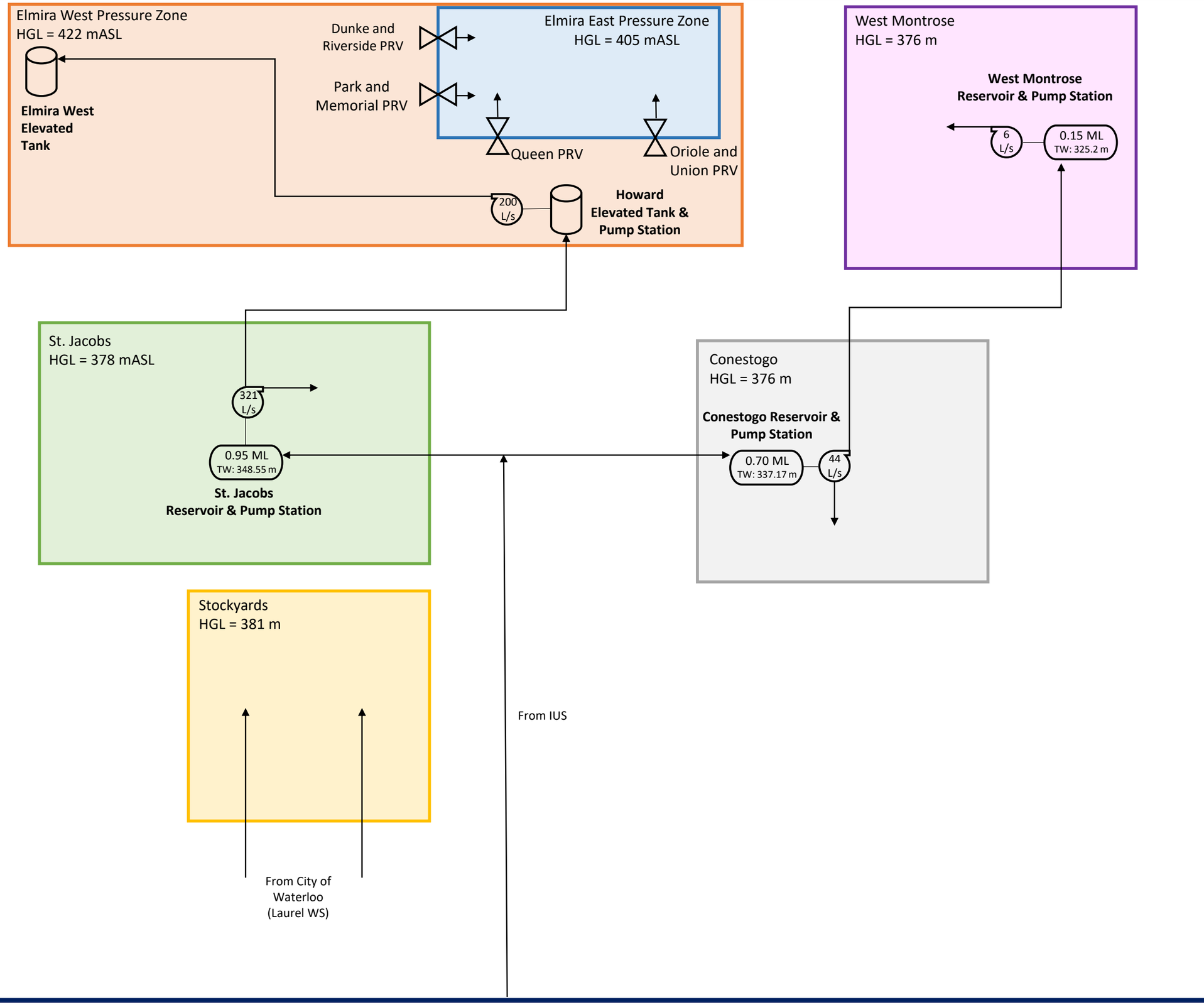
West Montrose

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April, 2025
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0 0.1 0.2 km

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Volume TWL — Reservoir
Well
Water Treatment Plant
Firm Capacity — Pump
Existing Treatment Capacity — Water Supply System
Floating Storage
Pressure Reducing Valve
Flow Direction

ZONES

- Elmira West Pressure Zone
- Elmira East Pressure Zone
- St. Jacobs
- Stockyards
- Conestogo
- West Montrose

Elmira, St. Jacobs, Stockyards, Conestogo, and West Montrose

Figure 5-33
Existing Water System Schematic

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September 2023
622098

5.9.2 Assessment of Existing Township Water Infrastructure

Table 5-27 summarizes the existing system performance within West Montrose. System performance mapping is presented in **Appendix B**.

Table 5-27: Summary of Existing System Performance – West Montrose

System Performance Metric	Level of Service Target	Existing System Performance
System Pressures	40 – 100 psi	• System pressures are within the 50 – 80 psi range under ADD and MDD.
Available Fire Flow	Fire flow targets by Land Use	• The West Montrose water system does not support fire flows through municipal servicing due to limitations in system capacity. • Alternative emergency fire procedures are utilized within this community.
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.9.3 Assessment of Growth Impacts

It should be noted that there is no significant growth planned within the community of West Montrose. As such, for the purposes of the Township's SCS, there are no anticipated growth impacts to the existing system.

5.9.4 Servicing Alternatives and Evaluation

There are no existing system deficiencies or future planned growth impacts within West Montrose which require review of Township servicing alternatives.

5.9.5 Preferred Water Capital / DC / Developer Program

There are no existing system upgrades or planned future growth upgrades within West Montrose which require Township capital / DC / developer program projects.

5.10 Maryhill

5.10.1 Existing Water System Overview

The Maryhill water system consists of two pressure zones, the Village Heights zone at an approximate target HGL of 376 mASL and the Maryhill zone at an approximate target HGL of 367 mASL. Each pressure zone is supplied by independent groundwater wells rather than the Region's IUS. The two pressure zones are separated by a normally closed valve on St. Charles Street East just east of Notre Dame Avenue.

The Village Heights zone is supplied by the Village Heights WTP, which includes two groundwater wells, a small in-ground reservoir, and discharge booster pumps which supply domestic demand to the system. The Maryhill zone is supplied by the Isley WTP, which includes two groundwater wells, a small in-ground reservoir, and discharge booster pumps which supply domestic demand to the system. Fire flow capacity is not provided by either facility. The two pressure zones are separated by a normally closed valve on St. Charles Street East just east of Notre Dame Avenue.

Figure 5-34 and **Figure 5-35** present the existing system map and schematic.

The Region completed a review in 2024 to assess the feasibility of decommissioning the Isley WTP by expanding the service area of the Village Heights WTP, such that it supplies water for the entire Maryhill system. The conclusions of this assessment indicate that the Isley WTP can be decommissioned in the future, assuming limited growth within the system and no additional connections to the municipal system from existing private well users, with the following recommendations:

- Capacity upgrades are required for the Village Heights WTP well pumps.
- Review limitations in the Village Heights WTP building electrical/control, well pump life-cycle analysis, and hydrogeological supply.
- Maintain emergency stand-by power and SOPs for water trucking.
- Continue to enforce the Region's Water Conservation By-Law to mitigate unpredictable water usages.

Village Heights BPS and RSVR

St Boniface Dr

Zingervilla Pl

Homestead Dr

Maryhill Rd

Matthias Pl

Matthias Cres

Sunset Hills Cres

St Charles St E

St Charles St W

Isley Dr

Notre Dame Ave

Isley BPS and RSVR

Halter Ave

Maryhill Rd

Hopewell Creek

0 0.2 0.4 km

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Watermains
- <=300 mm
- 400-825 mm

Existing Water Facilities
- Pressure Reducing Valve
- Pump Station and Storage
- Storage

Other Features
- Elmira East Existing Pressure Zone
- Elmira East Future Pressure Zone Expansion
- Watercourse
- Parcels
- Settlement Area Boundary
- Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

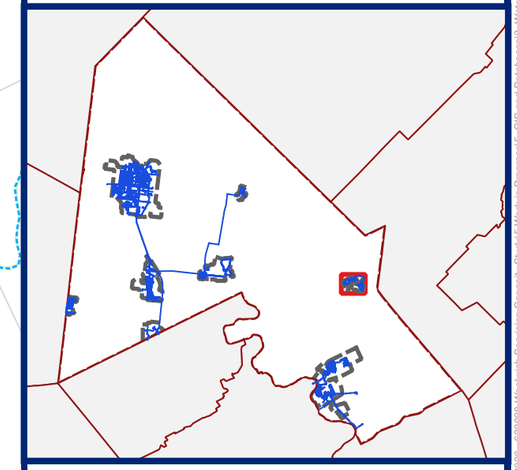


Figure 5-34

Existing Water System

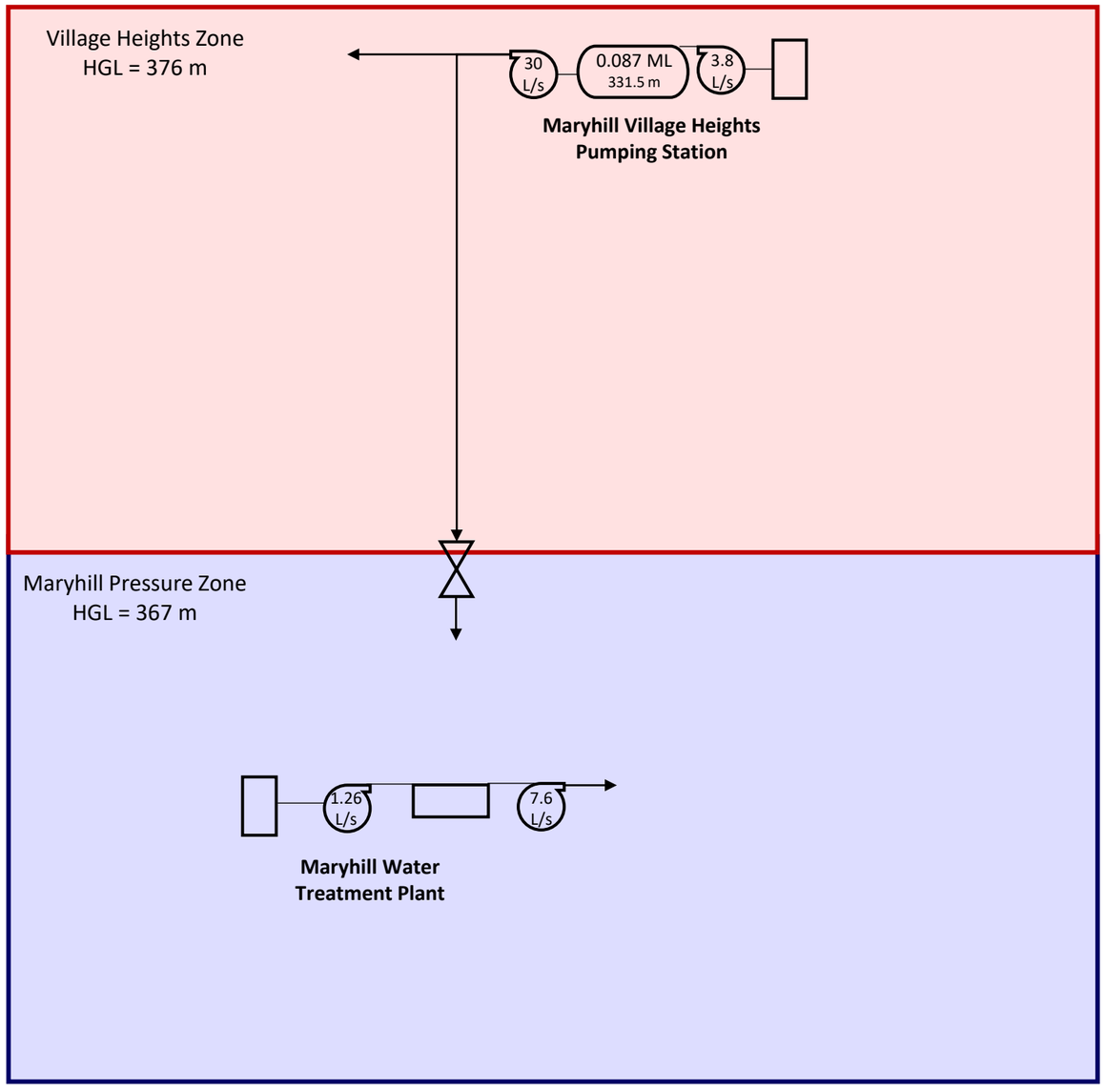
Maryhill

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Figure 5-35: Existing Water System Schematic – Maryhill



WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Volume TWL — Reservoir

Well

Water Treatment Plant

Firm Capacity — Pump

Existing Treatment Capacity — Water Supply System

Floating Storage

Pressure Reducing Valve

Flow Direction

ZONES

Maryhill North Pressure Zone

Maryhill South Pressure Zone

Maryhill

Figure 5-35
Existing Water System Schematic

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622098

5.10.2 Assessment of Existing Township Water Infrastructure

Table 5-28 summarizes the existing system performance within Maryhill. System performance mapping is presented in **Appendix B**.

Table 5-28: Summary of Existing System Performance – Maryhill

System Performance Metric	Level of Service Target	Existing System Performance
System Pressures	40 – 100 psi	• System pressures are within the 40 – 70 psi range under ADD and MDD. • In the future, if the Isley WTP is decommissioned and the Village Heights WTP services the entire Maryhill system at an HGL of 376 mASL, the expected pressures within the system will be maintained within the same 40 – 70 psi pressure range. Pressures in the south of Maryhill will experience pressure increase but will still be maintained within the same pressure range.
Available Fire Flow	Fire flow targets by Land Use	• The Maryhill water system does not support fire flows through municipal servicing due to limitations in system capacity. • Alternative emergency fire procedures are utilized within this community.
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.10.3 Assessment of Growth Impacts

It should be noted that there is no significant growth planned within the community of Maryhill. As such, for the purposes of the Township's SCS, there are no anticipated growth impacts to the existing system.

5.10.4 Servicing Alternatives and Evaluation

There are no existing system deficiencies or future planned growth impacts within Maryhill which require review of Township servicing alternatives.

5.10.5 Preferred Water Capital / DC / Developer Program

There are no existing system upgrades or planned future growth upgrades within Maryhill which require Township capital / DC / developer program projects.

5.11 Heidelberg

5.11.1 Existing Water System Overview

The Heidelberg water system consists of one pressure zone, supplied by the Heidelberg WTP at an approximate target HGL of 416 mASL. The Heidelberg WTP is supplied by independent groundwater wells rather than the Region's IUS. The community of Heidelberg is located on the municipal boundary of the Townships of Woolwich and Wellesley. The water system east of Kressler Road, including the Heidelberg WTP, is located within the Township of Woolwich, and the water system west of Kressler Road is located within the Township of Wellesley. The Heidelberg water system does not support fire flows through municipal servicing due to limitations in system capacity. Alternative emergency fire procedures are utilized within this community.

Figure 5-36 and **Figure 5-37** present the existing system map and schematic.

A condition assessment of the Heidelberg WTP in 2018 completed by C3 Water identified that much of the process equipment at the facility is nearing the end of its useful life and major capital investment will be required to maintain this facility moving forward. Further, the current Heidelberg WTP process is considered oversized for the current and projected system demands. A Municipal Class EA study, completed by Stantec in 2022, evaluated four (4) alternatives to supply water to the Heidelberg community and recommended that the WTP in St. Clements supply the Heidelberg water distribution system through a new 150 mm trunk main – and that the Heidelberg WTP is eventually decommissioned.

The target HGL of the St. Clements water system is 417 mASL, slightly higher than the current HGL of 416 mASL within Heidelberg.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Watermains
- <=300 mm
- 400-825 mm

Existing Water Facilities
- Pressure Reducing Valve
- Pump Station and Storage
- Storage

Other Features
- Elmira East Existing Pressure Zone
- Elmira East Future Pressure Zone Expansion
- Watercourse
- Parcels
- Settlement Area Boundary
- Municipal Boundary
- Surrounding Municipalities
- Rail Line
- Watercourse

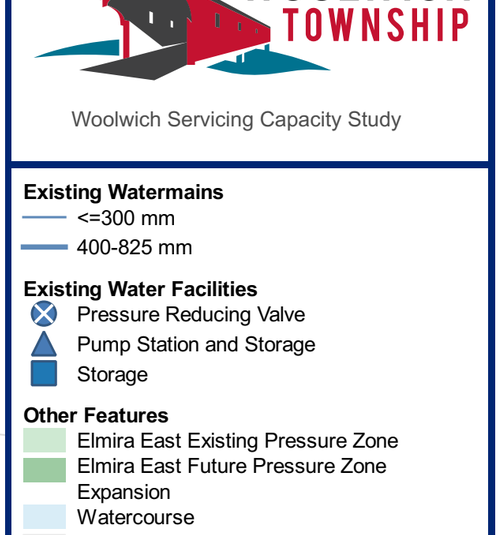


Figure 5-36

Existing Water System

Heidelberg

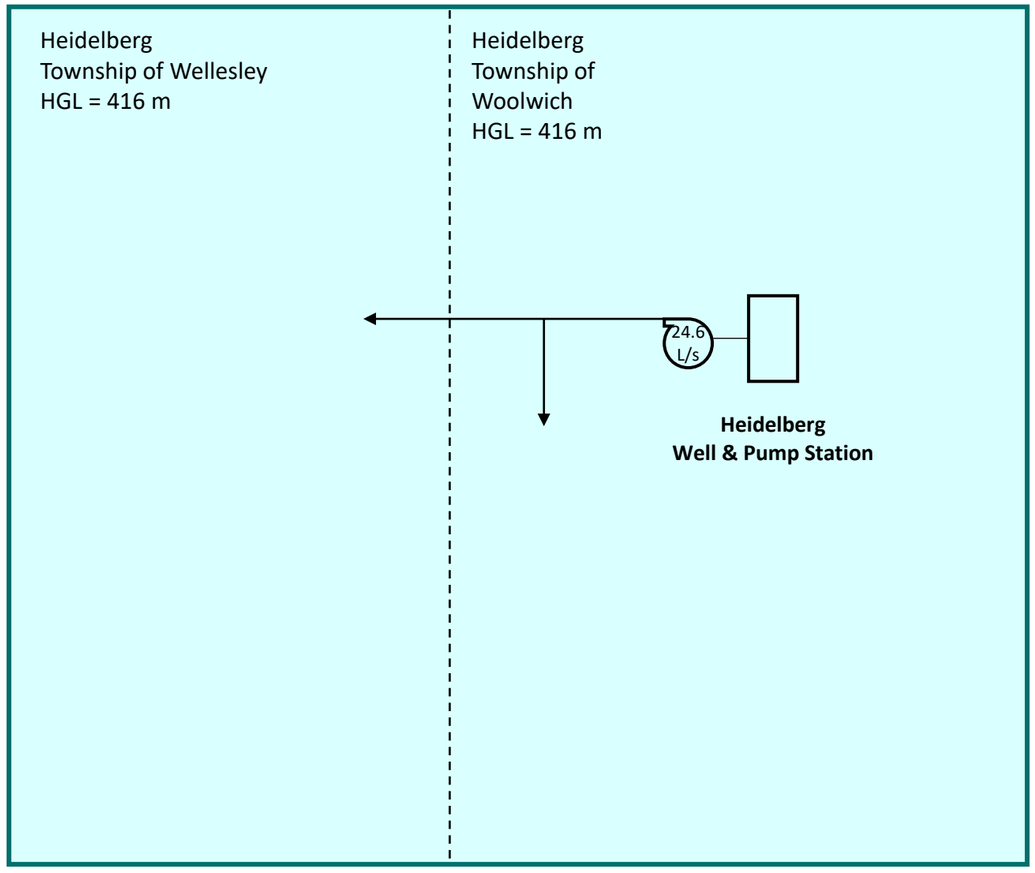
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Rhine Meadow Rd
Kressler Rd
Chancellor Dr
Alpen Grove
Dresden Dr
Alten Way
Vienna Cres
Danube Dr
Bavarian Dr
Bavarian Pl
Heidelberg BPS and RSVR
Apollo Dr
Trillium Crt
Trillium Crt
Venus Cres
Lobsinger Line
Mary St
Rocky Lane
Arthur Rd
Township Of Wellesley
John Pl
James Crt
James Crt
John Pl
Arthur Rd
Wayne St
Wayne St

0 0.2 0.4 km

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Volume TWL — Reservoir

Well

Water Treatment Plant

Firm Capacity — Pump

Existing Treatment Capacity — Water Supply System

Floating Storage

Pressure Reducing Valve

Flow Direction

ZONES

Heidelberg

Heidelberg

Figure 5-37
Existing Water System Schematic

GEI Consultants

September 2023
622098

5.11.2 Assessment of Existing Township Water Infrastructure

Table 5-29 summarizes the existing system performance within Heidelberg. System performance mapping is presented in **Appendix B**.

Table 5-29: Summary of Existing System Performance – Heidelberg

System Performance Metric	Level of Service Target	Existing System Performance
System Pressures	40 – 100 psi	• System pressures are generally within the 40 – 80 psi range under ADD and MDD. • In the future, when the Heidelberg system is supplied by the St. Clements WTP, the system pressures will be marginally increased as the St. Clements HGL (417.1 mASL) is very slightly higher than the existing Heidelberg HGL (416.2 mASL). Pressures under ADD and MDD will be maintained within the 40 – 80 psi range.
Available Fire Flow	Fire flow targets by Land Use	• The Heidelberg water system does not support fire flows through municipal servicing due to limitations in system capacity. • Alternative emergency fire procedures are utilized within this community.
Watermain Velocity	0.5 – 5 m/s	• Watermain velocities are maintained below 5 m/s. • Most watermain velocities are less than 0.5 m/s.(1)

(1) Refer to discussion regarding minimum water velocity targets in **Section 5.1**. Watermain velocities less than the minimum velocity target do not trigger upgrades.

5.11.3 Assessment of Growth Impacts

It should be noted that there is no significant growth planned within the community of Heidelberg. As such, for the purposes of the Township's SCS, there are no anticipated growth impacts to the existing system.

5.11.4 Servicing Alternatives and Evaluation

There are no existing system deficiencies or future planned growth impacts within Heidelberg which require review of Township servicing alternatives.

5.11.5 Preferred Water Capital / DC / developer Program

There are no existing system upgrades or planned future growth upgrades within Heidelberg which require Township capital / DC / developer program projects.

6 Summary of Water Capital / DC / Developer Program

A summary of the Water capital / DC / developer program for the municipally-serviced settlements within the Township of Woolwich is presented in **Table 6-1** and the full detailed program is presented in **Table 6-2**. This program addresses the infrastructure needs to support existing and growth needs to buildout of the settlement area boundary, using the planning assumptions presented in **Section 3**. A detailed breakdown of the capital / DC / developer program is provided in **Appendix E**.

6.1 Project Implementation

The majority of projects identified within the water capital / DC / developer program are triggered by surrounding developments. The project timeline provided in the capital / DC / developer program represents current understanding of the developments likely to occur within the next 10 years. As planning activities and development approvals are in constant flux, the timeline of the projects are subject to change accordingly. As developments progress through the application and approvals process, the Townships should consult the capital / DC / developer program mapping and tables to identify the watermain projects which are relevant to the subject development and trigger projects accordingly. For projects whose primary role is to strengthen supply resiliency (e.g. Region-led projects within Breslau) or are required to address existing deficiencies, project timing is flexible and up to the Township's discretion. These projects can be timed to coincide with other renewal/infrastructure projects as needed.

Table 6-1: Summary of Water Capital / DC / Developer Program By Community

Community	Length (km)	Total Project Cost ($2025)(1)	2024 – 2033 Total Project Cost ($2025)(1)	2034 - 2051 Total Project Cost ($2025)(1)	Beyond 2051 Total Project Cost ($2025)(1)
Elmira	14.9	$39,319,308	$22,218,515	$17,100,793	$0
St. Jacobs	2.9	$8,433,803	$1,965,028	$6,468,775	$0
Stockyards	1.9	$5,677,475	$0	$5,677,475	$0
Breslau	33.8	$109,333,675	$57,230,875	$32,018,950	$20,083,850
Conestogo	0.3	$771,825	$771,825	$0	$0
West Montrose	0.0	$0	$0	$0	$0
Maryhill	0.0	$0	$0	$0	$0
Heidelberg	0.0	$0	$0	$0	$0
Total	**53.5**	**$163,536,085**	**$82,186,243**	**$61,265,993**	**$20,083,850**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.

Table 6-2: Water Capital / DC / Developer Program

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)(1)	Project Triggers	Project Dependencies
W-M-BRE-001	New WM along Fountain St N from Airport Rd to Kossuth Rd	1,131	450	2024 – 2033	$3,698,200	Region Capital Project from Cambridge or Site Development application.	-
W-M-BRE-002	New WM along Kossuth Rd from Fountain St N to Cober Rd	2,000	350	2034 - 2051	$5,145,500	Site Development application.	After W-M-BRE-001
W-M-BRE-003	New WM Airport Easement through Cober Rd to Lonsdale Rd	3,018	300	2034 - 2051	$9,287,525	Site Development application.	After W-M-BRE-002 and/or W-M-BRE-031
W-M-BRE-004	Upgrade WM along Menno St from Fountain St N to existing east Menno St WM Dead end	575	300	2024 - 2033	$1,555,950	Site Development application	With W-M-BRE-005
W-M-BRE-005	New WM Extension along Menno St to support Greenfield Growth to Shantz Station Rd	2,429	300	2024 - 2033	$6,173,575	Site Development application - Conestoga Meats Project	After W-M-BRE-004 and/or W-M-BRE-031
W-M-BRE-006	New WM along Burkholder St through Madwest subdivision	738	300	2024 - 2033	$1,838,850	Site Development application - Madwest Subdivision	-
W-M-BRE-007	New WM along future Dolman St in the Madwest Subdivision from Woolwich St S to Fountain St N	805	300	2024 - 2033	$2,758,275	Site Development application - Madwest Subdivision	-
W-M-BRE-008	New recommended WM in east greenfield growth area connecting Kramp Rd and Menno St	1,748	250	Beyond 2051	$6,089,525	Site Development application	After W-M-BRE-004 or W-M-BRE-012
W-M-BRE-009	New WM Connection to support Trunk Main along Ottawa St from Woolwich St S to Fountain St N	773	450	2024 - 2033	$9,002,575	Site Development application	-

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
W-M-BRE-010	New WM along Shantz Station Rd between Kramp Rd and Menno St	1,666	300	Beyond 2051	$4,452,600	Site Development application	After W-M-BRE-005 or W-M-BRE-011
W-M-BRE-011	New WM along Shantz Station Rd between Victoria St N and Kramp Rd	955	300	Beyond 2051	$2,503,050	Site Development application	After W-M-BRE-010, W-M-BRE-029, or W-M-BRE-030
W-M-BRE-012	New WM along Kramp Rd from Greenhouse Rd to Shantz Station Rd	726	300	2024 - 2033	$1,807,075	Site Development application	-
W-M-BRE-013	New WM connecting Victoria St N and Kramp Rd	797	300	2024 - 2033	$1,983,375	Site Development application	After W-M-BRE-012 or W-M-BRE-028
W-M-BRE-014	New WM connection along Fountain St N from Townsend Dr to Madwest Division	1,119	450	2024 - 2033	$7,770,525	Timing flexible - Region to prioritize, supports strengthened connections from Kitchener	-
W-M-BRE-015	Upgrade PRV WM along Victoria St N from Breslau Victoria PRV to Fountain St N	1,127	450	2034 - 2051	$4,470,025	Timing flexible - Region to prioritize, supports strengthened connections from Kitchener	-
W-M-BRE-016	New WM extension for future Fountain St N extension to connect to northwest greenfield growth	377	300	2024 - 2033	$1,063,950	Site Development application	After W-M-BRE-022 or with Region Capital Plan
W-M-BRE-017	New WM extension from Woolwich St S along Ebycrest Rd	776	200	2024 - 2033	$2,553,275	Site Development application	-
W-M-BRE-018	New WM along Ebycrest from Bridge St E to future extension of Fountain St N	908	300	2034 - 2051	$2,386,200	Site Development application	After W-M-BRE-016
W-M-BRE-019	New WM in northwest greenfield growth area	2,060	300	2034 - 2051	$5,254,150	Site Development application	After W-M-BRE-018
W-M-BRE-020	New WM connection between Breslau North-West Greenfield Development and Bridgeport	295	300	2034 - 2051	$733,900	Site Development application	After W-M-BRE-019
W-M-BRE-021	New WM along Victoria St N between Fountain St N and Greenhouse Rd	1,804	300	2034 - 2051	$4,741,650	Site Development application	After W-M-BRE-022
W-M-BRE-022	New WM extension of Fountain St N to connect to north-west greenfield growth	113	300	2024 - 2033	$282,900	Site Development application	After W-M-BRE-015
W-M-BRE-024	New Future WM to connect Woolwich St S	520	300	2024 - 2033	$1,549,800	Site Development application - Madwest Subdivision	-
W-M-BRE-025	New Future Breslau EA Connector from Fountain St N to Greenhouse Rd	1,456	300	2024 - 2033	$5,022,500	Site Development application	After W-M-BRE-007
W-M-BRE-026	New WM from Fountain St N to Lonsdale Rd	1,384	300	2024 – 2033	$4,620,700	Site Development application	After W-M-BRE-003 and W-M-BRE-031
W-M-BRE-027	New WM along Greenhouse Rd between Kramp Rd and Victoria St N	794	300	2024 - 2033	$2,514,325	With GO Station Lands	-
W-M-BRE-028	New WM along Victoria St N between Greenhouse Rd and W-M-BRE-013	628	300	Beyond 2051	$1,564,150	Site Development application	After W-M-BRE-021
W-M-BRE-029	New WM along Victoria St N between W-M-BRE-013 and Shantz Station Rd	1,112	300	Beyond 2051	$2,893,575	Site Development application	After W-M-BRE-028

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
W-M-BRE-030	New WM along Kramp Rd between W-M-BRE-013 and Shantz Station Rd	1,036	300	Beyond 2051	$2,580,950	With surrounding developments	After W-M-BRE-010, W-M-BRE-011, W-M-BRE-012, or W-M-013
W-M-BRE-031	New WM along Lonsdale Rd to Menno St	969	300	2024 - 2033	$3,035,025	Site Development application.	After W-M-BRE-004
W-M-CON-001	New WM along Evening Star Lane from Sawmill Rd to Elgin St W	159	300	2024 - 2033	$473,550	Timing flexible - addresses existing deficiency	-
W-M-CON-002	Upgrade WM along Elgin St W from Northfield Dr E to Evening Star Lane	100	200	2024 - 2033	$298,275	Timing flexible - addresses existing deficiency	-
W-M-ELM-001	Upgrade WM along Arthur St N from Riverside Dr W to end of existing Arthur St N	444	300	2024 - 2033	$1,471,900	Addresses Existing Deficiency - Recommend completing before neighboring growth. Align with Region Rd improvements and new sanitary installation.	-
W-M-ELM-002	Upgrade WM along Martins Ln to High St	342	300	2024 - 2033	$1,017,415	Align with new industrial development on Martin's Lane.	-
W-M-ELM-004	New WM along Arthur St N to North East Greenfield Growth	89	300	2024 - 2033	$264,450	Site Development application. Internal Servicing Works	With W-M-ELM-005
W-M-ELM-005	New WM in North East Greenfield Growth connecting from Arthur St N and Church St E	1,620	300	2034 - 2051	$4,035,425	Site Development application. Internal Servicing Works	With W-M-ELM-004
W-M-ELM-009	New WM along Church St W to service west Greenfield Growth Development	665	300	2024 - 2033	$1,657,425	Flexible Timing – potential timing with Region Church Street project.	-
W-M-ELM-010	New WM through West Greenfield Growth from Church St W to West Tank	939	300	2024 - 2033	$2,463,075	Site Development application. Internal Servicing Works	After W-M-ELM-009
W-M-ELM-011	New WM in West Greenfield Growth Development from West Tank to South Parkwood Blvd Extension	1,265	300	2034 - 2051	$3,274,875	Site Development application. Internal Servicing Works	After W-M-ELM-010 and -009, or After -012
W-M-ELM-012	New WM Extension along South Parkwood Blvd to West Greenfield Growth	1,022	300	2034 - 2051	$2,670,125	Site Development application. Internal Servicing Works	-
W-M-ELM-014	New WM Connection from Whippoorwill Dr to South Parkwood Blvd	429	200	2034 - 2051	$1,069,075	Site Development application. Internal Servicing Works	-
W-M-ELM-015	New WM extension from Timber Trail Rd connecting to South Parkwood Blvd	693	300	2034 - 2051	$1,850,125	Site Development application. Internal Servicing Works	-
W-M-ELM-016	New WM connection from Kingfisher Dr. to west Greenfield Growth WM	342	200	2034 - 2051	$851,775	Site Development application. Internal Servicing Works	-
W-M-ELM-017	New WM along Scotch Line Rd from Arthur St S	1,555	300	2024 - 2033	$3,872,450	Site Development application. Internal Servicing Works	After / In conjunction with W-M-ELM-021 or W-M-ELM-018
W-M-ELM-018	New WM from Scotch Line Rd to South East Greenfield Growth Development	1,190	300	2024 - 2033	$2,964,300	Site Development application. Internal Servicing Works	After W-M-ELM-019
W-M-ELM-019	Extension of Southfield Dr WM Eastwards	696	300	2024 - 2033	$2,035,650	Site Development application.	-

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
W-M-ELM-020	Upgrade WM along First Street East from Duke St to Union St	313	300	2034 - 2051	$932,238	Timing flexible - addresses existing deficiency	-
W-M-ELM-021	Replacement of abandoned WM along Arthur St S	812	300	2024 - 2033	$2,147,375	Site Development application or Region Capital Project	-
W-M-ELM-023	Upgrade WM on Mill St from Duke St to Mill St East Dead End	59	200	2024 - 2033	$174,250	Timing flexible - addresses existing deficiency	-
W-M-ELM-025	Upgrade WM on Bonnie Crescent from Union St to Bonnie Cres Dead End	216	250	2034 - 2051	$642,675	Timing flexible - addresses existing deficiency	-
W-M-ELM-026	Upgrade WM on Howard Ave from Howard Tank Connection to Industrial Dr	155	350	2034 - 2051	$461,455	Timing flexible - addresses existing deficiency	-
W-M-ELM-028	Upgrade WM on First Street E from Union St to First Street East Dead end	292	250	2024 - 2033	$870,225	Timing flexible - addresses existing deficiency	-
W-M-ELM-029	New WM from Listowel Rd to west greenfield growth	477	300	2034 - 2051	$1,313,025	With surrounding developments	After W-M-ELM-015 or W-M-ELM-012
W-M-ELM-030	New WM from Church St W to Eldale Rd dead-end	499	200	2024 - 2033	$1,241,275	Site Development application. Internal Servicing Works	After W-M-ELM-009
W-M-ELM-031	New WM from Eldale Rd looping to Church St W	819	200	2024 - 2033	$2,038,725	Site Development application. Internal Servicing Works	After W-M-ELM-009
W-M-STJ-001	Upgrade WM along King St N from St Jacobs Rsvr Connection to North King St N	236	200	2034 - 2051	$704,175	Addresses Existing Deficiency - recommend completing before neighboring growth	-
W-M-STJ-002	New WM through North West Greenfield Growth	709	200	2034 - 2051	$1,765,050	Site Development application. Internal Servicing Works	In conjunction or after W-M-STJ-003.
W-M-STJ-003	Upgrade and extend WM along Hawkesville Rd from Northside Dr to St. Jacobs North Lands Development	281	200	2034 - 2051	$837,425	Site Development application.	-
W-M-STJ-004	Upgrade WM along Eby St from Northside Dr to Eby St Dead End	338	200	2024 - 2033	$1,005,730	Timing flexible - addresses existing deficiency	-
W-M-STJ-005	New WM through south west Greenfield Growth Development	1,148	300	2034 - 2051	$3,162,125	1115 King Street North Development. Internal Servicing Works	-
W-M-STJ-006	New WM connection to Parkside Dr from Northside Dr	210	250	2024 - 2033	$959,298	Addresses Existing Deficiency - recommend completing before neighboring growth	-
W-M-STY-001	New WM through Weber St N from Benjamin Rd to Farmer's Market Rd	553	300	2034 - 2051	$1,378,625	With Region Capital Project	-
W-M-STY-002	New WM through Weber St N from Farmer's Market Rd to King St N	427	300	2034 - 2051	$1,063,950	With Region Capital Project	-
W-M-STY-003	Upgrade WM on Farmer's Market Rd from Weber St N to Benjamin Rd	102	300	2034 - 2051	$304,425	Site Development application. Internal Servicing Works	-
W-M-STY-004	New WM on Farmer's Market Rd to King St N	155	300	2034 - 2051	$460,225	Site Development application. Internal Servicing Works	-
W-M-STY-005	New WM along King St N from Weber St N to Farmer's Market Rd	708	300	2034 - 2051	$2,470,250	Site Development application. Internal Servicing Works	After W-M-STY-002 or W-M-STY-004

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)(1)	Project Triggers	Project Dependencies
Total		**52,761**	**-**	**-**	**$159,837,885**	**-**	**-**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.

7 Wastewater System

The Township of Woolwich's existing wastewater system is part of a two-tier wastewater system within the Regional Municipality of Waterloo. The Region is responsible for receiving and treating wastewater and the Township is responsible for local sewers and pump stations.

7.1 Wastewater Design Criteria and Level of Service Objectives

Level of Service objectives are critical elements in the evaluation of existing and future system performance and development of servicing strategies and a capital / DC / developer program. The objectives were identified using the following process:

- Review of the Region of Waterloo and Area Municipalities 2023 Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS);
- Review of the Township of Woolwich 2022 Engineering Development and Infrastructure Manual;
- In-depth background review to develop a baseline understanding of system performance, capacities, and operations;
- Review of industry standards, and ministry requirements; and,
- A workshop held with Township Staff to confirm system operations and discussion on desired level of service objectives.

Once established, these objectives were used in the evaluation of existing and future system performance, and to assess infrastructure needs. **Table 7-1** presents the performance targets that are relevant to Township-owned infrastructure. These performance targets are in line with industry standards and the Region's 2023 DGSSMS.

Table 7-1: Summary of Wastewater System Level of Service Objectives

Criteria			Performance Target
Wastewater Flows	Per Capita Rate		275 L/c/d
	Peaking Factor		Harmon
	Inflow and Infiltration Rate		0.25 L/s/ha
System Performance	Existing Sewers	Depth of Flow in Pipe (d/D)	< 1.0
		Hydraulic Grade Line (HGL) Target - 10-yr Design Storm	> 1.8 m basement protection freeboard
	New Sewers	Depth of Flow in Pipe (d/D)	< 0.7

7.1.1 Per Capita Average Dry Weather Flow

Using flow monitoring data from 2019 – 2023 and existing population estimates based on the 2021 Census, average, residential, and employment per capita average dry weather flow rates were calculated for each community, as shown in **Table 7-2**. It should be noted that the average values are skewed due to the residential and employment population split. For example, St. Jacobs and Stockyards have significant employment wastewater flows, resulting in a very high per capita flow rate.

Table 7-2: Wastewater Per Capita ADWF Rates by Community

Population	Average Per Capita ADWF (L/c/d)	Residential Per Capita ADWF (L/c/d)	Employment Per Capita ADWF (L/c/d)
Elmira	350	180	350
St. Jacobs	447	309	449
Stockyards	516	0(1)	516
Conestoga	231	231	0(1)
Heidelberg	286	286	0(1)
Breslau	285	285	287
Average	**353**	**257**	**401**
Median	**318**	**279**	**400**

(1) Data was not available to determine specific land use-based flows in this community.

The residential per capita rates are more reasonable and generally align with typical industry values for the size/type of communities within the Township when accounting for residential and employment land uses. Employment flow rates can vary significantly across employment types, as demonstrated within the Township. The option to utilize separate residential and non-residential per capita rates was presented to the Township (e.g., 305 L/c/d for residential and a higher option for employment, such as 350 L/c/d).

Through discussion with the Township and the Region, it was determined that the preferred option was to maintain the single per capita rate for all settlements and for residential/non-residential land uses. Due to uncertainty of future employment land uses, it was determined that the 275 L/c/d should be maintained and that a level of conservatism is still maintained through the peaking factors. Further, the 275 L/c/d rate aligns with the Region's DGSSMS, maintaining consistency of criteria between the upper and lower tier municipalities.

7.1.2 Peaking Factor

Using flow monitoring data from 2019 – 2023, observed peaking factors were established for each community, as detailed in **Table 7-3**. Peaking factors were also calculated using Harmon's Peaking Factor, as per the 2023 DGSSMS, using 2021 Census populations.

Table 7-3: Wastewater Peaking Factors by Community

Population	Observed	Harmon's Peaking Factor		
		Residential	Employment	Combined
Elmira	1.5	2.9	3.2	3.3
St. Jacobs	1.9	3.6	3.9	4.1
Stockyards	2.9	4.2	4.2	4.0
Conestoga	1.9	4.0	4.5	4.2
Heidelberg	2.4	4.1	4.5	3.6
Breslau	2.1	3.3	4.3	2.9

Based on the observed and calculated peaking factors, it was determined that the preferred option was to continue using Harmon's method, in line with the Region's design guidelines, as it is more conservative, which will provide additional safety factor for growth.

7.1.3 Inflow and Infiltration

Using the calibrated PCSWMM model, rainfall-derived inflow and infiltration (RDII) rates were modelled at each flow monitor in each community for a range of design storms, as detailed in **Table 7-4**.

Table 7-4: Rainfall-Derived Inflow and Infiltration Rates by Community

Community	Median RDII Rate (L/s/ha)				
	2-year	5-year	10-year	25-year	50-year
Elmira	0.43	0.39	0.51	0.69	0.84
St. Jacobs	1.04	1.51	1.77	2.36	2.66
Stockyards	1.27	1.89	2.20	2.57	2.77
Conestogo	0.15	0.19	0.21	0.23	0.25
Heidelberg	0.33	0.50	0.60	0.70	0.77
Breslau	1.00	1.50	1.78	2.15	2.36
Average	**0.70**	**1.00**	**1.18**	**1.45**	**1.61**

The RDII rates varied between flow monitors and settlements due to sewer age, land use, and other factors. Generally, residential areas (i.e. Conestogo, Heidelberg) have lower RDII rates while employment areas (i.e. Stockyards) have higher RDII rates, and in areas of new development, such as Hopewell Crossing in Breslau, the observed RDII rates are in line with design criteria.

Through discussion with the Township, it was determined that the preferred option was to continue using the Region of Waterloo's DGSSMS (2023) rate of 0.25 L/s/ha as it is achievable for growth areas and inline with the Township's wet weather reduction approach. In order to achieve an RDII rate of 0.25 L/s/ha in growth areas, monitoring and enforcement will be required as well as maintenance and expansion of existing wet weather reduction programs and inspection requirements. The 0.25 L/s/ha rate is for the life cycle of the system and shouldn't be used for a maximum leakage limit for new development when finalizing the acceptance process.

7.2 Wastewater Hydraulic Model

The basis of the assessment of hydraulic performance is the PCSWMM all-pipes hydraulic wastewater model which was developed as part of the SCS. Detailed information regarding the wastewater model software selection process can be found in **Appendix C**.

The model consists of five (5) separate models for each community with wastewater servicing, including Stockyards, St. Jacobs, Elmira, Breslau, Conestogo, and Heidelberg.

Using the Township of Woolwich GIS shapefiles of the existing wastewater system, a wastewater network review was completed to adjust pipe parameters as required. Model calibration involved the analysis of water billing and flow monitoring data.

7.3 Wastewater Flows

Existing system flows were determined through a review of the Township's water billing records and SCADA records. Projected future flows were calculated using the existing system flows as a historic baseline starting point, and growth flows were then added to the starting point using the design criteria presented in **Section 7.1**.

7.3.1 Existing Flows

Table 7-5 summarizes the existing wastewater flows by community.

Table 7-5 : Existing Wastewater Flow Analysis

Community	Dry Weather Flow (L/s)	Wet Weather Flow (L/s)(1)
Elmira	52.5	1,177.7
St. Jacobs	18.3	151.4
Stockyards	3.6	48.2
Breslau	82.5	203.8
Conestogo	4.0	4.9
Heidelberg	1.6	9.7

(1) Wet weather flows under 10-year design storm

7.3.2 Projected Future Flows

The projected wastewater system flows were identified from the projected growth discussed in **Section 3** and the wastewater per capita rate of 275 L/capita/day, as detailed in **Table 7-6**. As the settlements of Conestogo and Heidelberg do not have any significant planned municipally serviced growth, their future wastewater flows are not expected to change significantly.

Table 7-6 : Future Wastewater Flow Analysis

Community	Dry Weather Flow (L/s)	Wet Weather Flow (L/s)(1)
Elmira	274.1	1,555.5
St. Jacobs(2)	59.2	205.2
Stockyards	28.8	60.6
Breslau – To Kitchener WWTP	214.1	400.7
Breslau – To Kossuth(3)	493.6	573.2
Conestogo(4)	4.0	4.9
Heidelberg(4)	1.6	9.7

(1) Wet weather flows under 10-year design storm.
(2) Note that there is an ongoing St. Jacobs WWTP Expansion EA that only considers projects out to 2051 needs.
(3) Dry Weather Flow and Wet Weather Flow based on the East Side Lands Woolwich Sanitary Servicing Class EA Appendix E.
(4) No projected growth in these settlements.

7.4 Elmira

7.4.1 Existing Wastewater System Overview

The wastewater system in the community of Elmira services approximately 555 ha. The system is serviced by the Region-owned Elmira Wastewater Treatment Plant, located at 80 First Street East. System flows are conveyed to the treatment plant via a network of local sewers and three (3) Township-owned pump stations, detailed in **Table 7-7**.

Figure 7-1 and **Figure 7-2** present the existing system map and schematic.

Table 7-7: Elmira Pumping Station and Forcemain Overview

Details		Snyder Avenue North PS	Victoria Glen PS	Arthur Street North PS
Catchment Area (ha)		18	6	14
Pump Station Details	Number of Pumps	3 (2 duty, 1 standby)	2 (1 duty, 1 standby)	2 (1 duty, 1 standby)
	Firm Capacity (L/s)	36	65[1]	33
Forcemain Details	Single or Twinned Forcemain	Single	Single	Single
	Length (m)	1,240	95	45

(1) Assumed firm capacity based on comparable pumps.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Other Features

- GRCA Watercourse
- Surrounding Municipalities
- Woolwich Municipal Boundary
- Rail Line
- Watercourse

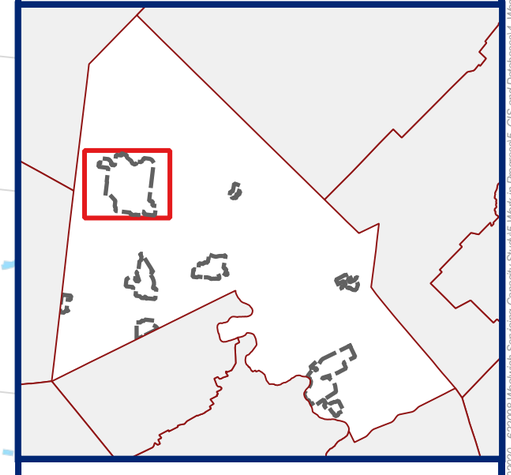


Figure 7-1

Existing Wastewater System

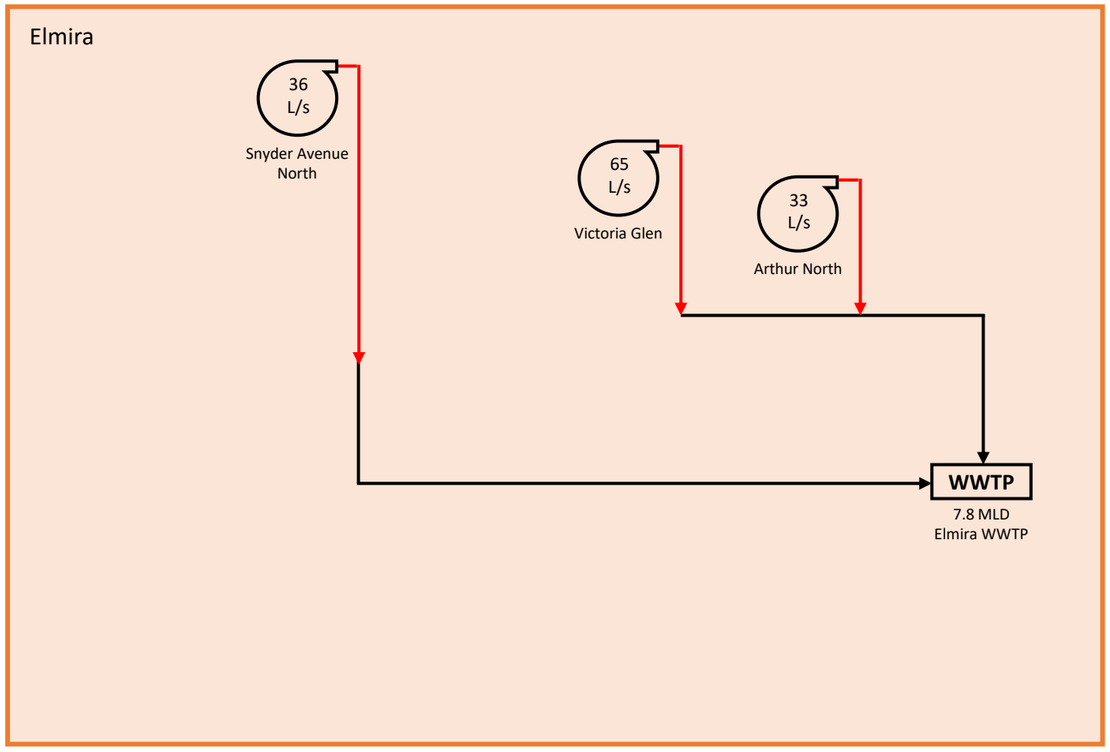
Elmira

GEI Consultants

November, 2025
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0 0.7 1.4 km

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Woolwich Servicing Capacity Study

WWTP Wastewater Treatment Plant
RATED CAPACITY

Firm Capacity — Pump

Forcemain

Connection from SPS to SPS

Connection from SPS to WWTP

Elmira

Figure 7-2
Existing Wastewater System Schematic

GEI Consultants

June 2024
622098

7.4.2 Assessment of Existing Township Wastewater Infrastructure

Existing system performance mapping is presented in **Appendix D**. There are significant surcharging issues in the Oriole Parkway West catchment area due to undersized sewers, leading to significant backflow issues encompassing the catchment area. Additional surcharging issues are present near the Elmira Wastewater Treatment Plant along the railway line, in the Elmira downtown area along Wyatt Street East and Queen Street, and along Arthur Street North.

7.4.3 Assessment of Growth Impacts

The existing surcharging issues remain and are worsened by anticipated future growth. Significant surcharging issues remain in the Oriole Parkway West catchment area due to undersized sewers, leading to significant backflow issues encompassing the catchment area. Additional surcharging issues remain near the Elmira Wastewater Treatment Plant along the railway line, Elmira downtown area along Wyatt Street East and Queen Street, and along Arthur Street North.

7.4.4 Servicing Alternatives and Evaluation

7.4.4.1 Oriole Parkway Trunk Alternatives

To address the existing and future capacity needs, multiple servicing alternatives were considered to improve performance along the Oriole Parkway trunk sewer, as detailed in **Table 7-8** and **Figure 7-3.**

New Trunk Sewer from Pintail Drive to MH 647 (Alternative 1)

Alternative 1 consists of 1.0 km of new 450 mm diameter trunk sewer along Whippoorwill Drive, from Pintail Drive to Arthur Street South, and South Field Drive, from Arthur Street South to the railway as well as 2.1 km of sewer upgrades along the existing Oriole parkway trunk sewer to the WWTP.

New Trunk Sewer from Barnswallow Drive to MH 647 (Alternative 2)

Alternative 2 consists of 2.4 km of new 450 mm diameter trunk sewer along Whippoorwill Drive, from Barnswallow Drive to Arthur Street South, and South Field Drive, from Arthur Street South to the railway as well as 1.0 km of sewer upgrades along the existing Oriole parkway trunk sewer to the WWTP.

Full Trunk Sewer Upgrade (Alternative 3)

Alternative 3 consists of 2.1 km of upgrades along the existing Oriole Parkway trunk sewer from 50 m east of Meadowlark Road to the WWTP. The upgrades range from 525 mm to 750 mm.

Trunk Sewer Upgrade with I/I Reduction (Alternative 4)

Alternative 4 consists of 1.4 km of upgrades along the existing Oriole Parkway trunk sewer in combination with an I/I reduction program within the contributing Birdland sewer catchment area as shown in **Figure 7-3.**

New Trunk Sewer along Oriole Parkway and Railway (Alternative 5)

Alternative 5 consists of 1.7 km of new 450 mm diameter trunk sewer along Oriole Parkway West and East to the railway and 0.6 km of upgrades along the existing trunk sewer adjacent to the railway. Multiple alignments for the new trunk sewer were considered, but due to Regional ownership of Arthur Street South and recent works on Union Street and Industrial Street, the proposed alignment was selected. Further, since upgrades to the existing sewer along the railway (between Oriole Parkway East and First Street) are required, it is beneficial to construct the new sewer along the same alignment.

New Trunk Sewer along Oriole Parkway and Railway with I/I Reduction (Alternative 6)

Alternative 6 consists of 1.7 km of new 450 mm diameter trunk sewer along Oriole Parkway West and East to the railway and 0.6 km of upgrades along the existing trunk sewer adjacent to the railway in combination with an I/I reduction program with the contributing sewer catchments.

Table 7-8: Oriole Parkway Trunk Sewer Alternatives Evaluation

Category	Criteria	Alternative 1 - New Trunk Sewer from Pintail Drive to MH 647	Alternative 2 – New Trunk Sewer from Barnswallow Drive to MH 647	Alternative 3 – Oriole Parkway Full Trunk Sewer Upgrade	Alternative 4 – Oriole Parkway Trunk Sewer Upgrades with I/I Reduction	Alternative 5 – New Trunk Sewer along Oriole Parkway and Railway	Alternative 6 – New Trunk Sewer along Oriole Parkway and Railway with I/I Reduction
		- 1.0 km of 450 mm trunk sewer - 2.1 km of upgrades	- 2.4 km of 450 mm trunk sewer - 1.0 km of upgrades	- No new trunk sewer - 2.1 km of upgrades	- No new trunk sewer - 1.4 km of upgrades - I/I Program	- 1.7 km of 450 mm trunk sewer - 0.6 km of upgrades	- 1.7 km of 450 mm trunk sewer - 0.6 km of upgrades - I/I Program
Technical Impacts	Meets existing and future servicing needs	🟢 - Yes	🟢 - Yes	🟢 - Yes	🟢 - Yes	🟢 - Yes	🟢 - Yes
	Provides a reliable service	🟢 - Services existing & growth - New trunk adds reliability	🟢 - Services existing & growth - New trunk adds reliability	🟡 - Services existing and growth	🟡 - Services existing and growth	🟢 - Services existing & growth - New trunk adds reliability	🟢 - Services existing & growth - New trunk adds reliability
	Minimizes and manages construction risk	🟡 - Construction on minor arterial/collector - Crosses Regional Road - Construction along creek	🟡 - Construction on minor arterial/collector - Crosses Regional Road - Construction along creek	🔴 - Construction on local road - Crosses Regional Road - Construction along creek - Construction easements required	🟡 - Construction on local road - Crosses Regional Road - Construction along creek	🔴 - Construction along minor arterial/collector - Crosses Regional Road - Construction along creek - Construction easements	🔴 - Construction along minor arterial/collector - Crosses Regional Road - Construction along creek - Construction Easements
	Supports phased expansion of the system	🟢 - Additional upgrades improve existing - New trunk expansion can be timed with growth	🟢 - Additional upgrades improve existing - New trunk expansion can be timed with growth	🟡 - Minimal opportunity for project phasing	🟢 - I/I reduction pre-growth - Upgrade sizing dependent on observed I/I reduction	🟡 - Minimal opportunity for project phasing	🟢 - I/I reduction pre-growth - New trunk sizing dependent on observed I/I reduction
	Operational Complexity	🟢 - No changes in complexity	🟢 - No changes in complexity	🟢 - No changes in complexity	🟢 - No changes in complexity	🟢 - No changes in complexity	🟢 - No changes in complexity
	Timing and Certainty	🟢 - Typical timing and certainty levels associated with capital works	🟢 - Typical timing and certainty levels associated with capital works	🟢 - Typical timing and certainty levels associated with capital works	🟡 - Additional time/resources required for I/I programs - Some uncertainty in actual I/I reductions	🟢 - Typical timing and certainty levels associated with capital works	🟡 - Additional time/resources required for I/I programs - Some uncertainty in actual I/I reductions
	Resiliency to climate change	🟡 - New sewer provides additional capacity	🟡 - New sewer provides additional capacity	🟡 - Upgraded sewer provides additional capacity	🟢 - Reduced I/I creates additional capacity	🟡 - New sewer provides additional capacity	🟢 - Reduced I/I creates additional capacity
Environmental Impacts	Protects environment features, wildlife, and species at risk	🔴 - Large impact due to upgrades in green space	🟡 - Potential impact due to upgrades in green space	🔴 - Large impact due to upgrades in green space	🔴 - Large impact due to upgrades in green space	🟡 - Potential impact due to upgrades in green space	🟡 - Potential impact due to upgrades in green space

Category	Criteria	Alternative 1 - New Trunk Sewer from Pintail Drive to MH 647	Alternative 2 – New Trunk Sewer from Barnswallow Drive to MH 647	Alternative 3 – Oriole Parkway Full Trunk Sewer Upgrade	Alternative 4 – Oriole Parkway Trunk Sewer Upgrades with I/I Reduction	Alternative 5 – New Trunk Sewer along Oriole Parkway and Railway	Alternative 6 – New Trunk Sewer along Oriole Parkway and Railway with I/I Reduction
		- 1.0 km of 450 mm trunk sewer - 2.1 km of upgrades	- 2.4 km of 450 mm trunk sewer - 1.0 km of upgrades	- No new trunk sewer - 2.1 km of upgrades	- No new trunk sewer - 1.4 km of upgrades - I/I Program	- 1.7 km of 450 mm trunk sewer - 0.6 km of upgrades	- 1.7 km of 450 mm trunk sewer - 0.6 km of upgrades - I/I Program
	Minimizes climate change impacts	🔴 - Large impact due to construction	🔴 - Large impact due to construction	🔴 - Large impact due to construction	🟡 - Moderate impact due to construction	🟡 - Moderate impact due to construction	🟡 - Moderate impact due to construction
Social and Cultural Impacts	Protects resident quality of life	🟢 - Maintains/improves current LOS to customers	🟢 - Maintains/improves current LOS to customers	🟢 - Maintains/improves current LOS to customers	🟢 - Maintains/improves current LOS to customers	🟢 - Maintains/improves current LOS to customers	🟢 - Maintains/improves current LOS to customers
	Manages and minimizes construction impacts	🟡 - Moderate construction disruption	🟡 - Moderate construction disruption	🔴 - High construction disruption	🔴 - High construction disruption	🟡 - Moderate construction disruption	🟡 - Moderate construction disruption
	Protects cultural heritage and archeological features	🟡 - Potential impacts to Cultural Heritage and Archaeological	🟡 - Potential impacts to Cultural Heritage and Archaeological	🟡 - Potential impacts to Cultural Heritage and Archaeological	🟡 - Potential impacts to Cultural Heritage and Archaeological	🟢 - Unknown impacts to Cultural Heritage and Archaeological	🟢 - Unknown impacts to Cultural Heritage and Archaeological
Financial Impacts	Option capital and life-cycle costs	🔴 - $$$ - **$27M total** - $12M in new sewers - $15M in upgrades	🔴 - $$$ - **$26M total** - $17M in new sewers - $8M in upgrades	🟢 - $$ - **$15M total** - $15M in upgrades	🟢 - $$ - **$15M total** - $2M I/I Program - $13M in upgrades	🟡 - $$ - **$18M total** - $13M in new sewers - $5M in upgrades	🟡 - $$ - **$20M total** - $13M in new sewers - $5M in upgrades - $2M I/I Program
	Operation and maintenance costs	🟢 - No changes to O&M	🟢 - No changes to O&M	🟢 - No changes to O&M	🟢 - No changes to O&M	🟢 - No changes to O&M	🟢 - No changes to O&M
	Aligns with approval and permitting process	🟢 - No land acquisition needed	🟢 - No land acquisition needed	🟢 - No land acquisition needed	🟢 - No land acquisition needed	🟢 - No land acquisition needed	🟢 - No land acquisition needed

🟢 “High” solution generates beneficial impacts and/or has no substantial technical challenges.

🟡 “Medium” solution to a mix of positive and negative elements with some impacts.

🔴 “Low” solution presents permanent negative impacts and/or presents significant technical challenges.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Alternatives
- Alternative 1
- Alternative 2
- Alternative 3
- Alternative 4
- Alternative 5 & 6
- Birdland I/I Reduction Area

Existing Infrastructure
- Sanitary Pump Station
- Wastewater Treatment Plant
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Other Features
- Rail Line
- Watercourse
- GRCA Watercourse
- Surrounding Municipalities
- Woolwich Municipal Boundary

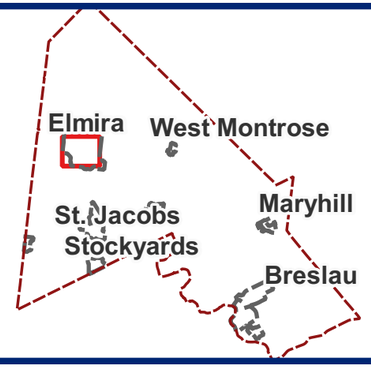


Figure 7-3

Oriole Parkway Alternatives

GEI Consultants

April, 2025
622098-WW-004
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0 0.4 0.8 km

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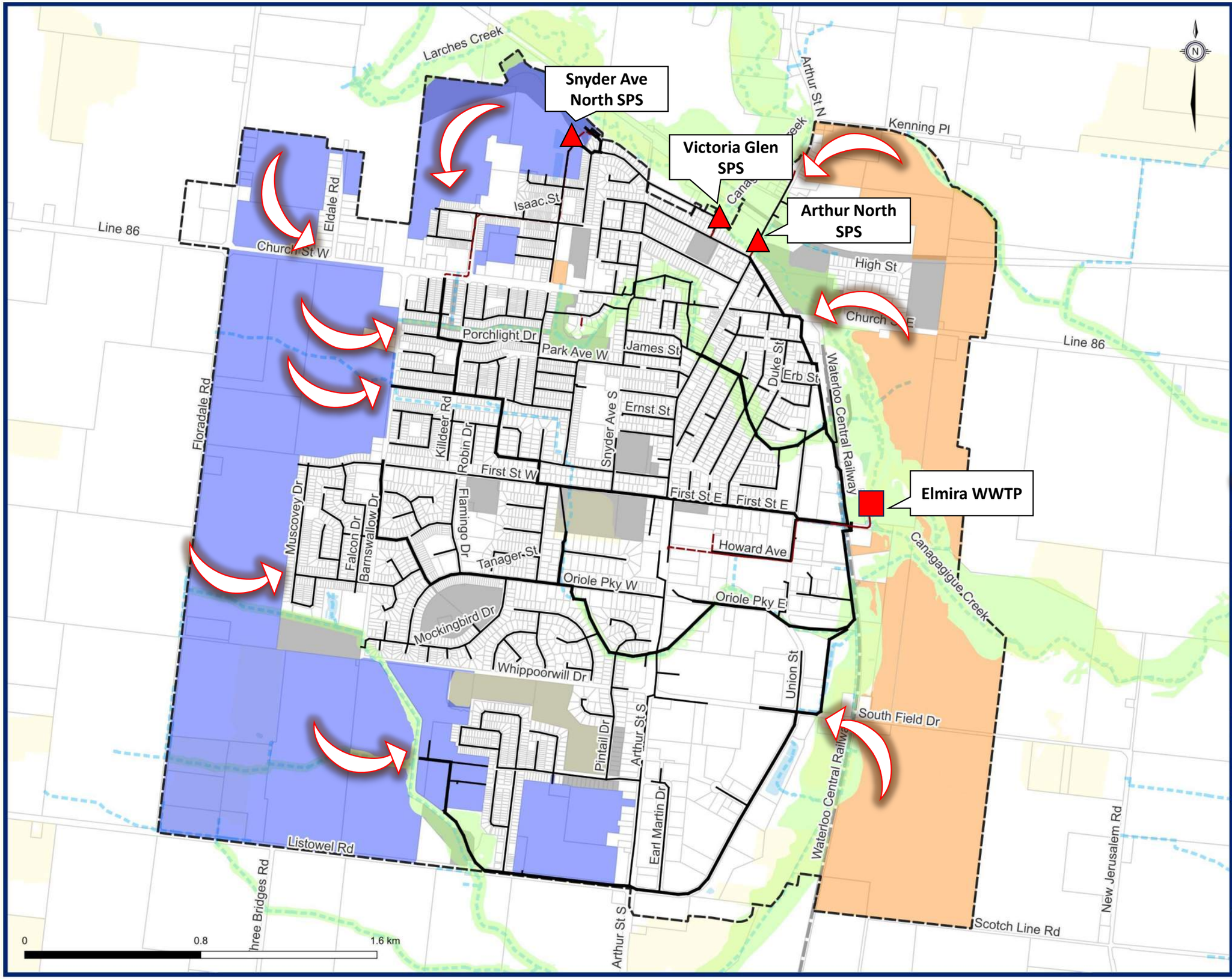
Based on the evaluation, the preferred servicing alternative is the new trunk sewer along Oriole Parkway and railway with I/I reduction (Alternative 6) (SAN-ELM-012). The main advantages of this alternative are the additional service reliability due to the new trunk and additional capacity created by I/I reductions providing resiliency to climate change.

7.4.4.2 Growth Servicing Strategy

The majority of the large greenfield growth areas are concentrated on the outskirts of the existing built-up area. The west side of the updated urban area boundary consists of large residential greenfield growth areas, while the east side of the updated urban area boundary consists of large employment greenfield growth areas.

Draft plans were not available for all planned future growth areas within the Township. Where draft plans were available, sewers were identified along planned road alignments. Some upgrades and/or extensions to the existing system are required to support the level and locations of planned future growth. Further, where growth areas required sewers sized 300 mm diameter or greater, mid-block trunk servicing strategies were identified. The alignments of mid-block trunk servicing strategies are subject to change through the preliminary and detailed design processes for these developments. The intent of these projects within the SCS is to identify projects requiring upsized sewers supporting multiple growth areas.

Figure 7-4 presents an overview of planned growth areas within Elmira, and the general servicing strategies for the significant greenfield growth areas.



WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Greenfield Growth within ROPA6 UAB
- Employment
- Residential

Other Land Use
- Official Plan - Open Space Area
- Environmental Protection
- Environmental Restricted Area

Existing Wastewater Infrastructure
- <=300mm Township Sewer
- >300mm Township Sewer
- <=300mm Forcemain
- >300mm Forcemain

Other
- Rail Line
- Watercourse
- ROPA6 Urban Area Boundary (UAB)
- Municipal Boundary
- Potential Sanitary Servicing



Figure 7-4

Growth Servicing Strategy

Elmira

GEI Consultants

November, 2025
622098-G-001
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7.4.4.3 I/I Reduction Program

As part of the ongoing wet weather flow reduction program, multiple I/I reduction programs were recommended and carried through to the capital / DC / developer program. **Table 7-9** and **Figure 7-5**.

Table 7-9: Elmira I/I Reduction Programs

Project Location	Reduction Target	Priority Level	Total Area (ha)	Cost
Birdland	50%	High	161	$1,926,000
Downtown Elmira South	25%	High	31	$881,000
Downtown Elmira North	25%	High	70	$1,093,000
Downtown Elmira West	10%	High	44	$590,000
Brookmead	10%	High	55	$977,000
South Parkwood	50%	High	23	$1,007,000
		Total	**384**	**$6,474,000**

7.4.5 Preferred Wastewater Capital / DC / Developer Program

Table 7-10 and **Figure 7-6** present the preferred wastewater capital / DC / developer program for Township infrastructure within Elmira. The alignments presented in the capital / DC / developer program are subject to change based on revised development growth strategies, potential future road alignments, funding allocations, and other factors.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Infrastructure

- Sanitary Pump Station
- Wastewater Treatment Plant
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

I-I Reduction Area

- Birdland
- Brookmead
- Downtown Elmira North
- Downtown Elmira South
- Downtown Elmira West
- South Parkwood

Other Features

- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary



Figure 7-5

I/I Reduction Program - Elmira

November, 2025
622098-WW-004
Projection EPSG:26917

0 0.7 1.4 km

Table 7-10: Preferred Wastewater Capital / DC / Developer Program – Elmira

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
SAN-ELM-001	New sewer in west of Barnswallow Drive	400	300	2024 - 2033	$785,150	Site Development application. Internal Servicing Works	-
SAN-ELM-005	New sewer on Church St W	662	300	2024 - 2033	$2,901,775	Site Development application.	-
SAN-ELM-006	New sewer on Eldale Rd.	327	250	2034 - 2051	$625,250	Site Development application. Internal Servicing Works	After SAN-ELM-005
SAN-ELM-007	New Sewer on Church St E	771	375	2034 - 2051	$6,245,325	Site Development application.	-
SAN-ELM-008	New sewer South Field Dr	689	300	2034 - 2051	$1,577,475	Site Development application.	-
SAN-ELM-009	New sewer southwest Elmira	320	250	2024 - 2033	$3,581,350	Site Development application.	-
SAN-ELM-010	Downtown Trunk Upgrade and I&I	143	250	2024 - 2033	$326,975	Existing Deficiency - recommend completing before upstream growth if I/I reduction targets in Downtown Elmira South not achieved.	Not Required if Downtown South I/I Reduction Target Met
SAN-ELM-011	New sewer on Arthur St N	139	300	2024 - 2033	$672,400	Site Development application. Internal Servicing Works	With SAN-ELM-015. After SAN-ELM-017.
SAN-ELM-012	New trunk along Oriole Pkwy W	1,703	450	2024 - 2033	$13,013,400	Existing Deficiency - recommend completing before upstream growth if I/I reduction targets in Birdland not achieved.	Not Required if Birdland I/I Reduction Target Met
SAN-ELM-013	Upgrade west of railway between Oriole Pkwy E and First St E	486	675	2024 - 2033	$17,360,425	Existing Deficiency - recommend completing before upstream growth if I/I reduction targets in Birdland not achieved.	Not Required if Birdland I/I Reduction Target Met
SAN-ELM-014	New sewer at Kingfisher Drive	270	250	2034 - 2051	$515,575	Site Development application. Internal Servicing Works	-
SAN-ELM-015	New sewer east of Arthur St N	310	300	2034 - 2051	$1,008,600	Site Development application. Internal Servicing Works	With SAN-ELM-011. After SAN-ELM-017
SAN-ELM-016	New sewer from High St and George St to Arthur St N	370	375	2024 – 2033	$918,400	High Street / Charles Street / George Street Servicing if Township wishes to move residents off septic	After SAN-ELM-017
SAN-ELM-017	Sanitary Upgrade along Arthur St N north of Arthur SPS	367	300	2024 – 2033	$4,214,800	Existing Deficiency - recommend completing before upstream growth. Work to be tied into Region project.	-
	Total	**6,957**	**-**	**-**	**$53,746,900**	**-**	**-**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Upgrades to Existing Infrastructure
- <= 300 mm
- 300 - 525 mm
- > 525 mm

New Infrastructure
- <= 300 mm
- 300 - 525 mm
- > 525 mm
- Forcemain

Existing Infrastructure
- Sanitary Pump Station
- Wastewater Treatment Plant
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Other Features
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities



Figure 7-6

Wastewater Capital Program

Elmira

GEI Consultants

April, 2026
622098-W-001
Projection EPSG:26917

0 0.9 1.8 km

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7.5 St. Jacobs

7.5.1 Existing Wastewater System Overview

The wastewater system in the community of St. Jacobs services approximately 133 ha. The system is serviced by the Region-owned St. Jacobs Wastewater Treatment Plant, located at 61 Water Street. System flows are conveyed to the treatment plant via a network of local sewers and one (1) pump station, detailed in **Table 7-11**.

Figure 7-7 and **Figure 7-8** present the existing system map and schematic.

Table 7-11: St Jacobs Pumping Station and Forcemain Overview

Details		Mill Race Crescent PS
Catchment Area (ha)		6
Pump Station Details	Number of Pumps	2 (1 duty, 1 standby)
	ECA Firm Capacity (L/s)	11.1
Forcemain Details	Single or Twinned Forcemain	Single
	Length (m)	193

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Other Features

- GRCA Watercourse
- Surrounding Municipalities
- Woolwich Municipal Boundary
- Rail Line
- Watercourse

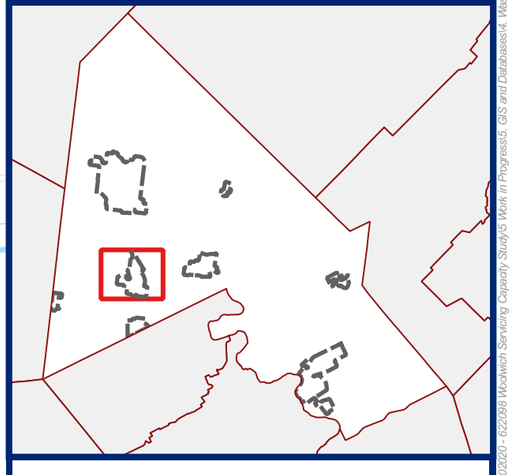


Figure 7-7

Existing Wastewater System

St. Jacobs

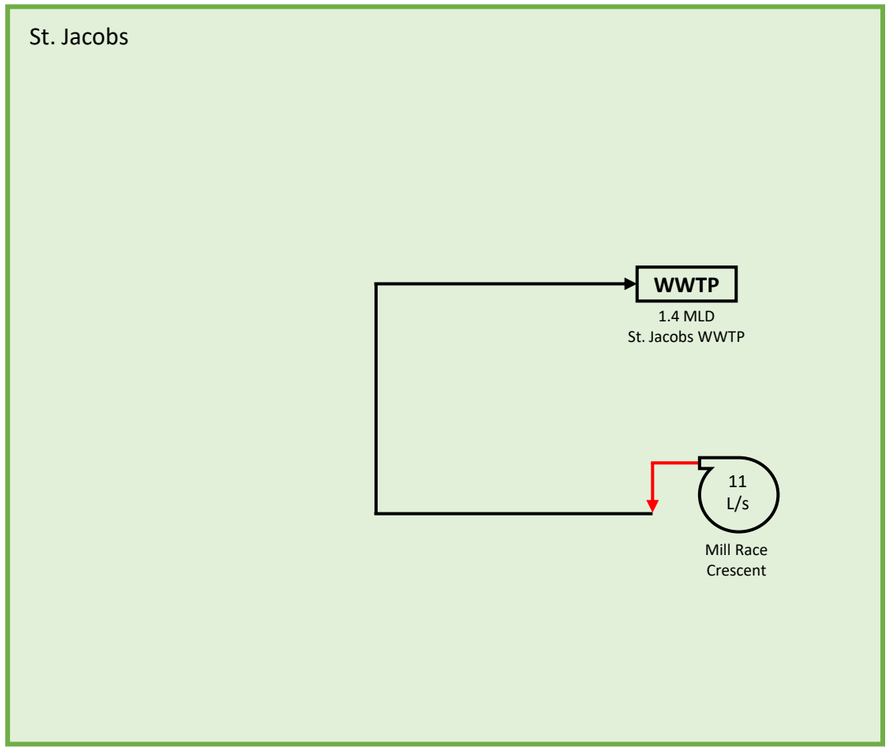
GEI Consultants

November, 2025
622098-WW-001
Projection EPSG:26917

0 0.5 1 km

Hawkesville Rd
Waterloo Central Railway
Northside Dr
King St N
Parkside Dr
Sawmill Rd
New Jerusalem Rd
Eby St
Front St
Isabella St S
Albert St W
Albert St E
Conestogo River
Queensway Dr
St Jacobs WWTP
Young St
Water St
Arthur St S
Three Bridges Rd
Henry St
Conestogo River
Conestogo River
Waterloo Central Railway
Maplelawn Dr
Treeview Dr
Mill Race Crescent SPS
Parkhaven Dr
Printery Rd
Conlon Dr
Old Scout Pl
Martin Grove Rd
Bo-De Lane

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

WWTP
RATED CAPACITY
Wastewater Treatment Plant

Firm Capacity
Pump

Forcemain

Connection from SPS to SPS

Connection from SPS to WWTP

St. Jacobs

Figure 7-8
Existing Wastewater System Schematic

GEI Consultants

June 2024
622098

7.5.2 Assessment of Existing Township Wastewater Infrastructure

Existing system performance mapping is presented in **Appendix D.** Surcharging above 1.8 m freeboard occurs in downtown St. Jacobs along Hachborn Street East and Water Street near the WWTP due to undersized sewers on Water Street. Surcharging above 1.8 m freeboard is also reported at the Waterloo Central Railway crossing near the Home Hardware distribution centre (west of Queensway Drive and High Crest Lane West) due to backflow from sewers along Queensway Drive.

7.5.3 Assessment of Growth Impacts

Under future growth conditions, the surcharging issues in downtown St. Jacobs along Hachborn Street East and Water Street are expected to worsen due to additional upstream growth flows, increasing risk of basement flooding. Similarly, the existing surcharging issues along the Waterloo Central Railway crossing near the Home Hardware distribution centre are worsened by growth south of Henry Street.

7.5.4 Servicing Alternatives and Evaluation

7.5.4.1 Upgrades to Address Surcharging Downtown St. Jacobs

To address the existing and future surcharging issues in downtown St. Jacobs, the 250 mm diameter sewer on Hachborn Street East between Young Street and Water Street should be replaced with a 300 mm diameter sewer (SAN-STJ-006), and the 250 mm diameter sewer on Water Street between Hachborn Street East and Princess Street East should be replaced with a 375 mm diameter sewer (SAN-STJ-007). If the I/I reduction program within St. Jacobs as described in **Section 7.5.4.4** can achieve its target, then SAN-STJ-007 can be 300 mm. As both SAN-STJ-006 and SAN-STJ-007 addresses existing deficiencies, it is recommended that these projects are completed prior to any upstream growth to avoid increasing existing risk of basement flooding.

7.5.4.2 Upgrades to Address Surcharging along Waterloo Central Railway Crossing

To address existing surcharging issues along the Waterloo Central Railway crossing near the Home Hardware distribution centre, a new twin 300 mm sewer is proposed between west of Waterloo Central Railway to High Crest Lane (SAN-STJ-011). The twin sewer is expected to increase flows downstream along Princess Street West, causing surcharging above 1.8 m freeboard along the existing 250 mm sewer between Princess Street West and Hachborn Street East. To address deficiencies caused by SAN-STJ-011, a new 300 mm sewer is proposed along Princess Street West and King Street North (SAN-STJ-012). Alternatively, if the I/I reduction program within the Hachborn area as described in **Section 7.5.4.4** can achieve its target, then SAN-STJ-012 is not required.

7.5.4.3 Growth Servicing Strategy

The larger greenfield growth areas are concentrated on the outskirts of the existing built-up area. There is a large residential greenfield area in the northwest of St. Jacobs, and employment greenfield areas in the southwest of St. Jacobs.

Draft plans were not available for all planned future growth areas within the Township. Where draft plans were available, sewers were identified along planned road alignments. Some upgrades and/or extensions to the existing system are required to support the level and locations of planned future growth. Further, where growth areas required sewers sized 300 mm diameter or greater, mid-block trunk servicing strategies were identified. The alignments of mid-block trunk servicing strategies are subject to change through the preliminary and detailed design processes for these developments. The intent of these projects within the SCS is to identify projects requiring upsized sewers supporting multiple growth areas.

Figure 7-9 presents an overview of planned growth areas within St. Jacobs, and the general servicing strategies for the significant growth areas.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Greenfield Growth within ROPA6 UAB
- Employment
- Residential

Other Land Use
- Official Plan - Open Space Area
- Environmental Protection
- Environmental Restricted Area

Existing Wastewater Infrastructure
- <=300mm Township Sewer
- >300mm Township Sewer
- <=300mm Forcemain
- >300mm Forcemain

Other
- Rail Line
- Watercourse
- ROPA6 Urban Area Boundary (UAB)
- Municipal Boundary
- Potential Sanitary Servicing

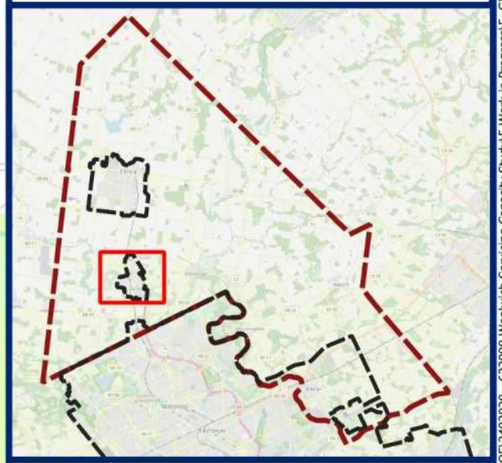


Figure 7-9

Growth Servicing Strategy

St. Jacobs

GEI Consultants

November, 2025
622098-G-001
Projection EPSG:26917

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7.5.4.4 I/I Reduction Program

As part of the ongoing wet weather flow reduction program, multiple I/I reduction programs were recommended and carried through to the capital / DC / developer program. **Table 7-12** and **Figure 7-10** detail the extent and locations of the programs.

Table 7-12: St. Jacobs I/I Reduction Programs

Project Location	Reduction Target	Priority Level	Total Area (ha)	Cost[1]
Princess West	25%	Low	8	$8,000
Hachborn	25%	Low	2	$8,000
Cedar	25%	Low	7	$8,000
Albert	25%	Low	9	$8,000
		Total	**26**	$32,000

(1) Remaining estimated cost for removal of flow monitors post I/I reduction work and currently under review.

7.5.5 Preferred Wastewater Capital / DC / Developer Program

Table 7-13 and **Figure 7-11** present the preferred wastewater capital / DC / developer program for Township infrastructure within St. Jacobs. The alignments presented in the capital / DC / developer program are subject to change based on revised development growth strategies, potential future road alignments, funding allocations, and other factors.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Infrastructure
- Sanitary Pump Station
- Wastewater Treatment Plant
- <= 300 mm Sewer
- > 300 mm Sewer

I-I Reduction Area
- Albert Street
- Cedar Street
- Hachborn Street
- Princess Street West

Other Features
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary

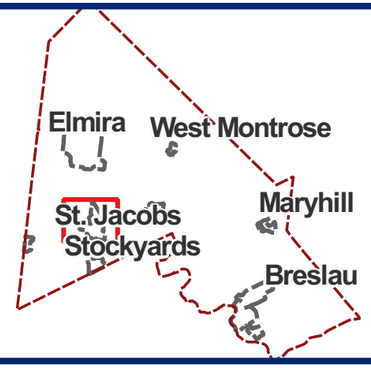


Figure 7-10

I/I Reduction Program - St. Jacobs

GEI Consultants

November, 2025
622098-WW-004
Projection EPSG:26917

Hawkesville Rd
King St N
Northside Dr
Eby St
Sawmill Rd
New Jerusalem Rd
Albert Street
Cedar Street
St Jacobs WWTP
Three Bridges Rd
Hachborn Street
Water St
Henry St
Princess Street West
Young St
Arthur St S
Maplelawn Dr
Treeview Dr
Parkhaven Dr
Printery Rd
Old Scout Pl
Bo-De Lane
0
0.5
1 km

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622098-WW-004 - Woolwich Servicing Capacity Study\05 Work in Progress\5. GIS and Database\4. Wastewater\622098

Table 7-13 : Preferred Wastewater Capital / DC / Developer Program – St. Jacobs

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
SAN-STJ-006	Sanitary Upgrade along Hachborn St E between Young St and Water St	93	300	2034 - 2051	$218,325	Existing Deficiency - recommend completing before upstream growth.	-
SAN-STJ-007	Sanitary Upgrade along Water St between Hachborn St E and Princess St E	93	375	2034 - 2051	$230,625	Existing Deficiency - recommend completing before upstream growth.	If St. Jacobs I/I Reduction Program is completed. Only 300 mm Sewer Upgrade is necessary.
SAN-STJ-008	New sewer south of Henry St	38	250	2034 - 2051	$328,000	Site Development application. Internal Servicing Works	-
SAN-STJ-009	New sewer in employment land, north of HH	57	250	2034 - 2051	$508,400	Site Development application. Internal Servicing Works	-
SAN-STJ-010	New connection from 3017 Regional Road 17	28	250	2034 - 2051	$54,325	Site Development application. Internal Servicing Works	-
SAN-STJ-011	New twin sewer crossing Waterloo Central Railway to Queensway Dr	134	300	2034 - 2051	$793,350	Existing Deficiency - recommend completing before upstream growth.	-
SAN-STJ-012	New Sewer along Princess St W and King St N	118	300	2034 - 2051	$276,750	Should be completed after SAN-STJ-011.	If St. Jacobs I/I Reduction Program is completed within Hachborn, this project is not necessary.
Total		**559**	**-**	**-**	**$2,409,775**	**-**	**-**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Upgrades to Existing Infrastructure
- <= 300 mm
- 300 - 525 mm
- > 525 mm

New Infrastructure
- <= 300 mm
- 300 - 525 mm
- > 525 mm
- Forcemain

Existing Infrastructure
- Sanitary Pump Station
- Wastewater Treatment Plant
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Developer Led Projects
- Developer Led Sewers

Other Features
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities

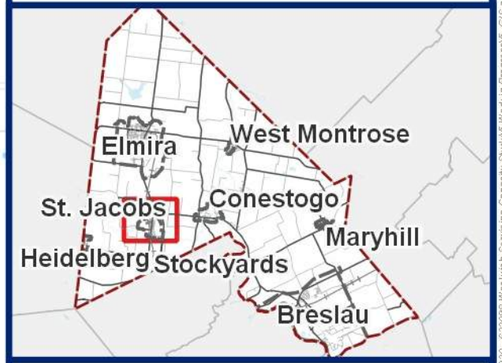


Figure 7-11

Wastewater Capital Program

St. Jacobs

BluePlan ENGINEERING

June, 2026
622098-WW-004
Projection EPSG:26917

Waterloo Central Railway
Hawkesville Rd
Northside Dr
King St N
Sawmill Rd
SAN-STJ-010
Eby St
Front St
Conestogo River
SAN-STJ-009
St. Jacobs
SAN-STJ-006
SAN-STJ-007
SAN-STJ-012
St Jacobs WWTP
SAN-STJ-011
Three Bridges Rd
Henry St
Young St
Water St
SAN-STJ-008
Maplelawn Dr
Parkhaven Dr
Printery Rd
Old Scout Pl
Arthur St S
New Jerusalem Rd
Bo-De Lane
0
0.5
1 km

7.6 Stockyards

7.6.1 Existing Wastewater System Overview

The wastewater system in the community of Stockyards services approximately 31 ha. The system is serviced by the Region-owned Waterloo Wastewater Treatment Plant, located at 340 University Avenue. System flows are conveyed to the treatment plant via a network of local sewers in Stockyards before discharging to City of Waterloo-owned sewers on Conrad Place and Kumpf Drive.

Figure 7-12 and **Figure 7-13** present the existing system map and schematic.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Other Features

- GRCA Watercourse
- Surrounding Municipalities
- Woolwich Municipal Boundary
- Rail Line
- Watercourse

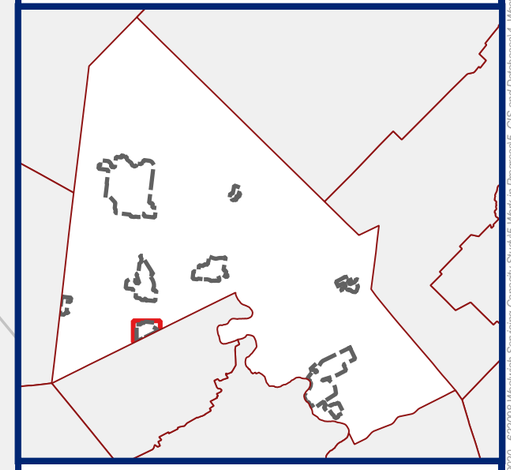


Figure 7-12

Existing Wastewater System

Stockyards

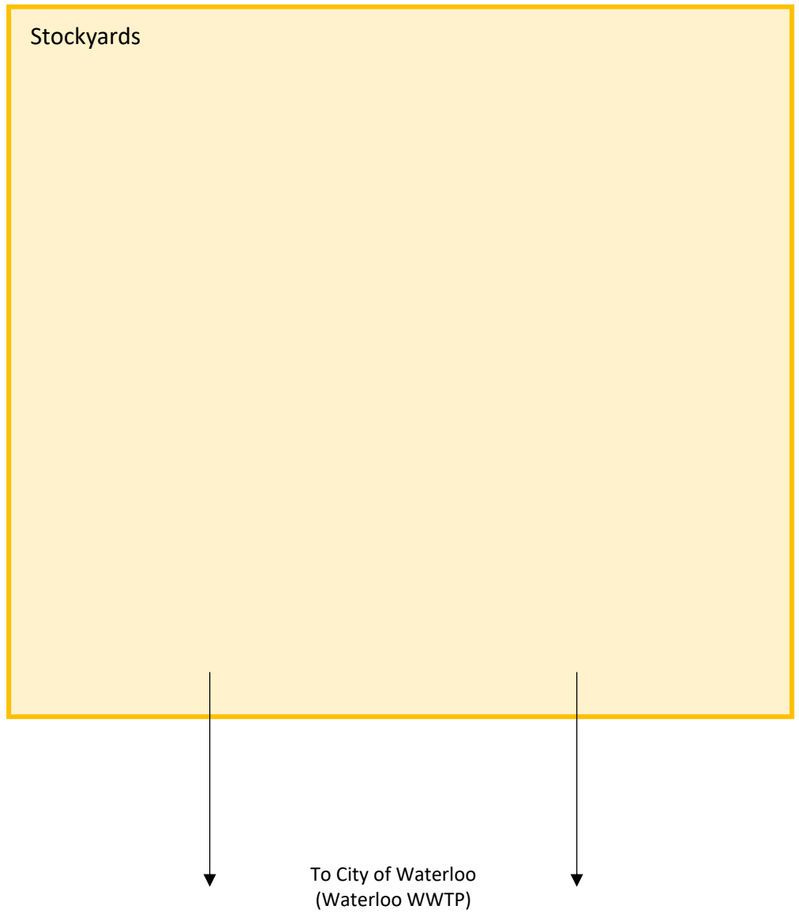
GEI Consultants

November, 2025
622098-WW-001
Projection EPSG:26917

Martin Creek
King St N
Martin Grove Rd
Stockyards
Farmer's Market Rd
Waterloo Central Railway
Apple Grove Rd
Weber St N
Benjamin Rd
<Null>
Colby Crt
Colby Dr
City Of Waterloo
Kumpf Dr
Conrad Pl
Randall Dr

0 0.2 0.4 km

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

WWTP
RATED CAPACITY
Wastewater Treatment Plant

Firm Capacity
Pump

Forcemain

Connection from SPS to SPS

Connection from SPS to WWTP

Stockyards

Figure 7-13
Existing Wastewater System Schematic

GEI Consultants

June 2024
622098

7.6.2 Assessment of Existing Township Wastewater Infrastructure

Existing system performance mapping is presented in **Appendix D.** There is surcharging on Benjamin Road at the west side of Stockyards due to undersized sewers. Surcharging results in an HGL above the basement protection freeboard of 1.8 m in this location.

7.6.3 Assessment of Growth Impacts

The surcharging issues at Benjamin Road are worsened by growth in the north due to undersized sewers on Benjamin Road. Surcharging results in an HGL above the basement protection freeboard of 1.8 m in this location.

7.6.4 Servicing Alternatives and Evaluation

7.6.4.1 Upgrades to Address Surcharging on Benjamin Road

To address the existing and future surcharging issues along Benjamin Road, the existing 200 mm diameter sewer on Benjamin Road between the City of Waterloo municipal boundary and Farmer's Market Road should be replaced with a 300 mm diameter sewer (SAN-STY-001). Additionally, the existing 200 mm diameter sewer extending from Benjamin Road to Conrad Place should be replaced with a 300 mm diameter sewer (SAN-STY-002) and 450 mm diameter sewer (SAN-STY-003).

7.6.4.2 Growth Servicing Strategy

Growth areas within the Stockyards area consist of employment land use only. There are two greenfield employment areas west of Weber Street North, and two areas immediately west and east of Highway 95, south of King Street North. The Stockyards Secondary Plan (2020) identified servicing to the Stockyards to the east and west of Highway 85. The timing for the linear infrastructure to service these developments is unknown as it is likely to occur as development occurs. The development northwest of Weber Street North and Benjamin Road will be serviced by a new 250 mm diameter sewer (SAN-STY-005) connected to the existing sewer on Benjamin Road. The developments on King Street North and north of Apple Grover Road on Weber Street North will be serviced by new 250 mm diameter sewers (SAN-STY-008, SAN-STY-009, SAN-STY-010) discharging to a new pump station (SAN-STY-007) at the northeast corner of Weber Street North and King Street North, which will pump flows via a 200 mm diameter forcemain (SAN-STY-006) to the existing sewer at Benjamin Road and Farmer's Market Road.

Figure 7-14 presents an overview of planned growth areas within Stockyards, and the general servicing strategies for the significant greenfield growth areas.

To address existing surcharging issues and future anticipated growth, the existing sewer on Benjamin Road will be upgraded to 300 mm and 450 mm diameter sewers (SAN-STY-001, SAN-STY-002, SAN-STY-003).

As part of the Stockyards Secondary Plan, the Stockyards east of Highway 85 is planned to be serviced via connection to the existing City of Waterloo sewer on Colby Court.

As part of the growth servicing strategy, consideration was made for the option to pump future growth-related flows to the St. Jacobs WWTP via a forcemain along Highway 85. Through discussions with the Township, this was determined to be too costly and was not considered as part of the latest WWTPMP, and the above servicing strategy was preferred.

7.6.5 Preferred Wastewater Capital / DC / Developer Program

Table 7-14 and **Figure 7-15** present the preferred wastewater capital / DC / developer program for Township infrastructure within Stockyards. The alignments presented in the capital / DC / developer program are subject to change based on revised development growth strategies, potential future road alignments, funding allocations, and other factors.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Greenfield Growth within ROPA6 UAB
- Employment
- Residential

Other Land Use
- Official Plan - Open Space Area
- Environmental Protection
- Environmental Restricted Area

Existing Wastewater Infrastructure
- <=300mm Township Sewer
- >300mm Township Sewer
- <=300mm Forcemain
- >300mm Forcemain

Other
- Rail Line
- Watercourse
- ROPA6 Urban Area Boundary (UAB)
- Municipal Boundary
- Potential Sanitary Servicing

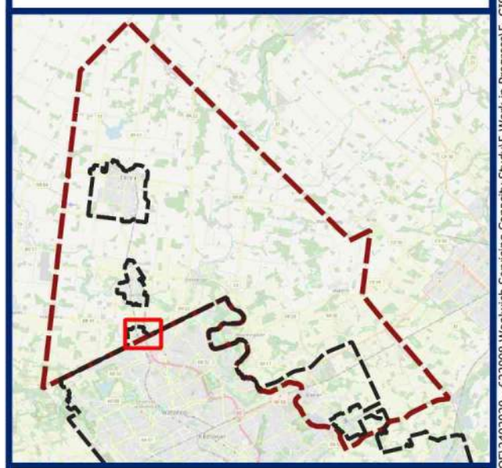


Figure 7-14

Growth Servicing Strategy

Stockyards

GEI Consultants

November, 2025
622098-G-001
Projection EPSG:26917

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Table 7-14 : Preferred Wastewater Capital / DC / Developer Program – Stockyards

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
SAN-STY-001	Sanitary Upgrade along Benjamin Rd between Weber St N and Farmers Market Rd	533	300	2034 – 2051	$1,254,600	Existing Deficiency - recommend completing before upstream growth.	With SAN-STY-002, 003.
SAN-STY-002	Sanitary Upgrade along Benjamin Rd to Conrad Pl	97	300	2034 – 2051	$228,575	Existing Deficiency - recommend completing before upstream growth.	With SAN-STY-001, 003
SAN-STY-003	Sanitary Upgrade along Benjamin Rd to Conrad Pl	91	450	2034 – 2051	$243,950	Site Development application. Internal Servicing Works	With SAN-STY-001, 002
SAN-STY-004	New sewer connection to Colby Ct (Waterloo)	114	250	2034 – 2051	$259,325	Site Development application. Internal Servicing Works	-
SAN-STY-005	New sewer from NW corner Weber/Benjamin to ex Benjamin Rd sewer	174	250	2034 – 2051	$731,850	Site Development application. Internal Servicing Works	-
SAN-STY-006	Forcemain from Stockyards SPS on Weber St N	427	200	2034 – 2051	$1,464,725	Site Development application. Internal Servicing Works	Prior to all new sewers, with SAN-STY-007
SAN-STY-007	Stockyards SPS	-	-	2034 – 2051	$2,903,825	Site Development application. Internal Servicing Works	Prior to all new sewers, with SAN-STY-006
SAN-STY-008	New sewer on King St N to new SPS	252	250	2034 – 2051	$1,281,250	Site Development application. Internal Servicing Works	-
SAN-STY-009	New connection from 800 King St N	156	250	2034 – 2051	$1,098,800	Site Development application. Internal Servicing Works	-
SAN-STY-010	New connection from Weber, south of Farmer's Market Rd, to SPS	384	200	2034 – 2051	$1,533,400	Site Development application. Internal Servicing Works	-
Total		**2,228**	**-**	**-**	**$11,000,300**	**-**	**-**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Upgrades to Existing Infrastructure
- <= 300 mm
- 300 - 525 mm
- > 525 mm

New Infrastructure
- <= 300 mm
- 300 - 525 mm
- > 525 mm
- Forcemain

Existing Infrastructure
- Sanitary Pump Station
- Wastewater Treatment Plant
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Other Features
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities



Figure 7-15

Wastewater Capital Program

Stockyards

GEI Consultants

April, 2026
622098-W-001
Projection EPSG:26917

SAN-STY-008
SAN-STY-009
SAN-STY-007
SAN-STY-010
SAN-STY-006
SAN-STY-001
SAN-STY-003
SAN-STY-005
SAN-STY-002
SAN-STY-004
Martin Creek
King St N
Martin Grove Rd
Stockyards
Farmer's Market Rd
Waterloo Central Railway
Weber St N
Apple Grove Rd
Benjamin Rd
Colby Crt
Kumpf Dr
Colby Dr
City Of Waterloo
Conrad Pl
<Null>
Randall Dr
0
0.2
0.4 km

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7.7 Breslau

In parallel with this Servicing Capacity Study, the Township of Woolwich has completed the East Side Lands Sanitary Servicing Class Environmental Assessment (EA) dated October 2024 by Associated Engineering (Ont.) Ltd (AE). The East Side Lands EA study was initiated to identify the optimal servicing strategy for future anticipated growth within the borders of Victoria Street North, Shantz Station Road, and Kossuth Road.

The EA evaluated several servicing alternatives based on both qualitative and quantitative factors. Quantitative factors focused on hydraulic feasibility, infrastructure complexity, and financial costs whereas qualitative factors focused on the impacts to the natural and social environments.

Due to the focused and more detailed nature of the Breslau-specific EA, the EA evaluation process for servicing alternatives included more updated information compared to the high-level Township-wide Servicing Capacity Study. As such, the EA's preferred solution was adopted for this capital / DC / developer program. The methodology employed by AE in terms of growth loading was reviewed to ensure the adopted solution aligns with the Servicing Capacity Study as described in **Section 7.7.3**.

7.7.1 Existing Wastewater System Overview

The wastewater system in the community of Breslau services approximately 124 ha. The system is serviced by the Region-owned Kitchener Wastewater Treatment Plant, located at 368 Mill Park Drive. System flows are conveyed to the City of Kitchener-owned Shirley Pumping Station via the local sewers in Breslau and one (1) pump station, detailed in Table 7-15, before discharging to Kitchener's local sewers. **Figure 7-16** and **Figure 7-17** present the existing system map and schematic.

Table 7-15: Breslau Pumping Station and Forcemain Overview

Details		Hopewell Crossing SPS
Catchment Area (ha)		16 ha
Pump Station Details	Number of Pumps	4 (3 duty, 1 standby)
	Firm Capacity (L/s)	99(1)
Forcemain Details	Single or Twinned Forcemain	Twinned
	Length (m)	1,030

(1) Ultimate pump station peak capacity (anticipated 2023) per AECOM's Hopewell Crossing Subdivision Wastewater Pumping Station Preliminary Design (2016).

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Other Features

- GRCA Watercourse
- Surrounding Municipalities
- Woolwich Municipal Boundary
- Rail Line
- Watercourse

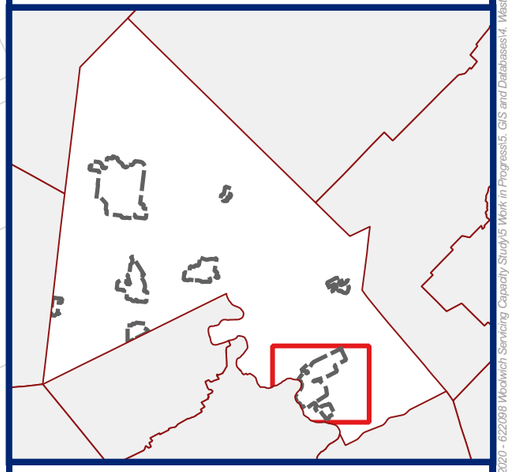


Figure 7-16

Existing Wastewater System

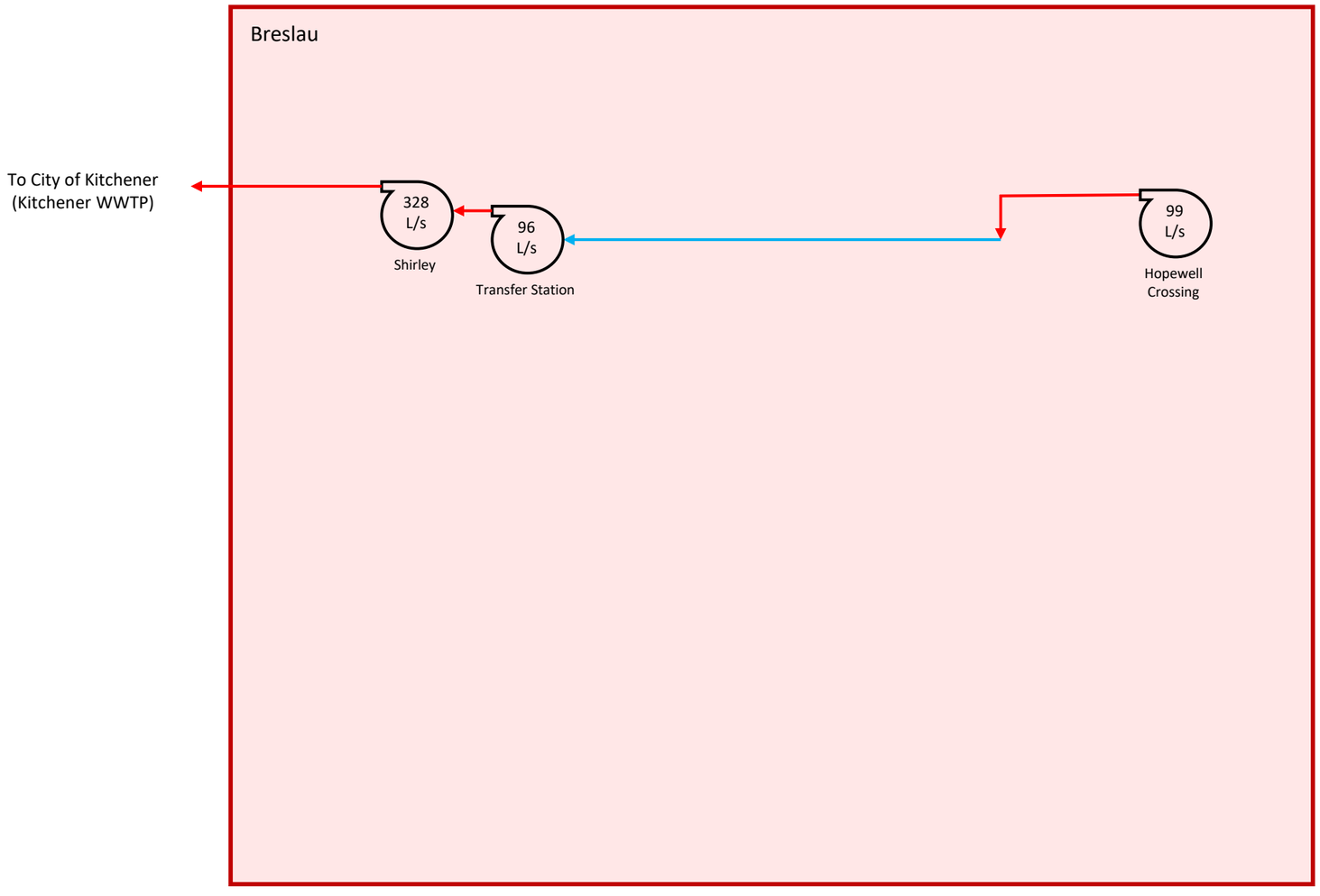
Breslau

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November, 2025
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0 0.9 1.8 km

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Woolwich Servicing Capacity Study

WWTP
RATED CAPACITY
Wastewater Treatment Plant

Firm Capacity
Pump

Forcemain

Connection from SPS to SPS

Connection from SPS to WWTP

Breslau

Figure 7-17
Existing Wastewater System Schematic

GEI Consultants

June 2024
622098

7.7.2 Assessment of Existing Township Wastewater Infrastructure

Existing system performance mapping is presented in **Appendix D**. There are no capacity issues for the existing wastewater infrastructure in Breslau.

7.7.3 Assessment of Growth Impacts

To ensure that the adopted capital / DC / developer program is applicable for this Servicing Capacity Study, a review of the growth using the servicing capacity study methodology and the East Side Lands EA was completed. **Table 7-16** highlights the key differences but the overall loaded growth flows are comparable. To remain consistent with the EA, the growth loading completed through the East Side Lands EA was adopted for the Servicing Capacity Study.

Table 7-16: SCS and East Side Lands EA Growth Loading Comparison

	Servicing Capacity Study	East Side Lands EA
Groundwater Infiltration Rate (L/s/ha)	0.25	0.15
Per Capita Rate (L/c/d)	275	275
Employment Density (ppha)	40	40
Residential Density (ppha)	60	Low/Med Residential: 93 Med/High Residential: 210 Village Residential: 100
Peaking Factor	2.1	2
Flows Conveyed to Kossuth Rd (East Side Lands) (L/s)	694	679
Flows Conveyed to Victoria Ave SPS (L/s)	190	204

As the future growth conditions in Breslau are largely greenfield growth in the East Side Lands, there continues to be no capacity issues for the existing wastewater infrastructure in Breslau based on the existing flows in the system.

7.7.4 Servicing Alternatives and Evaluation

As described briefly above, the East Side Lands EA evaluated several servicing alternatives based on both qualitative and quantitative factors. In total, 7 alternatives were considered with the preferred solution being a hybrid of previously considered alternatives. Please refer to the EA for the full evaluation criteria and process.

To service the future greenfield East Side Lands, the EA preferred solution is summarized below and in **Figure 7-19**.

1. Trunk sewers along alignments 3B and 3D as described below:
    a. 375mm sewers along Wambold Drive and Kramp Road,
    b. 450mm sewers along existing Wurster Place,
    c. 600mm sewer along the assumed Wurster Place extension to Menno Street,
    d. 750mm sewer along Lonsdale Road, across runway 14-32 and along Jetliner Court (3B)
    e. 900mm sewer along Fountain Street to Kossuth Road (3B)
    f. 750mm sewer along Lonsdale Road, across runway 08-26 and along Cober Road (3D)
    g. 750mm and 900mm sewers along Kossuth Road (3D)
2. Local sewers along all remaining side streets
3. Pumping Station #1 – Menno Street near Shantz Station Road
4. Pumping Station #2 – Jetliner Court near Fountain Street
5. 1050mm trunk sewer along Fountain Street, south of Kossuth Road to Middle Block Road.

7.7.4.1 Growth Servicing Strategy

The majority of the large greenfield growth areas are concentrated on east side of the existing built-up area within Breslau, with some greenfield growth areas along the Grand River as well. Residential greenfield areas are generally located north of Menno Street and employment greenfield areas are generally south, in the areas closer to the Region of Waterloo International Airport.

The growth servicing strategy has been evaluated as part of the East Side Lands EA. **Figure 7-19** presents an overview of planned growth areas within Breslau, and the general servicing strategies for the significant greenfield growth areas.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Greenfield Growth within ROPA6 UAB
- Employment
- Residential

Other Land Use
- Official Plan - Open Space Area
- Environmental Protection
- Environmental Restricted Area

Existing Wastewater Infrastructure
- <=300mm Township Sewer
- >300mm Township Sewer
- <=300mm Forcemain
- >300mm Forcemain

Other
- Rail Line
- Watercourse
- ROPA6 Urban Area Boundary (UAB)
- Municipal Boundary
- Potential Sanitary Servicing

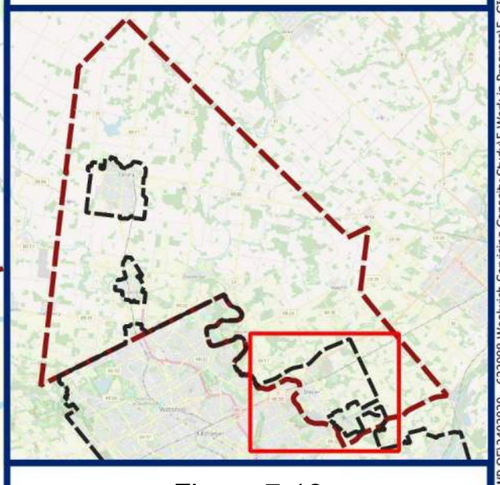


Figure 7-18

Growth Servicing Strategy

Breslau

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November, 2025
622098-G-001
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Future Hwy #7
Local Road (Future)
Victoria Street
Greenhouse Road
Wambolt Street
Victoria Street Pumping Station
Victoria Street
Fountain Street
Kramp Road
Wurster Place
Mentrolinx Tracks
East Connector Road
Woolwich Street
Rider Road Extension
Shantz Station Road
Wurster Place Extension
Ottawa Street (Ext)
Menno Street
LIFT STATION #1
Conestoga Meat Packers
Lonsdale Road
Vance Road Extension
LIFT STATION #2
Otter Ct
New Germany Ln
Cober Road
Airport Road
Cober Road
Fountain Street
Kossuth Road
Middle Block Road

Assumed Construction Timing

2025 (0 Years)	2035 (10 Years)	2045 (20 Years)	2065 (40 Years)	
2030 (5 Years)	2040 (15 Years)	2055 (30 Years)	2075 (50 Years)	

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

WOOLWICH TOWNSHIP

East Side Lands (Woolwich) Sanitary Servicing EA
Figure 7-15
Staging of Infrastructure Construction (Alt# 7)

Not to Scale

7.7.5 Preferred Wastewater Capital / DC / Developer Program

Table 7-17 and present the preferred wastewater capital / DC / developer program for Township infrastructure within Breslau. As this Servicing Capacity Study has adopted the EA capital program, the costs presented are from the EA as well, with costs being in 2025 dollars rather than 2024 dollars. The alignments presented in the capital / DC / developer program are subject to change based on revised development growth strategies, potential future road alignments, funding allocations, and other factors.

Table 7-17: Preferred Wastewater Capital / DC / Developer Program – Breslau

Project ID	East Side Lands EA Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
SAN-BRE-001	Fountain St – Kossuth to Middle Block	New Sanitary Trunk on Fountain St between Kossuth Rd and Middle Block Rd	730	1050	2024-2033	$9,349,519	Prior to any Breslau East Side Lands Growth (i.e.. Conestoga Meats Expansion, Madwest Subdivision Phase 5)	Breslau East Side Lands Phase 1 Projects
SAN-BRE-002	Kossuth East/West	New Sanitary main on Kossuth Rd between Shantz Station Rd and Cober Rd	1305	375	Beyond 2051	$10,307,257	Site Development application.	After Phase 1 is complete - project expected by 2055
SAN-BRE-003	New Germany	New Sanitary main on New Germany Lane	1027	300	2034-2051	$1,552,460	Site Development application on New Germany Lane	After Phase 1 is complete - project expected between 2040 to 2045
SAN-BRE-004	Vance Rd Ext	New Sanitary main on Lonsdale Rd between Shantz Station Rd and Airport Crossing	1316	300	Beyond 2051	$4,942,327	Site Development application. (i.e.. Polocorp or Green Horizons)	After Phase 1 is complete - project expected by 2055
SAN-BRE-005	Fountain St (Menno to Jetliner)	New Sanitary main on Fountain St between Menno St and Woolwich St	974	450	2024-2033	$15,982,969	Site specific Development application. (i.e.. Future GO Station)	After Phase 1 is complete - project expected by 2030
SAN-BRE-006		New Sanitary main on Fountain St between Woolwich St and Jetliner Court	652	750	2024-2033			
SAN-BRE-007	Shantz Station Rd (S of Menno)	New Sanitary main on Shantz Station Road between Menno Rd and Kossuth Rd	2050	300	Beyond 2051	$15,929,005	Site Development application. (i.e.. Polocorp or Green Horizons)	After Phase 1 is complete - project expected by 2055
SAN-BRE-008		New sanitary main on Shantz Station Rd between Menno Rd and Kossuth Rd	632	375	Beyond 2051			
SAN-BRE-009	Woolwich	New Sanitary main on Woolwich St to Fountain St	388	300	2024-2033	$8,348,779	Site Development application. (i.e.. Mad-West and / or Forewell Lands)	After Phase 1 is complete - project expected by 2030
SAN-BRE-010		New Sanitary main on Woolwich St to Fountain St	679	525	2024-2033			
SAN-BRE-011	Menno East	New Sanitary main on Menno St to Lonsdale Rd	233	300	2034 - 2051	$2,302,601	Site Development application.	After Phase 1 is complete - project expected within 10 years
SAN-BRE-012		New Sanitary main on Menno St to Lonsdale Rd	911	750	2024-2033	$8,582,025	Prior to any Breslau East Side Lands Growth (i.e.. Conestoga Meats Expansion)	Remainder of Breslau East Side Lands Phase 1 Projects
SAN-BRE-013		New Sanitary main on Menno Rd to Lonsdale Rd	1388	600	Beyond 2051	$12,243,668	Site Development application.	After Phase 1 is complete - project expected by 2065
SAN-BRE-014	Menno W	New Sanitary main on Menno Rd to Fountain St	360	200	2034-2051	$3,576,952	Site Development application.	After Phase 1 is complete - project expected within 10 years
SAN-BRE-015		New Sanitary main on Menno Rd to Woolwich St	734	375	2024-2033	$4,040,323	Site Development application. (i.e.. Mad-West)	After Phase 1 is complete - project expected by 2030
SAN-BRE-016	Fountain St (N of Menno)	New Sanitary main on Fountain St to East Connector	664	600	2024-2033	$9,154,702	Site Development application. (i.e..Future Go. Station)	After Phase 1 is complete - project expected by 2030
SAN-BRE-017		New Sanitary main on Fountain St to East Connector	164	525	2024-2033			
SAN-BRE-018	Rider Rd Ext	New sanitary main on Rider Road	1070	300	Beyond 2051	$4,064,871	Site Development application. (i.e.. Polocorp)	

Project ID	East Side Lands EA Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
SAN-BRE-019		New sanitary main on Rider Rd	383	375	Beyond 2051			After Phase 1 is complete - project expected by 2075
SAN-BRE-020	East Connector	East Connector	1441	450	2024-2033	$7,280,633	Site Development application. (i.e. North and south of Goderich-Exeter Railway)	After Phase 1 is complete - project expected by 2030
SAN-BRE-021	Shantz Station (North of Menno)	New Sanitary main on Shantz Station Rd to Kramp Rd	1499	300	Beyond 2051	$24,852,078	Site Development application. (i.e.. Along Shantz Station Road)	After Phase 1 is complete - project expected by 2075
SAN-BRE-022		New Sanitary main on Shantz Station Rd	164	450	Beyond 2051			
SAN-BRE-023		New Sanitary main on North Shantz Station Rd to Menno Rd	1502	600	Beyond 2051			
SAN-BRE-024	Kramp Rd East	New Sanitary main on Kramp Rd East	1043	300	Beyond 2051	$1,561,940	Site Development application. (I.e.. 2124985 Ont. Inc)	After Phase 1 is complete - project expected by 2075
SAN-BRE-025	Kramp Rd West	New Sanitary main on Kramp Rd West	372	300	2024-2033	$571,967	Site Development connection as needed	After Phase 1 is complete - project expected by 2030
SAN-BRE-026	Greenhouse Rd	New Sanitary main on Greenhouse Rd	882	300	2024-2033	$2,021,449	Site Development application. (i.e.. 495025 Ont. Ltd, Bluebird, Bisgould)	After Phase 1 is complete - project expected by 2030
SAN-BRE-027		New Sanitary main on Greenhouse Rd	407	450	2024-2033			
SAN-BRE-028	North Dev Rd	New Sanitary main for north development	619	300	Beyond 2051	$3,446,773	Site Development application (i.e.. 495025 Ont Ltd)	After SAN-BRE-026
SAN-BRE-029		New Sanitary main for north development	267	375	Beyond 2051			
SAN-BRE-030	Trunk03D	New Sanitary Trunk 03D	4262	750	2034-2051	$53,791,520	Site Development application (i.e.. RoW International Airport)	After Phase 1 is complete - project expected between 2035 to 2040
SAN-BRE-031		New Sanitary Trunk 03D	824	900	2034-2051			
SAN-BRE-032	Trunk03B	New Sanitary Trunk 03B	709	600	2024-2033	$41,020,077	Prior to any Breslau East Side Lands Growth (i.e.. Conestoga Meats Expansion, Madwest Subdivision)	Breslau East Side Lands Phase 1
SAN-BRE-033		New sanitary Trunk 03B	445	750	2024-2033			
SAN-BRE-034		New Sanitary Trunk 03B	2192	900	2024-2033			
SAN-BRE-040		New Sanitary Trunk 03B	863	900	2024-2033			
SAN-BRE-035	Trunk 03	New Sanitary Trunk 03	1238	375	2024-2033	$4,302,167	Site Development application. (i.e.. Bisgould)	After Phase 1 is complete - project expected by 2030
SAN-BRE-036		New Sanitary Trunk 03	693	450	Beyond 2051	$12,849,849	Site Development application. (i.e.. Bisgould)	After Phase 1 is complete - project expected by 2075
SAN-BRE-037		New Sanitary Trunk 03	83	525	Beyond 2051			
SAN-BRE-038		New Sanitary Trunk 03	1145	600	Beyond 2051			
SAN-BRE-039		New Sanitary Trunk 03	346	750	Beyond 2051			
SAN-BRE-041	Menno Street Lift Station	Menno Street Lift Station	-	-	Beyond 2051	$15,798,276	Site Development application.	Requires Breslau East Side Lands Phase 1 to be completed
SAN-BRE-042	Jetliner Court Lift Station	Jetliner Court Lift Station	-	-	2024-2033	$9,904,213	Prior to any Breslau East Side Lands Growth (i.e.. Conestoga Meats Expansion, Madwest Subdivision)	Breslau East Side Lands Phase 1
		Total	**36,656**	**-**	**-**	**$287,778,400**	**-**	**-**

(1) Project Cost directly taken from Breslau East Sides Lands EA. Costs are in 2025 Dollars.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Upgrades to Existing Infrastructure
- <= 300 mm
- 300 - 525 mm
- > 525 mm

New Infrastructure
- <= 300 mm
- 300 - 525 mm
- > 525 mm
- Forcemain

Existing Infrastructure
- Sanitary Pump Station
- Wastewater Treatment Plant
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Other Features
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities

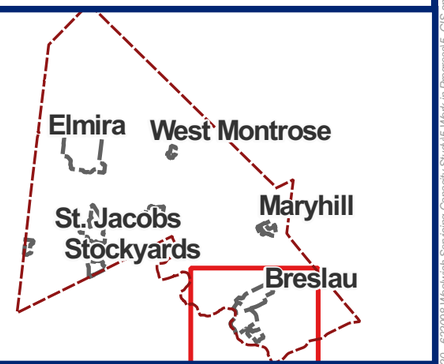


Figure 7-20

Wastewater Capital Program

Breslau

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April, 2026
622098-W-001
Projection EPSG:26917

Township Of Guelph/eramosa
City Of Kitchener
City Of Cambridge
Sawmill Rd
Hopewell Creek Rd
Spitzig Rd
Hopewell Creek
Kraft Dr
Bloomingdale Rd N
Rosendale Creek
Ebycrest Rd
Victoria St N
Kramp Rd
Goderich-Exeter Railway
Rider Rd
Bridge St E
Hopewell Creek
Woolwich St S
Shirley Dr
Grand River
Shirley Ave Bingemans Centre Dr
Centennial Rd
Forwell Rd
Kolb Creek
Keewatin Ave
Menno St
Lonsdale Rd
Shantz Station Rd
Ellis Creek (Chilligo Creek, Fisher Mills Creek)
Vance Rd
Cober Rd
Kossuth Rd
Waterloo-Guelph Airport Creek
Fountain St N
Lackner Blvd
Zeller Dr
Old Zeller Dr
Fairway Rd N
Riverbank Dr
Speedsville Rd
021
029
028
026
035
024
022
025
027
036
023
020
037
018
019
017
038
041
013
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7.8 Conestogo

7.8.1 Existing Wastewater System Overview

The wastewater system in the community of Conestogo services approximately 124 ha. The system is serviced by the Region-owned Conestogo Wastewater Treatment Plant, located at 370-400 Golf Course Road. System flows are conveyed to the treatment plant via a network of local sewers in Conestogo and one (1) pump station, detailed in **Table 7-18**.

Figure 7-21 and **Figure 7-22** present the existing system map and schematic.

Table 7-18: Conestogo Pumping Station and Forcemain Overview

Details		River Run Place SPS
Catchment Area (ha)		3
Pump Station Details	Number of Pumps	2 (1 duty, 1 standby)
	Firm Capacity (L/s)	3.5
Forcemain Details	Single or Twinned Forcemain	Single
	Length (m)	580

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Other Features

- GRCA Watercourse
- Surrounding Municipalities
- Woolwich Municipal Boundary
- Rail Line
- Watercourse

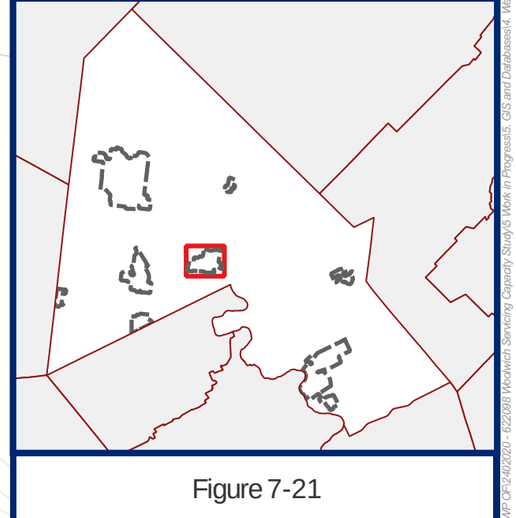


Figure 7-21

Existing Wastewater System

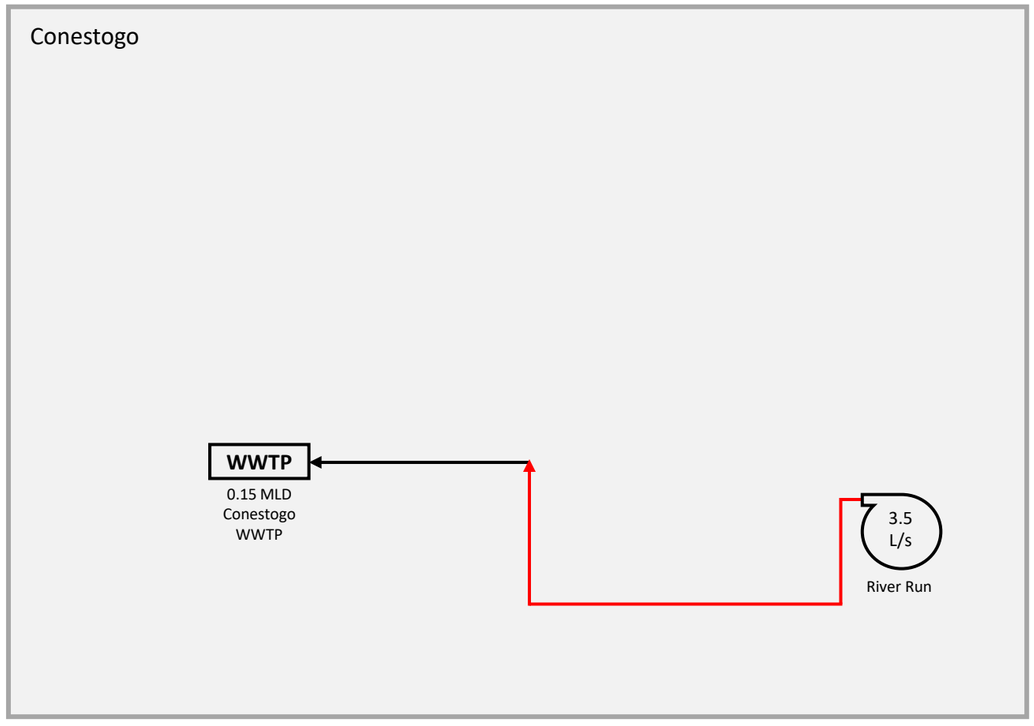
Conestogo

GEI Consultants

November, 2025
622098-WW-001
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Woolwich Servicing Capacity Study

WWTP
RATED CAPACITY
Wastewater Treatment Plant

Firm Capacity
Pump

Forcemain

Connection from SPS to SPS

Connection from SPS to WWTP

Conestogo

Figure 7-22
Existing Wastewater System Schematic

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June 2024
622098

7.8.2 Assessment of Existing Township Wastewater Infrastructure

Existing system performance mapping is presented in **Appendix D**. There are no capacity issues for the existing wastewater infrastructure in Conestogo.

7.8.3 Assessment of Growth Impacts

There is no significant growth planned within the community of Conestogo. As such, for the purposes of the Township's SCS, there are no anticipated growth impacts to the existing system.

7.8.4 Servicing Alternatives and Evaluation

There are no existing system deficiencies or future planned growth impacts within Conestogo which require review of Township servicing alternatives.

7.8.5 Preferred Wastewater Capital / DC / Developer Program

There are no existing system upgrades or planned future growth upgrades within Conestogo which require Township capital / DC / developer program projects. The alignments presented in the capital / DC / developer program are subject to change based on revised development growth strategies, potential future road alignments, funding allocations, and other factors.

7.9 West Montrose

7.9.1 Existing Wastewater System Overview

The wastewater system in the community of West Montrose is serviced via septic system.

7.9.2 Assessment of Existing Township Wastewater Infrastructure

As the community of West Montrose is serviced via septic systems, there is no existing Township wastewater infrastructure.

7.9.3 Assessment of Growth Impacts

There is no significant growth planned within the community of West Montrose. As such, for the purposes of the Township's SCS, there are no anticipated growth impacts to the existing system.

7.9.4 Servicing Alternatives and Evaluation

There are no existing system deficiencies or future planned growth impacts within West Montrose which require review of Township servicing alternatives.

7.9.5 Preferred Wastewater Capital / DC / Developer Program

There are no existing system upgrades or planned future growth upgrades within West Montrose which require Township capital program projects.

7.10 Maryhill

7.10.1 Existing Wastewater System Overview

The wastewater system in the community of West Montrose is serviced via septic system.

7.10.2 Assessment of Existing Township Wastewater Infrastructure

As the community of Maryhill is serviced via septic, there is no existing Township wastewater infrastructure.

7.10.3 Assessment of Growth Impacts

There is no significant growth planned within the community Maryhill. As such, for the purposes of the Township's SCS, there are no anticipated growth impacts to the existing system.

7.10.4 Servicing Alternatives and Evaluation

There are no existing system deficiencies or future planned growth impacts within Maryhill which require review of Township servicing alternatives.

7.10.5 Preferred Wastewater Capital / DC / Developer Program

There are no existing system upgrades or planned future growth upgrades within Maryhill which require Township capital / DC / developer program projects.

7.11 Heidelberg

7.11.1 Existing Wastewater System Overview

The wastewater system in the community of Heidelberg services approximately 14 ha. The system is serviced by the Region-owned Heidelberg Wastewater Treatment Plant (WWTP), located at 8 Alpen Grove Road. System flows are conveyed to the treatment plant via a network of local sewers in Heidelberg.

Figure 7-23 and **Figure 7-24** present the existing system map and schematic.

7.11.2 Assessment of Existing Township Wastewater Infrastructure

Existing system performance mapping is presented in **Appendix D**. There are no capacity issues for the existing wastewater infrastructure in Heidelberg.

7.11.3 Assessment of Growth Impacts

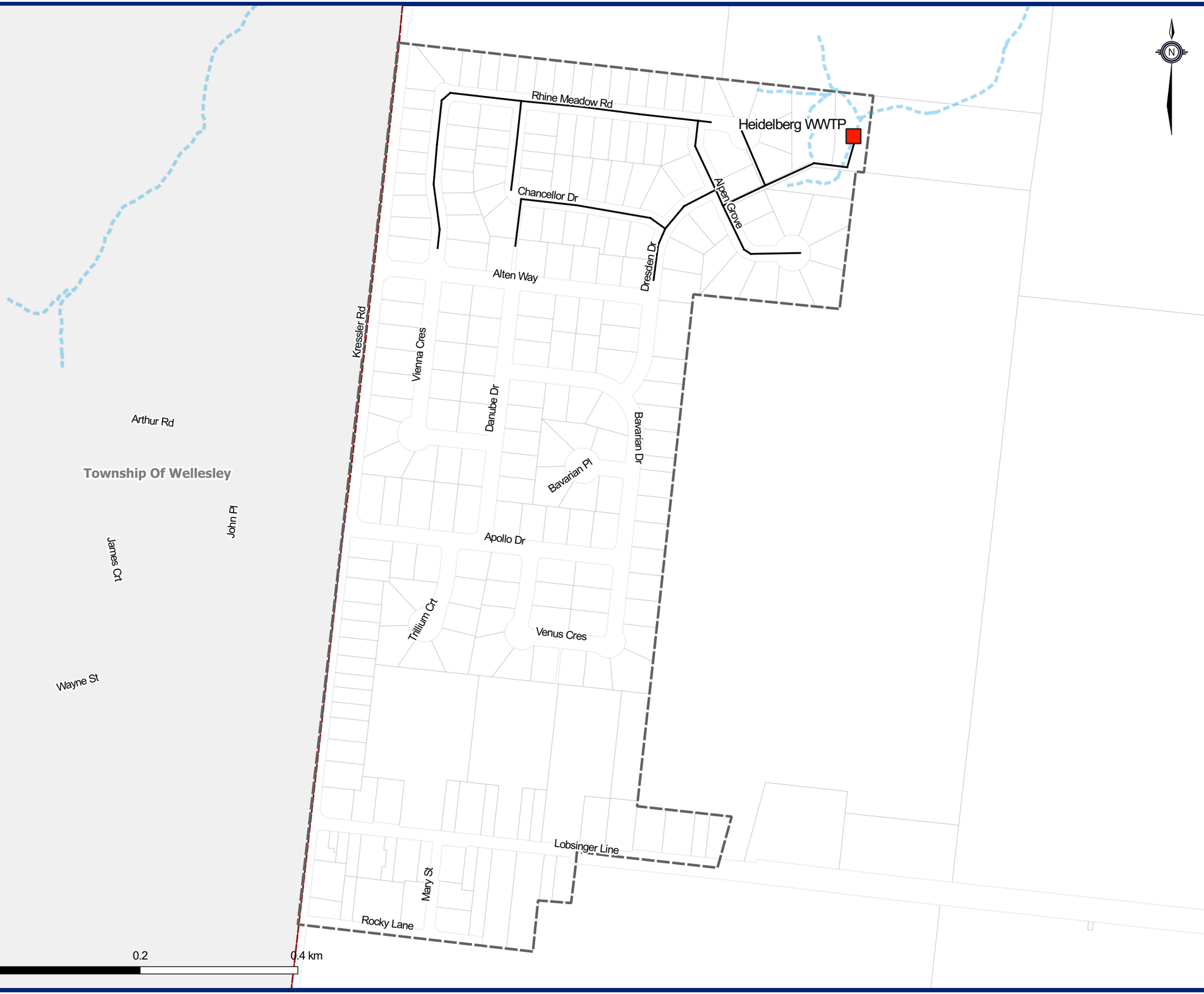
Through discussion with the Township, it was determined that the growth area on Lobsinger Line will not be serviced by the Alt-Heidelberg WWTP.

7.11.4 Servicing Alternatives and Evaluation

There are no existing system deficiencies or future planned growth impacts within Heidelberg which require review of Township servicing alternatives.

7.11.5 Preferred Wastewater Capital / DC / Developer Program

There are no existing system upgrades or planned future growth upgrades within Heidelberg which require Township capital / DC / developer program projects.



WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants
- <= 300 mm Sewer
- > 300 mm Sewer
- Forcemain

Other Features

- GRCA Watercourse
- Surrounding Municipalities
- Woolwich Municipal Boundary
- Rail Line
- Watercourse

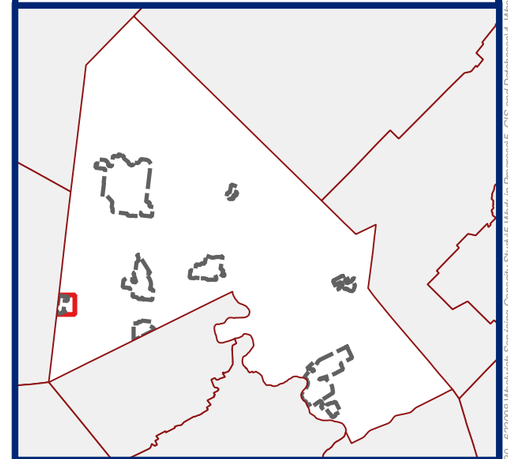


Figure 7-23

Existing Wastewater System

Heidelberg

GEI Consultants

November, 2025
622098-WW-001
Projection EPSG:26917

Document Path: B:\Working\WOOL\WICH ON, TWP OF\2402200 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\4. Wastewater\622098-WW-001 - Existing Wastewater System.qgz

Heidelberg

WWTP
0.13 MLD
Alt-Heidelberg
WWTP

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

WWTP
RATED CAPACITY
Wastewater Treatment Plant

Firm Capacity
Pump

Forcemain

Connection from SPS to SPS

Connection from SPS to WWTP

Heidelberg

Figure 7-24
Existing Wastewater System Schematic

GEI Consultants

June 2024
622098

8 Summary of Wastewater Capital / DC / Developer Program

A summary of the Wastewater capital / DC / developer program for the municipally-serviced settlements within the Township of Woolwich is presented in **Table 8-1** and the full detailed program is presented in **Table 8-2**. This program addresses the infrastructure needs to support existing and growth needs to buildout of the settlement area boundary, using the planning assumptions presented in **Section 3**. A detailed breakdown of the capital / DC / developer program is provided in **Appendix I**.

8.1 Project Implementation

The majority of projects identified within the wastewater capital / DC / developer program are triggered by surrounding developments. The project timeline provided in the capital / DC / developer program represents current understanding of the developments likely to occur within the next 10 years. As planning activities and development approvals are in constant flux, the timeline of the projects is subject to change accordingly. As developments progress through the application and approvals process, the Townships should consult the capital / DC / developer program mapping and tables to identify the sewer projects which are relevant to the subject development and trigger projects accordingly. Supporting information on project implementation is provided in **Appendix I**.

Table 8-1: Summary of Wastewater Capital / DC / Developer Program By Community

Community	Length (km)	Total Project Cost ($2025)[1]	2024 – 2033 Total Project Cost ($2025)[1]	2034 – 2051 Total Project Cost ($2025)[1]	Beyond 2051 Total Project Cost ($2025)[1]
Elmira	7.0	$53,746,900	$43,774,675	$9,972,225	$0
St. Jacobs	0.6	$2,409,775	$0	$2,409,775	$0
Stockyards	2.2	$11,000,300	$0	$11,000,300	$0
Breslau[2]	36.7	$287,778,400	$120,558,823	$61,223,533	$105,996,044
Conestogo	0	$0	$0	$0	$0
West Montrose	0	$0	$0	$0	$0
Maryhill	0	$0	$0	$0	$0
Heidelberg	0	$0	$0	$0	$0
Total	45.9	**$354,935,375**	**$164,333,498**	**$84,605,833**	**$105,996,044**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.
(2) Breslau project costs based on East Side Lands EA. Costs are in 2025 dollars.

Table 8-2: Wastewater Capital / DC / Developer Program

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
SAN-ELM-001	New sewer in west of Barnswallow Drive	400	300	2024 - 2033	$785,150	Site Development application. Internal Servicing Works	-
SAN-ELM-005	New sewer on Church St W	662	300	2024 - 2033	$2,901,775	Site Development application.	-
SAN-ELM-006	New sewer on Church St W	327	250	2034 - 2051	$625,250	Site Development application. Internal Servicing Works	After SAN-ELM-005
SAN-ELM-007	New Sewer on Church St E	771	375	2034 - 2051	$6,245,325	Site Development application.	-
SAN-ELM-008	New sewer South Field Dr	689	300	2034 - 2051	$1,577,475	Site Development application.	-
SAN-ELM-009	New sewer southwest Elmira	320	250	2024 - 2033	$3,581,350	Site Development application.	-
SAN-ELM-010	Downtown Trunk Upgrade and I&I	143	250	2024 - 2033	$326,975	Existing Deficiency - recommend completing before upstream growth if I/I reduction targets in Downtown Elmira South not achieved.	Not Required if Downtown South I/I Reduction Target Met
SAN-ELM-011	New sewer on Arthur St N	139	300	2024 - 2033	$672,400	Site Development application. Internal Servicing Works	With SAN-ELM-015. After SAN-ELM-017.
SAN-ELM-012	New trunk along Oriole Pkwy W	1,703	450	2024 - 2033	$13,013,400	Existing Deficiency - recommend completing before upstream growth if I/I reduction targets in Birdland not achieved.	Not Required if Birdland I/I Reduction Target Met

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
SAN-ELM-013	Upgrade west of railway between Oriole Pkwy E and First St E	486	675	2024 - 2033	$17,360,425	Existing Deficiency - recommend completing before upstream growth if I/I reduction targets in Birdland not achieved.	Not Required if Birdland I/I Reduction Target Met
SAN-ELM-014	New sewer at Kingfisher Drive	270	250	2034 - 2051	$515,575	Site Development application. Internal Servicing Works	-
SAN-ELM-015	New sewer east of Arthur St N	310	300	2034 - 2051	$1,008,600	Site Development application. Internal Servicing Works	With SAN-ELM-011. After SAN-ELM-017
SAN-ELM-016	New sewer from High St and George St to Arthur St N	370	375	2024 – 2033	$918,400	High Street / Charles Street / George Street Servicing if Township wishes to move residents off septic	After SAN-ELM-017
SAN-ELM-017	Sanitary Upgrade along Arthur St N north of Arthur SPS	367	300	2024 – 2033	$4,214,800	Existing Deficiency - recommend completing before upstream growth. Work to be tied into Region project.	-
SAN-STJ-006	Sanitary Upgrade along Hachborn St E between Young St and Water St	93	300	2034 - 2051	$218,325	Existing Deficiency - recommend completing before upstream growth.	-
SAN-STJ-007	Sanitary Upgrade along Water St between Hachborn St E and Princess St E	93	375	2034 - 2051	$230,625	Existing Deficiency - recommend completing before upstream growth.	If St. Jacobs I/I Reduction Program is completed. Only 300 mm Sewer Upgrade is necessary.
SAN-STJ-008	New sewer south of Henry St	38	250	2034 - 2051	$328,000	Site Development application. Internal Servicing Works	-
SAN-STJ-009	New sewer in employment land, north of HH	57	250	2034 - 2051	$508,400	Site Development application. Internal Servicing Works	-
SAN-STJ-010	New connection from 3017 Regional Road 17	28	250	2034 - 2051	$54,325	Site Development application. Internal Servicing Works	-
SAN-STJ-011	New twin sewer crossing Waterloo Central Railway to Queensway Dr	134	300	2034 - 2051	$793,350	Existing Deficiency - recommend completing before upstream growth.	-
SAN-STJ-012	New Sewer along Princess St W and King St N	118	300	2034 - 2051	$276,750	Should be completed after SAN-STJ-011.	If St. Jacobs I/I Reduction Program is completed within Hachborn, this project is not necessary.
SAN-STY-001	Sanitary Upgrade along Benjamin Rd between Weber St N and Farmers Market Rd	533	300	2034 - 2051	$1,254,600	Existing Deficiency - recommend completing before upstream growth.	With SAN-STY-002, 003.
SAN-STY-002	Sanitary Upgrade along Benjamin Rd to Conrad Pl	97	300	2034 - 2051	$228,575	Existing Deficiency - recommend completing before upstream growth.	With SAN-STY-001, 003
SAN-STY-003	Sanitary Upgrade along Benjamin Rd to Conrad Pl	91	450	2034 - 2051	$243,950	Site Development application. Internal Servicing Works	With SAN-STY-001, 002
SAN-STY-004	New sewer connection to Colby Ct (Waterloo)	114	250	2034 - 2051	$259,325	Site Development application. Internal Servicing Works	-
SAN-STY-005	New sewer from NW corner Weber/Benjamin to ex Benjamin Rd sewer	174	250	2034 - 2051	$731,850	Site Development application. Internal Servicing Works	-
SAN-STY-006	Forcemain from Stockyards SPS on Weber St N	427	200	2034 - 2051	$1,464,725	Site Development application. Internal Servicing Works	Prior to all new sewers, with SAN-STY-007
SAN-STY-007	Stockyards SPS	37	-	2034 - 2051	$2,903,825	Site Development application. Internal Servicing Works	Prior to all new sewers, with SAN-STY-006

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
SAN-STY-008	New sewer on King St N to new SPS	252	250	2034 - 2051	$1,281,250	Site Development application. Internal Servicing Works	-
SAN-STY-009	New connection from 800 King St N	156	250	2034 - 2051	$1,098,800	Site Development application. Internal Servicing Works	-
SAN-STY-010	New connection from Weber, south of Farmer's Market Rd, to SPS	384	200	2034 - 2051	$1,533,400	Site Development application. Internal Servicing Works	-
SAN-BRE-001	New Sanitary Trunk on Fountain St between Kossuth Rd and Middle Block Rd	730	1050	2024-2033	$9,349,519	Prior to any Breslau East Side Lands Growth (i.e.. Conestoga Meats Expansion, Madwest Subdivision)	Breslau East Side Lands Phase 1 Projects
SAN-BRE-002	New Sanitary main on Kossuth Rd between Shantz Station Rd and Cober Rd	1305	375	Beyond 2051	$10,307,257	Site Development application.	After Phase 1 is complete - project expected by 2055
SAN-BRE-003	New Sanitary main on New Germany Lane	1027	300	2034-2051	$1,552,460	Site Development application on New Germany Lane	After Phase 1 is complete - project expected between 2040 to 2045
SAN-BRE-004	New Sanitary main on Lonsdale Rd between Shantz Station Rd and Airport Crossing	1316	300	Beyond 2051	$4,942,327	Site Development application. (i.e.. Polocorp or Green Horizons)	After Phase 1 is complete - project expected by 2055
SAN-BRE-005	New Sanitary main on Fountain St between Menno St and Woolwich St	974	450	2024-2033	$15,982,969	Site specific Development application. (i.e.. Future GO Station)	After Phase 1 is complete - project expected by 2030
SAN-BRE-006	New Sanitary main on Fountain St between Woolwich St and Lonsdale Rd	652	750	2024-2033			
SAN-BRE-007	New Sanitary main on Shantz Station Road between Menno Rd and Kossuth Rd	2050	300	Beyond 2051	$15,929,005	Site Development application. (i.e.. Polocorp or Green Horizons)	After Phase 1 is complete - project expected by 2055
SAN-BRE-008	New sanitary main on Shantz Station Rd between Menno Rd and Kossuth Rd	632	375	Beyond 2051			
SAN-BRE-009	New Sanitary main on Woolwich St to Fountain St	388	300	2024-2033	$8,348,779	Site Development application. (i.e.. Mad-West or Woolwich St S)	After Phase 1 is complete - project expected by 2030
SAN-BRE-010	New Sanitary main on Woolwich St to Fountain St	679	525	2024-2033			
SAN-BRE-011	New Sanitary main on Menno St to Lonsdale Rd	233	300	2034 - 2051	$2,302,601	Site Development application.	After Phase 1 is complete - project expected within 10 years
SAN-BRE-012	New Sanitary main on Menno St to Lonsdale Rd	911	750	2024-2033	$8,582,025	Prior to any Breslau East Side Lands Growth (i.e.. Conestoga Meats Expansion)	Remainder of Breslau East Side Lands Phase 1 Projects
SAN-BRE-013	New Sanitary main on Menno Rd to Lonsdale Rd	1388	600	2024-2033	$12,243,668	Site Development application.	After Phase 1 is complete - project expected by 2065
SAN-BRE-014	New Sanitary main on Menno Rd to Fountain St	360	300	2034-2051	$3,576,952	Site Development application.	After Phase 1 is complete - project expected within 10 years
SAN-BRE-015	New Sanitary main on Menno Rd to Woolwich St	734	450	2024-2033	$4,040,323	Site Development application. (i.e.. Mad-West)	After Phase 1 is complete - project expected by 2030
SAN-BRE-016	New Sanitary main on Fountain St to East Connector	664	600	2024-2033	$9,154,702	Site Development application. (i.e.. Mad-West)	After Phase 1 is complete - project expected by 2030

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)[1]	Project Triggers	Project Dependencies
SAN-BRE-017	New Sanitary main on Fountain St to East Connector	164	525	2024-2033			
SAN-BRE-018	New sanitary main on Rider Road	1070	300	Beyond 2051	$4,064,871	Site Development application. (i.e.. Polocorp)	After Phase 1 is complete - project expected by 2075
SAN-BRE-019	New sanitary main on Rider Rd	383	375	Beyond 2051			
SAN-BRE-020	East Connector	1441	450	2024-2033	$7,280,663	Site Development application. (i.e..North or south of Goderich-Exeter Railway)	After Phase 1 is complete - project expected by 2030
SAN-BRE-021	New Sanitary main on Shantz Station Rd to Kramp Rd	1499	300	Beyond 2051	$24,852,078	Site Development application. (i.e.. Along Shantz Station Road)	After Phase 1 is complete - project expected by 2075
SAN-BRE-022	New Sanitary main on Shantz Station Rd	164	450	Beyond 2051			
SAN-BRE-023	New Sanitary main on North Shantz Station Rd to Menno Rd	1502	600	Beyond 2051			
SAN-BRE-024	New Sanitary main on Kramp Rd East	1043	300	Beyond 2051	$1,561,940	Site Development application. (i.e.. 2124985 Ont. Inc)	After Phase 1 is complete - project expected by 2075
SAN-BRE-025	New Sanitary main on Kramp Rd West	372	300	2024-2033	$571,967	Site Development connection as needed	After Phase 1 is complete - project expected by 2030
SAN-BRE-026	New Sanitary main on Greenhouse Rd	882	300	2024-2033	$2,021,449	Site Development application. (i.e.. 495025 Ont. Ltd, Bluebird, Bisgould)	After Phase 1 is complete - project expected by 2030
SAN-BRE-027	New Sanitary main on Greenhouse Rd	407	450	2024-2033			
SAN-BRE-028	New Sanitary main for north development	619	300	Beyond 2051	$3,446,773	Site Development application (i.e.. 495025 Ont Ltd)	After SAN-BRE-026
SAN-BRE-029	New Sanitary main for north development	267	375	Beyond 2051			
SAN-BRE-030	New Sanitary Trunk 03D	4262	750	2034-2051	$53,791,520	Site Development application (i.e.. RoW International Airport)	After Phase 1 is complete - project expected between 2035 to 2040
SAN-BRE-031	New Sanitary Trunk 03D	824	900	2034-2051			
SAN-BRE-032	New Sanitary Trunk 03B	709	600	2024-2033	$41,020,077	Prior to any Breslau East Side Lands Growth (i.e.. Conestoga Meats Expansion, Madwest Subdivision)	Breslau East Side Lands Phase 1
SAN-BRE-033	New sanitary Trunk 03B	445	750	2024-2033			
SAN-BRE-034	New Sanitary Trunk 03B	2192	900	2024-2033			
SAN-BRE-040	New Sanitary Trunk 03B	863	900	2024-2033			
SAN-BRE-035	New Sanitary Trunk 03	1238	375	2024-2033	$4,302,167	Site Development application. (i.e.. Bisgould)	After Phase 1 is complete - project expected by 2030
SAN-BRE-036	New Sanitary Trunk 03	693	450	Beyond 2051	$12,849,849	Site Development application. (i.e.. Bisgould)	After Phase 1 is complete - project expected by 2075
SAN-BRE-037	New Sanitary Trunk 03	83	525	Beyond 2051			
SAN-BRE-038	New Sanitary Trunk 03	1145	600	Beyond 2051			
SAN-BRE-039	New Sanitary Trunk 03	346	750	Beyond 2051			

Project ID	Description	Length (m)	Proposed Diameter (mm)	Project Timeline	Total Project Cost ($2025)(1)	Project Triggers	Project Dependencies
SAN-BRE-041	Menno Street Lift Station	-	-	Beyond 2051	$15,798,276	Site Development application.	Requires Breslau East Side Lands Phase 1 to be completed
SAN-BRE-042	Jetliner Court Lift Station	-	-	2024-2033	$9,904,213	Prior to any Breslau East Side Lands Growth (ie. Conestoga Meats Expansion, Madwest Subdivision)	Breslau East Side Lands Phase 1
Total		**46,400**	**-**	**-**	**354,935,375**	**-**	**-**

(1) Total Projected Costs estimated based on 2024 Unit Rates but inflated to 2025 costs by 2.5% based on Statistics Canada Consumer Price Index dated November 2025.
(2) Breslau project costs based on East Side Lands EA. Costs are in 2025 dollars.

9 Township Staffing Level

9.1 Background Context

A high-level review was completed to assess the staffing level within the engineering departments (Infrastructure Services and Development Services departments). Our understanding of the current staffing complement for these departments is below:

- Development Services Department – Development Engineering Division:
  - Director of Development Services (1)
    - Director oversees Planning, Building and Development Engineering Divisions
  - Manager of Development Engineering (1)
  - Development Engineering Project Coordinator (1)
  - Development Engineering Technologist (1)
  - Field Services Supervisor (1)
  - Inspector (1)
- Infrastructure Services Department – Engineering Division
  - Director of Infrastructure Services (1)
    - Director oversees Engineering, Operations, Corporate Asset Management
  - Manager of Engineering (Vacancy)
  - Engineering Project Supervisors (3)
    - For capital, municipal drains and DC projects
  - Engineering Technologist (1)
    - For maintenance projects, municipal drains and traffic calming projects
  - Engineering Technician (1)
    - For road corridor permits, customer service, CLI-ECA, maintenance projects
  - Administrative and Technical Assistant (1)
    - For customer service and project support
  - Asset Management Coordinator (1)
    - For asset management tasks
  - Student (1)
    - To support on road corridor inspections, stormwater inspections, various duties

Further, it is our understanding that the majority of DC projects at this time would be supported by the Infrastructure Services Department – Engineering Division. Other projects would be supported by the Development Services Division. Exact allocation of Township resources will be determined by the Township at a later date, and potentially on a case-by-case basis, depending on the nature of the project, available resources, and other factors.

9.2 Staffing Recommendations

Through discussions with the Township, the Township is currently planning to hire the following staff subject to council approval:

- 1 Field Staff in 2026,

- 1 Plan Examiner in 2027.

In addition to the Township's staffing planning, it is recommended that the Township consider hiring a total of at least seven new full-time employees (FTE), as follows:

- 5 Development Engineering Project Coordinator
- 1 Engineering Project Supervisor
- 1 additional FTE (position to be determined; may support on I/I projects).

The recommendations were based on the following methodology:

- The recommended capital / DC / developer program cost was totalled for water and wastewater over the next 10 years (2024 – 2034)
  - Subtotals were reviewed for DC-eligible projects, Township-led projects, Non-Township projects
- For DC projects and Township projects, 3% of total project cost was assumed to be required for in-house support (based on typical assumptions used for master plan costing for other municipalities in southern Ontario)
- For Non-Township projects, 1% of total project cost was assumed to be required for in-house support (developer or Region-led projects will require a much lower level of Township coordination).
- These values were then simplified into a recommendation of number of staff roughly based on magnitude of salary (intended to be a high-level approximation of potential salaries).
- **Table 9-1** summarizes the overall methodology, with rounded estimates.
- The roles for the recommended staff assume that Development Engineering Project Coordinators work with DC projects, while the Engineering Project Supervisors work on other Township projects. The roles should be adjusted as needed, based on delegation of which staff would deliver DC or other projects.
- The recommended staffing provided are meant to be used as a general guideline based on projected future work. The Township should review and update hiring needs as projects are confirmed and funded. If project timing is deferred, the need for added staff to administer and deliver capital projects would likely follow suit.

Table 9-1: Staffing Level Review

Capital Program Category	Total Project Cost Over 10 years	Assumed In House Needs (% of Total Project Cost)	Assumed In House Cost Over 10 Years	Assumed In House Cost Per Year	Recommendation
DC Projects	$192,000,000	3%	$5,760,000	$576,000	**5 Dev Eng Project Coordinator**
Developer-Led Projects	$36,000,000	1%	$360,000	$36,000	**1 Engineering Project Supervisor**
Other Township Projects	$5,000,000	3%	$150,000	$15,000	
To support Township needs where required. Address existing deficit at the Township's discretion, may need support on I/I program.					**1 Staff – Role TBD**

For further rationale regarding the additional staff role that is to be decided, **Table 9-2** presents data from the Township's Infrastructure Services Budget and Actual spent amounts over the past several years. It appears that there is an increasing trend in the difference between the budgeted amount and actual delivered amount, which may be an indicator that there is an existing deficit in staffing to deliver projects. This is a simplified perspective and there are many other factors that may affect this difference; however, based on the magnitude of difference, it is presented for consideration.

Table 9-2: Capital Forecast – Infrastructure Services Budgeted and Actual Spent Amounts

	2018	2019	2020	2021	2022	2023
Budget	$6,312,800	$12,032,521	$10,563,335	$15,861,800	$19,891,500	$20,242,160
Actual	$4,268,082	$7,430,947	$5,211,396	$11,872,298	$13,408,800	$8,521,286
Difference	**$2,044,718**	**$4,601,574**	**$5,351,939**	**$3,989,502**	**$6,482,700**	**$11,720,874**



A

Township of Woolwich

APPENDIX A

WATER HYDRAULIC MODEL

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1. Appendix Introduction

This Technical Appendix is intended to summarize the hydraulic model update process and provide information regarding model parameters and model validation.

2. Model Update Process

The Region of Waterloo's (Region) existing all-pipes model for the Integrated Urban System (IUS) was updated to support the water system analysis and used as the base model for all hydraulic modelling analysis. Separate models for the Maryhill and Heidelberg systems were provided as well. The models were received as follows:

- All-Pipes IUS model (ALL_PIPES_20221104) – received November 22, 2022
- Maryhill model (Maryhil_20160808) – received February 15, 2023
- Heidelberg model (Heidelberg_StClements_Water_Model) – received February 15, 2023

The Heidelberg and Maryhill systems were added to the IUS model as part of the model update for this study such that the Township of Woolwich water system is modelled in one "all-pipes" InfoWater hydraulic model.

As part of the Servicing Capacity Study, the hydraulic model was updated through the following procedure:

- Water network review through SCADA, and GIS data
- Direct GIS to model link for pipes
- Demand analysis and allocation based on billing and Township invoicing records
- Steady state validation through hydrant testing and EPS validation through SCADA
- Establish model scenarios
    - Average day demand (ADD)
    - Maximum day demand (MDD)
    - Maximum day demand plus fire flow (MDD+FF)

2.1 Network Development

Updates of local watermains were imported directly into the model using the Township's existing GIS water system infrastructure data. Before importing the network information into the model, the GIS and existing model pipes were analyzed for any discrepancies with respect to watermain diameter and material. A small number of discrepancies were found, and the correct source of information was identified for each case (GIS or existing model).

System network elevation for each model junction was based on 1 m ground surface contours.

2.2 Facility Development

Existing facility parameters in the model were reviewed to ensure accuracy of information using data provided by the Township and the Region.

2.3 System Demand

The system's water demands were evaluated based on SCADA and billing information provided. This process supports determination of:

- Average system demands, including determination of system non-revenue water rates.
- Spatial allocation of system demands.
- Temporal variation of system demands and peaking factors.

2.3.1 Baseline Water Consumption Records

The Township of Woolwich water system is a fully metered water system, with all authorized water services having billing meters to record total consumption. Based on the 2020 – 2022 records, the top five water users make up about 35% of the total billed consumption and primarily consist of industrial land uses. Non-revenue water was calculated for each community using the local billing records and the available SCADA data from 2020 – 2022 to represent total amount of water supplied. Non-revenue water financial losses were calculated based on the Township of Woolwich water usage charges dated March 2024, and from the Region of Waterloo wholesale rates for cities and townships. **Table 2-1** summarizes the 2020 to 2022 billing records, as well as the non-revenue water financial losses.

Table 2-1: 2020 to 2022 Billing Records

Community	Total Consumption (L/s)	NRW (L/s)	%NRW	NRW Loss at Region Bulk Rate(1) ($/Yr)	NRW Loss at Township Rate(2) ($/Yr)	NRW Net Loss in Revenue ($/Yr)
Elmira	38.0	7.0	18%	$247,600	$463,600	$216,000
St. Jacobs	5.3	1.0	18%	$34,500	$64,600	$30,100
Stockyards	2.5	0.5	18%	$16,000	$30,000	$14,000
Breslau	27.0	5.7	21%	$202,000	$378,100	$176,100
Conestogo	2.9	0.5	18%	$18,700	$35,000	$16,300
West Montrose	0.6	0.1	18%	$4,100	$7,800	$3,700
Maryhill	1.6	0.1	8%	$4,600	$8,500	$3,900
Heidelberg	1.3	0.2	16%	$7,500	$14,000	$6,500
Total	**79.0**	**15.1**	**-**	**$535,000**	**$1,001,600**	**$466,600**

(1) Bulk Cost based on Region of Region of Waterloo Wholesale Rate for Cities and Townships as of October 2024: $1.1271/m^3

(2) User Cost based on Township of Woolwich Water Usage Charges as of March 1, 2024: $2.11/m^3

Non-revenue water percentage is similar across all communities. The greatest financial losses from non-revenue water are primarily from larger communities requiring greater water supply (i.e. Elmira and Breslau).

2.3.2 Demand Allocation

Using the billing data, ADD was allocated to nodes in the model using a method of spatial allocation. This method takes the average demand of each meter's parcel and assigns it to the pipe, and subsequently adjoining nodes, in the closest proximity.

Further, the average non-revenue water (NRW) from billing data was distributed equally at each meter and allocated to nodes in the model using the same method of special allocation for the billed demands. The NRW remains constant for all scenarios.

Table 2-2 summarizes the allocated system demands for each community.

Table 2-2: Existing System Demands by Communities

Zone	Existing ADD (L/s)	Existing MDD (L/s)	Existing MDD Peaking Factor
Elmira	44.9	56.9	1.32
St. Jacobs	6.3	10.9	1.87
Stockyards	2.9	5.1	1.87
Conestogo	32.6	39.0	2.27
West Montrose	3.4	7.0	2.27
Heidelberg	0.8	1.6	2.11
Maryhill	1.7	4.7	1.54
Breslau	1.5	2.9	1.24
Total	**94.1**	**128.1**	**-**

Projected system demands were calculated using the population projections, a water usage rate of 225 L/c/d, and maximum day demand peaking corresponding to each community. The system demands are summarized in **Table 2-3**.

Table 2-3: System Demands

	ADD (L/s)	MDD (L/s)
Existing	94.1	128.1
UBO Total Demand	335.1	515.4

2.4 Diurnal Pattern

Diurnal patterns for each community were updated during this Servicing Capacity Study using provided SCADA data.

Figure 2-1 and **Figure 2-2** present the diurnal curves used in the ADD and MDD model scenarios for each community, respectively. Note that West Montrose's diurnal patterns was assumed to be similar to Conestogo.

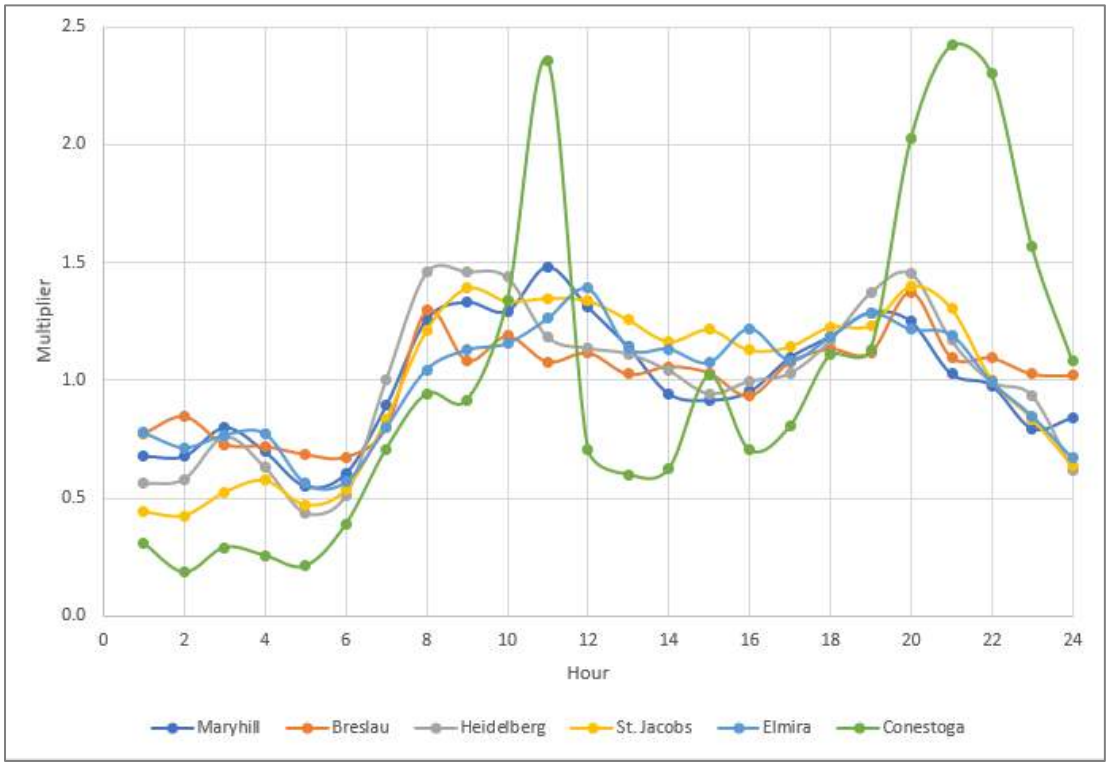


Figure 2-1: ADD Diurnal Curves

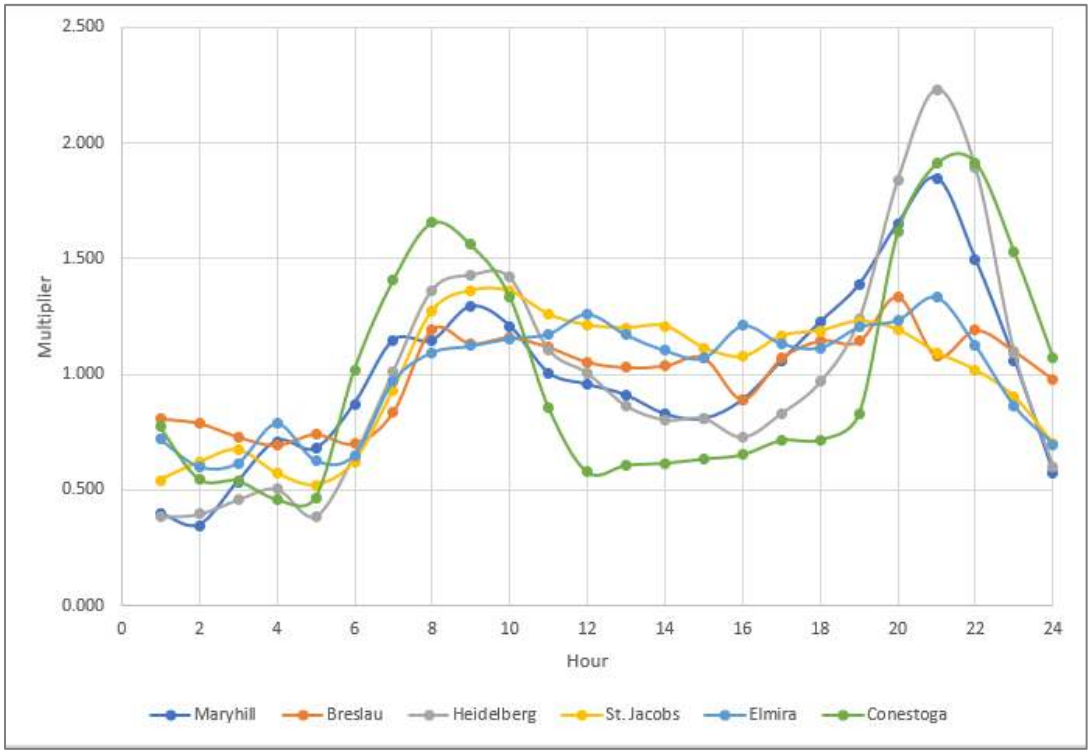


Figure 2-2: MDD Diurnal Curves

2.5 System Control Narrative

This section provides a summary of the water system control narrative.

2.5.1 Elmira Howard Tank High Lift Pumps

- Supplied by Elmira's Howard Elevated Tank
- Currently supplies Elmira via the Elmira West Tank. Future pressure zone boundary realignment will have Howard Tank dedicated to supply the Elmira East pressure zone.
- Flow is controlled by tank levels at the Elmira West Tank, as shown in **Table 2-4.**

Table 2-4: Pump Controls for Elmira Howard Tank High Lift Pumps

	ADD		MDD	
High Lift Pump 1	Setting = OPEN	<49% (5.65 m)	Setting = OPEN	<49% (5.65 m)
	Setting = OFF	>59% (6.78 m)	Setting = OFF	>59% (6.78 m)
High Lift Pump 2	Setting = OPEN	<59% (6.78 m)	Setting = OPEN	<59% (6.78 m)
	Setting = OFF	>78% (9.04 m)	Setting = OFF	>78% (9.04 m)
High Lift Pump 3	Setting = OPEN	Always	Setting = OPEN	Always
	N/A	N/A	N/A	N/A
Highlight Pump 4	Setting = OFF	Always	Setting = OFF	Always

2.5.2 St. Jacobs Tank High Lift Pumps

- Supplied by St. Jacob Tank
- Supplies St. Jacobs
- Flow is controlled by the tank levels at Elmira's Howard Tank, as shown in **Table 2-5.**

Table 2-5: Pump Controls for St. Jacobs Tank High Lift Pumps

	ADD		MDD	
High Lift Pump 1	Setting = OPEN	<64% (7.28 m)	Setting = OPEN	<64% (7.28 m)
	Setting = OFF	>81% (8.84 m)	Setting = OFF	>81% (8.84 m)
High Lift Pump 2	Setting = OPEN	<70% (7.8 m)	Setting = OPEN	<70% (7.8 m)
	Setting = OFF	>87% (9.36 m)	Setting = OFF	>87% (9.36 m)
High Lift Pump 3	Setting = OPEN	<75% (8.32 m)	Setting = OPEN	<75% (8.32 m)
	Setting = OFF	>92% (9.88 m)	Setting = OFF	>92% (9.88 m)

2.5.3 Conestogo High Lift Pumps

- Supplied by Conestogo Tank
- Supplies Conestogo.
- Flow is controlled by the demands in Conestogo, as shown in **Table 2-6.**

Table 2-6: Pump Controls for Conestogo High Lift Pumps

	ADD		MDD	
High Lift Pump 1	Setting = OPEN	N/A	Setting = OPEN	N/A
	N/A	N/A	N/A	N/A
High Lift Pump 2	Setting = OPEN	N/A	Setting = OPEN	N/A
	N/A	N/A	N/A	N/A
High Lift Pump 3	Setting = OFF	N/A	Setting = OFF	N/A
	N/A	N/A	N/A	N/A

2.5.4 West Montrose High Lift Pumps

- Supplied by West Montrose Tank
- Supplies West Montrose.
- Flow is controlled by the demands in West Montrose, as shown in **Table 2-7.**

Table 2-7 : Pump Controls for West Montrose Tank High Lift Pumps

	ADD		MDD	
High Lift Pump 1	Setting = OPEN	N/A	Setting = OPEN	N/A
	N/A	N/A	N/A	N/A
High Lift Pump 2	Setting = OFF	N/A	Setting = OFF	N/A
	N/A	N/A	N/A	N/A

2.5.5 Heidelberg High Lift Pumps

- Supplied by Heidelberg WTP
- Supplies Heidelberg
- Flow is controlled by demands in Heidelberg, as shown in **Table 2-8.**

Table 2-8: Pump Controls for Heidelberg High Lift Pumps

	ADD		MDD	
High Lift Pump 1	Setting = OPEN	N/A	Setting = OPEN	N/A
	N/A	N/A	N/A	N/A
High Lift Pump 2	Setting = OFF	N/A	Setting = OFF	N/A
	N/A	N/A	N/A	N/A
High Lift Pump 3	Setting = OFF	N/A	Setting = OFF	N/A
	N/A	N/A	N/A	N/A

2.5.6 Maryhill Water Treatment Plant High Lift Pumps

- Supplied by the Maryhill Water Treatment Plant
- Supplies Maryhill's south pressure zone boundary
- Flow is controlled by demands in Maryhill, as shown in **Table 2-9**.

Table 2-9 : Pump Controls for Maryhill WTP High Lift Pumps

	ADD		MDD	
High Lift Pump 1	Setting = OPEN	N/A	Setting = OPEN	N/A
	N/A	N/A	N/A	N/A
High Lift Pump 2	Setting = OPEN	N/A	Setting = OPEN	N/A
	N/A	N/A	N/A	N/A

2.5.7 Maryhill Village Heights Pumping Station

- Supplied by the Maryhill's groundwater reservoir.
- Supplies Maryhill's north pressure zone boundary.
- Flow is controlled by demands in Maryhill, as shown in **Table 2-10.**

Table 2-10 : Pump Controls for Village Heights Pumping Station

	ADD		MDD	
High Lift Pump 1	Setting = OPEN	N/A	Setting = OPEN	N/A
	N/A	N/A	N/A	N/A
High Lift Pump 2	Setting = OPEN	N/A	Setting = OPEN	N/A
	N/A	N/A	N/A	N/A
High Lift Pump 3	Setting = OPEN	N/A	Setting = OPEN	N/A
	N/A	N/A	N/A	N/A

2.6 Model Validation

The hydraulic water models were validated for both steady state and extended period simulation (EPS) using field testing results. This ensured that the models are an accurate representation of the water distribution system. Steady state validation was done through hydrant testing to evaluate the model's C-factors and system losses. EPS validation was done for ADD and MDD using SCADA information to ensure pump controls and tank levels were being accurately represented.

The Township of Woolwich has performed hydrant testing in selected communities. Selection of the hydrant test sites were based on the spatial distribution (focused on gaps in historic data and key areas), and watermain material coverage. The historic tests were also used in model validation. **Figure 2-3** shows the locations of the hydrant test.

Table 2-11 summarizes the validation of the model in comparison to 2022 field results.

Based on the results of the model calibration, the model has a relatively high level of accuracy relative to the observed hydrant test results:

- Model is generating comparable static pressures and peak fire flow capacity as compared to the hydrant testing results.
- All of the testing results are within +/- 4 psi under both static and drop conditions.

Table 2-11: 2022 Hydrant Testing Results and Model Comparison

Pipe Information					Field			Model		Comparison	
Road	Material	Diameter	Install Date	Municipality	Flow (L/s)	H-1 Static HGL (m)	Drop (m)	H-1 Static (m)	H-1 Drop (m)	H-1 Static (m)	H-1 Drop (m)
Woodberry Crescent	PVC	150	2016	Elmira	47	419	4	420	5	-2	-2
Union Street	PVC	150	2021	Elmira	33	397	3	398	3	-1	0
High Street	Iron	150	1979	Elmira	29	396	4	398	4	-2	0
Oriole Parkway West	Iron	150	1989	Elmira	41	417	1	420	1	-2	0
Bristow Creek Drive	PVC	150	2004	Elmira	49	418	1	421	2	-3	0
Snyder Avenue North	PVC	150	1976	Elmira	48	420	2	420	2	-1	0
Benjamin Road	Iron	150	1993	Stockyards	34	377	1	380	2	-3	0
Golf Course Road	Iron	150	2016	Conestogo	36	365	12	367	9	-2	3
Dolman Street	PVC	150	1988	Breslau	49	363	2	366	1	-2	1
Ravenswood Road	PVC	150	2018	Breslau	36	364	1	366	1	-1	0
Young Street	PVC	150	2009	St. Jacobs	34	380	5	380	2	0	3
King St North	PVC	150	1972	St. Jacobs	25	381	8	380	7	2	2
Fountain Street	PVC	150	1972	Breslau	42	367	4	366	0	2	3

Township of Woolwich

2022 Woolwich Servicing Capacity Study

Hydrant Testing Program
Test Hydrant Locations

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Elmira Pressure Zone

Watermains

- Region
- Local

BluePlan Engineering

November 2022
622098
NAD83 / UTM zone 17N

0 2.5 5 km

Tilman Rd
Reid Woods Dr
Arthur St N
Northfield Dr E
Middlebrook Rd
Katherine St N
Weisenberg Rd
Line 86
Floradale Rd
Union St
Hill St
Tribe Rd
Steffler Rd
Arthur St S
New Jerusalem Rd
Jigs Hollow Rd
Letson Dr
Maryhill Rd
Sideroad 16
Peel St
King St N
Golf Course Rd
Cox Creek Rd
Halm Rd
Lundy Rd
Crowsfoot Rd
St Charles St E
Hawkesville Rd
Sawmill Rd
Katherine St S
Durst Rd
Three Bridges Rd
600 mm
Beitz Rd
Durant Rd
Shantz Station Rd
Woolwich-Gue
Lobsinger Line
Kressler Rd
Bridge St W
St Charles St W
Spitzig Rd
Victoria St N
Benjamin Rd
Northlake Dr
University Ave E
Kramp Rd
Rider Rd
Bisch St
Conservation Dr
Kraft Dr
Bridge St E
Shirley Dr
Fountain St N
Menno St
Lonsdale Rd
Zeller Dr
Gober Rd

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Township of Woolwich

2022 Woolwich Servicing Capacity Study

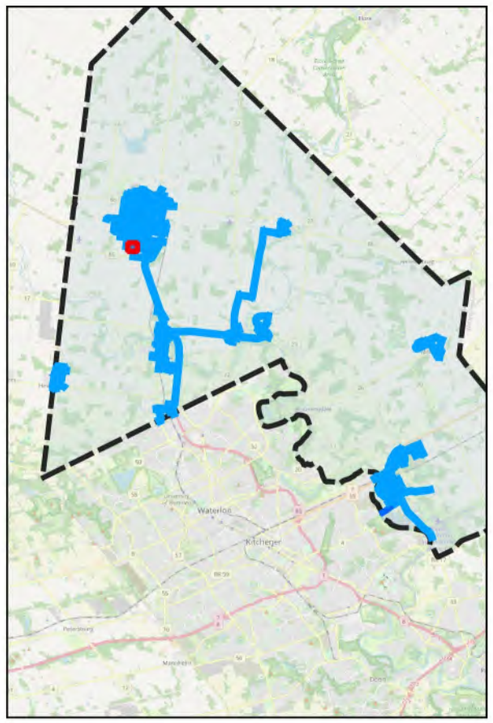
Hydrant Testing Program
Test 1
Woodberry Crescent, Elmira

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



130635

130637

130727

Woodberry Cres

Woodberry Crescent

Richard Rank Rd

Richard Rank Road

Bur Oak Dr

Bur Oak Drive

Burlwood Dr

Burlwood Drive

Bitternut Pl

Bitternut Place

Timber Trail Rd

Timber Trail Road

South Parkwood Blvd

South Parkwood Boulevard

Weymouth St

Weymouth Street

200 mm

300 mm

150 mm

0 50 100 m

BluePlan ENGINEERING

October 2022
622098
NAD83 / UTM zone 17N

Township of Woolwich

2022 Woolwich Servicing Capacity Study

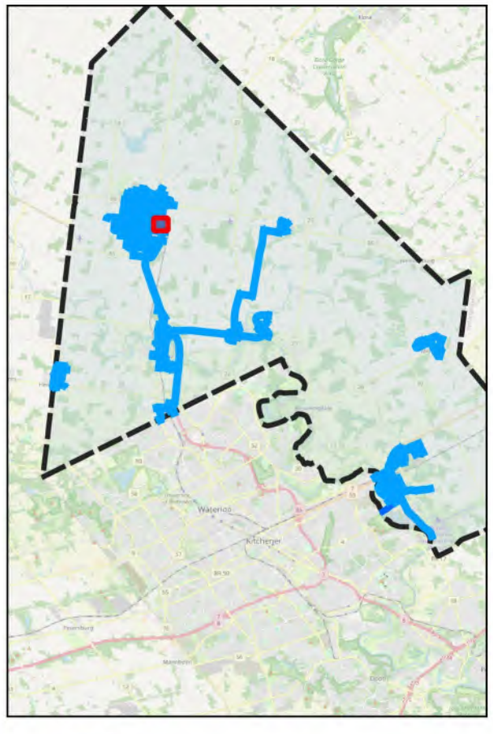
Hydrant Testing Program
Test 2
Union Street, Elmira

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant
- Elmira Pressure Zone

Watermains

- Fire Hydrant Lead
- Region
- Local



BluePlan ENGINEERING

October 2022
622098
NAD83 / UTM zone 17N

130431
130768
130766
College St
First St E
Howard Ave
Bonnie Cres
Union St
Duke St
Oriole Pky E
150 mm
200 mm
300 mm
250 mm
50 mm
0 50 100 m

Township of Woolwich

2022 Woolwich Servicing Capacity Study

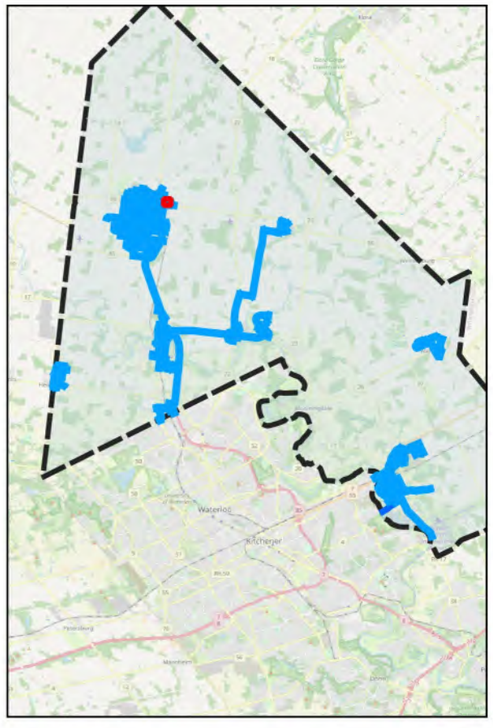
Hydrant Testing Program
Test 3
High Street, Elmira

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



BluePlan ENGINEERING

October 2022
622098
NAD83 / UTM zone 17N

Township of Woolwich

2022 Woolwich Servicing Capacity Study

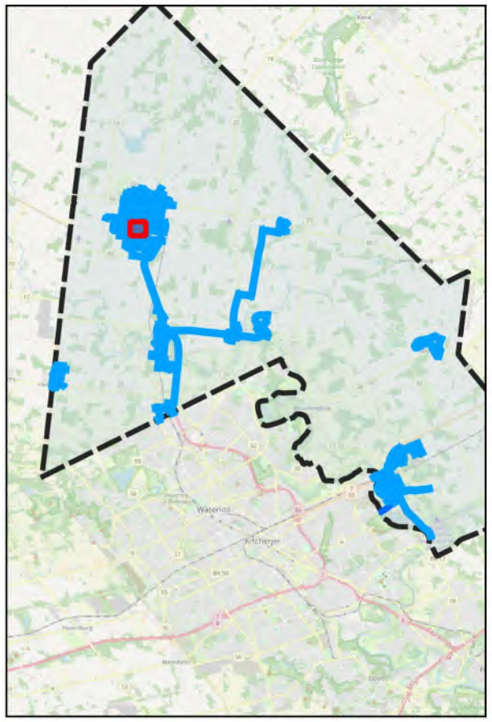
Hydrant Testing Program
Test 4
Oriole Parkway West, Elmira

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



BluePlan ENGINEERING

October 2022
622098
NAD83 / UTM zone 17N

0 50 100 m

Mourningdove Cres
300 mm
Hummingbird Pl
300 mm
Meadowlark Rd
Tanager St
200 mm
Bobolink Pl
150 mm
Bobolink Pl
150 mm
Goldfinch St
130421
150 mm
150 mm
150 mm
150 mm
130417 Oriole Pky W
150 mm
130415
200 mm
Mockingbird Dr
200 mm
150 mm
Nightingale Cres
150 mm
150 mm
Grey Owl Dr
150 mm
150 mm
Warbler Cres
Blue Heron Crt
Purple Martin Crt
Purple Martin Crt
150 mm
Sandpiper Crt
Sandpiper Crt
Pintail Dr
150 mm

Township of Woolwich

2022 Woolwich Servicing Capacity Study

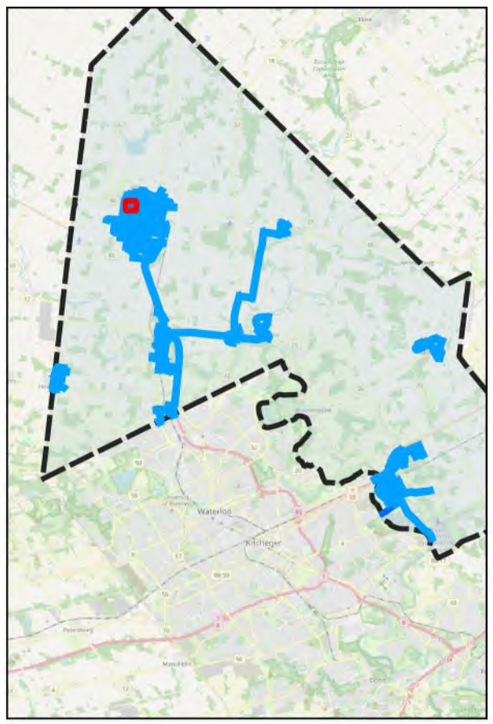
Hydrant Testing Program
Test 5
Bristow Creek Drive, Elmira

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



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October 2022
622098
NAD83 / UTM zone 17N

0 50 100 m

Township of Woolwich

2022 Woolwich Servicing Capacity Study

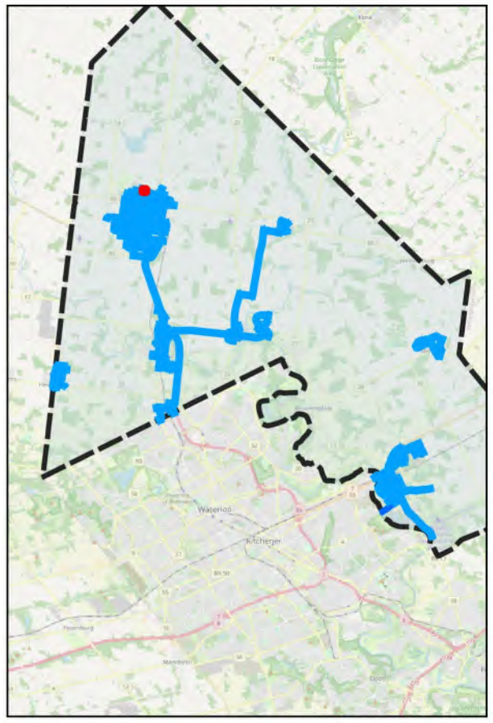
Hydrant Testing Program
Test 6
Snyder Avenue North, Elmira

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



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October 2022
622098
NAD83 / UTM zone 17N

Snyder Avenue North
Snyder Ave N
130601
150 mm
Snyder Avenue North
150 mm
Sunset Place
Sunset Pl
Sunset Pl
150 mm
150 mm
Snyder Avenue North
130687
130598
150 mm
Riverside Drive West
Riverside Dr W
150 mm
Riverside Drive West
0
50
100 m

Township of Woolwich

2022 Woolwich Servicing Capacity Study

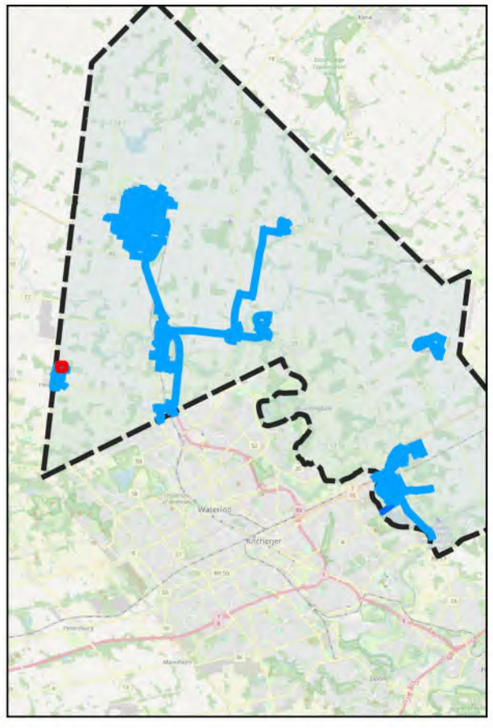
Hydrant Testing Program
Test 7
Rhine Meadow Road, Heidelberg

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



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October 2022
622098
NAD83 / UTM zone 17N

Farmer's Market Rd

130008

300 mm

Apple Grove Rd

Weber St N

130011

Benjamin Rd

300 mm

130013

Conrad Pl

0 50 100 m

Township of Woolwich

2022 Woolwich Servicing Capacity Study

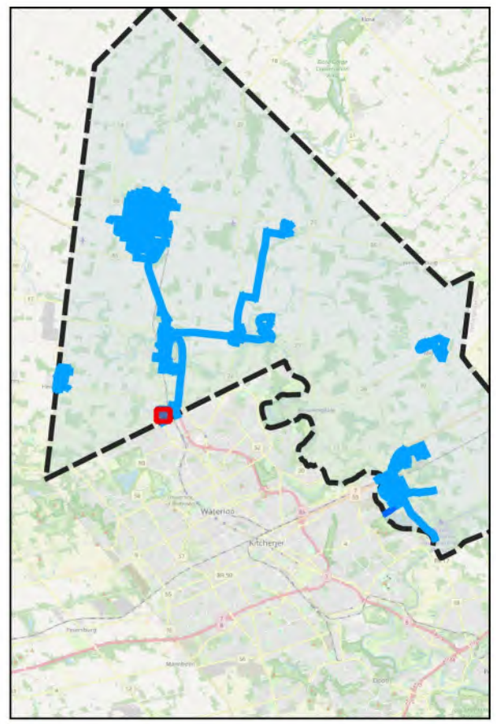
Hydrant Testing Program
Test 8
Benjamin Road, Stockyards

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



BluePlan ENGINEERING

October 2022
622098
NAD83 / UTM zone 17N

130665

130666

130663

150 mm

Sunset Hills Crescent

Zingervilla Pl

Homestead Dr

Sunset Hills Cres

0 50 100 m

Township of Woolwich

2022 Woolwich Servicing Capacity Study

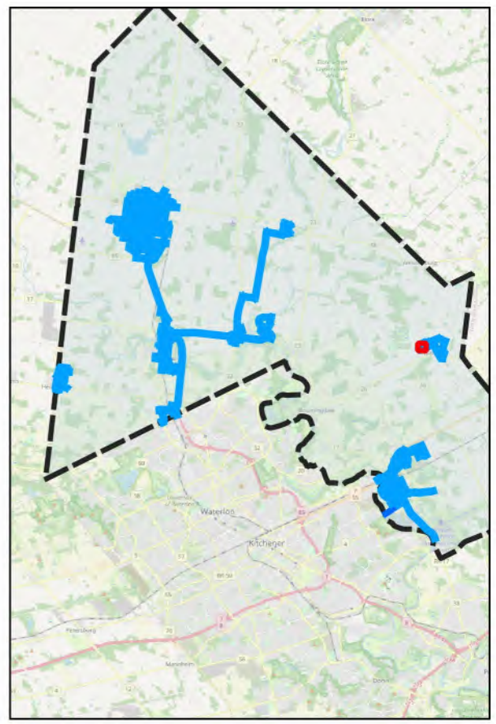
Hydrant Testing Program
Test 9
Sunset Hills Crescent, Maryhill

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



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October 2022
622098
NAD83 / UTM zone 17N

Township of Woolwich

2022 Woolwich Servicing Capacity Study

Hydrant Testing Program
Test 10
Golf Course Road, Conestogo

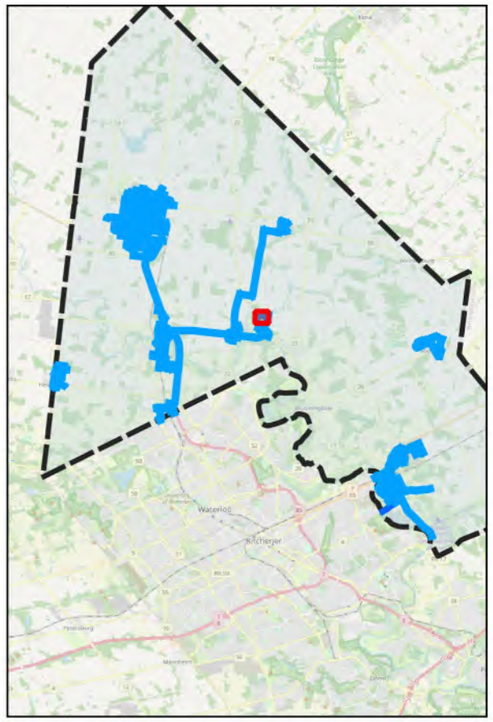
2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local





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October 2022
622098
NAD83 / UTM zone 17N

Township of Woolwich

2022 Woolwich Servicing Capacity Study

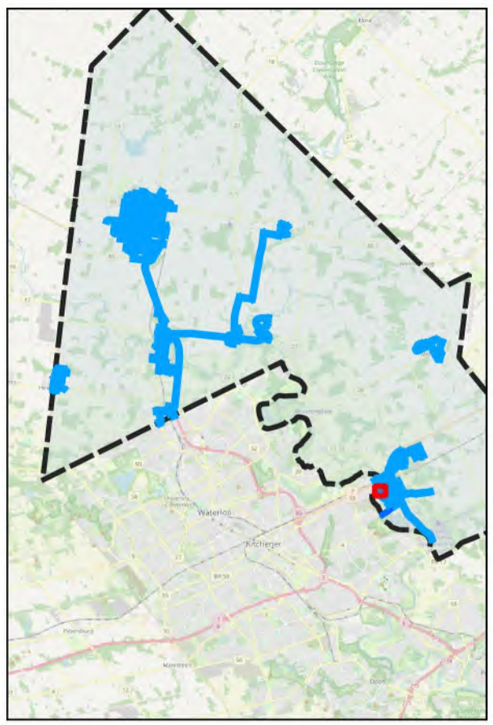
Hydrant Testing Program
Test 11
Dolman Street, Breslau

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



BluePlan ENGINEERING

October 2022
622098
NAD83 / UTM zone 17N

130180
130692
130696
Shields St
Wakefield St
Curtis St
Dolman St
Norwich Rd
Staines St
Stamford St
Tilbury St
Blacksmith Dr
Eva Dr
150 mm
300 mm
50 mm
0 50 100 m

Township of Woolwich

2022 Woolwich Servicing Capacity Study

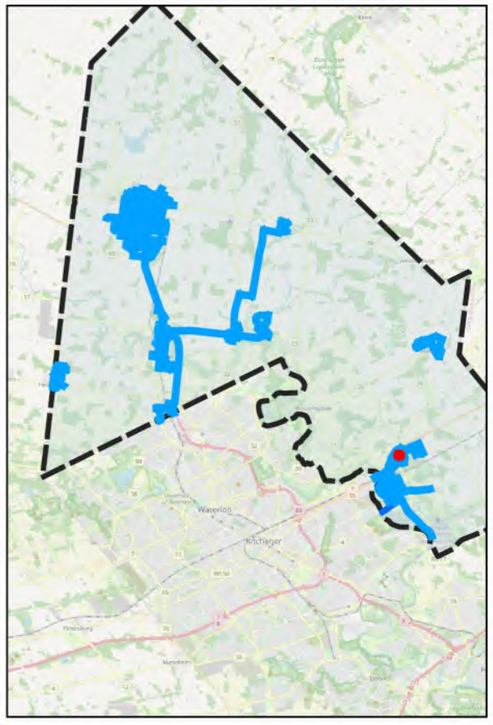
Hydrant Testing Program
Test 12
Ravenswood Road, Breslau

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



BluePlan ENGINEERING

October 2022
622098
NAD83 / UTM zone 17N

130136
130138
130140
Townsend Dr
Avery Cres
Avery Crescent
East Tree Drive
West Tree Dr
Ravenswood Rd
Ravenswood Road
Cordell St
Cordell Street
East Tree Dr
Flanders Rd
300 mm
150 mm
0
50
100 m

Township of Woolwich

2022 Woolwich Servicing Capacity Study

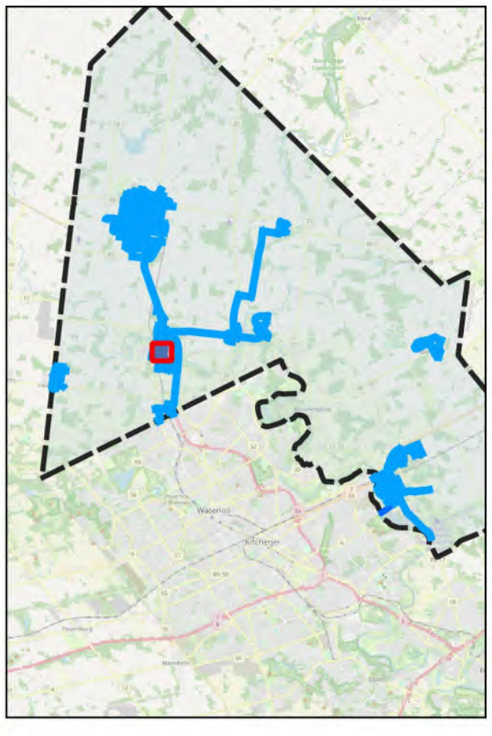
Hydrant Testing Program
Test 13
Young Street, St Jacobs

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



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622098
NAD83 / UTM zone 17N

Isabella St S
Cedar St W
Cedar St E
Hachborn St E
Princess St W
Princess St E
Water St
Queensway Dr
Adam St
High Crest Lane E
Abners Lane
Henry St
King St N
Young St
130041
130053
130064
150 mm
250 mm
300 mm

0 50 100 m

Township of Woolwich

2022 Woolwich Servicing Capacity Study

Hydrant Testing Program
Test 14
King St North, St Jacobs

King St N
130014
150 mm
600 mm
300 mm
130016
Arthur St S
300 mm
Northside Dr
150 mm
150 mm
600 mm
130020

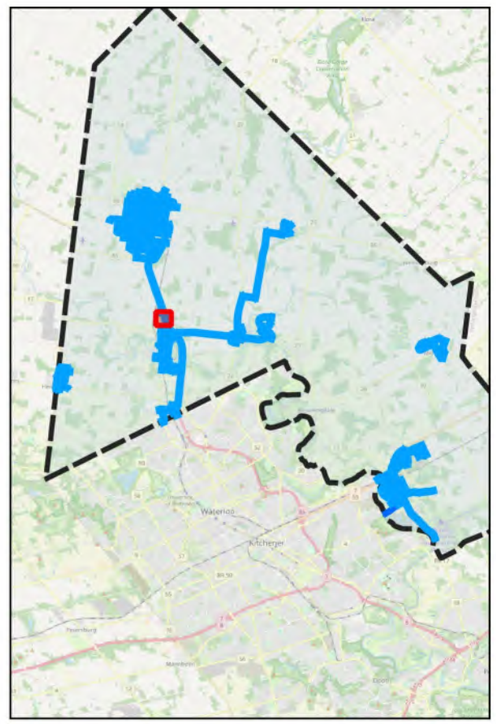
0 50 100 m

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

- Fire Hydrant Lead
- Local



BluePlan ENGINEERING

October 2022
622098
NAD83 / UTM zone 17N

Township of Woolwich

2022 Woolwich Servicing Capacity Study

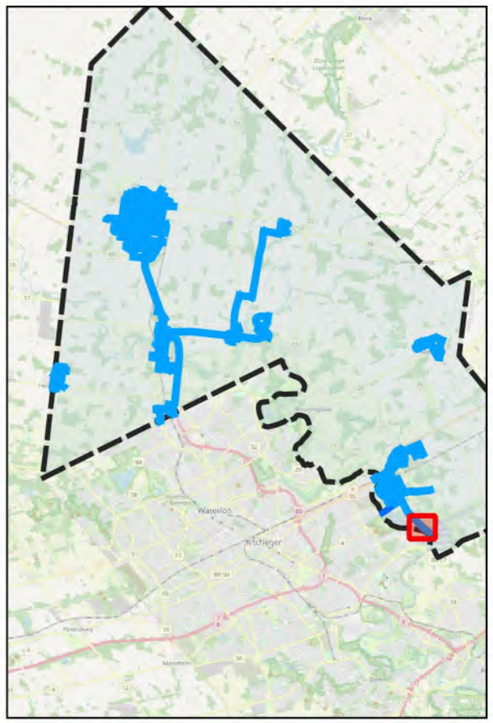
Hydrant Testing Program
Test 15
Fountain Street, Breslau

2022 Hydrant Testing Program

- Monitoring Hydrant
- Flow Hydrant
- Test Segment
- Hydrant

Watermains

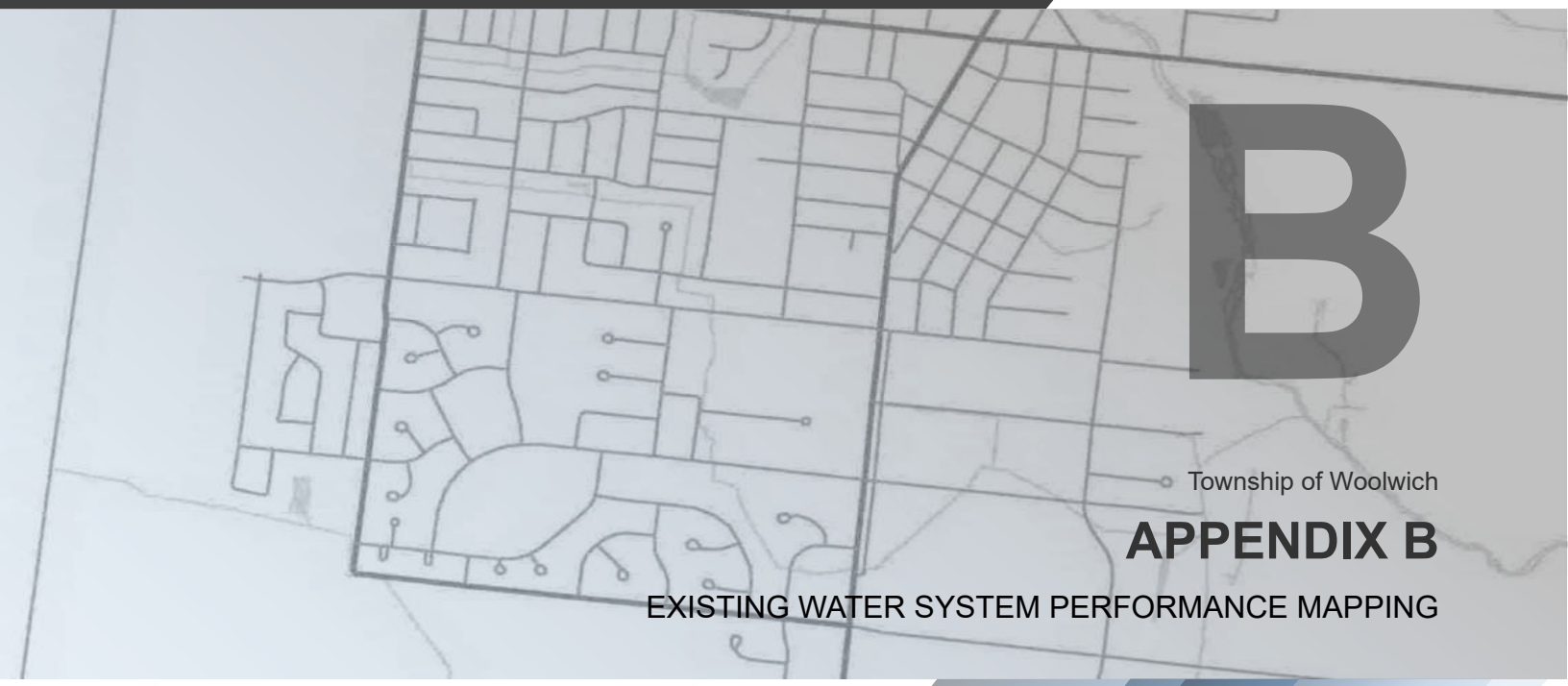
- Fire Hydrant Lead
- Local



BluePlan ENGINEERING

October 2022
622098
NAD83 / UTM zone 17N

130237
130239
130241
350 mm
Jetliner Crt
Airside Perimeter Rd
Fountain St N
Otter Crt
Threshold 08 Rd
ODALS Rd
Localizer Rd
Silver Dart Pl
Airport Rd
River Ridge St
Rivertrail Ave
Grand Flats Trail
Eden Oak Trail
0 50 100 m



B

Township of Woolwich

APPENDIX B

EXISTING WATER SYSTEM PERFORMANCE MAPPING

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- Surrounding Municipalities
- Woolwich Municipal Boundary
- GRCA Watercourse
- Settlement Boundaries

Water Facilities

PRV | PS/Storage | Storage

Maximum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

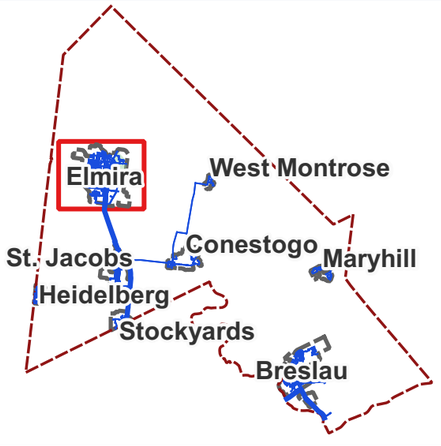


Figure B-1-ELM

Existing Average Day Demand

Maximum Pressures

Elmira

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July, 2024
622098-W-001
Projection EPSG:26917

Line 86
Church St W
Floradale Rd
Arthur St N
Dunke PRV
Park PRV
Queen PRV
Elmira
Elmira West ET
Howard BPS and ET
Oriole PRV
Line 86
Arthur St S
South Field Dr
Listowel Rd
Three Bridges Rd
0
0.7
1.4 km

Document Path: B:\Working\WOOLWICH ON\TWP OP\2402020 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-002 - ADD Max Pressures.aprx

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- Surrounding Municipalities
- Woolwich Municipal Boundary
- GRCA Watercourse
- Settlement Boundaries

Water Facilities

PRV | PS/Storage | Storage

Maximum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

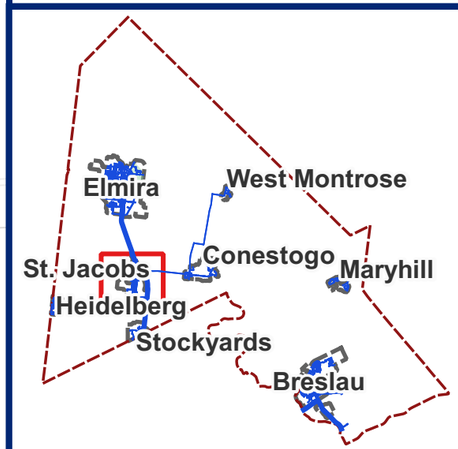


Figure B-1-STJ

Existing Average Day Demand Maximum Pressures

St. Jacobs

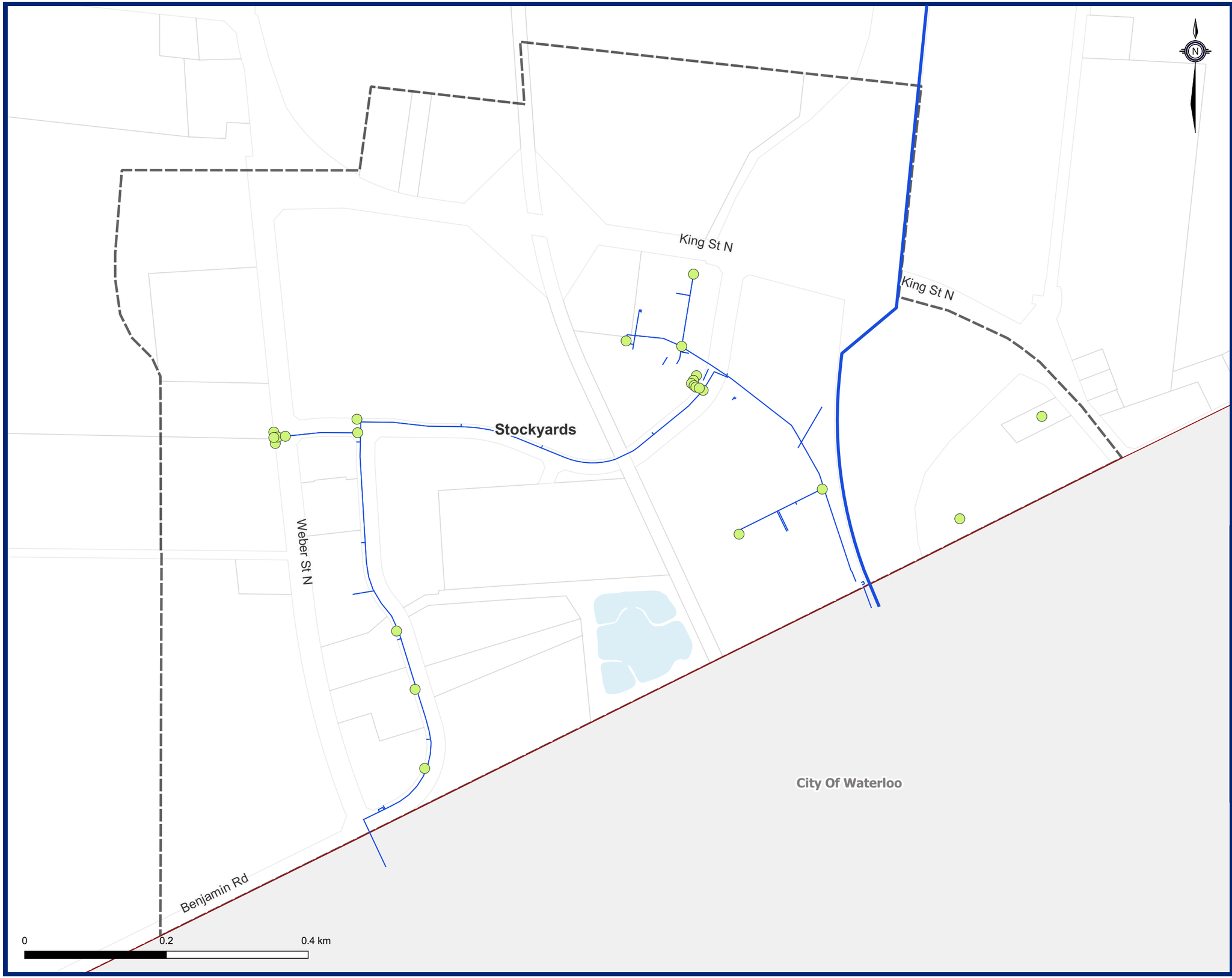
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July, 2024
622098-W-001
Projection EPSG:26917

Hawkesville Rd
Three Bridges Rd
Henry St
Sawmill Rd
Sawmill Rd
King St N
Arthur St S
St Jacobs BPS and RSVR
St Jacobs PRV
St. Jacobs

0 0.5 1 km

Document Path: B:\Working\WOOLWICH ON_TWP OF\24\02\20 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3 Water\622098-W-002 - ADD Max Pressures.mxd



WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- Surrounding Municipalities
- Woolwich Municipal Boundary
- GRCA Watercourse
- Settlement Boundaries

Water Facilities

PRV | PS/Storage | Storage

Maximum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

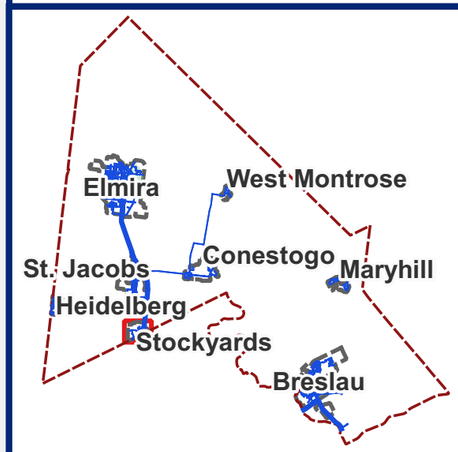


Figure B-1-STO

Existing Average Day Demand Maximum Pressures

Stockyards

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July, 2024
622098-W-001
Projection EPSG:26917

Document Path: B:\Working\WOOLWICH ON_TWP OF\240220 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-002 - ADD Max Pressures.mxd

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- Surrounding Municipalities
- Woolwich Municipal Boundary
- GRCA Watercourse
- Settlement Boundaries

Water Facilities

PRV | PS/Storage | Storage

Maximum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

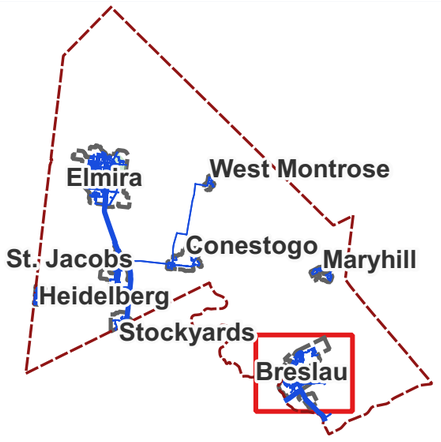


Figure B-1-BRE

Existing Average Day Demand Maximum Pressures

Breslau

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July, 2024
622098-W-001
Projection EPSG:26917

Victoria St N
Ebycrest Rd
Bridge St E
Shantz Station Rd
Breslau
Breslau North PRV
Shirley Dr
Woolwich St S
Fountain St N
Menno St
City Of Kitchener
Lackner Blvd
Keewatin Ave
Ottawa St N
Breslau South PRV
0
0.9
1.8 km

Document Path: B:\Working\WOOLWICH ON, TWP OF\2402020 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-002 - ADD Max Pressures.qgz

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Line 86

West Montrose

West Montrose BPS and RSVR

0 0.1 0.2 km

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- Surrounding Municipalities
- Woolwich Municipal Boundary
- GRCA Watercourse
- Settlement Boundaries

Water Facilities

PRV PS/Storage Storage

Maximum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

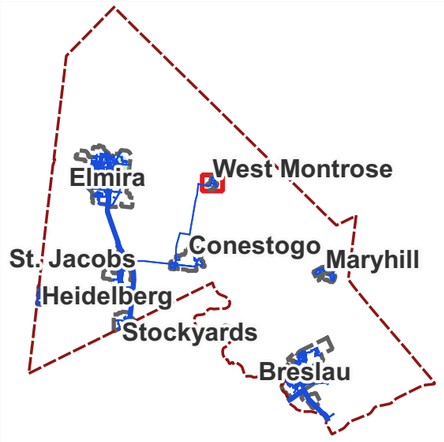


Figure B-1-WMR

Existing Average Day Demand Maximum Pressures

West Montrose

BluePlan ENGINEERING

July, 2024
622098-W-001
Projection EPSG:26917

Document Path: B:\Working\WOOLWICH ON_TWP OF\240220 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-002 - ADD MaxDay Pressures.qgz

Village Heights BPS and RSVR

Maryhill

Isley BPS and RSVR

St Charles St W

Maryhill Rd

0 0.2 0.4 km

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- Surrounding Municipalities
- Woolwich Municipal Boundary
- GRCA Watercourse
- Settlement Boundaries

Water Facilities

PRV PS/Storage Storage

Maximum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

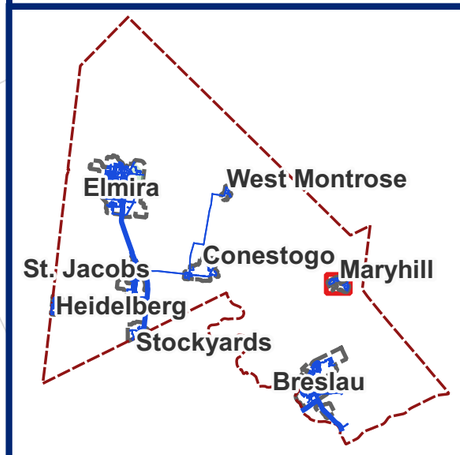


Figure B-1-MH

Existing Average Day Demand Maximum Pressures

Maryhill

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July, 2024
622098-W-001
Projection EPSG:26917

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- Surrounding Municipalities
- Woolwich Municipal Boundary
- GRCA Watercourse
- Settlement Boundaries

Water Facilities

PRV | PS/Storage | Storage

Maximum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

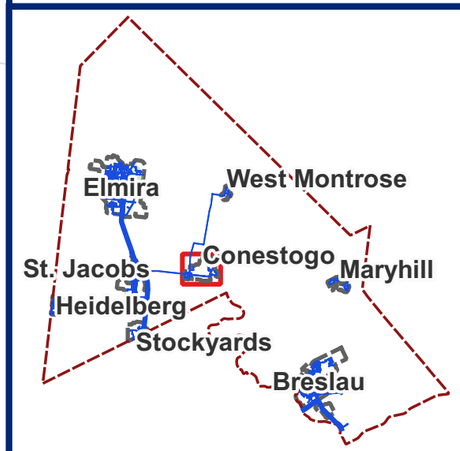


Figure B-1-CON

Existing Average Day Demand Maximum Pressures

Conestogo

BluePlan ENGINEERING

July, 2024
622098-W-001
Projection EPSG:26917

Northfield Dr E

Conestogo

Conestogo BPS and RSVR

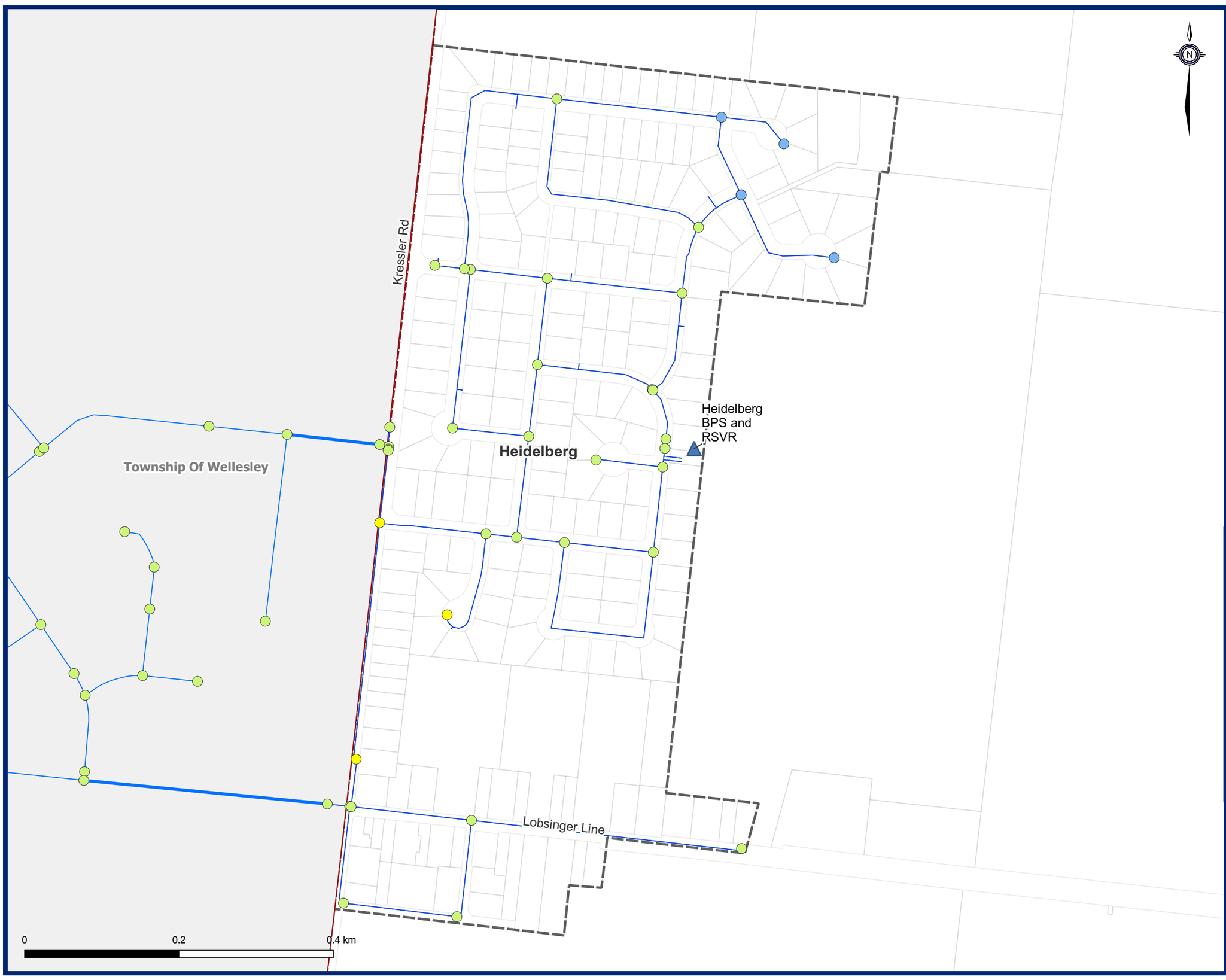
Sawmill Rd

Conestogo PRV

Glasgow St S

0 0.3 0.6 km

Document Path: B:\Working\WOOLWICH ON\TWP OP\2402020 – 622098 Woolwich Servicing Capacity Study\5 Work In Progress\5. GIS and Databases\3. Water\622098-W-002 - ADD Max Pressures.mxd



WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- Surrounding Municipalities
- Woolwich Municipal Boundary
- GRCA Watercourse
- Settlement Boundaries

Water Facilities

PRV | PS/Storage | Storage

Maximum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

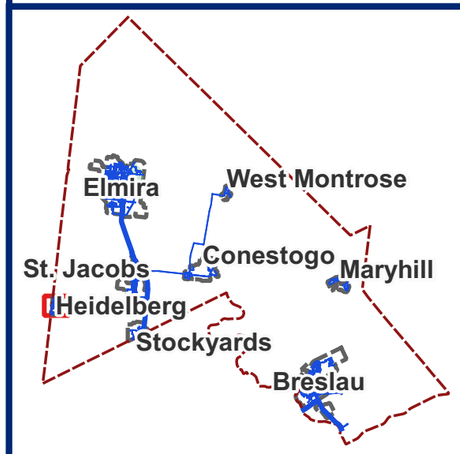


Figure B-1-HDB

Existing Average Day Demand Maximum Pressures

Heidelberg

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July, 2024
622098-W-001
Projection EPSG:26917

Document Path: B:\Working\WOOLWICH ON_TWP OF\2402020 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-002 - ADD Max Pressures.qpz

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

Water Facilities

PRV PS/Storage Storage

Minimum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

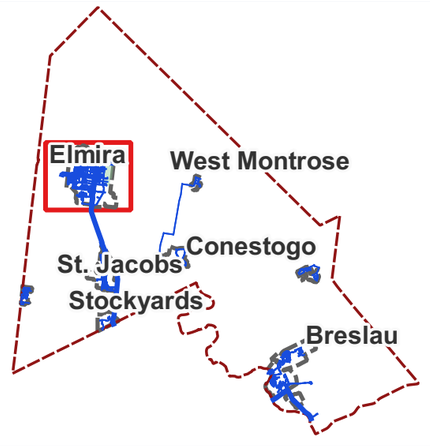


Figure B-2-ELM

Existing Maximum Day Demand Minimum Pressures

Elmira

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July, 2024
622098-W-001
Projection EPSG:26917

Dunke PRV
Park PRV
Queen PRV
Howard BPS and ET
Oriole PRV
Elmira West ET
Arthur St N
Arthur St S
Line 86
Church St W
Floradale Rd
South Field Dr
Listowel Rd
Three Bridges Rd
Elmira

0 0.7 1.4 km

Document Path: B:\Working\WOOLWICH ON - TWP OF\622020 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-003 - MDD Min Pressures.qgz

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Hawkesville Rd

Three Bridges Rd

Henry St

Sawmill Rd

Sawmill Rd

King St N

Arthur St S

St Jacobs BPS and RSVR

St Jacobs PRV

0 0.5 1 km

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

Water Facilities

PRV PS/Storage Storage

Minimum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

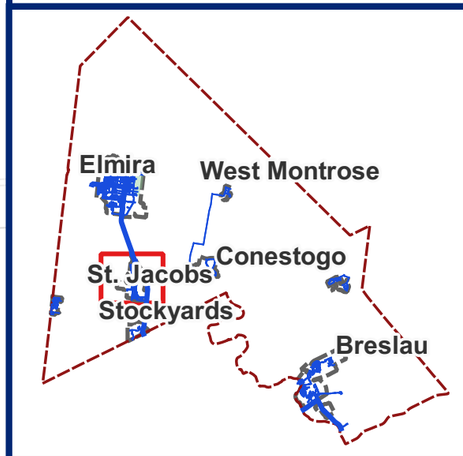


Figure B-2-STJ

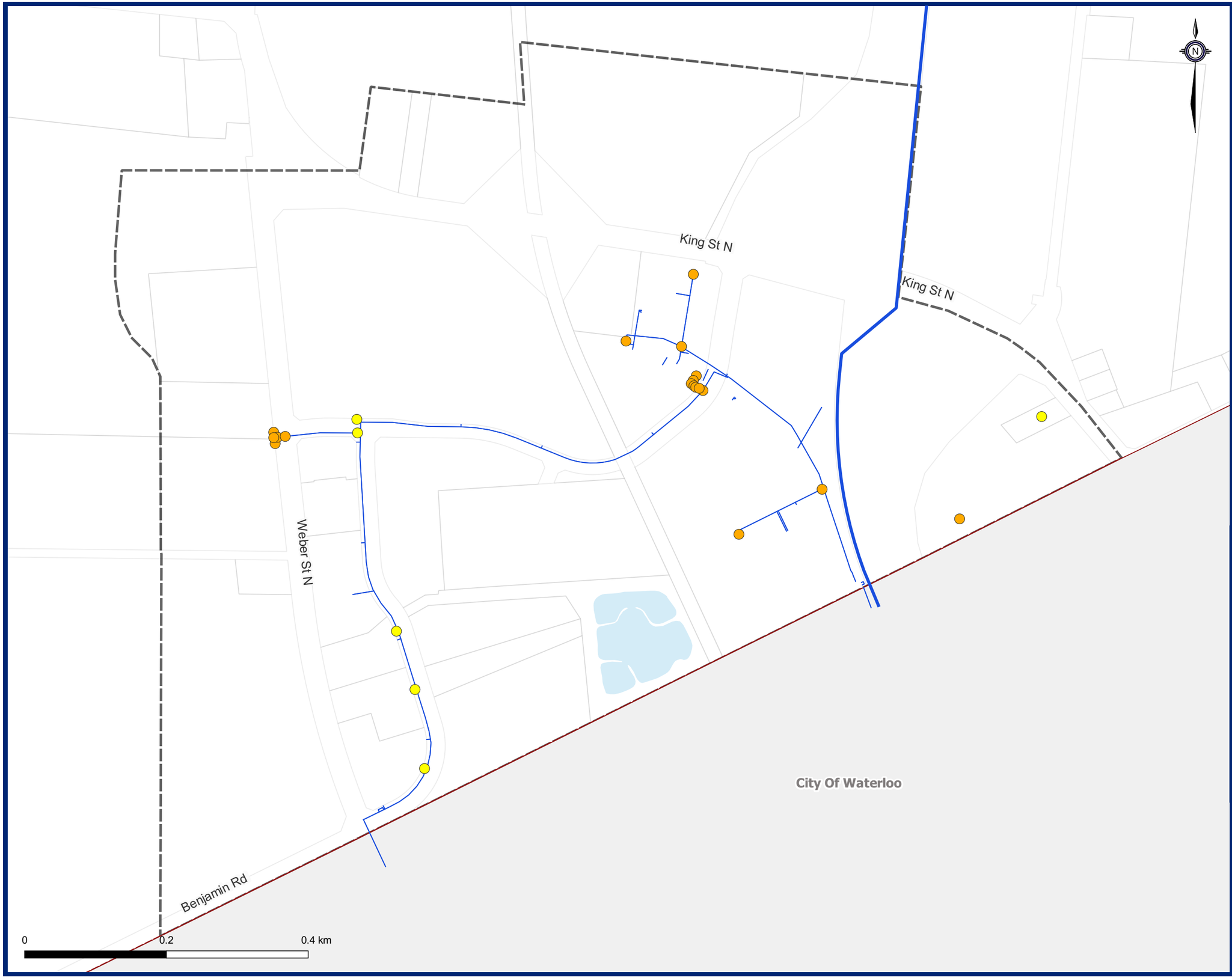
Existing Maximum Day Demand Minimum Pressures

St. Jacobs

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July, 2024
622098-W-001
Projection EPSG:26917

Document Path: B:\Working\WOOLWICH ON, TWP OF\2402020 - 622098 Woolwich Servicing Capacity Study\5 GIS and Databases\3 Water\622098-W-003 - MDD Min Pressures.qgz



WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

Water Facilities

PRV PS/Storage Storage

Minimum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

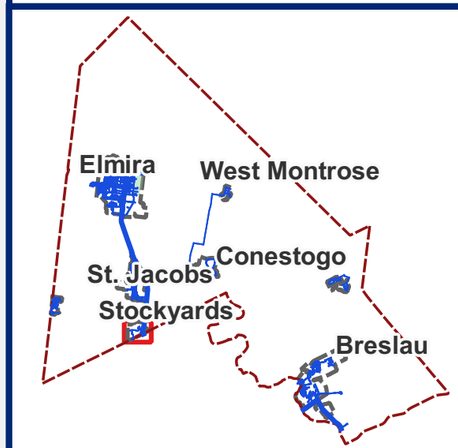


Figure B-2-STO

Existing Maximum Day Demand Minimum Pressures

Stockyards

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July, 2024
622098-W-001
Projection EPSG:26917

Document Path: B:\Working\WOOLWICH ON, TWP OF\2402020 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-003 - MDD Min Pressures.qgz

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

Water Facilities

PRV PS/Storage Storage

Minimum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

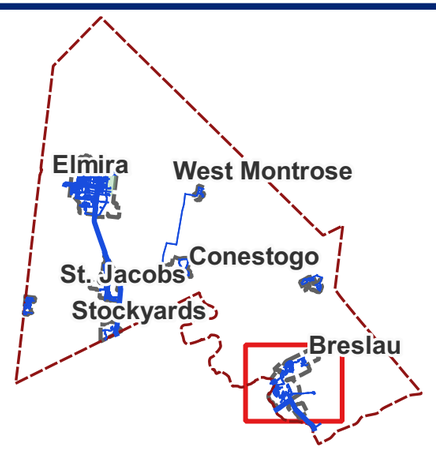


Figure B-2-BRE

Existing Maximum Day Demand Minimum Pressures

Breslau

BluePlan ENGINEERING

July, 2024
622098-W-001
Projection EPSG:26917

Victoria St N
Breslau
Shantz Station Rd
Ebycrest Rd
Bridge St E
Breslau North PRV
Woolwich St S
Menno St
Fountain St N
Shirley Dr
City Of Kitchener
Lackner Blvd
Keewatin Ave
Breslau South PRV
Ottawa St N
0
0.9
1.8 km

Document Path: B:\Working\WOOLWICH ON, TWP OF\2022\20 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-003 - MDD Min Pressures.qgz

Line 86

West Montrose BPS and RSVR

0 0.1 0.2 km

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

Water Facilities

PRV PS/Storage Storage

Minimum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

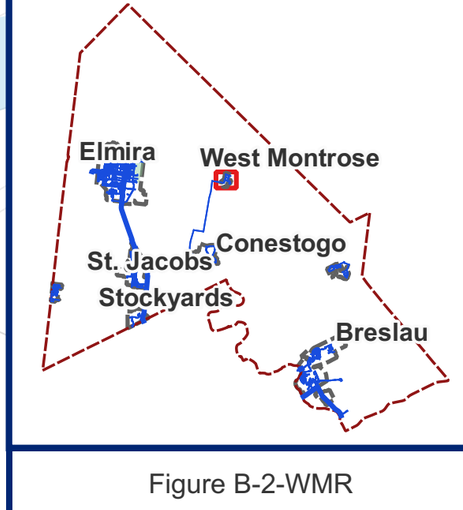


Figure B-2-WMR

Existing Maximum Day Demand Minimum Pressures

West Montrose

BluePlan ENGINEERING

July, 2024
622098-W-001
Projection EPSG:26917

Document Path: B:\Working\WOOLWICH ON, TWP Of\240220 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-003 - MDD Min Pressures.qgz

Village Heights BPS and RSVR

Isley BPS and RSVR

St Charles St W

Maryhill Rd

0 0.2 0.4 km

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

Water Facilities

PRV PS/Storage Storage

Minimum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100



Figure B-2-MH

Existing Maximum Day Demand Minimum Pressures

Maryhill

BluePlan ENGINEERING

July, 2024
622098-W-001
Projection EPSG:26917

Document Path: B:\Working\WOOLWICH ON, TWP OF\2020 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-003 - MDD Min Pressures.qgz

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

Water Facilities

PRV | PS/Storage | Storage

Minimum Pressures (psi)

- < 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- > 100

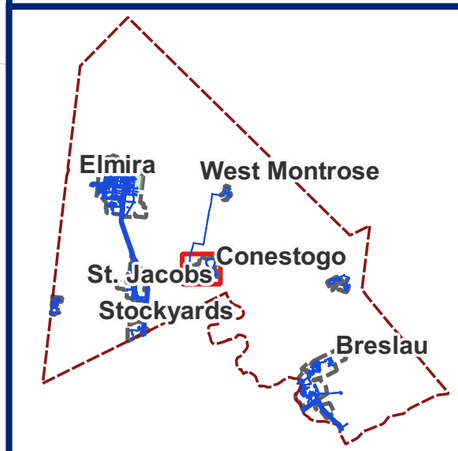


Figure B-2-CON

Existing Maximum Day Demand Minimum Pressures

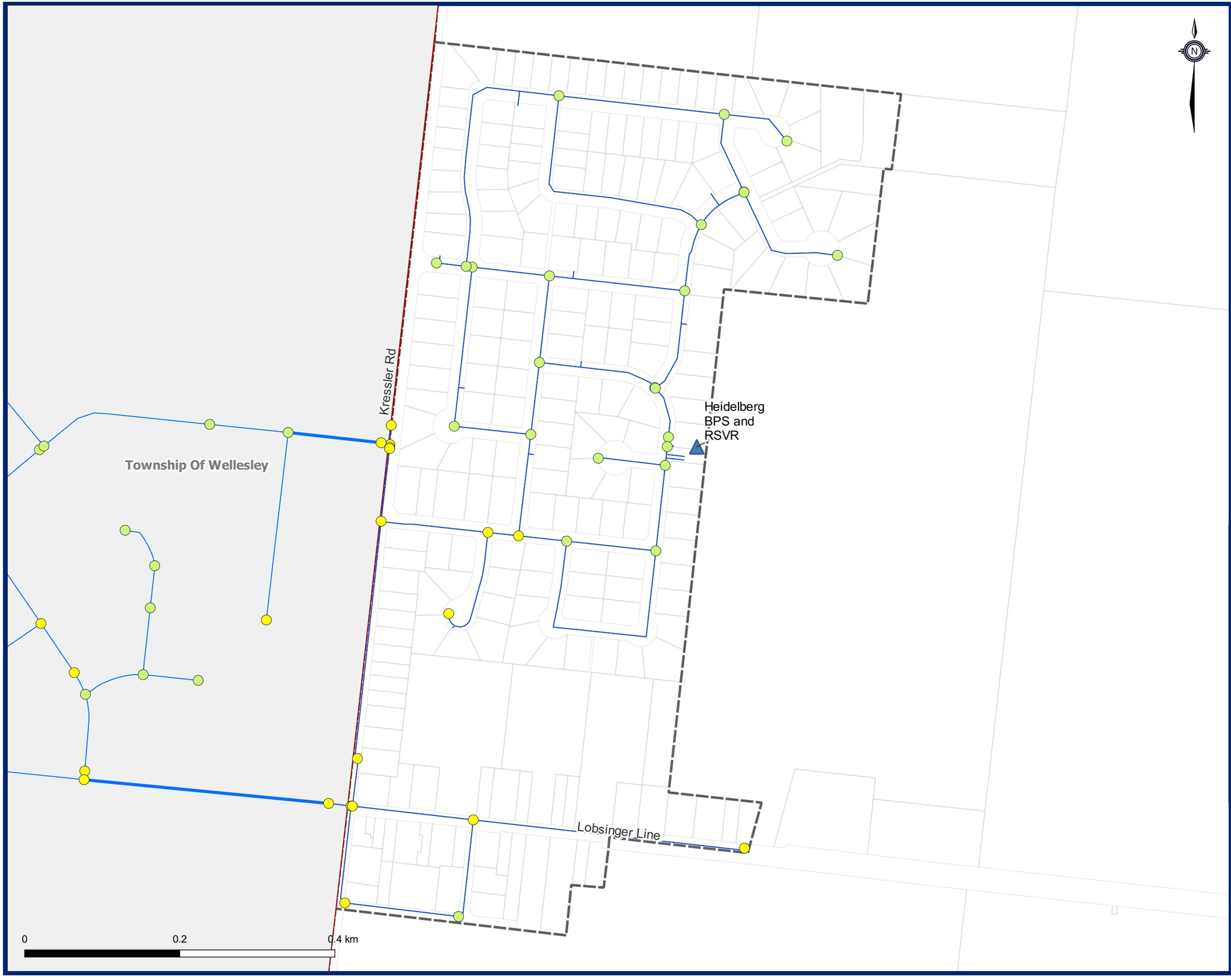
Conestogo

BluePlan ENGINEERING

July, 2024
622098-W-001
Projection EPSG:26917

Northfield Dr E
Conestogo BPS and RSVR
Sawmill Rd
Conestogo PRV
Glasgow St S
Conestogo
0
0.3
0.6 km

Document Path: B:\Working\WOOLWICH ON_TWP OF\24\02\20 – 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3 Water\622098-W-003 - MDD Min Pressures.qgz



WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing Water Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

Water Facilities

PRV PS/Storage Storage

Minimum Pressures (psi)

< 40 60 - 80 > 100
40 - 50 80 - 90
50 - 60 90 - 100

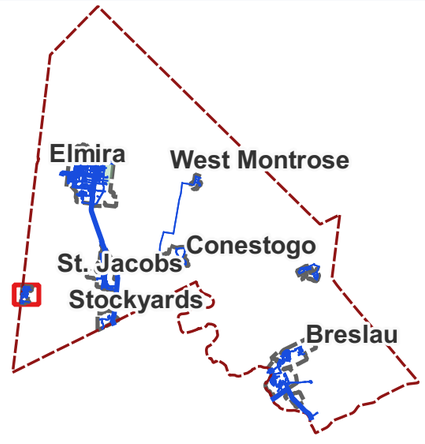


Figure B-2-HDB

Existing Maximum Day Demand Minimum Pressures

Heidelberg

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622098-W-001
Projection EPSG:26917

Document Path: B:\Working\WOOLWICH ON, TWP OF\240220 - 622098 Woolwich Servicing Capacity Study\5 GIS and Databases\3 Water\622098-W-003 - MDD Min Pressures.qgz

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Available Fire Flow (L/s)

- < 50
- 50 - 75
- 75 - 150
- 150 - 250
- > 250

Existing Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

Township Of Mapleton
Township Of Centre Wellington
Township Of Guelph/eramosa
Township Of Wellesley
City Of Guelph
City Of Waterloo
Township Of Wilmot
City Of Kitchener
Township Of Puslinch
City Of Cambridge

Elmira
West Montrose
Heidelberg
St. Jacobs
Maryhill
Breslau

Arthur St N
Reid Woods Dr
Middlebrook Rd
Line 86
Listowel Rd
Three Bridges Rd
Northfield Dr E
Katherine St N
Katherine St S
Arthur St S
King St N
Ament Line
King St N
Lobsinger Line
Kressler Rd
Benjamin Rd
Northlake Dr
Conservation Dr
University Ave E
Sawmill Rd
St Charles St W
Shantz Station Rd
Hwy 7
Victoria St N
Bridge St E
Shirley Dr
Menno St
Fountain St N
Shantz Station Rd
Fife Rd
Kossuth Rd

0 5 10 km

Figure B-3

Maximum Day Demand Fire Flows

Woolwich Water System

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622098-W-001
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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Fire Flow

- Existing Fire Flow Deficiency
- Additional Fire Flow Deficiency Due to Growth Impacts

Existing Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities

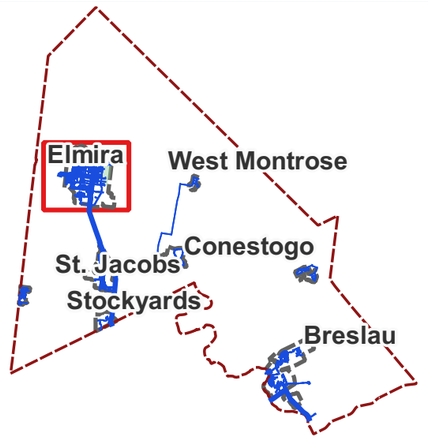


Figure B-4-ELM

Maximum Day Demand Fire Flow Deficiency

Elmira

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May, 2024
622098-W-001
Projection EPSG:26917

Elmira
Line 86
Church St W
Arthur St N
Dunke PRV
Church St E
Line 86
Park PRV
Duke St
Queen PRV
Floradale Rd
Elmira West ET
Barnswallow Dr
First St W
First St E
Howard BPS and ET
Arthur St S
Oriole PRV
Whippoorwill Dr
South Field Dr
Listowel Rd
Three Bridges Rd
Arthur St S
0
0.7
1.4 km

Document Path: B:\Working\WOOLWICH ON_TWP OF\24\20220 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-004 - MDD FF.qgz

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Fire Flow

- Existing Fire Flow Deficiency
- Additional Fire Flow Deficiency Due to Growth Impacts

Existing Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities

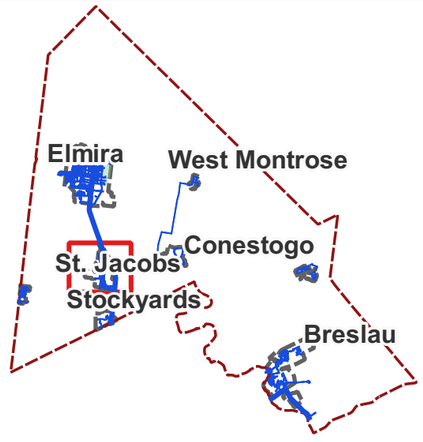


Figure B-4-STJ

Maximum Day Demand Fire Flow Deficiency

St. Jacobs

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May, 2024
622098-W-001
Projection EPSG:26917

St Jacobs BPS and RSVR

St Jacobs PRV

King St N

Hawkesville Rd

Sawmill Rd

Three Bridges Rd

Henry St

Arthur St S

0 0.5 1 km

Document Path: B:\Working\WOOLWICH ON, TWP OF\2402020 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-004 - MDD FF.qgz

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Fire Flow

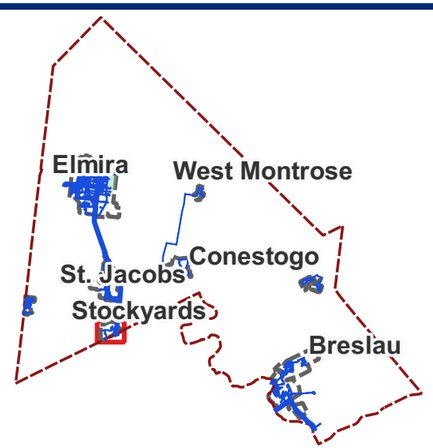
- Existing Fire Flow Deficiency
- Additional Fire Flow Deficiency Due to Growth Impacts

Existing Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities



King St N

King St N

Weber St N

Benjamin Rd

City Of Waterloo

0 0.2 0.4 km

Figure B-4-STO

Maximum Day Demand Fire Flow Deficiency

Stockyards

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Fire Flow

- Existing Fire Flow Deficiency
- Additional Fire Flow Deficiency Due to Growth Impacts

Existing Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities

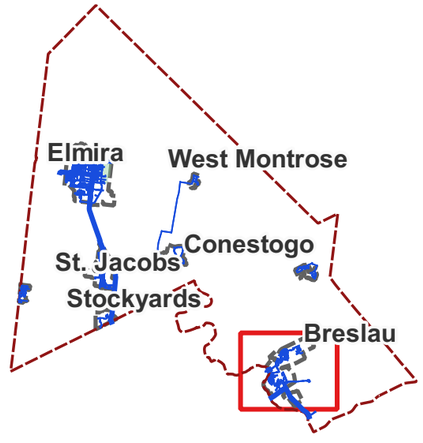


Figure B-4-BRE

Maximum Day Demand Fire Flow Deficiency

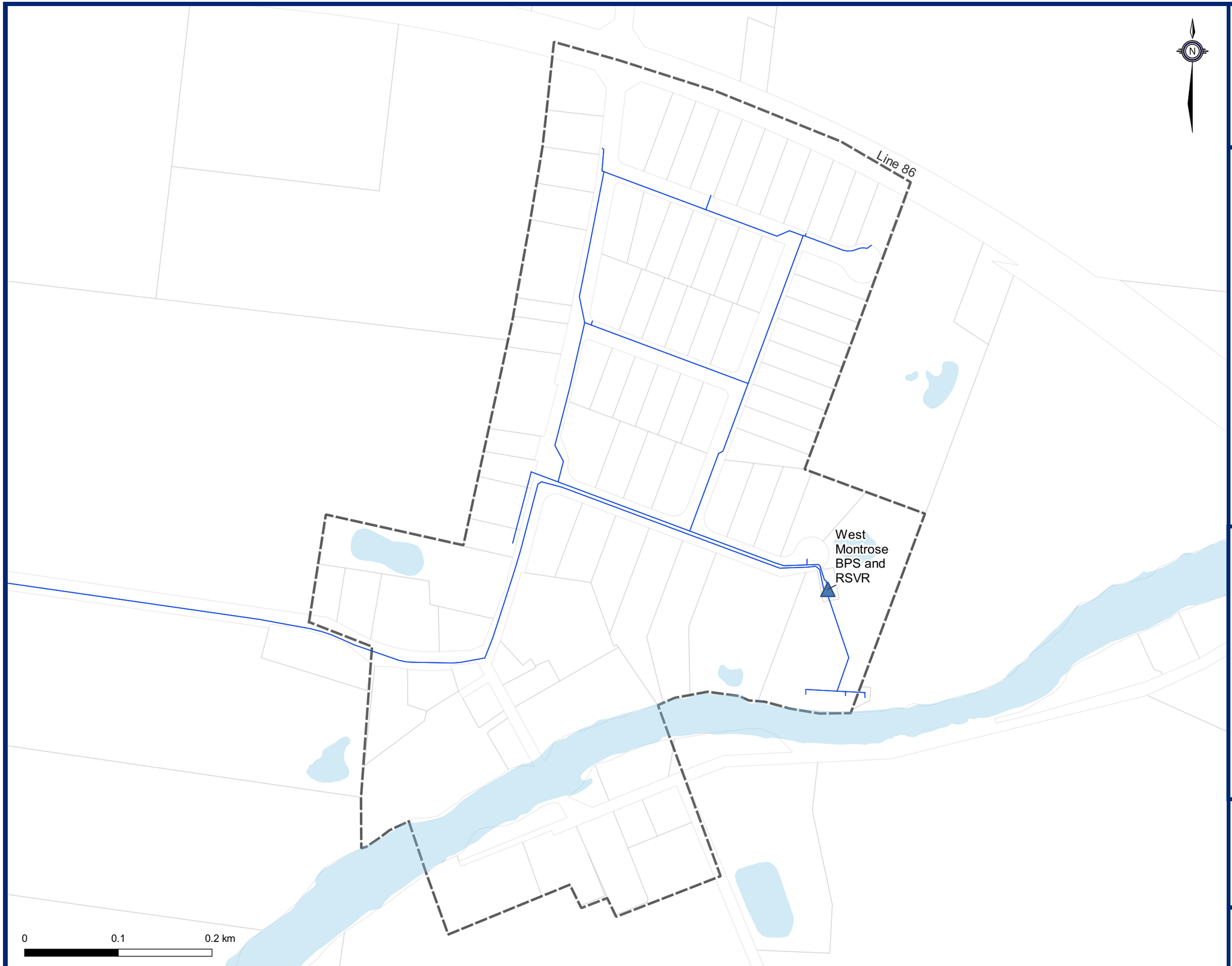
Breslau

BluePlan ENGINEERING

May, 2024
622098-W-001
Projection EPSG:26917

Victoria St N
Breslau
Ebycrest Rd
Bridge St E
Shantz Station Rd
Breslau North PRV
Shirley Dr
Woolwich St S
Menno St
Fountain St N
City Of Kitchener
Lackner Blvd
Keewatin Ave
Breslau South PRV
Ottawa St N
0
0.9
1.8 km

Document Path: B:\Working\WOOLWICH ON_TWP OF\2402020 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-004 - MDD FF.qgz



WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Fire Flow

- Existing Fire Flow Deficiency
- Additional Fire Flow Deficiency Due to Growth Impacts

Existing Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities

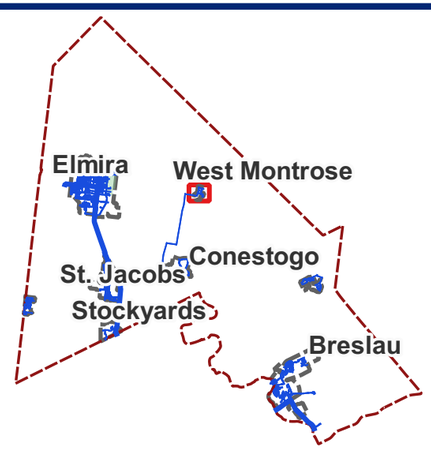


Figure B-4-WMR

Maximum Day Demand Fire Flow Deficiency

West Montrose

BluePlan Engineering

May, 2024
622098-W-001
Projection EPSG:26917

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Village Heights BPS and RSVR

Isley BPS and RSVR

St Charles St W

Maryhill Rd

0 0.2 0.4 km

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Fire Flow

- Existing Fire Flow Deficiency
- Additional Fire Flow Deficiency Due to Growth Impacts

Existing Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities



Figure B-4-MH

Maximum Day Demand Fire Flow Deficiency

Maryhill

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622098-W-001
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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Fire Flow

- Existing Fire Flow Deficiency
- Additional Fire Flow Deficiency Due to Growth Impacts

Existing Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities

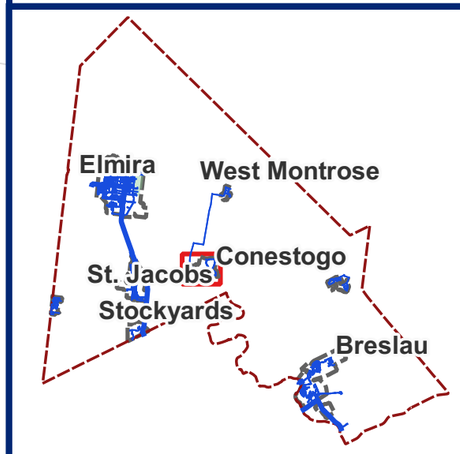


Figure B-4-CON

Maximum Day Demand Fire Flow Deficiency

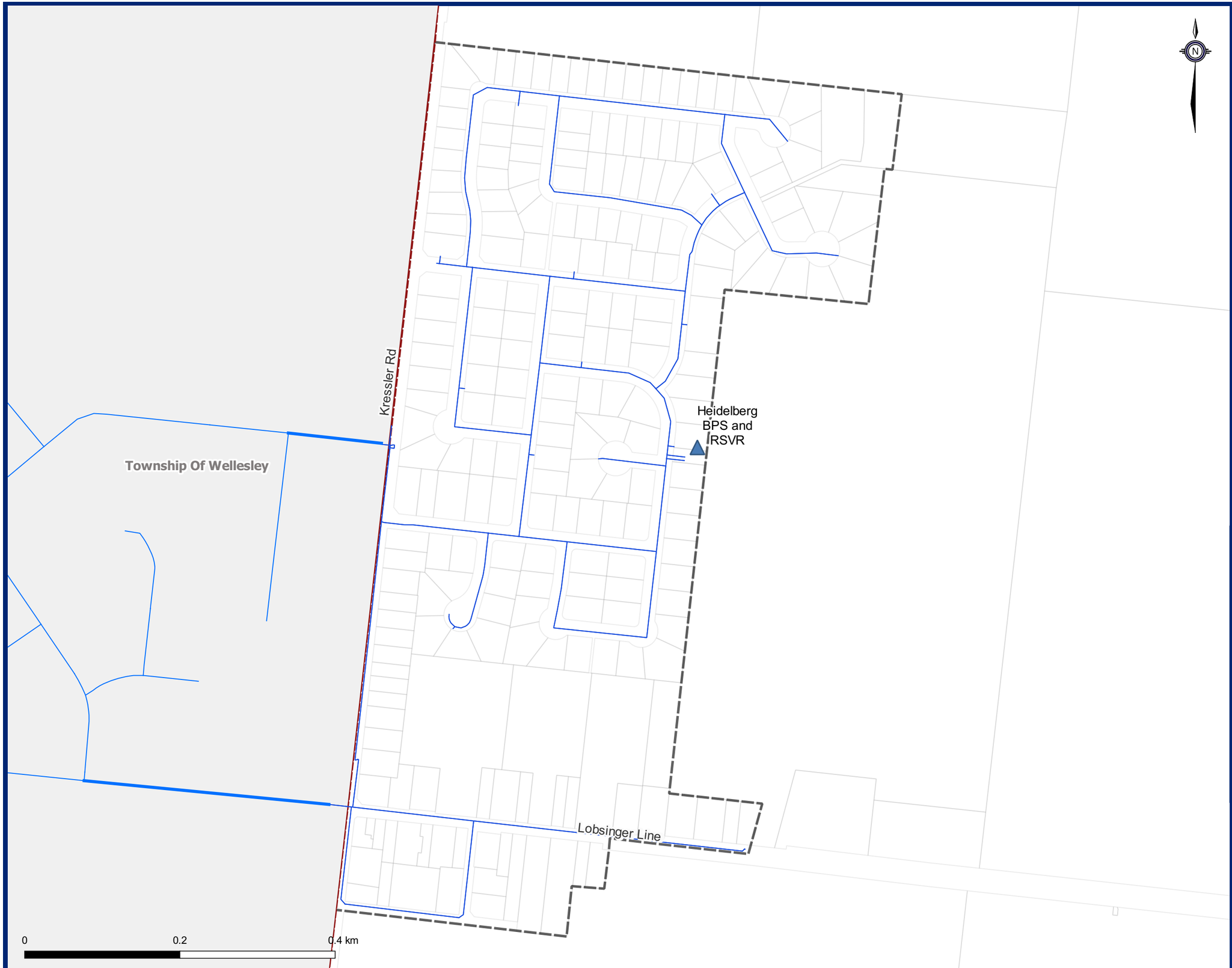
Conestogo

BluePlan Engineering

May, 2024
622098-W-001
Projection EPSG:26917

Northfield Dr E
Conestogo BPS and RSVR
Sawmill Rd
Conestogo PRV
Glasgow St S
Conestogo
0
0.3
0.6 km

Document Path: B:\Working\WOOLWICH ON_TWP OF\24\02\20 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5_GIS and Databases\3_Water\622098-W-004 - MDD FF.qgz



WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Fire Flow

- Existing Fire Flow Deficiency
- Additional Fire Flow Deficiency Due to Growth Impacts

Existing Infrastructure

- < 300 mm
- 300 mm - 825 mm

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Woolwich Municipal Boundary
- Surrounding Municipalities

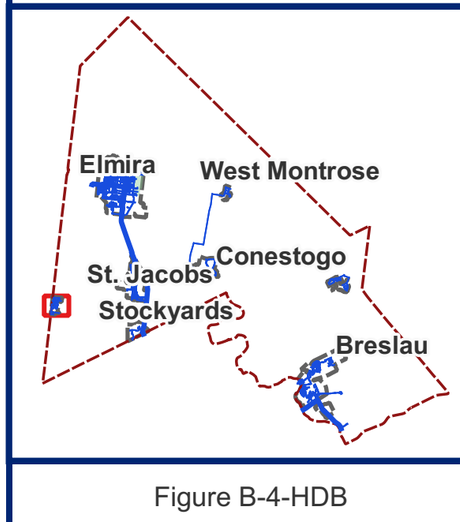


Figure B-4-HDB

Maximum Day Demand Fire Flow Deficiency

Heidelberg

BluePlan ENGINEERING

May, 2024
622098-W-001
Projection EPSG:26917

Document Path: B:\Working\WOOLWICH ON, TWP OF\240220 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-004 - MDD FF.qgz

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Maximum Velocities (m/s)

- < 0.5
- 0.5 - 1.5
- 1.5 - 5
- > 5

Other Features

- Elmira Pressure Zone
- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

Figure B-5

Existing Maximum Day Demand Maximum Velocities

Woolwich Water System

BluePlan Engineering

November, 2024
622098-W-001
Projection EPSG:26917

Township Of Mapleton
Township Of Centre Wellington
Township Of Guelph/eramosa
Township Of Wellesley
City Of Guelph
City Of Waterloo
City Of Kitchener
Township Of Wilmot
Township Of Puslinch
City Of Cambridge

Elmira
West Montrose
St. Jacobs
Heidelberg
Maryhill
Breslau

Arthur St N
Reid Woods Dr
Middlebrook Rd
Line 86
Listowel Rd
Three Bridges Rd
Northfield Dr E
Katherine St S
Arthur St S
King St N
Ament Line
Lobsinger Line
Kressler Rd
Benjamin Rd
Northlake Dr
Conservation Dr
University Ave E
Sawmill Rd
St Charles St W
Shantz Station Rd
Hwy 7
Victoria St N
Bridge St E
Shirley Dr
Menno St
Fountain St N
Fife Rd
Kossuth Rd

0 5 10 km

Document Path: B:\Working\WOOLWICH ON_TWP OF\622020 - 622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\3. Water\622098-W-006 - MDD Velocities.qgz



C

Township of Woolwich

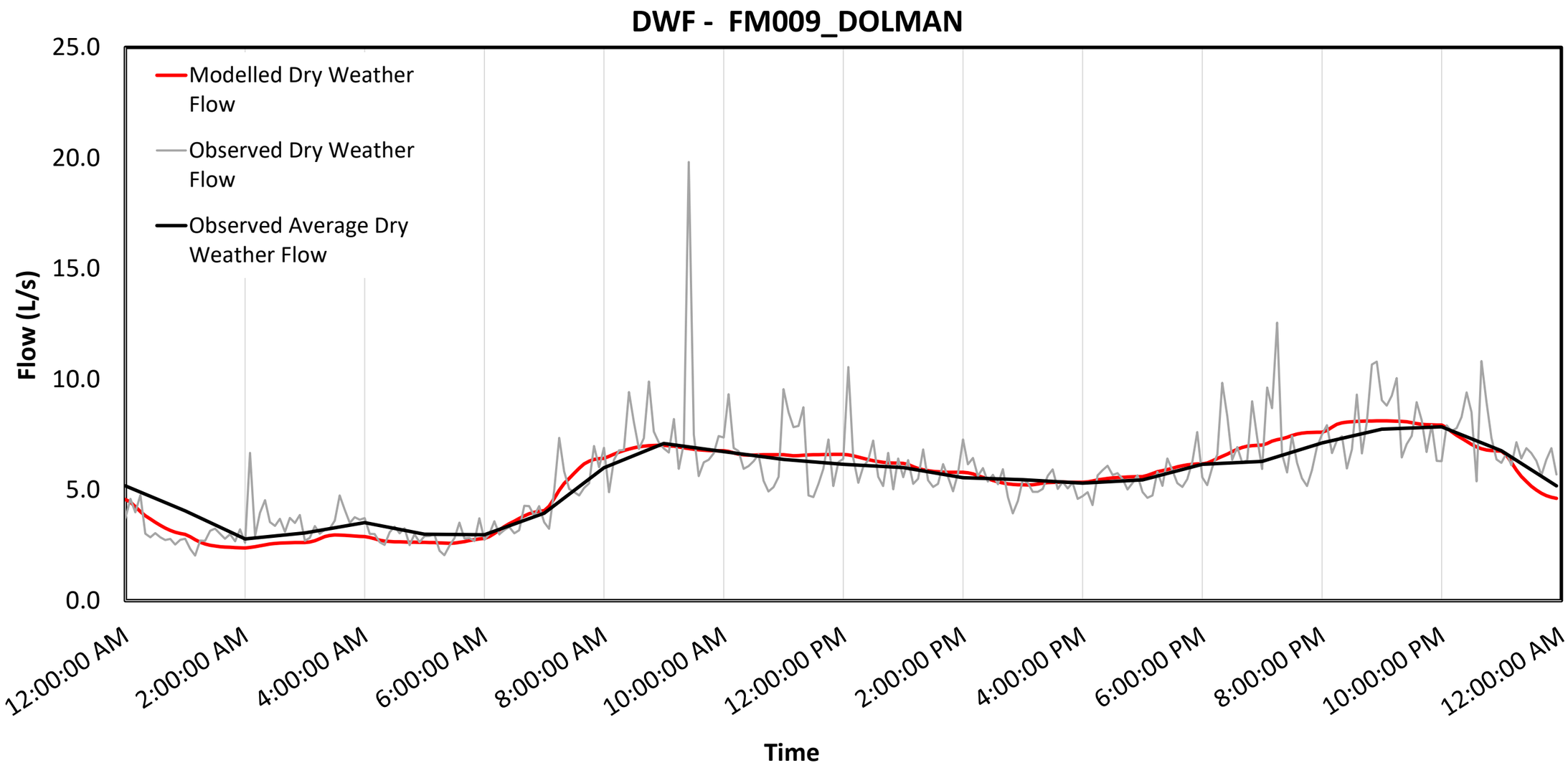
APPENDIX C

WASTEWATER HYDRAULIC MODEL

Dry Weather Flow Comparison

Tag:	FM009_DOLMAN
Conduit ID:	SN_TS-230019
Scenario:	DWF - FM009_DOLMAN

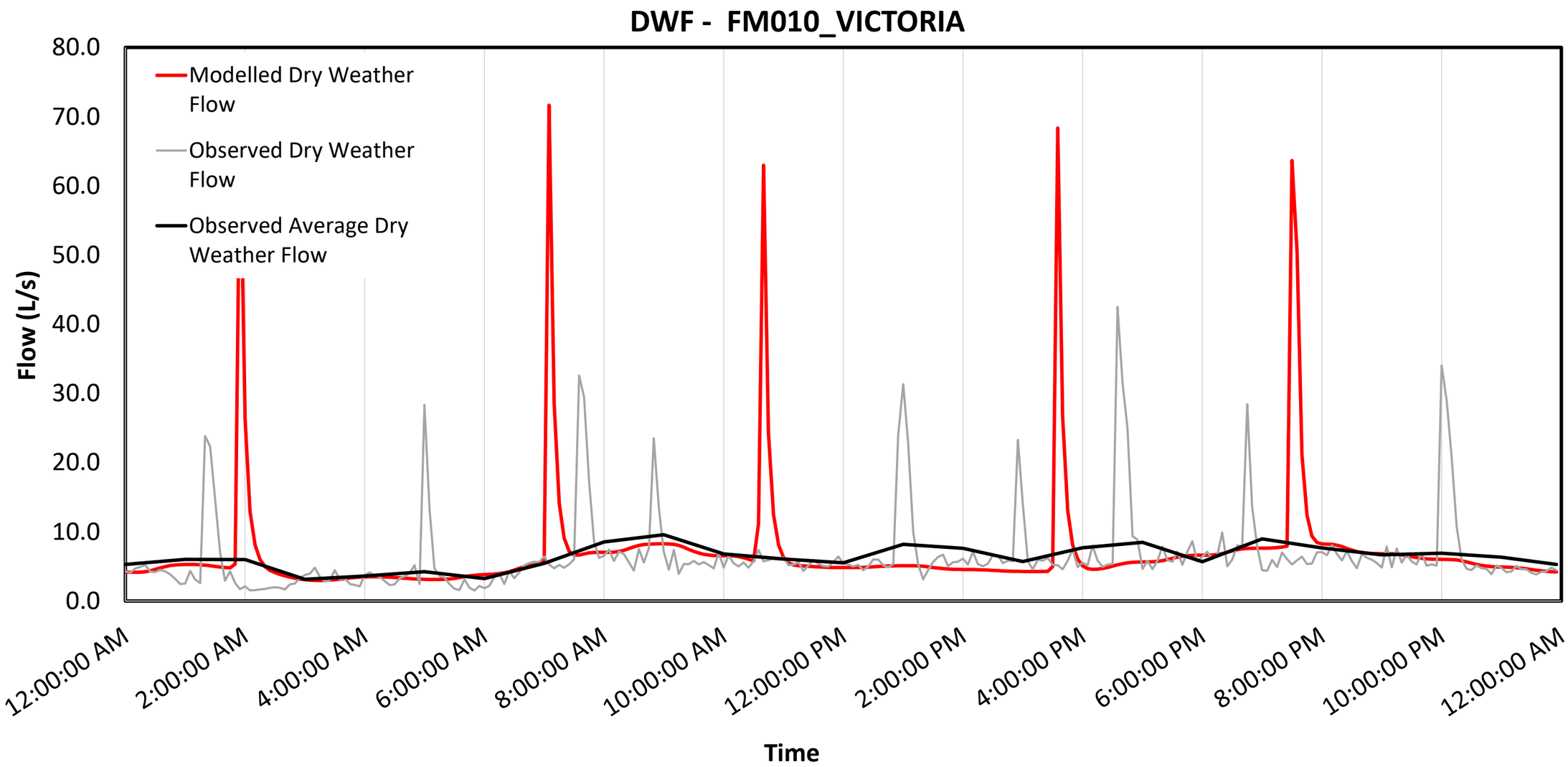
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	21.1	8.1	1.5	2.6	-
Total Volume (m³):	513	-	457	-	469



Dry Weather Flow Comparison

Tag:	FM010_VICTORIA
Conduit ID:	SN_TS-230037
Scenario:	DWF - FM010_VICTORIA

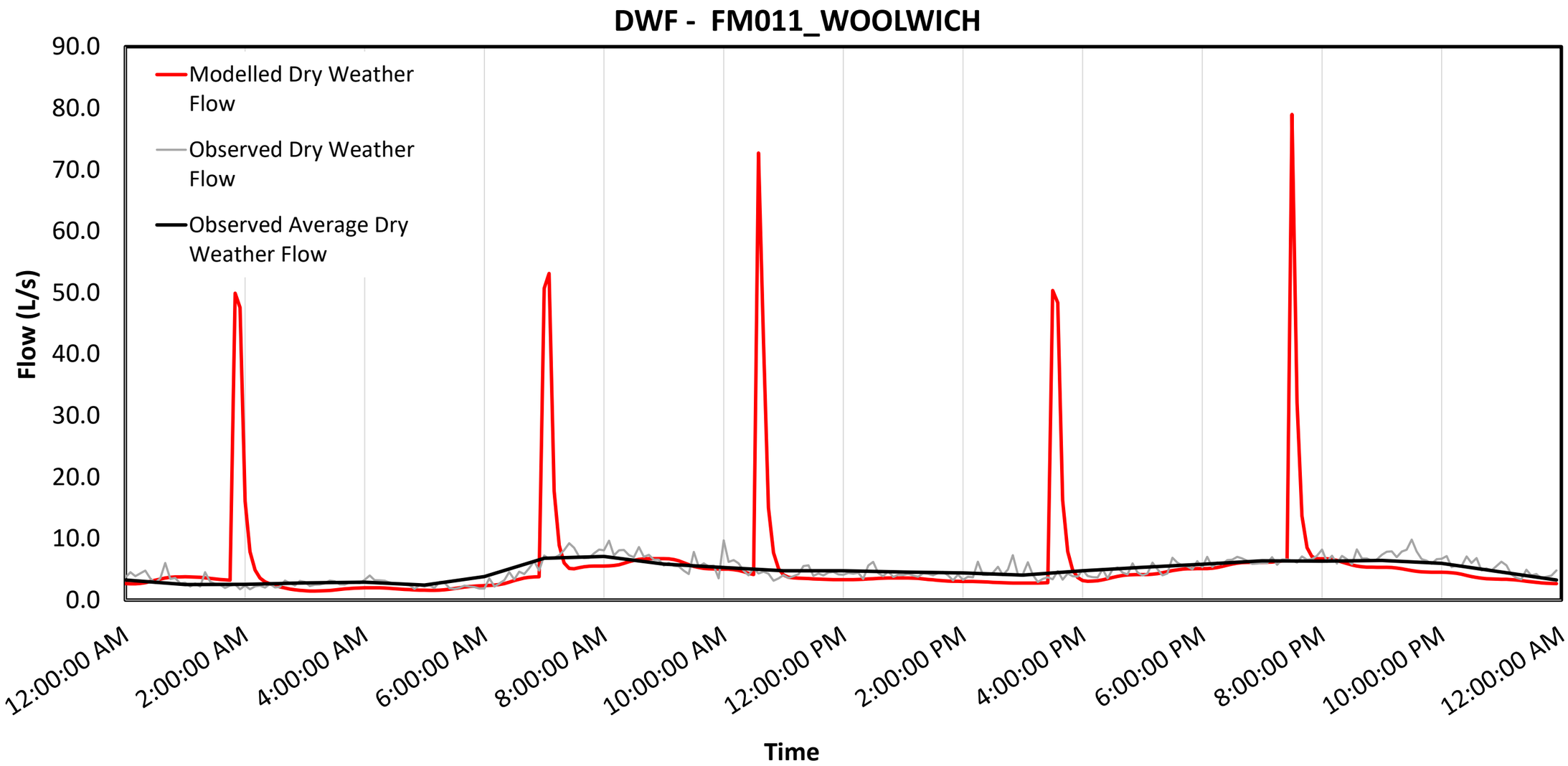
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	42.5	78.2	1.3	3.1	-
Total Volume (m^3):	635	-	391	-	627



Dry Weather Flow Comparison

Tag:	FM011_WOOLWICH
Conduit ID:	SN_TS-230034
Scenario:	DWF - FM011_WOOLWICH

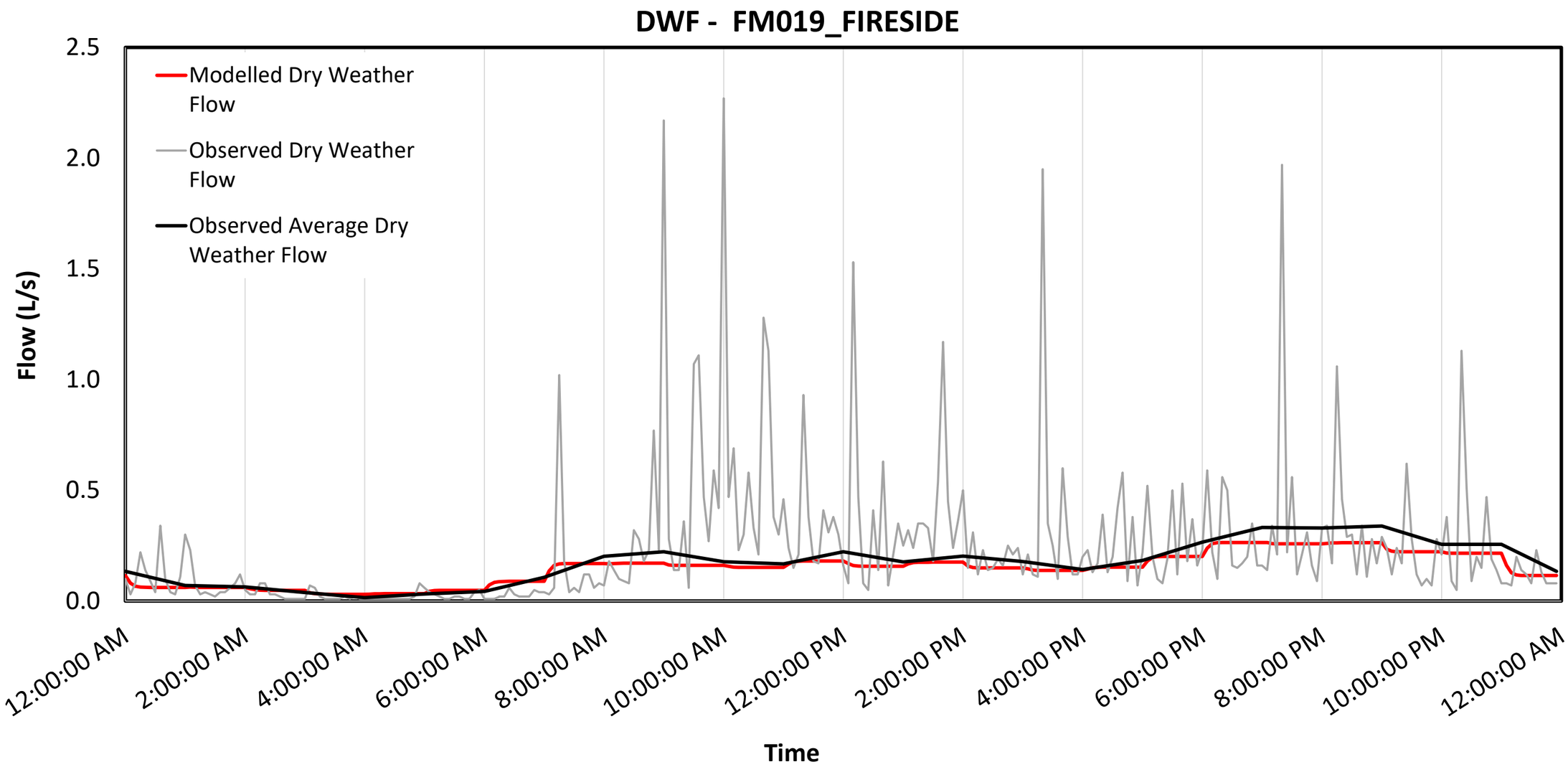
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	14.2	79.0	0.3	1.6	-
Total Volume (m^3):	423	-	319	-	496



Dry Weather Flow Comparison

Tag:	FM019_FIRESIDE
Conduit ID:	SAN_P-210242
Scenario:	DWF - FM019_FIRESIDE

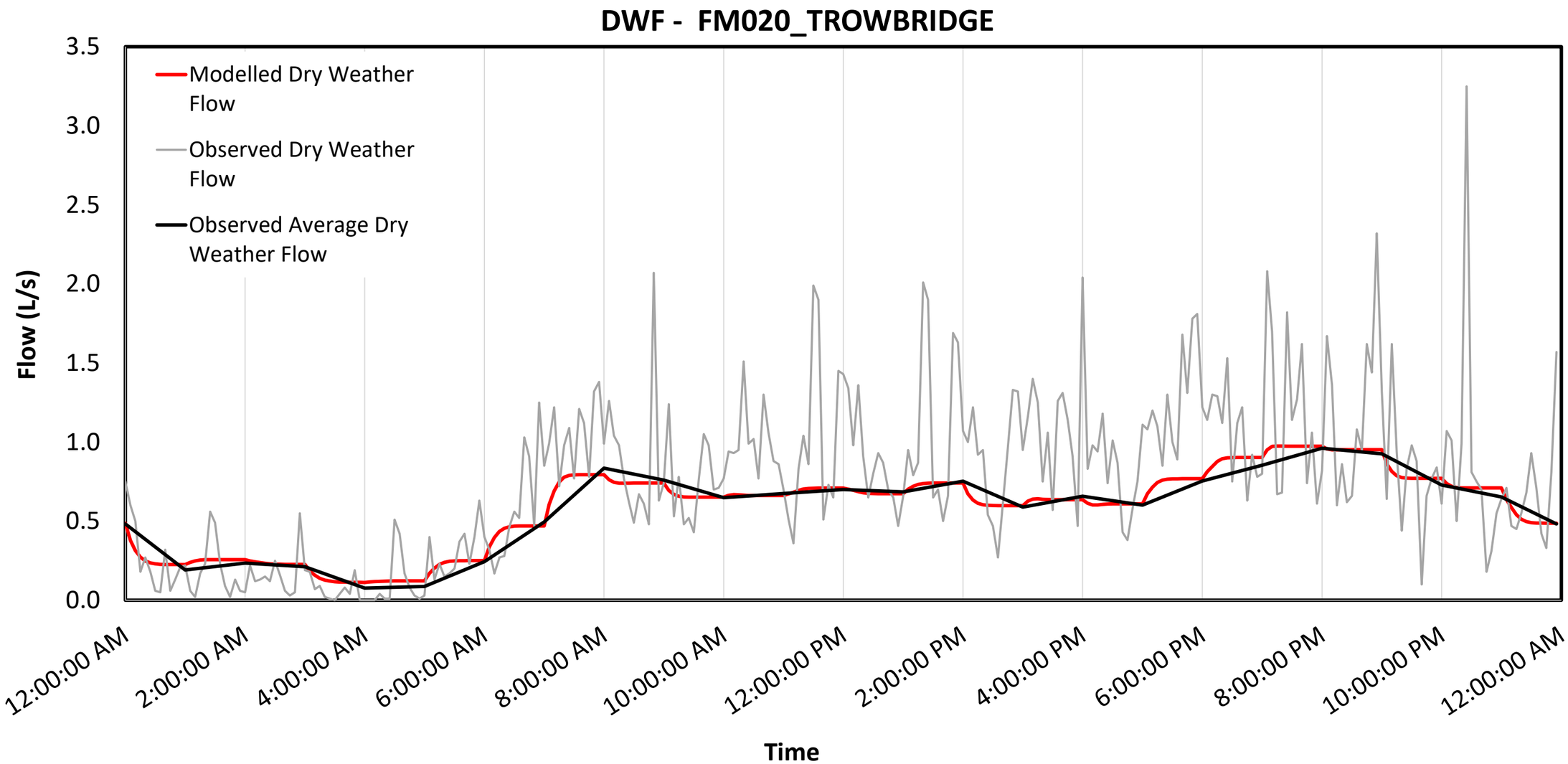
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	2.9	0.3	0.0	0.0	-
Total Volume (m^3):	24	-	11	-	13



Dry Weather Flow Comparison

Tag:	FM020_TROWBRIDGE
Conduit ID:	SAN_P-210253
Scenario:	DWF - FM020_TROWBRIDGE

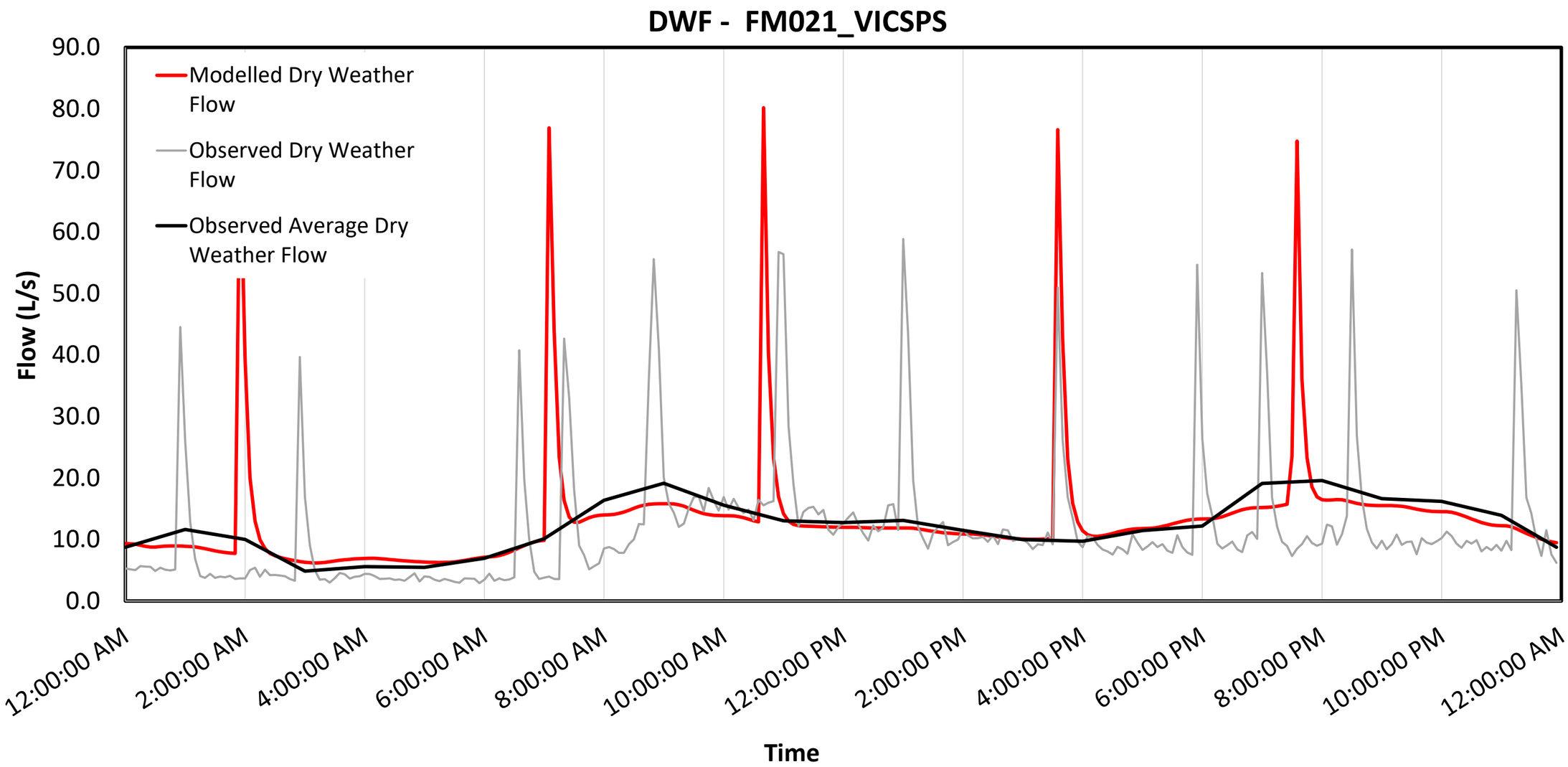
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	4.2	1.0	0.0	0.1	-
Total Volume (m³):	84	-	45	-	51



Dry Weather Flow Comparison

Tag:	FM021_VICSPS
Conduit ID:	SN_TS-230040
Scenario:	DWF - FM021_VICSPS

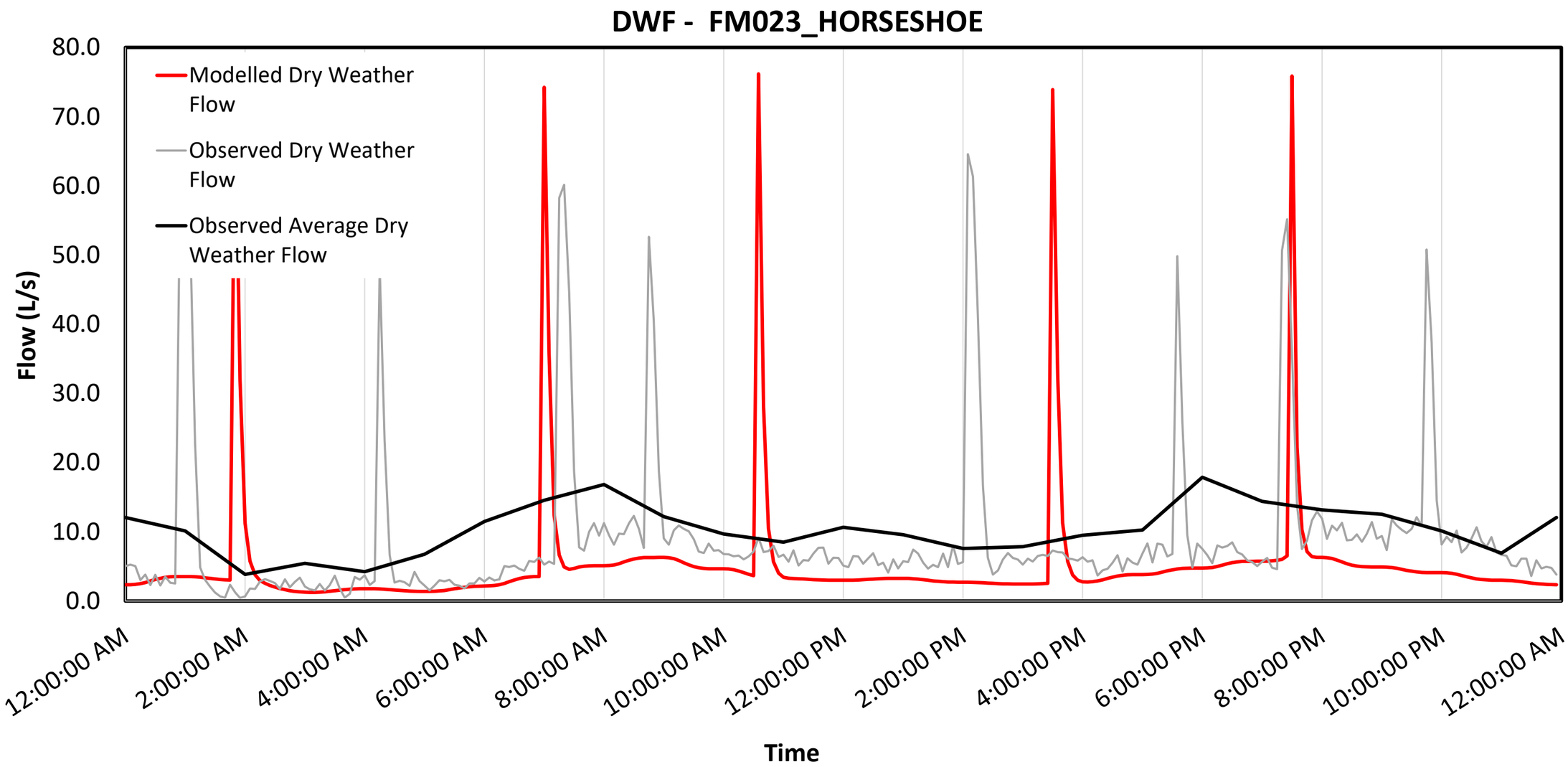
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	77.4	85.8	2.1	6.3	-
Total Volume (m^3):	1415	-	981	-	1143



Dry Weather Flow Comparison

Tag:	FM023_HORSESHOE
Conduit ID:	SN_TS-230031
Scenario:	DWF - FM023_HORSESHOE

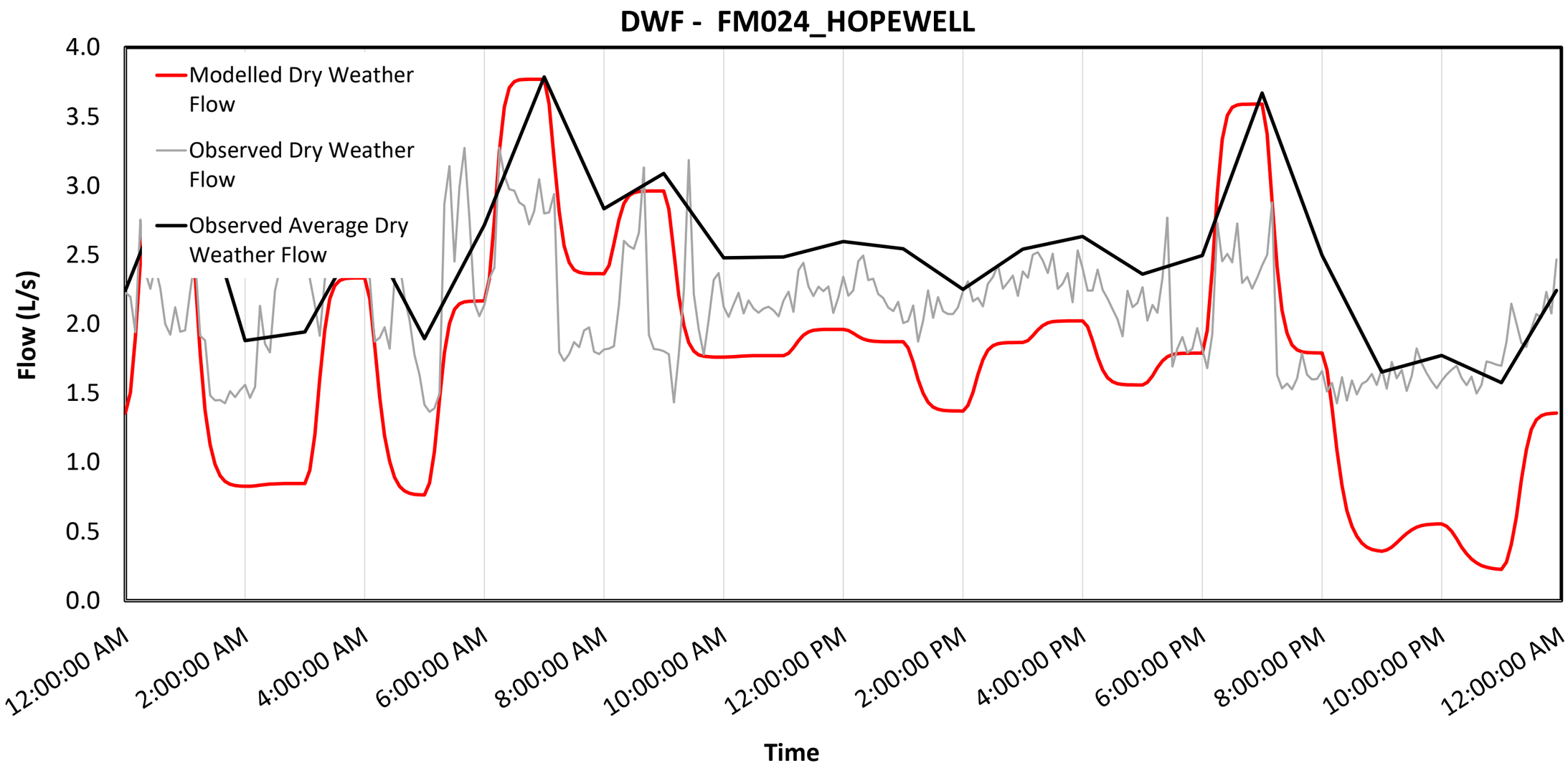
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	66.0	85.3	0.4	1.4	-
Total Volume (m^3):	860	-	717	-	467



Dry Weather Flow Comparison

Tag:	FM024_HOPEWELL
Conduit ID:	SN_TS-230058
Scenario:	DWF - FM024_HOPEWELL

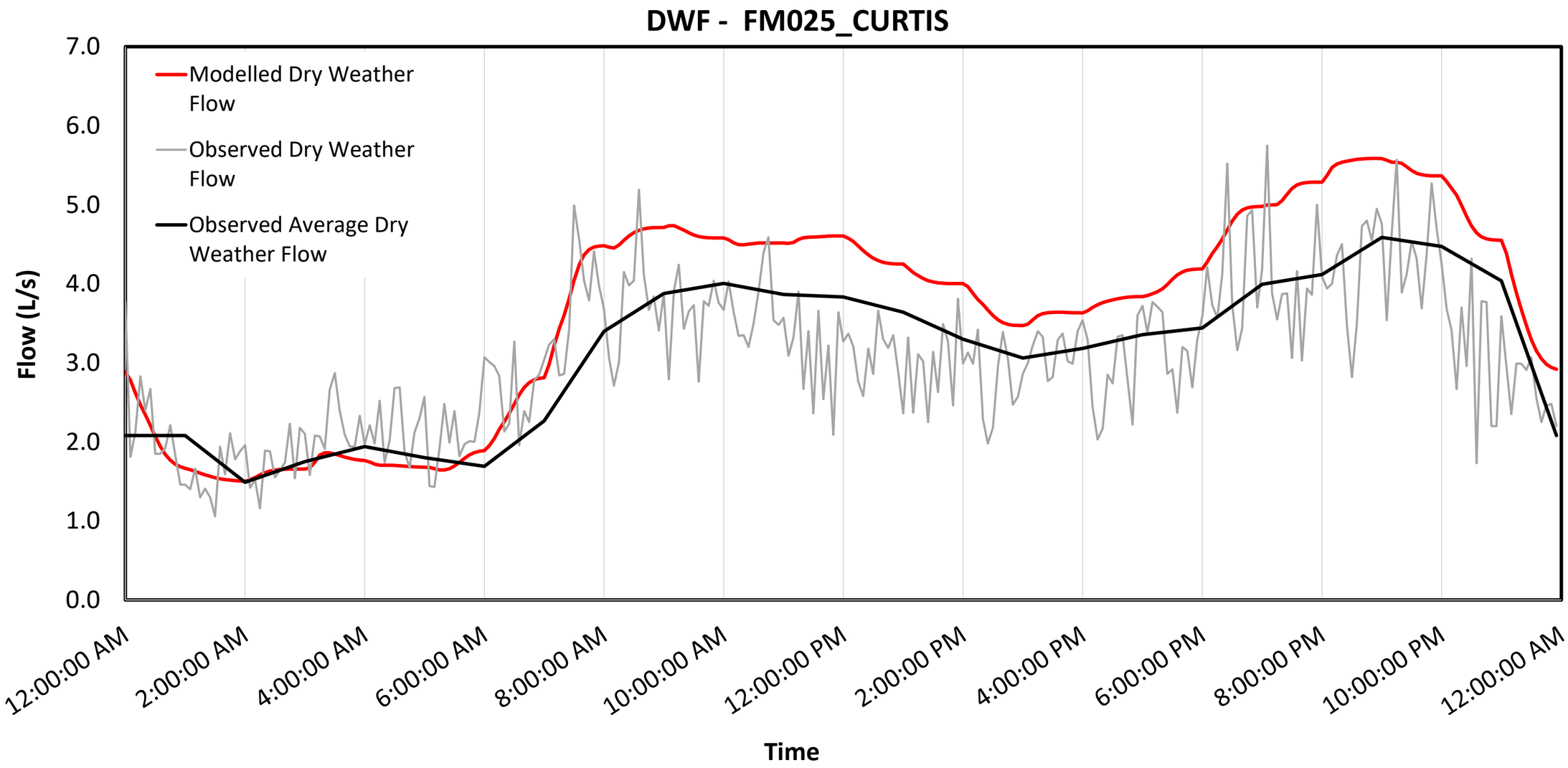
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	4.4	3.8	0.0	0.2	-
Total Volume (m³):	167	-	21	-	155



Dry Weather Flow Comparison

Tag:	FM025_CURTIS
Conduit ID:	SN_TS-230016
Scenario:	DWF - FM025_CURTIS

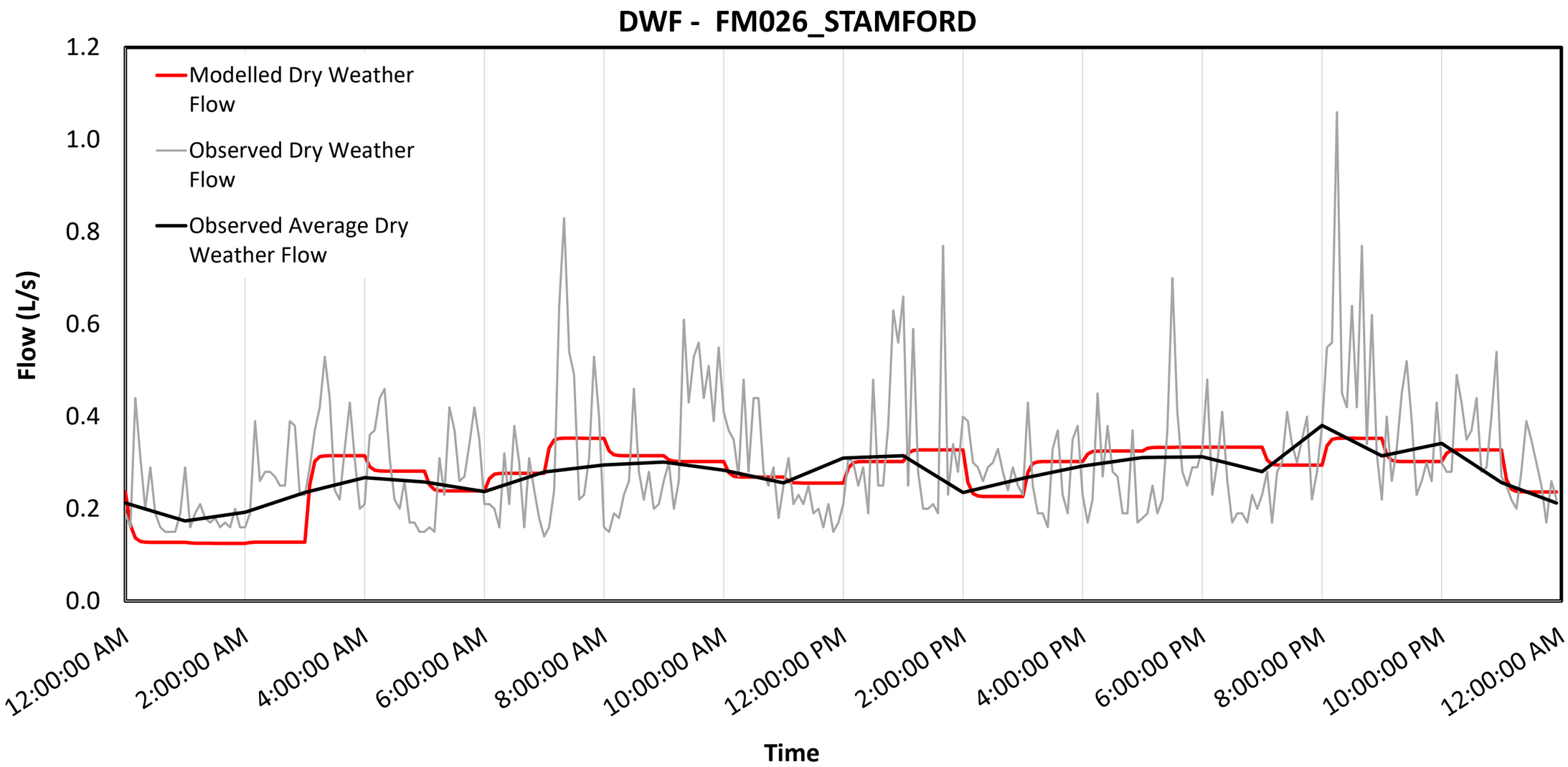
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	9.9	5.6	0.7	1.6	-
Total Volume (m^3):	440	-	263	-	316



Dry Weather Flow Comparison

Tag:	FM026_STAMFORD
Conduit ID:	SAN_P-210337
Scenario:	DWF - FM026_STAMFORD

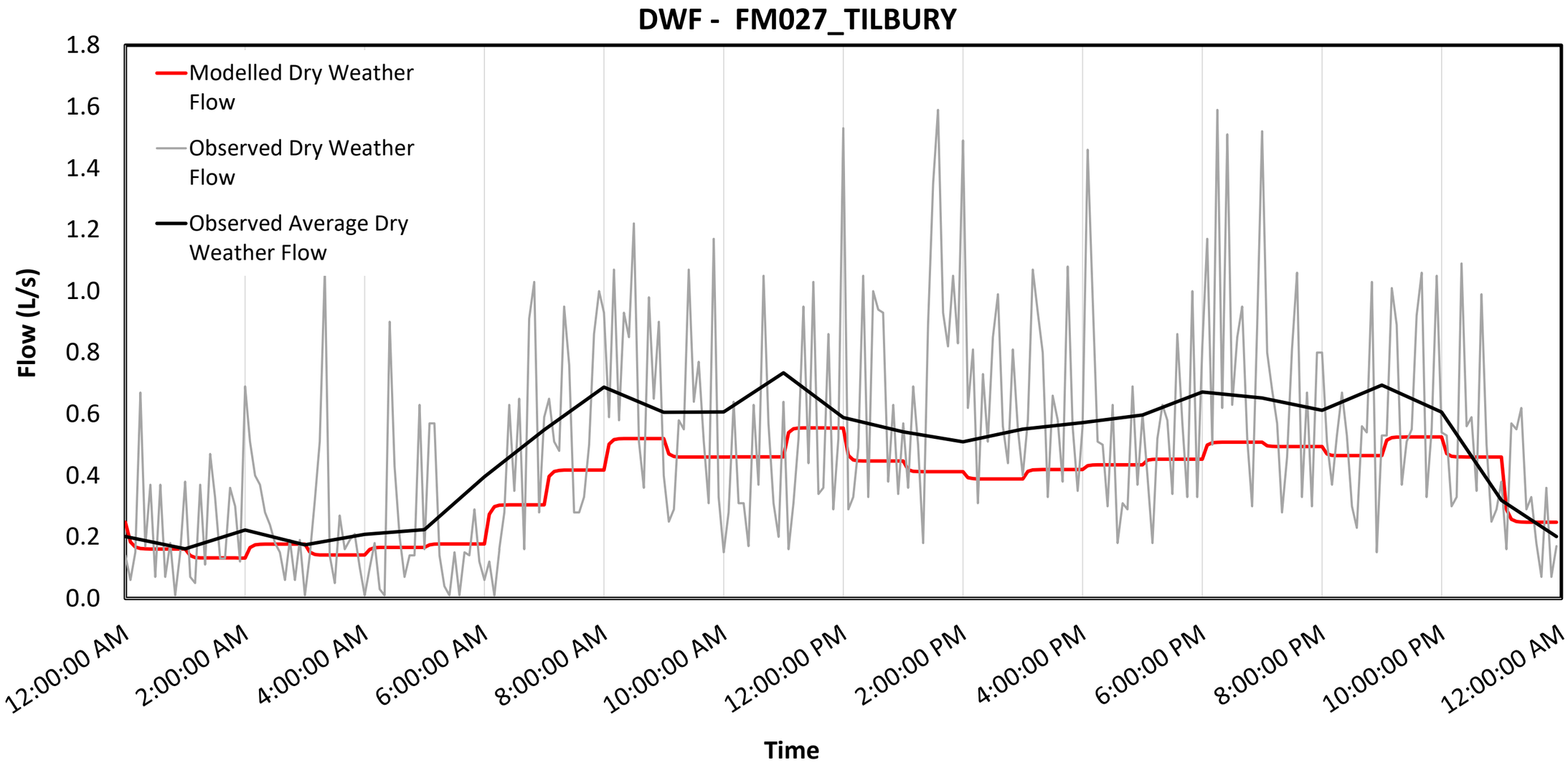
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	1.1	0.4	0.1	0.2	-
Total Volume (m³):	26	-	14	-	24



Dry Weather Flow Comparison

Tag:	FM027_TILBURY
Conduit ID:	SAN_P-210330
Scenario:	DWF - FM027_TILBURY

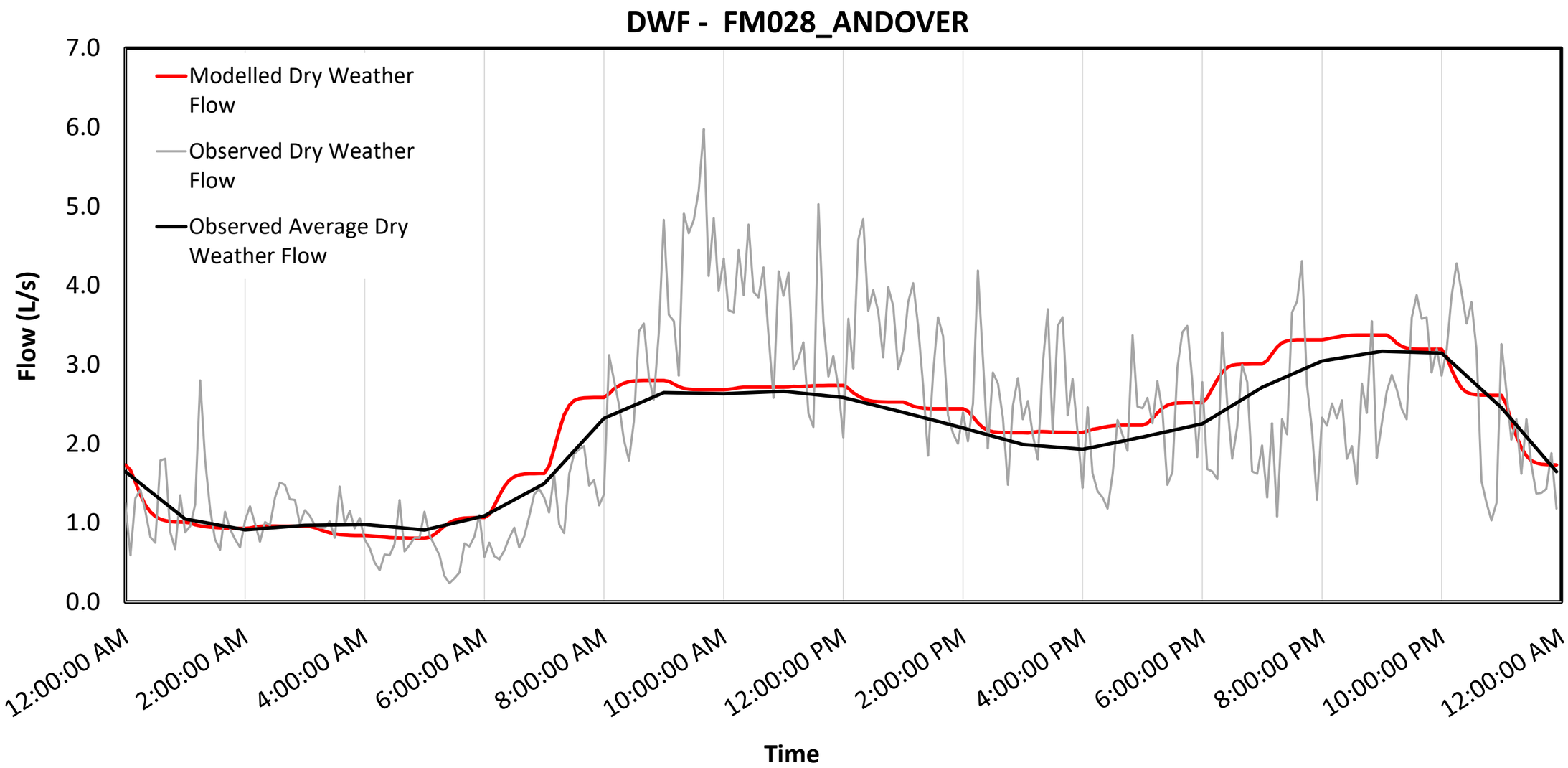
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	2.6	0.6	0.0	0.2	-
Total Volume (m³):	63	-	44	-	32



Dry Weather Flow Comparison

Tag:	FM028_ANDOVER
Conduit ID:	SN_TS-230002
Scenario:	DWF - FM028_ANDOVER

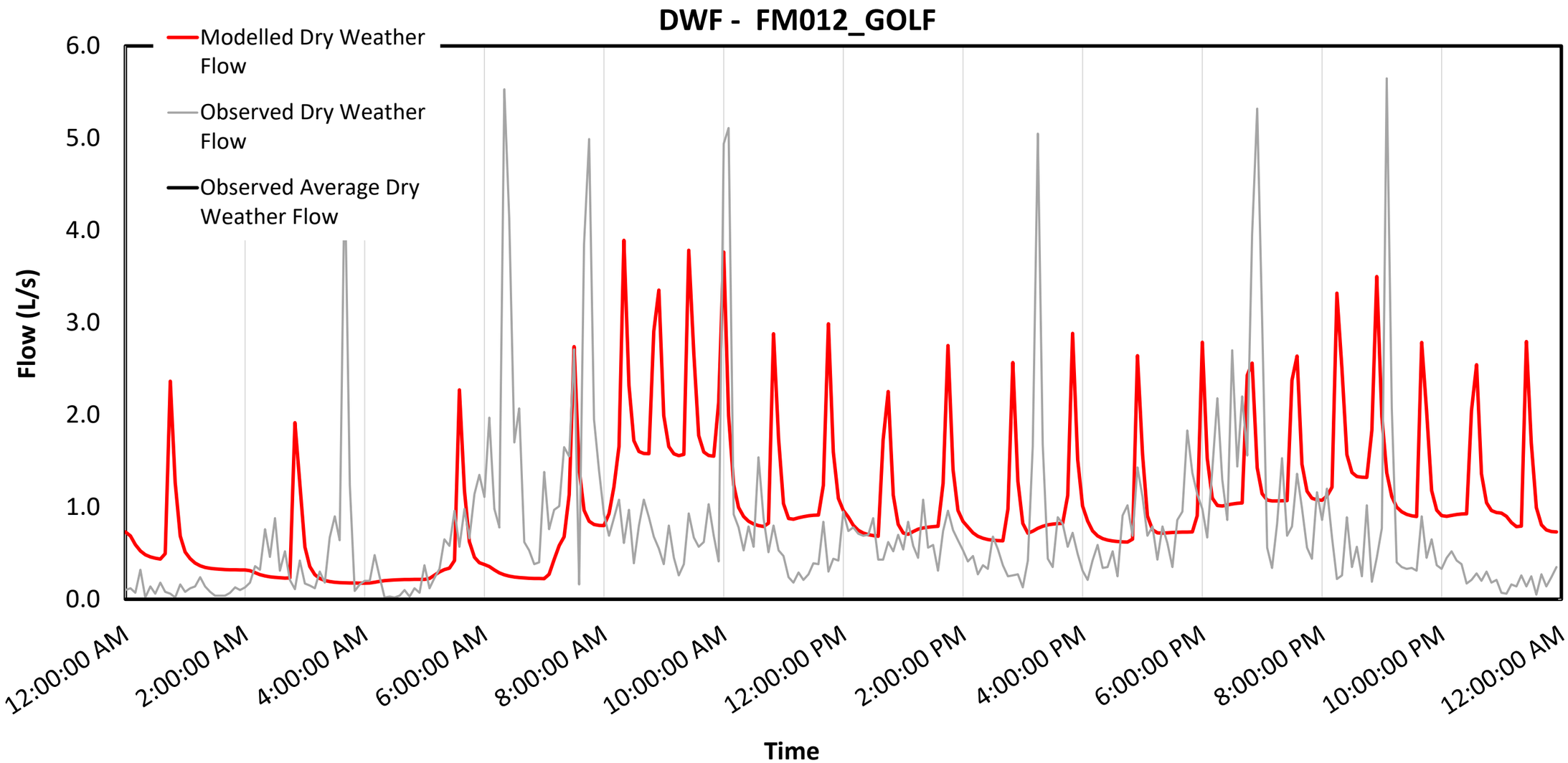
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	8.7	3.4	0.2	0.8	-
Total Volume (m³):	356	-	192	-	187



Dry Weather Flow Comparison

Tag:	FM012_GOLF
Conduit ID:	SAN_P-210217
Scenario:	DWF - FM012_GOLF

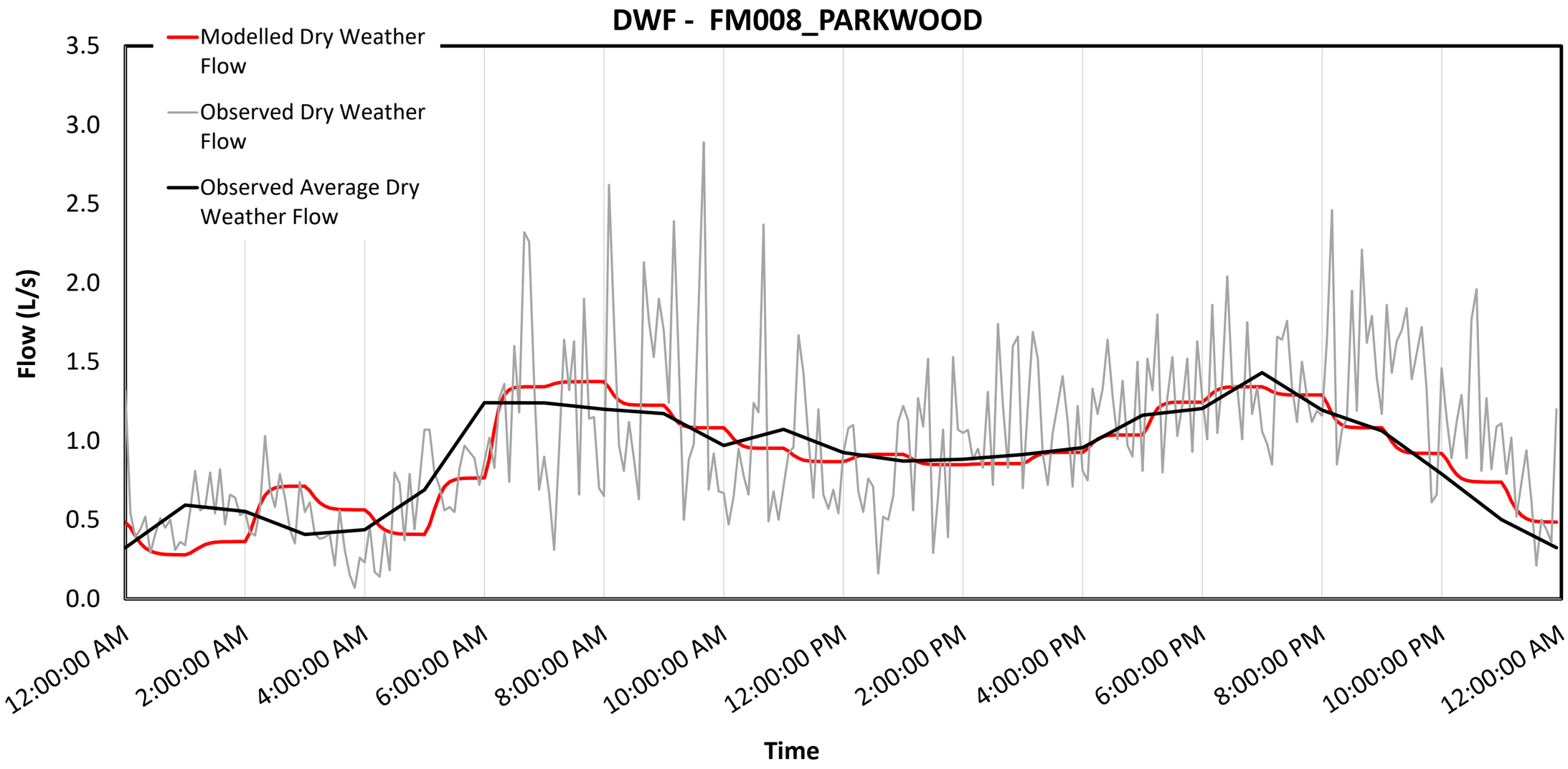
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	6.0	4.0	0.0	0.2	-
Total Volume (m^3):	67	-	46	-	88



Dry Weather Flow Comparison

Tag:	FM008_PARKWOOD
Conduit ID:	SAN_P-211387
Scenario:	DWF - FM008_PARKWOOD

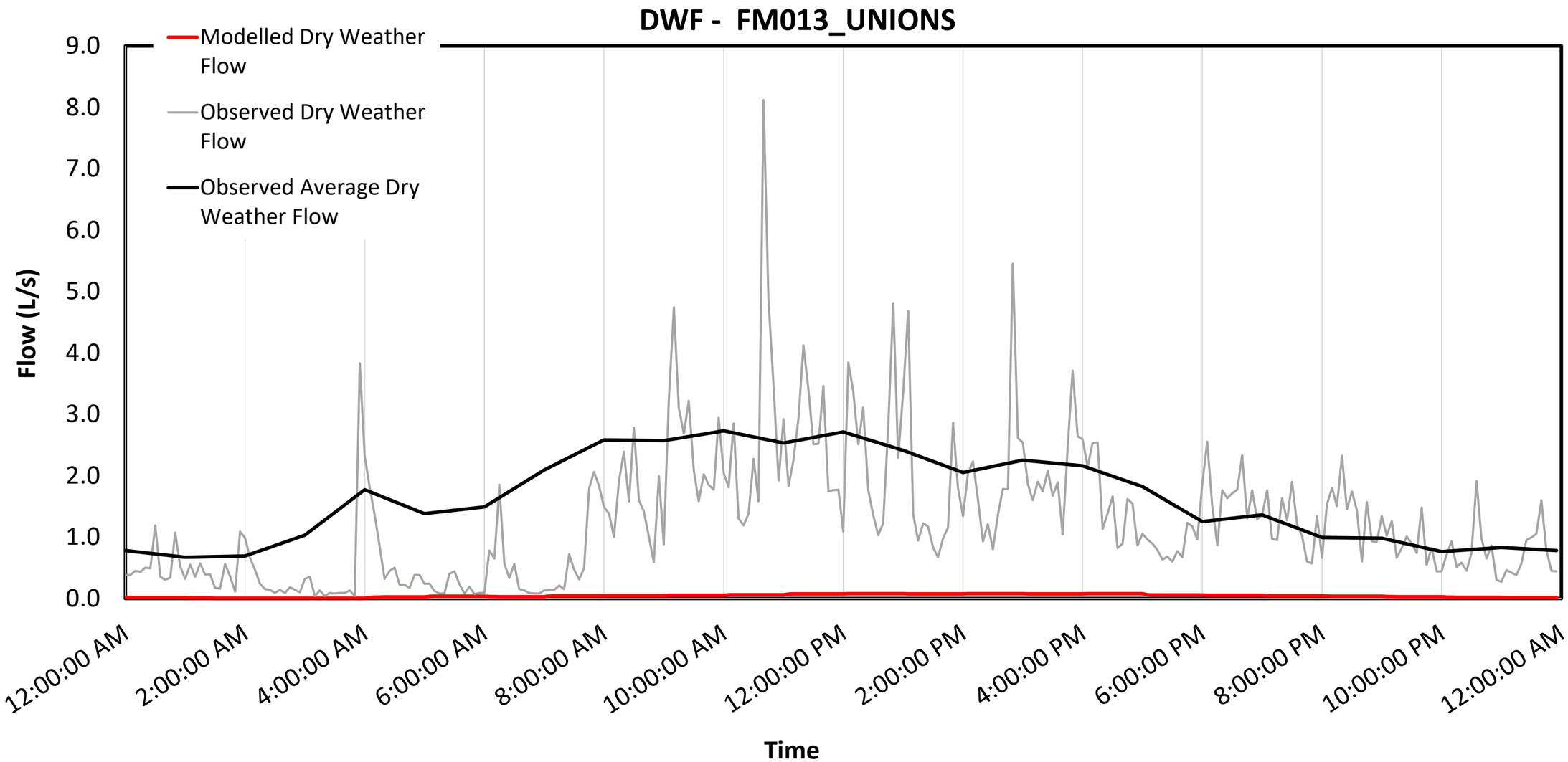
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	3.6	1.4	0.0	0.4	-
Total Volume (m³):	87	-	47	-	78



Dry Weather Flow Comparison

Tag:	FM013_UNIONS
Conduit ID:	SAN_P-211037
Scenario:	DWF - FM013_UNIONS

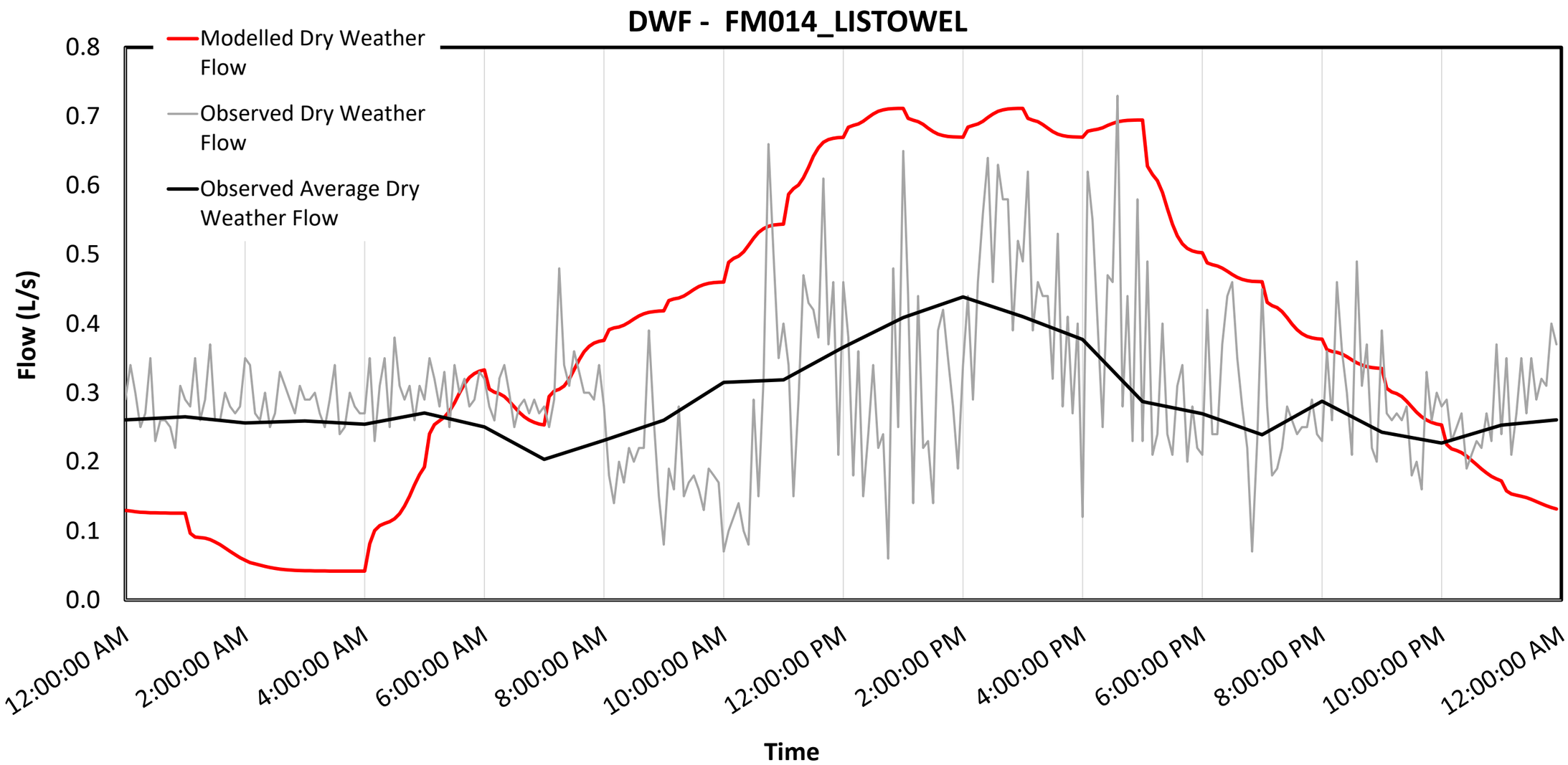
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	12.5	0.1	0.0	0.0	-
Total Volume (m³):	158	-	26	-	4



Dry Weather Flow Comparison

Tag:	FM014_LISTOWEL
Conduit ID:	SAN_P-211416
Scenario:	DWF - FM014_LISTOWEL

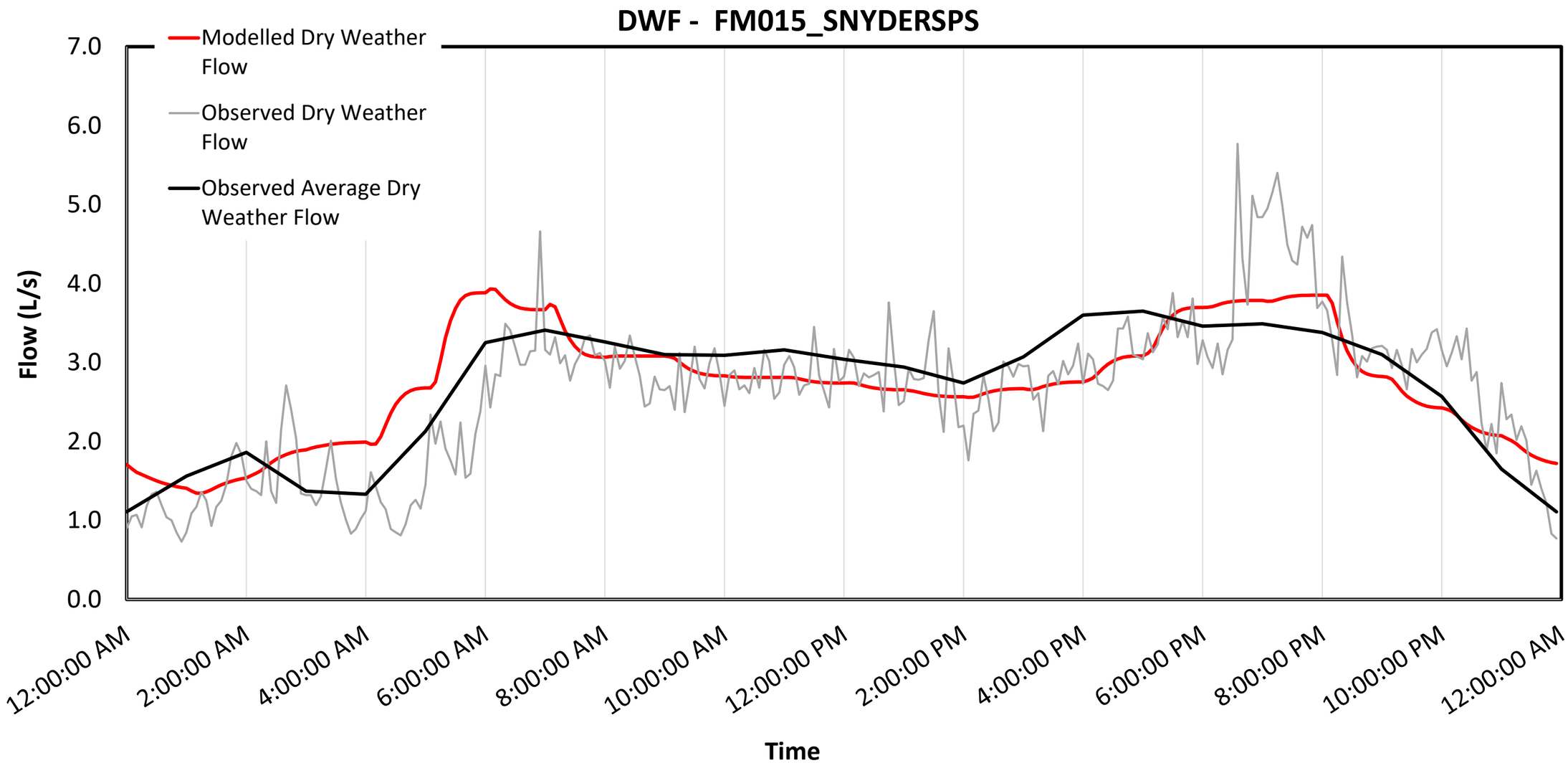
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	1.0	0.7	0.0	0.1	-
Total Volume (m^3):	30	-	26	-	33



Dry Weather Flow Comparison

Tag:	FM015_SNYDERSPS
Conduit ID:	SAN_P-210384
Scenario:	DWF - FM015_SNYDERSPS

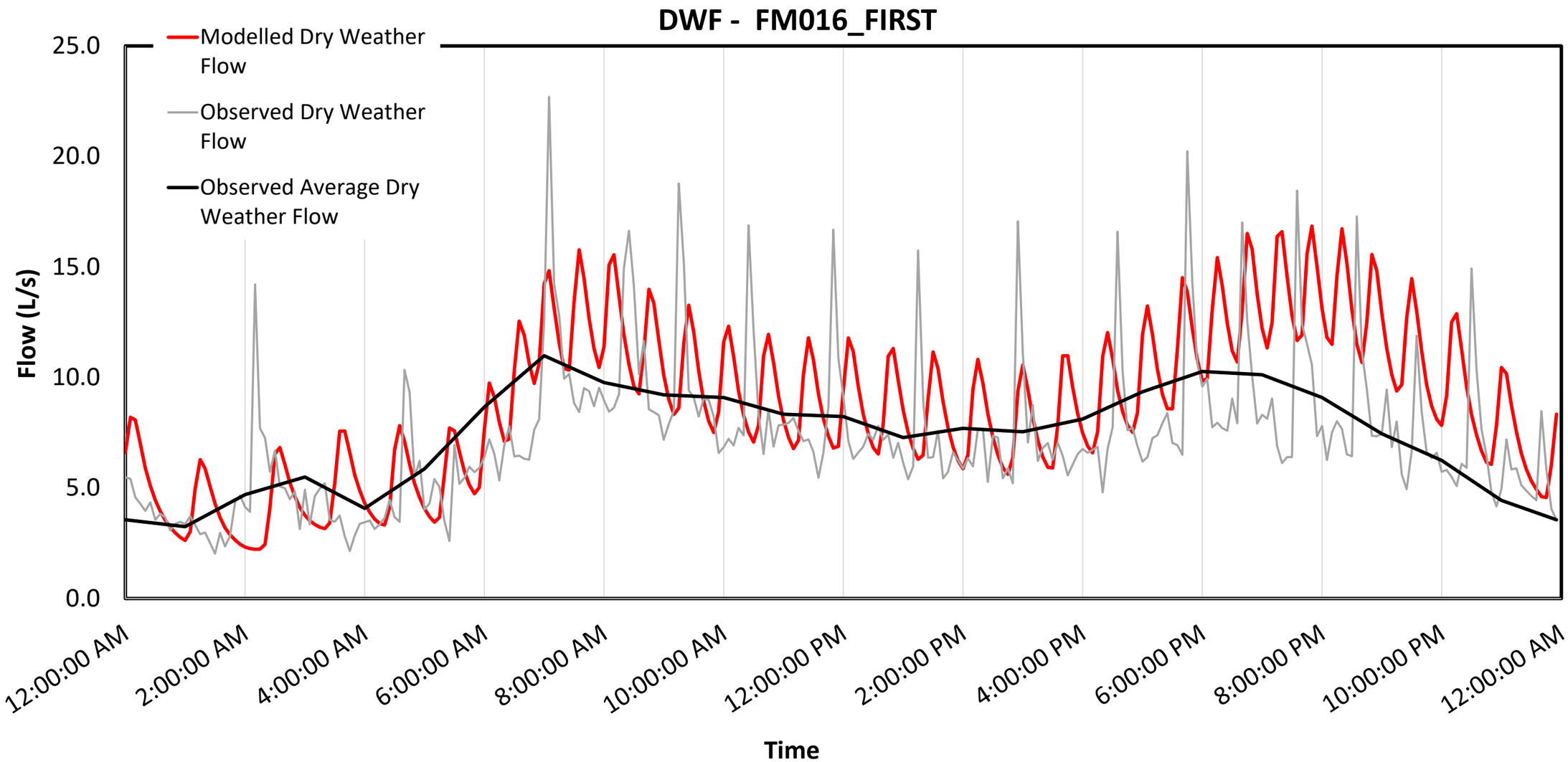
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	5.8	3.9	0.1	1.7	-
Total Volume (m^3):	226	-	112	-	236



Dry Weather Flow Comparison

Tag:	FM016_FIRST
Conduit ID:	SAN_P-210666
Scenario:	DWF - FM016_FIRST

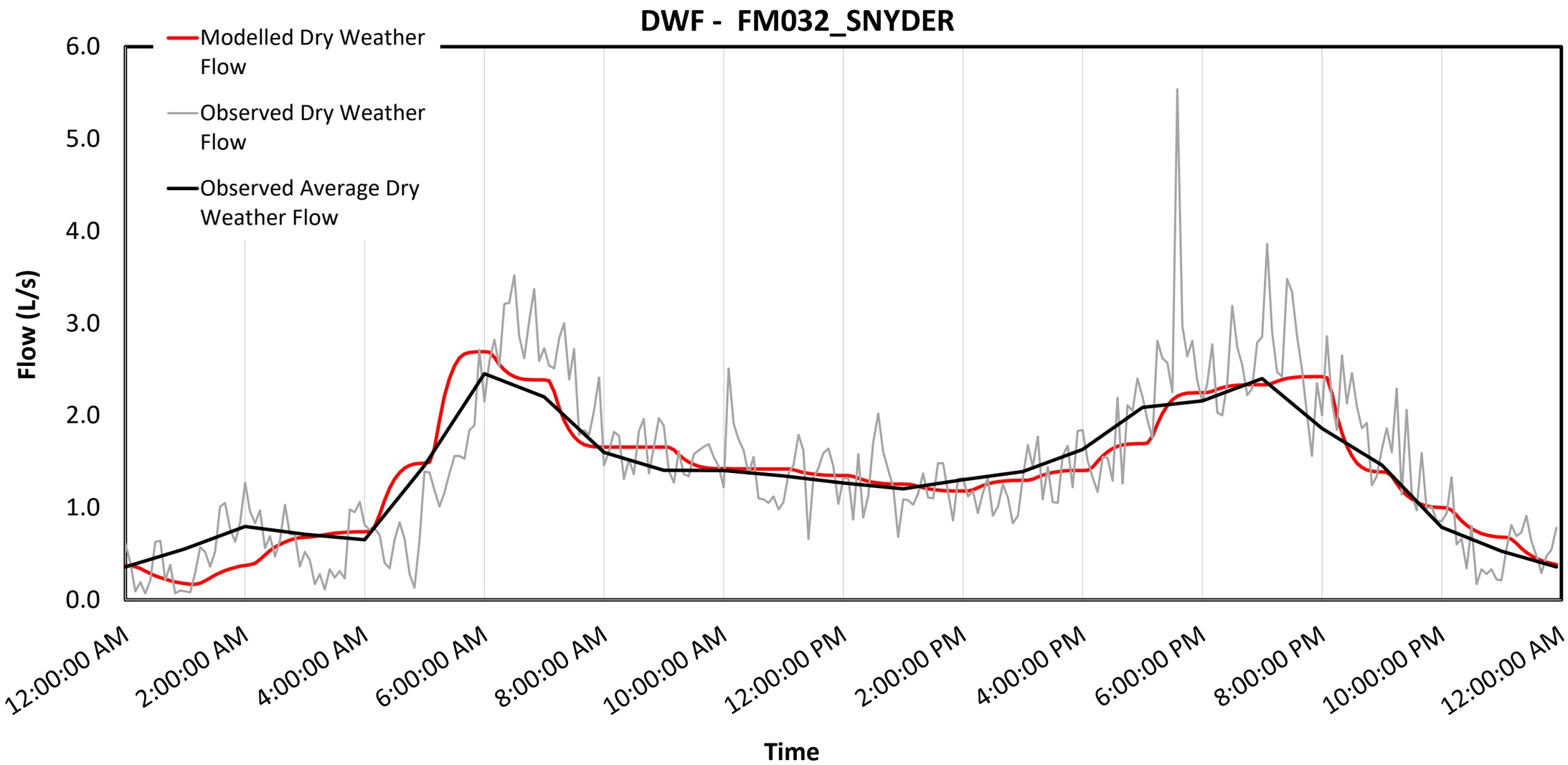
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	22.7	17.0	1.7	3.4	-
Total Volume (m³):	809	-	632	-	760



Dry Weather Flow Comparison

Tag:	FM032_SNYDER
Conduit ID:	SAN_P-211010
Scenario:	DWF - FM032_SNYDER

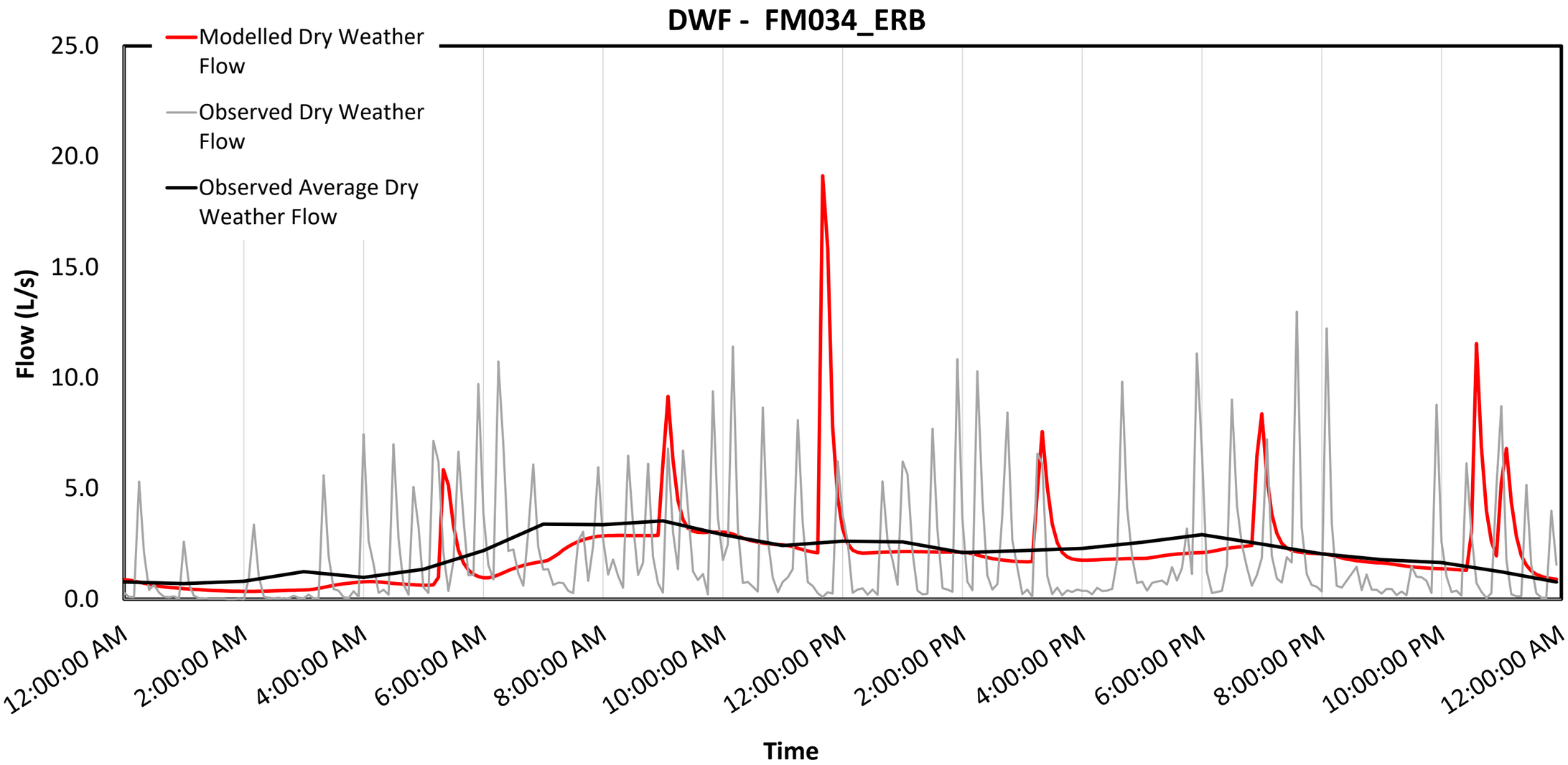
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	5.5	2.7	0.0	0.4	-
Total Volume (m^3):	125	-	121	-	120



Dry Weather Flow Comparison

Tag:	FM034_ERB
Conduit ID:	SAN_P-211049
Scenario:	DWF - FM034_ERB

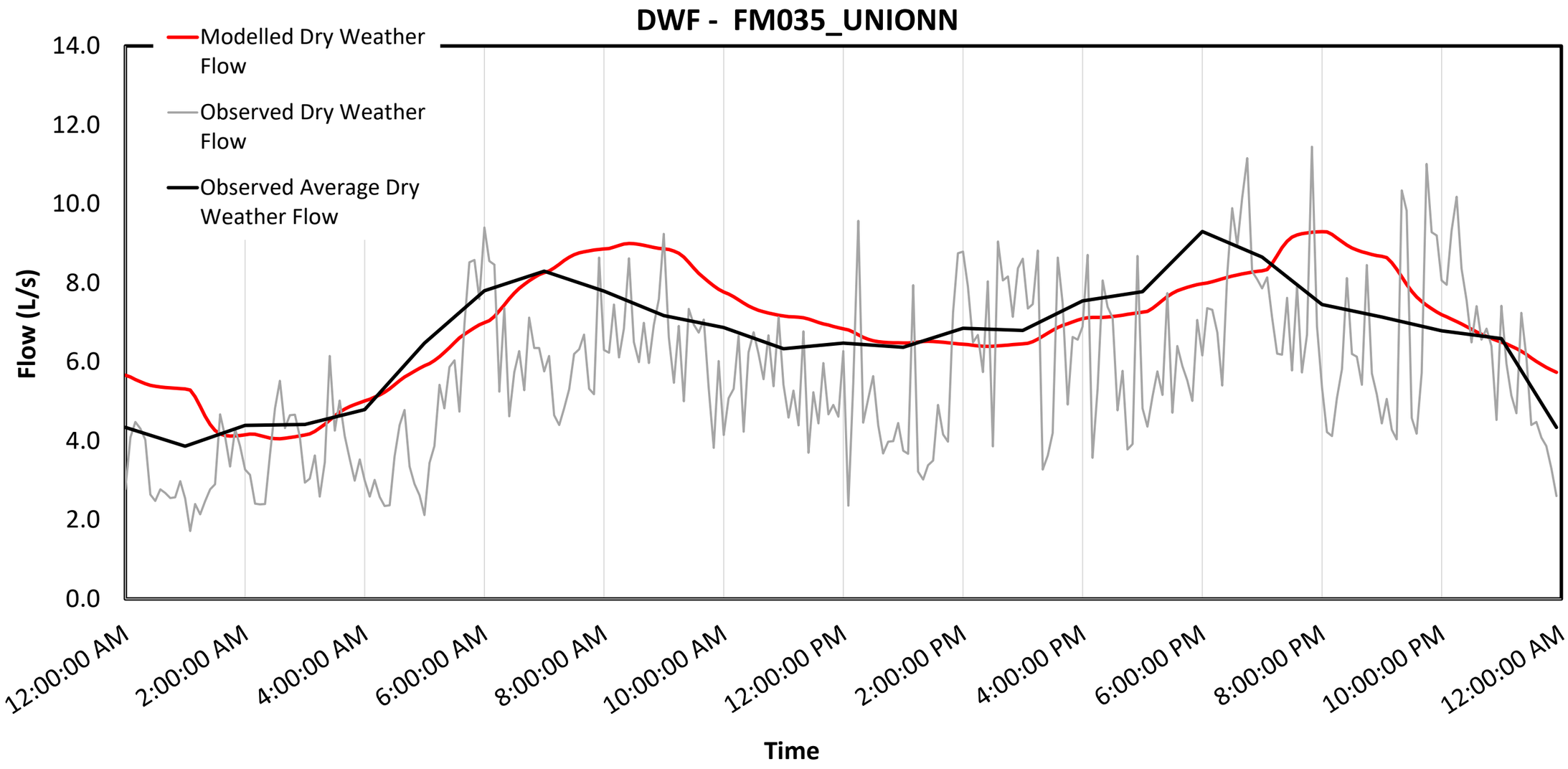
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	31.9	23.7	0.0	0.6	-
Total Volume (m^3):	462	-	176	-	185



Dry Weather Flow Comparison

Tag:	FM035_UNIONN
Conduit ID:	SAN_P-211113
Scenario:	DWF - FM035_UNIONN

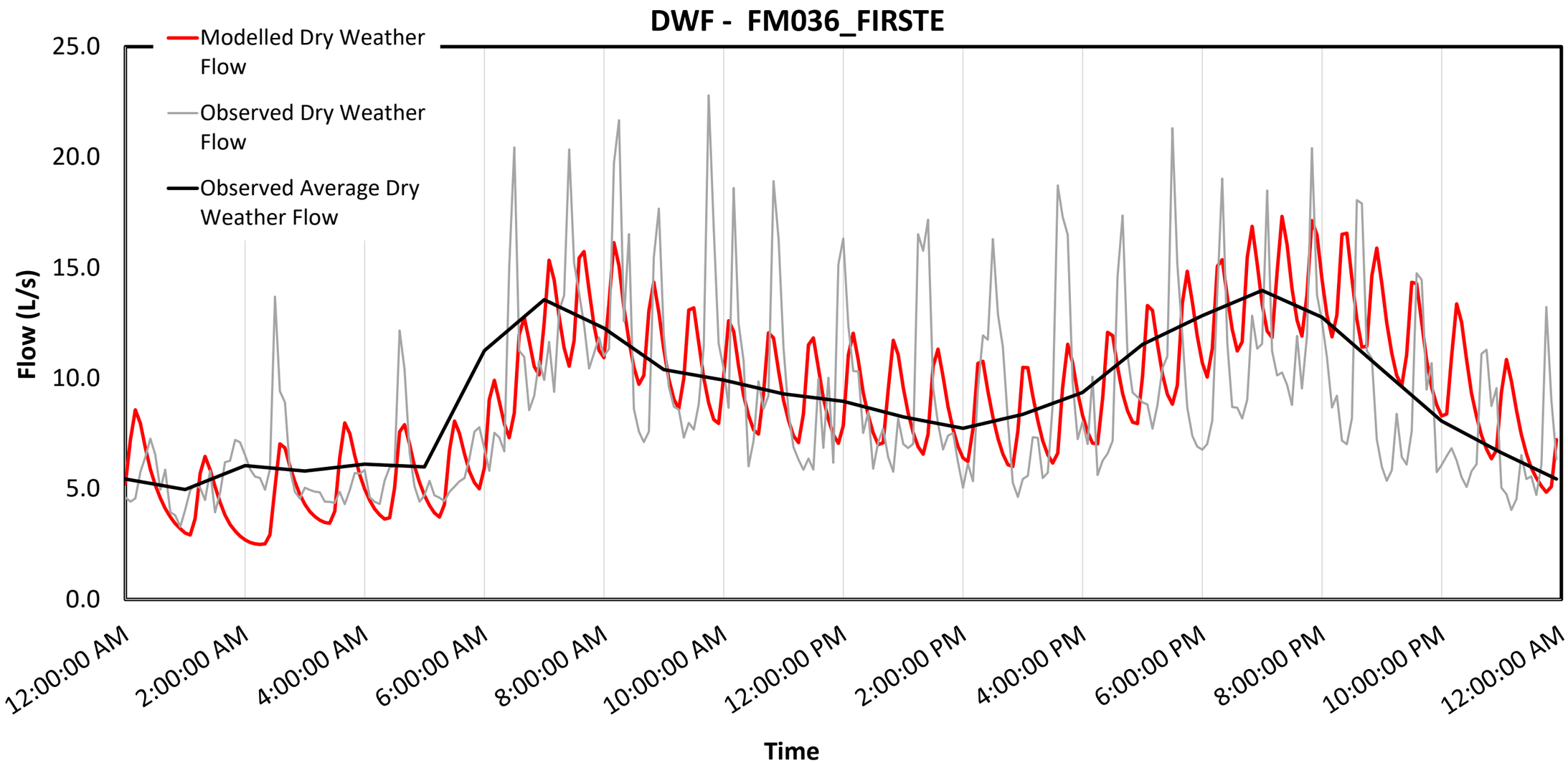
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	12.0	9.3	1.7	5.6	-
Total Volume (m³):	622	-	486	-	600



Dry Weather Flow Comparison

Tag:	FM036_FIRSTE
Conduit ID:	SAN_P-210671
Scenario:	DWF - FM036_FIRSTE

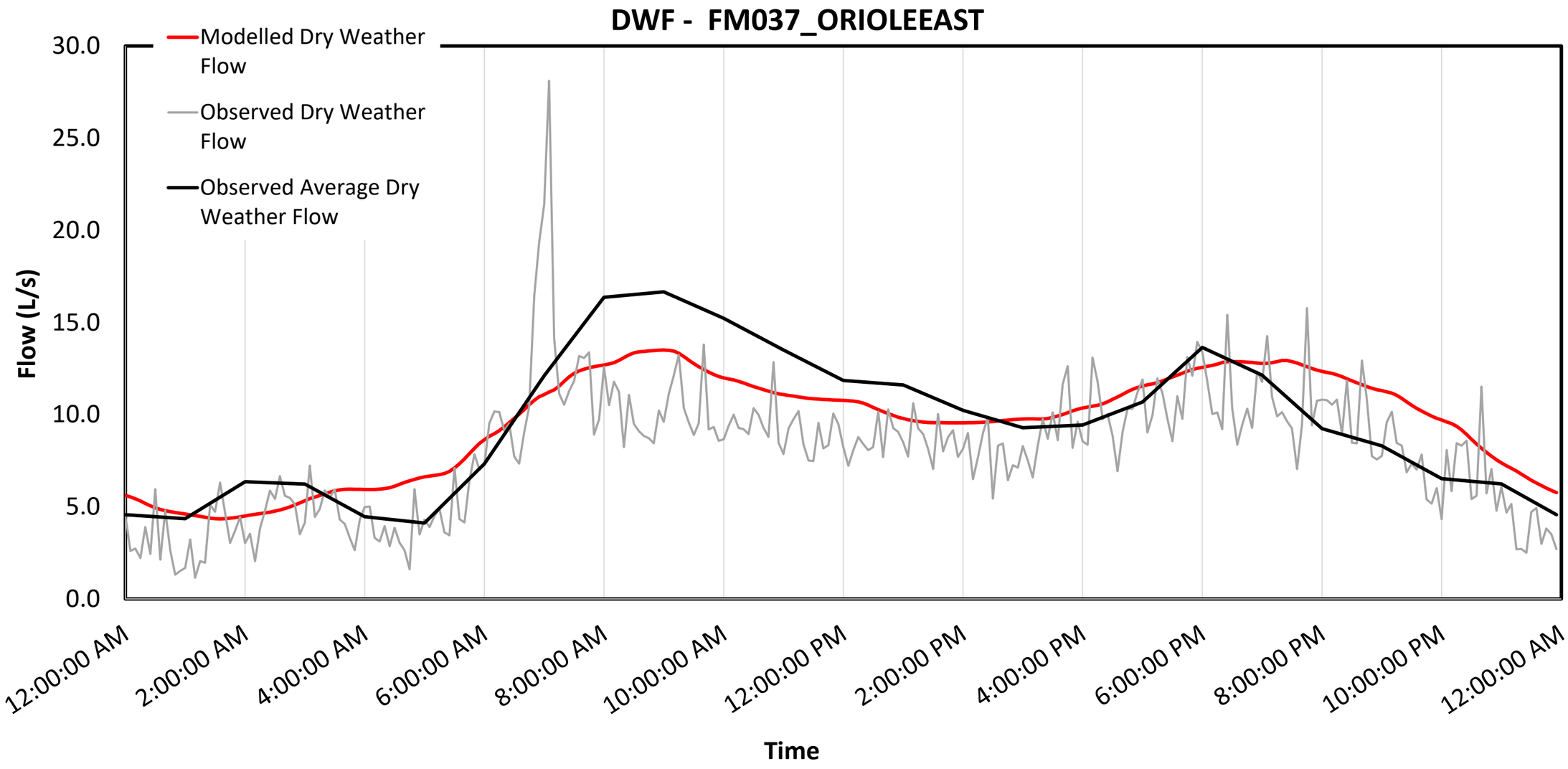
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	44.0	17.3	3.3	3.7	-
Total Volume (m³):	1342	-	768	-	787



Dry Weather Flow Comparison

Tag:	FM037_ORIOLEEAST
Conduit ID:	SAN_P-211281
Scenario:	DWF - FM037_ORIOLEEAST

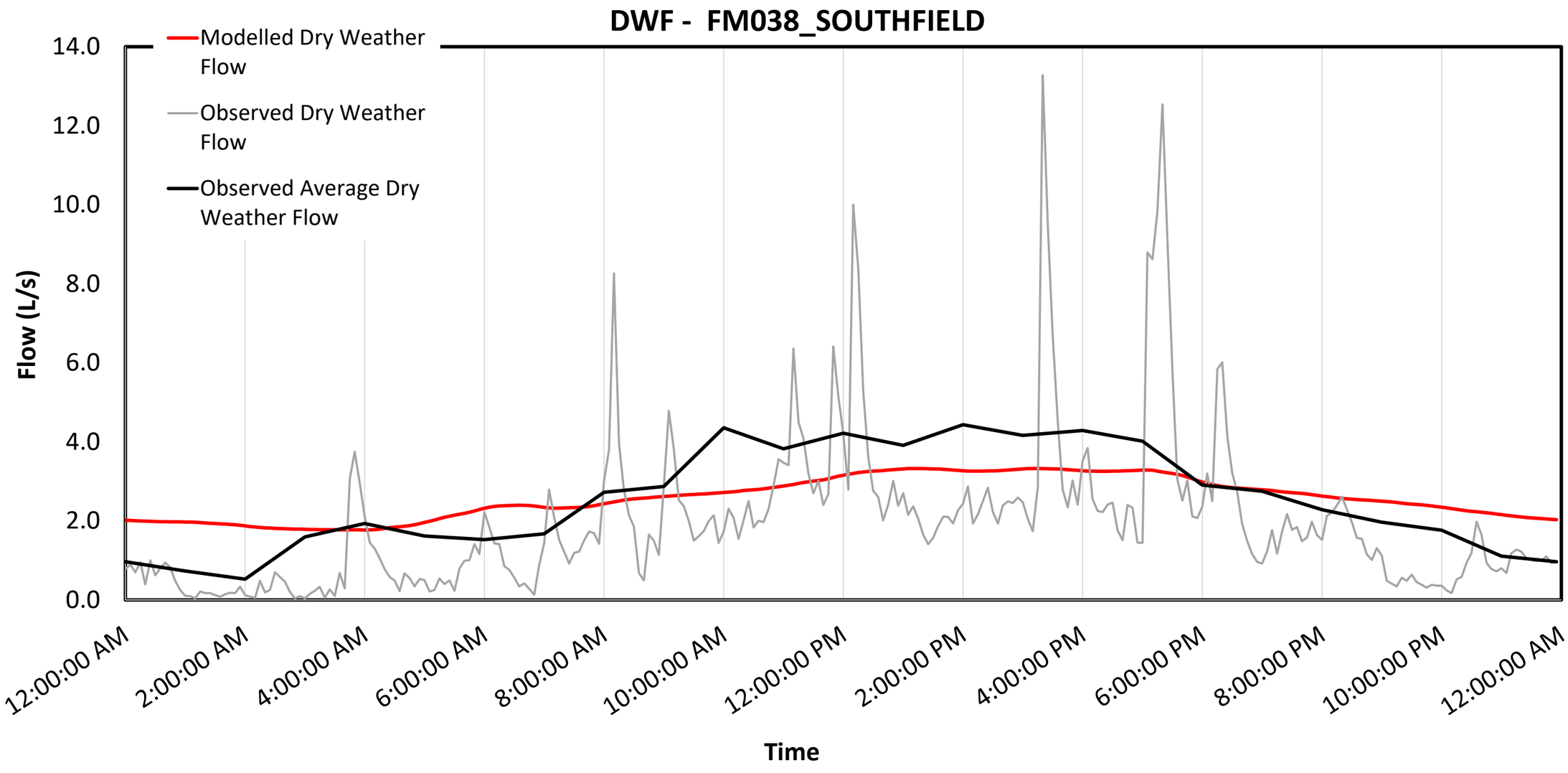
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	41.2	13.5	1.2	5.6	-
Total Volume (m^3):	1909	-	694	-	825



Dry Weather Flow Comparison

Tag:	FM038_SOUTHFIELD
Conduit ID:	SAN_P-211031
Scenario:	DWF - FM038_SOUTHFIELD

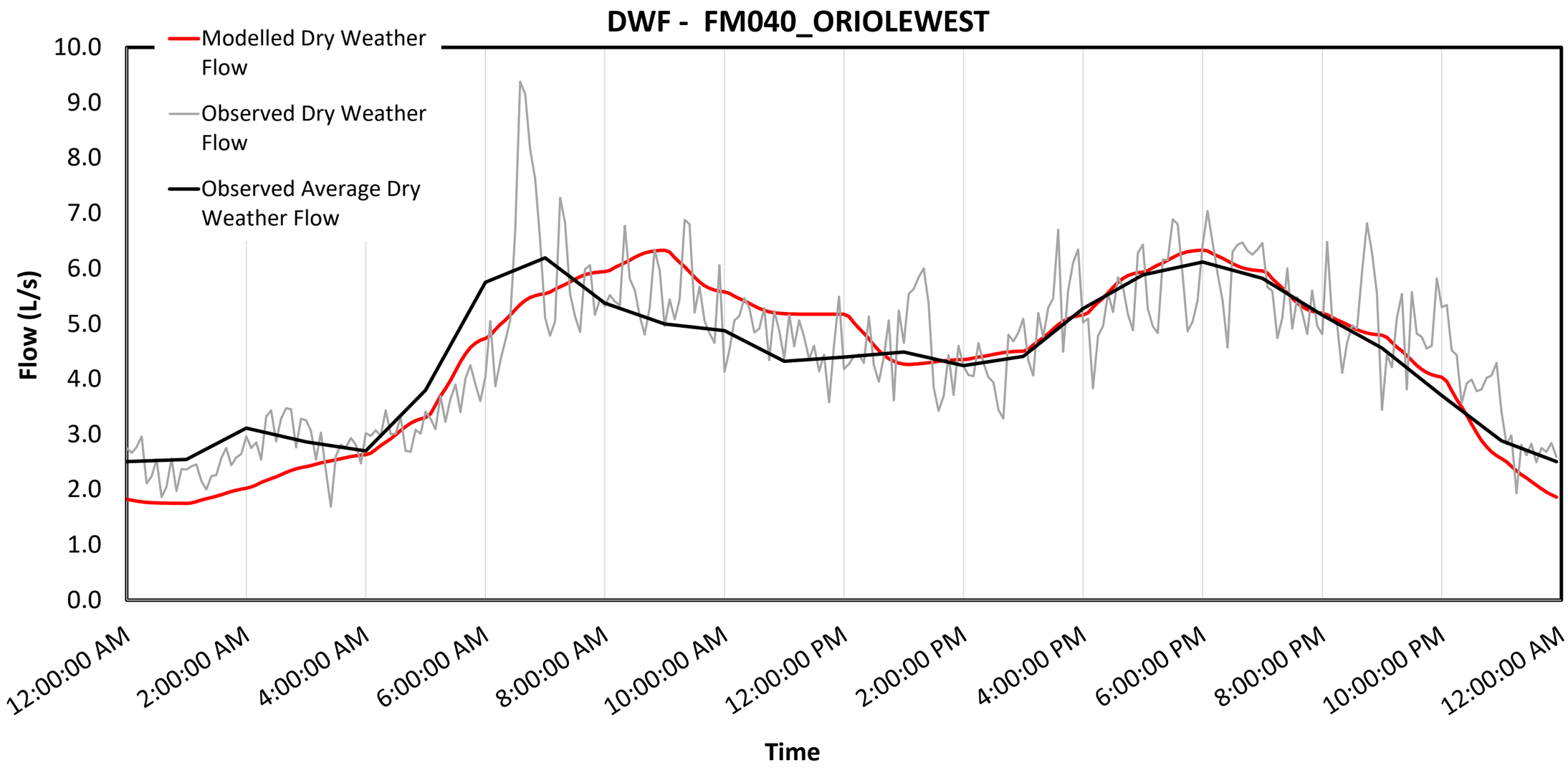
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	16.4	3.3	0.0	1.9	-
Total Volume (m^3):	456	-	170	-	222



Dry Weather Flow Comparison

Tag:	FM040_ORIOLEWEST
Conduit ID:	SAN_P-210806
Scenario:	DWF - FM040_ORIOLEWEST

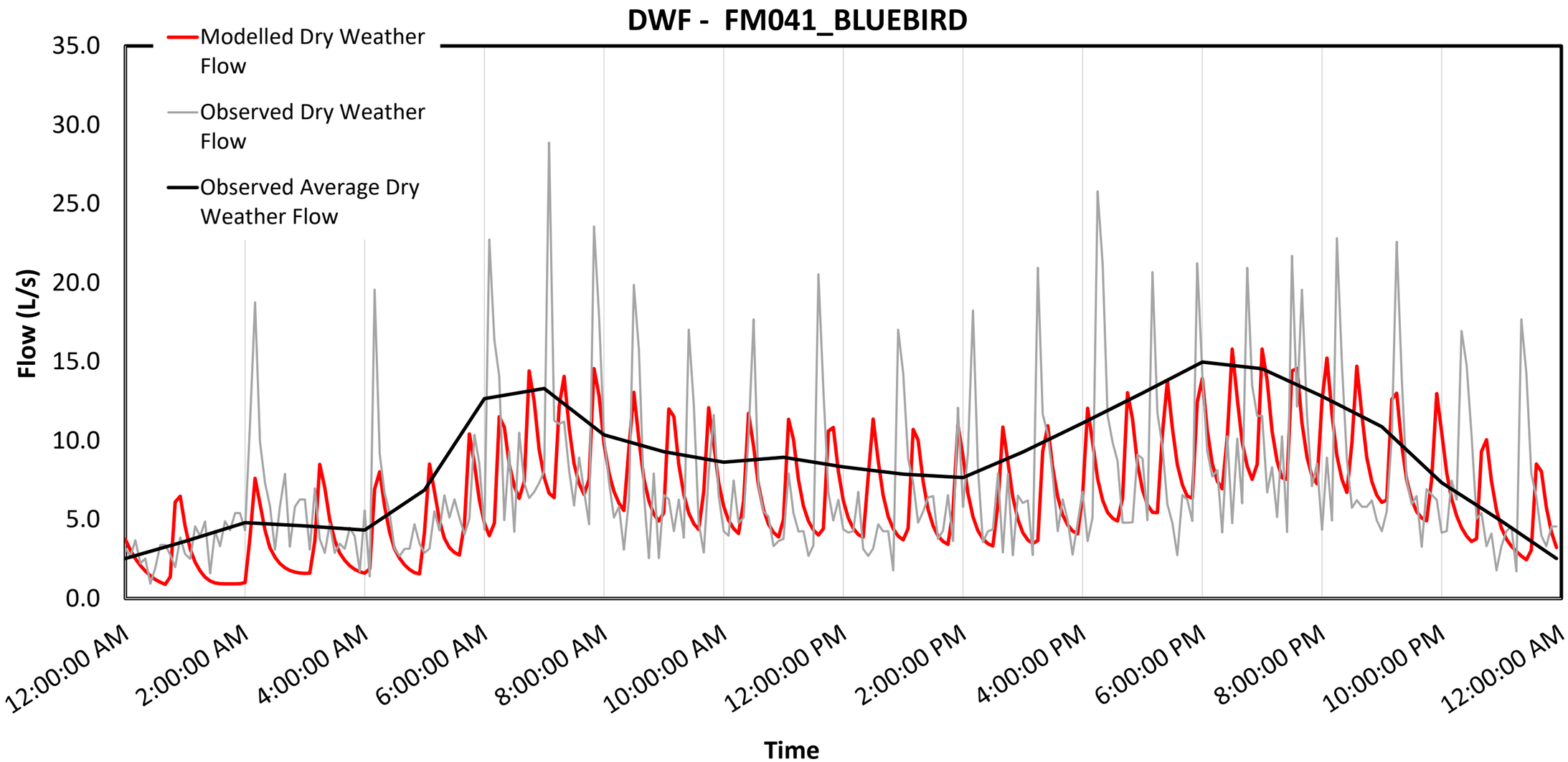
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	11.6	6.3	1.7	1.8	-
Total Volume (m³):	724	-	388	-	380



Dry Weather Flow Comparison

Tag:	FM041_BLUEBIRD
Conduit ID:	SAN_P-210629
Scenario:	DWF - FM041_BLUEBIRD

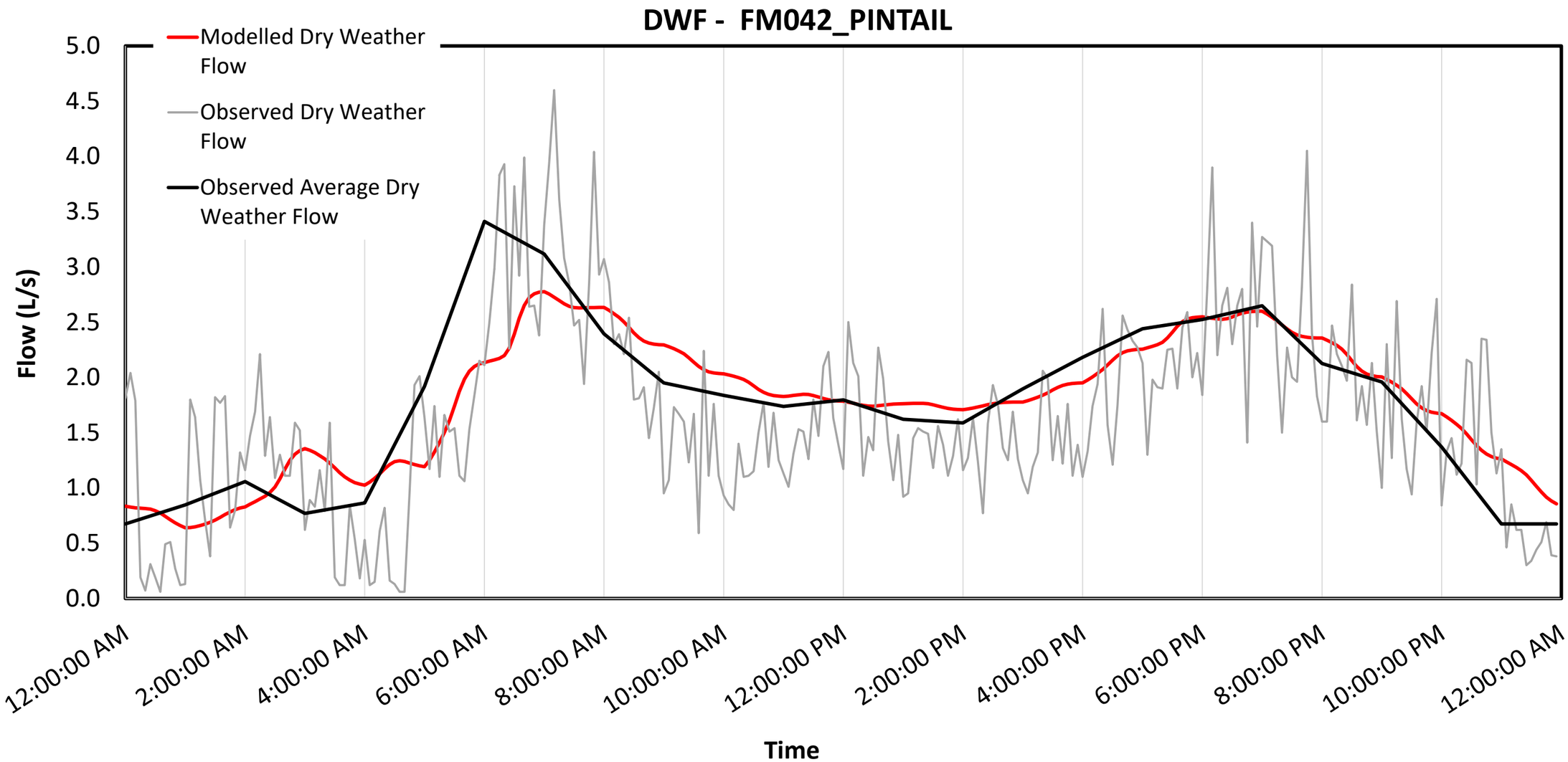
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	28.9	16.0	0.9	1.5	-
Total Volume (m³):	734	-	631	-	565



Dry Weather Flow Comparison

Tag:	FM042_PINTAIL
Conduit ID:	SAN_P-210714
Scenario:	DWF - FM042_PINTAIL

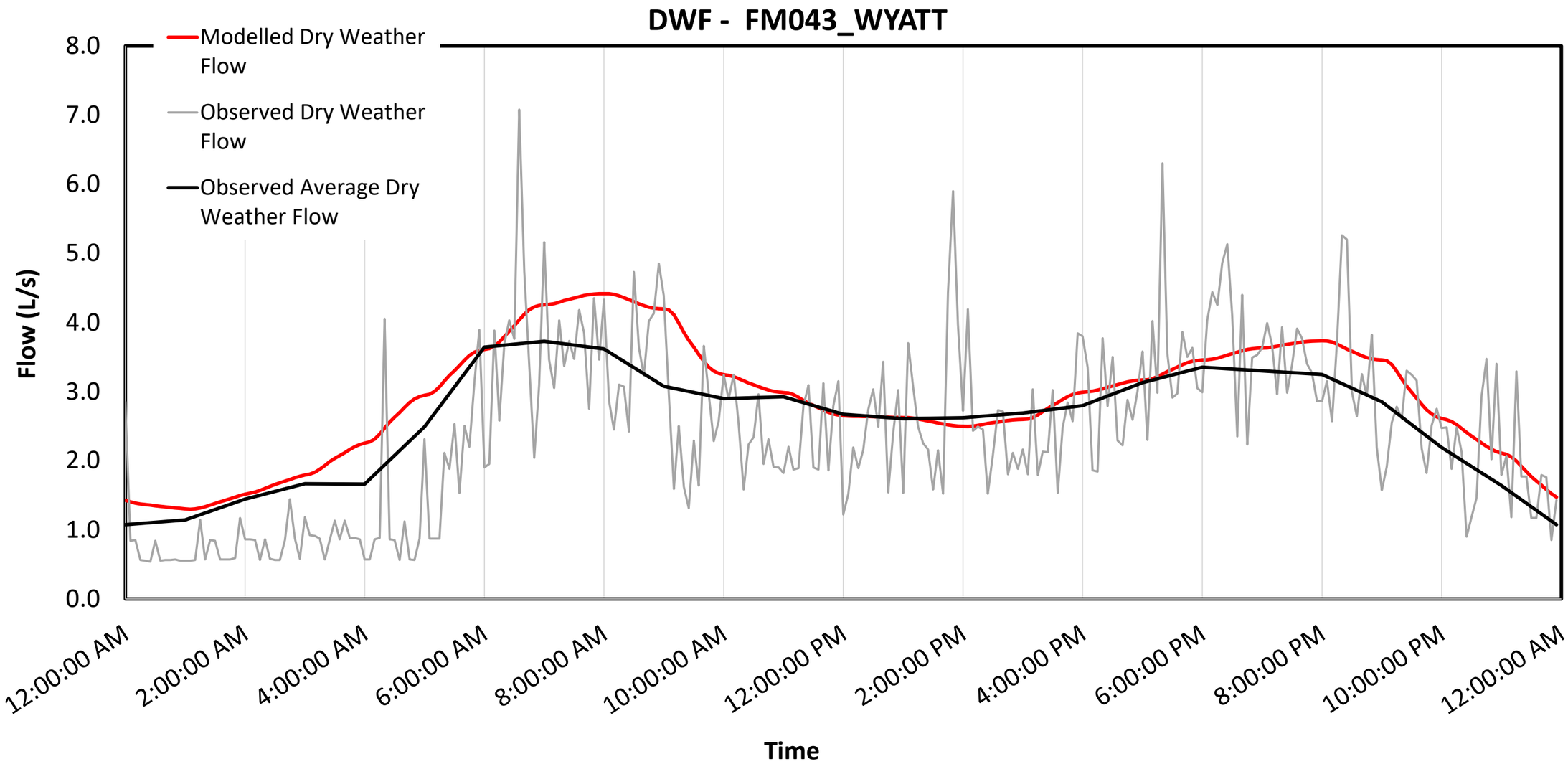
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	5.1	2.8	0.1	0.8	-
Total Volume (m³):	162	-	142	-	155



Dry Weather Flow Comparison

Tag:	FM043_WYATT
Conduit ID:	SAN_P-211070
Scenario:	DWF - FM043_WYATT

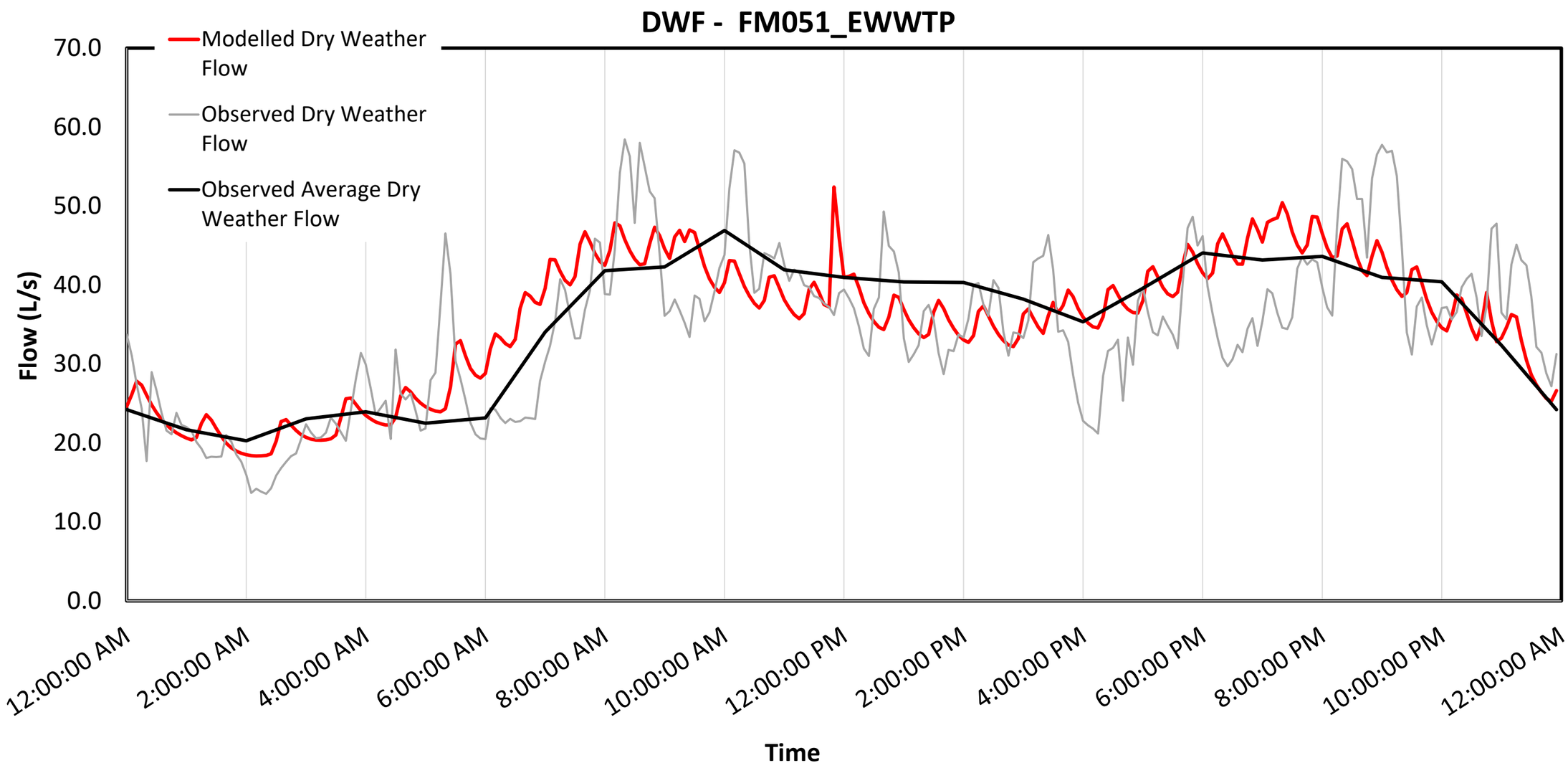
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	8.0	4.4	0.3	1.4	-
Total Volume (m³):	209	-	153	-	250



Dry Weather Flow Comparison

Tag:	FM051_EWWTP
Conduit ID:	SAN_P-211154
Scenario:	DWF - FM051_EWWTP

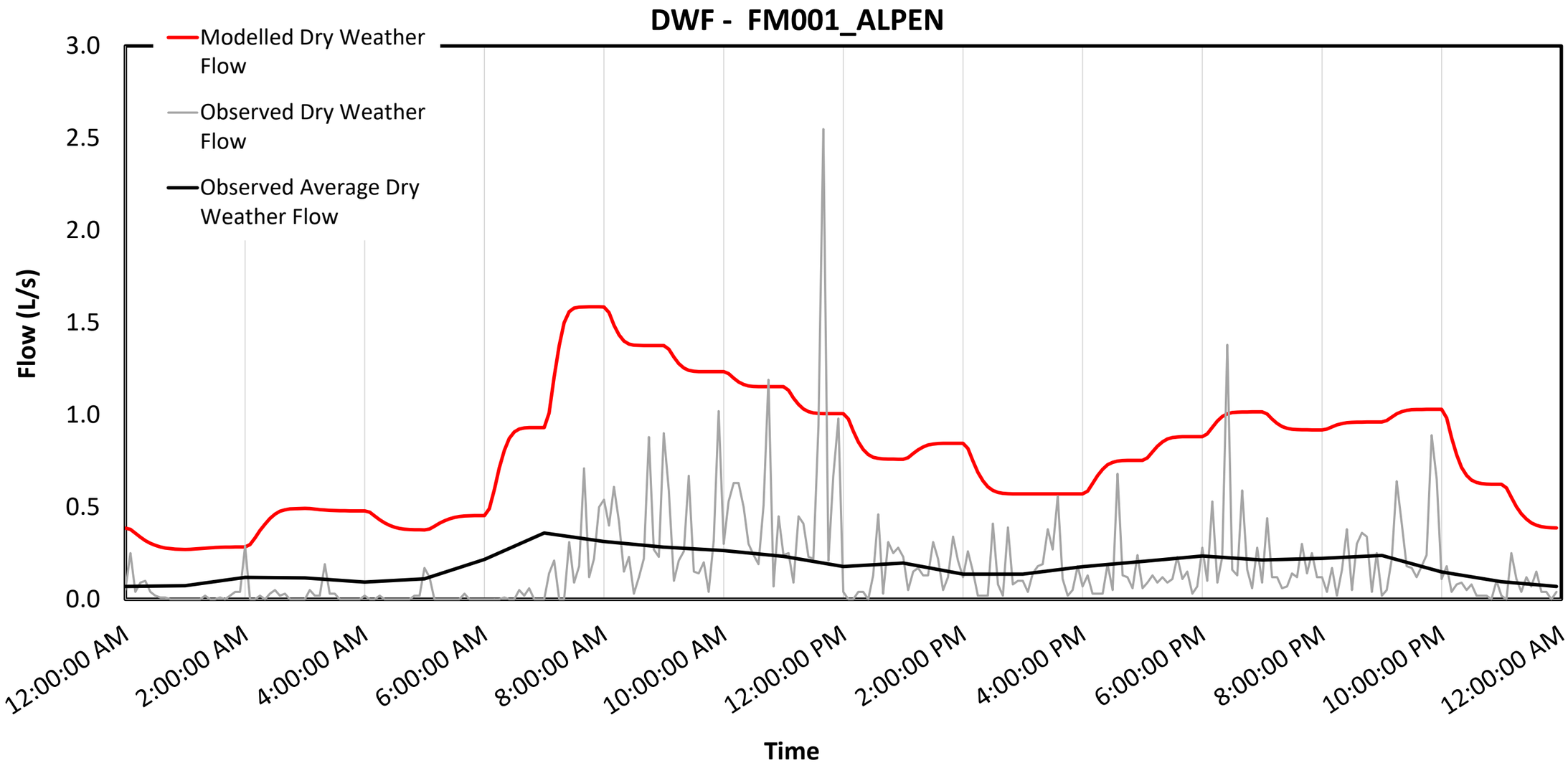
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	68.8	52.4	8.5	23.9	-
Total Volume (m³):	4456	-	2970	-	3056



Dry Weather Flow Comparison

Tag:	FM001_ALPEN
Conduit ID:	SAN_P-210028
Scenario:	DWF - FM001_ALPEN

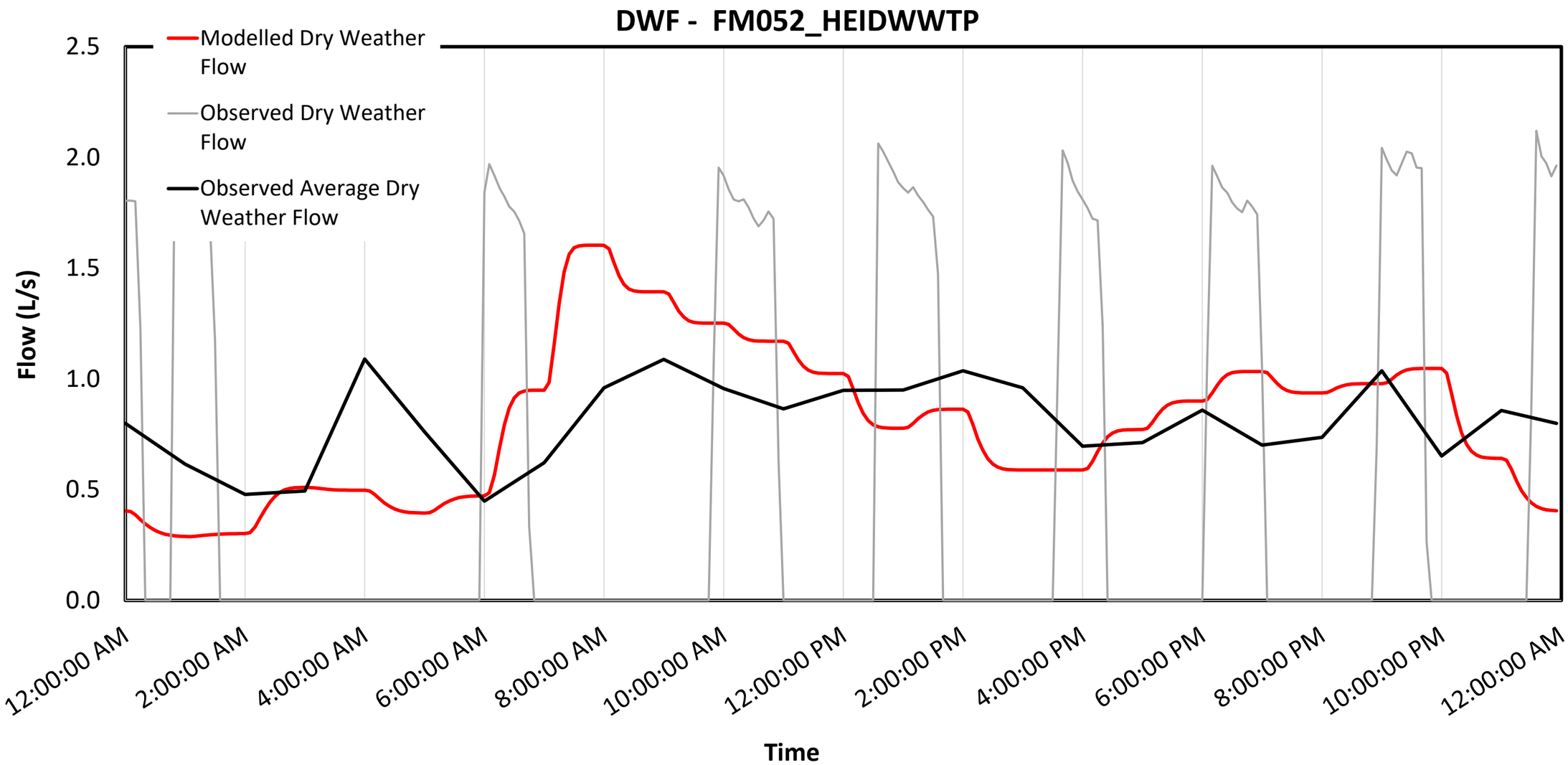
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	3.2	1.6	0.0	0.4	-
Total Volume (m³):	31	-	15	-	34



Dry Weather Flow Comparison

Tag:	FM052_HEIDWWTP
Conduit ID:	SAN_P-210030
Scenario:	DWF - FM052_HEIDWWTP

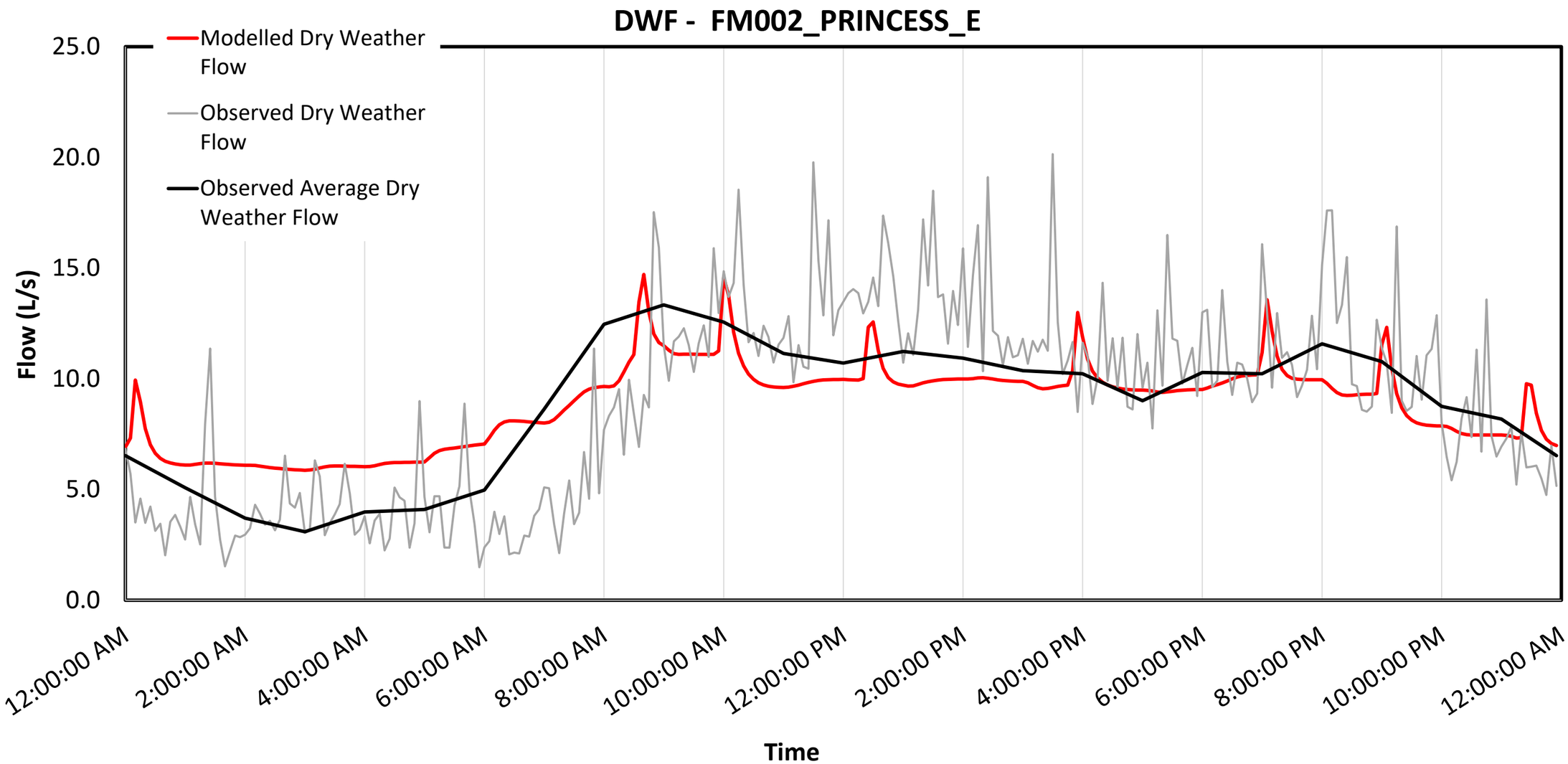
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	2.3	1.6	0.1	0.4	-
Total Volume (m^3):	53	-	44	-	35



Dry Weather Flow Comparison

Tag:	FM002_PRINCESS_E
Conduit ID:	SAN_P-211328
Scenario:	DWF - FM002_PRINCESS_E

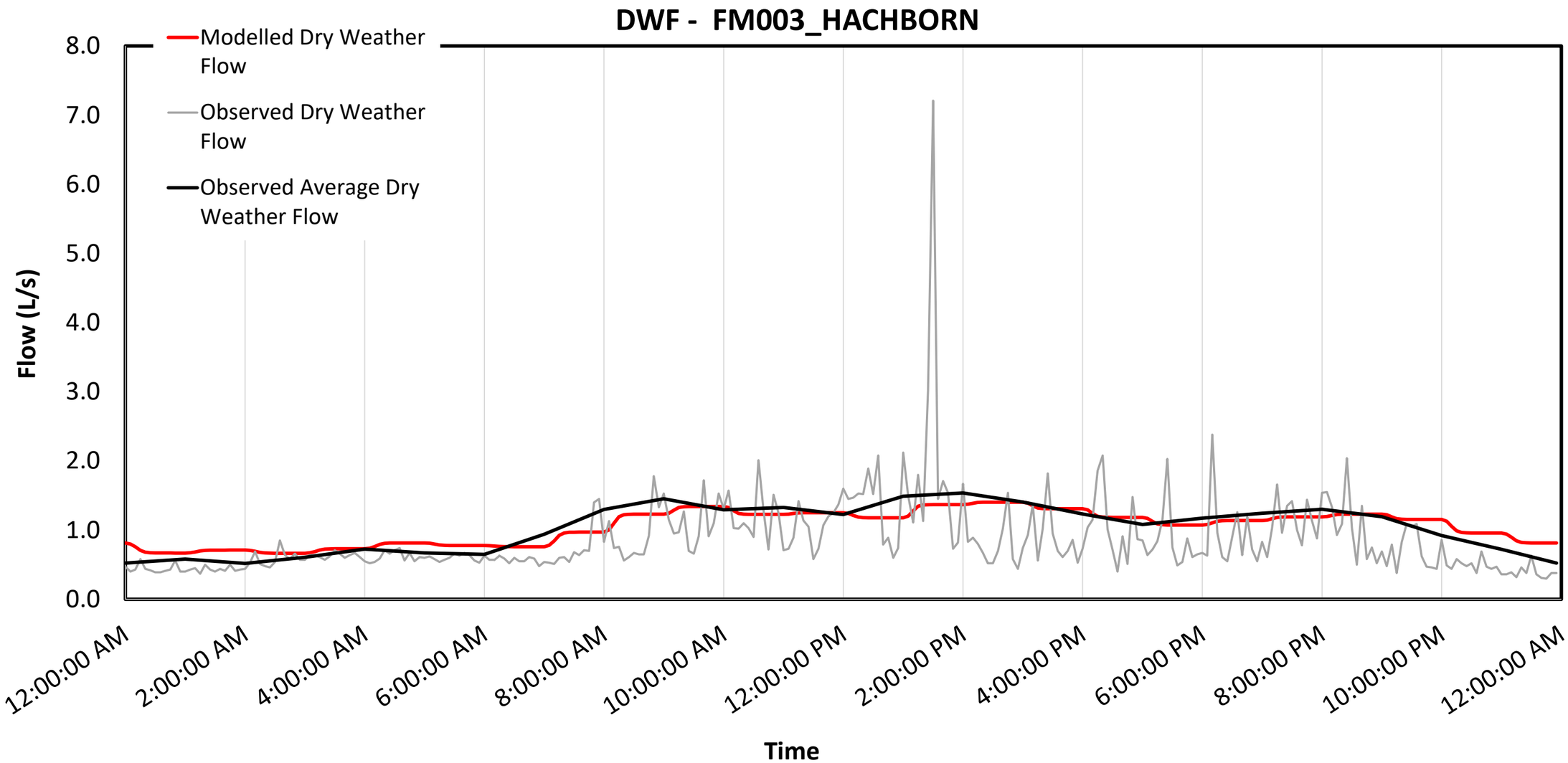
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	22.7	15.2	0.3	6.2	-
Total Volume (m³):	897	-	462	-	765



Dry Weather Flow Comparison

Tag:	FM003_HACHBORN
Conduit ID:	SAN_P-210109
Scenario:	DWF - FM003_HACHBORN

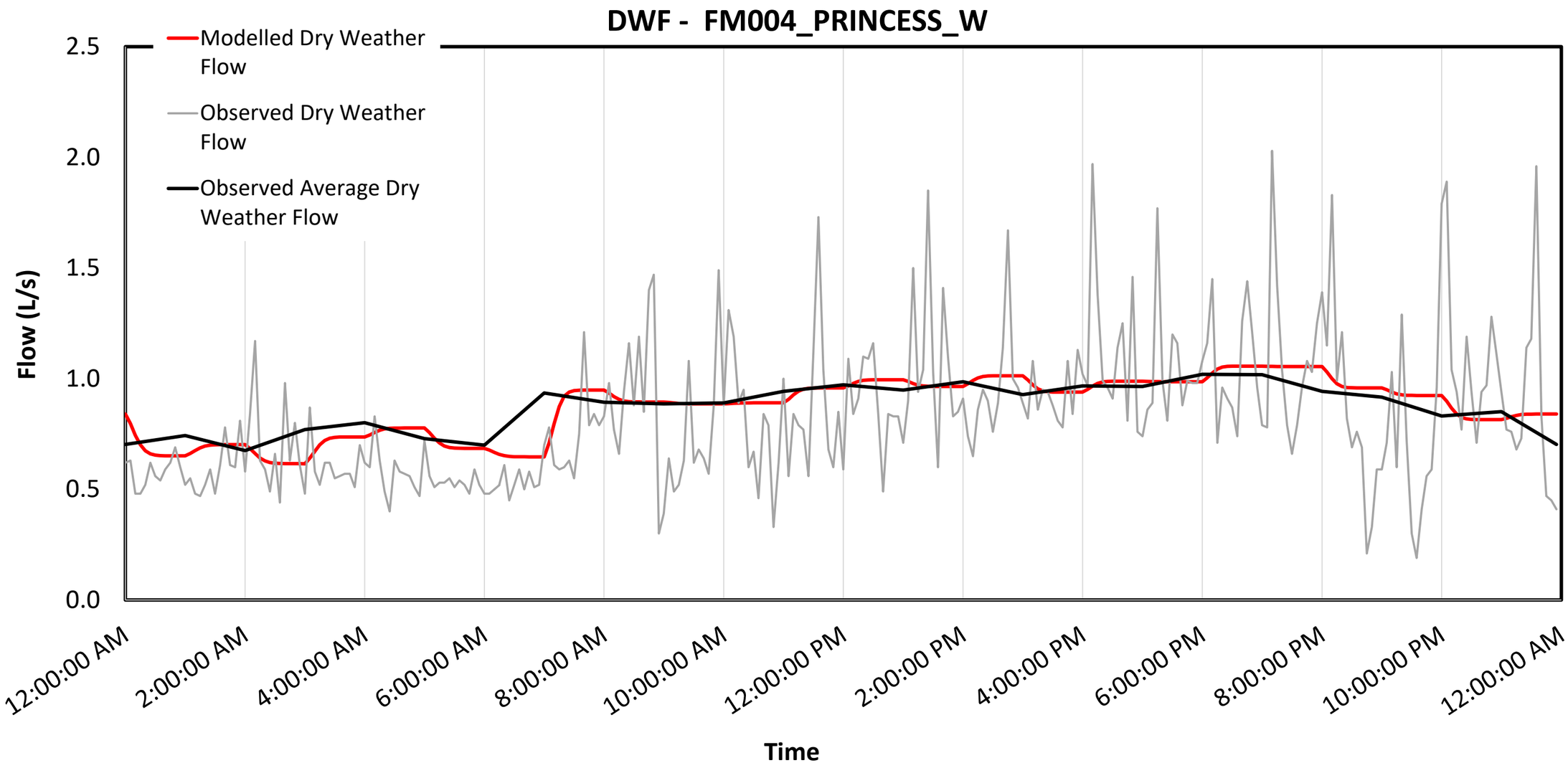
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	7.2	1.4	0.2	0.8	-
Total Volume (m^3):	123	-	33	-	91



Dry Weather Flow Comparison

Tag:	FM004_PRINCESS_W
Conduit ID:	SAN_P-210106
Scenario:	DWF - FM004_PRINCESS_W

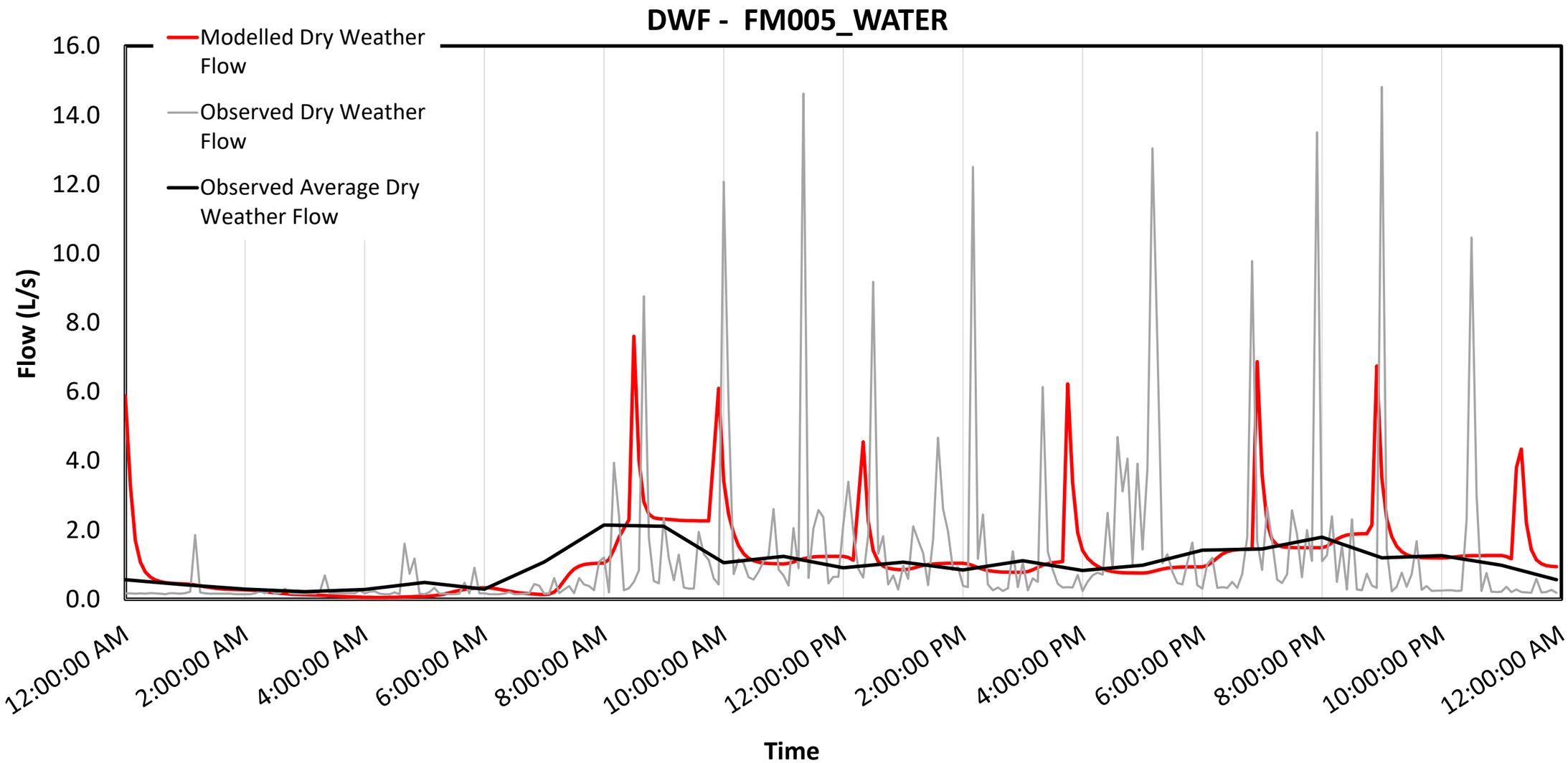
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	3.0	1.1	0.2	0.6	-
Total Volume (m³):	78	-	59	-	75



Dry Weather Flow Comparison

Tag:	FM005_WATER
Conduit ID:	SAN_P-210082
Scenario:	DWF - FM005_WATER

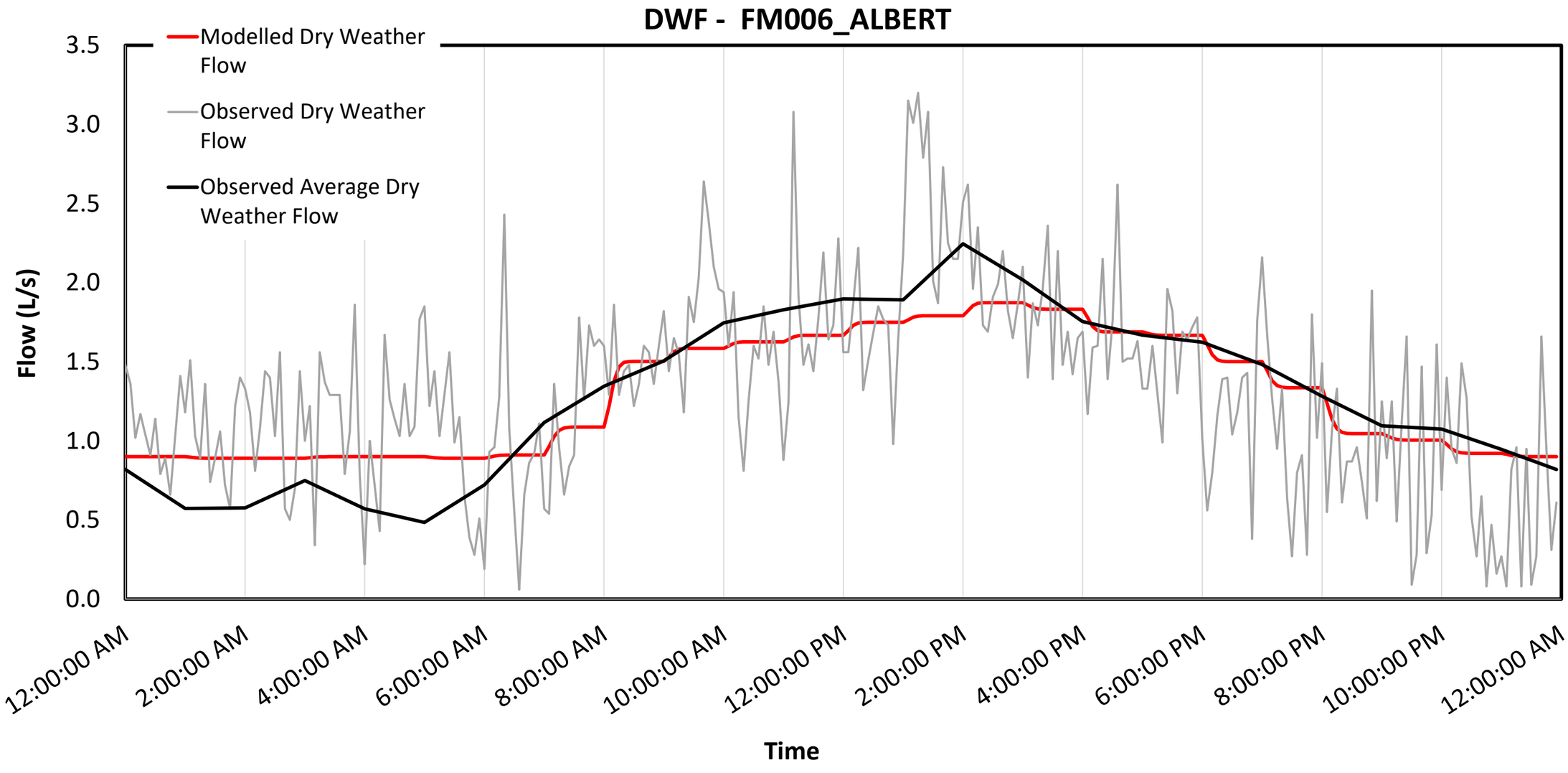
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	18.6	8.1	0.1	0.1	-
Total Volume (m³):	122	-	62	-	102



Dry Weather Flow Comparison

Tag:	FM006_ALBERT
Conduit ID:	SAN_P-210141
Scenario:	DWF - FM006_ALBERT

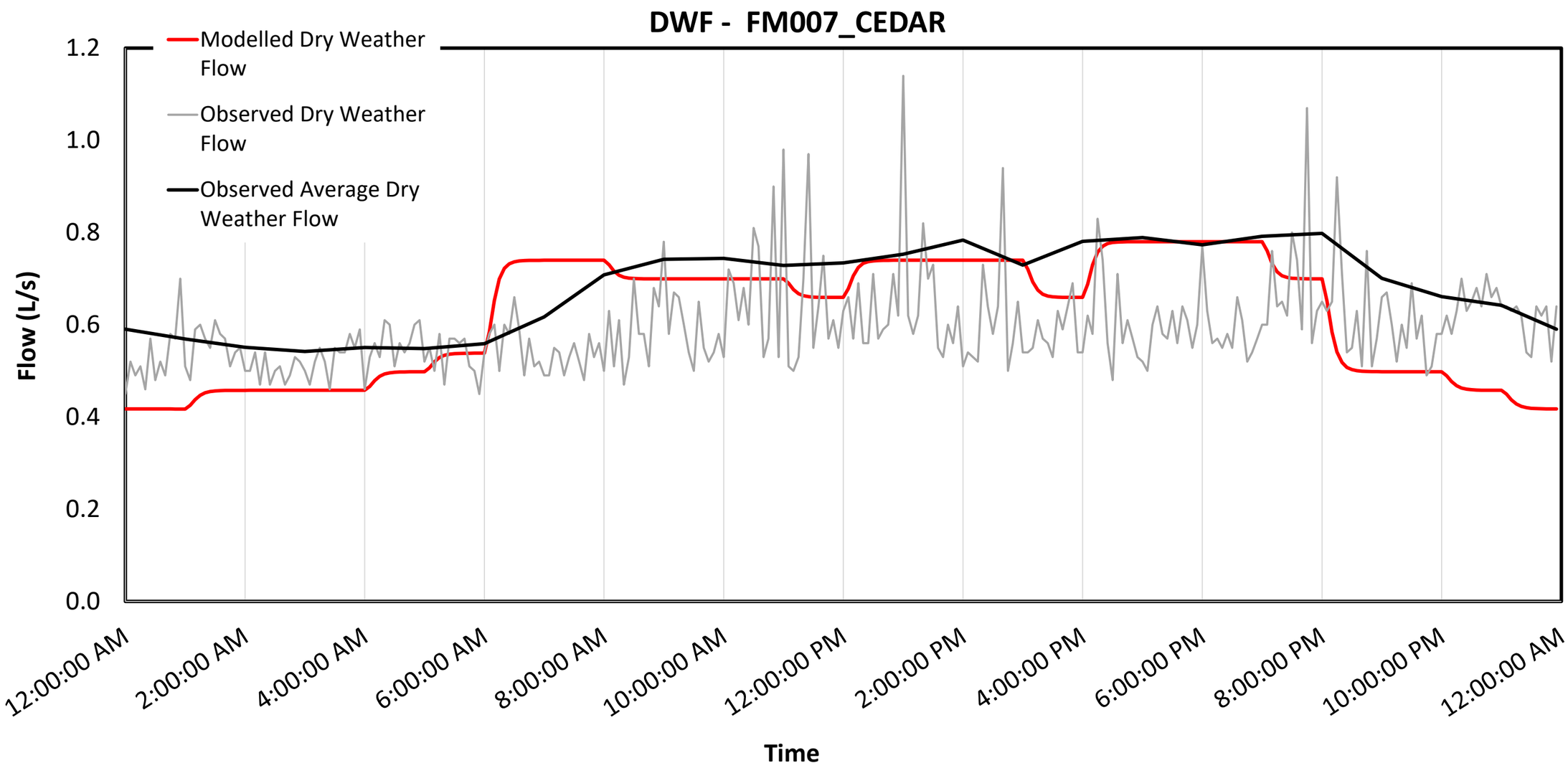
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	3.8	1.9	0.1	0.9	-
Total Volume (m³):	141	-	58	-	112



Dry Weather Flow Comparison

Tag:	FM007_CEDAR
Conduit ID:	SAN_P-210130
Scenario:	DWF - FM007_CEDAR

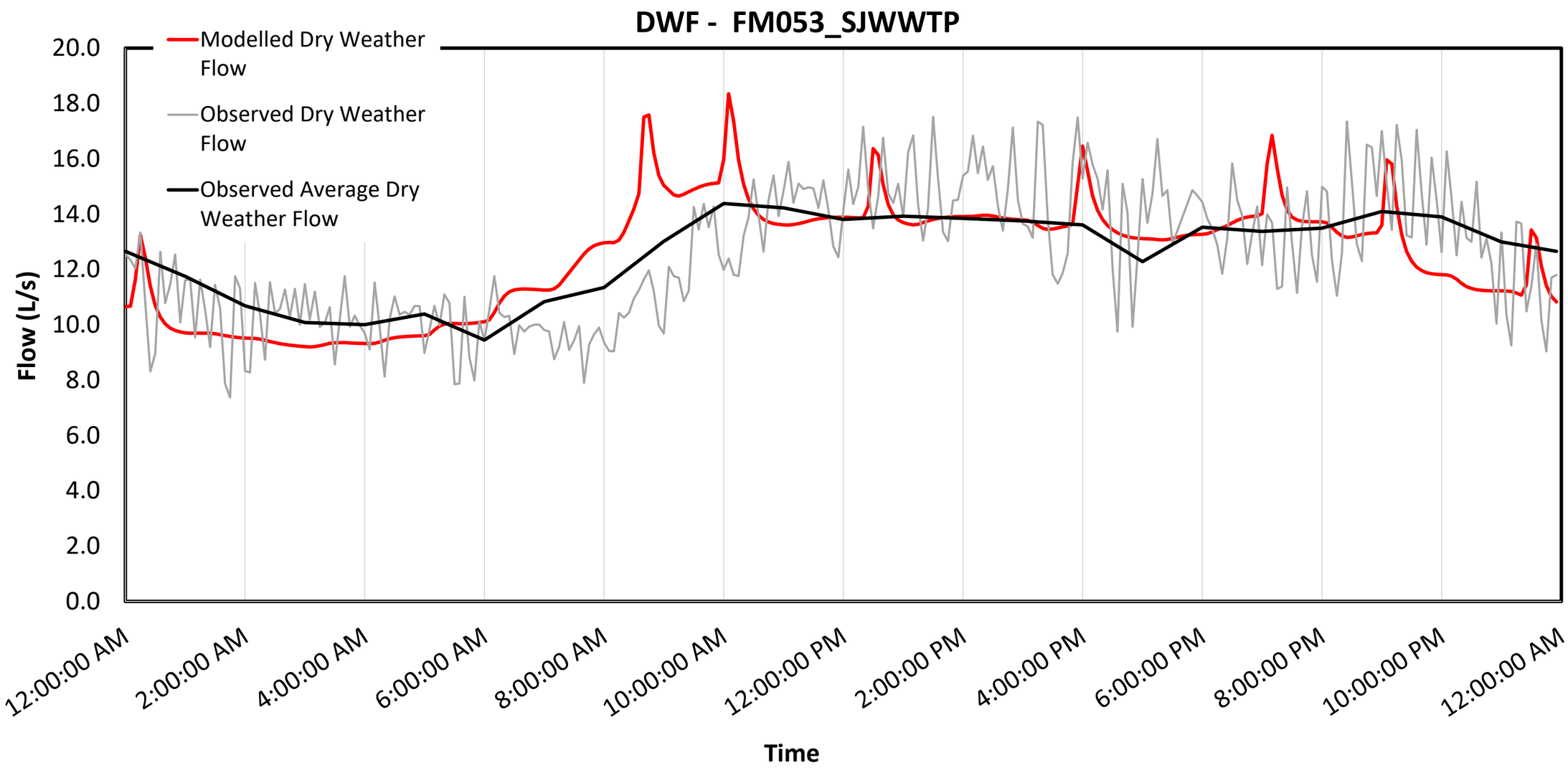
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	2.7	0.8	0.2	0.4	-
Total Volume (m^3):	66	-	34	-	53



Dry Weather Flow Comparison

Tag:	FM053_SJWWTP
Conduit ID:	SAN_P-0-GMBP-06
Scenario:	DWF - FM053_SJWWTP

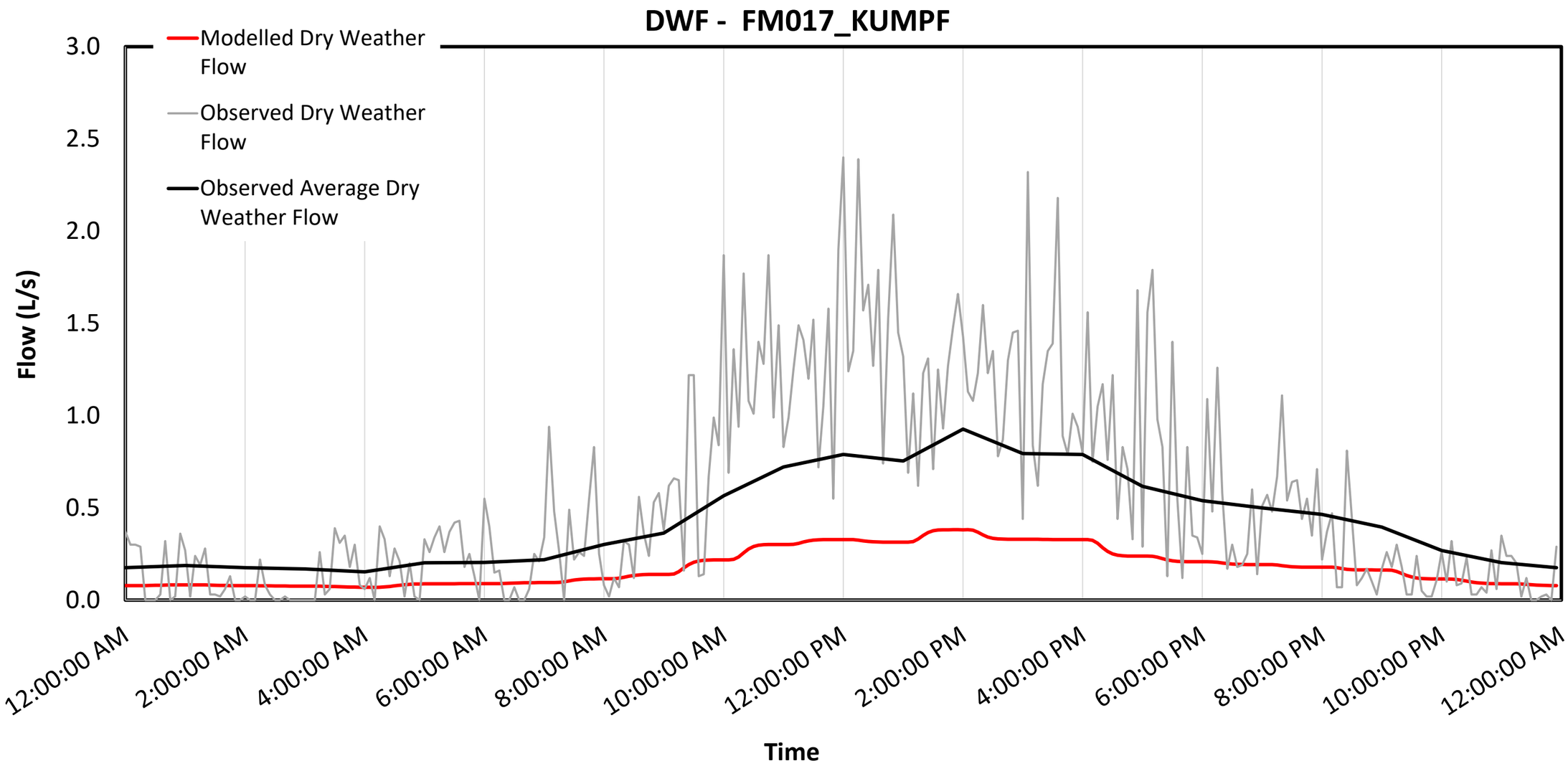
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	19.3	18.4	0.5	9.6	-
Total Volume (m³):	1211	-	718	-	1081



Dry Weather Flow Comparison

Tag:	FM017_KUMPF
Conduit ID:	SAN_P-210050
Scenario:	DWF - FM017_KUMPF

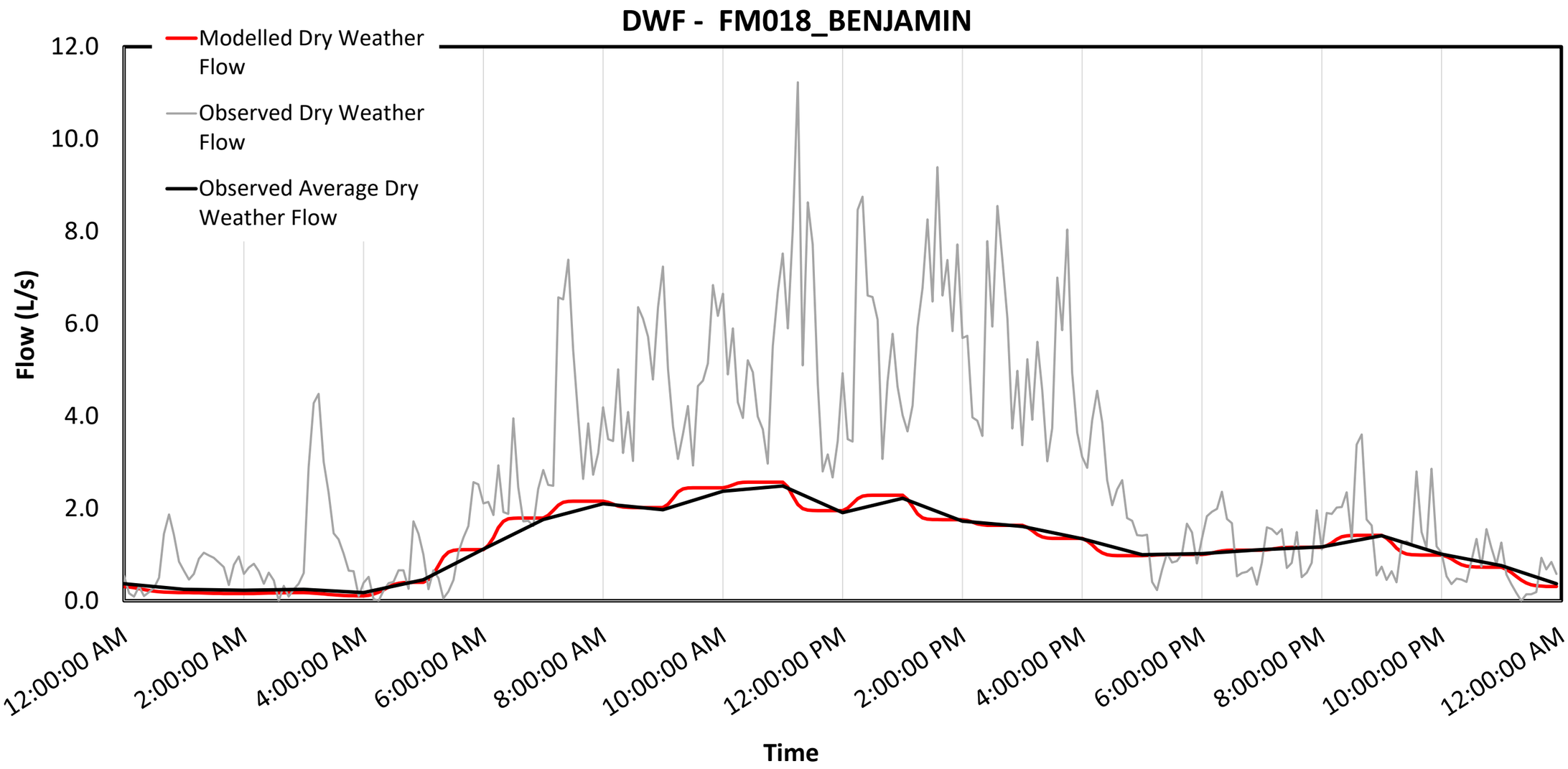
	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	2.4	0.4	0.0	0.1	-
Total Volume (m³):	48	-	21	-	15



Dry Weather Flow Comparison

Tag:	FM018_BENJAMIN
Conduit ID:	SAN_P-210037
Scenario:	DWF - FM018_BENJAMIN

	Observed Max	Model Max	Observed Min	Model Min	Modelled Volume
Peak Flow (L/s):	11.5	2.6	0.0	0.3	-
Total Volume (m^3):	235	-	87	-	107





D

Township of Woolwich

APPENDIX D

EXISTING WASTEWATER SYSTEM PERFORMANCE MAPPING

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing System Performance

- d/D<1
- d/D=1
- Freeboard < 1.8 m
- Forcemain

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants

Other Features

- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

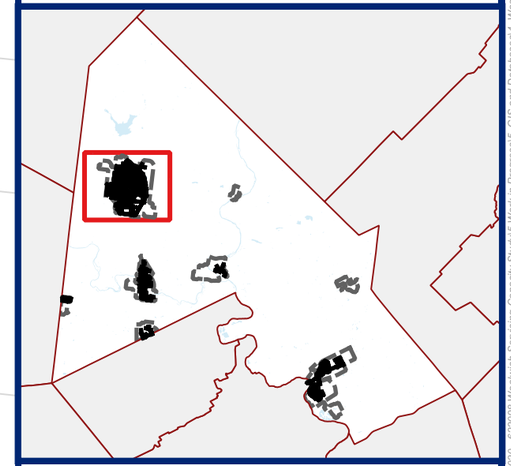


Figure D-1

Existing Wastewater Performance

Elmira

BluePlan Engineering

May, 2024
622098-W-001
Projection EPSG:26917

Snyder Avenue North SPS
Victoria Glen SPS
Arthur North SPS
Elmira WWTP
Arthur St N
Kenning Pl
Isaac St
William St
High St
Church St E
Church St W
Line 86
Eldale Rd
Floradale Rd
Elmira
Porchlight Dr
Park Ave W
James St
Duke St
Erb St
Ernst St
Snyder Ave S
Barnswallow Dr
Killdeer Rd
Robin Dr
First St W
First St E
Falcon Dr
Flamingo Dr
Tanager St
Oriole Pky W
Oriole Pky E
Arthur St S
Howard Ave
Mockingbird Dr
Union St
South Field Dr
Pintail Dr
Earl Martin Dr
Listowel Rd
Three Bridges Rd
Scotch Line Rd
New Jerusalem Rd

0 0.7 1.4 km

Document Path: B:\Working\WOOLWICH ON\TWP OF\2020-622098 Woolwich Servicing Capacity Study\5 Work in Progress\5. GIS and Databases\4. Wastewater\622098-WW-002 - Existing Performance.qgz

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing System Performance

- d/D<1
- d/D=1
- Freeboard < 1.8 m
- Forcemain

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants

Other Features

- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

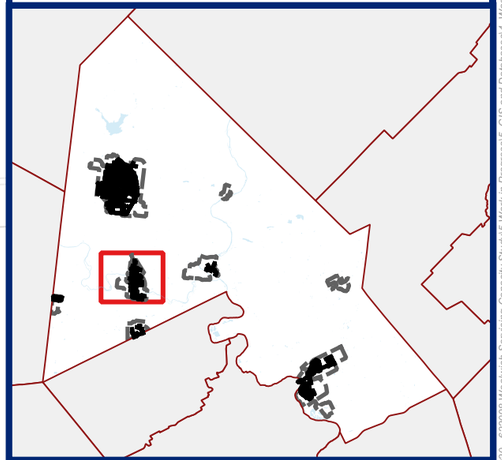


Figure D-2

Existing Wastewater Performance

St. Jacobs

BluePlan Engineering

May, 2024
622098-W-001
Projection EPSG:26917

Hawkesville Rd
Northside Dr
King St N
Sawmill Rd
New Jerusalem Rd
Eby St
Front St
Queensway Dr
St Jacobs WWTP
Arthur St S
Three Bridges Rd
Henry St
Young St
Water St
Maplelawn Dr
Mill Race Crescent SPS
Parkhaven Dr
Printery Rd
Old Scout Pl
Bo-De Lane
0
0.5
1 km

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing System Performance

- d/D<1
- d/D=1
- Freeboard < 1.8 m
- Forcemain

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants

Other Features

- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

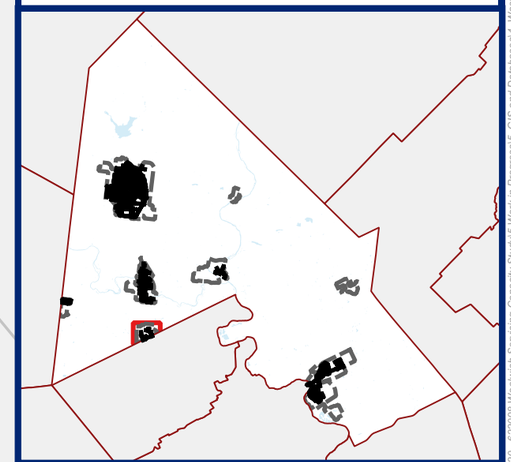


Figure D-3

Existing Wastewater Performance

Stockyards

BluePlan ENGINEERING

May, 2024
622098-W-001
Projection EPSG:26917

King St N
Martin Grove Rd
Farmer's Market Rd
Apple Grove Rd
Weber St N
Benjamin Rd
City Of Waterloo
Colby Crt
Colby Dr
Kumpf Dr
Conrad Pl
Randall Dr
0
0.2
0.4 km

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing System Performance

- d/D<1
- d/D=1
- Freeboard < 1.8 m
- Forcemain

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants

Other Features

- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

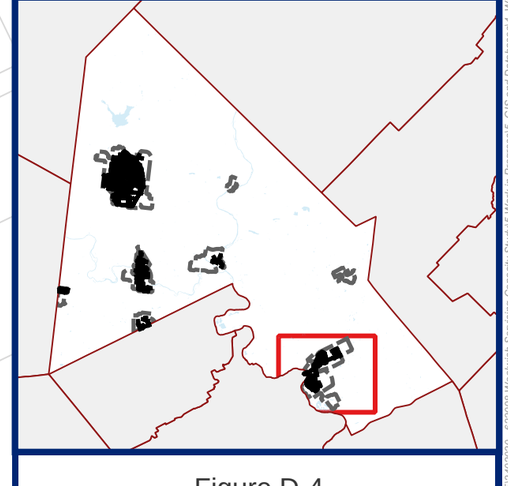


Figure D-4

Existing Wastewater Performance

Breslau

BluePlan Engineering

May, 2024
622098-W-001
Projection EPSG:26917

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing System Performance

- d/D<1
- d/D=1
- Freeboard < 1.8 m
- Forcemain

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants

Other Features

- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

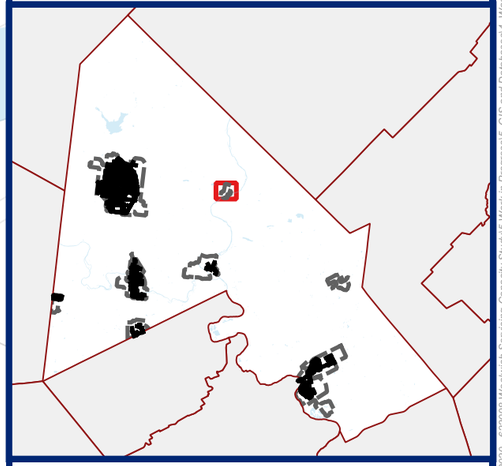


Figure D-5

Existing Wastewater Performance

West Montrose

BluePlan ENGINEERING

May, 2024
622098-W-001
Projection EPSG:26917

0 0.1 0.2 km

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing System Performance

- d/D<1
- d/D=1
- Freeboard < 1.8 m
- Forcemain

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants

Other Features

- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

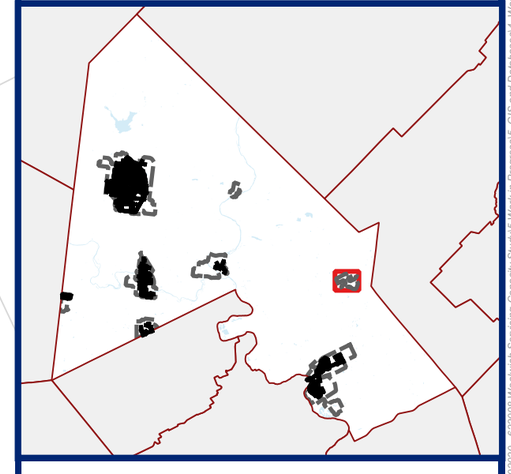


Figure D-6

Existing Wastewater Performance

Maryhill

BluePlan ENGINEERING

May, 2024
622098-W-001
Projection EPSG:26917

0 0.2 0.4 km

Zingervilla Pl
St Boniface Dr
Matthias Cres
Homestead Dr
Matthias Pl
Sunset Hills Cres
St Charles St E
Maryhill Rd
Isley Dr
Halter Ave
Notre Dame Ave
St Charles St W

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing System Performance

- d/D<1
- d/D=1
- Freeboard < 1.8 m
- Forcemain

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants

Other Features

- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

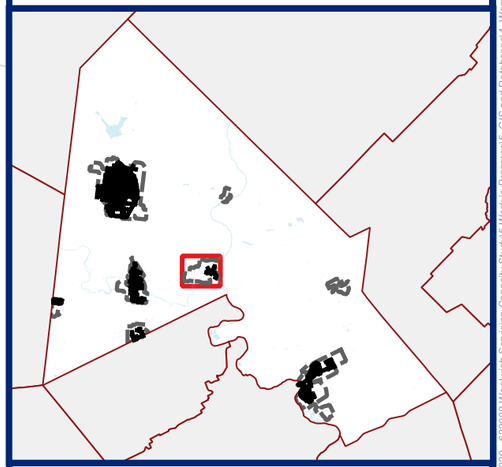


Figure D-7

Existing Wastewater Performance

Conestogo

BluePlan ENGINEERING

May, 2024
622098-W-001
Projection EPSG:26917

0 0.3 0.6 km

Golf Course Rd
Hunsberger Rd
Zaduk Crt
Conestogo WWTP
Conestogo
River Run Pl
River Run SPS
Misty River Dr
Glasgow St N
Northfield Dr E
Northfield Dr
Country Spring Walk
Musselman Cres
Flax Mill Dr
Weberlyn Cres
Elgin St W
Elgin St E
Sawmill Rd
Glasgow St S

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Existing System Performance

- d/D<1
- d/D=1
- Freeboard < 1.8 m
- Forcemain

Existing Wastewater Infrastructure

- Sanitary Pump Stations
- Wastewater Treatment Plants

Other Features

- GRCA Watercourse
- Settlement Boundaries
- Surrounding Municipalities
- Woolwich Municipal Boundary

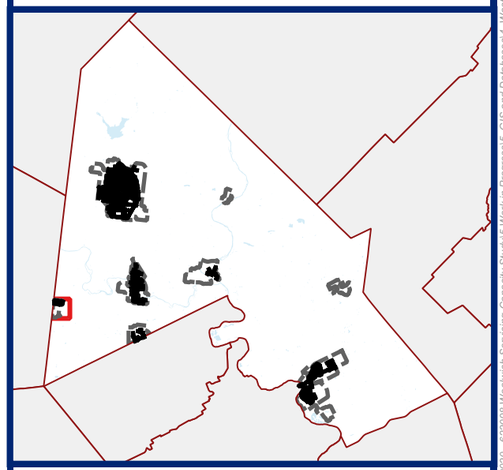


Figure D-8

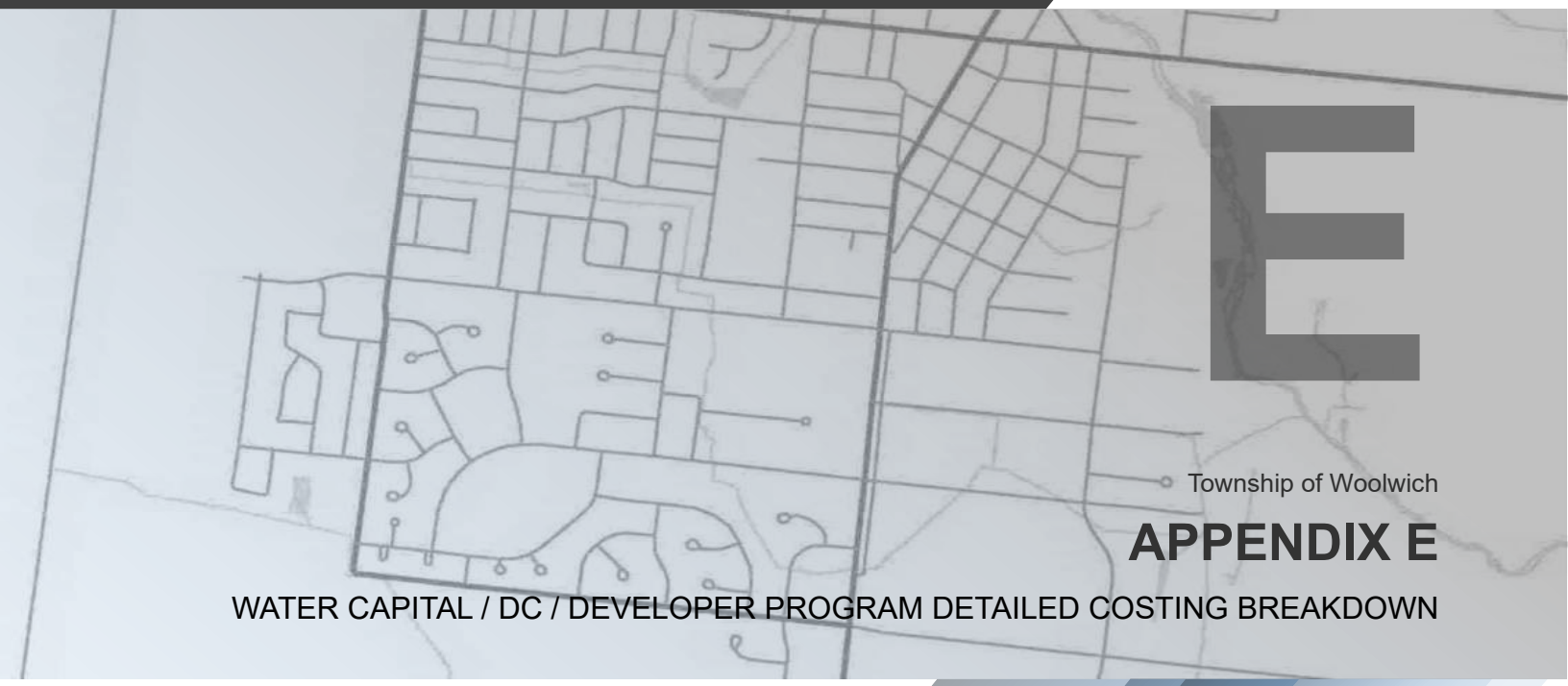
Existing Wastewater Performance

Heidelberg

BluePlan ENGINEERING

May, 2024
622098-W-001
Projection EPSG:26917

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E

Township of Woolwich

APPENDIX E

WATER CAPITAL / DC / DEVELOPER PROGRAM DETAILED COSTING BREAKDOWN

											Base Cost		Special Cost				Construction Uplift		Soils Uplift		Additional Construction Cost		Provisional Allowance			Contingency and Soft Costs			
Project No	Category	Pipe ID	Community	Description	Existing Diameter (mm)	Proposed Diameter (mm)	Project Timing	Length (m)	Area Conditions	Base Unit Rate - Open Cut	Base Cost - Open Cut	Special Cost - Crossings	Cost	Special Cost - Valves	Cost	%	Construction Uplift	%	Updated Soils Regulation Uplift	%	Additional Construction Costs	%	Provisional Allowance	Sub Total	Project Contingency (25%)	Design, CA, PA, Studies (20%)	HST (1.76%)	Total ($2024)
W-M-BRE-001	New	PPE_FUTURE_CONNECTION_134	Breslau	New WM along Fountain St N from Airport Rd to Kossuth Rd	N/A	450	2024 - 2033	531	Rural	$ 1,382	$ 733,405		$ -	0.0	$ -	0%	$ -	2%	$ 13,564	15%	$ 103,761	10%	$ 79,550	$ 930,280	$ 232,570	$ 186,056	$ 23,741	$ 1,372,647
W-M-BRE-001	New	PPE_FUTURE_CONNECTION_139	Breslau	New WM along Fountain St N from Airport Rd to Kossuth Rd	N/A	450	2024 - 2033	100	Rural	$ 1,382	$ 137,641		$ -	0.0	$ -	0%	$ -	2%	$ 2,546	15%	$ 19,473	10%	$ 14,929	$ 174,589	$ 43,647	$ 34,918	$ 4,456	$ 257,610
W-M-BRE-001	New	PPE_FUTURE_CONNECTION_140	Breslau	New WM along Fountain St N from Airport Rd to Kossuth Rd	N/A	450	2024 - 2033	198	Rural	$ 1,382	$ 273,266		$ -	0.0	$ -	0%	$ -	2%	$ 5,054	15%	$ 38,661	10%	$ 29,640	$ 346,621	$ 86,655	$ 69,324	$ 8,846	$ 511,447
W-M-BRE-001	New	PPE_FUTURE_CONNECTION_141	Breslau	New WM along Fountain St N from Airport Rd to Kossuth Rd	N/A	450	2024 - 2033	303	Rural	$ 1,382	$ 419,470	Creek	$ 358,000	0.0	$ -	0%	$ -	2%	$ 14,918	15%	$ 114,120	10%	$ 87,492	$ 994,000	$ 248,500	$ 198,800	$ 25,367	$ 1,466,666
W-M-BRE-002	New	PPE_FUTURE_CONNECTION_142	Breslau	New WM along Kossuth Rd from Fountain St N to Cober Rd	N/A	350	2034 - 2051	215	Rural	$ 1,278	$ 274,210		$ -	0.0	$ -	0%	$ -	2%	$ 5,484	15%	$ 41,954	10%	$ 32,165	$ 353,813	$ 88,453	$ 70,763	$ 9,029	$ 522,058
W-M-BRE-002	New	PPE_FUTURE_CONNECTION_143	Breslau	New WM along Kossuth Rd from Fountain St N to Cober Rd	N/A	350	2034 - 2051	622	Rural	$ 1,278	$ 794,546		$ -	0.0	$ -	0%	$ -	2%	$ 15,891	15%	$ 121,566	10%	$ 93,200	$ 1,025,203	$ 256,301	$ 205,041	$ 26,163	$ 1,512,708
W-M-BRE-002	New	PPE_FUTURE_CONNECTION_145	Breslau	New WM along Kossuth Rd from Fountain St N to Cober Rd	N/A	350	2034 - 2051	526	Rural	$ 1,278	$ 671,609	Creek	$ 80,000	0.0	$ -	0%	$ -	2%	$ 15,032	15%	$ 114,996	10%	$ 88,164	$ 969,801	$ 242,450	$ 193,960	$ 24,749	$ 1,430,961
W-M-BRE-002	New	PPE_FUTURE_CONNECTION_146	Breslau	New WM along Kossuth Rd from Fountain St N to Cober Rd	N/A	350	2034 - 2051	639	Rural	$ 1,278	$ 816,332		$ -	0.0	$ -	0%	$ -	2%	$ 16,327	15%	$ 124,899	10%	$ 95,756	$ 1,053,313	$ 263,328	$ 210,663	$ 26,881	$ 1,554,184
W-M-BRE-003	New	PPE_FUTURE_CONNECTION_149	Breslau	New WM Airport Easement through Cober Rd to Lonsdale Rd	N/A	300	2034 - 2051	775	Suburban	$ 1,276	$ 988,998	Creek	$ 64,000	0.0	$ -	20%	$ 210,600	2%	$ 21,060	15%	$ 192,699	10%	$ 147,736	$ 1,625,093	$ 406,273	$ 325,019	$ 41,472	$ 2,397,856
W-M-BRE-003	New	PPE_UPDATE_4	Breslau	New WM Airport Easement through Cober Rd to Lonsdale Rd	N/A	300	2034 - 2051	2243	Suburban	$ 1,276	$ 2,862,061	Creek	$ 64,000	0.0	$ -	20%	$ 585,212	2%	$ 58,521	15%	$ 535,469	10%	$ 410,526	$ 4,515,790	$ 1,128,948	$ 903,158	$ 115,243	$ 6,663,139
W-M-BRE-004	Upgrade	PPE_05120	Breslau	Upgrade WM along Menno St from Fountain St N to existing east Menno St WM Dead end	300	300	2024 - 2033	80	Rural	$ 1,276	$ 102,338		$ -	0.0	$ -	0%	$ -	2%	$ 2,047	15%	$ 15,658	10%	$ 12,004	$ 132,047	$ 33,012	$ 26,409	$ 3,370	$ 194,838
W-M-BRE-004	Upgrade	PPE_05101	Breslau	Upgrade WM along Menno St from Fountain St N to existing east Menno St WM Dead end	250	300	2024 - 2033	169	Rural	$ 1,276	$ 215,372		$ -	0.0	$ -	0%	$ -	2%	$ 4,307	15%	$ 32,952	10%	$ 25,263	$ 277,895	$ 69,474	$ 55,579	$ 7,092	$ 410,039
W-M-BRE-004	Upgrade	PPE_05102	Breslau	Upgrade WM along Menno St from Fountain St N to existing east Menno St WM Dead end	250	300	2024 - 2033	326	Rural	$ 1,276	$ 415,494	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 9,590	15%	$ 73,363	10%	$ 56,245	$ 618,691	$ 154,673	$ 123,738	$ 15,789	$ 912,890
W-M-BRE-005	New	PPE_FUTURE_CONNECTION_113	Breslau	New WM Extension along Menno St to support Greenfield Growth to Shantz Station Rd	N/A	300	2024 - 2033	232	Rural	$ 1,276	$ 296,381		$ -	0.0	$ -	0%	$ -	2%	$ 5,928	15%	$ 45,346	10%	$ 34,766	$ 382,421	$ 95,605	$ 76,484	$ 9,759	$ 564,270
W-M-BRE-005	New	PPE_FUTURE_CONNECTION_111	Breslau	New WM Extension along Menno St to support Greenfield Growth to Shantz Station Rd	N/A	300	2024 - 2033	162	Rural	$ 1,276	$ 206,746		$ -	0.0	$ -	0%	$ -	2%	$ 4,135	15%	$ 31,632	10%	$ 24,251	$ 266,765	$ 66,691	$ 53,353	$ 6,808	$ 393,617
W-M-BRE-005	New	PPE_FUTURE_CONNECTION_112	Breslau	New WM Extension along Menno St to support Greenfield Growth to Shantz Station Rd	N/A	300	2024 - 2033	303	Rural	$ 1,276	$ 387,024		$ -	0.0	$ -	0%	$ -	2%	$ 7,740	15%	$ 59,215	10%	$ 45,398	$ 499,377	$ 124,844	$ 99,875	$ 12,744	$ 736,840
W-M-BRE-005	New	FUTURE_PIPE_48	Breslau	New WM Extension along Menno St to support Greenfield Growth to Shantz Station Rd	N/A	300	2024 - 2033	819	Rural	$ 1,276	$ 1,044,689	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 22,174	15%	$ 169,629	10%	$ 130,049	$ 1,430,542	$ 357,635	$ 286,108	$ 36,507	$ 2,110,793
W-M-BRE-005	New	FUTURE_PIPE_49	Breslau	New WM Extension along Menno St to support Greenfield Growth to Shantz Station Rd	N/A	300	2024 - 2033	480	Rural	$ 1,276	$ 612,693		$ -	0.0	$ -	0%	$ -	2%	$ 12,254	15%	$ 93,742	10%	$ 71,869	$ 790,557	$ 197,639	$ 158,111	$ 20,175	$ 1,166,483
W-M-BRE-005	New	PPE_FUTURE_CONNECTION_151	Breslau	New WM Extension along Menno St to support Greenfield Growth to Shantz Station Rd	N/A	300	2024 - 2033	432	Rural	$ 1,276	$ 551,846		$ -	0.0	$ -	0%	$ -	2%	$ 11,037	15%	$ 84,432	10%	$ 64,732	$ 712,047	$ 178,012	$ 142,409	$ 18,171	$ 1,050,639
W-M-BRE-006	New	PPE_FUTURE_CONNECTION_103	Breslau	New WM along Burkholder St through Madwest subdivision	N/A	300	2024 - 2033	15	Rural	$ 1,276	$ 19,025		$ -	0.0	$ -	0%	$ -	2%	$ 380	15%	$ 2,911	10%	$ 2,232	$ 24,548	$ 6,137	$ 4,910	$ 626	$ 36,221
W-M-BRE-006	New	FUTURE_PIPE_195	Breslau	New WM along Burkholder St through Madwest subdivision	N/A	300	2024 - 2033	211	Rural	$ 1,276	$ 268,853		$ -	0.0	$ -	0%	$ -	2%	$ 5,377	15%	$ 41,134	10%	$ 31,536	$ 346,901	$ 86,725	$ 69,380	$ 8,853	$ 511,859
W-M-BRE-006	New	FUTURE_PIPE_194	Breslau	New WM along Burkholder St through Madwest subdivision	N/A	300	2024 - 2033	216	Rural	$ 1,276	$ 276,025		$ -	0.0	$ -	0%	$ -	2%	$ 5,520	15%	$ 42,232	10%	$ 32,378	$ 356,155	$ 89,039	$ 71,231	$ 9,089	$ 525,513
W-M-BRE-006	New	FUTURE_PIPE_192	Breslau	New WM along Burkholder St through Madwest subdivision	N/A	300	2024 - 2033	296	Rural	$ 1,276	$ 378,277		$ -	0.0	$ -	0%	$ -	2%	$ 7,566	15%	$ 57,876	10%	$ 44,372	$ 488,091	$ 122,023	$ 97,618	$ 12,456	$ 720,188
W-M-BRE-007	New	PPE_FUTURE_CONNECTION_154	Breslau	New WM along future Dolman St in the Madwest Subdivision from Woolwich St S to Fountain St N	N/A	300	2024 - 2033	246	Suburban	$ 1,276	$ 314,509		$ -	0.0	$ -	20%	$ 62,902	2%	$ 6,290	15%	$ 57,555	10%	$ 44,126	$ 485,381	$ 121,345	$ 97,076	$ 12,387	$ 716,189
W-M-BRE-007	New	FUTURE_PIPE_193	Breslau	New WM along future Dolman St in the Madwest Subdivision from Woolwich St S to Fountain St N	N/A	300	2024 - 2033	132	Suburban	$ 1,276	$ 167,856		$ -	0.0	$ -	20%	$ 33,571	2%	$ 3,357	15%	$ 30,718	10%	$ 23,550	$ 259,053	$ 64,763	$ 51,811	$ 6,611	$ 382,237
W-M-BRE-007	New	FUTURE_PIPE_184	Breslau	New WM along future Dolman St in the Madwest Subdivision from Woolwich St S to Fountain St N	N/A	300	2024 - 2033	156	Suburban	$ 1,276	$ 199,002		$ -	0.0	$ -	20%	$ 39,800	2%	$ 3,980	15%	$ 36,417	10%	$ 27,920	$ 307,120	$ 76,780	$ 61,424	$ 7,838	$ 453,161
W-M-BRE-007	New	FUTURE_PIPE_185	Breslau	New WM along future Dolman St in the Madwest Subdivision from Woolwich St S to Fountain St N	N/A	300	2024 - 2033	98	Suburban	$ 1,276	$ 124,963		$ -	0.0	$ -	20%	$ 24,993	2%	$ 2,499	15%	$ 22,868	10%	$ 17,532	$ 192,855	$ 48,214	$ 38,571	$ 4,922	$ 284,562
W-M-BRE-007	New	FUTURE_PIPE_187	Breslau	New WM along future Dolman St in the Madwest Subdivision from Woolwich St S to Fountain St N	N/A	300	2024 - 2033	154	Suburban	$ 1,276	$ 196,578		$ -	0.0	$ -	20%	$ 39,316	2%	$ 3,932	15%	$ 35,974	10%	$ 27,580	$ 303,379	$ 75,845	$ 60,676	$ 7,742	$ 447,642
W-M-BRE-007	New	PPE_FUTURE_CONNECTION_160	Breslau	New WM along future Dolman St in the Madwest Subdivision from Woolwich St S to Fountain St N	N/A	300	2024 - 2033	19	Suburban	$ 1,276	$ 24,034	Regional Road	$ 155,000	0.0	$ -	20%	$ 35,807	2%	$ 3,581	15%	$ 32,763	10%	$ 25,118	$ 276,303	$ 69,076	$ 55,261	$ 7,051	$ 407,691
W-M-BRE-008	New	FUTURE_PIPE_50	Breslau	New recommended WM in east greenfield growth area connecting Kramp Rd and Menno St	N/A	250	Beyond 2051	762	Rural	$ 1,276	$ 972,863	Major Creek	$ 347,000	0.0	$ -	0%	$ -	2%	$ 26,397	15%	$ 201,939	10%	$ 154,820	$ 1,703,019	$ 425,755	$ 340,604	$ 43,461	$ 2,512,839
W-M-BRE-008	New	PPE_FUTURE_CONNECTION_239	Breslau	New recommended WM in east greenfield growth area connecting Kramp Rd and Menno St	N/A	250	Beyond 2051	404	Rural	$ 1,276	$ 515,698	Major Creek	$ 347,000	0.0	$ -	0%	$ -	2%	$ 17,254	15%	$ 131,993	10%	$ 101,194	$ 1,113,139	$ 278,285	$ 222,628	$ 28,407	$ 1,642,458
W-M-BRE-008	New	PPE_FUTURE_CONNECTION_97	Breslau	New recommended WM in east greenfield growth area connecting Kramp Rd and Menno St	N/A	250	Beyond 2051	204	Rural	$ 1,276	$ 260,301	Railway	$ 143,000	0.0	$ -	0%	$ -	2%	$ 8,066	15%	$ 61,705	10%	$ 47,307	$ 520,380	$ 130,095	$ 104,076	$ 13,280	$ 767,830
W-M-BRE-008	New	PPE_UPDATE_6	Breslau	New recommended WM in east greenfield growth area connecting Kramp Rd and Menno St	N/A	250	Beyond 2051	377	Rural	$ 1,276	$ 481,404	Creek	$ 53,000	0.0	$ -	0%	$ -	2%	$ 10,688	15%	$ 81,764	10%	$ 62,686	$ 689,542	$ 172,385	$ 137,908	$ 17,597	$ 1,017,432
W-M-BRE-009	New	PPE_FUTURE_CONNECTION_101	Breslau	New WM Connection to support Trunk Main along Ottawa St from Woolwich St S to Fountain St N	N/A	450	2024 - 2033	48	Rural	$ 1,382	$ 66,558		$ -	0.0	$ -	0%	$ -	2%	$ 1,229	15%	$ 9,403	10%	$ 7,209	$ 84,399	$ 21,100	$ 16,880	$ 2,154	$ 124,533
W-M-BRE-009	New	FUTURE_PIPE_204	Breslau	New WM Connection to support Trunk Main along Ottawa St from Woolwich St S to Fountain St N	N/A	450	2024 - 2033	162	Rural	$ 1,382	$ 223,835	Major Creek	$ 1,782,000	0.0	$ -	0%	$ -	2%	$ 39,774	15%	$ 304,269	10%	$ 233,273	$ 2,583,151	$ 645,788	$ 516,630	$ 65,922	$ 3,811,491
W-M-BRE-009	New	FUTURE_PIPE_264	Breslau	New WM Connection to support Trunk Main along Ottawa St from Woolwich St S to Fountain St N	N/A	450	2024 - 2033	149	Rural	$ 1,382	$ 206,087	Major Creek	$ 1,782,000	0.0	$ -	0%	$ -	2%	$ 39,446	15%	$ 301,762	10%	$ 231,351	$ 2,560,646	$ 640,161	$ 512,129	$ 65,348	$ 3,778,284
W-M-BRE-009	New	FUTURE_PIPE_263	Breslau	New WM Connection to support Trunk Main along Ottawa St from Woolwich St S to Fountain St N	N/A	450	2024 - 2033	88	Rural	$ 1,382	$ 120,999		$ -	0.0	$ -	0%	$ -	2%	$ 2,235	15%	$ 17,095	10%	$ 13,106	$ 153,435	$ 38,359	$ 30,687	$ 3,916	$ 226,396
W-M-BRE-009	New	FUTURE_PIPE_203	Breslau	New WM Connection to support Trunk Main along Ottawa St from Woolwich St S to Fountain St N	N/A	450	2024 - 2033	279	Rural	$ 1,382	$ 386,108		$ -	0.0	$ -	0%	$ -	2%	$ 7,131	15%	$ 54,549	10%	$ 41,821	$ 489,610	$ 122,402	$ 97,922	$ 12,495	$ 722,429
W-M-BRE-009	New	PPE_FUTURE_CONNECTION_106	Breslau	New WM Connection to support Trunk Main along Ottawa St from Woolwich St S to Fountain St N	N/A	450	2024 - 2033	46	Rural	$ 1,382	$ 64,153		$ -	0.0	$ -	0%	$ -	2%	$ 1,185	15%	$ 9,063	10%	$ 6,949	$ 81,350	$ 20,337	$ 16,270	$ 2,076	$ 120,033
W-M-BRE-010	New	PPE_FUTURE_CONNECTION_152	Breslau	New WM along Shantz Station Rd between Kramp Rd and Menno St	N/A	300	Beyond 2051	1666	Rural	$ 1,276	$ 2,126,455	Railway	$ 155,000	0.0	$ -	0%	$ -	2%	$ 45,629	15%	$ 349,063	10%	$ 267,615	$ 2,943,761	$ 735,940	$ 588,752	$ 75,125	$ 4,343,578
W-M-BRE-011	New	PPE_FUTURE_CONNECTION_188	Breslau	New WM along Shantz Station Rd between Victoria St N and Kramp Rd	N/A	300	Beyond 2051	955	Rural	$ 1,276	$ 1,218,583	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 25,652	15%	$ 196,235	10%	$ 150,447	$ 1,654,917	$ 413,729	$ 330,983	$ 42,233	$ 2,441,863
W-M-BRE-012	New	PPE_FUTURE_CONNECTION_82	Breslau	New WM along Kramp Rd from Greenhouse Rd to Shantz Station Rd	N/A	300	2024 - 2033	726	Rural	$ 1,276	$ 926,128		$ -	0.0	$ -	0%	$ -	2%	$ 18,523	15%	$ 141,698	10%	$ 108,635	$ 1,194,983	$ 298,746	$ 238,997	$ 30,496	$ 1,763,221
W-M-BRE-013	New	PPE_FUTURE_CONNECTION_90	Breslau	New WM connecting Victoria St N and Kramp Rd	N/A	300	2024 - 2033	151	Rural	$ 1,276	$ 192,962		$ -	0.0	$ -	0%	$ -	2%	$ 3,859	15%	$ 29,523	10%	$ 22,634	$ 248,979	$ 62,245	$ 49,796	$ 6,354	$ 367,374
W-M-BRE-013	New	FUTURE_PIPE_53	Breslau	New WM connecting Victoria St N and Kramp Rd	N/A	300	2024 - 2033	507	Rural	$ 1,276	$ 647,251		$ -	0.0	$ -	0%	$ -	2%	$ 12,945	15%	$ 99,029	10%	$ 75,923	$ 835,148	$ 208,787	$ 167,030	$ 21,313	$ 1,232,278
W-M-BRE-013	New	PPE_FUTURE_CONNECTION_96	Breslau	New WM connecting Victoria St N and Kramp Rd	N/A	300	2024 - 2033	138	Rural	$ 1,276	$ 176,319		$ -	0.0	$ -	0%	$ -	2%	$ 3,526	15%	$ 26,977	10%	$ 20,682	$ 227,504	$ 56,876	$ 45,501	$ 5,806	$ 335,687
W-M-BRE-014	New	PPE_FUTURE_CONNECTION_155	Breslau	New WM connection along Fountain St N from Townsend Dr to Madwest Division	N/A	450	2024 - 2033	196	Suburban	$ 1,382	$ 271,487		$ -	0.0	$ -	20%	$ 54,297	2%	$ 5,430	15%	$ 49,682	10%	$ 38,090	$ 418,986	$ 104,747	$ 83,797	$ 10,693	$ 618,223

W-M-BRE-014	**New**	PPE_FUTURE_CONNECTION_156	Breslau	New WM along Victoria St N from Townsend Dr to Madwest Division	N/A	450	2024 - 2033	471	Suburban	$ 1,382	$ 650,383	Major Creek	$ 1,782,000	0.0	$ -	20%	$ 486,477	2%	$ 48,648	15%	$ 445,126	10%	$ 341,263	$ 3,753,897	$ 938,474	$ 750,779	$ 95,799	$ 5,538,950
W-M-BRE-014	**New**	PPE_FUTURE_CONNECTION_157	Breslau	New WM connection along Fountain St N from Townsend Dr to Madwest Division	N/A	450	2024 - 2033	324	Suburban	$ 1,382	$ 447,572		$ -	0.0	$ -	20%	$ 89,514	2%	$ 8,951	15%	$ 81,906	10%	$ 62,794	$ 690,738	$ 172,684	$ 138,148	$ 17,628	$ 1,019,198
W-M-BRE-014	**New**	PPE_05048	Breslau	New WM connection along Fountain St N from Townsend Dr to Madwest Division	N/A	450	2024 - 2033	129	Suburban	$ 1,382	$ 177,768		$ -	0.0	$ -	20%	$ 35,554	2%	$ 3,555	15%	$ 32,532	10%	$ 24,941	$ 274,350	$ 68,587	$ 54,870	$ 7,001	$ 404,809
W-M-BRE-015	**Upgrade**	PPE_30842	Breslau	Upgrade PRV WM along Victoria St N from Breslau Victoria PRV to Fountain St N	300	450	2034 - 2051	161	Suburban	$ 1,382	$ 223,012		$ -	0.0	$ -	20%	$ 44,602	2%	$ 4,460	15%	$ 40,811	10%	$ 31,289	$ 344,175	$ 86,044	$ 68,835	$ 8,783	$ 507,837
W-M-BRE-015	**Upgrade**	PPE_38135	Breslau	Upgrade PRV WM along Victoria St N from Breslau Victoria PRV to Fountain St N	300	450	2034 - 2051	1	Suburban	$ 1,382	$ 1,420		$ -	0.0	$ -	20%	$ 284	2%	$ 28	15%	$ 260	10%	$ 199	$ 2,191	$ 548	$ 438	$ 56	$ 3,233
W-M-BRE-015	**Upgrade**	PPE_05017	Breslau	Upgrade PRV WM along Victoria St N from Breslau Victoria PRV to Fountain St N	300	450	2034 - 2051	312	Suburban	$ 1,382	$ 431,449		$ -	0.0	$ -	20%	$ 86,290	2%	$ 8,629	15%	$ 78,955	10%	$ 60,532	$ 665,855	$ 166,464	$ 133,171	$ 16,993	$ 982,483
W-M-BRE-015	**Upgrade**	PPE_05018	Breslau	Upgrade PRV WM along Victoria St N from Breslau Victoria PRV to Fountain St N	300	450	2034 - 2051	171	Suburban	$ 1,382	$ 236,981	Creek	$ 358,000	0.0	$ -	20%	$ 118,996	2%	$ 11,900	15%	$ 108,882	10%	$ 83,476	$ 918,234	$ 229,559	$ 183,647	$ 23,433	$ 1,354,873
W-M-BRE-015	**Upgrade**	PPE_05023	Breslau	Upgrade PRV WM along Victoria St N from Breslau Victoria PRV to Fountain St N	300	450	2034 - 2051	481	Suburban	$ 1,382	$ 664,226		$ -	0.0	$ -	20%	$ 132,845	2%	$ 13,285	15%	$ 121,553	10%	$ 93,191	$ 1,025,101	$ 256,275	$ 205,020	$ 26,161	$ 1,512,557
W-M-BRE-016	**New**	PPE_FUTURE_CONNECTION_171	Breslau	New WM extension for future Fountain St N extension to connect to northwest greenfield growth	N/A	300	2024 - 2033	181	Rural	$ 1,276	$ 230,929	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 5,899	15%	$ 45,124	10%	$ 34,595	$ 380,547	$ 95,137	$ 76,109	$ 9,712	$ 561,504
W-M-BRE-016	**New**	PPE_FUTURE_CONNECTION_172	Breslau	New WM extension for future Fountain St N extension to connect to northwest greenfield growth	N/A	300	2024 - 2033	196	Rural	$ 1,276	$ 250,296		$ -	0.0	$ -	0%	$ -	2%	$ 5,006	15%	$ 38,295	10%	$ 29,360	$ 322,956	$ 80,739	$ 64,591	$ 8,242	$ 476,529
W-M-BRE-017	**New**	PPE_FUTURE_CONNECTION_163	Breslau	New WM extension from Woolwich St S along Ebycrest Rd	N/A	200	2024 - 2033	106	Suburban	$ 1,276	$ 134,939	Creek	$ 52,000	0.0	$ -	20%	$ 37,388	2%	$ 3,739	15%	$ 34,210	10%	$ 26,227	$ 288,502	$ 72,126	$ 57,700	$ 7,363	$ 425,691
W-M-BRE-017	**New**	PPE_FUTURE_CONNECTION_164	Breslau	New WM extension from Woolwich St S along Ebycrest Rd	N/A	200	2024 - 2033	131	Suburban	$ 1,276	$ 166,625		$ -	0.0	$ -	20%	$ 33,325	2%	$ 3,333	15%	$ 30,492	10%	$ 23,378	$ 257,153	$ 64,288	$ 51,431	$ 6,563	$ 379,434
W-M-BRE-017	**New**	PPE_FUTURE_CONNECTION_167	Breslau	New WM extension from Woolwich St S along Ebycrest Rd	N/A	200	2024 - 2033	198	Suburban	$ 1,276	$ 253,123	Creek	$ 52,000	0.0	$ -	20%	$ 61,025	2%	$ 6,102	15%	$ 55,838	10%	$ 42,809	$ 470,896	$ 117,724	$ 94,179	$ 12,017	$ 694,817
W-M-BRE-017	**New**	PPE_FUTURE_CONNECTION_168	Breslau	New WM extension from Woolwich St S along Ebycrest Rd	N/A	200	2024 - 2033	279	Suburban	$ 1,276	$ 356,310		$ -	0.0	$ -	20%	$ 71,262	2%	$ 7,126	15%	$ 65,205	10%	$ 49,990	$ 549,893	$ 137,473	$ 109,979	$ 14,033	$ 811,378
W-M-BRE-017	**New**	PPE_FUTURE_CONNECTION_169	Breslau	New WM extension from Woolwich St S along Ebycrest Rd	N/A	200	2024 - 2033	28	Suburban	$ 1,276	$ 35,576		$ -	0.0	$ -	20%	$ 7,115	2%	$ 712	15%	$ 6,510	10%	$ 4,991	$ 54,905	$ 13,726	$ 10,981	$ 1,401	$ 81,013
W-M-BRE-017	**New**	FUTURE_PIPE_107	Breslau	New WM extension from Woolwich St S along Ebycrest Rd	N/A	200	2024 - 2033	34	Suburban	$ 1,276	$ 43,444		$ -	0.0	$ -	20%	$ 8,689	2%	$ 869	15%	$ 7,950	10%	$ 6,095	$ 67,047	$ 16,762	$ 13,409	$ 1,711	$ 98,929
W-M-BRE-018	**New**	PPE_FUTURE_CONNECTION_173	Breslau	New WM along Ebycrest from Bridge St E to future extension of Fountain St N	N/A	300	2034 - 2051	908	Rural	$ 1,276	$ 1,158,754	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 24,455	15%	$ 187,081	10%	$ 143,429	$ 1,577,720	$ 394,430	$ 315,544	$ 40,263	$ 2,327,958
W-M-BRE-019	**New**	PPE_FUTURE_CONNECTION_174	Breslau	New WM in northwest greenfield growth area	N/A	300	2034 - 2051	460	Rural	$ 1,276	$ 587,564		$ -	0.0	$ -	0%	$ -	2%	$ 11,751	15%	$ 89,897	10%	$ 68,921	$ 758,133	$ 189,533	$ 151,627	$ 19,348	$ 1,118,641
W-M-BRE-019	**New**	FUTURE_PIPE_35	Breslau	New WM in northwest greenfield growth area	N/A	300	2034 - 2051	1599	Rural	$ 1,276	$ 2,041,064	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 42,101	15%	$ 322,075	10%	$ 246,924	$ 2,716,164	$ 679,041	$ 543,233	$ 69,317	$ 4,007,754
W-M-BRE-020	**New**	BRIDGEPORT_BRESLAU_CONNECTION	Breslau	New WM connection between Breslau North-West Greenfield Development and Bridgeport	N/A	300	2034 - 2051	295	Rural	$ 1,276	$ 376,251		$ -	0.0	$ -	0%	$ -	2%	$ 7,525	15%	$ 57,566	10%	$ 44,134	$ 485,477	$ 121,369	$ 97,095	$ 12,389	$ 716,331
W-M-BRE-021	**New**	PPE_FUTURE_CONNECTION_193	Breslau	New WM along Victoria St N between Fountain St N and Greenhouse Rd	N/A	300	2034 - 2051	349	Rural	$ 1,276	$ 445,466		$ -	0.0	$ -	0%	$ -	2%	$ 8,909	15%	$ 68,156	10%	$ 52,253	$ 574,785	$ 143,696	$ 114,957	$ 14,669	$ 848,107
W-M-BRE-021	**New**	PPE_FUTURE_CONNECTION_194	Breslau	New WM along Victoria St N between Fountain St N and Greenhouse Rd	N/A	300	2034 - 2051	419	Rural	$ 1,276	$ 534,937		$ -	0.0	$ -	0%	$ -	2%	$ 10,699	15%	$ 81,845	10%	$ 62,748	$ 690,229	$ 172,557	$ 138,046	$ 17,615	$ 1,018,447
W-M-BRE-021	**New**	PPE_FUTURE_CONNECTION_195	Breslau	New WM along Victoria St N between Fountain St N and Greenhouse Rd	N/A	300	2034 - 2051	565	Rural	$ 1,276	$ 720,446	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 15,689	15%	$ 120,020	10%	$ 92,015	$ 1,012,170	$ 253,043	$ 202,434	$ 25,831	$ 1,493,478
W-M-BRE-021	**New**	PPE_FUTURE_CONNECTION_196	Breslau	New WM along Victoria St N between Fountain St N and Greenhouse Rd	N/A	300	2034 - 2051	471	Rural	$ 1,276	$ 601,037	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 13,301	15%	$ 101,751	10%	$ 78,009	$ 858,097	$ 214,524	$ 171,619	$ 21,899	$ 1,266,139
W-M-BRE-022	**New**	PPE_FUTURE_CONNECTION_170	Breslau	New WM extension of Fountain St N to connect to north-west greenfield growth	N/A	300	2024 - 2033	113	Rural	$ 1,276	$ 144,719		$ -	0.0	$ -	0%	$ -	2%	$ 2,894	15%	$ 22,142	10%	$ 16,976	$ 186,731	$ 46,683	$ 37,346	$ 4,765	$ 275,526
W-M-BRE-024	**New**	PPE_UPDATE_3	Breslau	New Future WM to connect Woolwich St S	N/A	300	2024 - 2033	520	Suburban	$ 1,276	$ 663,929		$ -	0.0	$ -	20%	$ 132,786	2%	$ 13,279	15%	$ 121,499	10%	$ 93,149	$ 1,024,641	$ 256,160	$ 204,928	$ 26,149	$ 1,511,879
W-M-BRE-025	**New**	PPE_FUTURE_CONNECTION_159	Breslau	New Future Breslau EA Connector from Fountain St N to Greenhouse Rd	N/A	300	2024 - 2033	350	Rural	$ 1,276	$ 447,107	Major Creek	$ 358,000	0.0	$ -	0%	$ -	2%	$ 16,102	15%	$ 123,181	10%	$ 94,439	$ 1,038,830	$ 259,707	$ 207,766	$ 26,511	$ 1,532,814
W-M-BRE-025	**New**	PPE_UPDATE_5	Breslau	New Future Breslau EA Connector from Fountain St N to Greenhouse Rd	N/A	300	2024 - 2033	687	Rural	$ 1,276	$ 877,139	Major Creek	$ 358,000	0.0	$ -	0%	$ -	2%	$ 24,703	15%	$ 188,976	10%	$ 144,882	$ 1,593,699	$ 398,425	$ 318,740	$ 40,671	$ 2,351,535
W-M-BRE-025	**New**	PPE_UPDATE_7	Breslau	New Future Breslau EA Connector from Fountain St N to Greenhouse Rd	N/A	300	2024 - 2033	418	Rural	$ 1,276	$ 533,501		$ -	0.0	$ -	0%	$ -	2%	$ 10,670	15%	$ 81,626	10%	$ 62,580	$ 688,377	$ 172,094	$ 137,675	$ 17,567	$ 1,015,714
W-M-BRE-026	**New**	PPE_UPDATE_11	Breslau	New WM from Fountain St N to Lonsdale Rd	N/A	300	2024 - 2033	1384	Urban	$ 1,276	$ 1,765,783	Creek	$ 64,000	0.0	$ -	30%	$ 548,935	2%	$ 36,596	15%	$ 362,297	10%	$ 277,761	$ 3,055,371	$ 763,843	$ 611,074	$ 77,973	$ 4,508,261
W-M-BRE-027	**New**	PPE_FUTURE_CONNECTION_91	Breslau	New WM along Greenhouse Rd between Kramp Rd and Victoria St N	N/A	300	2024 - 2033	295	Suburban	$ 1,276	$ 376,557	Creek	$ 64,000	0.0	$ -	20%	$ 88,111	2%	$ 8,811	15%	$ 80,622	10%	$ 61,810	$ 679,911	$ 169,978	$ 135,982	$ 17,351	$ 1,003,223
W-M-BRE-027	**New**	PPE_UPDATE_9	Breslau	New WM along Greenhouse Rd between Kramp Rd and Victoria St N	N/A	300	2024 - 2033	499	Suburban	$ 1,276	$ 636,484		$ -	0.0	$ -	20%	$ 127,297	2%	$ 12,730	15%	$ 116,477	10%	$ 89,299	$ 982,287	$ 245,572	$ 196,457	$ 25,068	$ 1,449,383
W-M-BRE-028	**New**	PPE_FUTURE_CONNECTION_92	Breslau	New WM along Victoria St N between Greenhouse Rd and W-M-BRE-013	N/A	300	Beyond 2051	317	Rural	$ 1,276	$ 404,022		$ -	0.0	$ -	0%	$ -	2%	$ 8,080	15%	$ 61,815	10%	$ 47,392	$ 521,309	$ 130,327	$ 104,262	$ 13,304	$ 769,202
W-M-BRE-028	**New**	PPE_FUTURE_CONNECTION_93	Breslau	New WM along Victoria St N between Greenhouse Rd and W-M-BRE-013	N/A	300	Beyond 2051	311	Rural	$ 1,276	$ 397,330		$ -	0.0	$ -	0%	$ -	2%	$ 7,947	15%	$ 60,791	10%	$ 46,607	$ 512,675	$ 128,169	$ 102,535	$ 13,083	$ 756,462
W-M-BRE-029	**New**	PPE_FUTURE_CONNECTION_187	Breslau	New WM along Victoria St N between W-M-BRE-013 and Shantz Station Rd	N/A	300	Beyond 2051	1112	Rural	$ 1,276	$ 1,418,971	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 29,659	15%	$ 226,895	10%	$ 173,952	$ 1,913,477	$ 478,369	$ 382,695	$ 48,832	$ 2,823,374
W-M-BRE-030	**New**	PPE_FUTURE_CONNECTION_83	Breslau	New WM along Kramp Rd between W-M-BRE-013 and Shantz Station Rd	N/A	300	Beyond 2051	192	Rural	$ 1,276	$ 245,546		$ -	0.0	$ -	0%	$ -	2%	$ 4,911	15%	$ 37,569	10%	$ 28,803	$ 316,828	$ 79,207	$ 63,366	$ 8,085	$ 467,486
W-M-BRE-030	**New**	PPE_FUTURE_CONNECTION_84	Breslau	New WM along Kramp Rd between W-M-BRE-013 and Shantz Station Rd	N/A	300	Beyond 2051	207	Rural	$ 1,276	$ 264,165		$ -	0.0	$ -	0%	$ -	2%	$ 5,283	15%	$ 40,417	10%	$ 30,987	$ 340,852	$ 85,213	$ 68,170	$ 8,699	$ 502,934
W-M-BRE-030	**New**	PPE_FUTURE_CONNECTION_85	Breslau	New WM along Kramp Rd between W-M-BRE-013 and Shantz Station Rd	N/A	300	Beyond 2051	211	Rural	$ 1,276	$ 269,723		$ -	0.0	$ -	0%	$ -	2%	$ 5,394	15%	$ 41,268	10%	$ 31,638	$ 348,023	$ 87,006	$ 69,605	$ 8,882	$ 513,515
W-M-BRE-030	**New**	PPE_FUTURE_CONNECTION_86	Breslau	New WM along Kramp Rd between W-M-BRE-013 and Shantz Station Rd	N/A	300	Beyond 2051	270	Rural	$ 1,276	$ 345,012		$ -	0.0	$ -	0%	$ -	2%	$ 6,900	15%	$ 52,787	10%	$ 40,470	$ 445,169	$ 111,292	$ 89,034	$ 11,361	$ 656,855
W-M-BRE-030	**New**	PPE_FUTURE_CONNECTION_98	Breslau	New WM along Kramp Rd between W-M-BRE-013 and Shantz Station Rd	N/A	300	Beyond 2051	155	Rural	$ 1,276	$ 198,209		$ -	0.0	$ -	0%	$ -	2%	$ 3,964	15%	$ 30,326	10%	$ 23,250	$ 255,749	$ 63,937	$ 51,150	$ 6,527	$ 377,362
W-M-BRE-031	**New**	PPE_UPDATE_10	Breslau	New WM along Lonsdale Rd to Menno St	N/A	300	2024 - 2033	969	Suburban	$ 1,276	$ 1,236,483	Creek	$ 64,000	0.0	$ -	20%	$ 260,097	2%	$ 26,010	15%	$ 237,988	10%	$ 182,458	$ 2,007,035	$ 501,759	$ 401,407	$ 51,220	$ 2,961,420
W-M-CON-001	**New**	PPE_06132	Conestogo	New WM along Evening Star Lane from Sawmill Rd to Elgin St W	150	300	2024 - 2033	9	Suburban	$ 1,276	$ 11,238		$ -	0.0	$ -	20%	$ 2,248	2%	$ 225	15%	$ 2,056	10%	$ 1,577	$ 17,343	$ 4,336	$ 3,469	$ 443	$ 25,590
W-M-CON-001	**New**	PPE_06133	Conestogo	New WM along Evening Star Lane from Sawmill Rd to Elgin St W	150	300	2024 - 2033	145	Suburban	$ 1,276	$ 185,414		$ -	0.0	$ -	20%	$ 37,083	2%	$ 3,708	15%	$ 33,931	10%	$ 26,014	$ 286,150	$ 71,537	$ 57,230	$ 7,303	$ 422,219
W-M-CON-001	**New**	PPE_06131	Conestogo	New WM along Evening Star Lane from Sawmill Rd to Elgin St W	150	300	2024 - 2033	5	Suburban	$ 1,276	$ 6,134		$ -	0.0	$ -	20%	$ 1,227	2%	$ 123	15%	$ 1,122	10%	$ 861	$ 9,466	$ 2,367	$ 1,893	$ 242	$ 13,967
W-M-CON-002	**Upgrade**	PPE_06155	Conestogo	Upgrade WM along Elgin St W from Northfield Dr E to Evening Star Lane	150	200	2024 - 2033	4	Suburban	$ 1,276	$ 4,639		$ -	0.0	$ -	20%	$ 928	2%	$ 93	15%	$ 849	10%	$ 651	$ 7,159	$ 1,790	$ 1,432	$ 183	$ 10,563
W-M-CON-002	**Upgrade**	PPE_UPGRADE_12	Conestogo	Upgrade WM along Elgin St W from Northfield Dr E to Evening Star Lane	N/A	200	2024 - 2033	82	Suburban	$ 1,276	$ 104,461		$ -	0.0	$ -	20%	$ 20,892	2%	$ 2,089	15%	$ 19,116	10%	$ 14,656	$ 161,215	$ 40,304	$ 32,243	$ 4,114	$ 237,876
W-M-CON-002	**Upgrade**	PPE_43069	Conestogo	Upgrade WM along Elgin St W from Northfield Dr E to Evening Star Lane	150	200	2024 - 2033	15	Suburban	$ 1,276	$ 18,803		$ -	0.0	$ -	20%	$ 3,761	2%	$ 376	15%	$ 3,441	10%	$ 2,638	$ 29,019	$ 7,255	$ 5,804	$ 741	$ 42,818
W-M-ELM-001	**Upgrade**	PPE_05348	Elmira	Upgrade WM along Arthur St N from Riverside Dr W to end of existing Arthur St N	150	300	2024 - 2033	295	Suburban	$ 1,276	$ 376,517	Creek	$ 64,000	0.0	$ -	20%	$ 88,103	2%	$ 8,810	15%	$ 80,615	10%	$ 61,804	$ 679,849	$ 169,962	$ 135,970	$ 17,350	$ 1,003,131
W-M-ELM-001	**Upgrade**	PPE_05349	Elmira	Upgrade WM along Arthur St N from Riverside Dr W to end of existing Arthur St N	150	300	2024 - 2033	149	Suburban	$ 1,276	$ 190,118		$ -	0.0	$ -	20%	$ 38,024	2%	$ 3,802	15%	$ 34,792	10%	$ 26,674	$ 293,410	$ 73,352	$ 58,682	$ 7,488	$ 432,932
W-M-ELM-002	**Upgrade**	PPE_05350	Elmira	Upgrade WM along Martins Ln to High St	150	300	2024 - 2033	190	Suburban	$ 1,276	$ 242,599		$ -	0.0	$ -	20%	$ 48,520	2%	$ 4,852	15%	$ 44,396	10%	$ 34,037	$ 374,402	$ 93,601	$ 74,880	$ 9,555	$ 552,438

W-M-ELM-002	**Upgrade**	PPE_05352	Elmira	Upgrade WM along Martins Ln to High St	150	300	2024 - 2033	151	Suburban	$ 1,276	$ 193,306		$ -	0.0	$ -	20%	$ 38,661	2%	$ 3,866	15%	$ 35,375	10%	$ 27,121	$ 298,330	$ 74,582	$ 59,666	$ 7,613	$ 440,191
W-M-ELM-004	**New**	PPE_FUTURE_CONNECTION_31	Elmira	New WM along Arthur St N to North East Greenfield Growth	N/A	300	2034 - 2051	89	Suburban	$ 1,276	$ 113,273		$ -	0.0	$ -	20%	$ 22,655	2%	$ 2,265	15%	$ 20,729	10%	$ 15,892	$ 174,814	$ 43,704	$ 34,963	$ 4,461	$ 257,942
W-M-ELM-005	**New**	PPE_FUTURE_CONNECTION_32	Elmira	New WM in North East Greenfield Growth connecting from Arthur St N and Church St E	N/A	300	2034 - 2051	316	Rural	$ 1,276	$ 403,558		$ -	0.0	$ -	0%	$ -	2%	$ 8,071	15%	$ 61,744	10%	$ 47,337	$ 520,711	$ 130,178	$ 104,142	$ 13,289	$ 768,320
W-M-ELM-005	**New**	FUTURE_PIPE_14	Elmira	New WM in North East Greenfield Growth connecting from Arthur St N and Church St E	N/A	300	2034 - 2051	626	Rural	$ 1,276	$ 798,594		$ -	0.0	$ -	0%	$ -	2%	$ 15,972	15%	$ 122,185	10%	$ 93,675	$ 1,030,425	$ 257,606	$ 206,085	$ 26,296	$ 1,520,413
W-M-ELM-005	**New**	FUTURE_PIPE_15	Elmira	New WM in North East Greenfield Growth connecting from Arthur St N and Church St E	N/A	300	2034 - 2051	215	Rural	$ 1,276	$ 273,762		$ -	0.0	$ -	0%	$ -	2%	$ 5,475	15%	$ 41,886	10%	$ 32,112	$ 353,236	$ 88,309	$ 70,647	$ 9,015	$ 521,206
W-M-ELM-005	**New**	PPE_FUTURE_CONNECTION_247	Elmira	New WM in North East Greenfield Growth connecting from Arthur St N and Church St E	N/A	300	2034 - 2051	206	Rural	$ 1,276	$ 262,936		$ -	0.0	$ -	0%	$ -	2%	$ 5,259	15%	$ 40,229	10%	$ 30,842	$ 339,267	$ 84,817	$ 67,853	$ 8,658	$ 500,595
W-M-ELM-005	**New**	PPE_FUTURE_CONNECTION_34	Elmira	New WM in North East Greenfield Growth connecting from Arthur St N and Church St E	N/A	300	2034 - 2051	147	Rural	$ 1,276	$ 187,092		$ -	0.0	$ -	0%	$ -	2%	$ 3,742	15%	$ 28,625	10%	$ 21,946	$ 241,404	$ 60,351	$ 48,281	$ 6,161	$ 356,197
W-M-ELM-005	**New**	PPE_FUTURE_CONNECTION_33	Elmira	New WM in North East Greenfield Growth connecting from Arthur St N and Church St E	N/A	300	2034 - 2051	111	Rural	$ 1,276	$ 141,884		$ -	0.0	$ -	0%	$ -	2%	$ 2,838	15%	$ 21,708	10%	$ 16,643	$ 183,073	$ 45,768	$ 36,615	$ 4,672	$ 270,129
W-M-ELM-009	**New**	PPE_FUTURE_CONNECTION_1	Elmira	New WM along Church St W to service west Greenfield Growth Development	N/A	300	2024 - 2033	342	Rural	$ 1,276	$ 436,768		$ -	0.0	$ -	0%	$ -	2%	$ 8,735	15%	$ 66,825	10%	$ 51,233	$ 563,561	$ 140,890	$ 112,712	$ 14,382	$ 831,546
W-M-ELM-009	**New**	PPE_FUTURE_CONNECTION_2	Elmira	New WM along Church St W to service west Greenfield Growth Development	N/A	300	2024 - 2033	128	Rural	$ 1,276	$ 163,417		$ -	0.0	$ -	0%	$ -	2%	$ 3,268	15%	$ 25,003	10%	$ 19,169	$ 210,857	$ 52,714	$ 42,171	$ 5,381	$ 311,123
W-M-ELM-009	**New**	PPE_FUTURE_CONNECTION_3	Elmira	New WM along Church St W to service west Greenfield Growth Development	N/A	300	2024 - 2033	195	Rural	$ 1,276	$ 249,045		$ -	0.0	$ -	0%	$ -	2%	$ 4,981	15%	$ 38,104	10%	$ 29,213	$ 321,343	$ 80,336	$ 64,269	$ 8,201	$ 474,148
W-M-ELM-010	**New**	PPE_FUTURE_CONNECTION_7	Elmira	New WM through West Greenfield Growth from Church St W to West Tank	N/A	300	2024 - 2033	619	Rural	$ 1,276	$ 790,377	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 17,088	15%	$ 130,720	10%	$ 100,218	$ 1,102,403	$ 275,601	$ 220,481	$ 28,133	$ 1,626,618
W-M-ELM-010	**New**	PPE_FUTURE_CONNECTION_190	Elmira	New WM through West Greenfield Growth from Church St W to West Tank	N/A	300	2024 - 2033	320	Rural	$ 1,276	$ 407,774		$ -	0.0	$ -	0%	$ -	2%	$ 8,155	15%	$ 62,389	10%	$ 47,832	$ 526,151	$ 131,538	$ 105,230	$ 13,427	$ 776,347
W-M-ELM-011	**New**	FUTURE_PIPE_7	Elmira	New WM in West Greenfield Growth Development from West Tank to South Parkwood Blvd Extension	N/A	300	2034 - 2051	485	Rural	$ 1,276	$ 619,224		$ -	0.0	$ -	0%	$ -	2%	$ 12,384	15%	$ 94,741	10%	$ 72,635	$ 798,985	$ 199,746	$ 159,797	$ 20,390	$ 1,178,919
W-M-ELM-011	**New**	FUTURE_PIPE_8	Elmira	New WM in West Greenfield Growth Development from West Tank to South Parkwood Blvd Extension	N/A	300	2034 - 2051	780	Rural	$ 1,276	$ 995,017	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 21,180	15%	$ 162,030	10%	$ 124,223	$ 1,366,449	$ 341,612	$ 273,290	$ 34,872	$ 2,016,224
W-M-ELM-012	**New**	FUTURE_PIPE_9	Elmira	New WM Extension along South Parkwood Blvd to West Greenfield Growth	N/A	300	2034 - 2051	492	Rural	$ 1,276	$ 627,750		$ -	0.0	$ -	0%	$ -	2%	$ 12,555	15%	$ 96,046	10%	$ 73,635	$ 809,985	$ 202,496	$ 161,997	$ 20,671	$ 1,195,150
W-M-ELM-012	**New**	PPE_FUTURE_CONNECTION_25	Elmira	New WM Extension along South Parkwood Blvd to West Greenfield Growth	N/A	300	2034 - 2051	199	Rural	$ 1,276	$ 253,481		$ -	0.0	$ -	0%	$ -	2%	$ 5,070	15%	$ 38,783	10%	$ 29,733	$ 327,067	$ 81,767	$ 65,413	$ 8,347	$ 482,593
W-M-ELM-012	**New**	PPE_FUTURE_CONNECTION_24	Elmira	New WM Extension along South Parkwood Blvd to West Greenfield Growth	N/A	300	2034 - 2051	182	Rural	$ 1,276	$ 232,237		$ -	0.0	$ -	0%	$ -	2%	$ 4,645	15%	$ 35,532	10%	$ 27,241	$ 299,655	$ 74,914	$ 59,931	$ 7,647	$ 442,147
W-M-ELM-012	**New**	PPE_FUTURE_CONNECTION_23	Elmira	New WM Extension along South Parkwood Blvd to West Greenfield Growth	N/A	300	2034 - 2051	149	Rural	$ 1,276	$ 190,690	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 5,094	15%	$ 38,968	10%	$ 29,875	$ 328,626	$ 82,156	$ 65,725	$ 8,387	$ 484,894
W-M-ELM-014	**New**	PPE_FUTURE_CONNECTION_224	Elmira	New WM Connection from Whippoorwill Dr to South Parkwood Blvd	N/A	200	2034 - 2051	63	Rural	$ 1,276	$ 80,043		$ -	0.0	$ -	0%	$ -	2%	$ 1,601	15%	$ 12,247	10%	$ 9,389	$ 103,280	$ 25,820	$ 20,656	$ 2,636	$ 152,392
W-M-ELM-014	**New**	PPE_FUTURE_CONNECTION_26	Elmira	New WM Connection from Whippoorwill Dr to South Parkwood Blvd	N/A	200	2034 - 2051	367	Rural	$ 1,276	$ 467,982		$ -	0.0	$ -	0%	$ -	2%	$ 9,360	15%	$ 71,601	10%	$ 54,894	$ 603,838	$ 150,959	$ 120,768	$ 15,410	$ 890,975
W-M-ELM-015	**New**	GMBP_PPE_42984	Elmira	New WM extension from Timber Trail Rd connecting to South Parkwood Blvd	300	300	2034 - 2051	8	Rural	$ 1,276	$ 10,813		$ -	0.0	$ -	0%	$ -	2%	$ 216	15%	$ 1,654	10%	$ 1,268	$ 13,952	$ 3,488	$ 2,790	$ 356	$ 20,587
W-M-ELM-015	**New**	PPE_FUTURE_CONNECTION_226	Elmira	New WM extension from Timber Trail Rd connecting to South Parkwood Blvd	N/A	300	2034 - 2051	468	Rural	$ 1,276	$ 597,743	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 13,235	15%	$ 101,247	10%	$ 77,622	$ 853,847	$ 213,462	$ 170,769	$ 21,790	$ 1,259,869
W-M-ELM-015	**New**	PPE_FUTURE_CONNECTION_228	Elmira	New WM extension from Timber Trail Rd connecting to South Parkwood Blvd	N/A	300	2034 - 2051	216	Rural	$ 1,276	$ 275,571		$ -	0.0	$ -	0%	$ -	2%	$ 5,511	15%	$ 42,162	10%	$ 32,324	$ 355,569	$ 88,892	$ 71,114	$ 9,074	$ 524,650
W-M-ELM-016	**New**	PPE_FUTURE_CONNECTION_223	Elmira	New WM connection from Kingfisher Dr. to west Greenfield Growth WM	N/A	200	2034 - 2051	342	Rural	$ 1,276	$ 436,358		$ -	0.0	$ -	0%	$ -	2%	$ 8,727	15%	$ 66,763	10%	$ 51,185	$ 563,033	$ 140,758	$ 112,607	$ 14,369	$ 830,767
W-M-ELM-017	**New**	PPE_SCOTCHLINE_1	Elmira	New WM along Scotch Line Rd from Arthur St S	N/A	300	2024 - 2033	523	Rural	$ 1,276	$ 667,734		$ -	0.0	$ -	0%	$ -	2%	$ 13,355	15%	$ 102,163	10%	$ 78,325	$ 861,577	$ 215,394	$ 172,315	$ 21,987	$ 1,271,274
W-M-ELM-017	**New**	PPE_SCOTCHLINE_2	Elmira	New WM along Scotch Line Rd from Arthur St S	N/A	300	2024 - 2033	398	Rural	$ 1,276	$ 508,090		$ -	0.0	$ -	0%	$ -	2%	$ 10,162	15%	$ 77,738	10%	$ 59,599	$ 655,588	$ 163,897	$ 131,118	$ 16,731	$ 967,334
W-M-ELM-017	**New**	PPE_SCOTCHLINE_3	Elmira	New WM along Scotch Line Rd from Arthur St S	N/A	300	2024 - 2033	634	Rural	$ 1,276	$ 808,577		$ -	0.0	$ -	0%	$ -	2%	$ 16,172	15%	$ 123,712	10%	$ 94,846	$ 1,043,307	$ 260,827	$ 208,661	$ 26,625	$ 1,539,421
W-M-ELM-018	**New**	PPE_SCOTCHLINE_4	Elmira	New WM from Scotch Line Rd to South East Greenfield Growth Development	N/A	300	2024 - 2033	215	Rural	$ 1,276	$ 274,764		$ -	0.0	$ -	0%	$ -	2%	$ 5,495	15%	$ 42,039	10%	$ 32,230	$ 354,529	$ 88,632	$ 70,906	$ 9,048	$ 523,114
W-M-ELM-018	**New**	FUTURE_PIPE_74	Elmira	New WM from Scotch Line Rd to South East Greenfield Growth Development	N/A	300	2024 - 2033	296	Rural	$ 1,276	$ 377,585		$ -	0.0	$ -	0%	$ -	2%	$ 7,552	15%	$ 57,770	10%	$ 44,291	$ 487,198	$ 121,799	$ 97,440	$ 12,433	$ 718,870
W-M-ELM-018	**New**	FUTURE_PIPE_75	Elmira	New WM from Scotch Line Rd to South East Greenfield Growth Development	N/A	300	2024 - 2033	278	Rural	$ 1,276	$ 355,405		$ -	0.0	$ -	0%	$ -	2%	$ 7,108	15%	$ 54,377	10%	$ 41,689	$ 458,579	$ 114,645	$ 91,716	$ 11,703	$ 676,642
W-M-ELM-018	**New**	FUTURE_PIPE_70	Elmira	New WM from Scotch Line Rd to South East Greenfield Growth Development	N/A	300	2024 - 2033	206	Rural	$ 1,276	$ 263,102		$ -	0.0	$ -	0%	$ -	2%	$ 5,262	15%	$ 40,255	10%	$ 30,862	$ 339,481	$ 84,870	$ 67,896	$ 8,664	$ 500,911
W-M-ELM-018	**New**	PPE_FUTURE_CONNECTION_42	Elmira	New WM from Scotch Line Rd to South East Greenfield Growth Development	N/A	300	2024 - 2033	195	Rural	$ 1,276	$ 248,408		$ -	0.0	$ -	0%	$ -	2%	$ 4,968	15%	$ 38,006	10%	$ 29,138	$ 320,520	$ 80,130	$ 64,104	$ 8,180	$ 472,934
W-M-ELM-019	**New**	PPE_FUTURE_CONNECTION_37	Elmira	Extension of Southfield Dr WM Eastwards	N/A	300	2024 - 2033	223	Rural	$ 1,276	$ 285,149	Railway	$ 155,000	0.0	$ -	0%	$ -	2%	$ 8,803	15%	$ 67,343	10%	$ 51,629	$ 567,924	$ 141,981	$ 113,585	$ 14,493	$ 837,983
W-M-ELM-019	**New**	PPE_FUTURE_CONNECTION_38	Elmira	Extension of Southfield Dr WM Eastwards	N/A	300	2024 - 2033	473	Rural	$ 1,276	$ 603,108		$ -	0.0	$ -	0%	$ -	2%	$ 12,062	15%	$ 92,276	10%	$ 70,745	$ 778,190	$ 194,548	$ 155,638	$ 19,859	$ 1,148,235
W-M-ELM-020	**Upgrade**	PPE_05159	Elmira	Upgrade WM along First Street East from Duke St to Union St	200	300	2034 - 2051	313	Suburban	$ 1,276	$ 399,409		$ -	0.0	$ -	20%	$ 79,882	2%	$ 7,988	15%	$ 73,092	10%	$ 56,037	$ 616,408	$ 154,102	$ 123,282	$ 15,731	$ 909,523
W-M-ELM-021	**Upgrade**	PPE_SCOTCHLINE	Elmira	Replacement of abandoned WM along Arthur St S	300	300	2024 - 2033	812	Rural	$ 1,276	$ 1,036,423	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 22,008	15%	$ 168,365	10%	$ 129,080	$ 1,419,876	$ 354,969	$ 283,975	$ 36,235	$ 2,095,056
W-M-ELM-023	**Upgrade**	PPE_05559	Elmira	Upgrade WM on Mill St from Duke St to Mill St East Dead End	150	200	2024 - 2033	59	Suburban	$ 1,276	$ 74,818		$ -	0.0	$ -	20%	$ 14,964	2%	$ 1,496	15%	$ 13,692	10%	$ 10,497	$ 115,467	$ 28,867	$ 23,093	$ 2,947	$ 170,374
W-M-ELM-025	**Upgrade**	PPE_05549	Elmira	Upgrade WM on Bonnie Crescent from Union St to Bonnie Cres Dead End	150	250	2034 - 2051	216	Suburban	$ 1,276	$ 275,424		$ -	0.0	$ -	20%	$ 55,085	2%	$ 5,508	15%	$ 50,403	10%	$ 38,642	$ 425,062	$ 106,265	$ 85,012	$ 10,848	$ 627,187
W-M-ELM-026	**Upgrade**	PPE_05552	Elmira	Upgrade WM on Howard Ave from Howard Tank Connection to Industrial Dr	250	350	2034 - 2051	155	Suburban	$ 1,278	$ 197,691		$ -	0.0	$ -	20%	$ 39,538	2%	$ 3,954	15%	$ 36,177	10%	$ 27,736	$ 305,096	$ 76,274	$ 61,019	$ 7,786	$ 450,176
W-M-ELM-028	**Upgrade**	PPE_05547	Elmira	Upgrade WM on First Street E from Union St to First Street East Dead end	150	250	2024 - 2033	292	Suburban	$ 1,276	$ 372,941		$ -	0.0	$ -	20%	$ 74,588	2%	$ 7,459	15%	$ 68,248	10%	$ 52,324	$ 575,559	$ 143,890	$ 115,112	$ 14,688	$ 849,249
W-M-ELM-029	**New**	PPE_FUTURE_CONNECTION_28	Elmira	New WM from Listowel Rd to west greenfield growth	N/A	300	2034 - 2051	438	Rural	$ 1,276	$ 559,616	Creek	$ 64,000	0.0	$ -	0%	$ -	2%	$ 12,472	15%	$ 95,413	10%	$ 73,150	$ 804,651	$ 201,163	$ 160,930	$ 20,535	$ 1,187,279
W-M-ELM-029	**New**	PPE_FUTURE_CONNECTION_229	Elmira	New WM from Listowel Rd to west greenfield growth	N/A	300	2034 - 2051	39	Rural	$ 1,276	$ 49,234		$ -		$ -	0%	$ -	2%	$ 985	15%	$ 7,533	10%	$ 5,775	$ 63,526	$ 15,882	$ 12,705	$ 1,621	$ 93,734
W-M-ELM-030	**New**	PPE_FUTURE_CONNECTION_5	Elmira	New WM from Church St W to Eldale Rd dead-end	N/A	200	2024 - 2033	187	Rural	$ 1,276	$ 238,635		$ -		$ -	0%	$ -	2%	$ 4,773	15%	$ 36,511	10%	$ 27,992	$ 307,911	$ 76,978	$ 61,582	$ 7,858	$ 454,328
W-M-ELM-030	**New**	FUTURE_PIPE_5	Elmira	New WM from Church St W to Eldale Rd dead-end	N/A	200	2024 - 2033	312	Rural	$ 1,276	$ 397,639		$ -		$ -	0%	$ -	2%	$ 7,953	15%	$ 60,839	10%	$ 46,643	$ 513,073	$ 128,268	$ 102,615	$ 13,094	$ 757,050
W-M-ELM-031	**New**	FUTURE_PIPE_4	Elmira	New WM from Eldale Rd looping to Church St W	N/A	200	2024 - 2033	286	Rural	$ 1,276	$ 365,423		$ -		$ -	0%	$ -	2%	$ 7,308	15%	$ 55,910	10%	$ 42,864	$ 471,505	$ 117,876	$ 94,301	$ 12,033	$ 695,715
W-M-ELM-031	**New**	FUTURE_PIPE_3	Elmira	New WM from Eldale Rd looping to Church St W	N/A	200	2024 - 2033	334	Rural	$ 1,276	$ 425,753		$ -		$ -	0%	$ -	2%	$ 8,515	15%	$ 65,140	10%	$ 49,941	$ 549,349	$ 137,337	$ 109,870	$ 14,019	$ 810,575
W-M-ELM-031	**New**	FUTURE_PIPE_3	Elmira	New WM from Eldale Rd looping to Church St W	N/A	200	2024 - 2033	199	Rural	$ 1,276	$ 253,685		$ -		$ -	0%	$ -	2%	$ 5,074	15%	$ 38,814	10%	$ 29,757	$ 327,330	$ 81,832	$ 65,466	$ 8,353	$ 482,981
W-M-STJ-001	**Upgrade**	PPE_05393	St. Jacobs	Upgrade WM along King St N from St Jacobs Rsvr Connection to North King St N	150	200	2034 - 2051	135	Suburban	$ 1,276	$ 172,856		$ -	0.0	$ -	20%	$ 34,571	2%	$ 3,457	15%	$ 31,633	10%	$ 24,252	$ 266,769	$ 66,692	$ 53,354	$ 6,808	$ 393,623
W-M-STJ-001	**Upgrade**	PPE_05394	St. Jacobs	Upgrade WM along King St N from St Jacobs Rsvr Connection to North King St N	150	200	2034 - 2051	101	Suburban	$ 1,276	$ 128,837		$ -	0.0	$ -	20%	$ 25,767	2%	$ 2,577	15%	$ 23,577	10%	$ 18,076	$ 198,835	$ 49,709	$ 39,767	$ 5,074	$ 293,385
W-M-STJ-002	**New**	PPE_FUTURE_CONNECTION_46	St. Jacobs	New WM through North West Greenfield Growth	N/A	200	2034 - 2051	161	Rural	$ 1,276	$ 205,966		$ -	0.0	$ -	0%	$ -	2%	$ 4,119	15%	$ 31,513	10%	$ 24,160	$ 265,757	$ 66,439	$ 53,151	$ 6,782	$ 392,130
W-M-STJ-002	**New**	FUTURE_PIPE_86	St. Jacobs	New WM through North West Greenfield Growth	N/A	200	2034 - 2051	167	Rural	$ 1,276	$ 213,539		$ -	0.0	$ -	0%	$ -	2%	$ 4,271	15%	$ 32,672	10%	$ 25,048	$ 275,530	$ 68,882	$ 55,106	$ 7,032	$ 406,550
W-M-STJ-002	**New**	FUTURE_PIPE_84	St. Jacobs	New WM through North West Greenfield Growth	N/A	200	2034 - 2051	74	Rural	$ 1,276	$ 94,101		$ -	0.0	$ -	0%	$ -	2%	$ 1,882	15%	$ 14,397	10%	$ 11,038	$ 121,419	$ 30,355	$ 24,284	$ 3,099	$ 179,156
W-M-STJ-002	**New**	PPE_UPDATE_8	St. Jacobs	New WM through North West Greenfield Growth	N/A	200	2034 - 2051	306	Rural	$ 1,276	$ 390,785		$ -	$ -	$ -	0%	$ -	2%	$ 7,816	15%	$ 59,790	10%	$ 45,839	$ 504,230	$ 126,057	$ 100,846	$ 12,868	$ 744,001

W-M-STJ-003	**Upgrade**	PPE_05170	St. Jacobs	Upgrade and extend WM along Hawkesville Rd from Northside Dr to St. Jacobs North Lands Development	150	200	2034 - 2051	94	Suburban	$ 1,276	$ 119,335		$ -	0.0	$ -	20%	$ 23,867	2%	$ 2,387	15%	$ 21,838	10%	$ 16,743	$ 184,170	$ 46,043	$ 36,834	$ 4,700	$ 271,747
W-M-STJ-003	**Upgrade**	PPE_05591	St. Jacobs	Upgrade and extend WM along Hawkesville Rd from Northside Dr to St. Jacobs North Lands Development	150	200	2034 - 2051	73	Suburban	$ 1,276	$ 93,622		$ -	0.0	$ -	20%	$ 18,724	2%	$ 1,872	15%	$ 17,133	10%	$ 13,135	$ 144,487	$ 36,122	$ 28,897	$ 3,687	$ 213,194
W-M-STJ-003	**Upgrade**	PPE_FUTURE_CONNECTION_43	St. Jacobs	Upgrade and extend WM along Hawkesville Rd from Northside Dr to St. Jacobs North Lands Development	N/A	200	2034 - 2051	114	Suburban	$ 1,276	$ 145,935		$ -	0.0	$ -	20%	$ 29,187	2%	$ 2,919	15%	$ 26,706	10%	$ 20,475	$ 225,221	$ 56,305	$ 45,044	$ 5,748	$ 332,319
W-M-STJ-004	**Upgrade**	PPE_05592	St. Jacobs	Upgrade WM along Eby St from Northside Dr to Eby St Dead End	150	200	2024 - 2033	280	Suburban	$ 1,276	$ 357,728		$ -	0.0	$ -	20%	$ 71,546	2%	$ 7,155	15%	$ 65,464	10%	$ 50,189	$ 552,081	$ 138,020	$ 110,416	$ 14,089	$ 814,607
W-M-STJ-004	**Upgrade**	PPE_05172	St. Jacobs	Upgrade WM along Eby St from Northside Dr to Eby St Dead End	150	200	2024 - 2033	57	Suburban	$ 1,276	$ 73,147		$ -	0.0	$ -	20%	$ 14,629	2%	$ 1,463	15%	$ 13,386	10%	$ 10,263	$ 112,888	$ 28,222	$ 22,578	$ 2,881	$ 166,569
W-M-STJ-005	**New**	PPE_FUTURE_CONNECTION_54	St. Jacobs	New WM through south west Greenfield Growth Development	N/A	300	2034 - 2051	507	Rural	$ 1,276	$ 646,866		$ -	0.0	$ -	0%	$ -	2%	$ 12,937	15%	$ 98,970	10%	$ 75,877	$ 834,651	$ 208,663	$ 166,930	$ 21,300	$ 1,231,544
W-M-STJ-005	**New**	FUTURE_PIPE_28	St. Jacobs	New WM through south west Greenfield Growth Development	N/A	300	2034 - 2051	248	Rural	$ 1,276	$ 317,036		$ -	0.0	$ -	0%	$ -	2%	$ 6,341	15%	$ 48,507	10%	$ 37,188	$ 409,072	$ 102,268	$ 81,814	$ 10,440	$ 603,593
W-M-STJ-005	**New**	PPE_FUTURE_CONNECTION_55	St. Jacobs	New WM through south west Greenfield Growth Development	N/A	300	2034 - 2051	393	Rural	$ 1,276	$ 501,299	Railway	$ 155,000	0.0	$ -	0%	$ -	2%	$ 13,126	15%	$ 100,414	10%	$ 76,984	$ 846,822	$ 211,706	$ 169,364	$ 21,611	$ 1,249,503
W-M-STJ-006	**New**	PPE_FUTURE_CONNECTION_204	St. Jacobs	New WM connection to Parkside Dr from Northside Dr	N/A	250	2024 - 2033	210	Suburban	$ 1,276	$ 268,010	Regional Road	$ 143,000	0.0	$ -	20%	$ 82,202	2%	$ 8,220	15%	$ 75,215	10%	$ 57,665	$ 634,312	$ 158,578	$ 126,862	$ 16,188	$ 935,941
W-M-STY-001	**New**	PPE_FUTURE_CONNECTION_58	Stockyards	New WM through Weber St N from Benjamin Rd to Farmer's Market Rd	N/A	300	2034 - 2051	387	Rural	$ 1,276	$ 494,029		$ -	0.0	$ -	0%	$ -	2%	$ 9,881	15%	$ 75,587	10%	$ 57,950	$ 637,446	$ 159,362	$ 127,489	$ 16,268	$ 940,565
W-M-STY-001	**New**	PPE_FUTURE_CONNECTION_65	Stockyards	New WM through Weber St N from Benjamin Rd to Farmer's Market Rd	N/A	300	2034 - 2051	166	Rural	$ 1,276	$ 212,216		$ -	0.0	$ -	0%	$ -	2%	$ 4,244	15%	$ 32,469	10%	$ 24,893	$ 273,822	$ 68,456	$ 54,764	$ 6,988	$ 404,030
W-M-STY-002	**New**	PPE_FUTURE_CONNECTION_66	Stockyards	New WM through Weber St N from Farmer's Market Rd to King St N	N/A	300	2034 - 2051	106	Rural	$ 1,276	$ 134,867		$ -	0.0	$ -	0%	$ -	2%	$ 2,697	15%	$ 20,635	10%	$ 15,820	$ 174,019	$ 43,505	$ 34,804	$ 4,441	$ 256,768
W-M-STY-002	**New**	PPE_FUTURE_CONNECTION_69	Stockyards	New WM through Weber St N from Farmer's Market Rd to King St N	N/A	300	2034 - 2051	321	Rural	$ 1,276	$ 410,241		$ -	0.0	$ -	0%	$ -	2%	$ 8,205	15%	$ 62,767	10%	$ 48,121	$ 529,334	$ 132,334	$ 105,867	$ 13,509	$ 781,043
W-M-STY-003	**Upgrade**	PPE_FUTURE_CONNECTION_64	Stockyards	Upgrade WM on Farmer's Market Rd from Weber St N to Benjamin Rd	200	300	2034 - 2051	102	Suburban	$ 1,276	$ 130,440		$ -	0.0	$ -	20%	$ 26,088	2%	$ 2,609	15%	$ 23,871	10%	$ 18,301	$ 201,309	$ 50,327	$ 40,262	$ 5,137	$ 297,035
W-M-STY-004	**New**	PPE_FUTURE_CONNECTION_73	Stockyards	New WM on Farmer's Market Rd to King St N	N/A	300	2034 - 2051	155	Suburban	$ 1,276	$ 197,217		$ -	0.0	$ -	20%	$ 39,443	2%	$ 3,944	15%	$ 36,091	10%	$ 27,670	$ 304,365	$ 76,091	$ 60,873	$ 7,767	$ 449,097
W-M-STY-005	**New**	PPE_FUTURE_CONNECTION_70	Stockyards	New WM along King St N from Weber St N to Farmer's Market Rd	N/A	300	2034 - 2051	517	Suburban	$ 1,276	$ 659,875	Railway	$ 155,000	0.0	$ -	20%	$ 162,975	2%	$ 16,298	15%	$ 149,122	10%	$ 114,327	$ 1,257,597	$ 314,399	$ 251,519	$ 32,094	$ 1,855,610
W-M-STY-005	**New**	PPE_FUTURE_CONNECTION_71	Stockyards	New WM along King St N from Weber St N to Farmer's Market Rd	N/A	300	2034 - 2051	126	Suburban	$ 1,276	$ 160,499		$ -	0.0	$ -	20%	$ 32,100	2%	$ 3,210	15%	$ 29,371	10%	$ 22,518	$ 247,698	$ 61,924	$ 49,540	$ 6,321	$ 365,483
W-M-STY-005	**New**	PPE_FUTURE_CONNECTION_72	Stockyards	New WM along King St N from Weber St N to Farmer's Market Rd	N/A	300	2034 - 2051	65	Suburban	$ 1,276	$ 82,811		$ -	0.0	$ -	20%	$ 16,562	2%	$ 1,656	15%	$ 15,154	10%	$ 11,618	$ 127,802	$ 31,950	$ 25,560	$ 3,262	$ 188,574



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Township of Woolwich

APPENDIX F

DATA GAP ANALYSIS MEMO

Date:	May 16, 2023 File: 622098
To:	Lori Fox – Township of Woolwich
From:	Julien Bell and Jody Lee – GM BluePlan
Project:	Woolwich Servicing Capacity Study
Subject:	Data Gap Analysis Memo

TECHNICAL MEMO

1 Introduction

The Township of Woolwich (Township) retained GM BluePlan Engineering Limited (GMBP) to develop hydraulic models to assess the existing, and projected capacity/performance of the Township's water and wastewater systems, as part of the Township's Servicing Capacity Study.

The objective of this technical memo is to provide a concise overview of the data gaps assessment. Where there are gaps in the GIS data and as-built drawings information provided by the Township, a set of reasonable assumptions were made to logically fill these gaps in line with the methodology outlined in the model development memo. This memo provides detailed accounting of data gaps and the proposed resolutions.

Data assumptions required during the model build process have been categorized by asset type (gravity sewer pipe, forcemain, etc.), and colour-coded based on resolution priority:

Priority Level
High
Medium
Low

Assets with data gaps flagged as low- to medium-priority do not require immediate action, as data for these objects have generally been inferred or interpolated between two known data points (negligible impact on the model's ability to predict flows). Assets with data gaps flagged as high priority may require resolution prior to the model calibration phase, as these objects can have an impact on both the model calibration and subsequent system performance analysis. The following approaches may be needed to address high-priority data gaps:

- Access to as-built drawings if unavailable during model build process;
- Site inspection to confirm existence of network features (e.g., system overflows);
- Confirmation from Township of Woolwich that temporary model assumptions are appropriate based on local system knowledge.

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2 Wastewater Model

2.1 Sewage Pumping Stations (SPS)

For the purposes of the PCSWMM model, only Township-owned pump stations will be included in the hydraulic model. All private pump stations that service individual properties will not be included. The sanitary flows and contribution catchment areas for the private pump station areas will be included in the gravity catchment of these respective private pump stations discharge manhole. **Table 1** lists the pump stations included in the scope of the PCSWMM model.

Table 1: Township SPS Data

Asset Reference	Data Requirements/Modelling Inputs	Data Source	Priority
Conestogo River Run Place SPS	Pump Info (model/make; pump curves; pump start/stop levels)	**CoA #35799-5THS89**	**Low**
	Pump Station Capacity		
	Wet Well Volume	**Conestogo Estates Subdivision Dwg Set (Stantec, dated 04/03/11)**	**Low**
	Wet Well Elevation		**Low**
	Invert Elevations		**Low**
	Discharge Pipe Elevations		**Low**
	Overflow Elevations		**Low**
St. Jacobs Mill Race Crescent SPS	Pump Info (model/make; pump curves; pump start/stop levels)	**Jacobs Trail Sewage Pump Station Design Report (GMBP, dated Jan/18)**	**Low**
	Pump Station Capacity		**Low**
	Wet Well Volume		**Low**
	Wet Well Elevation		**Low**
	Invert Elevations	**Jacobs Trail Sewage Pumping Station IFT Dwg Set (GMBP, dated 03/29/18)**	**Low**
	Discharge Pipe Elevations		**Low**
	Overflow Elevations	*Estimated from:* **Jacobs Trail Sewage Pumping Station IFT Dwg Set (GMBP, dated 03/29/18)**	**Low**
Breslau Hopewell Crossing Drive SPS	Pump Info (model/make; pump curves; pump start/stop levels)	**Hopewell Crossing Subdivision Wastewater Pumping Station Preliminary Design Report (AECOM, dated Dec/16)**	**Low**
	Pump Station Capacity		**Low**
	Wet Well Volume	**Hopewell Crossing Sewage Pumping Station IFT Dwg**	**Low**
	Wet Well Elevation		**Low**

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Asset Reference	Data Requirements/Modelling Inputs	Data Source	Priority
	Invert Elevations	**Set (AECOM, dated 10/03/17)**	**Low**
	Discharge Pipe Elevations		**Low**
	Overflow Elevations		**Low**
Elmira Victoria Glen SPS	Pump Info (model/make; pump curves; pump start/stop levels)	**Riverside Drive West Reconstruction Dwg Set, No.2 (TSH Associates Ltd., dated Aug/08)**	**Low**
	Pump Station Capacity		**High**
	Wet Well Volume	**Riverside Drive West Reconstruction Dwg Set, No.2 (TSH Associates Ltd., dated Aug/08)**	**Low**
	Wet Well Elevation		**Low**
	Invert Elevations		**Low**
	Discharge Pipe Elevations		**Low**
	Overflow Elevations		**Low**
Elmira Arthur North SPS	Pump Info (model/make; pump curves; pump start/stop levels)	**North Sanitary Pumping Station Upgrades, IFT Dwg Set (MTE, dated 02/24/22)**	**Low**
	Pump Station Capacity		**Low**
	Wet Well Volume	**Township's MECP Municipal Sewage Collection System Form (rec'd 11/10/22)**	**Low**
	Wet Well Elevation	**North Sanitary Pumping Station Upgrades, IFT Dwg Set (MTE, dated 02/24/22)**	**Low**
	Invert Elevations		**Low**
	Discharge Pipe Elevations		**Low**
	Overflow Elevations		**Low**
Elmira Snyder Avenue North SPS	Pump Info (model/make; pump curves; pump start/stop levels)	**ECA #6796-949JHE**	**Low**
	Pump Station Capacity		**Low**
	Wet Well Volume		**Low**
	Wet Well Elevation	**Country Club Estates Sanitary Pumping Station Dwg Set (Gamsby & Mannerow, dated 10/15/14)**	**Low**
	Invert Elevations		**Low**
	Discharge Pipe Elevations		**Low**
	Overflow Elevations		**Low**

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2.2 Forcemains

Only active forcemains for the Township-owned stations were included in the scope of the model. Discharge forcemain from private pump stations were not included in the model. Limited invert information was available for the forcemains, however, as they operate as pumps, critical hydraulic parameters are limited to startup depth, shutoff depth, and outlet node. The startup and shutoff depth source information can be found in **Table 1**. The Township GIS did not indicate all of the outlet nodes.

Data gaps and assumptions for all forcemains in the Township are outlined in **Table 2**.

Table 2: Forcemain Data Comments and Assumptions

Settlement	Model Asset Reference	Data Comments	GMBP Data Assumption	Priority
Conestogo	SAN_FM-250002	Invert elevations: based on wet well, township GIS had value of 0	Inlet Node: SAN_PS-280001 Outlet Node: SAN_MH-220300	**Low**
Elmira	SAN_FM-250003	Invert elevations: township GIS had value of 0, inlet elevation is pump station but invert elevation may be based on dummy node	Inlet Node: SAN_PS-280002 Outlet Node: SAM_MH-221044	**Low**
Elmira	SAN_FM-250004	Invert elevations: township GIS had value of 0	Inlet Node: SAN_PS-28003a Outlet Node: SAN_MH-221041	**Low**
Elmira	SAN_FM-250011	Invert elevations: outlet node - township GIS had value of 0 inlet node -need township node	Inlet Node: SA_WWa (Wet Well) Outlet Node: SAN_MH-221057	**Low**
St. Jacobs	SAN_FM-250012	Invert elevation - outlet: township GIS had value of 0 inlet elevation - need township node	Inlet Node: SAN_MH-221433 Outlet Node: SAN_MH220171	**Low**
Breslau	SAN_FM-250009	Missing inlet and outlet invert elevations in Township GIS	Inlet Node: HC_WWa (Wet Well) Outlet Node: SAN_MH-221413	**Low**

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2.3 Gravity Sewer Network

The data assumptions made within the gravity sewer pipe network are generally low priority for resolution. These data were inferred by using elevations from an upstream or downstream object where available. A total of 6.8% of sanitary devices and 22% of pipe data were changed, including objects that were removed (abandoned or unnecessary for model), or values that were modified based on best engineering judgement.

Data assumptions for pipes in the network are summarized in **Table 3**.

Table 3: Conduit Diameter Assumptions

Settlement	Model Asset Reference	Township GIS Data	GMBP Assumption and Rationale	Priority
Elmira	SAN_P-211154	Diameter inputted as 525 mm	Diameter in model is 825mm, based on the assumption that it must be sized for the inflows from two trunk mains (525 mm and 600 mm).	**High**
Elmira	SAN_P-211425	Diameter inputted as 0 mm	Diameter in model is 200 mm. Based on the assumption that it is a stub for the undeveloped land at	**Low**
St. Jacobs	SAN_P-211479	Diameter inputted as 200 mm	Diameter in model is 300 mm. Based on Jacobs Trail Sewage Pumping Station IFT Dwg Set (GMBP, dated 03/29/18).	**Low**

The full list of manholes that were modified is provided in **Appendix A** and **Appendix B.**

Figure 1 to **Figure 6** show the locations where pipe inlet and/or outlet elevation values from the township that were missing. All missing elevations have been interpolated, calculated along a continuous slope, or assumed using best engineering judgement under the following process:

- Where sections of pipe were missing inverts but had upstream and downstream inverts, the missing inverts were interpolated based on a generally continuous slope;
- Where only downstream inverts were known, an obvert depth of 2.8 m was prioritized for upstream manholes unless the interpolated slope was less than 0.1% when tying into the known downstream inverts;
- Where downstream inverts were not known (i.e. outflows, WWTPs, SPS), a minimum slope of 0.1% was maintained; and,
- Where there were multiple interconnected sections of pipe with unknown inverts (e.g. Park Street East area in Elmira), the elevations of the downstream sewers were interpolated first, then the smaller upstream sewers, and then adjusted on a case-by case basis to ensure appropriate slopes were maintained.

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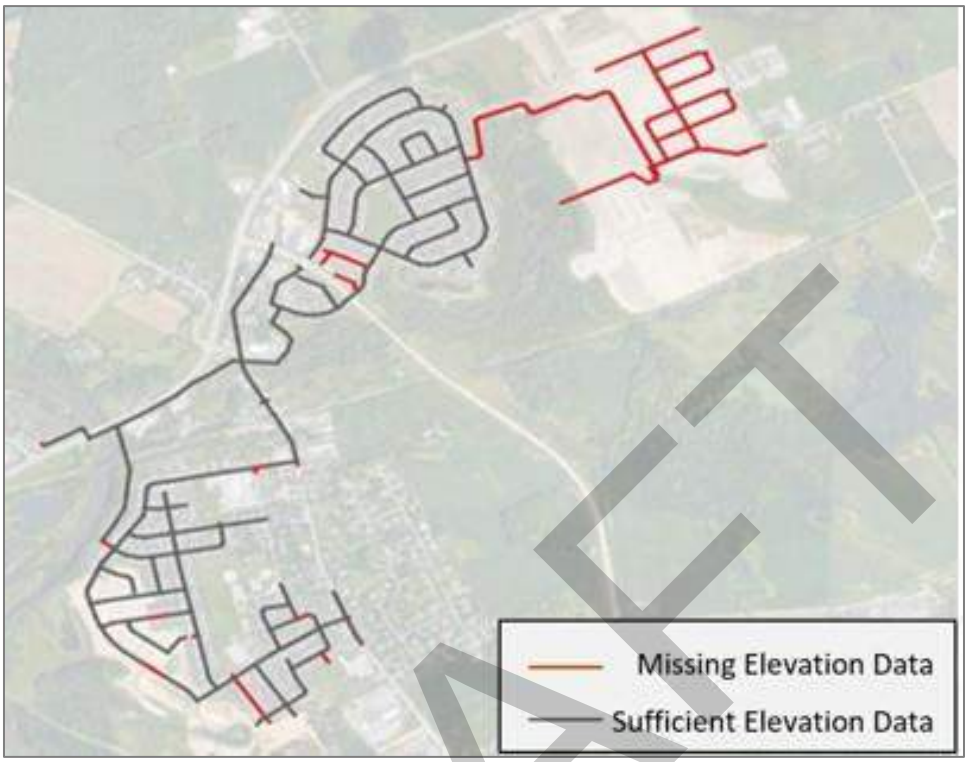


Figure 1: Breslau Missing Conduit Information

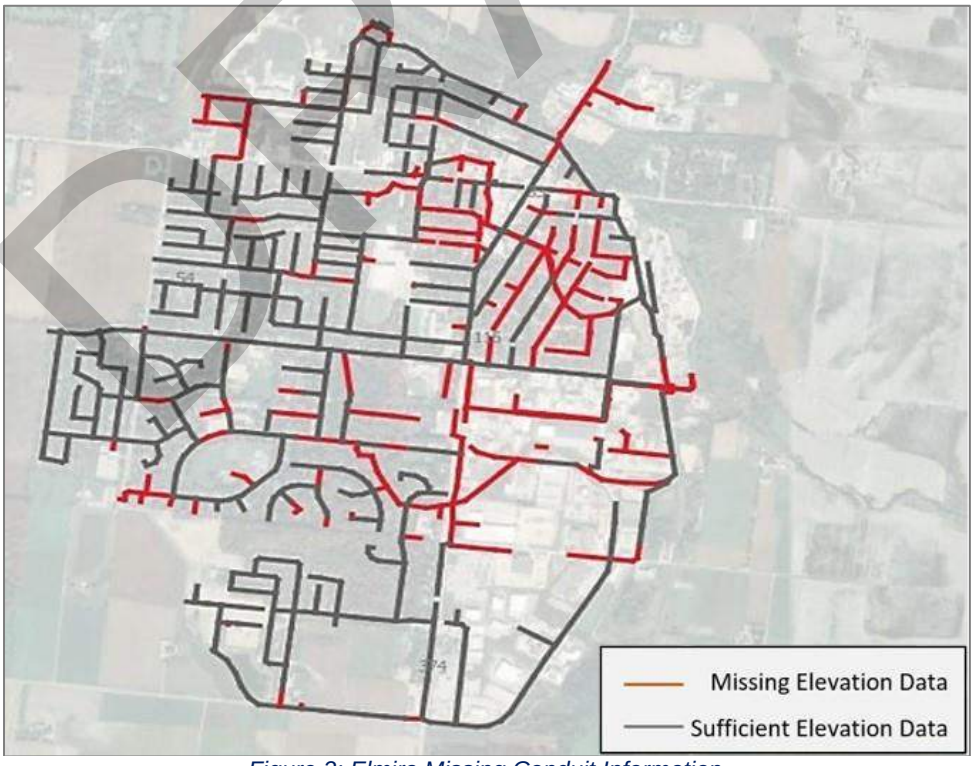


Figure 2: Elmira Missing Conduit Information

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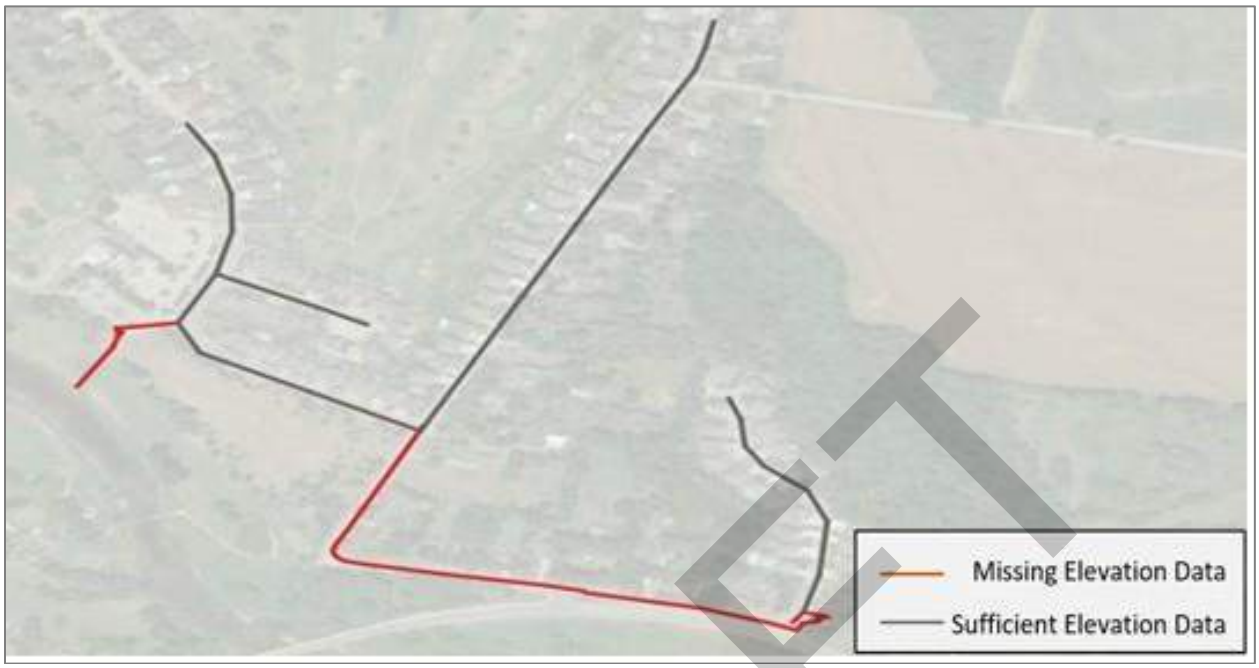


Figure 3: Conestogo Missing Conduit Information

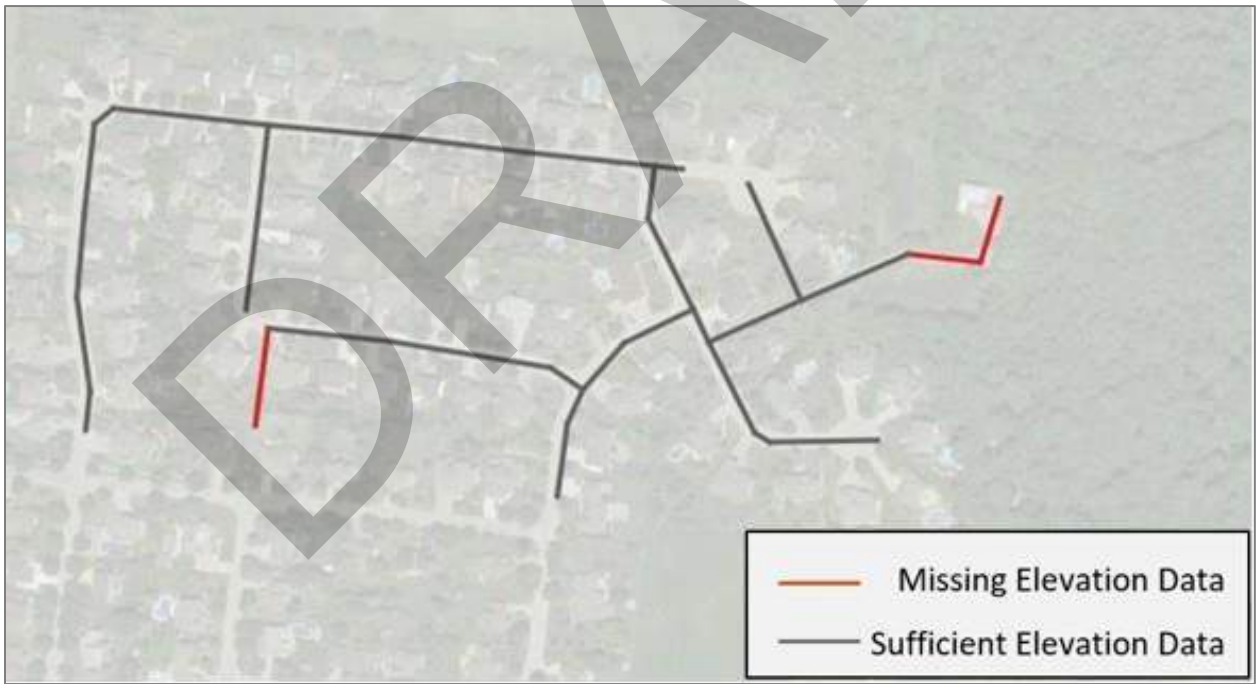


Figure 4: Heidelberg Missing Conduit Information

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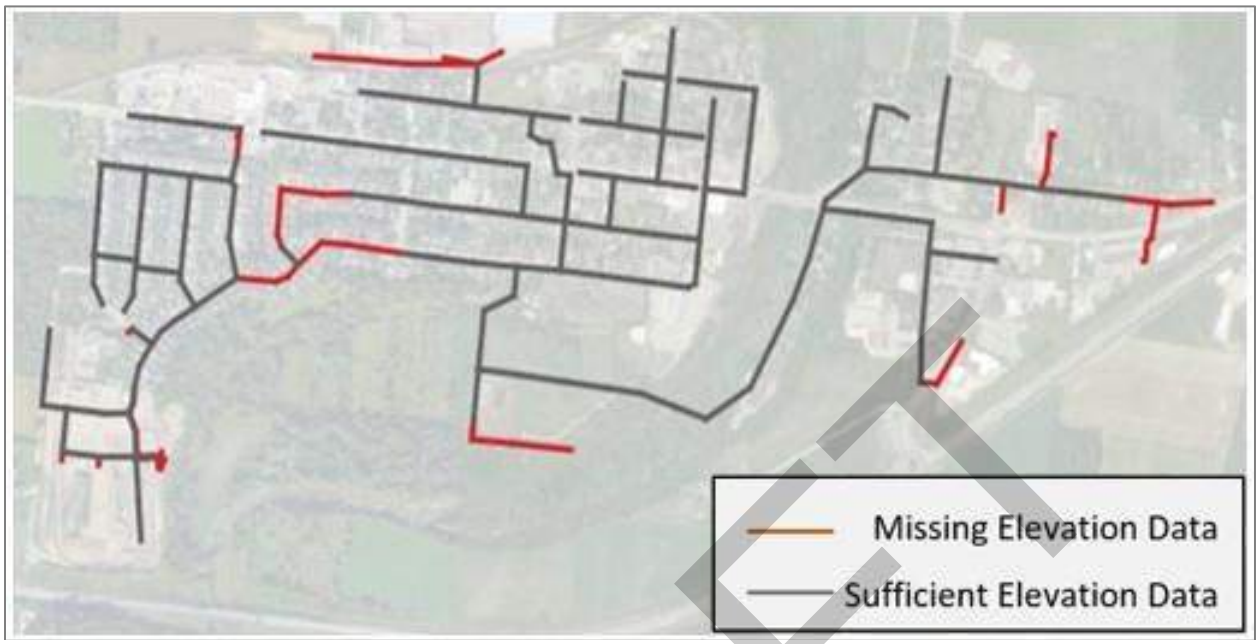


Figure 5: St. Jacobs Missing Conduit Information

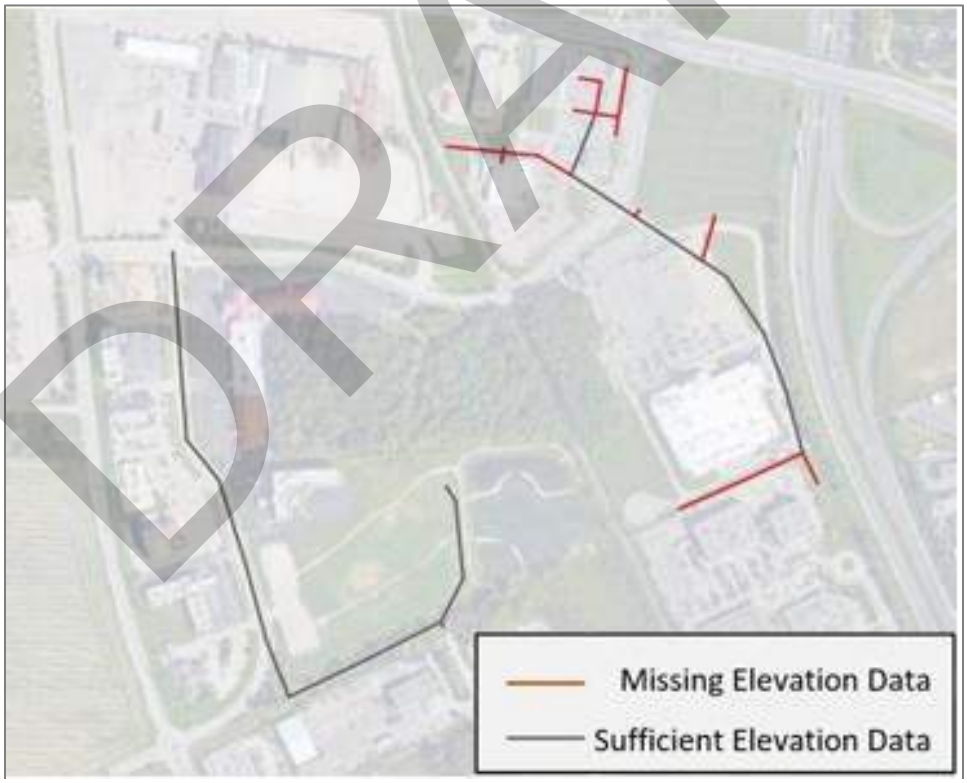


Figure 6: Stockyards Missing Conduit Information

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2.4 Overflows

Overflows and corresponding data gaps were identified in five settlements as summarized in **Table 4**.

Table 4: Overflows Data Assumptions

Settlement	Model Asset Reference	Data Comment	Data Assumption and Rationale	Priority
Conestogo	GMBP-J49	Missing township GIS manhole	Invert from Conestogo Estates Subdivision Dwg Set (Stantec, dated 04/03/11)	**Low**
Conestogo	WWTP_CONES	Invert elevation in GIS township data is 0	Invert assumption based on upstream elevations.	**Low**
Elmira	GMBP-J38	Missing township GIS manhole and invert elevation same as rim elevation	Invert assumption based on surface elevation at Country Club Estates Sanitary Pumping Station Dwg Set (Gamsby & Mannerow, dated 10/15/14).	**Low**
Elmira	Outfall_AN	Missing township GIS manhole and invert elevation same as rim elevation	Invert assumption based on topographic elevation.	**Low**
Elmira	Outfall_VG	Missing township GIS manhole and invert elevation same as rim elevation	Invert assumption based on topographic elevation	**Low**
Elmira	WWTP_ELMIRA	Township GIS sewer device elevation missing	Invert assumption based on upstream elevations.	**Low**
St. Jacobs	GMBP-J48	Missing township GIS manhole and invert elevation same as rim elevation	Invert assumption based on surface elevation at Jacobs Trail Sewage Pumping Station IFT Dwg Set (GMBP, dated 03/29/18).	**Low**
St. Jacobs	WWTP_STJ	Township GIS sewer device elevation missing	Invert interpolated from slope upstream elevations.	**Low**
Heidelberg	WWTP_HEID	Township GIS sewer device elevation missing	Invert assumption based on upstream elevations.	**Low**
Stockyards	WWTP_STOCK1	Township GIS sewer device elevation missing	Invert based on City of Waterloo GIS data.	**Low**
Stockyards	WWTP_STOCK2	Missing township GIS manhole	Invert based on City of Waterloo GIS data.	**Low**

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2.5 Parcel Servicing

The following areas were identified and confirmed by the Township to be on private septic systems:

- Joseph Street to Kennedy Road, Breslau
- Scheifele Place, Breslau
- Woolwich Street North, Breslau
- King Street North, St Jacobs
- Arthur Street North, Elmira
- George Street, High Street, Charles Street, & Spruce Lane, Elmira

A detailed list of these parcels can be found in previous submissions of this memo.

2.6 Proposed Wastewater Field Program

In order to support the wastewater system analysis in Elmira, a field program is proposed to determine elevations and diameters of pipes within the area of concern.

The proposed area surrounds Church St W and Maple St, as shown in **Figure 7**. **Table 5** lists the pipes and manholes of concern.



Figure 7: Elmira Field Program Area

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Table 5: Elmira Field Program Pipes

MH ID	Inlet Pipe	Outlet Pipe
SAN_MH-221229	SAN_P-211264	SAN_P-211321
SAN_MH-220081	SAN_P-211321	SAN_P-211366
SAN_MH-220082	SAN_P-211366	SAN_P-211315
SAN_MH-221232	SAN_P-211315	SAN_P-211314
SAN_MH-221233	SAN_P-211314	SAN_P-211313
SAN_MH-221234	SAN_P-211313	SAN_P-211312
SAN_MH-221235	SAN_P-211312	SAN_P-211311
SAN_MH-221236	SAN_P-211311	SAN_P-211411
SAN_MH-221237	SAN_P-211411	SAN_P-211412
SAN_MH-221242	SAN_P-211412	SAN_P-211233
SAN_MH-221218	SAN_P-211233	SAN_P-211234
SAN_MH-221219	SAN_P-211234	SAN_P-211235
SAN_MH-221220	SAN_P-211235	SAN_P-211236
SAN_MH-221170	SAN_P-211236	SAN_P-211238

Based on preliminary wastewater model results, the Elmira system experiences surcharge conditions in this area during wet weather flow events, which could be the result of incorrect elevation data assumptions or incorrect pipe diameters from the Township's GIS data.

While there are a large number of assumed inverts within the system, the identified pipes are the only areas experiencing surcharge conditions and thus the only pipes requiring further investigation at this time. The other wastewater models do not appear to experience surcharge conditions as a result of assumed inverts. Missing invert elevation data for other pipes still maintains a high priority in Appendix A because this information could potentially impact model results.

It is anticipated that two field staff (GM BluePlan) would be required for one day to complete the manhole survey, as well as an additional day for data processing. It is not expected that a Township operator will be required to support the survey, however, the Township's permission and notification of the Township's operations department will be required to proceed with the survey.

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3 Water Model

3.1 Supply Wells

Supply well data for the settlements of Maryhill and Heidelberg was received from the Region through their existing water models and assumed to be accurate.

The full list of supply wells in the water models are provided in **Appendix C.**

3.2 Pump Stations

Pump station data for the Township was received from the Region through their existing water models and assumed to be accurate. The full list of pump stations in the water model is provided in **Appendix D**.

3.3 Watermains

The existing model conduits and the Township GIS data did not have a common Pipe ID and therefore a spatial join in QGIS was performed to join the model and Township pipes. After the spatial join of the pipes was completed, pipe attributes including diameter, installation date, and material were compared for each conduit. Ultimately, if there was a discrepancy in the pipe attributes, the attributes were updated in the model with the data source that contained the newer pipe information. Most often, the Township GIS data contained updated conduit information that was used in the model.

The full list of watermains that were modified is provided in **Appendix E.**

3.4 Storage Facilities

Storage facilities for the Township was received from the Region through their existing water models and assumed to be accurate.

The full list of storage facilities in the water models is provided in **Appendix F.**

3.5 Proposed Water Field Program

All data gaps for the water system have been flagged as low priority and do not require immediate action as these items have been inferred or interpolated between known data point (negligible impact on the model's hydraulic results). As such, a field program to investigate data gaps within the water data is not required or recommended.

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4 Summary and Recommendations

Based on the data provided by the Township and the Region to support the development of the Township's wastewater hydraulic model and the update of the Region's water model, various data assumptions were made in order to fill in data gaps or data issues within the provided data. Most of the data gaps were flagged as low- to medium- priority and do not require immediate action, as these items have been inferred or interpolated between known data points (negligible impact on the model's ability to predict flows). However, there are items that were flagged as high priority that the Township should review in order to either confirm assumptions to be made. Sections noted with high priority data gaps are as follows:

- **Section 2.1** Sewage Pumping Stations
- **Section 2.3** Gravity Sewer Network, detailed tables in the following Appendices:
    - **Appendix A** – Model Inlet Nodes with Data Assumptions
    - **Appendix B** – Model Outlet Nodes with Data Assumptions

It is recommended that a short field program consisting of one day of manhole surveys in Elmira be completed in order to determine the existing inverts and pipe diameters to resolve any surcharge conditions as a result of assumed inverts and/or incorrect GIS data. Detailed information regarding the proposal field program is found in **Section 2.6.**

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Appendix A – Model Inlet Nodes with Data Assumptions

Table 6: Adjusted elevations from Township GIS (assumed/inferred data shown in red)

Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-210326	SAN_MH-220396	**310.533**	**311**	Adjusted for connectivity.	**Low**
SAN_P-210210	SAN_MH-220304	**314.66**	**315.57**	Adjusted for connectivity.	**Low**
SAN_P-	SAN_MH-221503	**356.535**	**356.812**	Adjusted for connectivity.	**Low**
SAN_P-210369	SAN_MH-221348	**360.754**	**361.15**	Adjusted for connectivity.	**Low**
SAN_P-210556	SAN_MH-220613	**368.42**	**368.398**	Adjusted for connectivity.	**Low**
SAN_P-210559	SAN_MH-220613	**369.21**	**369.61**	Adjusted for connectivity.	**Low**
SAN_P-210569	SAN_MH-220624	**368.85**	**365.85**	Adjusted for connectivity.	**Low**
SAN_P-210570	SAN_MH-220619	**364.51**	**364.97**	Adjusted for connectivity.	**Low**
SAN_P-210571	SAN_MH-220625	**364.04**	**364.43**	Adjusted for connectivity.	**Low**
SAN_P-210572	SAN_MH-220626	**367.78**	**368.615**	Adjusted for connectivity.	**Low**
SAN_P-210573	SAN_MH-220627	**367.49**	**368.39**	Adjusted for connectivity.	**Low**
SAN_P-210575	SAN_MH-220611	**369.06**	**369.2**	Adjusted for connectivity.	**Low**
SAN_P-210576	SAN_MH-220629	**368.69**	**368.962**	Adjusted for connectivity.	**Low**
SAN_P-210628	SAN_MH-220683	**363.258**	**361.072**	Adjusted for connectivity.	**Low**
SAN_P-210662	SAN_MH-220716	**356.328**	**356.388**	Adjusted for connectivity.	**Low**
SAN_P-210773	SAN_MH-220821	**368.445**	**368.415**	Adjusted for connectivity.	**Low**
SAN_P-210864	SAN_MH-220912	**359.186**	**359.551**	Adjusted for connectivity.	**Low**
SAN_P-210876	SAN_MH-221330	**357.72**	**357.838**	Adjusted for connectivity.	**Low**
SAN_P-210877	SAN_MH-221329	**357.896**	**357.974**	Adjusted for connectivity.	**Low**
SAN_P-210878	SAN_MH-221328	**358.154**	**358.209**	Adjusted for connectivity.	**Low**
SAN_P-210880	SAN_MH-220924	**357.61**	**357.728**	Adjusted for connectivity.	**Low**
SAN_P-210881	SAN_MH-220925	**357.48**	**357.59**	Adjusted for connectivity.	**Low**
SAN_P-210882	SAN_MH-220926	**357.27**	**357.372**	Adjusted for connectivity.	**Low**
SAN_P-210885	SAN_MH-221028	**364.224**	**364.49**	Adjusted for connectivity.	**Low**
SAN_P-210892	SAN_MH-220955	**362.5**	**362.632**	Adjusted for connectivity.	**Low**

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-210913	SAN_MH-220955	**361.68**	**361.676**	Adjusted for connectivity.	**Low**
SAN_P-210915	SAN_MH-220957	**362.51**	**362.22**	Adjusted for connectivity.	**Low**
SAN_P-210956	SAN_MH-220993	**354.22**	**354.307**	Adjusted for connectivity.	**Low**
SAN_P-210977	SAN_MH-221029	**363.8**	**365**	Adjusted for connectivity.	**Low**
SAN_P-211027	SAN_MH-220656	**345.945**	**345.64**	Adjusted for connectivity.	**Low**
SAN_P-211041	SAN_MH-221036	**361.62**	**361.013**	Adjusted for connectivity.	**Low**
SAN_P-211042	SAN_MH-220085	**360.71**	**361.58**	Adjusted for connectivity.	**Low**
SAN_P-211057	SAN_MH-221208	**344.44**	**344.51**	Adjusted for connectivity.	**Low**
SAN_P-211114	SAN_MH-221114	**348.15**	**348.82**	Adjusted for connectivity.	**Low**
SAN_P-211152	SAN_MH-221115	**349.81**	**351.46**	Adjusted for connectivity.	**Low**
SAN_P-211182	SAN_MH-221281	**349.361**	**349.393**	Adjusted missing inverts.	**Low**
SAN_P-211285	SAN_MH-220853	**359.56**	**359.472**	Adjusted missing inverts.	**Low**
SAN_P-211314	SAN_MH-221232	**355.4**	**355.926**	Adjusted missing inverts.	**Low**
SAN_P-210004	SAN_MH-220102	**367.207**	**364.28**	Adjusted due to GIS entry error.	**Low**
SAN_P-210097	SAN_MH-220190	**340.239**	**340.079**	Adjusted for connectivity.	**Low**
SAN_P-210120	SAN_MH-220214	**363.684**	**333.684**	Adjusted due to GIS entry error.	**Low**
SAN_P-210129	SAN_MH-220220	**326.112**	**326.16**	Adjusted for connectivity.	**Low**
SAN_P-211477	SAN_MH-221444	**330.87**	**330.88**	Adjusted for connectivity.	**Low**

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Model Inlet Nodes with Data Assumptions

Table 7: No elevations available in Township GIS (assumed/inferred data shown in red)

Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-210232	GMBP-16	0	311.87	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210240	GMBP-17	0	310.757	Adjusted missing inverts	Low
SAN_P-210250	GMBP-18	0	307.585	Adjusted missing inverts	Low
SAN_P-210252	GMBP-J19	0	307.09	Adjusted missing inverts	Low
SAN_P-210254	SAN_MH-220341	0	306.07	Adjusted missing inverts	Low
SAN_P-210255	SAN_MH-220342	0	305.647	Adjusted missing inverts	Low
SAN_P-210260	SAN_MH-220348	0	310.832	Adjusted missing inverts	Low
SAN_P-210275	SAN_MH-221309	0	305.645	Adjusted missing inverts	Low
SAN_P-210290	GMBP-20	0	316.09	Adjusted missing inverts	Low
SAN_P-210302	GMBP-21	0	312.272	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210329	GMBP-22	0	309.96	Adjusted missing inverts	Low
SAN_P-210331	SAN_MH-220399	0	308.233	Adjusted missing inverts	Low
SAN_P-211345	SAN_MH-0-GMBP-40	0	313.519	Adjusted missing inverts	Low
SAN_P-211346	SAN_MH-0-GMBP-41	0	315.567	Adjusted missing inverts	Low
SAN_P-211349	SAN_MH-220086	0	316.147	Adjusted missing inverts	Low
SAN_P-211351	GMBP-J33	0	313.472	Adjusted missing inverts	Low
SN_TS-230005	SAN_MH-221367	0	299.865	Adjusted missing inverts	Low
SN_TS-230018	SAN_MH-220423	0	306.694	Adjusted missing inverts	Low
SAN_P-210217	SAN_MH-220303	0	312.2	Adjusted missing inverts	Low
SAN_P-210225	SAN_MH-220318	0	315.365	Adjusted missing inverts	Low
SAN_P-210227	SAN_MH-220318	0	313.281	Adjusted missing inverts	Low
SAN_P-210228	SAN_MH-220320	0	313.21	Adjusted missing inverts	Low
SAN_P-0	SAN_MH-0	0	353.97	Adjusted missing inverts	Low
SAN_P-210281	SAN_MH-221272	0	350.98	Adjusted missing inverts (trunk sewer)	High

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-210289	SAN_MH-221126	0	349.93	Adjusted missing inverts (trunk sewer)	High
SAN_P-210383	SAN_MH-220021	0	356.335	Adjusted missing inverts	Low
SAN_P-210384	SAN_MH-220020	0	355.32	Adjusted missing inverts	Low
SAN_P-210536	SAN_MH-220594	0	364.345	Adjusted missing inverts	Low
SAN_P-210537	SAN_MH-220594	0	364.345	Adjusted missing inverts	Low
SAN_P-210626	SAN_MH-220679	0	363.45	Adjusted missing inverts	Low
SAN_P-210700	SAN_MH-220769	0	357.355	Adjusted missing inverts (trunk sewer)	High
SAN_P-210720	SAN_MH-220787	0	363.39	Adjusted missing inverts	Low
SAN_P-210725	SAN_MH-220792	0	362.04	Adjusted missing inverts	Low
SAN_P-210734	SAN_MH-220794	0	364.08	Adjusted missing inverts	Low
SAN_P-210735	SAN_MH-220795	0	364.3	Adjusted missing inverts	Low
SAN_P-210736	SAN_MH-220796	0	361.32	Adjusted missing inverts	Low
SAN_P-210744	SAN_MH-220804	0	363.07	Adjusted missing inverts	Low
SAN_P-210745	SAN_MH-220736	0	363.6	Adjusted missing inverts	Low
SAN_P-210746	SAN_MH-220737	0	363.34	Adjusted missing inverts	Low
SAN_P-210747	SAN_MH-220738	0	363.25	Adjusted missing inverts	Low
SAN_P-210748	SAN_MH-220739	0	362.9	Adjusted missing inverts	Low
SAN_P-210782	SAN_MH-220829	0	364.11	Adjusted missing inverts	Low
SAN_P-210789	GMBP-J25	0	364.935	Adjusted missing inverts	Low
SAN_P-210799	SAN_MH-220845	0	362.002	Adjusted missing inverts	Low
SAN_P-210800	SAN_MH-220846	0	361.843	Adjusted missing inverts	Low
SAN_P-210801	SAN_MH-220847	0	361.67	Adjusted missing inverts	Low
SAN_P-210806	SAN_MH-220852	0	360.06	Adjusted missing inverts	Low
SAN_P-210828	SAN_MH-220835	0	363.547	Adjusted missing inverts	Low
SAN_P-210829	SAN_MH-220890	0	363.14	Adjusted missing inverts	Low
SAN_P-210834	SAN_MH-220883	0	365.646	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210839	SAN_MH-220888	0	363.152	Adjusted missing inverts	Low

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-210891	SAN_MH-220953	0	362	Adjusted missing inverts	Low
SAN_P-210908	SAN_MH-220950	0	362.63	Adjusted missing inverts	Low
SAN_P-210910	SAN_MH-220952	0	362.051	Adjusted missing inverts	Low
SAN_P-210912	SAN_MH-220954	0	361.37	Adjusted missing inverts	Low
SAN_P-210922	SAN_MH-220973	0	360.16	Adjusted missing inverts	Low
SAN_P-210968	SAN_MH-221021	0	355.09	Adjusted missing inverts	Low
SAN_P-210969	SAN_MH-221022	0	355.3	Adjusted missing inverts	Low
SAN_P-210970	SAN_MH-221023	0	355.55	Adjusted missing inverts	Low
SAN_P-210971	SAN_MH-221024	0	355.8	Adjusted missing inverts	Low
SAN_P-211009	SAN_MH-221062	0	361.78	Adjusted missing inverts	Low
SAN_P-211011	SAN_MH-221064	0	352.96	Adjusted missing inverts	Low
SAN_P-211012	SAN_MH-221065	0	351.08	Adjusted missing inverts	Low
SAN_P-211013	SAN_MH-221066	0	348.7	Adjusted missing inverts	Low
SAN_P-211014	SAN_MH-221067	0	345.39	Adjusted missing inverts	Low
SAN_P-211025	SAN_MH-221100	0	347.29	Adjusted missing inverts	Low
SAN_P-211026	SAN_MH-221087	0	346.39	Adjusted missing inverts	Low
SAN_P-211028	SAN_MH-221086	0	345.352	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211029	SAN_MH-221085	0	345.277	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211058	SAN_MH-221308	0	356.12	Adjusted missing inverts	Low
SAN_P-211062	SAN_MH-221225	0	357.35	Adjusted missing inverts	Low
SAN_P-211064	SAN_MH-221244	0	357.87	Adjusted missing inverts	Low
SAN_P-211065	SAN_MH-221249	0	349.886	Adjusted missing inverts	Low
SAN_P-211068	SAN_MH-221156	0	357.65	Adjusted missing inverts	Low
SAN_P-211072	SAN_MH-221174	0	353.35	Adjusted missing inverts (trunk sewer)	High
SAN_P-211074	SAN_MH-220857	0	362.39	Adjusted missing inverts	Low
SAN_P-211076	SAN_MH-220854	0	358.69	Adjusted missing inverts	Low
SAN_P-211077	SAN_MH-221192	0	353.443	Adjusted missing inverts (receiving sewer)	Medium

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211078	SAN_MH-221191	0	354.85	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211079	SAN_MH-221190	0	357.79	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211080	SAN_MH-221189	0	358.75	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211081	SAN_MH-221193	0	355.75	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211082	SAN_MH-221182	0	360.27	Adjusted missing inverts	Low
SAN_P-211084	SAN_MH-221185	0	356.88	Adjusted missing inverts	Low
SAN_P-211085	SAN_MH-221185	0	356.88	Adjusted missing inverts	Low
SAN_P-211086	SAN_MH-221186	0	355.87	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211087	SAN_MH-221187	0	351.68	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211088	SAN_MH-221138	0	352.04	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211089	SAN_MH-221137	0	354.13	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211090	SAN_MH-221136	0	355.37	Adjusted missing inverts	Low
SAN_P-211091	SAN_MH-221133	0	348.39	Adjusted missing inverts	Low
SAN_P-211092	SAN_MH-221200	0	354.23	Adjusted missing inverts	Low
SAN_P-211093	SAN_MH-221254	0	349.48	Adjusted missing inverts	Low
SAN_P-211094	SAN_MH-221253	0	353.99	Adjusted missing inverts	Low
SAN_P-211095	SAN_MH-221194	0	358.11	Adjusted missing inverts	Low
SAN_P-211096	SAN_MH-221195	0	358.06	Adjusted missing inverts	Low
SAN_P-211097	SAN_MH-221196	0	356.06	Adjusted missing inverts	Low
SAN_P-211098	SAN_MH-221197	0	353.76	Adjusted missing inverts	Low
SAN_P-211099	SAN_MH-221198	0	352.64	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211100	SAN_MH-221169	0	352.431	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211101	SAN_MH-0-GMBP-24	0	353.55	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211102	SAN_MH-0-GMBP-23	0	352.91	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211103	SAN_MH-221167	0	352.947	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211104	SAN_MH-221168	0	352.652	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211105	SAN_MH-221177	0	352.92	Adjusted missing inverts (trunk sewer)	High

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211106	SAN_MH-221178	0	352.6	Adjusted missing inverts (trunk sewer)	High
SAN_P-211107	SAN_MH-211431	0	352.24	Adjusted missing inverts (trunk sewer)	High
SAN_P-211108	SAN_MH-221180	0	351.79	Adjusted missing inverts (trunk sewer)	High
SAN_P-211109	SAN_MH-221181	0	351.18	Adjusted missing inverts (trunk sewer)	High
SAN_P-211110	SAN_MH-221124	0	351.04	Adjusted missing inverts (trunk sewer)	High
SAN_P-211111	SAN_MH-221125	0	350.27	Adjusted missing inverts (trunk sewer)	High
SAN_P-211112	SAN_MH-221127	0	349.23	Adjusted missing inverts (trunk sewer)	High
SAN_P-211113	SAN_MH-221128	0	349.19	Adjusted missing inverts (trunk sewer)	High
SAN_P-211115	SAN_MH-221199	0	355.01	Adjusted missing inverts	Low
SAN_P-211116	SAN_MH-221129	0	348.55	Adjusted missing inverts	Low
SAN_P-211117	SAN_MH-221130	0	348.24	Adjusted missing inverts	Low
SAN_P-211118	SAN_MH-221131	0	347.9	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211119	SAN_MH-221134	0	348.09	Adjusted missing inverts	Low
SAN_P-211120	SAN_MH-221135	0	347.84	Adjusted missing inverts	Low
SAN_P-211121	SAN_MH-221132	0	347.42	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211122	SAN_MH-221111	0	352.331	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211123	SAN_MH-221110	0	352.504	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211124	SAN_MH-221109	0	352.668	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211125	SAN_MH-221112	0	349.07	Adjusted missing inverts	Low
SAN_P-211126	SAN_MH-221113	0	348.87	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211128	GMBP-25	0	361.44	Adjusted missing inverts	Low
SAN_P-211142	SAN_MH-221258	0	353.62	Adjusted missing inverts	Low
SAN_P-211143	SAN_MH-221188	0	359.73	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211144	SAN_MH-221122	0	352.67	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211146	SAN_MH-221123	0	352.71	Adjusted missing inverts	Low
SAN_P-211147	SAN_MH-221120	0	355.93	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211148	SAN_MH-221119	0	356.27	Adjusted missing inverts (receiving sewer)	Medium

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211149	SAN_MH-221118	0	356.75	Adjusted missing inverts	Low
SAN_P-211153	SAN_MH-220726	0	348.499	Adjusted missing inverts	Low
SAN_P-211154	SAN_MH-220728	0	340.82	Adjusted missing inverts	Low
SAN_P-211155	SAN_MH-221207	0	344.44	Adjusted missing inverts	Low
SAN_P-211156	SAN_MH-221344	0	363.13	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211157	SAN_MH-221343	0	363.78	Adjusted missing inverts	Low
SAN_P-211158	SAN_MH-221345	0	364.1	Adjusted missing inverts	Low
SAN_P-211164	SAN_MH-221301	0	349.234	Adjusted missing inverts	Low
SAN_P-211165	SAN_MH-221300	0	349.372	Adjusted missing inverts	Low
SAN_P-211166	SAN_MH-221299	0	349.57	Adjusted missing inverts	Low
SAN_P-211167	SAN_MH-221298	0	349.66	Adjusted missing inverts	Low
SAN_P-211168	SAN_MH-221297	0	349.85	Adjusted missing inverts	Low
SAN_P-211169	SAN_MH-221296	0	350	Adjusted missing inverts	Low
SAN_P-211170	SAN_MH-221295	0	350.07	Adjusted missing inverts	Low
SAN_P-211171	SAN_MH-221304	0	349.56	Adjusted missing inverts	Low
SAN_P-211172	SAN_MH-221303	0	349.95	Adjusted missing inverts	Low
SAN_P-211173	SAN_MH-221302	0	350.48	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211176	SAN_MH-221275	0	348.24	Adjusted missing inverts (trunk sewer)	High
SAN_P-211177	SAN_MH-221276	0	347.62	Adjusted missing inverts (trunk sewer)	High
SAN_P-211178	SAN_MH-221277	0	346.184	Adjusted missing inverts (trunk sewer)	High
SAN_P-211179	SAN_MH-221278	0	344.326	Adjusted missing inverts (trunk sewer)	High
SAN_P-211183	SAN_MH-221282	0	348.766	Adjusted missing inverts	Low
SAN_P-211185	SAN_MH-221306	0	358.42	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211186	SAN_MH-220581	0	358.19	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211187	SAN_MH-220582	0	357.94	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211188	SAN_MH-220583	0	357.69	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211189	SAN_MH-220584	0	357.42	Adjusted missing inverts (receiving sewer)	Medium

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211191	SAN_MH-221238	0	356	Adjusted missing inverts	Low
SAN_P-211197	SAN_MH-221284	0	356.09	Adjusted missing inverts	Low
SAN_P-211198	SAN_MH-221285	0	355.669	Adjusted missing inverts	Low
SAN_P-211199	SAN_MH-221286	0	355.488	Adjusted missing inverts	Low
SAN_P-211200	SAN_MH-221287	0	355.293	Adjusted missing inverts	Low
SAN_P-211201	SAN_MH-221071	0	352.372	Adjusted missing inverts	Low
SAN_P-211202	SAN_MH-221072	0	341.01	Adjusted missing inverts	Low
SAN_P-211203	SAN_MH-221270	0	352.4	Adjusted missing inverts (trunk sewer)	High
SAN_P-211204	SAN_MH-221269	0	353.18	Adjusted missing inverts (trunk sewer)	High
SAN_P-211205	SAN_MH-221008	0	353.59	Adjusted missing inverts (trunk sewer)	High
SAN_P-211206	SAN_MH-221320	0	358.414	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211207	SAN_MH-221321	0	357.502	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211208	SAN_MH-221322	0	355.992	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211209	SAN_MH-221319	0	358.93	Adjusted missing inverts	Low
SAN_P-211210	SAN_MH-221318	0	359.514	Adjusted missing inverts	Low
SAN_P-211211	SAN_MH-221317	0	360.02	Adjusted missing inverts	Low
SAN_P-211212	SAN_MH-221327	0	359.53	Adjusted missing inverts	Low
SAN_P-211213	SAN_MH-221326	0	359.45	Adjusted missing inverts	Low
SAN_P-211214	SAN_MH-221325	0	359.05	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211215	SAN_MH-221324	0	358.75	Adjusted missing inverts	Low
SAN_P-211216	SAN_MH-221323	0	358.35	Adjusted missing inverts	Low
SAN_P-211217	SAN_MH-221007	0	354.3	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211218	SAN_MH-221006	0	355	Adjusted missing inverts	Low
SAN_P-211219	SAN_MH-221267	0	354.12	Adjusted missing inverts (trunk sewer)	High
SAN_P-211221	SAN_MH-221266	0	354.41	Adjusted missing inverts (trunk sewer)	High
SAN_P-211222	SAN_MH-221265	0	355.01	Adjusted missing inverts (trunk sewer)	High
SAN_P-211223	SAN_MH-221264	0	355.4	Adjusted missing inverts (trunk sewer)	High

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211224	SAN_MH-221263	0	356.226	Adjusted missing inverts (trunk sewer)	High
SAN_P-211225	SAN_MH-221262	0	356.934	Adjusted missing inverts (trunk sewer)	High
SAN_P-211226	SAN_MH-221261	0	357.423	Adjusted missing inverts (trunk sewer)	High
SAN_P-211227	SAN_MH-221260	0	357.693	Adjusted missing inverts (trunk sewer)	High
SAN_P-211228	SAN_MH-221259	0	357.86	Adjusted missing inverts (trunk sewer)	High
SAN_P-211229	SAN_MH-220855	0	358.07	Adjusted missing inverts (trunk sewer)	High
SAN_P-211230	SAN_MH-221336	0	361.85	Adjusted missing inverts	Low
SAN_P-211231	SAN_MH-221337	0	360.87	Adjusted missing inverts	Low
SAN_P-211232	SAN_MH-221338	0	360.42	Adjusted missing inverts	Low
SAN_P-211233	SAN_MH-221242	0	354.57	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211234	SAN_MH-221218	0	354.461	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211235	SAN_MH-221219	0	354.38	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211236	SAN_MH-221220	0	354.28	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211237	SAN_MH-221384	0	355.49	Adjusted missing inverts (trunk sewer)	High
SAN_P-211238	SAN_MH-221170	0	354.033	Adjusted missing inverts (trunk sewer)	High
SAN_P-211240	SAN_MH-221144	0	357.74	Adjusted missing inverts (trunk sewer)	High
SAN_P-211241	SAN_MH-221145	0	357.94	Adjusted missing inverts (trunk sewer)	High
SAN_P-211242	SAN_MH-221146	0	358.37	Adjusted missing inverts (trunk sewer)	High
SAN_P-211243	SAN_MH-221146	0	358.37	Adjusted missing inverts (trunk sewer)	High
SAN_P-211244	SAN_MH-221147	0	357.3	Adjusted missing inverts (trunk sewer)	High
SAN_P-211245	SAN_MH-221148	0	356.42	Adjusted missing inverts (trunk sewer)	High
SAN_P-211246	SAN_MH-221160	0	356.57	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211247	SAN_MH-221307	0	356.89	Adjusted missing inverts	Low
SAN_P-211249	SAN_MH-221152	0	358.02	Adjusted missing inverts	Low
SAN_P-211250	SAN_MH-221153	0	357.65	Adjusted missing inverts	Low
SAN_P-211251	SAN_MH-221154	0	357.29	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211254	SAN_MH-0-GMBP-26	0	358.864	Adjusted missing inverts	Low

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211260	SAN_MH-221250	0	350.289	Adjusted missing inverts	Low
SAN_P-211264	SAN_MH-221228	0	356.86	Adjusted missing inverts	Low
SAN_P-211265	SAN_MH-221159	0	357.68	Adjusted missing inverts	Low
SAN_P-211270	SAN_MH-221158	0	358.8	Adjusted missing inverts	Low
SAN_P-211271	SAN_MH-221227	0	356.96	Adjusted missing inverts	Low
SAN_P-211275	SAN_MH-221226	0	357.3	Adjusted missing inverts	Low
SAN_P-211279	SAN_MH-221271	0	351.69	Adjusted missing inverts (trunk sewer)	High
SAN_P-211280	SAN_MH-221342	0	353.975	Adjusted missing inverts (trunk sewer)	High
SAN_P-211282	SAN_MH-221274	0	348.896	Adjusted missing inverts (trunk sewer)	High
SAN_P-211286	SAN_MH-221176	0	352.93	Adjusted missing inverts (trunk sewer)	High
SAN_P-211288	SAN_MH-221175	0	353.34	Adjusted missing inverts (trunk sewer)	High
SAN_P-211297	SAN_MH-221164	0	353.774	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211298	SAN_MH-221165	0	353.418	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211299	SAN_MH-221166	0	353.4	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211300	SAN_MH-221201	0	353.286	Adjusted missing inverts	Low
SAN_P-211307	SAN_MH-220084	0	360.1	Adjusted missing inverts	Low
SAN_P-211311	SAN_MH-221235	0	355.16	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211312	SAN_MH-221234	0	355.32	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211313	SAN_MH-221233	0	355.82	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211321	SAN_MH-221229	0	356.43	Adjusted missing inverts	Low
SAN_P-211332	SAN_MH-221171	0	353.937	Adjusted missing inverts	Low
SAN_P-211333	SAN_MH-221339	0	357.92	Adjusted missing inverts	Low
SAN_P-211339	GMBP-J31	0	360.575	Adjusted missing inverts	Low
SAN_P-211341	SAN_MH-221157	0	359.58	Adjusted missing inverts	Low
SAN_P-211342	SAN_MH-221151	0	360.31	Adjusted missing inverts	Low
SAN_P-211388	SAN_MH-220043	0	364.22	Adjusted missing inverts	Low
SAN_P-211389	SAN_MH-220044	0	365.48	Adjusted missing inverts	Low

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211390	SAN_MH-220045	0	366.1	Adjusted missing inverts	Low
SAN_P-211391	SAN_MH-220046	0	366.43	Adjusted missing inverts	Low
SAN_P-211392	SAN_MH-220039	0	366.66	Adjusted missing inverts	Low
SAN_P-211393	SAN_MH-220047	0	366.35	Adjusted missing inverts	Low
SAN_P-211394	SAN_MH-220071	0	363.99	Adjusted missing inverts	Low
SAN_P-211395	SAN_MH-220042	0	363.53	Adjusted missing inverts	Low
SAN_P-211396	SAN_MH-220041	0	362.93	Adjusted missing inverts	Low
SAN_P-211397	SAN_MH-220040	0	366.72	Adjusted missing inverts	Low
SAN_P-211398	SAN_MH-220039	0	366.66	Adjusted missing inverts	Low
SAN_P-211399	SAN_MH-220038	0	365.33	Adjusted missing inverts	Low
SAN_P-211400	SAN_MH-220037	0	364.04	Adjusted missing inverts	Low
SAN_P-211405	SAN_MH-221268	0	353.95	Adjusted missing inverts (trunk sewer)	High
SAN_P-211411	SAN_MH-221236	0	354.84	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211412	SAN_MH-221237	0	354.64	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211414	SAN_MH-221149	0	355.84	Adjusted missing inverts (trunk sewer)	High
SAN_P-211425	GMBP-J36	0	353.586	Adjusted missing inverts	Low
SAN_P-211444	SAN_MH-221416	0	361.089	Adjusted missing inverts	Low
SAN_P-211445	SAN_MH-221417	0	361.12	Adjusted missing inverts	Low
SAN_P-211446	SAN_MH-221418	0	361.528	Adjusted missing inverts	Low
SAN_P-211460	SAN_MH-221179	0	352.29	Adjusted missing inverts (trunk sewer)	High
SAN_P-211461	SAN_MH-221508	0	352.26	Adjusted missing inverts (trunk sewer)	High
SAN_P-211480	SAN_MH-221464	0	343.614	Adjusted missing inverts	Low
SAN_P-211481	SAN_MH-221465	0	344.08	Adjusted missing inverts	Low
SAN_P-211482	SAN_MH-221206	0	344.33	Adjusted missing inverts	Low
SAN_P-211483	SAN_MH-220727	0	346	Adjusted missing inverts	Low
SAN_P-211484	SAN_MH-221361	0	353.84	Adjusted missing inverts (trunk sewer)	High
SAN_P-211485	SAN_MH-221466	0	363.93	Adjusted missing inverts	Low

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211486	SAN_MH-221467	0	363.84	Adjusted missing inverts	Low
SAN_P-211487	SAN_MH-221468	0	363.68	Adjusted missing inverts	Low
SAN_P-211536	SAN_MH-221500	0	361.167	Adjusted missing inverts	Low
SAN_P-210020	SAN_MH-220119	0	361.94	Adjusted missing inverts	Low
SAN_P-210030	SAN_MH-220128	0	353.89	Adjusted missing inverts	Low
SAN_FM-250006	SAN_MH-0-GMBP-7	0	344.305	Adjusted missing inverts	Low
SAN_P-210072	GMBP-J15	0	340.857	Adjusted missing inverts	Low
SAN_P-210081	SAN_MH-221382	0	340.99	Adjusted missing inverts	Low
SAN_P-210082	SAN_MH-220167	0	339.5	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210083	SAN_MH-220177	0	339.07	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210084	SAN_MH-220178	0	338.93	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210085	SAN_MH-220179	0	338.91	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210086	SAN_MH-220180	0	338.59	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210087	SAN_MH-220181	0	338.32	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210092	SAN_MH-220186	0	339.44	Adjusted missing inverts	Low
SAN_P-210093	SAN_MH-220187	0	339.87	Adjusted missing inverts	Low
SAN_P-210094	SAN_MH-220187	0	340.98	Adjusted missing inverts	Low
SAN_P-210095	SAN_MH-220188	0	340.52	Adjusted missing inverts	Low
SAN_P-210166	SAN_MH-220260	0	342.31	Adjusted missing inverts	Low
SAN_P-210167	SAN_MH-220261	0	343.27	Adjusted missing inverts	Low
SAN_P-210183	SAN_MH-220276	0	342.93	Adjusted missing inverts	Low
SAN_P-210187	SAN_MH-220280	0	343.7	Adjusted missing inverts	Low
SAN_P-210188	SAN_MH-220281	0	343.84	Adjusted missing inverts	Low
SAN_P-210189	SAN_MH-220282	0	344.73	Adjusted missing inverts	Low
SAN_P-210190	SAN_MH-220283	0	344.04	Adjusted missing inverts	Low
SAN_P-210192	SAN_MH-220284	0	337.33	Adjusted missing inverts	Low
SAN_P-210193	SAN_MH-220285	0	336.28	Adjusted missing inverts	Low

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Conduit Reference	Inlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-210194	SAN_MH-220286	**0**	**335.8**	Adjusted missing inverts (receiving sewer)	**Medium**
SAN_P-210195	SAN_MH-220287	**0**	**335.427**	Adjusted missing inverts (receiving sewer)	**Medium**
SAN_P-211340	SAN_MH-220277	**0**	**342.755**	Adjusted missing inverts (receiving sewer)	**Medium**
SAN_P-211409	SAN_MH-221383	**0**	**341.28**	Adjusted missing inverts	**Low**
SAN_P-211473	GMBP-J37	**0**	**336.78**	Adjusted missing inverts	**Low**
SAN_P-211475	GMBP-J42	**0**	**340.73**	Adjusted missing inverts	**Low**
SAN_P-211478	SAN_MH-221445	**0**	**330.67**	Adjusted missing inverts	**Low**
SAN_P-210042	GMBP-J14	**0**	**342.74**	Adjusted missing inverts	**Low**
SAN_P-210043	SAN_MH-220141	**0**	**342.12**	Adjusted missing inverts	**Low**
SAN_P-210044	SAN_MH-220142	**0**	**341.94**	Adjusted missing inverts	**Low**

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Appendix B – Model Outlet Nodes with Data Assumptions

Table 8: Adjusted elevations from Township GIS (assumed/inferred data shown in red)

Conduit Reference	Outlet Node Reference	Township Elevation (m)	Model Elevation (m)	GMBP Comment	Priority
SAN_P-210326	SAN_MH-220395	**309.86**	**310.56**	Adjusted for connectivity.	**Low**
SAN_P-210210	SAN_MH-220305	**315.57**	**314.91**	Adjusted for connectivity.	**Low**
SAN_P-210220	SAN_MH-220314	**319.951**	**318.598**	Adjusted for connectivity.	**Low**
SAN_P-	SAN_MH-221481	**356.812**	**356.196**	Adjusted for connectivity.	**Low**
SAN_P-210556	SAN_MH-220612	**367.92**	**367.88**	Adjusted for connectivity.	**Low**
SAN_P-210559	SAN_MH-220615	**368.7**	**369.072**	Adjusted for connectivity.	**Low**
SAN_P-210570	SAN_MH-220625	**364.07**	**364.43**	Adjusted for connectivity.	**Low**
SAN_P-210571	SAN_MH-220811	**363.55**	**363.87**	Adjusted for connectivity.	**Low**
SAN_P-210572	SAN_MH-220627	**369.15**	**368.399**	Adjusted for connectivity.	**Low**
SAN_P-210573	SAN_MH-220628	**367.79**	**367.708**	Adjusted for connectivity.	**Low**
SAN_P-210575	SAN_MH-220629	**368.72**	**368.962**	Adjusted for connectivity.	**Low**
SAN_P-210576	SAN_MH-220630	**368.39**	**368.647**	Adjusted for connectivity.	**Low**
SAN_P-210693	SAN_MH-220760	**349.969**	**348.7**	Adjusted for connectivity.	**Low**
SAN_P-210700	SAN_MH-220770	**356.98**	**357.06**	Adjusted for connectivity.	**Low**
SAN_P-210703	SAN_MH-220773	**356.8**	**356.76**	Adjusted for connectivity.	**Low**
SAN_P-210720	SAN_MH-220788	**363.0138**	**363.014**	Rounding difference.	**Low**
SAN_P-210805	SAN_MH-220852	**360.332**	**360.06**	Adjusted for connectivity.	**Low**
SAN_P-210806	SAN_MH-220853	**359.6**	**359.472**	Adjusted for connectivity.	**Low**
SAN_P-210831	SAN_MH-220881	**364.84**	**365.126**	Adjusted for connectivity.	**Low**
SAN_P-210864	SAN_MH-220913	**359.47**	**359.16**	Adjusted for connectivity.	**Low**

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	Model Elevation (m)	GMBP Comment	Priority
SAN_P-210876	SAN_MH-220924	**357.61**	**357.728**	Adjusted for connectivity.	**Low**
SAN_P-210877	SAN_MH-221330	**357.73**	**357.838**	Adjusted for connectivity.	**Low**
SAN_P-210878	SAN_MH-221329	**357.899**	**357.974**	Adjusted for connectivity.	**Low**
SAN_P-210879	SAN_MH-221328	**358.159**	**358.209**	Adjusted for connectivity.	**Low**
SAN_P-210880	SAN_MH-220925	**357.48**	**357.59**	Adjusted for connectivity.	**Low**
SAN_P-210881	SAN_MH-220926	**357.27**	**357.372**	Adjusted for connectivity.	**Low**
SAN_P-210882	SAN_MH-221340	**357.183**	**357.288**	Adjusted for connectivity.	**Low**
SAN_P-210885	SAN_MH-220928	**363.847**	**364.45**	Adjusted for connectivity.	**Low**
SAN_P-210892	SAN_MH-220957	**361.74**	**362.22**	Adjusted for connectivity.	**Low**
SAN_P-210956	SAN_MH-221173	**353.72**	**353.932**	Adjusted for connectivity.	**Low**
SAN_P-210973	SAN_MH-221026	**360.04**	**360.598**	Adjusted for connectivity.	**Low**
SAN_P-210976	SAN_MH-221028	**363.921**	**364.49**	Adjusted for connectivity.	**Low**
SAN_P-210977	SAN_MH-221028	**363.578**	**364.49**	Adjusted for connectivity.	**Low**
SAN_P-210985	SAN_MH-221036	**360.099**	**361**	Adjusted for connectivity.	**Low**
SAN_P-211017	SAN_MH-221071	**352.05**	**352.372**	Adjusted for connectivity.	**Low**
SAN_P-211041	SAN_MH-220085	**361.08**	**361.58**	Adjusted for connectivity.	**Low**
SAN_P-211057	SAN_MH-221207	**344.088**	**344.44**	Adjusted for connectivity.	**Low**
SAN_P-211114	SAN_MH-221097	**346.54**	**345.95**	Adjusted for connectivity.	**Low**
SAN_P-211182	SAN_MH-221282	**349.068**	**348.766**	Adjusted missing inverts.	**Low**
SAN_P-211201	SAN_MH-220724	**352.286**	**352.072**	Adjusted missing inverts.	**Low**
SAN_P-211240	SAN_MH-220768	**358.36**	**357.55**	Adjusted missing inverts.	**Low**
SAN_P-211248	SAN_MH-220765	**359.64**	**359.81**	Adjusted for connectivity.	**Low**

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	Model Elevation (m)	GMBP Comment	Priority
SAN_P-211284	SAN_MH-221281	**349.11**	**349.393**	Adjusted for connectivity.	**Low**
SAN_P-211296	SAN_MH-221164	**353.766**	**353.774**	Adjusted for connectivity.	**Low**
SAN_P-211315	SAN_MH-221232	**355.39**	**355.95**	Adjusted for connectivity.	**Low**
SAN_P-211387	SAN_MH-220000	**359.792**	**360.032**	Adjusted for connectivity.	**Low**
SAN_P-211404	SAN_MH-221020	**354.53**	**354.69**	Adjusted for connectivity.	**Low**
SAN_P-211537	SAN_MH-221503	**356.565**	**356.812**	Adjusted for connectivity.	**Low**
SAN_P-210091	SAN_MH-220179	**338.773**	**338.91**	Adjusted for connectivity.	**Low**
SAN_P-210096	SAN_MH-220190	**340.672**	**340.079**	Adjusted for connectivity.	**Low**
SAN_P-210115	SAN_MH-220208	**362.377**	**332.377**	Adjusted due to GIS entry error.	**Low**
SAN_P-210120	SAN_MH-220208	**363.197**	**333.197**	Adjusted due to GIS entry error.	**Low**
SAN_P-210129	SAN_MH-220222	**325.673**	**326.112**	Adjusted for connectivity.	**Low**
SAN_P-210197	SAN_MH-220210	**334.0517**	**334.052**	Rounding difference.	**Low**
SAN_P-211476	SAN_MH-221444	**330.9**	**330.91**	Invert from record drawings.	**Low**
SAN_P-211478	SAN_MH-221433	**330.36**	**330.33**	Invert from record drawings	**Low**

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Model Outlet Nodes with Data Assumptions

Table 9: No elevations available in Township GIS (assumed/inferred data shown in red)

Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-210232	SAN_MH-220324	0	308.57	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210252	SAN_MH-220340	0	306.87	Adjusted missing inverts	Low
SAN_P-210253	SAN_MH-220341	0	306.07	Adjusted missing inverts	Low
SAN_P-210254	SAN_MH-220342	0	305.647	Adjusted missing inverts	Low
SAN_P-210275	SAN_MH-220343	0	305.535	Adjusted missing inverts	Low
SAN_P-210290	SAN_MH-220364	0	315.914	Adjusted missing inverts	Low
SAN_P-210302	SAN_MH-220378	0	312.187	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210329	SAN_MH-220397	0	309.824	Adjusted missing inverts	Low
SAN_P-211345	SAN_MH-220481	0	313.455	Adjusted missing inverts	Low
SN_TS-230004	SAN_MH-221367	0	299.865	Adjusted missing inverts	Low
SAN_P-210217	WWTP_CONES	0	311.95	Adjusted missing inverts	Low
SAN_P-210225	GMBP-J49	0	315.29	Adjusted missing inverts	Low
SAN_P-210227	SAN_PS-280001	0	313.2	Adjusted missing inverts	Low
SAN_P-210228	SAN_PS-280001	0	313.2	Adjusted missing inverts	Low
SAN_P-0	SAN_MH-221279	0	353.82	Adjusted missing inverts	Low
SAN_P-210282	SAN_MH-221103	0	356.08	Adjusted missing inverts	Low
SAN_P-210289	SAN_MH-221127	0	349.23	Adjusted missing inverts (trunk sewer)	High
SAN_P-210368	SAN_MH-221348	0	361.15	Adjusted missing inverts	Low
SAN_P-210383	SAN_MH-220020	0	355.35	Adjusted missing inverts	Low
SAN_P-210384	SAN_MH-221487	0	355	Adjusted missing inverts	Low
SAN_P-210675	SAN_MH-220084	0	360.1	Adjusted missing inverts	Low
SAN_P-210699	SAN_MH-220769	0	357.355	Adjusted missing inverts (trunk sewer)	High
SAN_P-210735	SAN_MH-220794	0	364.08	Adjusted missing inverts	Low
SAN_P-210745	SAN_MH-220737	0	363.34	Adjusted missing inverts	Low

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-210746	SAN_MH-220738	0	363.25	Adjusted missing inverts	Low
SAN_P-210747	SAN_MH-220739	0	362.9	Adjusted missing inverts	Low
SAN_P-210789	SAN_MH-220839	0	364.785	Adjusted missing inverts	Low
SAN_P-210799	SAN_MH-220846	0	361.843	Adjusted missing inverts	Low
SAN_P-210800	SAN_MH-220847	0	361.67	Adjusted missing inverts	Low
SAN_P-210828	SAN_MH-220890	0	363.14	Adjusted missing inverts	Low
SAN_P-210829	SAN_MH-220891	0	362.928	Adjusted missing inverts	Low
SAN_P-210834	SAN_MH-220884	0	365.297	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210838	SAN_MH-220888	0	363.152	Adjusted missing inverts	Low
SAN_P-210891	SAN_MH-220955	0	361.676	Adjusted missing inverts	Low
SAN_P-210908	SAN_MH-220951	0	362.35	Adjusted missing inverts	Low
SAN_P-210909	SAN_MH-220952	0	362.051	Adjusted missing inverts	Low
SAN_P-210922	SAN_MH-220765	0	359.81	Adjusted missing inverts	Low
SAN_P-210950	SAN_MH-220995	0	350.88	Adjusted missing inverts	Low
SAN_P-210968	SAN_MH-221006	0	355.04	Adjusted missing inverts	Low
SAN_P-210969	SAN_MH-221021	0	355.1	Adjusted missing inverts	Low
SAN_P-210970	SAN_MH-221022	0	355.32	Adjusted missing inverts	Low
SAN_P-210971	SAN_MH-221023	0	355.57	Adjusted missing inverts	Low
SAN_P-211008	SAN_MH-221062	0	361.78	Adjusted missing inverts	Low
SAN_P-211011	SAN_MH-221065	0	351.08	Adjusted missing inverts	Low
SAN_P-211012	SAN_MH-221066	0	348.7	Adjusted missing inverts	Low
SAN_P-211013	SAN_MH-221067	0	345.39	Adjusted missing inverts	Low
SAN_P-211014	SAN_MH-221076	0	342.96	Adjusted missing inverts	Low
SAN_P-211025	SAN_MH-221087	0	346.39	Adjusted missing inverts	Low
SAN_P-211027	SAN_MH-221086	0	345.352	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211028	SAN_MH-221085	0	345.277	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211058	SAN_MH-221233	0	355.82	Adjusted missing inverts	Low

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211061	SAN_MH-221225	0	357.35	Adjusted missing inverts	Low
SAN_P-211062	SAN_MH-221226	0	357.3	Adjusted missing inverts	Low
SAN_P-211065	SAN_MH-221247	0	349.773	Adjusted missing inverts	Low
SAN_P-211068	SAN_MH-221154	0	357.29	Adjusted missing inverts	Low
SAN_P-211071	SAN_MH-221174	0	353.35	Adjusted missing inverts (trunk sewer)	High
SAN_P-211072	SAN_MH-221175	0	353.34	Adjusted missing inverts (trunk sewer)	High
SAN_P-211074	SAN_MH-220856	0	361.4	Adjusted missing inverts	Low
SAN_P-211076	SAN_MH-220855	0	358.07	Adjusted missing inverts	Low
SAN_P-211077	SAN_MH-221176	0	353.1	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211078	SAN_MH-221192	0	353.463	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211079	SAN_MH-221191	0	354.85	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211080	SAN_MH-221190	0	357.79	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211081	SAN_MH-221191	0	354.85	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211084	SAN_MH-220719	0	356.67	Adjusted missing inverts	Low
SAN_P-211085	SAN_MH-221186	0	355.87	Adjusted missing inverts	Low
SAN_P-211086	SAN_MH-221187	0	351.68	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211087	SAN_MH-221181	0	351.18	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211088	SAN_MH-221181	0	351.343	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211089	SAN_MH-221138	0	352.04	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211090	SAN_MH-221137	0	354.13	Adjusted missing inverts	Low
SAN_P-211091	SAN_MH-221134	0	348.09	Adjusted missing inverts	Low
SAN_P-211094	SAN_MH-221258	0	353.62	Adjusted missing inverts	Low
SAN_P-211095	SAN_MH-221195	0	358.06	Adjusted missing inverts	Low
SAN_P-211096	SAN_MH-221196	0	356.06	Adjusted missing inverts	Low
SAN_P-211097	SAN_MH-221197	0	353.76	Adjusted missing inverts	Low
SAN_P-211098	SAN_MH-221198	0	352.649	Adjusted missing inverts	Low
SAN_P-211099	SAN_MH-221169	0	352.482	Adjusted missing inverts (receiving sewer)	Medium

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211100	SAN_MH-221508	0	352.379	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211101	SAN_MH-0-GMBP-23	0	352.91	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211102	SAN_MH-221167	0	352.947	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211103	SAN_MH-221168	0	352.652	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211104	SAN_MH-221169	0	352.489	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211105	SAN_MH-221178	0	352.6	Adjusted missing inverts (trunk sewer)	High
SAN_P-211106	SAN_MH-221179	0	352.29	Adjusted missing inverts (trunk sewer)	High
SAN_P-211107	SAN_MH-221180	0	351.79	Adjusted missing inverts (trunk sewer)	High
SAN_P-211108	SAN_MH-221181	0	351.18	Adjusted missing inverts (trunk sewer)	High
SAN_P-211109	SAN_MH-221124	0	351.04	Adjusted missing inverts (trunk sewer)	High
SAN_P-211110	SAN_MH-221125	0	350.27	Adjusted missing inverts (trunk sewer)	High
SAN_P-211111	SAN_MH-221126	0	349.93	Adjusted missing inverts (trunk sewer)	High
SAN_P-211112	SAN_MH-221128	0	349.19	Adjusted missing inverts (trunk sewer)	High
SAN_P-211113	SAN_MH-221114	0	348.82	Adjusted missing inverts (trunk sewer)	High
SAN_P-211115	SAN_MH-221197	0	353.76	Adjusted missing inverts	Low
SAN_P-211116	SAN_MH-221130	0	348.24	Adjusted missing inverts	Low
SAN_P-211117	SAN_MH-221131	0	347.9	Adjusted missing inverts	Low
SAN_P-211118	SAN_MH-221132	0	347.42	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211119	SAN_MH-221135	0	347.84	Adjusted missing inverts	Low
SAN_P-211120	SAN_MH-221132	0	347.42	Adjusted missing inverts	Low
SAN_P-211121	SAN_MH-221094	0	347.205	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211122	SAN_MH-221138	0	352.04	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211123	SAN_MH-221111	0	352.331	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211124	SAN_MH-221110	0	352.504	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211125	SAN_MH-221113	0	348.87	Adjusted missing inverts	Low
SAN_P-211126	SAN_MH-221114	0	348.82	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211141	SAN_MH-221258	0	353.62	Adjusted missing inverts	Low

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211142	SAN_MH-220757	0	350.5	Adjusted missing inverts	Low
SAN_P-211143	SAN_MH-220731	0	359.3	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211144	SAN_MH-221126	0	349.93	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211146	SAN_MH-221122	0	352.67	Adjusted missing inverts	Low
SAN_P-211147	SAN_MH-221123	0	352.71	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211148	SAN_MH-221120	0	355.93	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211149	SAN_MH-221119	0	356.271	Adjusted missing inverts	Low
SAN_P-211153	SAN_MH-220727	0	346	Adjusted missing inverts	Low
SAN_P-211154	WWTP_ELMIRA	0	340.662	Adjusted missing inverts	Low
SAN_P-211155	SAN_MH-221206	0	344.33	Adjusted missing inverts	Low
SAN_P-211156	SAN_MH-220740	0	362.71	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211157	SAN_MH-220737	0	363.34	Adjusted missing inverts	Low
SAN_P-211158	SAN_MH-220738	0	363.25	Adjusted missing inverts	Low
SAN_P-211164	SAN_PS-280002	0	349.03	Adjusted missing inverts	Low
SAN_P-211165	SAN_MH-221301	0	349.234	Adjusted missing inverts	Low
SAN_P-211166	SAN_MH-221300	0	349.372	Adjusted missing inverts	Low
SAN_P-211167	SAN_MH-221299	0	349.57	Adjusted missing inverts	Low
SAN_P-211168	SAN_MH-221298	0	349.66	Adjusted missing inverts	Low
SAN_P-211169	SAN_MH-221297	0	349.85	Adjusted missing inverts	Low
SAN_P-211170	SAN_MH-221296	0	350	Adjusted missing inverts	Low
SAN_P-211171	SAN_MH-221298	0	349.49	Adjusted missing inverts	Low
SAN_P-211172	SAN_MH-221304	0	349.56	Adjusted missing inverts	Low
SAN_P-211173	SAN_MH-221303	0	349.95	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211176	SAN_MH-221276	0	347.62	Adjusted missing inverts (trunk sewer)	High
SAN_P-211177	SAN_MH-221277	0	346.184	Adjusted missing inverts (trunk sewer)	High
SAN_P-211178	SAN_MH-221278	0	344.326	Adjusted missing inverts (trunk sewer)	High
SAN_P-211183	SAN_MH-221275	0	348.467	Adjusted missing inverts	Low

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211184	SAN_MH-221306	0	358.42	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211185	SAN_MH-220581	0	358.19	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211186	SAN_MH-220582	0	357.94	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211187	SAN_MH-220583	0	357.69	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211188	SAN_MH-220584	0	357.42	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211189	SAN_MH-220770	0	357.06	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211191	SAN_MH-221240	0	355.7	Adjusted missing inverts	Low
SAN_P-211197	SAN_MH-221285	0	355.669	Adjusted missing inverts	Low
SAN_P-211198	SAN_MH-221286	0	355.496	Adjusted missing inverts	Low
SAN_P-211199	SAN_MH-221287	0	355.315	Adjusted missing inverts	Low
SAN_P-211200	SAN_MH-221068	0	355.12	Adjusted missing inverts	Low
SAN_P-211202	SAN_MH-220728	0	340.82	Adjusted missing inverts	Low
SAN_P-211203	SAN_MH-221271	0	351.69	Adjusted missing inverts (trunk sewer)	High
SAN_P-211204	SAN_MH-221270	0	352.4	Adjusted missing inverts (trunk sewer)	High
SAN_P-211205	SAN_MH-221269	0	353.18	Adjusted missing inverts (trunk sewer)	High
SAN_P-211206	SAN_MH-221321	0	357.502	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211207	SAN_MH-221322	0	355.992	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211208	SAN_MH-221008	0	353.807	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211209	SAN_MH-221320	0	358.414	Adjusted missing inverts	Low
SAN_P-211210	SAN_MH-221319	0	359.01	Adjusted missing inverts	Low
SAN_P-211211	SAN_MH-221318	0	359.514	Adjusted missing inverts	Low
SAN_P-211212	SAN_MH-221326	0	359.45	Adjusted missing inverts	Low
SAN_P-211213	SAN_MH-221325	0	359.05	Adjusted missing inverts	Low
SAN_P-211214	SAN_MH-221324	0	358.75	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211215	SAN_MH-221323	0	358.35	Adjusted missing inverts	Low
SAN_P-211216	SAN_MH-220716	0	358.259	Adjusted missing inverts	Low
SAN_P-211217	SAN_MH-221008	0	353.77	Adjusted missing inverts (receiving sewer)	Medium

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211218	SAN_MH-221007	0	354.3	Adjusted missing inverts	Low
SAN_P-211219	SAN_MH-221268	0	353.95	Adjusted missing inverts (trunk sewer)	High
SAN_P-211221	SAN_MH-221267	0	354.12	Adjusted missing inverts (trunk sewer)	High
SAN_P-211222	SAN_MH-221266	0	354.41	Adjusted missing inverts (trunk sewer)	High
SAN_P-211223	SAN_MH-221265	0	355.01	Adjusted missing inverts (trunk sewer)	High
SAN_P-211224	SAN_MH-221264	0	355.4	Adjusted missing inverts (trunk sewer)	High
SAN_P-211225	SAN_MH-221263	0	356.226	Adjusted missing inverts (trunk sewer)	High
SAN_P-211226	SAN_MH-221262	0	356.934	Adjusted missing inverts (trunk sewer)	High
SAN_P-211227	SAN_MH-221261	0	357.423	Adjusted missing inverts (trunk sewer)	High
SAN_P-211228	SAN_MH-221260	0	357.693	Adjusted missing inverts (trunk sewer)	High
SAN_P-211229	SAN_MH-221259	0	357.86	Adjusted missing inverts (trunk sewer)	High
SAN_P-211230	SAN_MH-221337	0	360.87	Adjusted missing inverts	Low
SAN_P-211231	SAN_MH-221338	0	360.42	Adjusted missing inverts	Low
SAN_P-211233	SAN_MH-221218	0	354.461	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211234	SAN_MH-221219	0	354.38	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211235	SAN_MH-221220	0	354.28	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211236	SAN_MH-221170	0	354.133	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211237	SAN_MH-221170	0	355.21	Adjusted missing inverts (trunk sewer)	High
SAN_P-211238	SAN_MH-221171	0	353.937	Adjusted missing inverts (trunk sewer)	High
SAN_P-211241	SAN_MH-221144	0	357.74	Adjusted missing inverts (trunk sewer)	High
SAN_P-211242	SAN_MH-221145	0	357.94	Adjusted missing inverts (trunk sewer)	High
SAN_P-211243	SAN_MH-221147	0	357.3	Adjusted missing inverts (trunk sewer)	High
SAN_P-211244	SAN_MH-221148	0	356.42	Adjusted missing inverts (trunk sewer)	High
SAN_P-211245	SAN_MH-221149	0	355.84	Adjusted missing inverts (trunk sewer)	High
SAN_P-211246	SAN_MH-221149	0	355.84	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211247	SAN_MH-221160	0	356.57	Adjusted missing inverts	Low
SAN_P-211249	SAN_MH-221153	0	357.65	Adjusted missing inverts	Low

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211250	SAN_MH-221154	0	357.29	Adjusted missing inverts	Low
SAN_P-211254	SAN_MH-220985	0	358.783	Adjusted missing inverts	Low
SAN_P-211260	SAN_MH-221249	0	349.886	Adjusted missing inverts	Low
SAN_P-211261	SAN_MH-221016	0	350.233	Adjusted missing inverts	Low
SAN_P-211264	SAN_MH-221229	0	356.43	Adjusted missing inverts	Low
SAN_P-211265	SAN_MH-221160	0	356.57	Adjusted missing inverts	Low
SAN_P-211270	SAN_MH-221159	0	357.68	Adjusted missing inverts	Low
SAN_P-211271	SAN_MH-221228	0	356.86	Adjusted missing inverts	Low
SAN_P-211275	SAN_MH-221227	0	356.96	Adjusted missing inverts	Low
SAN_P-211278	SAN_MH-221263	0	356.226	Adjusted missing inverts	Low
SAN_P-211279	SAN_MH-221272	0	350.98	Adjusted missing inverts (trunk sewer)	High
SAN_P-211280	SAN_MH-221272	0	350.98	Adjusted missing inverts (trunk sewer)	High
SAN_P-211282	SAN_MH-221275	0	348.24	Adjusted missing inverts (trunk sewer)	High
SAN_P-211285	SAN_MH-220854	0	358.69	Adjusted missing inverts	Low
SAN_P-211286	SAN_MH-221177	0	352.92	Adjusted missing inverts (trunk sewer)	High
SAN_P-211288	SAN_MH-221176	0	352.93	Adjusted missing inverts (trunk sewer)	High
SAN_P-211298	SAN_MH-221166	0	353.4	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211299	SAN_MH-221167	0	352.947	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211300	SAN_MH-221167	0	352.947	Adjusted missing inverts	Low
SAN_P-211311	SAN_MH-221236	0	354.84	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211312	SAN_MH-221235	0	355.16	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211313	SAN_MH-221234	0	355.32	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211314	SAN_MH-221233	0	355.82	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211321	SAN_MH-220081	0	356.34	Adjusted missing inverts	Low
SAN_P-211323	SAN_MH-220976	0	363.736	Adjusted missing inverts	Low
SAN_P-211332	SAN_MH-221172	0	353.898	Adjusted missing inverts	Low
SAN_P-211333	SAN_MH-221340	0	357.186	Adjusted missing inverts	Low

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211339	SAN_MH-221214	0	360.508	Adjusted missing inverts	Low
SAN_P-211341	SAN_MH-221158	0	358.8	Adjusted missing inverts	Low
SAN_P-211342	SAN_MH-221150	0	359.99	Adjusted missing inverts	Low
SAN_P-211388	SAN_MH-220042	0	363.53	Adjusted missing inverts	Low
SAN_P-211389	SAN_MH-220043	0	364.22	Adjusted missing inverts	Low
SAN_P-211390	SAN_MH-220044	0	365.48	Adjusted missing inverts	Low
SAN_P-211391	SAN_MH-220045	0	366.1	Adjusted missing inverts	Low
SAN_P-211392	SAN_MH-220047	0	366.35	Adjusted missing inverts	Low
SAN_P-211393	SAN_MH-220045	0	366.1	Adjusted missing inverts	Low
SAN_P-211394	SAN_MH-220042	0	363.53	Adjusted missing inverts	Low
SAN_P-211395	SAN_MH-220041	0	362.93	Adjusted missing inverts	Low
SAN_P-211396	SAN_MH-220036	0	362.022	Adjusted missing inverts	Low
SAN_P-211397	SAN_MH-220039	0	366.66	Adjusted missing inverts	Low
SAN_P-211398	SAN_MH-220038	0	365.33	Adjusted missing inverts	Low
SAN_P-211399	SAN_MH-220037	0	364.04	Adjusted missing inverts	Low
SAN_P-211405	SAN_MH-221361	0	353.84	Adjusted missing inverts (trunk sewer)	High
SAN_P-211411	SAN_MH-221237	0	354.64	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211412	SAN_MH-221242	0	354.57	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-211414	SAN_MH-221384	0	355.49	Adjusted missing inverts (trunk sewer)	High
SAN_P-211424	SAN_MH-221391	0	354.07	Adjusted missing inverts	Low
SAN_P-211425	SAN_MH-221390	0	353.427	Adjusted missing inverts	Low
SAN_P-211444	SAN_MH-220963	0	361.03	Adjusted missing inverts	Low
SAN_P-211445	SAN_MH-221416	0	361.089	Adjusted missing inverts	Low
SAN_P-211446	SAN_MH-221417	0	361.12	Adjusted missing inverts	Low
SAN_P-211460	SAN_MH-221508	0	352.26	Adjusted missing inverts (trunk sewer)	High
SAN_P-211461	SAN_MH-211431	0	352.24	Adjusted missing inverts (trunk sewer)	High
SAN_P-211480	SAN_MH-220728	0	343.178	Adjusted missing inverts	Low

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-211481	SAN_MH-221464	0	343.63	Adjusted missing inverts	Low
SAN_P-211482	SAN_MH-221465	0	344.08	Adjusted missing inverts	Low
SAN_P-211483	SAN_MH-221464	0	343.72	Adjusted missing inverts	Low
SAN_P-211484	SAN_MH-221008	0	353.59	Adjusted missing inverts (trunk sewer)	High
SAN_P-211485	SAN_MH-221467	0	363.84	Adjusted missing inverts	Low
SAN_P-211486	SAN_MH-221468	0	363.68	Adjusted missing inverts	Low
SAN_P-211487	SAN_MH-220736	0	363.6	Adjusted missing inverts	Low
SAN_P-210020	SAN_MH-220120	0	361.344	Adjusted missing inverts	Low
SAN_P-210029	SAN_MH-220128	0	353.89	Adjusted missing inverts	Low
SAN_P-210030	SAN_MH-220129	0	353.69	Adjusted missing inverts	Low
SAN_FM-250006	SAN_MH-220283	0	344.04	Adjusted missing inverts	Low
SAN_P-210072	SAN_MH-220175	0	340.757	Adjusted missing inverts	Low
SAN_P-210082	SAN_MH-220177	0	339.07	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210083	SAN_MH-220178	0	338.93	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210084	SAN_MH-220179	0	338.773	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210085	SAN_MH-220180	0	338.59	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210086	SAN_MH-220181	0	338.32	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210087	SAN_MH-220182	0	337.737	Adjusted missing inverts (receiving sewer)	Medium
SAN_P-210092	SAN_MH-221231	0	339.309	Adjusted missing inverts	Low
SAN_P-210093	SAN_MH-220186	0	339.44	Adjusted missing inverts	Low
SAN_P-210094	SAN_MH-220188	0	340.52	Adjusted missing inverts	Low
SAN_P-210095	SAN_MH-220189	0	340.239	Adjusted missing inverts	Low
SAN_P-210183	SAN_MH-220275	0	342.418	Adjusted missing inverts	Low
SAN_P-210187	SAN_MH-220279	0	343.324	Adjusted missing inverts	Low
SAN_P-210188	SAN_MH-220280	0	343.7	Adjusted missing inverts	Low
SAN_P-210189	SAN_MH-220281	0	343.84	Adjusted missing inverts	Low
SAN_P-210190	SAN_MH-220280	0	343.7	Adjusted missing inverts	Low

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Conduit Reference	Outlet Node Reference	Township Elevation (m)	GMBP Assumed Model Elevation (m)	GMBP Comment	Priority
SAN_P-210192	SAN_MH-220285	**0**	**336.28**	Adjusted missing inverts	**Low**
SAN_P-210193	SAN_MH-220286	**0**	**335.8**	Adjusted missing inverts	**Low**
SAN_P-210194	SAN_MH-220287	**0**	**335.427**	Adjusted missing inverts (receiving sewer)	**Medium**
SAN_P-210195	SAN_MH-220288	**0**	**335.073**	Adjusted missing inverts (receiving sewer)	**Medium**
SAN_P-211340	SAN_MH-221312	**0**	**342.696**	Adjusted missing inverts (receiving sewer)	**Medium**
SAN_P-211409	SAN_MH-221382	**0**	**341.11**	Adjusted missing inverts	**Low**
SAN_P-211475	SAN_MH-221443	**0**	**340.58**	Adjusted missing inverts	**Low**
SAN_P-211477	SAN_MH-221445	**0**	**330.73**	Adjusted missing inverts	**Low**
SAN_P-211479	GMBP-J48	**0**	**333.135**	Adjusted missing inverts	**Low**
SAN_P-210042	SAN_MH-220141	**0**	**342.12**	Adjusted missing inverts	**Low**

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Appendix C – Water Supply Wells

Table 10: Water Supply Well Model Information

Settlement	Pump Reference ID	Elevation (m)	Pump Design Point/Curve (m)
Maryhill	MH_PMP_MHWELL	329.00	Design Head: 3.00 Design Flow: 1.26
	MHBOOSTER1	329.00	Existing pump curve in model
	MHBOOSTER2	329.00	Existing pump curve in model
	V_PMP_VHWELL	331.50	Design Head: 4.00 Design Flow: 3.80
	VHBOOSTER1	332.50	Existing pump curve in model
	VHBOOSTER2	332.50	Existing pump curve in model
	VHBOOSTER3	332.50	Existing pump curve in model
Heidelberg	PMP_ALT3	371.78	Design Head: 0.00 Design Flow: 0.00
	PMP_ALT1A	371.78	Design Head: 0.00 Design Flow: 0.00
	PMP_SCB1	371.78	Existing pump curve in model
	PMP_SCB2	371.78	Existing pump curve in model
	PMP_SCB3	371.78	Existing pump curve in model
	PMP_SCB4	371.78	Existing pump curve in model
	PMP_HDB2	365.36	Existing pump curve in model
	PMP_HDB1	365.36	Existing pump curve in model
	PMP_HDB3	365.36	Existing pump curve in model

Table 11: Water Supply Well Pump Curves

Pump Curve ID	Pump Reference ID	Flow (lps)	Head (m)
MARYHILLHISTORICAL	MHBOOSTER1 & MHBOOSTER2	0.00	41.40
		1.25	37.40
		2.30	36.10
PMP_VIS-WF6CHC	VHBOOSTER1 & VHBOOSTER2 & VHBOOSTER3	0.00	82.00
		2.50	81.50
		5.00	81.00
		7.50	80.00
		10.00	78.00
		12.50	69.00
		15.00	62.00
		17.50	48.00
		20.00	35.00
		22.00	21.00

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PMP_SCB1	PMP_SCB1	0.00	85.30
		1.24	81.59
		3.11	74.92
		4.66	67.50
		6.22	56.37
		6.93	50.44
		7.46	44.50
		8.70	29.67
		10.26	0.00
PMP_SCB2_90PCT	PMP_SCB2	0.00	47.53
		5.67	47.40
		11.34	46.91
		17.01	43.95
		21.55	40.74
		28.35	33.08
		34.02	22.96
		39.69	9.88
		43.21	0.00
PMP_SCB3_90PCT	PMP_SCB3	0.00	47.53
		5.67	47.40
		11.34	46.91
		17.01	43.95
		21.55	40.74
		28.35	33.08
		34.02	22.96
		39.69	9.88
		43.21	0.00
PMP_SCB4	PMP_SCB4	0.00	63.05
		29.87	56.19
		45.41	53.45
		59.74	49.89
		71.69	46.60
		84.24	41.12
		95.59	34.26
		112.02	20.56
		119.49	13.71
		128.45	0.00
PMP_HDB2	PMP_HDB2	0.00	52.67
		2.94	52.15
		5.88	50.60
		8.82	47.99

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		11.76	44.32
		14.70	39.60
		17.64	33.81
		20.58	26.96
		23.52	19.04
		26.46	10.06
		29.40	0.00
PMP_HDB1	PMP_HDB1	0.00	63.18
		3.54	62.56
		7.08	60.69
		10.62	57.56
		14.16	53.17
		17.70	47.50
		21.24	40.56
		24.78	32.34
		28.32	22.84
		31.86	12.06
		35.40	0.00
PMP_HDB3	PMP_HDB3	0.00	67.30
		3.80	66.64
		7.60	64.65
		11.40	61.32
		15.20	56.64
		19.00	50.60
		22.80	43.21
		26.60	34.45
		30.40	24.33
		34.20	12.85
		38.00	0.00

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Appendix D – Water Pump Station Data

Table 12: Water Pump Station Model Information

Settlement	Pump Reference ID	Elevation (m)	Pump Design Point/Curve
Elmira	PMP_EB10	360.80	Existing pump curve in model
	PMP_EB11	360.80	Existing pump curve in model
	PMP_EB12	360.80	Existing pump curve in model
	PMP_EB13	360.80	Existing pump curve in model
St. Jacobs	PMP_SJB5	345.60	Existing pump curve in model
	PMP_SJB6	345.60	Existing pump curve in model
	PMP_SJB7	345.60	Existing pump curve in model

Table 13: Water Pump Station Pump Curves

Pump Curve ID	Flow (lps)	Head (m)
PMP_EB10 & PMP_EB11	0.00	39.70
	25.20	39.00
	50.50	37.50
	75.70	34.50
	105.30	27.50
PMP_EB12	13.90	40.41
	27.79	39.87
	41.69	39.33
	55.59	37.72
	69.48	36.11
	83.38	33.16
	97.28	29.68
	111.17	25.65
PMP_EB13	0.00	37.76
	15.77	36.54
	31.55	35.62
	47.32	34.71
	63.09	33.19
	78.86	31.97
	94.64	28.00
	110.41	24.04
	126.18	19.47
	165.00	0.00
PMP_SJB5	0.00	61.20
	54.00	58.50
	90.00	54.00
	117.00	47.16
	126.00	45.00
PMP_SJB6 & PMP_SJB7	0.00	76.80
	63.00	74.70
	126.00	70.10
	189.00	62.50
	252.00	48.80

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Appendix E – Water Model Watermains with Data Assumptions

Table 14: Water Model Watermains with Data Assumptions (assumed/inferred data shown in red)

Model ID	Township GIS Asset ID	Model Yr. Inst. Date	Updated Yr. Inst. Date (Township GIS)	Model Pipe Diameter	Updated Diameter (Township GIS)	Model Material	Priority
PPE_05094	100828	2004	2003?	300	200	PVC	Low
PPE_05215	100828	1973	2011	150	200	Cast Iron	Low
PPE_05217	100826	1973	2011	150	200	Cast Iron	Low
PPE_05218	0	1971	2011	150	200	Cast Iron	Low
PPE_05230	100828	1971	2011	150	200	Cast Iron	Low
PPE_05233	100826	1970	1972	150	200	Cast Iron	Low
PPE_05292	100826	1961	2011	150	200	Asbestos Cement	Low
PPE_05295	100826	1964	2010	150	200	Cast Iron	Low
PPE_05296	100826	1964	2010	150	200	Cast Iron	Low
PPE_05308	100826	1964	2014	150	200	Cast Iron	Low
PPE_05309	100826	1966	2010	150	200	Cast Iron	Low
PPE_05310	100825	1949	2017	150	300	Cast Iron	Low
PPE_05311	100825	1949	2017	150	300	Cast Iron	Low
PPE_05313	100205	1959	2010	150	200	Asbestos Cement	Low
PPE_05320	100205	1978	2017	150	300	Ductile Iron	Low
PPE_05321	100856	1978	2010	150	300	Ductile iron	Low
PPE_05323	0	1908	2019	150	300	Cast Iron	Low
PPE_05341	100204	1961	1923?	150	300	Asbestos Cement	Low
PPE_05363	0	1947	2014	100	150	Cast Iron	Low
PPE_05366	0	1947	2014	100	150	Cast Iron	Low
PPE_05370	0	1952	2021	150	300	Cast Iron	Low

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Model ID	Township GIS Asset ID	Model Yr. Inst. Date	Updated Yr. Inst. Date (Township GIS)	Model Pipe Diameter	Updated Diameter (Township GIS)	Model Material	Priority
PPE_05382	0	1952	2021	200	300	Cast Iron	**Low**
PPE_05384	0	1962	2021	200	150	Asbestos Cement	**Low**
PPE_05385	100849	1959	2021	200	150	Ductile Iron	**Low**
PPE_05392	100097	1987	2021	200	300	Ductile Iron	**Low**
PPE_05396	100097	1961	2008	300	200	Asbestos Cement	**Low**
PPE_05430	100233	2003	1996?	300	200	PVC	**Low**
PPE_05475	100307	2002	1997?	300	150	PVC	**Low**
PPE_05476	100307	2002	2003	300	250	PVC	**Low**
PPE_05499	100218	1973	2003	200	300	Cast Iron	**Low**
PPE_05513	100332	1973	2011	150	200	Cast Iron	**Low**
PPE_05545	100223	1964	2021	200	300	Ductile Iron	**Low**
PPE_05546	100223	1987	2021	200	300	Ductile Iron	**Low**
PPE_05551	100249	1987	2021	200	300	Ductile Iron	**Low**
PPE_05559	100250	1947	2014	100	150	Cast Iron	**Low**
PPE_05603	100252	1961	2008	300	200	Asbestos Cement	**Low**
PPE_05609	100219	1961	1974	300	150	Cast Iron	**Low**
PPE_42876	100220	2020	2021	300	150	PVC	**Low**
PPE_42878	100222	2020	2004?	300	150	PVC	**Low**
PPE_05187	100219	1971	2016	250	300	PVC	**Low**
PPE_05188	100208	1971	2016	250	300	PVC	**Low**
PPE_05441	100240	2003	2017	250	300	PVC	**Low**
PPE_05454	100241	2006	2003?	150	250	PVC	**Low**
PPE_05137	100242	1994	1994	200	250	Ductile Iron	**Low**

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Appendix F – Water Storage Facilities

Table 15: Water Storage Facilities Model Information

Settlement	Facility ID	Elevation (m)	Maximum Level (m)	Volume (m^3)
Elmira	TNK_ELMIRA_WEST	411.40	11.30	Existing curve in model
	TNK_HOWARD	388.16	10.40	Existing curve in model
St. Jacobs	TNK_ST_JACOBS	345.95	3.10	Existing curve in model
Maryhill	MARYHILLRES	326.00	2.44	Existing curve in model
	VHRES	328.50	3.00	Existing curve in model
Heidelberg	TNK_ALT4	361.89	2.44	Minimum volume: 0.00

Table 16: Water Storage Facility Storage Curves

Curve Facility ID	Model Facility ID	Depth (m)	Volume (m^3)
TNK_ELMIRA_WEST	TNK_ELMIRA_WEST	0.00	435.01
		1.00	784.44
		2.00	1203.25
		3.00	1697.7000
		4.00	2274.16
		4.70	2722.62
		11.30	7152.84
TNK_HOWARD	TNK_HOWARD	0.50	15.60
		1.00	38.80
		1.50	69.80
		2.00	110.40
		2.50	162.90
		3.00	227.70
		3.50	297.10
		4.00	376.50
		4.50	461.60
		5.00	551.30
		5.50	644.50
		6.00	739.90
		6.50	836.30
		7.00	932.60
		7.50	1027.70
		8.00	1120.10
		8.50	1208.80
		9.00	1292.10
		9.50	1370.10

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Curve Facility ID	Model Facility ID	Depth (m)	Volume (m^3)
		10.00	1439.90
		10.67	1514.00
TNK_ST_JACOBS	TNK_ST_JACOBS	0.00	0.00
		3.10	951.00
TNK_MHRES	MARYHILLRES	0.00	0.00
		2.44	45.50
TNK_VHRES	VHRES	0.00	0.00
		3.00	87.00

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Township of Woolwich

APPENDIX G

WASTEWATER MODELLING SOFTWARE SELECTION MEMO

Date:	December 1, 2022 File: 622098
To:	Lori Fox – Township of Woolwich
From:	Julien Bell and Jody Lee – GM BluePlan
Project:	Woolwich Servicing Capacity Study
Subject:	Wastewater Modelling Software Selection

TECHNICAL MEMO

1 Background

This memo is intended to present and compare the functionality and costing of various wastewater modelling software and provide a recommendation for the preferred wastewater modelling software that is best suited for the Township's needs.

2 Township Wastewater Modelling Needs

The Township would like to build and maintain a wastewater model which includes the communities of Elmira, St. Jacobs, Breslau, Stockyards, Conestogo, and Heidelberg. **Table 2-1** presents the number of pipes within the Township's GIS which will be utilized as the basis for the wastewater model.

Table 2-1: Township Wastewater System GIS Number of Pipes

Location	Number of Pipes	
	Main	Forcemain
Heidelberg	31	0
Elmira	965	7
Breslau	393	2
St. Jacobs	226	2
Conestogo	33	1
Waterloo	1	0
Total	**1,649**	**12**

The Township is looking for a wastewater modelling software that is compatible with ESRI GIS which can be updated and used by Township staff to provide a consistent approach for the assessment of wastewater system capacity. The software must be interactive and flexible to enable alternatives, adjustments, and updates to input parameters. The following parameters were reviewed in the assessment of the appropriate software: meets the needs of the Township, software accuracy, short term learning curve, current features, available technical support including upgrades, and cost.

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3 Comparison of Available Wastewater Modelling Software

Table 3-1 presents the various modelling software options that are used by municipalities within the GTHA, and some key information regarding each software.

Table 3-1: Wastewater Modelling Software Options

Software	Vendor	Key Information	GTHA Municipalities
InfoWorks ICM	Autodesk	• Standalone software with GIS import/export options • Includes 2D modelling capability (for stormwater) • Include scenario management and version management tools	• City of Toronto • Region of Peel • York Region (Including lower-tier municipalities) • Durham Region • City of Brantford • Region of Halton • City of London
InfoSWMM	Autodesk	• Extension using ArcGIS platform (requires ArcGIS license) • No 2D modelling capability • Include scenario management	• Niagara Region (Including lower-tier municipalities) • City of Guelph
InfoSewer	Autodesk	• Extension using ArcGIS platform (requires ArcGIS license) • No validation tools • No dynamic modelling – steady state only • No 2D modelling capability • Older software – potential to be retired in the future	• Region of Waterloo
XP-SWMM	Autodesk	• Standalone software with GIS import/export options • Includes 2D modelling capability (for stormwater) • Include scenario management	• City of Stratford
Mike+ Collection Systems	DHI	• Standalone software with GIS import/export options • Less commonly utilized in our experience • Includes 2D modelling capability (for stormwater) • Include scenario management	• City of Hamilton
SewerGEMS	Bentley	• Standalone software with GIS import/export options, or extension using ArcGIS/AutoCAD platforms • Less commonly utilized in our experience (in Ontario) • Includes 2D modelling capability (for stormwater) • Include scenario management	• Town of Bradford West Gwillimbury • City of Sarnia
PCSWMM	CHI	• Standalone software with GIS import/export options • Includes version management tools, but limited scenario manager • Can be easily imported into InfoSWMM or InfoWorks ICM • Includes 2D modelling capability (for stormwater)	• County of Brant • City of Cambridge • City of Waterloo • City of Barrie • Township of Wilmot

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3.1 Evaluation of Modelling Software Options

The evaluation scale presented in **Table 3-2** was utilized to evaluate the various wastewater modelling software options.

Table 3-2: Evaluation Scale for Modelling Software Options

Description	Rating
More favourable	
Moderately favourable	
Less favourable	

The modelling software options were evaluated based on the following categories: meets modelling needs, learning curve, workflow features, available technical support, use by other municipalities in the GTHA, and cost. The following summarizes the evaluation, which is presented in **Table 3-3**.

- **Meets Modelling Needs**: All of the software options meet the Township's technical modelling needs with the exception of InfoSewer as it is a steady state model and does not provide dynamic results.
- **Learning Curve**: Through GMBP's experience with various wastewater modelling software, PCSWMM is typically considered to be the most intuitive and user-friendly option, with the shallowest learning curve. Conversely, InfoWorks ICM has been noted to have the steepest learning curve.
- **Workflow Features**: This refers to features within the software which streamline and improve efficiency of modelling tasks. One key difference among the modelling options is that PCSWMM scenario manager is limited but does allow for the user to compare alternate scenarios results, for pushing updates to various models as needed and a built-in sensitivity-based calibration tool to aid in developing options, however, a new copy of the model must be saved for each different scenario. Another key difference is that InfoSewer does not include validation tools.
- **Available Technical Support**: All of the model options provide adequate technical support through online user guides/community FAQs and/or direct vendor contact for user support. However, user guides/FAQs for the software options owned by Autodesk (InfoWorks ICM, InfoSWMM, InfoSewer, XPSWMM) are more difficult to find online.
- **Use by Municipalities in the GTHA**: The most commonly used wastewater modelling software in the GTHA are: InfoWorks ICM, InfoSWMM, and PCSWMM. InfoWorks is

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commonly used by the larger municipalities in the GTHA, while InfoSWMM and PCSWMM are more commonly used by moderate to small-sized municipalities in the GTHA.

- **Cost**: The following cost categories were used to assess the software options
  - **Green** (more favourable) <= $5,000 per year per user
  - **Yellow** (moderately favourable) $5,000 - $10,000 per year per user
  - **Red** (less favourable) > $10,000 per year per user
  - The additional user cost for PCSWMM is $600 per additional user annually, while the remainder of the software options require additional full licenses to be purchased per additional user.

Table 3-3: Comparison of Various Wastewater Modelling Software Options

Software	Vendor	Meets Modelling Needs	Learning Curve	Workflow Features	Available Technical Support	Use by Municipalities in the GTHA	Cost[2]
InfoWorks ICM	Autodesk	🟢	🔴	🟢	🟡	🟢	🟡
InfoSWMM	Autodesk	🟢	🟡	🟢	🟡	🟢	🟡
InfoSewer	Autodesk	🔴	🟡	🟡	🟡	🟡	🟡
XP-SWMM	Autodesk	🟢	🟡	🟢	🟡	🔴	🟡
Mike+ Collection Systems	DHI	🟢	🟡	🟢	🟡	🔴	🟡
SewerGEMS	Bentley	🟢	🟡	🟢	🟢	🔴	🔴
PCSWMM	CHI	🟢	🟢	🟡	🟢	🟢	🟢

[1] Green = more favourable, yellow = moderately favourable, red = less favourable

[2] Does not include additional subscription costs for an ArcGIS license where needed (applicable to InfoSWMM and InfoSewer). Cost is based on unlimited pipe license for all software with the exception of SewerGEMS, which is a 5,000-pipe license, with option for unlimited pipes at a significantly higher annual cost

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- Based on the evaluation, the preferred candidates for consideration are: InfoWorks ICM, InfoSWMM, and PCSWMM.
- InfoSewer is not recommended as it is a steady-state model and does not meet the Township's modelling needs.
- XP-SWMM and Mike+ are not recommended as they are not widely utilized by other GTHA municipalities and scored as moderately favourable in more categories compared to the preferred options.
- SewerGEMs is not recommended as it is the most expensive option (>$10,000 per year per user) and not very widely utilized by other GTHA municipalities.

4 Compatibility with Region of Waterloo and Other Local Area Municipalities

The Region of Waterloo does not have an existing Township of Woolwich wastewater model, but typically uses InfoSewer for other existing wastewater models within the Region, however, it has been noted by the Region that the model is not utilized or updated regularly.

Based on our knowledge and historic master plans/reports, the other local area municipalities use the following wastewater modelling software:

- **PCSWMM:** City of Waterloo, City of Cambridge, Township of Wilmot
- **InfoSWMM**: City of Kitchener
- **Unknown**: Township of Wellesley and Township of North Dumfries

It is also noted that the recently completed Breslau Sanitary Sewer Capacity Analysis by K. Smart Associates Ltd. in September 2022 utilized the PCSWMM software to create a trunk model for the analysis.

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5 Recommended Software

PCSWMM is recommended to be used for the Township's wastewater model for the following reasons:

- PCSWMM is used by the three of the other local area municipalities within the Region of Waterloo – including the City of Waterloo which is connected to parts of the Township's wastewater system
    - The PCSWMM model can be easily imported into the Region's InfoSewer model
- PCSWMM is more cost effective compared to InfoWorks and InfoSWMM, especially if the Township wishes to have multiple users
- PCSWMM is the most intuitive software compared to the other options – ease of use is likely important for the Township (will likely be casual users rather than dedicated modellers)
- PCSWMM is also commonly used for stormwater modelling allowing the software to have a dual use in the township.
- PCSWMM includes the option of 2D modelling (i.e. the Township could use PCSWMM to build a stormwater model in the future) – this option is not available within InfoSWMM
- PCSWMM is commonly used by moderate to small-sized GTHA municipalities, whereas InfoWorks ICM is commonly used by large municipalities
- The limited scenario manager within PCSWMM can be managed
- Transition to a different software can be managed in the future if required

Ultimately, PCSWMM is a good starting point for the Township's wastewater model. It will allow for more straightforward integration with the Region's model and/or other existing local area municipalities models and will fulfill the Township's modelling needs while being cost effective and easy to learn.

DRAFT



H

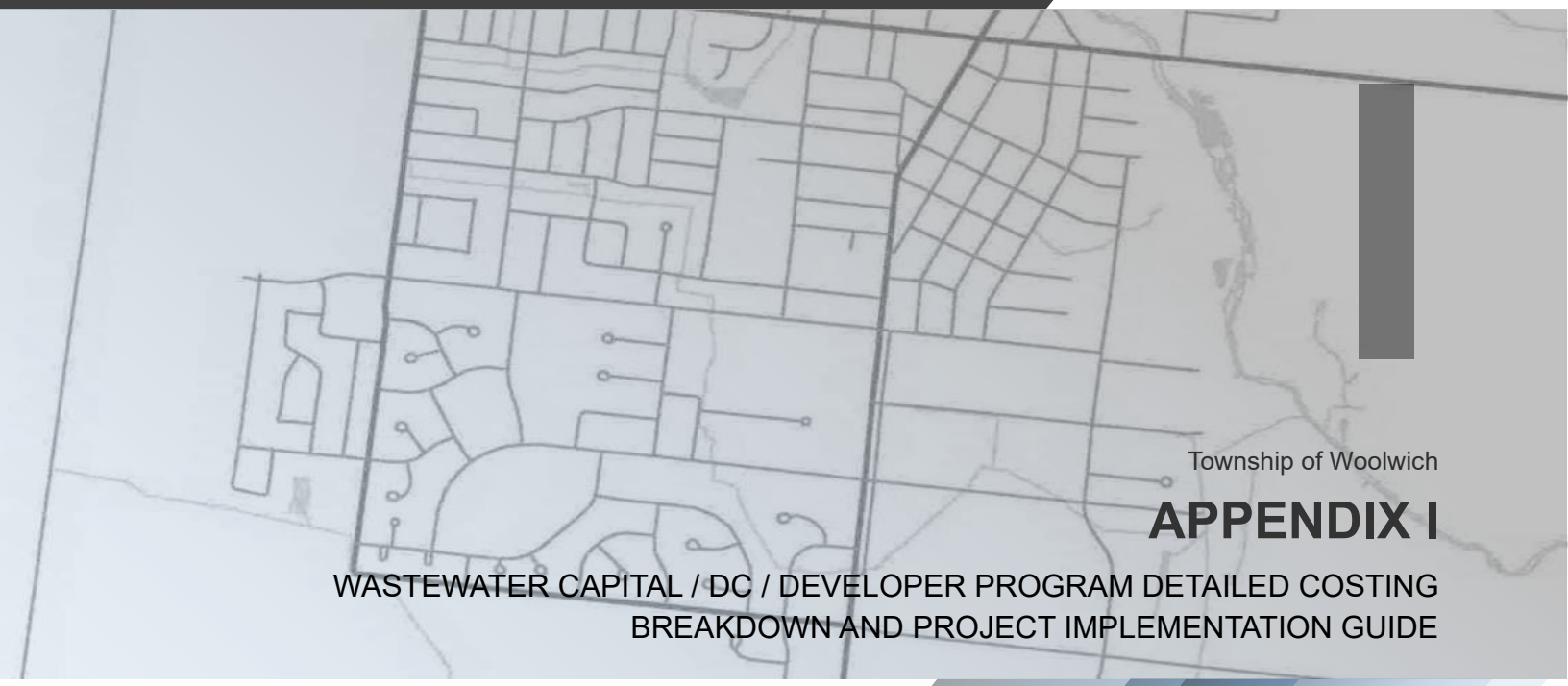
Township of Woolwich

APPENDIX H

FUS CALCULATIONS

Township of Woolwich - Sawmill Road
FUS Analysis

Project No.	Municipality	Building	Land Use	A = Total Floor Area (m^2)	Type of Construction	Fire Hazard	Sprinklers	Proximity				Adjustment 3	Fire Flow	Duration	Storage
622098	St Jacobs	W.K. Dahms Mfg. Ltd Steel Fabricator	Industrial	2,140	Non-Combustible	Limited Combustibility	System	0 to 3	3 to 10	Greater than 30	Greater than 30	0.45	**133**	2.0	0.96
622098	St Jacobs	A&F Souvenir, ULC Wholesaler	Industrial	3,000	Non-Combustible	Combustible	System	Greater than 30	10 to 20	Greater than 30	Greater than 30	0.15	**150**	2.0	1.08
622098	St Jacobs	Weber's Fabricating Fabricator	Industrial	1,650	Ordinary	Limited Combustibility	System	10 to 20	20 to 30	Greater than 30	Greater than 30	0.25	**117**	2.0	0.84
622098	St Jacobs	Pioneer Log Home Wood Construction	Industrial	650	Ordinary	Limited Combustibility	No	Greater than 30	Greater than 30	Greater than 30	Greater than 30	0	**83**	1.8	0.53



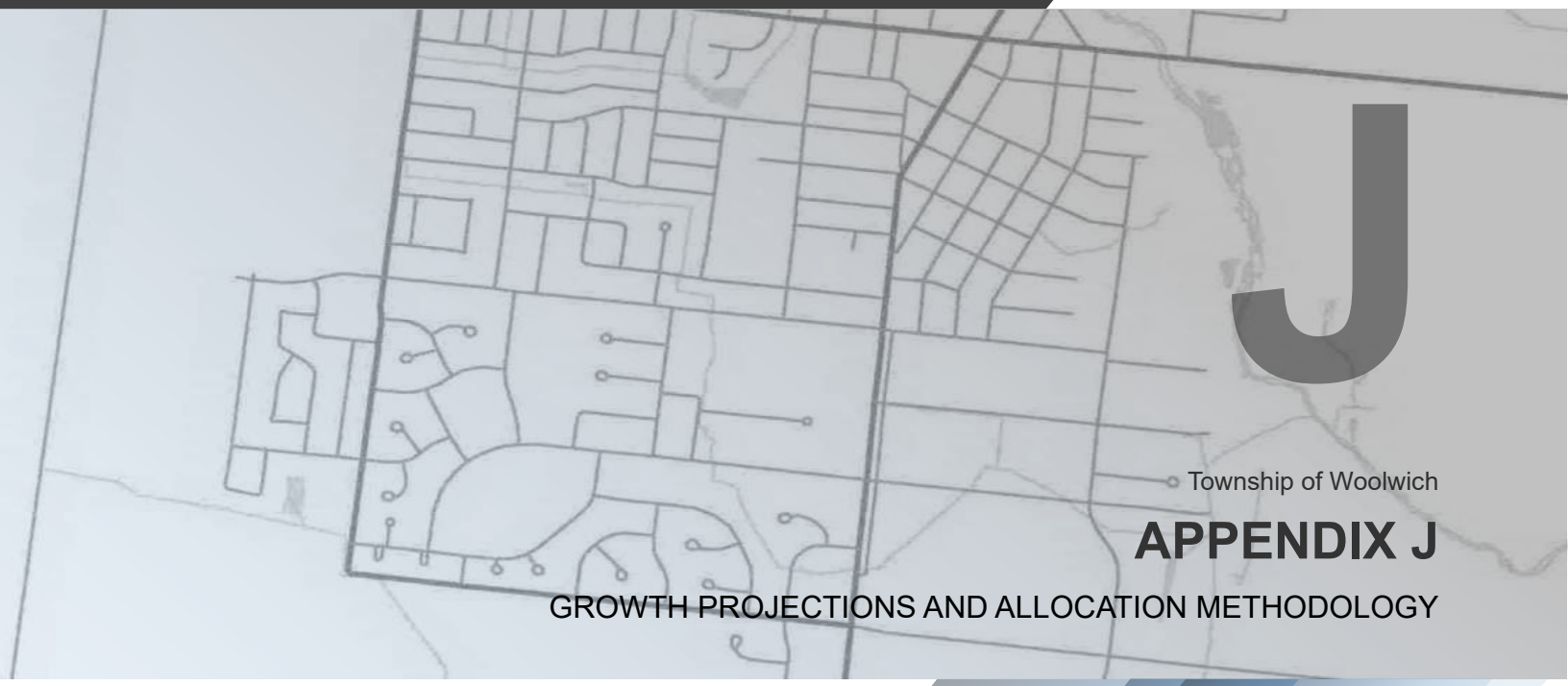
Township of Woolwich

APPENDIX I

WASTEWATER CAPITAL / DC / DEVELOPER PROGRAM DETAILED COSTING BREAKDOWN AND PROJECT IMPLEMENTATION GUIDE

											Base Cost		Special Cost				Construction Uplift		Soils Uplift		Additional Construction Costs		Provisional Allowance			Contingency and Soft Costs			
Project No	Category	Pipe ID	Community	Description	Existing Diameter (mm)	Proposed Diameter (mm)	Project Timing	Length (m)	Area Conditions	Base Unit Rate	Base Cost	Special Cost - Crossings	Cost	Special Cost - Other	Cost	%	Construction Uplift	%	Updated Soils Regulation Uplift	%	Additional Construction Costs	%	Provisional Allowance	Sub Total	Project Contingency (25%)	Design, CA, PA, Studies (20%)	HST (1.76%)	Total ($2024)
SAN-ELM-001	New	SAN_P-0-GMBP-142	Elmira	New sewer in west of Barnswallow Drive	-	300	2024 - 2033	400	Rural	$ 1,005	$ 402,155		$ -		$ -	0%	$ -	2%	$ 8,043	15%	$ 61,530	10%	$ 47,173	$ 518,900	$ 129,725	$ 103,780	$ 13,242	$ 766,000
SAN-ELM-005	New	SAN_P-0-GMBP-132	Elmira	New sewer on Church St W	-	300	2024 - 2033	19	Rural	$ 1,005	$ 19,560	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 4,491	15%	$ 34,358	10%	$ 26,341	$ 289,750	$ 72,437	$ 57,950	$ 7,394	$ 428,000
SAN-ELM-005	New	SAN_P-0-GMBP-133	Elmira	New sewer on Church St W	-	300	2024 - 2033	279	Rural	$ 1,005	$ 280,407	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 9,708	15%	$ 74,267	10%	$ 56,938	$ 626,321	$ 156,580	$ 125,264	$ 15,984	$ 925,000
SAN-ELM-005	New	SAN_P-0-GMBP-134	Elmira	New sewer on Church St W	-	300	2024 - 2033	237	Rural	$ 1,005	$ 238,596	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 8,872	15%	$ 67,870	10%	$ 52,034	$ 572,372	$ 143,093	$ 114,474	$ 14,607	$ 845,000
SAN-ELM-005	New	SAN_P-0-GMBP-135	Elmira	New sewer on Church St W	-	300	2024 - 2033	127	Rural	$ 1,005	$ 127,470	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 6,649	15%	$ 50,868	10%	$ 38,999	$ 428,986	$ 107,247	$ 85,797	$ 10,948	$ 633,000
SAN-ELM-006	New	SAN_P-0-GMBP-136	Elmira	New sewer on Eldale Rd	-	250	2034 - 2051	327	Rural	$ 977	$ 319,975		$ -		$ -	0%	$ -	2%	$ 6,399	15%	$ 48,956	10%	$ 37,533	$ 412,863	$ 103,216	$ 82,573	$ 10,536	$ 610,000
SAN-ELM-007	New	SAN_P-0-GMBP-137	Elmira	New Sewer on Church St E	-	375	2034 - 2051	18	Rural	$ 1,063	$ 19,540		$ -		$ -	0%	$ -	2%	$ 391	15%	$ 2,990	10%	$ 2,292	$ 25,212	$ 6,303	$ 5,042	$ 643	$ 38,000
SAN-ELM-007	New	SAN_P-0-GMBP-138_1	Elmira	New Sewer on Church St E	-	375	2034 - 2051	393	Rural	$ 4,579	$ 1,797,788		$ -		$ -	0%	$ -	2%	$ 35,956	15%	$ 275,062	10%	$ 210,881	$ 2,319,686	$ 579,921	$ 463,937	$ 59,198	$ 3,423,000
SAN-ELM-007	New	SAN_P-0-GMBP-138_2	Elmira	New Sewer on Church St E	-	375	2034 - 2051	360	Rural	$ 1,063	$ 382,328		$ -	Siphon	$ 1,000,000	0%	$ -	2%	$ 27,647	15%	$ 211,496	10%	$ 162,147	$ 1,783,618	$ 445,904	$ 356,724	$ 45,518	$ 2,632,000
SAN-ELM-008	New	SAN_P-0-GMBP-139_2	Elmira	New sewer South Field Dr	-	300	2034 - 2051	454	Rural	$ 1,005	$ 455,986	Creek	$ 115,000		$ -	0%	$ -	2%	$ 11,420	15%	$ 87,361	10%	$ 66,977	$ 736,743	$ 184,186	$ 147,349	$ 18,802	$ 1,088,000
SAN-ELM-008	New	SAN_P-0-GMBP-140	Elmira	New sewer South Field Dr	-	300	2034 - 2051	18	Rural	$ 1,005	$ 18,359		$ -		$ -	0%	$ -	2%	$ 367	15%	$ 2,809	10%	$ 2,154	$ 23,689	$ 5,922	$ 4,738	$ 605	$ 35,000
SAN-ELM-008	New	SAN_P-0-GMBP-139_1	Elmira	New sewer South Field Dr	-	300	2034 - 2051	217	Rural	$ 1,005	$ 218,431		$ -		$ -	0%	$ -	2%	$ 4,369	15%	$ 33,420	10%	$ 25,622	$ 281,842	$ 70,460	$ 56,368	$ 7,193	$ 416,000
SAN-ELM-009	New	SAN_P-0-GMBP-58	Elmira	New sewer southwest Elmira	-	250	2024 - 2033	320	Rural	$ 4,460	$ 1,426,900	Major Creek	$ 408,000		$ -	0%	$ -	2%	$ 36,698	15%	$ 280,740	10%	$ 215,234	$ 2,367,572	$ 591,893	$ 473,514	$ 60,420	$ 3,494,000
SAN-ELM-010	Upgrade	SAN_P-211103	Elmira	Downtown Trunk Upgrade and I&I	200	250	2024 - 2033	65	Suburban	$ 977	$ 63,855		$ -		$ -	20%	$ 12,771	2%	$ 1,277	15%	$ 11,685	10%	$ 8,959	$ 98,547	$ 24,637	$ 19,709	$ 2,515	$ 146,000
SAN-ELM-010	Upgrade	SAN_P-211104	Elmira	Downtown Trunk Upgrade and I&I	200	250	2024 - 2033	78	Suburban	$ 977	$ 75,885		$ -		$ -	20%	$ 15,177	2%	$ 1,518	15%	$ 13,887	10%	$ 10,647	$ 117,113	$ 29,278	$ 23,423	$ 2,989	$ 173,000
SAN-ELM-011	New	SAN_P-0-GMBP-141	Elmira	New sewer on Arthur St N	-	300	2024 - 2033	139	Rural	$ 1,005	$ 139,309	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 6,886	15%	$ 52,679	10%	$ 40,387	$ 444,262	$ 111,066	$ 88,852	$ 11,338	$ 656,000
SAN-ELM-012	New	SAN_P-0-GMBP-60_3	Elmira	New trunk along Oriole Pkwy W	-	450	2024 - 2033	909	Suburban	$ 1,141	$ 1,036,779	Regional Road	$ 779,000	Culvert Crossing	$ 614,000	20%	$ 485,956	2%	$ 48,596	15%	$ 444,650	10%	$ 340,898	$ 3,749,878	$ 937,470	$ 749,976	$ 95,697	$ 5,534,000
SAN-ELM-012	New	SAN_P-0-GMBP-60_2	Elmira	New trunk along Oriole Pkwy E	-	450	2024 - 2033	386	Suburban	$ 1,141	$ 440,830		$ -		$ -	20%	$ 88,166	2%	$ 8,817	15%	$ 80,672	10%	$ 61,848	$ 680,333	$ 170,083	$ 136,067	$ 17,362	$ 1,004,000
SAN-ELM-012	New	SAN_P-0-GMBP-60_1	Elmira	New trunk west of railway between Oriole Pkwy E and First St E	-	450	2024 - 2033	407	Suburban	$ 4,726	$ 1,924,883	Railway	$ 779,000		$ -	20%	$ 540,777	2%	$ 54,078	15%	$ 494,811	10%	$ 379,355	$ 4,172,903	$ 1,043,226	$ 834,581	$ 106,492	$ 6,158,000
SAN-ELM-013	Upgrade	SAN_P-211018	Elmira	Upgrade west of railway between Oriole Pkwy E and First St E	600	675	2024 - 2033	83	Suburban	$ 5,762	$ 475,384	Railway	$ 866,000		$ -	20%	$ 268,277	2%	$ 26,828	15%	$ 245,473	10%	$ 188,196	$ 2,070,158	$ 517,539	$ 414,032	$ 52,830	$ 3,055,000
SAN-ELM-013	Upgrade	SAN_P-211019	Elmira	Upgrade west of railway between Oriole Pkwy E and First St E	600	675	2024 - 2033	85	Suburban	$ 1,868	$ 158,099	Railway	$ 866,000		$ -	20%	$ 204,820	2%	$ 20,482	15%	$ 187,410	10%	$ 143,681	$ 1,580,493	$ 395,123	$ 316,099	$ 40,334	$ 2,333,000
SAN-ELM-013	Upgrade	SAN_P-211020	Elmira	Upgrade west of railway between Oriole Pkwy E and First St E	600	675	2024 - 2033	76	Suburban	$ 1,868	$ 141,719	Railway	$ 866,000		$ -	20%	$ 201,544	2%	$ 20,154	15%	$ 184,413	10%	$ 141,383	$ 1,555,213	$ 388,803	$ 311,043	$ 39,689	$ 2,295,000
SAN-ELM-013	Upgrade	SAN_P-211021	Elmira	Upgrade west of railway between Oriole Pkwy E and First St E	600	675	2024 - 2033	73	Suburban	$ 1,868	$ 136,690	Railway	$ 866,000		$ -	20%	$ 200,538	2%	$ 20,054	15%	$ 183,492	10%	$ 140,677	$ 1,547,451	$ 386,863	$ 309,490	$ 39,491	$ 2,284,000
SAN-ELM-013	Upgrade	SAN_P-211023	Elmira	Upgrade west of railway between Oriole Pkwy E and First St E	600	675	2024 - 2033	87	Suburban	$ 1,868	$ 162,652	Railway	$ 866,000		$ -	20%	$ 205,730	2%	$ 20,573	15%	$ 188,243	10%	$ 144,320	$ 1,587,519	$ 396,880	$ 317,504	$ 40,513	$ 2,343,000
SAN-ELM-013	Upgrade	SAN_P-211024	Elmira	Upgrade west of railway between Oriole Pkwy E and First St E	600	675	2024 - 2033	45	Suburban	$ 1,868	$ 84,064	Railway	$ 866,000		$ -	20%	$ 190,013	2%	$ 19,001	15%	$ 173,862	10%	$ 133,294	$ 1,466,234	$ 366,558	$ 293,247	$ 37,418	$ 2,164,000
SAN-ELM-013	Upgrade	SAN_P-211202	Elmira	Upgrade west of railway between Oriole Pkwy E and First St E	600	675	2024 - 2033	37	Suburban	$ 5,762	$ 215,339	Railway	$ 866,000		$ -	20%	$ 216,268	2%	$ 21,627	15%	$ 197,885	10%	$ 151,712	$ 1,668,830	$ 417,208	$ 333,766	$ 42,589	$ 2,463,000
SAN-ELM-014	New	SAN_P-0-GMBP-143	Elmira	New sewer at Kingfisher Drive	-	250	2034 - 2051	270	Rural	$ 977	$ 263,863		$ -		$ -	0%	$ -	2%	$ 5,277	15%	$ 40,371	10%	$ 30,951	$ 340,462	$ 85,116	$ 68,092	$ 8,689	$ 503,000
SAN-ELM-015	New	SAN_P-0-GMBP-144	Elmira	New sewer east of Arthur St N	-	300	2034 - 2051	310	Rural	$ 1,005	$ 311,670	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 10,333	15%	$ 79,050	10%	$ 60,605	$ 666,659	$ 166,665	$ 133,332	$ 17,013	$ 984,000
SAN-ELM-016	New		Elmira	New sewer from High St and George St to Arthur St N	-	375	2024 - 2033	370	Suburban	$ 1,063	$ 393,241		$ -		$ -	20%	$ 78,648	2%	$ 7,865	15%	$ 71,963	10%	$ 55,172	$ 606,889	$ 151,722	$ 121,378	$ 15,488	$ 896,000
SAN-ELM-017	Upgrade	SAN_P-211164	Elmira	Sanitary Upgrade along Arthur St N north of Arthur SPS	200	300	2024 - 2033	82	Suburban	$ 1,005	$ 82,303	Regional Road	$ 205,000		$ -	20%	$ 57,461	2%	$ 5,746	15%	$ 52,576	10%	$ 40,309	$ 443,395	$ 110,849	$ 88,679	$ 11,315	$ 655,000
SAN-ELM-017	Upgrade	**SAN_P-211165**	Elmira	Sanitary Upgrade along Arthur St N north of Arthur SPS	200	300	2024 - 2033	55	Suburban	$ 1,005	$ 55,782	Regional Road	$ 205,000		$ -	20%	$ 52,156	2%	$ 5,216	15%	$ 47,723	10%	$ 36,588	$ 402,465	$ 100,616	$ 80,493	$ 10,271	$ 594,000
SAN-ELM-017	Upgrade	**SAN_P-211166**	Elmira	Sanitary Upgrade along Arthur St N north of Arthur SPS	200	300	2024 - 2033	79	Suburban	$ 1,005	$ 79,460	Regional Road	$ 205,000		$ -	20%	$ 56,892	2%	$ 5,689	15%	$ 52,056	10%	$ 39,910	$ 439,007	$ 109,752	$ 87,801	$ 11,203	$ 648,000
SAN-ELM-017	Upgrade	**SAN_P-211167**	Elmira	Sanitary Upgrade along Arthur St N north of Arthur SPS	200	300	2024 - 2033	35	Suburban	$ 1,005	$ 35,362	Regional Road	$ 205,000		$ -	20%	$ 48,072	2%	$ 4,807	15%	$ 43,986	10%	$ 33,723	$ 370,951	$ 92,738	$ 74,190	$ 9,467	$ 548,000
SAN-ELM-017	Upgrade	**SAN_P-211168**	Elmira	Sanitary Upgrade along Arthur St N north of Arthur SPS	200	300	2024 - 2033	73	Suburban	$ 1,005	$ 73,056	Regional Road	$ 205,000		$ -	20%	$ 55,611	2%	$ 5,561	15%	$ 50,884	10%	$ 39,011	$ 429,124	$ 107,281	$ 85,825	$ 10,951	$ 634,000
SAN-ELM-017	Upgrade	**SAN_P-211169**	Elmira	Sanitary Upgrade along Arthur St N north of Arthur SPS	200	300	2024 - 2033	29	Suburban	$ 1,005	$ 28,954	Regional Road	$ 205,000		$ -	20%	$ 46,791	2%	$ 4,679	15%	$ 42,814	10%	$ 32,824	$ 361,061	$ 90,265	$ 72,212	$ 9,214	$ 533,000
SAN-ELM-017	Upgrade	**SAN_P-211170**	Elmira	Sanitary Upgrade along Arthur St N north of Arthur SPS	200	300	2024 - 2033	14	Suburban	$ 1,005	$ 14,427	Regional Road	$ 205,000		$ -	20%	$ 43,885	2%	$ 4,389	15%	$ 40,155	10%	$ 30,786	$ 338,642	$ 84,661	$ 67,728	$ 8,642	$ 500,000
SAN-STJ-006	Upgrade	**SAN_P-210108**	St Jacobs	Sanitary Upgrade along Hachborn St E between Young St and Wa	250	300	2034 - 2051	93	Suburban	$ 1,005	$ 93,230		$ -		$ -	20%	$ 18,646	2%	$ 1,865	15%	$ 17,061	10%	$ 13,080	$ 143,881	$ 35,970	$ 28,776	$ 3,672	$ 213,000
SAN-STJ-007	Upgrade	SAN_P-211327	St Jacobs	Sanitary Upgrade along Water St between Hachborn St E and Princess St E	250	375	2034 - 2051	93	Suburban	$ 1,063	$ 98,459		$ -		$ -	20%	$ 19,692	2%	$ 1,969	15%	$ 18,018	10%	$ 13,814	$ 151,952	$ 37,988	$ 30,390	$ 3,878	$ 225,000
SAN-STJ-008	New	SAN_P-0-GMBP-106	St Jacobs	New sewer south of Henry St	-	250	2034 - 2051	38	Rural	$ 4,460	$ 167,620		$ -		$ -	0%	$ -	2%	$ 3,352	15%	$ 25,646	10%	$ 19,662	$ 216,281	$ 54,070	$ 43,256	$ 5,519	$ 320,000
SAN-STJ-009	New	SAN_P-0-GMBP-108	St Jacobs	New sewer in employment land, north of HH	-	250	2034 - 2051	57	Rural	$ 977	$ 55,393	Railway	$ 205,000		$ -	0%	$ -	2%	$ 5,208	15%	$ 39,840	10%	$ 30,544	$ 335,985	$ 83,996	$ 67,197	$ 8,574	$ 496,000
SAN-STJ-010	New	SAN_P-0-GMBP-109	St Jacobs	New connection from 3017 Regional Road 17	-	250	2034 - 2051	28	Rural	$ 977	$ 27,709		$ -		$ -	0%	$ -	2%	$ 554	15%	$ 4,239	10%	$ 3,250	$ 35,752	$ 8,938	$ 7,150	$ 912	$ 53,000
SAN-STJ-011	New		St Jacobs	New twin sewer crossing Waterloo Central Railway to Queenswa	-	300	2034 - 2051	78	Suburban	$ 1,005	$ 78,024	Railway	$ 205,000		$ -	20%	$ 56,605	2%	$ 5,660	15%	$ 51,793	10%	$ 39,708	$ 436,791	$ 109,198	$ 87,358	$ 11,147	$ 645,000
SAN-STJ-011	New		St Jacobs	New twin sewer crossing Waterloo Central Railway to Queenswa	-	300	2034 - 2051	56	Suburban	$ 1,005	$ 56,484		$ -		$ -	20%	$ 11,297	2%	$ 1,130	15%	$ 10,337	10%	$ 7,925	$ 87,171	$ 21,793	$ 17,434	$ 2,225	$ 129,000
SAN-STJ-012	New		St Jacobs	New Sewer along Princess St W and King St N	-	300	2034 - 2051	52	Suburban	$ 1,005	$ 52,016		$ -		$ -	20%	$ 10,403	2%	$ 1,040	15%	$ 9,519	10%	$ 7,298	$ 80,276	$ 20,069	$ 16,055	$ 2,049	$ 119,000
SAN-STJ-012	New		St Jacobs	New Sewer along Princess St W and King St N	-	300	2034 - 2051	66	Suburban	$ 1,005	$ 66,246		$ -		$ -	20%	$ 13,249	2%	$ 1,325	15%	$ 12,123	10%	$ 9,294	$ 102,237	$ 25,559	$ 20,447	$ 2,609	$ 151,000
SAN-STY-001	Upgrade	SAN_P-210036	Stockyards	Sanitary Upgrade along Benjamin Rd between Weber St N and Farmers Market Rd	200	300	2034 - 2051	93	Suburban	$ 1,005	$ 93,129		$ -		$ -	20%	$ 18,626	2%	$ 1,863	15%	$ 17,043	10%	$ 13,066	$ 143,726	$ 35,931	$ 28,745	$ 3,668	$ 213,000
SAN-STY-001	Upgrade	SAN_P-210034	Stockyards	Sanitary Upgrade along Benjamin Rd between Weber St N and Farmers Market Rd	200	300	2034 - 2051	58	Suburban	$ 1,005	$ 58,725		$ -		$ -	20%	$ 11,745	2%	$ 1,174	15%	$ 10,747	10%	$ 8,239	$ 90,630	$ 22,657	$ 18,126	$ 2,313	$ 134,000
SAN-STY-001	Upgrade	SAN_P-210035	Stockyards	Sanitary Upgrade along Benjamin Rd between Weber St N and Farmers Market Rd	200	300	2034 - 2051	98	Suburban	$ 1,005	$ 98,387		$ -		$ -	20%	$ 19,677	2%	$ 1,968	15%	$ 18,005	10%	$ 13,804	$ 151,841	$ 37,960	$ 30,368	$ 3,875	$ 225,000
SAN-STY-001	Upgrade	SAN_P-210033	Stockyards	Sanitary Upgrade along Benjamin Rd between Weber St N and Farmers Market Rd	200	300	2034 - 2051	88	Suburban	$ 1,005	$ 88,152		$ -		$ -	20%	$ 17,630	2%	$ 1,763	15%	$ 16,132	10%	$ 12,368	$ 136,045	$ 34,011	$ 27,209	$ 3,472	$ 201,000
SAN-STY-001	Upgrade	SAN_P-210032	Stockyards	Sanitary Upgrade along Benjamin Rd between Weber St N and Farmers Market Rd	200	300	2034 - 2051	79	Suburban	$ 1,005	$ 79,828		$ -		$ -	20%	$ 15,966	2%	$ 1,597	15%	$ 14,608	10%	$ 11,200	$ 123,198	$ 30,800	$ 24,640	$ 3,144	$ 182,000
SAN-STY-001	Upgrade	SAN_P-210031	Stockyards	Sanitary Upgrade along Benjamin Rd between Weber St N and Farmers Market Rd	200	300	2034 - 2051	48	Suburban	$ 1,005	$ 47,987		$ -		$ -	20%	$ 9,597	2%	$ 960	15%	$ 8,782	10%	$ 6,733	$ 74,059	$ 18,515	$ 14,812	$ 1,890	$ 110,000
SAN-STY-001	Upgrade	SAN_P-210037	Stockyards	Sanitary Upgrade along Benjamin Rd between Weber St N and Farmers Market Rd	200	300	2034 - 2051	69	Suburban	$ 1,005	$ 69,452		$ -		$ -	20%	$ 13,890	2%	$ 1,389	15%	$ 12,710	10%	$ 9,744	$ 107,185	$ 26,796	$ 21,437	$ 2,735	$ 159,000
SAN-STY-002	Upgrade	SAN_P-210038	Stockyards	Sanitary Upgrade along Benjamin Rd to Conrad Pl	200	300	2034 - 2051	97	Suburban	$ 1,005	$ 97,693		$ -		$ -	20%	$ 19,539	2%	$ 1,954	15%	$ 17,878	10%	$ 13,706	$ 150,770	$ 37,693	$ 30,154	$ 3,848	$ 223,000

										Base Cost		Special Cost					Construction Uplift		Soils Uplift		Additional Construction Costs		Provisional Allowance			Contingency and Soft Costs			
Project No	Category	Pipe ID	Community	Description	Existing Diameter (mm)	Proposed Diameter (mm)	Project Timing	Length (m)	Area Conditions	Base Unit Rate	Base Cost	Special Cost - Crossings	Cost	Special Cost - Other	Cost	%	Construction Uplift	%	Updated Soils Regulation Uplift	%	Additional Construction Costs	%	Provisional Allowance	Sub Total	Project Contingency (25%)	Design, CA, PA, Studies (20%)	HST (1.76%)	Total ($2024)
SAN-STY-003	Upgrade	SAN_P-210039	Stockyards	Sanitary Upgrade along Benjamin Rd to Conrad Pl	200	450	2034 - 2051	91	Suburban	$ 1,141	$ 104,088		$ -		$ -	20%	$ 20,818	2%	$ 2,082	15%	$ 19,048	10%	$ 14,604	$ 160,639	$ 40,160	$ 32,128	$ 4,100	$ 238,000
SAN-STY-004	New	SAN_P-0-GMBP-56	Stockyards	New sewer connection to Colby Ct (Waterloo)	-	250	2034 - 2051	114	Suburban	$ 977	$ 110,999		$ -		$ -	20%	$ 22,200	2%	$ 2,220	15%	$ 20,313	10%	$ 15,573	$ 171,305	$ 42,826	$ 34,261	$ 4,372	$ 253,000
SAN-STY-005	New	SAN_P-0-GMBP-100	Stockyards	New sewer from NW corner Weber/Benjamin to ex Benjamin Rd sewer	-	250	2034 - 2051	174	Rural	$ 977	$ 169,947	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 7,499	15%	$ 57,367	10%	$ 43,981	$ 483,794	$ 120,949	$ 96,759	$ 12,346	$ 714,000
SAN-STY-006	New	SAN-STY-006	Stockyards	Forcemain from Stockyards SPS on Weber St N	-	200	2034 - 2051	427	Rural	$ 1,276	$ 545,330	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 15,007	15%	$ 114,800	10%	$ 88,014	$ 968,151	$ 242,038	$ 193,630	$ 24,707	$ 1,429,000
SAN-STY-007	New	SAN-STY-PUMP1	Stockyards	Stockyards SPS	-	-	2034 - 2051	37	Rural	$ 39,979	$ 1,487,632		$ -		$ -	0%	$ -	2%	$ 29,753	15%	$ 227,608	10%	$ 174,499	$ 1,919,492	$ 479,873	$ 383,898	$ 48,985	$ 2,833,000
SAN-STY-008	New	SAN_P-0-GMBP-101	Stockyards	New sewer on King St N to new SPS	-	250	2034 - 2051	123	Rural	$ 977	$ 120,465	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 6,509	15%	$ 49,796	10%	$ 38,177	$ 419,948	$ 104,987	$ 83,990	$ 10,717	$ 620,000
SAN-STY-008	New	SAN_P-0-GMBP-102	Stockyards	New sewer on King St N to new SPS	-	250	2034 - 2051	128	Rural	$ 977	$ 125,567	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 6,611	15%	$ 50,577	10%	$ 38,776	$ 426,531	$ 106,633	$ 85,306	$ 10,885	$ 630,000
SAN-STY-009	New	SAN_P-0-GMBP-103	Stockyards	New connection from 800 King St N	-	250	2034 - 2051	156	Rural	$ 977	$ 152,763	Regional Road	$ 205,000	Additional Crossing	$ 205,000	0%	$ -	2%	$ 11,255	15%	$ 86,103	10%	$ 66,012	$ 726,133	$ 181,533	$ 145,227	$ 18,531	$ 1,072,000
SAN-STY-010	New	SAN_P-0-GMBP-104	Stockyards	New connection from Weber, south of Farmer's Market Rd, to SPS	-	200	2034 - 2051	332	Rural	$ 977	$ 324,491	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 10,590	15%	$ 81,012	10%	$ 62,109	$ 683,202	$ 170,800	$ 136,640	$ 17,435	$ 1,009,000
SAN-STY-010	New	SAN_P-0-GMBP-105	Stockyards	New connection from Weber, south of Farmer's Market Rd, to SPS	-	250	2034 - 2051	52	Rural	$ 977	$ 50,712	Regional Road	$ 205,000		$ -	0%	$ -	2%	$ 5,114	15%	$ 39,124	10%	$ 29,995	$ 329,946	$ 82,486	$ 65,989	$ 8,420	$ 487,000
SAN-BRE-001	New		Breslau	New Sanitary Trunk on Fountain St between Kossuth Rd and Middle Block Rd	-	1050	2024 - 2033	730	Rural																			$ 9,349,519
SAN-BRE-002	New		Breslau	New Sanitary main on Kossuth Rd between Shantz Station Rd and Cober Rd	-	375	Beyond 2051	1305	Rural																			$ 10,307,257
SAN-BRE-003	New		Breslau	New sanitary main on New Germany Lane	-	300	2034 - 2051	1027	Rural																			$ 1,552,460
SAN-BRE-004	New		Breslau	New sanitary main on Lonsdale Rd between Shantz Station Rd and Airport Crossing	-	300	Beyond 2051	1316	Rural																			$ 4,942,327
SAN-BRE-005	New		Breslau	New sanitary main on Fountain St between Menno St and Woolwich St	-	450	2024 - 2033	974	Rural																			$ 15,982,969
SAN-BRE-006	New		Breslau	New Sanitary main on Fountain St between Woolwich St and Lonsdale Rd	-	750	2024 - 2033	652	Rural																			
SAN-BRE-007	New		Breslau	New sanitary main on Shantz Station Road between Menno Rd and Kossuth Rd	-	300	Beyond 2051	2050	Rural																			$ 15,929,005
SAN-BRE-008	New		Breslau	New sanitary main on Shantz Station Rd between Menno Rd and Kossuth Rd	-	375	Beyond 2051	632	Rural																			
SAN-BRE-009	New		Breslau	New sanitary main on Woolwich St to Fountain St	-	300	2024 - 2033	388	Rural																			$ 8,348,779
SAN-BRE-010	New		Breslau	New sanitary main on Woolwich St to Fountain St	-	525	2024 - 2033	679	Rural																			
SAN-BRE-011	New		Breslau	New sanitary main on Menno St to Lonsdale Rd	-	300	2034 - 2051	233	Rural																			$ 2,302,601
SAN-BRE-012	New		Breslau	New sanitary main on Menno St to Lonsdale Rd	-	750	2024 - 2033	911	Rural																			$ 8,582,025
SAN-BRE-013	New		Breslau	New sanitary main on Menno Rd to Lonsdale Rd	-	600	Beyond 2051	1388	Rural																			$ 12,243,668
SAN-BRE-014	New		Breslau	New sanitary main on Menno Rd to Fountain St	-	300	2034 - 2051	360	Rural																			$ 3,576,952
SAN-BRE-015	New		Breslau	New sanitary main on Menno Rd to Woolwich St	-	450	2024 - 2033	734	Rural																			$ 4,040,323
SAN-BRE-016	New		Breslau	New sanitary main on Fountain St to East Connector	-	600	2024 - 2033	664	Rural																			$ 9,154,702
SAN-BRE-017	New		Breslau	New sanitary main on Fountain St to East Connector	-	525	2024 - 2033	164	Rural																			
SAN-BRE-018	New		Breslau	New sanitary main on Rider Road	-	300	Beyond 2051	1070	Rural																			$ 4,064,871
SAN-BRE-019	New		Breslau	New sanitary main on Rider Rd	-	375	Beyond 2051	383	Rural																			
SAN-BRE-020	New		Breslau	East Connector	-	450	2024 - 2033	1441	Rural																			$ 7,280,633
SAN-BRE-021	New		Breslau	New sanitary main on Shantz Station Rd to Kramp Rd	-	300	Beyond 2051	1499	Rural																			
SAN-BRE-022	New		Breslau	New sanitary main on Shantz Station Rd	-	450	Beyond 2051	164	Rural																			$ 24,852,078
SAN-BRE-023	New		Breslau	New sanitary main on north Shantz Station Rd to Menno Rd	-	600	Beyond 2051	1502	Rural																			
SAN-BRE-024	New		Breslau	New sanitary main on Kramp Rd East	-	300	Beyond 2051	1043	Rural																			$ 1,561,940
SAN-BRE-025	New		Breslau	New sanitary main on Kramp Rd West	-	300	2024 - 2033	372	Rural																			$ 571,967
SAN-BRE-026	New		Breslau	New sanitary main on Greenhouse Rd	-	300	2024 - 2033	882	Rural																			$ 2,021,449
SAN-BRE-027	New		Breslau	New sanitary main on Greenhouse Rd	-	450	2024 - 2033	407	Rural																			
SAN-BRE-028	New		Breslau	New sanitary main for north development	-	300	Beyond 2051	619	Rural																			$ 3,446,773
SAN-BRE-029	New		Breslau	New sanitary main for north development	-	375	Beyond 2051	267	Rural																			
SAN-BRE-030	New		Breslau	New Sanitary Trunk 03D	-	750	2034 - 2051	4262	Rural																			$ 53,791,520
SAN-BRE-031	New		Breslau	New sanitary trunk 03D	-	900	2034 - 2051	824	Rural																			
SAN-BRE-032	New		Breslau	New sanitary trunk 03B	-	600	2024 - 2033	709	Rural																			
SAN-BRE-033	New		Breslau	New sanitary trunk 03B	-	750	2024 - 2033	445	Rural																			$ 41,020,077
SAN-BRE-034	New		Breslau	New Sanitary Trunk main 03B	-	900	2024 - 2033	2192	Rural																			
SAN-BRE-040	New		Breslau	New sanitary trunk main 03B			2024 - 2033																					
SAN-BRE-035	New		Breslau	New sanitary trunk main 03	-	375	2024 - 2033	1238	Rural																			$ 4,302,167
SAN-BRE-036	New		Breslau	New sanitary trunk main 03	-	450	Beyond 2051	693	Rural																			
SAN-BRE-037	New		Breslau	New sanitary trunk main 03	-	525	Beyond 2051	83	Rural																			$ 12,849,849
SAN-BRE-038	New		Breslau	New sanitary trunk main 03	-	600	Beyond 2051	1145	Rural																			
SAN-BRE-039	New		Breslau	New sanitary trunk main 03	-	750	Beyond 2051	346	Rural																			
SAN-BRE-041	New		Breslau	Menno Street Lift Station	-	0	Beyond 2051	0	Rural																			$15,798,276.00
SAN-BRE-042	New		Breslau	Jetliner Court Lift Station	-	0	2024 - 2033	0	Rural																			$9,904,213.00



J

Township of Woolwich

APPENDIX J

GROWTH PROJECTIONS AND ALLOCATION METHODOLOGY

Date:	September 27, 2023 File: 622098
To:	Bryan Bishop and Lori Fox – Township of Woolwich
From:	Julien Bell and Jody Lee – GM BluePlan
Project:	Woolwich Servicing Capacity Study
Subject:	Growth Projections and Allocation Methodology

TECHNICAL MEMO

1 Background

This memo is intended to outline the growth projections for the Township of Woolwich, the allocation approach, and assumptions which will be used to support the Township's Water and Wastewater Servicing Capacity Study (SCS). The growth scenario will be used to estimate future system demands and flows; and ultimately the growth-related infrastructure needs.

1.1 Communities within the Township

The SCS is focused on the following communities within the Township of Woolwich: Elmira, St. Jacobs, Breslau, Stockyards, Maryhill, Conestogo, West Montrose, and Heidelberg. Of these communities, the most substantial growth is expected to occur within Elmira, St. Jacobs, Breslau, and Stockyards. As such, most of the tables and discussion within this memo focus on the communities where growth is projected to occur and does not present the communities where growth is expected to be minimal.

2 Planning Data Sources

The following sources of planning data were reviewed for this study:

- Township of Woolwich Official Plan (2022)
    - Based on the Region of Waterloo's Official Plan
    - Official Plan Amendment 6 (ROPA 6) was adopted in August 2022 by the Region. Approval of ROPA 6 was confirmed by the Province in April 2023, with modifications impacting the Township of Woolwich (urban area boundary expansion)
- Development Charges Background Study (2019)
- Additional planning information from the Township Planning department (2022)
    - 2022 – 2051 population projection estimates spreadsheet;
    - Current subdivisions shapefile including the following subdivisions;
        - Empire Homes – Phase 5
        - Valley View – Phase 1
        - Sunset Hills Estate
        - Lunor
        - Hopewell Heights
        - Breslau Properties/Madison Group
        - Empire Homes

        - Southwood 3 and 4
        - Hawkridge
        - Activa
    - Expansion lands shapefile;
    - Breslau Settlement Plan (2015) and
    - Stockyards Secondary Plan (2021).
- Supplementary planning information from Township staff regarding the Stockyards settlement area through the Updated Consolidation of Waterloo North Pressure Zones project (2022)
- Concept plans for various developments within the Township:
    - Development in Elmira (Schlegel Urban Developments Concept Plan dated November 2022), northwest of Listowel Road and Arthur Street
    - Development in Elmira (MHBS Concept Draft Plan, dated July 2023), 1665 Scotch Line Road
    - Development in Breslau (GSP Group Development Concept Plan dated December 2021), west of Victoria Avenue N and Fountain Street North, north of Ebycrest Road
    - Development in Breslau (GSP Group Draft Plan Concept dated August 2022), south of Ebycrest Road and north of the Grand River
    - Development in Breslau (Polocorp Lotting Plan dated November 2022), west of Fountain Street, south of CN Railway
    - Developments in Breslau (MGP Conceptual Development Plan, dated September 2023, 0 Kramp Road and 2590 Victoria Street North
    - Development in Breslau (SCS Consulting Preliminary Servicing Alternatives, dated September 2023), 2590 Victoria Street North
    - Development in Breslau – Conestoga Meats (Dennis Group Proposed Site Layout Option 1, dated February 2023),
    - Development in St. Jacobs (Polocorp Concept Plan, dated June 2023), 51 and 55 Hawkesville Road
    - Development in St. Jacobs (MHBC Concept Plan, dated September 2023), 52 Hawkesville Road
- Region of Waterloo Official Plan Amendment (ROPA 6) (2022)
- Province of Ontario Region of Waterloo ROPA 6 Decision (2023)

3 Growth Projection Methodology

The planning data provided by the Township to support this study was used to develop the following two growth scenarios:

- Interim Growth Scenario (**Section 3.2**)
- Ultimate Buildout Growth Scenario (**Section 3.3**)

While the exact timing of the developments within each scenario is subject to change, for the purposes of delineating the two scenarios, the interim growth scenario considers all growth within the historic settlement area boundary (SAB), before the Province's adjustment of the Countryside line and addition of developable lands in Elmira, St. Jacobs, and Breslau. The additional lands may be developed before the lands within in the interim scenario, and as such, the assessment of potential water and wastewater servicing strategies should consider a level of flexibility in implementation.

3.1 Population Densities

Table 3-1 presents the minimum population density target identified in the Township's Official Plan (OP), in people and jobs per hectare (ppj/ha).

Table 3-1: Township Official Plan Minimum Population Densities

Community	Residential (ppj/ha)	Employment (ppj/ha)
Elmira	45(1)	40
Breslau	55	40
St. Jacobs	45(1)	40

(1) The Township's OP states 45 people per hectare, while the Region of Waterloo ROPA6 identifies a target population density of 53 people per hectare for Elmira and St. Jacobs.

For the purposes of the growth scenario development, the following methodology was used:

- Where areas and population were provided, the provided values were utilized.
- Where populations were not provided, densities were applied as presented in **Table 3-2**.
    - Through discussions with the Township, recent developments have commonly exceeded the minimum density targets.
    - As such, the densities presented in **Table 3-2** were determined to be more realistic residential population density targets and may also provide a marginal level of conservatism.

Table 3-2: Employment and Residential Densities for Planning Analysis

	Employment Density (ppj/ha)	Residential Density (ppj/ha)
Elmira	40	55
St. Jacobs	40	55
Breslau	40	65
Heidelberg	40	55
Stockyards	40	55

3.2 Interim Scenario – Growth to 2051

3.2.1 Interim Scenario – Residential Population Growth

The following methodology was used to determine the interim residential population growth:

- A comparison was completed of the projected residential population projections provided by the Township in the following formats:
    - Spreadsheet with yearly population and population projections from 2011 to 2051 differentiated by settlement area but no information regarding specific locations of projected growth;
    - ROPA 6 Designated Greenfield Area; and
    - Shapefile of current residential subdivisions.
- Using this data, the following conclusions were made.
    - **Interim residential population growth is 25,612 people.**
        - This was based on the population growth from 2019 to 2051 presented in the Township's spreadsheet.
        - This population growth was assumed to represent total residential population growth within the historic SAB.
    - **Interim residential greenfield growth is 20,483 people.**
        - The residential population growth within the historic SAB from the ROPA 6 designated greenfield areas was assumed to represent all residential greenfield growth.
    - **Interim residential infill and intensification is 5,129 people.**

- This was calculated as the difference between total residential growth and greenfield growth.
- The minimum annual intensification target for the Township of Woolwich from 2022 – 2051 is 20% based on the Region of Waterloo ROPA6

- Note that the Township's projected total (greenfield and infill/intensification) interim residential population growth within Breslau was increased from 11,621 people to 13,050 people for the following reasons:
  - Using the updated population density of 65 ppha for Breslau residential growth, the calculated greenfield growth was greater than the population growth from the Township's 2019 to 2051 growth spreadsheet
  - The population was increased such that infill and intensification growth within Breslau was not zero or negative and such that the overall infill and intensification target of 20% was met within the Township.
- **Table 3-3** presents a breakdown of this assessment by community.

- Spatial allocation of residential growth within the SAB will be completed as follows:
  - Residential greenfield growth will be assigned to the locations represented in the ROPA 6 designated greenfield areas, and
  - Residential infill and intensification growth will be evenly distributed across the existing water and wastewater systems.

Table 3-3: Residential Population Growth Within Historic Settlement Area Boundaries (Before Provincial ROPA 6 Addition of Lands)

Community	Total Residential Growth[(1)]	Greenfield Residential Growth [(2)]	Infill and Intensification Residential Growth [(3)]
Elmira	11,789	8,300	3,489
Breslau	13,050	12,009	1,041
St. Jacobs	675	76	599
Heidelberg	98	98	0
Total	**25,612**	**20,483**	**5,129**

[(1)] Source: Population projection spreadsheet

[(2)] Source: ROPA 6 Designated Greenfield Areas

[(3)] Calculated value – difference between total residential growth and greenfield residential growth

3.2.2 Interim Scenario – Employment Growth

The interim employment population growth was based on the following data sources.

- ROPA 6 designated employment areas within the historic SAB.
- A review of the settlement areas was completed to identify all remaining developable lands that were not included in the ROPA 6 employment growth, using the following criteria:
    - Focus on greenfield areas (based on satellite imagery);
    - Do not include areas already included in the Township's potential population growth area maps;
    - Do not include open space or environmental protection areas; and
    - Stay within settlement area boundaries.
- All identified remaining developable land was categorized as employment land within the Township's OP and parcel information, with the exception of one residential parcel in Heidelberg.
- The Township's population density target of 40 ppj/ha was utilized to determine employment projections for the remaining developable lands.

Table 3-4 presents the summary of the interim employment growth within the existing settlement boundary.

Table 3-4: Employment Growth Within Settlement Area Boundaries (Before Provincial ROPA 6 Addition of Lands)

Community	Total Employment Growth[(1)]	Greenfield Employment Growth[(2)]	Remaining Developable Lands Employment Growth[(3)]
Elmira	5,678	5,137	541
Breslau	4,551	4,246	305
St. Jacobs	1,109	1,109	0
Stockyards[(4)]	4,571	3,840	731
Total	**15,909**	**14,332**	**1,577**

[(1)] Calculated value – sum of greenfield employment growth and remaining developable employment growth

[(2)] Source: ROPA 6 Designated Greenfield Areas

[(3)] Source: GMBP remaining developable lands analysis as described above

[(4)] See **Section 3.2.2.1** for details regarding Stockyards employment estimate

3.2.2.1 Stockyards Secondary Plan

The Township completed the Stockyards Secondary Plan in 2021 and as part of the process, a Master Servicing and Stormwater Management Report was completed for the Stockyards study area in 2019 which included future demand projections. There have also been other historic documents, such as the Region of Waterloo Water Supply Distribution and Operations Master Plan (WSDOMP), the Region of Waterloo St. Jacobs and Elmira Supply Optimization Study (ESJOS), and the City of Waterloo Water Distribution Master Plan (WDMP), which include population and demand projections for the Stockyards. Further, as part of the Updated Consolidation of Waterloo North Pressure Zones project that GMBP completed for the Region of Waterloo in 2021, the Township provided input regarding estimated flows and population for the Stockyards. **Table 3-5** presents a comparison of all the information from various sources.

Table 3-5: Comparison of Stockyards Projected Growth to 2031 from Various Data Sources

Data Source	Population Equivalency
WSDOMP/ESJOS	384
Waterloo WDMP	15,356
Stockyards Secondary Plan	14,592
GMBP – Consolidation of Waterloo North Pressure Zones	**3,840**

Given that the most recent study is the Consolidation of Water North Pressure Zones project, through which Township staff were consulted regarding the Stockyards development potential, and that the projected growth represents a moderate scenario compared to the WDMP and Stockyards Secondary Plan, it is recommended that the population equivalency of 3,840 jobs be carried forward for the Township's Servicing Capacity Study.

3.3 Ultimate Buildout Scenario – Post-2051 Growth

Table 3-6 presents the additional residential and employment population growth projected for the ultimate buildout scenario. These estimates were calculated using the ROPA 6 designated greenfield areas that were added by the Province and using the population densities noted in **Section 3.1**. Note that environmentally restricted and environmental protection areas were removed from the total greenfield areas in order to assess the total developable area.

Table 3-6: Additional Growth Projected for the Ultimate Buildout Scenario

Community	Area (ha)	Developable Area (ha)	Residential Population Growth	Employment Population Growth	Total Population Growth
Elmira	162	134	6,652	517	7,169
Breslau	1,601	936	19,315	25,391	44,706
St. Jacobs	46	30	1,224	294	1,517
Total	**1,809**	**1,100**	**27,190**	**26,202**	**53,392**

3.4 Potential Impact of Breslau GO Station

There is a GO Station which is anticipated to be constructed within Breslau in the future. The Township has indicated that there is potential for surrounding developments to see an increase beyond the population densities that were presented in **Section 3.1**. While the timing and location of the station has not been finalized, several growth areas have been identified by the Township to be more likely to see increases in population density. For the purposes of this study, population density for these specific GO Station affected areas will be assumed to be 80 ppha. A planning sub-option will be reviewed to assess the impacts on future infrastructure needs with the increased population density for these growth areas. The density increase will result in an additional 3,367 people growth for all potential areas combined. **Figure 3-1** presents the growth areas that will be part of the increased density under the GO Station planning scenario. Note that the labelled IDs within the figure correspond to the Map IDs presented in **Table 3-7**, which presents the breakdown of parcels and their respective increases in population as a result of the density increase.

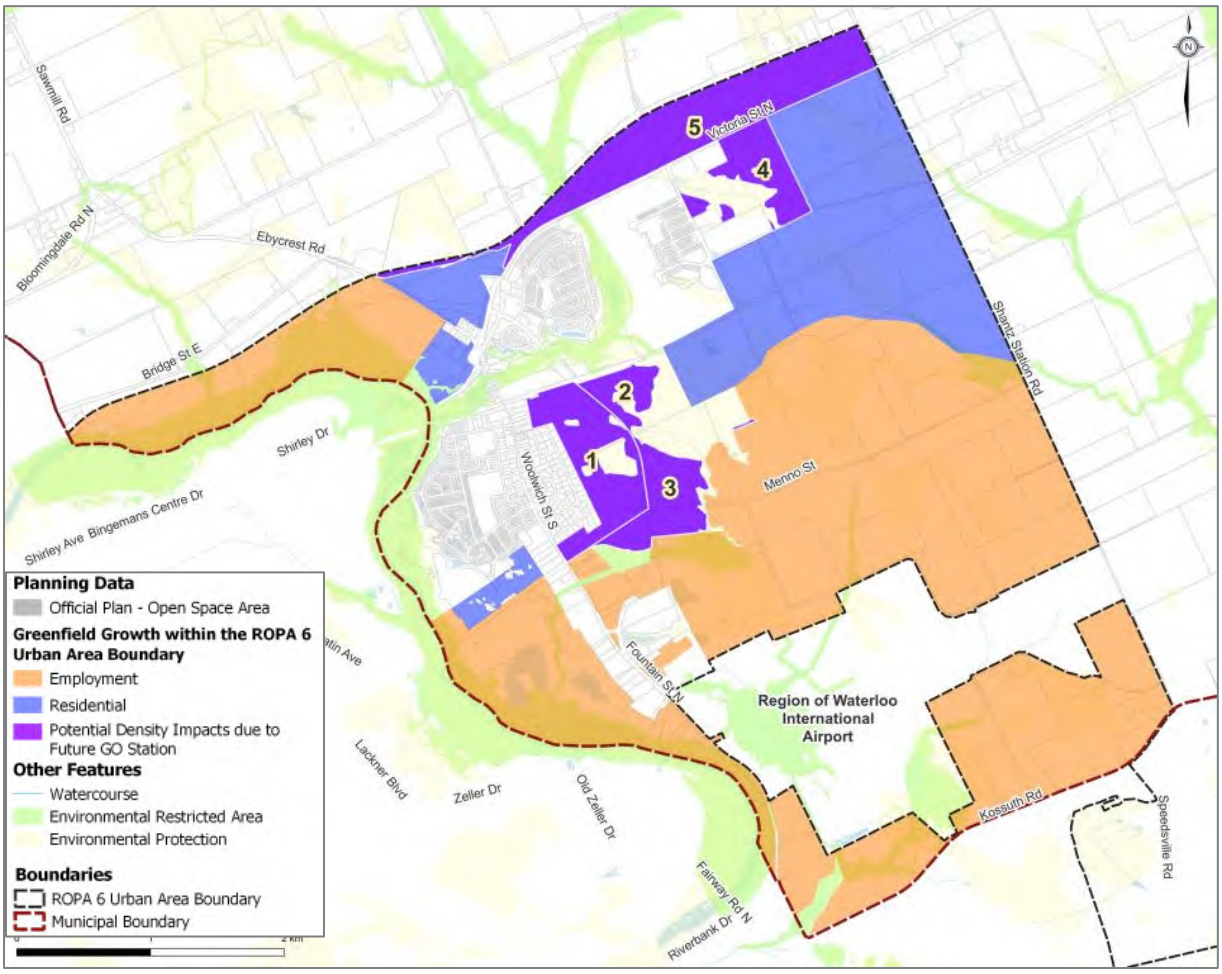


Figure 3-1: Potential Density Impacts due to Future Breslau GO Station

Table 3-7: Potential Impact to Population Density within Breslau due to GO Station Development

Map ID	Area (ha)	Population at 65 ppha	Population at 80 ppha	Population Increase (65 ppha to 80 ppha)
1	50.10	3,256	4,008	751
2	15.55	1,011	1,244	233
3	33.44	2,173	2,675	502
4	30.95	2,012	2,476	464
5	94.42	6,137	7,554	1,416
Total	**224.46**	**14,590**	**17,956**	**3,367**

3.5 Summary of Growth Projections

Table 3-8 presents the summary of growth projections for the two scenarios, and includes the GO Station option as well.

Table 3-8: Summary of Growth Projections

Scenario	Community	Residential Growth	Employment Growth	Total Growth
Interim Growth Scenario (Growth to 2051)	Elmira	11,789	5,678	17,467
	Breslau	13,050	4,551	17,601
	St. Jacobs	675	1,109	1,784
	Stockyards	0	4,571	4,571
	Heidelberg	98	0	98
Ultimate Buildout Scenario (Post-2051 Growth)	Elmira	6,652	517	7,169
	Breslau	19,315	25,391	44,706
	St. Jacobs	1,224	294	1,517
Interim Growth Total		**25,612**	**15,909**	**41,522**
Ultimate Buildout Growth Total		**52,802**	**42,111**	**94,914**
Breslau GO Station Option – Interim Growth Total		**27,563**	**15,909**	**43,472**
Breslau GO Station Option – Ultimate Buildout Growth Total		**56,169**	**42,111**	**98,281**

The following figures present the growth areas within the various settlement areas.

WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Planning Data

- Official Plan - Open Space Area

Greenfield Growth within the ROPA 6 Urban Area Boundary

- Employment
- Residential

Other Features

- Watercourse
- Environmental Restricted Area
- Environmental Protection

Boundaries

- ROPA 6 Urban Area Boundary
- Municipal Boundary

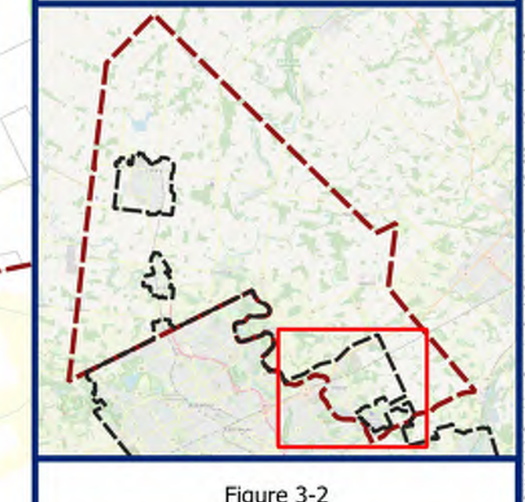


Figure 3-2

Growth Areas

Breslau

BluePlan ENGINEERING

September, 2023
622098-G-001
Projection EPSG:26917

0 1 2 km

Sawmill Rd
Bloomingdale Rd N
Ebycrest Rd
Bridge St E
Shirley Dr
Shirley Ave
Bingemans Centre Dr
Victoria St N
Shantz Station Rd
Woolwich St S
Menno St
Keewatin Ave
Fountain St N
Region of Waterloo International Airport
Lackner Blvd
Zeller Dr
Old Zeller Dr
Fairway Rd N
Riverbank Dr
Kossuth Rd
Speedsville Rd

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Planning Data

Official Plan - Open Space Area

Greenfield Growth within the ROPA 6 Urban Area Boundary

Employment

Residential

Other Features

Watercourse

Environmental Restricted Area

Environmental Protection

Boundaries

ROPA 6 Urban Area Boundary

Municipal Boundary

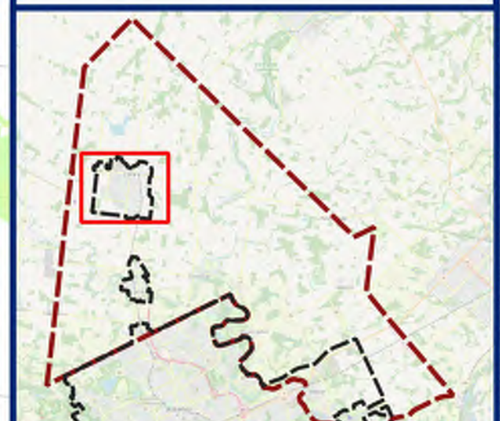


Figure 3-2

Growth Areas

Elmira

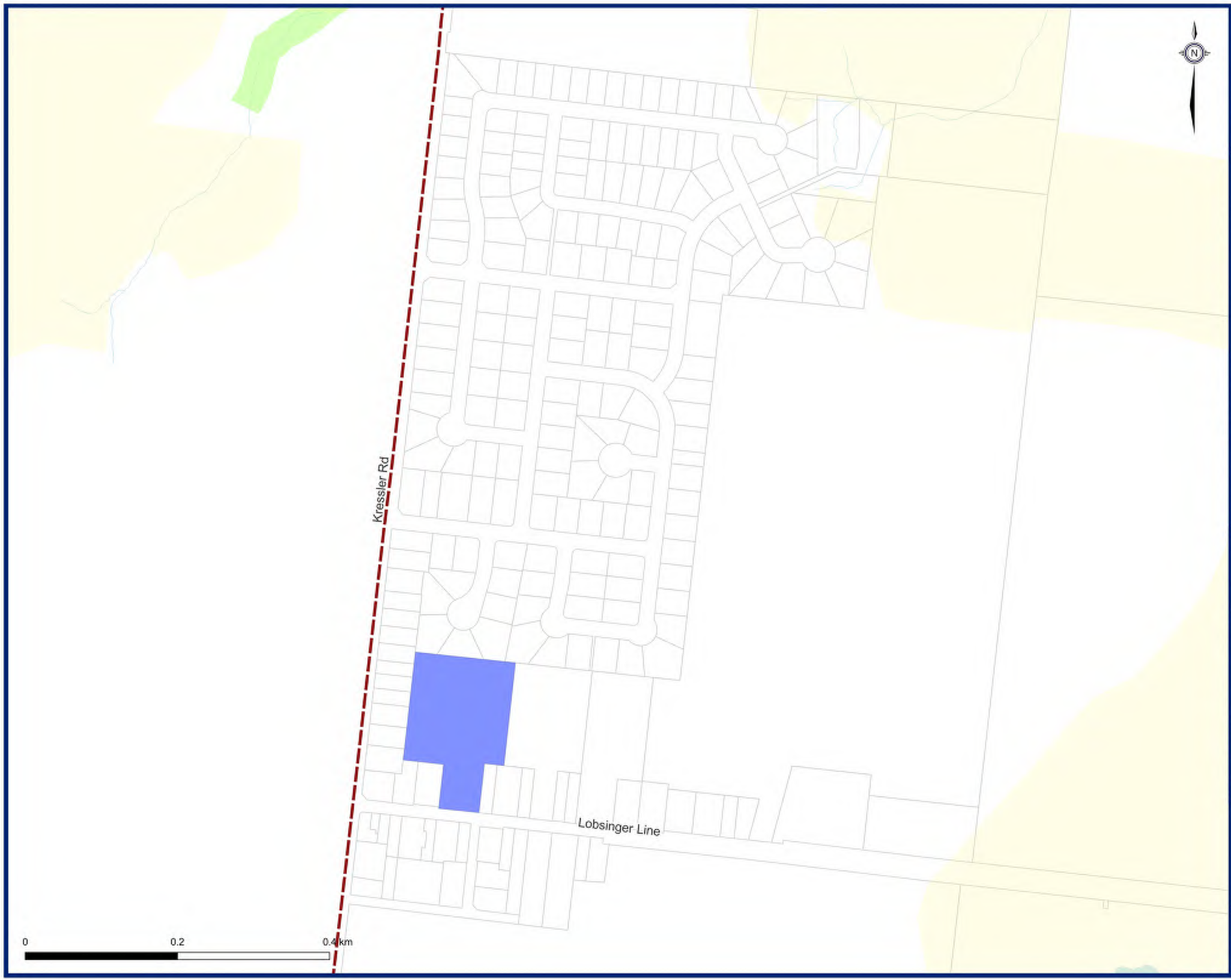
BluePlan Engineering

September, 2023
622098-G-001
Projection EPSG:26917

0 0.8 1.6 km

Line 86
Church St W
Church St E
Line 86
Arthur St N
Floradale Rd
Barnswallow Dr
First St W
First St E
Duke St
Arthur St S
Whippoorwill Dr
South Field Dr
Listowel Rd
Three Bridges Rd
Arthur St S

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Planning Data

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Greenfield Growth within the ROPA 6 Urban Area Boundary

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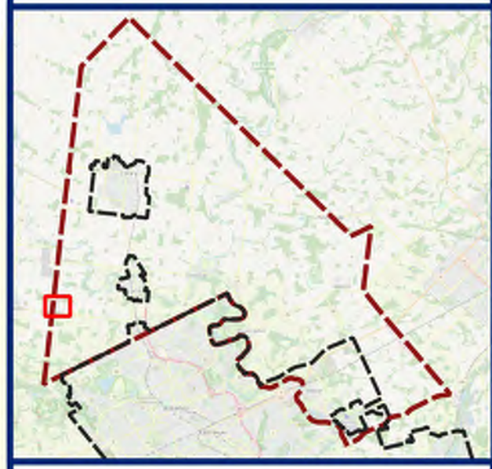


Figure 3-2

Growth Areas

Heidelberg

BluePlan ENGINEERING

September, 2023
622098-G-001
Projection EPSG:26917

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Planning Data

Official Plan - Open Space Area

Greenfield Growth within the ROPA 6 Urban Area Boundary

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Residential

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Environmental Protection

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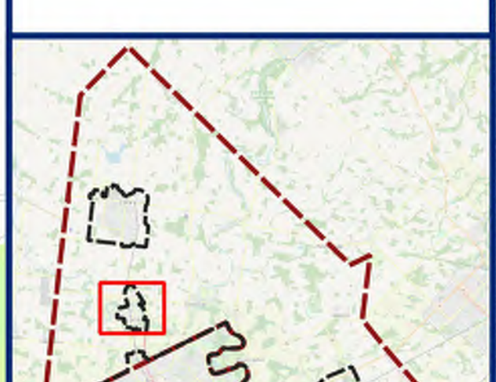


Figure 3-2

Growth Areas

St. Jacobs

BluePlan ENGINEERING

September, 2023
622098-G-001
Projection EPSG:26917

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WOOLWICH TOWNSHIP

Woolwich Servicing Capacity Study

Planning Data

Official Plan - Open Space Area

Greenfield Growth within the ROPA 6 Urban Area Boundary

Employment

Residential

Other Features

Watercourse

Environmental Restricted Area

Environmental Protection

Boundaries

ROPA 6 Urban Area Boundary

Municipal Boundary



Figure 3-2

Growth Areas

Stockyards

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4 Summary of Existing and Projected Future Population

The Township's Official Plan and Development Charges Background Study (DC) provide context relating to the baseline population and employment numbers and growth up to 2031. **Table 4-1** presents the available Township populations from the OP and DC.

Table 4-1: Official Plan and Development Charges Population Projections

Year	Residential		Employment		Total	
	2022 OP	2019 DC	2022 OP	2019 DC	2022 OP	2019 DC
2016	26,000	26,010	14,525	14,525	40,525	40,535
2019	-	26,840	-	15,061	-	41,901
2022	30,200	-	-	-	-	-
2031	36,500	36,500	19,000	17,108	55,500	53,608
2016 - 2031 Growth	10,500	10,490	4,475	2,583	14,975	13,073
2019 - 2031 Growth	-	9,660	-	2,047	-	11,707

It is recommended that the 2019 population from the Township's DC study be utilized as the baseline population for this study as this is the most recent baseline year with available residential and employment populations. The Township's DC study also presents projected populations for the 2031 planning horizon. Two additional proposed planning horizons include growth to 2051 (Interim) and post-2051 growth (Ultimate Buildout). **Table 4-2** presents the proposed growth scenarios to be utilized for the servicing capacity study. **Table 4-3** presents the proposed GO Station scenario to be considered for the servicing capacity study.

Table 4-2: Proposed Growth Scenario

Scenario			Residential	Employment	Total
Total Population	Based on Township's DC Study	2019	26,840	15,061	41,901
		2031	36,500	17,108	53,608
	Based on Growth Projection Methodology	**Interim (2051)**	52,452	30,970	83,423
		Ultimate Buildout (Post-2051)	79,642	57,172	136,815
Population Growth		2019 to Interim	25,612	15,909	41,522
		2019 to Ultimate Buildout	52,802	42,111	94,914

Table 4-3: Proposed Growth Scenario – GO Station Option

Scenario			Residential	Employment	Total
Total Population	Based on Township's DC Study	2019	26,840	15,061	41,901
		2031	36,500	17,108	53,608
	Based on Growth Projection Methodology	**Interim (2051)**	54,403	30,970	85,373
		Ultimate Buildout (Post-2051)	83,009	57,172	140,182
Population Growth		2019 to Interim	27,563	15,909	43,472
		2019 to Ultimate Buildout	56,169	42,111	98,281

5 Closing

The growth scenarios described above has been confirmed with Township staff. The finalized growth scenario will be used to estimate and allocate growth-related water demands and wastewater flows within the Township of Woolwich.