Township of Mapleton

Mapleton Water and Wastewater Servicing Master Plan

Master Plan

Wednesday, May 31, 2023

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Master Plan

Mapleton Water and Wastewater Servicing Master Plan

Project no T000974D | File no 081

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Executive Summary

Background

Municipalities can recognize the benefit of comprehensive long-range planning exercises that examine problems and solutions for an overall system of municipal services. Master Plans are not intended to address specific local problems or to plan for projects on a project-by-project basis. The Class EA defines Master Plans as:

"Long-range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. These plans examine an infrastructure system(s) or group of related projects to outline a framework for planning for subsequent projects and/or developments."

The purpose of the Water and Wastewater Plan is to use planning projections for the Township of Mapleton within the 2051 planning horizon. The review recommends the necessary strategy to project phasing and provides capital cost estimates which in turn will be fed into the Development Charges process. This is a critical component in the integrated planning process and is intended to consolidate and harmonize the Township's water and wastewater servicing strategies and capital program for Drayton and Moorefield based on planning information, design criteria, and project information.

Master Planning Process

The Municipal Class Environmental Assessment (EA) process clearly defines approaches for the completion of Master Plans within the Class EA context. The Township of Mapleton has prepared this Master Plan based generally on Approach 2, which involves preparing a Master Plan document after of Phases 1 and 2 to fulfill the requirements for Schedule B projects. The Township of Mapleton has identified select Schedule B projects that will follow on with separate studies to provide greater detail prior to finalizing property and/or easement requirements.

Planning Projections

Population projections for residential growth were prepared in consultation with the Township's Public Works department and include intensification of the urban areas of Mapleton, specifically Drayton and Moorefield. The distribution of population growth is summarized in Table ES- 1.

Table ES- 1: Projected Population Statistics – 2026 through 2051

SERVICE AREA	2026	2031	2036	2041	2046	2051
Drayton	3,200	3,641	3,779	4,507	4,793	4,983
Moorefield	900	1,181	1,531	2,125	2,349	2,775

Recommended Servicing Strategies

The general servicing concepts for the Mapleton Water and Wastewater Servicing Master Plan include servicing requirements, capacity allocations, scheduling, alignments, and preliminary costing. Wherever possible, the alignments of new facilities have been planned based on the location of existing road allowances and/or servicing corridors to ensure that servicing can proceed without undue delays resulting from the need to acquire property. However, the Township has the option to construct facilities through new development lands if it can be shown to be cost effective to do so. In this event, the alignment of the new facilities may be altered based on Approved Draft Plans of new developments. Should the new facilities be implemented through new development lands, additional notification to the Public would be provided through the Planning Act notifications.

The timing of the various projects has been established based on anticipated growth rates in Mapleton and on a fiscally responsible capital works program. The Township will have the option to advance or defer specific projects depending upon the rate of growth experienced in both Drayton and Moorefield, or upon the petition by a developer (or group of developers) provided that the financial impacts of advancing certain projects are reviewed and mitigated through collection of Development Charges or through Front-End Financing arrangements.

Drayton Servicing Strategy

Drayton Water System

The community of Drayton is serviced by the Drayton Drinking Water System, which is comprised of the Drinking Water Supply System (DWSS) and the Water Distribution System (WDS). The Drayton Drinking Water System provides Fire Protection service for properties within Drayton. The Water Servicing Master Plan does not alter the overall servicing strategy for Drayton.

The recommended water servicing strategy includes:

- Provision of additional supply capacity through construction of a third well at the Drayton Water Supply System.
- Construction of watermain extensions from the limits of the existing distribution system to the frontage of proposed development lands. The Plan also includes a future 250mm diameter watermain loop through the future industrial area to connect to Drayton Industrial Drive; and construction of a new 200mm diameter watermain connection through the residential growth areas in the southeast quadrant of the community and connecting to the existing watermains on Wellington Street South and Main Street East.

The Water Capital Program, Class EA Schedules and Costs for Drayton are detailed in Table ES- 2. The preferred Water Servicing Strategy is depicted in Figure ES- 1.

Table ES- 2: Water Capital Program and EA Schedules for Drayton

PROJECT NAME	PROJECT ID	CLASS EA SCHEDULE	COST ($MILLION)
Drayton			
Install new well at the existing DWS site to increase capacity	W-1	Schedule B	$1.44
Water distribution extension at Wellington Street South	W-2	Schedule A+	$0.20
Water distribution extension at Main Street West, near Drayton Industrial Drive	W-3	Schedule A+	$0.69
Water distribution extension at Main Street East	W-4	Schedule A+	$0.13
Total Estimated Cost (2023$)			$2.46

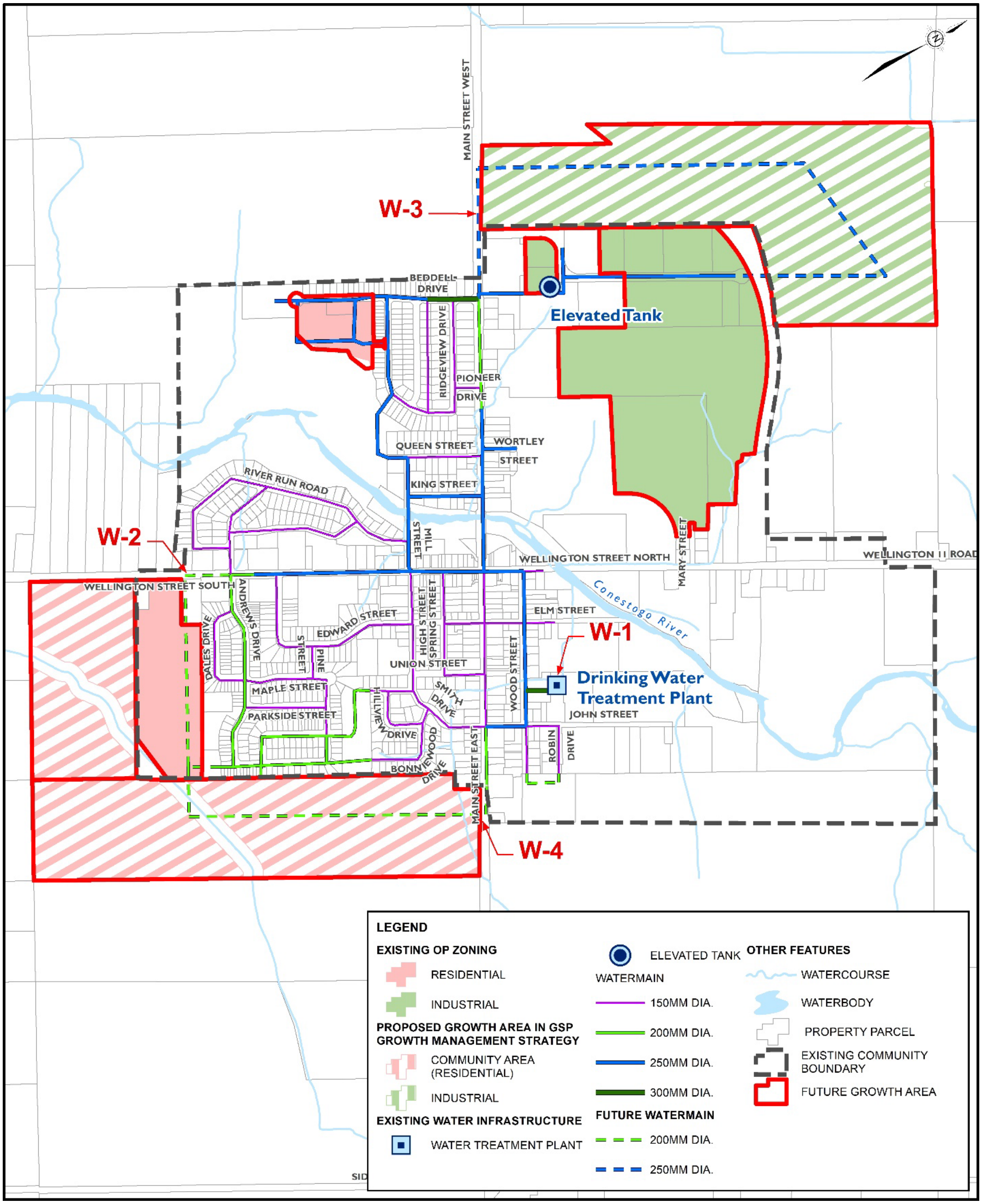

Figure ES- 1: Preferred Water Servicing Strategy in Drayton

Wastewater Treatment

The Mapleton WPCP is a facultative lagoon treatment system that services both Drayton and Moorefield. The Mapleton WPCP is currently rated for an average flow rate of 900 m^3/d.

With existing and committed development within Drayton and Moorefield, the full rated capacity of the WPCP has been allocated and, as such, there is no further capacity available to accommodate growth. The Township needs to initiate the required modifications to the treatment process at the Mapleton WWTP to increase the rated capacity of the facility to 1,300 m^3/d. An Addendum to the 2017 Class EA Study will be required to modify the recommended technology for nitrogen removal.

The planned nitrogen removal system will upgrade the design capacity of the Mapleton WPCP from 900 m^3/d to 1,300 m^3/d. Depending on the pace of growth within Drayton and/or Moorefield, the additional capacity created by the implementation of the nitrogen removal system will be utilized. It is recommended that the Township monitor the capacity allocations within the service area and initiate a further study to identify the Preferred Solution for provision of additional wastewater treatment capacity beyond 1,300 m^3/d.

Drayton Wastewater Collection System

Drayton is currently serviced by a conventional gravity collection system that drains to a centralized Sewage Pumping Station (SPS) which then conveys all wastewater to the Mapleton WPCP Mapleton Water Pollution Control Plant (WPCP).

The recommended servicing strategy for Drayton builds upon the existing collection system.

The recommended wastewater servicing strategy for Drayton includes:

- Continuation of the existing Inflow and Infiltration Study
- Construction of a new centralized sewage pumping station on the west side of the Conestoga River on municipally owned lands. The new station will be flood-proofed and should be provided with an emergency overflow storage facility.
- Construction of a new trunk sewer under-crossing of the Conestoga River to convey wastewater flow from the east side of the community to the new sewage pumping station. The new trunk sewer may be constructed in the existing un-opened right-of-way or may cross private property subject to the Township securing an easement from the affected property owner.

- Construction of local sewer extensions from the existing collection system to the frontage of planned growth areas. The location and elevation of the sewer extension should be coordinated with the affected developers.
- Construction of sewer upgrades to accommodate additional sewage flows generated from new development areas.

The Wastewater Capital Program, Class EA Schedules and Costs for Drayton are detailed in Table ES- 3 and is depicted in Figure ES- 2.

Table ES- 3: Wastewater System Servicing Strategy in Drayton

PROJECT NAME	PROJECT ID	CLASS EA SCHEDULE	COST ($MILLION)
Drayton			
New SPS with emergency storage	WW-1	B	$5.16
Inflow/Infiltration monitoring program	WW-2	N/A	$0.38
Upgrade gravity sewers on Wellington Street South	WW-3	A+	$0.70
Upgrade gravity sewers on Main Street East near existing SPS	WW-4	A+	$0.45
Upgrade gravity sewers on Main Street East	WW-5	A+	$0.30
Nitrogen removal upgrades	WW-7	C	$5.80
Class EA Study for Future Upgrades beyond 1,300 m^3/d	WW-8	C	$0.20
Total Estimated Cost (2023$)			$12.99

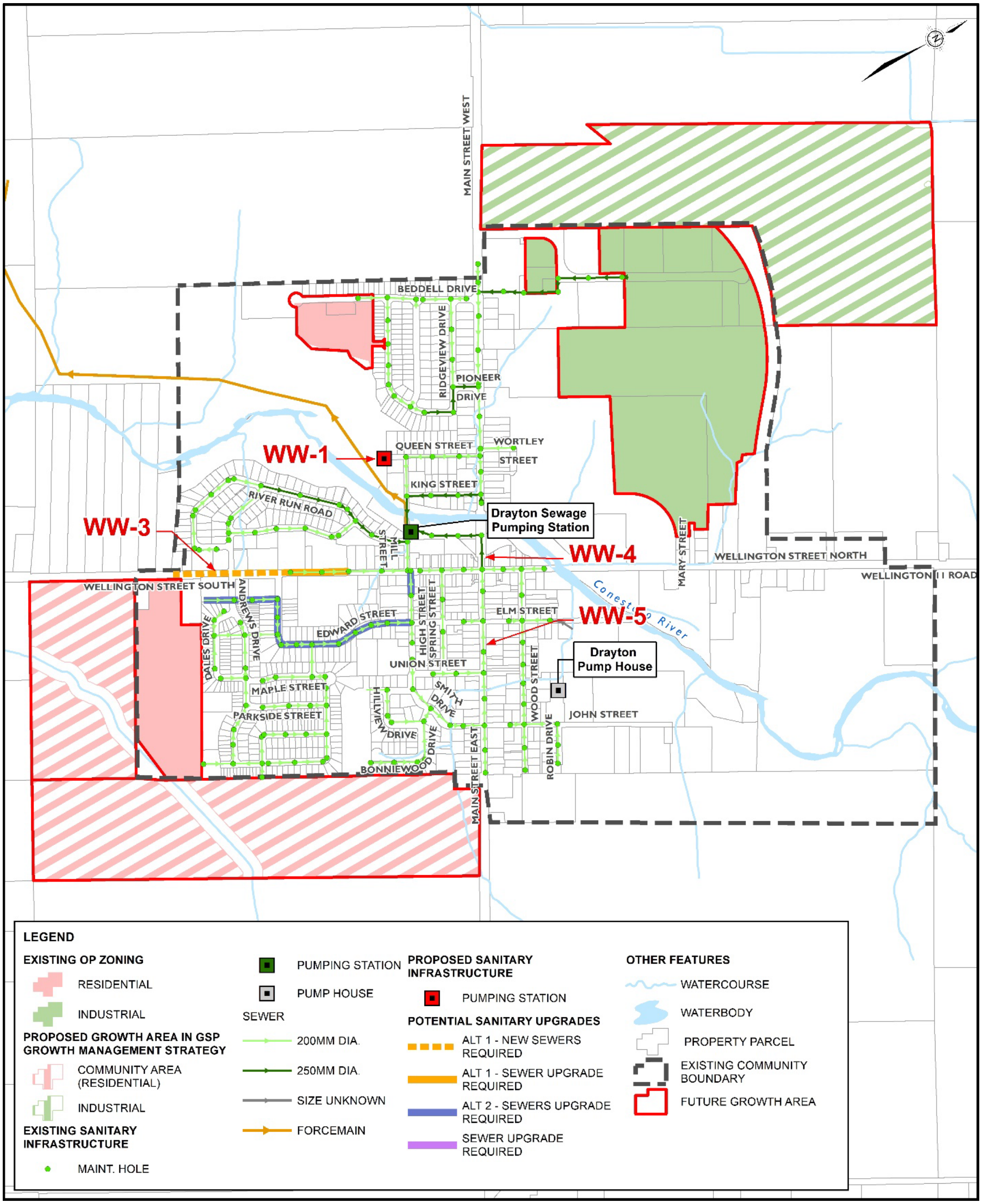

Figure ES- 2: Preferred Wastewater Servicing Strategy in Drayton

Moorefield Servicing Strategy

Water System

The community of Moorefield is serviced by the Moorefield Drinking Water System, which is comprised of the Drinking Water Supply System (DWSS) and the Water Distribution System (WDS). The Moorefield Water System is currently being upgraded with the addition of a third supply well, construction of additional treated water storage, and high lift pumping upgrades. The Moorefield Drinking Water System does not provide Fire Protection service for properties within Moorefield.

The recommended water servicing strategy for Moorefield does not alter the overall servicing strategy for Moorefield. In addition, all planned growth areas within Moorefield have direct access or access through adjacent development lands to the existing distribution system. No distribution system extensions are required to accommodate anticipated growth in Moorefield.

Wastewater Collection System

The existing wastewater collection system in Moorefield is a low-pressure sewer system with individual grinder pumps within each property pumping flows to a centralized sewage pumping station. Raw wastewater is then conveyed from the Moorefield SPS to the Mapleton WPCP through a 150mm forcemain approximately 5.0 km long.

The existing low-pressure sewer system in Moorefield has sufficient capacity to accommodate anticipated growth in the community. However, capacity limitations in the existing sewage pumping station and discharge forcemain will limit growth in the community.

The wastewater servicing strategy includes:

- Limit growth in Moorefield to approximately 2,000 persons.
- Upgrade of the existing SPS equipment to service the projected population of 2,000 persons which is equivalent to the conveyance capacity of the existing forcemain.

The Wastewater Capital Program, Class EA Schedules and Costs for Moorefield are detailed in Table ES- 4. The preferred Wastewater Servicing Strategy is depicted in Figure ES- 3.

Table ES- 4: Wastewater System Servicing Strategy in Moorefield

PROJECT NAME	PROJECT ID	CLASS EA SCHEDULE	COST ($MILLION)
Moorefield			
Upgrade the existing SPS equipment	WW-6	B	$0.40
Total Estimated Cost (2023$)			**$0.40**

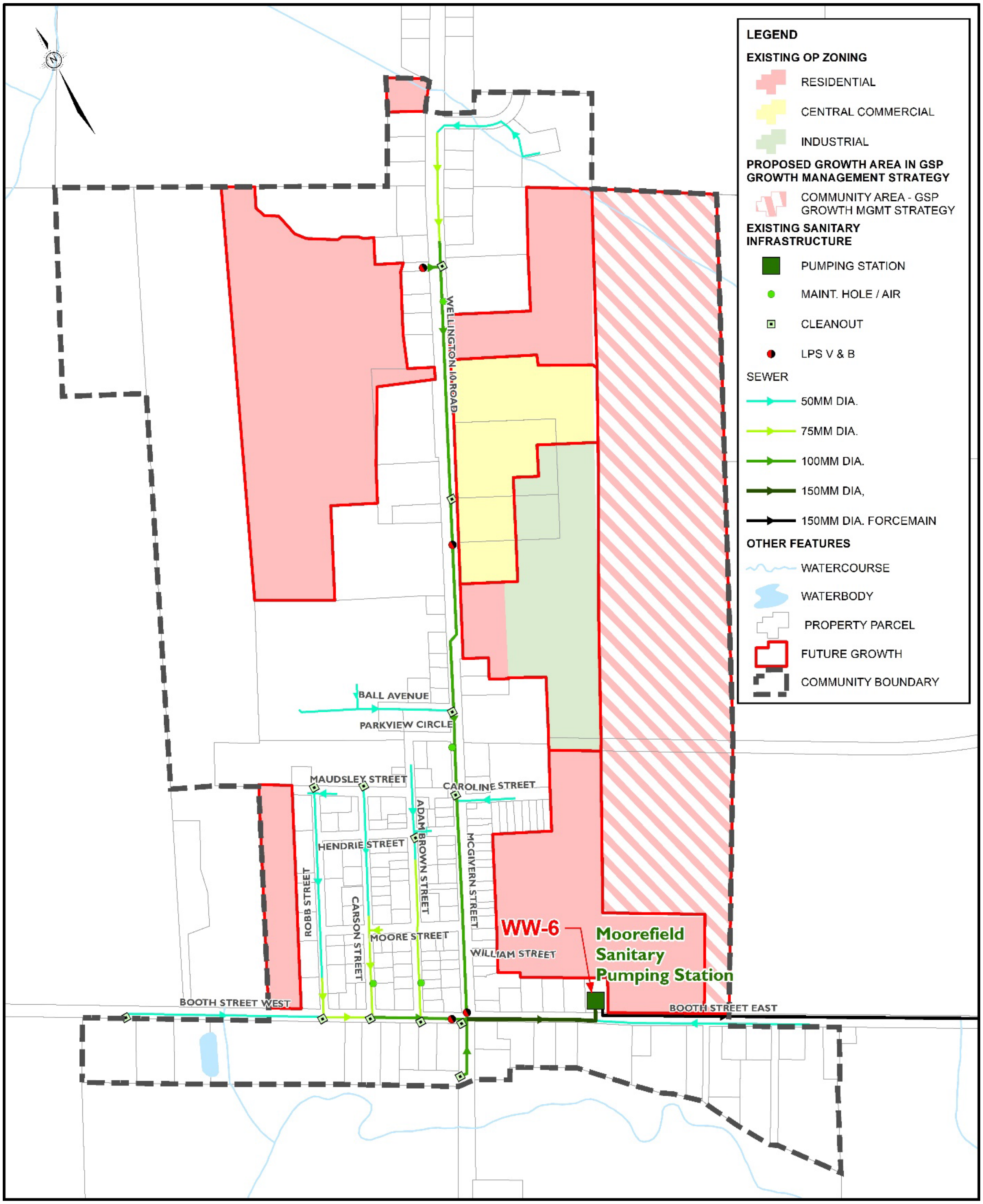

Figure ES- 3: Preferred Wastewater Servicing Strategy in Moorefield

Implementation Plan

Based on the projections for water demand or wastewater flow requirements of the service areas developed from the Population Projections, the project timing requirements were determined. This process took into consideration a logical extension of growth from the existing development. The evaluation of timing also took into consideration the availability of and need to maximize the use of existing infrastructure and best judgement on reasonable timing of subsequent expansions.

The Implementation Plans and capital costs for Drayton and Moorefield are summarized in Table ES- 5.

Table ES- 5: Implementation Plan for Drayton and Moorefield.

PROJECT IDs	LOCATION	DESCRIPTION	COST ($MILLION)
Immediate			
WW-1	Drayton	New SPS with emergency storage	$5.16
WW-7	Drayton	Nitrogen removal upgrades	$5.80
		Immediate Estimated Cost (2023$)	$10.96
1-5 years			
W-1	Drayton	Install new well at the existing DWS site to increase capacity	$1.44
W-2	Drayton	Water distribution extension at Wellington Street South	$0.20
WW-2	Drayton	Inflow/Infiltration monitoring program	$0.38
WW-3	Drayton	Upgrade gravity sewers on Wellington Street South	$0.70
WW-8	Drayton	Class EA Study for Future Treatment Capacity Upgrades beyond 1,300 m^3/d	$0.25
		1-5 years Estimated Cost (2023$)	$2.97
6-10 years			
W-3	Drayton	Water distribution extension at Main Street West, near Drayton Industrial Drive	$0.69

PROJECT IDs	LOCATION	DESCRIPTION	COST ($MILLION)
W-4	Drayton	Water distribution extension at Main Street East	$0.13
WW-4	Drayton	Upgrade gravity sewers on Main Street West near the existing SPS	$0.45
WW-5	Drayton	Upgrade gravity sewers on Main Street East	$0.30
		6-10 years Estimated Cost (2023$)	$1.57
10+ years			
WW-6	Moorefield	Upgrade the existing SPS equipment	$0.40
		10+ years Estimated Cost (2023$)	$0.40
		Total Estimated Cost (2023$)	$15.90

Summary

The preferred water and wastewater servicing strategies will support the short and long-term servicing needs of the approved growth areas and provide flexibility for servicing potential growth areas in the future. The strategies will also support meeting operational requirements, water quality and level of service objectives.

Upon completion of the Master Plan or Phase 2 of the EA process, Schedule A, A+ and B projects may proceed to Phase 5, Implementation, subject to finalization of the 30-day review period and assuming no Part II Orders are received. However, during implementation of some of these projects, additional study and analysis may be undertaken such as during the area servicing stages of development. While this work may address refinement to alignments, siting and minimizing environmental impacts, these projects will not require further planning under the Class EA process. The preferred water and wastewater strategies do not include any Schedule C projects requiring further planning under the Class EA process.

Next Steps

The following requirements will be addressed during the implementation of the projects:

- Finalization of property requirements (if any).
- Final refinement of infrastructure alignment and facility siting.
- Completion of additional supporting investigations, including but not limited to:
    - Geotechnical investigations to determine construction requirements for the infrastructure.
    - Hydrogeological investigations to determine and evaluate dewatering requirements and identify potential impacts and to support mitigative requirements during construction.
    - Natural and Cultural Heritage Studies in support of the final Site Selection for planned water and wastewater facilities.
    - Archeological Assessments for potential sites for water and wastewater facilities.
- Mitigation of potential construction related impacts including but not limited to:
    - Traffic control.
    - Noise, vibration and dust.
    - Air pollution.
    - Service interruption.
    - Environmental and water disturbance or contamination.
    - Siltation and erosion control.
- Approval Requirements as required but not limited to:
    - Environmental Compliance Approval from Ministry of Environment, Conservation and Parks (MECP).
    - Approvals from the County of Wellington.
    - Permit approvals from the Grand River Conservation Authority (GRCA).
    - Associated Planning Act Approvals.
    - Temporary Permit to Take Water for construction dewatering from the Ministry of the Environment, Conservation and Parks (MECP).

1 Introduction and Background

1.1 Background

The Township of Mapleton (Township) is a thriving rural municipality located within the County of Wellington in the heart of southwestern Ontario. The Township covers a land area of approximately 535.6 km2 and has a population of 10,839 according to the 2021 Census. The Township has two (2) designated urban centres, namely Drayton and Moorefield, as well as seven (7) rural hamlets, including Alma, Glen Allan, Hollen, Lebanon, Rothsay, Wallenstein, and Yatton.

Drayton and Moorefield are serviced by both municipal drinking water systems and wastewater collection and treatment systems. The Township owns and operates two (2) Drinking Water Systems (DWS), namely, the Drayton DWS and the Moorefield DWS. The Township also owns and operates one (1) wastewater pollution control plant (WPCP), and two (2) sewage pumping stations (SPS), namely, the Drayton SPS and the Moorefield SPS. The hamlets are not serviced by municipal drinking water systems or wastewater collection. At this time, only the urban centres of Drayton and Moorefield will be the focus of this Study, as shown on Figure 1-1. The hamlets will continue to remain on private services.

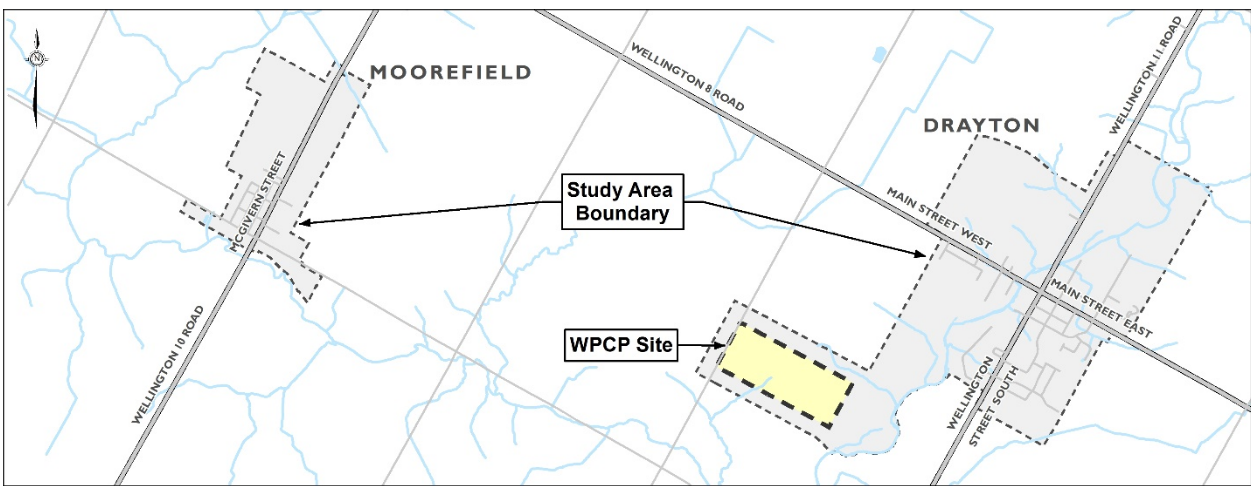

Figure 1-1: Study Area

The Township is proceeding to develop a Master Servicing Plan to ensure that the Township can continue to deliver high quality and sustainable drinking water and wastewater services to meet the needs of the community now and into the future.

1.2 Master Plan Goals and Objectives

The Water and Wastewater Master Plan documents the development and selection of the preferred water and wastewater servicing strategies to meet the servicing needs of existing and future development to 2051.

The key objectives Master Plan objectives were defined as follows:

- Review planning forecasts to 2051 and determine the impact on servicing needs for Drayton and Moorefield.
- Evaluate and incorporate proposed water and wastewater servicing needs to 2051.
- Confirm or refine water and wastewater policies to provide guidelines to the process and to the development/evaluation of servicing strategies.
- Integrate previous and concurrent related studies including:
    - 2015 Water and Wastewater Rate Study – Watson and Associates Ltd.
    - 2016 Drayton Water Servicing Needs Class EA – RJ Burnside
    - 2017 Development Charge Background Study – Watson and Associates Ltd.
    - 2017 Mapleton Wastewater Servicing Class EA – EXP
    - 2018 Mapleton Wastewater Servicing Class EA – Peer Review – CIMA+
    - 2018 Drayton Sanitary Collection System – Capacity Review – CIMA+
    - 2021 Wellington County Official Plan
    - 2022 Township of Mapleton Growth Management Summary Final Report – GSP Group
- Complete and document the Master Planning process in accordance with the Class Environmental Assessment process.
- Update the water and wastewater servicing strategies in consideration of:
    - Meeting technical service requirements.
    - Optimizing existing infrastructure.
    - Minimizing impact to or enhance the natural, social and economic environments.
    - Providing cost effective solutions.
- Establish a preferred long-term servicing strategy and implementation plan to meet the existing and future servicing needs of the Township.

- In general, the overall goals for the water and wastewater servicing strategies are:
    - Provide a high level of service to existing users and approved growth.
    - Provide security of supply.
    - Mitigate impacts to natural, social, and economic environments.
    - Best meet policy statements.
    - Ensure servicing meets the technical criteria.
    - Endeavour to optimize existing infrastructure.
    - Ensure the strategies are cost-effective.

1.3 Master Plan Study Components

The focus of the Water and Wastewater Master Plan consists of the evaluation of the water distribution and wastewater collection systems for the Township of Mapleton. The analysis undertaken as part of this study deals primarily with the water and wastewater systems within Drayton and Moorefield ultimately serviced by the water and wastewater treatment plant located within Drayton. This infrastructure consists of the watermains and collection system, major pumping stations, water storage facilities and treatment plant.

This Master Plan details the capital and implementation program for the infrastructure and provides all supporting reference data and deliverables.

1.4 Master Plan Class EA Report Outline

This Master Plan Class EA Report forms part of the overall deliverables for the Master Plan project. Based on the approach followed, the documentation has been prepared as described below:

1.4.1 Master Plan Report

The Water and Wastewater Master Plan Class EA Report, including all Appendices, is the documentation placed on public record for the Class EA review period.

This report contains and describes all required phases of the planning process and incorporates the procedure considered essential for compliance with the Environmental Assessment Act.

This Report contains the following sections:

- Introduction and Background – provision of relevant information and reports as basis to the Master Plan.

- Master Planning Process – description of the Class EA Master Planning process and approach taken under this Master Plan.
- Problem / Opportunity Statement – definition of the problem/opportunity needing to be addressed under this study and presentation of baseline planning information.
- Master Plan Methodologies – description of the approach, specific tasks and relevant background information unique to the completion of the Township of Mapleton Master Plan.
- Existing Conditions – description of the natural and social environments and the existing water and wastewater servicing strategies.
- Water:
  - Existing Water System – provides a description of the existing water system.
  - Water Design Criteria – confirmation and definition of the design criteria used for the water system.
- Wastewater:
  - Existing Wastewater System – provides a description of the existing wastewater system operating philosophy and infrastructure.
  - Wastewater Design Criteria – confirmation and definition of the design criteria used for the wastewater system, including plants, conveyance, and analysis approaches.
- Preferred Solution:
  - Preferred Servicing Strategies – description of the preferred water and wastewater servicing strategies.
  - Other Servicing Considerations – description of additional servicing requirements, whether growth-related or non-growth/operational related.
  - Implementation – description of overall implementation considerations.

1.4.2 Appendix A – Technical Memorandum

As part of the Master Planning Process, five (5) technical memoranda have been prepared, as follows:

- Technical Memo 1 – Background Conditions and Design Criteria
- Technical Memo 2 – Development of alternative servicing strategies.
- Technical Memo 3 – Evaluation Framework
- Technical Memo 4 – Evaluation of Alternatives

- Technical Memo 5 – Implementation Plan

1.4.3 Appendix B – Project and Implementation Data

This Appendix contains the project implementation data sheets for each of the Projects identified under this Master Servicing Plan. The project data sheets provide further information related to the details of the individual Projects.

1.4.4 Appendix C – Public Consultation

This Appendix contains all relevant documentation of the public consultation process including notices, comments and responses, and distributed information. The presentation material from the Public Information Centre (PIC) held during the process is included in Appendix C.

1.4.5 Appendix D – Cost Estimates

This Appendix contains relevant cost estimates using best available data and assuming 2023$. The cost estimates are Class D level accuracy. Updated cost estimates should be considered when individual Projects proceed to implementation.

1.4.6 Appendix E – Project and Implementation Data

This Appendix contains relevant technical analysis information.

Key information includes:

- Background system data including historical water and wastewater flow conditions.
- Water demand and wastewater flow calculations.
- System capacity calculations.

2 Planning Process

Municipalities in Ontario are subject to the provisions of the Environmental Assessment Act (EAA). The Ontario MEA "Municipal Class Environmental Assessment" document (October 2000, as amended in 2007, 2011 and 2015) provides municipalities with a five-phase planning procedure approved under the EAA to plan and undertake all municipal sewage, water, stormwater, and transportation projects that occur frequently, are usually limited in scale, and have a predictable range of environmental impacts and applicable mitigation measures. This Master Plan has proceeded in accordance with the 2015 Municipal Class EA Planning Process.

The Municipal Class Environmental Assessment (EA) process clearly defines approaches for completion of Master Plans. The Township of Mapleton has prepared this Master Plan based generally on Approach 2, which involves preparing a Master Plan document at the conclusion of Phases 1 and 2 in order to fulfill the requirements for Schedule B projects. However, as has been the practice of the Township of Mapleton, many Schedule B projects will follow on with separate studies. Any Schedule C projects identified would continue through the Planning Process to fulfill Phases 3 and 4.

Key components of the Class EA planning process include:

- Consultation early and throughout the process.
- Determine a reasonable range of alternatives.
- Consideration of effects on the environment and ways to avoid/reduce the impacts.
- Systematic evaluation of the alternatives.
- Document the process; and
- Traceable decision making.

2.1 Types of Projects

Based on the Municipal Class EA document, projects are classified as one of four potential types (or "Schedules") of undertakings. Each of the classifications requires a different level of review to complete the requirements of the Class EA, and thus comply with the EAA, as follows:

- Schedule "A" - Projects are limited in scale, have minimal adverse effects and include the majority of municipal water and wastewater operations and maintenance activities. These projects are pre-approved and may be implemented without further review under the Class EA process.

- Schedule “A+” - Projects are limited in scale, but where impact to the public may be more significant. These projects are pre-approved; however, the proponent is obligated to notify the public of infrastructure projects being implemented in their area. The public has the right to comment to the municipal officials/council in their area; however, considering that the projects are pre-approved, there is no appeal process to the Minister of the Environment for these projects.
- Schedule “B” - Projects have the potential for some adverse environmental effects. The proponent is required to undertake a screening process involving mandatory contact with the directly affected public and relevant review agencies to ensure that the are aware of the project and that their concerns are addressed, where possible.

  Schedule “B” projects require that Phases 1 and 2 of the Class EA planning process be followed, and that a Project File / Report be prepared and submitted for review by the public. If there are no outstanding concerns raised by the public and/or the review agencies, the proponent may proceed to implementation (Phase 5).
- Schedule “C” - Projects have the potential for significant environmental effects and must proceed under the full planning and documentation procedures (Phases 1 to 4) specified under the Municipal Class EA document. Schedule “C” projects require that an Environmental Study Report (ESR) be prepared and submitted for review by the public. If there are no outstanding concerns raised by the public and/or the review agencies, the proponent may proceed to implementation (Phase 5).

If there are no outstanding issues remaining after the public review period for Schedule B or Schedule C projects, then the project is approved and may proceed to construction. However, should there be any unresolved issues remaining during the public review period, any party may request that the Minister of the Environment consider a Part II Order. The Minister would then decide to deny the request for a Part II Order; refer the matter to mediation; or require the proponent to comply with Part II of the EA Act.

The Class EA process flowchart is provided in Figure 2-1.

2.1.1 Master Planning Process

Municipalities recognize the benefits of comprehensive, long-range planning exercises that examine problems and solutions for an overall system of municipal services. The Municipal Class EA for Water and Wastewater Projects recognizes the importance of master plans as the basis for sound environmental planning. The Class EA defines master plans as:

"Long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. These plans examine an infrastructure system(s) or group of related projects in order to outline a framework for planning for subsequent projects and/or developments."

Master plans have distinguishing features that set them apart from project specific studies. These features include the following:

- Master plans are broad in scope and focus on the analysis of a system for the purpose of outlining a framework for the provision of future works and developments.
- Specific projects recommended in a master plan are part of a larger management system and are distributed geographically throughout the study area. The implementation of specific projects may occur over an extended time frame.

According to the Class EA document, a master plan must at least satisfy the requirements of Phases 1 and 2 of the Class EA process and incorporate the five key principles of environmental planning, as identified in above. The Master Plan must document public and agency consultation at each phase of the process and a reasonable range of alternative solutions must be identified and systematically evaluated.

The Water and Wastewater Master Plan fulfills these requirements. This approach would also be scrutinized through a public and agency consultation process and be fully documented.

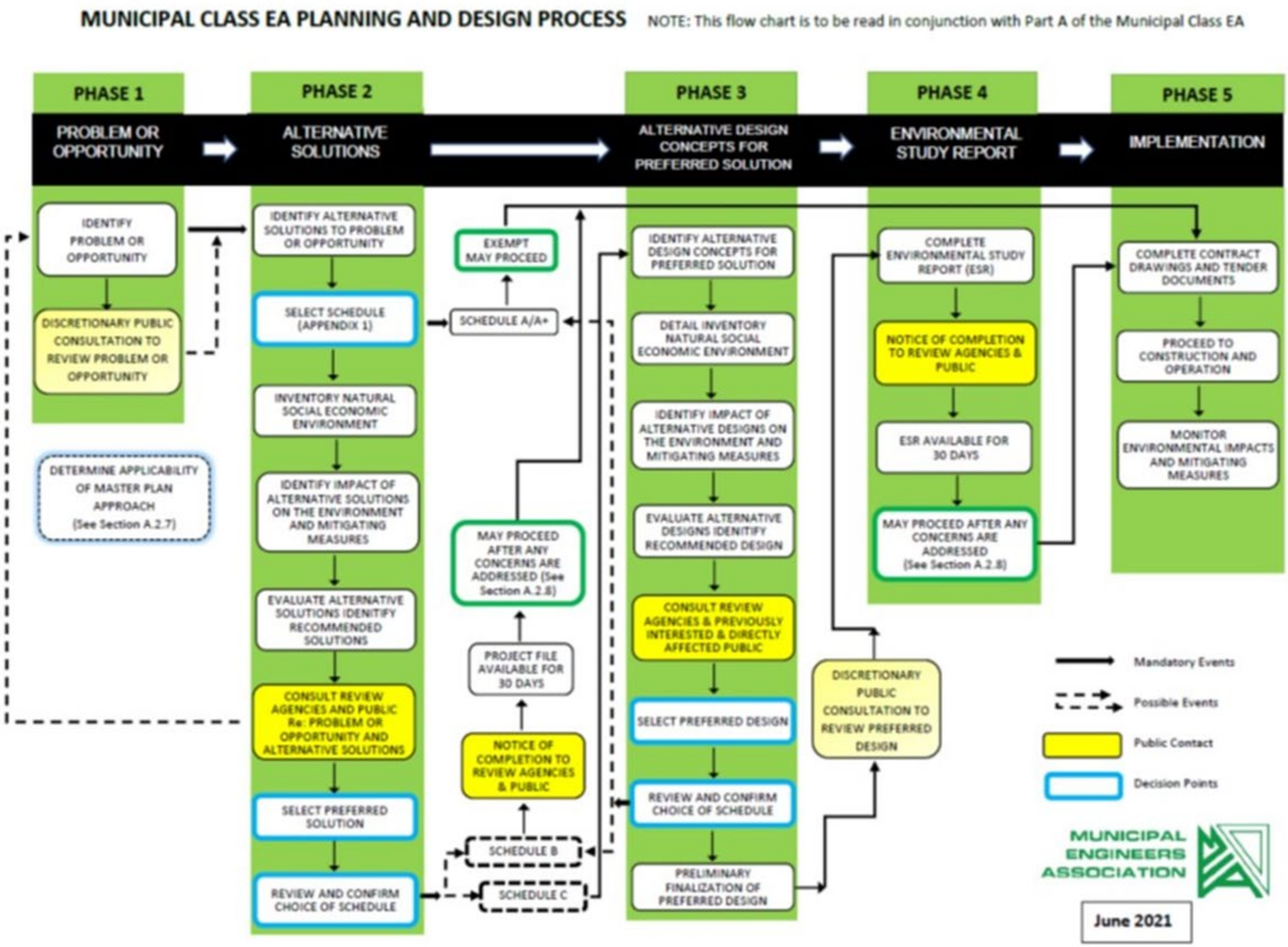

Figure 2-1: Municipal Class EA Planning and Design Process

2.2 Consultation and Communication

At the outset of the Master Plan process, a Public Consultation Plan was developed. The activities that were undertaken as part of the process are described in the following sections and are considered critical and required under the Class EA Master Planning process.

A major component of the Municipal Class EA process is to inform governmental agencies, affected landowners, the local community, and the general public of key project activities and to solicit comments and feedback from these groups on the results of major activities, before any final decisions are made.

The MEA Class EA document outlines mandatory and discretionary consultation contact points with the public and agencies. In order to communicate the project progress and goals and to solicit proper feedback and insight throughout the process, CIMA+ undertook the following communication and consultation activities:

- **Project Contact List**: A master project contact list was created at the onset of the project to include representatives from government and regulatory agencies, Indigenous groups, utilities, landowners, developers, and a number of technical review agencies and organizations that may have an interest in this project. Interested members of the public were added to the mailing list upon request and all individuals on the list were kept informed about project updates and upcoming meetings through direct mail.
- **Notice of Study Commencement and Public Information Centre**: A “Notice of Study Commencement and Public Information Centre” was provided by email and published on separate publications in the following local newspaper.
    - Public Information Center - The Wellington Advertiser on September 29 and October 6, 2022

  Copies of the notice were also mailed out to all individuals and groups on the Project Contact List. A copy of the Notice of Study Commencement and PIC is provided in Appendix C.
- **Public Information Centre**: The public meeting for this Master Plan study was held on Wednesday, October 12, 2022, from 5:00 to 7:00 pm and was held in the Council Chambers at the Township of Mapleton office on Sideroad 16 in Drayton. The meeting allowed all members of the public and stakeholders that may have an interest in the project to learn more about the need for the project, the Master Plan process, preliminary findings in the study area and to provide feedback on the information presented. The meeting was held near the study area in

anticipation that residents within the study area would attend. This meeting had thirty (30) attendees in total.

- **Notice of Study Completion**: A “Notice of Study Completion” notifying the public and agencies that the Project File Report has been placed on the public record for review will be issued. The Notice advises the public about where to find the Project File Report, as well as their ability to place a Part II Order. The Notice of Study Completion will be advertised in the Wellington Advertiser.

  The notice will also be posted on the Township’s website https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan and sent to all individuals and groups on the project contact list. A copy of the Notice of Study Completion is included in Appendix C.

Full documentation of the consultation and communication program is contained in the appendices to this report.

2.2.1 Public Access to Information

At the onset of the project, the Township developed and maintained a Mandatory Contact List. A copy of the mandatory Contact List is included in Appendix C. All Notices and relevant project materials was sent to all Agencies and members of the public identified on the Mandatory Contact List, and those who had expressed interest in the process. Notices of the Study Commencement and the Public Information Centre were posted on the Township’s website and published in the local papers.

2.2.2 First Nation Consultation

The Notice of Project Commencement was mailed to each of the following government departments and First Nations, along with an invitation to provide input into the Study:

- Metis Nation of Ontario
- Grand River Metis Council
- Mississaugas of the Credit First Nation
- Six Nations of the Grand River
- Haudenosaunee Confederacy Chiefs Council
- Aamjiwnaang First Nation
- Walpole Island First Nation, Bkejwanong Territory
- Chippewas of Kettle and Stony Point
- Chippewas of the Thames First Nation
- Chippewas of Nawash First Nation

- Saugeen Ojibway Nation
- Saugeen First Nation

Each of the above agencies and First Nation's representatives were also provided with the Notice of Public Information Center, as well as a copy of the information package.

2.2.3 Summary of Public Issues, Comments and Concerns

One comment sheet was completed and submitted during or after PIC. One comment was received during the review period. A summary of the comments is provided in Appendix C.

2.2.4 Agency Consultation

An important component of the Master Plan process is proper consultation with government review agencies and the public. The Township ensured that the public and relevant review agencies were informed about this study and encouraged to contribute during the study. This section outlines the agency consultation component of the study.

A list of agencies was prepared at the start of the project that included all relevant contacts at the federal, provincial, and local levels of government as well as local associations and utilities. Each party on the list of stakeholders was contacted to provide information or comments. The opportunity for these agencies to participate in the project was provided through the distribution of all study notices, direct letter mailings, and through direct invitations to participate in the formal PIC. The complete list of all agencies contacted and correspondence with these agencies is included in Appendix C of this report.

3 Problem / Opportunity Statement

3.1 Study Area

The Township of Mapleton (Township) is a thriving rural municipality located within the County of Wellington in the heart of southwestern Ontario. The Township covers a land area of approximately 535.6 km2 and has a population of 10,839 according to the 2021 Census. The Township has two (2) designated urban centres, namely Drayton and Moorefield, as well as seven (7) rural hamlets, including Alma, Glen Allan, Hollen, Lebanon, Rothsay, Wallenstein, and Yatton. The boundaries of the overall Master Plan study area are the boundaries of the Township as presented in Figure 3-1. While the Master Plan is intended to cover the entire Township, the study will focus on urban centres of Drayton and Moorefield. Drayton and Moorefield are currently serviced with municipal drinking water and wastewater systems, whereas Alma has been developed on private servicing. Provision of communal servicing for the community of Alma is beyond the scope of this Study.

3.2 Planning Projections

The first step in the Master Planning process is to document baseline population for the study area from existing data and establish population projections for the forecast planning period, up to 2051. Population projections and land use planning are critical to the development and evaluation of water and wastewater servicing alternatives developed through the Master Plan process.

Population projections are developed based on a combination of both best available planning information and professional judgement. Population projections form the basis of establishing water and wastewater flow projections which, in turn, dictate the water and wastewater servicing requirements. As part of the master planning exercise, these population projections need to be revised continuously to ensure the validity of the planning estimates according to actual development, conditions of servicing infrastructure, and growth experienced in the Township.

Several recent studies have presented figures for population projections in the Township. CIMA+ has compiled the available population projection data for the Township as a whole, Drayton, and Moorefield. Ultimately, the Township determined that the values shown in the Table 3-1, taken from the Growth Management Summary Final Report (GSP Group, 2022), shall be used for the Mapleton Water and Wastewater Servicing Master Plan. These values align with the most recent County of Wellington Official Plan Update (County of Wellington, 2021).

Table 3-1: Master Plan Population Projections

SERVICE AREA	2026	2031	2036	2041	2046	2051
Rural Areas	11,800	12,400	12,900	14,100	14,600	15,200
Drayton	3,200	3,641	3,779	4,507	4,793	4,983
Moorefield	900	1,181	1,531	2,125	2,349	2,775
Total	15,900	17,222	18,210	20,732	21,742	22,958

Based on the Wellington County Official Plan Update (July 2021), and the Township of Mapleton Growth Management Summary (January 2022), 82% of population growth in Wellington County will take place in 14 urban centres, including Drayton and Moorefield. The remainder will largely be directed mainly to hamlets and secondary agricultural areas.

Among the Wellington County's objectives for growth are the following points which are relevant to the Mapleton Water and Wastewater Servicing Master Plan:

- To take advantage of capacities in existing and planned water, wastewater, utilities, and transportation systems.
- To encourage growth in urban areas.
- To identify and promote opportunities for growth in the built-up areas of urban centres through intensification and redevelopment where this can be accommodated, considering small town scale and historic streetscapes; and,
- To encourage more efficient use of land through increased densities in designated Greenfield areas of urban centres.

The County of Wellington Official Plan identifies Policy Areas for growth in Drayton and Moorefield and will be used as a basis for identifying infrastructure needs during the Master Planning process.

The employment growth value presented in the County of Wellington Official Plan (2021) does not specify the region within the Township to which employment growth will be directed. For the purposes of this study, it will be assumed that the majority of employment growth will occur within Drayton.

3.3 Problem / Opportunity Statement

The Township of Mapleton (Township) is a thriving rural municipality located within the County of Wellington in the heart of southwestern Ontario and is experiencing significant development pressures within the urban centres of Drayton and Moorefield.

By 2051, the projected population in the urban hamlets of Drayton and Moorefield is expected to increase to approximately 7,758 persons. Water and Wastewater infrastructure upgrades and/or extensions will be required to service future residential and non-residential lands. A comprehensive Water and Wastewater Master Plan will ensure implementation of a sustainable growth strategy so that the Township can continue to deliver high quality and sustainable drinking water and wastewater services to meet the needs of the community now and into the future.

4 Master Plan Methodologies

4.1 Overview

A number of tasks and evaluation requirements were undertaken as part of the Master Plan process. Under any Master Plan, the methodology for analyzing planning information, developing water demands and wastewater flows and modelling the systems needs to be developed to best serve the proponent.

4.2 Population Data

This Master Plan makes use of the planning information derived through the Township of Mapleton Growth Management Summary (January 2022), in order to assess growth areas and allocate future water demands and wastewater flows.

4.3 Evaluation Methodology

The evaluation methodology is essential in guiding the decision-making process. A well-structured comprehensive evaluation methodology provides the foundation for a decision-making process that is sound, defensible, traceable, and consistent with the project objectives.

The following decision-making methodology was used for the Master Plan:

- Development of evaluation categories and criteria to assess a list of alternative solutions,
- Development of alternative solutions,
- Detailed evaluation of the alternative solutions using a Multi-Criteria Analysis (MCA) decision-making process, and
- Identification of the preliminary preferred alternative solution based on the results of the decision-making process.

The decision-making model for the Master Plan study was centred on an MCA. The MCA provides a structured approach to determine overall benefits among alternative options, where the options accomplish several objectives. This evaluation methodology requires specification of desirable objectives and identification of corresponding indicators, which are then used to measure/assess the ability of each alternative option to meet a specific objective.

The MCA approach includes the following major components:

- Evaluation Categories: Primary evaluation categories group the evaluation criteria.

- Evaluation Criteria: A set of evaluation criteria is developed to reflect aspects of importance for a specific project. Alternative options are assessed and compared relative to the others against the evaluation criteria.
- Qualitative Rating: Each alternative option is assigned a rating that reflects its ability to meet each evaluation criterion relative to the performance of the other alternative options.

4.3.1 Evaluation Criteria

Detailed criteria are identified within each main evaluation category, shown in Table 4-1. The criteria are intended to represent the specific aspects and considerations of each category that are most relevant to the project. Criteria are grouped by category with their respective descriptions and indicators to be used when assigning scores. The proposed criteria and indicators will be reviewed and agreed upon in consultation with the Township.

Table 4-1: Evaluation Criteria and Indicators

Evaluation Category	Criteria	Weighting
Natural / Environmental	**Natural Environmental Features** – Potential impacts to existing natural environment. **Water Resources and Source Water Protection** – Potential temporary and permanent effects on surface water and groundwater quantity / quality **Climate Change** – Resiliency to extreme conditions and ability to minimize greenhouse gas emissions. **Wildlife** - Protects wildlife and species at risk. **Climate Change -** Minimize contribution to climate change and maximize resiliency to extreme conditions	10%

Evaluation Category	Criteria	Weighting
Socio-Cultural	**Healthy and Safety** – Minimize potential impact of health and safety of operation staff and potential risks to public. **Nuisance (short-term) Impacts** – Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property) **Aesthetic and Operational (long-term) Impacts** – Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities. **Impacts on Businesses** - Minimizes short-term and long-term impacts to business sector. **Protects Cultural Heritage Features** - Minimizes impact to cultural heritage features. **Protects Archaeological Features** - Minimizes impact to archaeological features	20%
Technical / Operational	**Existing and Future Demands** - Able to meet existing and future demands and aligns with existing and planned infrastructure. **Reliability and Security** - Provides reliability, security, and robustness. **Constructability** – Ease of construction and integration with existing system(s) **Operational Complexity** – Improve operational efficiencies and operational and monitoring requirements. **Existing and Planned Infrastructure** - Aligns with existing and planned infrastructure. **Existing and Planned Land Use** - Aligns with existing and planned land use. **Permits and Approvals** - Ease of permits and approvals	40%
Financial / Economic	**Life Cycle Cost** – 20-year life cycle cost	30%
	Total Overall Maximum Score	100%

4.3.2 Qualitative Rating

The evaluation methodology consisted of a descriptive or qualitative evaluation of alternative solutions / strategies and identified advantages and disadvantages of each alternative option with respect to the evaluation criteria. In this respect, comparisons and trade-offs were made between alternatives. Trade-offs can involve forfeiting an advantage or accepting a disadvantage to address a higher priority consideration.

Life cycle costs were evaluated using quantitative means. High-level estimates were generated for this criterion, and they were evaluated using a relative rating provided for each alternative as it compares to each of the other alternatives.

An evaluation matrix was prepared describing the specific advantages and disadvantages that each alternative option offers for each criterion under consideration. For each option, detailed information was provided with a description of:

- Risk and/or potential impacts for each criterion,
- Approaches to mitigating risks and/or impacts,
- Scoring rationale, based on degree of risk and/or mitigation required, and
- Score, which were assigned as follows:

Table 4-2: Scoring Legend

Performance Score	Score Representation	Description
5	●	Potential impacts are negligible, no mitigation is required. Most preferred.
4	◕	Potential impacts are minor and can be easily mitigated through implementation of standard mitigation measures.
3	◑	Potential impacts are moderate and implementation of a number of mitigation measures are required to reduce / eliminate the risks.
2	◔	Potential impacts are major, and implementation of extensive mitigation measures are required to reduce / eliminate the risks.

Performance Score	Score Representation	Description
1	◯	Potential impacts are significant, and implementation of substantial mitigation measures are required to reduce the risks; however, risk cannot be completed eliminated. Least preferred.

4.4 Implementation and Scheduling

Typically, scheduling of infrastructure upgrades should be planned to ensure that actual flows do not exceed approximately 80% of full design capacity. This approach should ensure that future upgrades are undertaken approximately 2 years before flow projections meet their available capacity.

This concept is more easily achieved for the projects further out in the planning horizon. Given that many upgrades are required in the short term (i.e., before 10 years), some projects have been identified with accelerated schedules.

Total project scheduling has been based on total project delivery requirements including identifying all project components such as additional studies, Class EA studies, design, and construction requirements.

5 Existing Conditions

5.1 Water Supply

5.1.1 Drayton

The Drayton Drinking Water System is comprised of the Drinking Water Supply System (DWSS) and the Water Distribution System (WDS). The Drayton DWSS consists of the Drayton Water Treatment Plant (WTP) and two (2) raw water wells all located at 60 Wood Street on Lot 1 Concession 1 in Drayton, Ontario. Operational responsibility for the drinking water system has been contracted to the Ontario Clean Water Agency (OCWA).

Water is supplied to the Drayton DWSS from two wells located on the site of the WTP. Each of the supply wells has been fitted with pumps rated at 22.7 L/s at 37.0m TDH. The facility operates under Permit to Take Water No. 0758-98MLKT and allows for a maximum Daily Taking of 3,928.3 m^3/d.

The WTP consists of one drinking water treatment facility with iron sequestration and disinfection, 405 m^3 of storage for disinfection and for equalization, and five (5) high-lift pumps connected to the distribution system with approximately 780 service connections. The Township operates the Drinking Water System under Drinking Water Works Permit (DWWP) No. 105-201, dated January 2017.

Current Drinking Water demands are close or exceeding the Firm Rated Capacity of the supply wells, where the Firm Rated Capacity is defined as the supply capacity with the largest well out of service. However, the current demands are well within the taking limits under the current Permit to Take Water (PTTW).

5.1.2 Moorefield

The Moorefield Drinking Water System is comprised of the Drinking Water Supply System (DWSS) and the Water Distribution System (WDS). The Moorefield DWSS consists of the Moorefield Water Treatment Plant (WTP) and two raw water wells located at 5 Hillwood Drive in Moorefield, Ontario. Operational responsibility for the drinking water system has been contracted to the Ontario Clean Water Agency (OCWA).

Water is supplied to the Moorefield DWSS from two wells located on the site of the WTP. The supply wells have been fitted with pumps rated at 11 L/s and 7 L/s. The facility operates under Permit to Take Water No. 1401-9KXJW5 and allows for a maximum Daily Taking of 2,620 m^3/d.

The WTP consists of one drinking water treatment facility, on-site storage for disinfection and equalization purposes, and three high-lift pumps directly connected to the distribution system with approximately 155 service connections. The pumphouse houses the treatment and control facilities; located outside the pumphouse are the two groundwater wells each equipped with a submersible pump. Each of the well discharge pipes has an injection point for sodium hypochlorite disinfection. Four high-lift pumps pump water from the standpipe to a common header for distribution.

The Township is currently proceeding with upgrades to the Moorefield Water Supply System to address operational and redundancy issues. Under this Program, the Township will:

- Construct a new well on the site of the existing water treatment plant with a rated capacity of 15.0 L/s to ensure security of supply in the event of a well pump failure.
- Upgrade and rehabilitate the existing wells to reinstate their rated capacities to 15.0 L/s.
- Construct a new at-grade water storage facility to provide approximately 400 m^3 of additional equalization storage, and to provide system redundancy to facilitate maintenance of the storage facilities.
- Modifications to the high lift pumping station to accommodate the third supply well.

For the purposes of this Master Plan, it is assumed that the above upgrades are complete.

An overview of the Moorefield DWS process is presented in Figure 5-2. Before entering the distribution system from these wells, the raw water is treated by adding a disinfectant to protect against microbial contaminants. The water is disinfected with sodium hypochlorite solution (chlorine).

5.2 Storage Capacity

5.2.1 Drayton

Treated drinking water storage in Drayton is provided at the Water Treatment Plant (405 m^3) and at the Drayton Elevated Tank (2,400 m^3). The total available drinking water storage in Drayton is 2,805 m^3.

5.2.2 Moorefield

Water storage is currently provided by a single standpipe at the site of the WTP with a total capacity of 387 m^3. With completion of the current upgrade Project, the available storage at the Moorefield WTP will be increased to 787 m^3. The standpipes will be used for primary disinfection and for equalization.

5.3 Distribution System

5.3.1 Drayton

The existing distribution system consists of 12.4 km of 150 mm to 300 mm watermain, including appurtenances and service connections. In addition, a new Bulk Water Station has been provided on Drayton Industrial Drive to provide an opportunity for rural customers to obtain bulk supplies of safe drinking water.

5.3.2 Moorefield

The Moorefield Drinking Water distribution system consists of approximately 4.7 km of local distribution mains ranging in size between 50 mm and 150 mm. The distribution system has been designed and constructed based on providing domestic demands only. No Fire Protection is provided through the municipal distribution system.

5.4 Existing Water Servicing Systems

The existing Water Servicing Systems for Drayton and for Moorefield are depicted on Figure 5-1 and Figure 5-2 respectively.

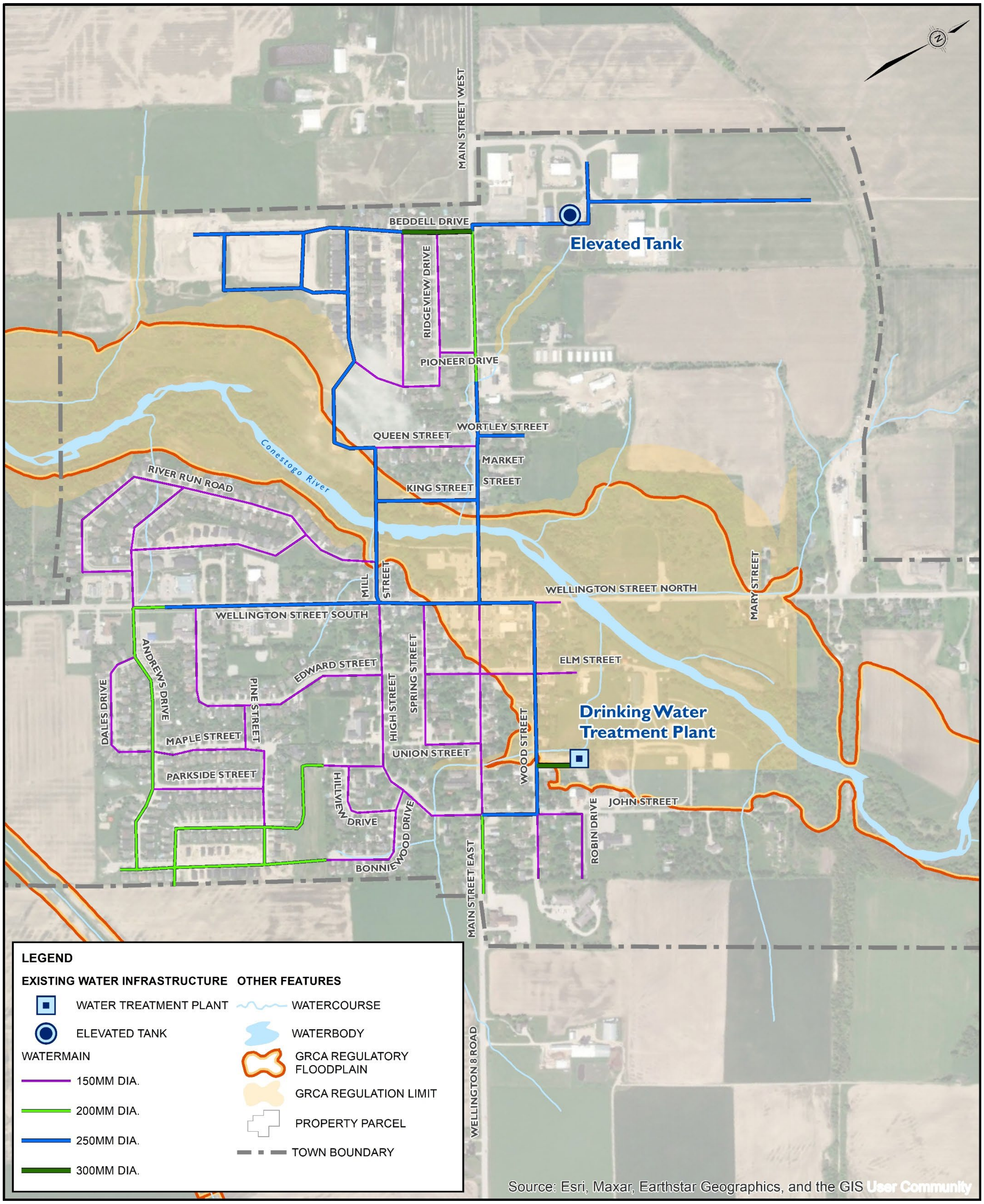

Figure 5-1: Drayton Drinking Water System

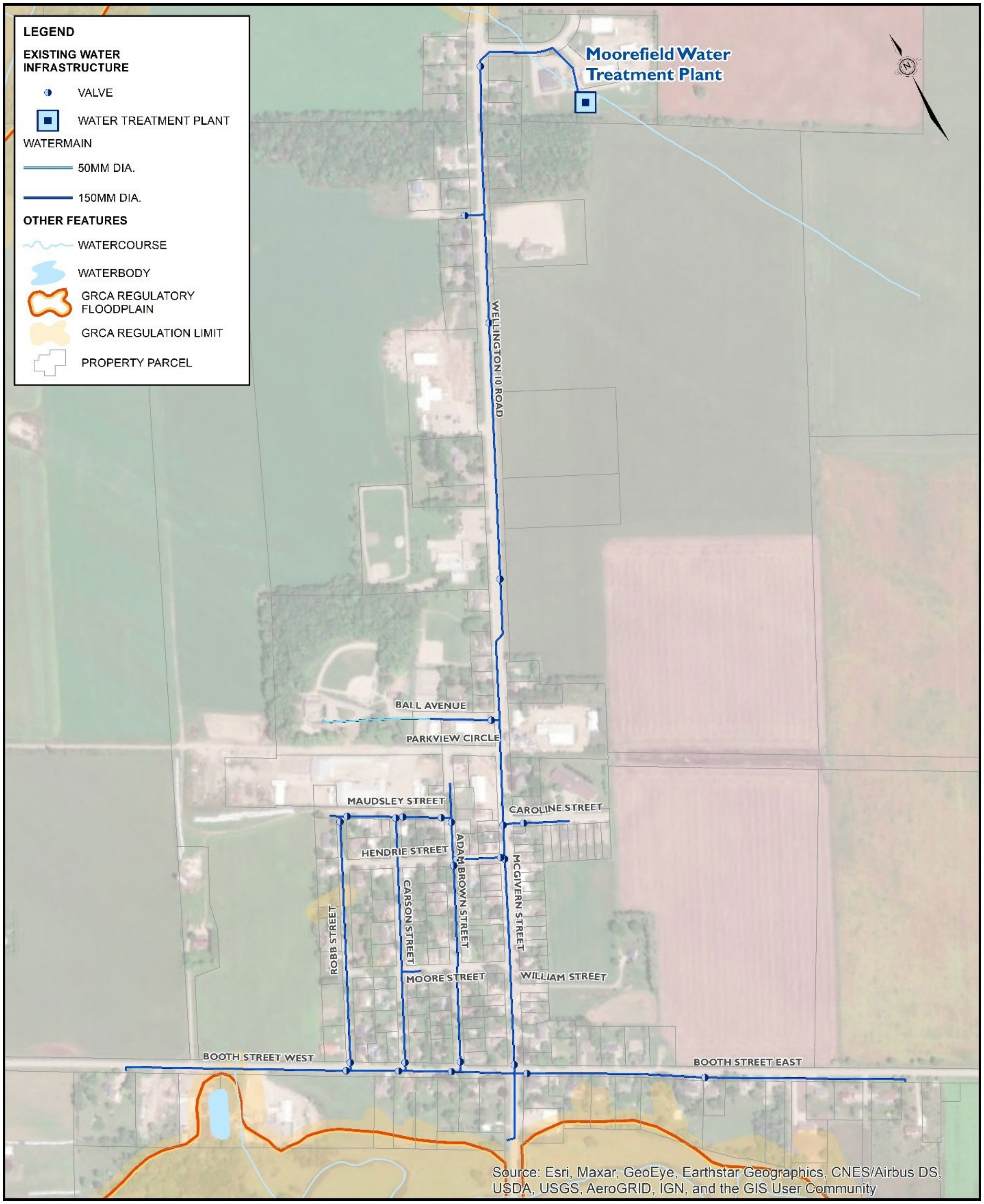

Figure 5-2: Moorefield Drinking Water System

5.5 Existing Wastewater Systems

5.5.1 Wastewater Treatment

The Mapleton WPCP is a five celled facultative lagoon treatment system that services both Drayton and Moorefield. A Schedule “C” Class EA completed in 2017 identified the future treatment needs based on forecasted growth for the communities of Moorefield and Drayton.

Following the completion Class EA, the Township obtained approval from the MECP to re-rate the facility from 750 m^3/d to 900 m^3/d (ECA 1391-B38PLA, August 2, 2018). A peer review of the Environmental Study Report (ESR) was also completed in 2018 to confirm that the recommendations in the Class EA. The Peer Review recommended technology to improve nitrogen removal and increase the rated capacity from 900 m^3/d to 1,300 m^3/d be changed from a Submerged Aerated Growth Reactor (SAGR) system to a Moving Bed Bioreactor (MBBR) system. The Township has pilot tested the MBBR system and verified that the technology works well at this facility. An Addendum to the Class EA will be required to modify the recommended design for the WPCP Upgrade. Timing for the upgrade to be identified in the Master Plan and as growth proceeds.

Overall, the Mapleton WPCP has performed well; however, improvements to the existing operation are required to reliably achieve effluent concentrations required for the expanded plant flow of 1,300 m^3/d. In the past, the plant has not fully used its spring discharge window due to high total ammonia nitrogen concentrations. In addition to this, the proposed effluent phosphorus objectives at an expanded capacity of 1,300 m^3/d, is achievable in the existing filters with optimized alum dosing, but this is nearing the limits of technology and would need to be upgraded for capacities > 1,300 m^3/d by the year 2029.

5.5.2 Wastewater Collection Systems

The local wastewater collection system is owned and operated by the Township of Mapleton. The collection system consists of local collection sewers including lateral service connections to the property lines, sewers, pumping stations and forcemain, and associated appurtenances.

5.5.2.1 Drayton

Drayton is currently serviced by a conventional gravity collection system that drains to a single communal pumping station conveying flow to the Mapleton WPCP (CIMA+, 2018a). The Drayton SPS is located adjacent to Mill Street immediately adjacent to the Conestoga River. The existing station is located within the Regional Flood line for the Conestoga River.

The Drayton sanitary sewer network consists of 11.5 km of gravity sewers, ranging in size between 200 mm – 350 mm, and 167 manholes (EXP, 2017). In 2018 CIMA+ completed a Drayton Sanitary Collection System Capacity Assessment of the existing sanitary system. The analysis of the existing collection system in Drayton identified that it is adequately sized for the current flows. In general, capacity is available in the sanitary collection system for the currently approved development in the Drayton. There are locations within the sewer network that may experience low flow velocities and may require more frequent flushing to prevent excessive solids deposition.

All wastewater from existing developments west of the Conestogo River are conveyed by a sewer to the east side of the river to the existing pumping station, then pumped back to the west side of the river and ultimately to the Mapleton WPCP. Wastewater flows from the east side of the Conestoga River are conveyed to the pump station through sewers on Mill Street and/or through an Open Space block adjacent to the Conestoga River from Main Street West.

The Drayton Sewage Pumping Station (SPS) has a firm rated capacity of 34 L/s, which is lower than the current design peak inflow. During the Drayton Sanitary Collection System Study, CIMA+ was provided with anecdotal evidence indicating that the Drayton SPS was operating beyond its Firm Rated Capacity during peak wet weather flow events. Between 2012-2017, 44 events were recorded where emergency pumping at the SPS bypass with pumper truck was necessary to prevent uncontrolled raw sewage discharges to the Conestoga River.

5.5.2.2 Moorefield

The existing wastewater collection system in Moorefield was developed with a low-pressure sewer system. Each property is provided with a grinder pump discharging to the low pressure sewers located within the public rights-of-way. All wastewater is conveyed by the low pressure sewers to the central sewage pumping station located at 20 Booth Street East in Moorefield.

Raw wastewater is conveyed from the Moorefield SPS to the Mapleton WPCP through a 150 mm forcemain approximately 5.0 km long. The station is equipped with an emergency overflow consisting of a 200 mm diameter pipe discharging northwest to an outlet ditch. A recent Condition Assessment of the facility indicated that the facility is in fair to good condition.

The existing Wastewater Servicing Systems for Drayton and for Moorefield are depicted on Figure 5-3 and Figure 5-4 respectively, and a site plan of the Mapleton WPCP is shown on Figure 5-5.

Figure 5-3: Drayton Wastewater Collection System

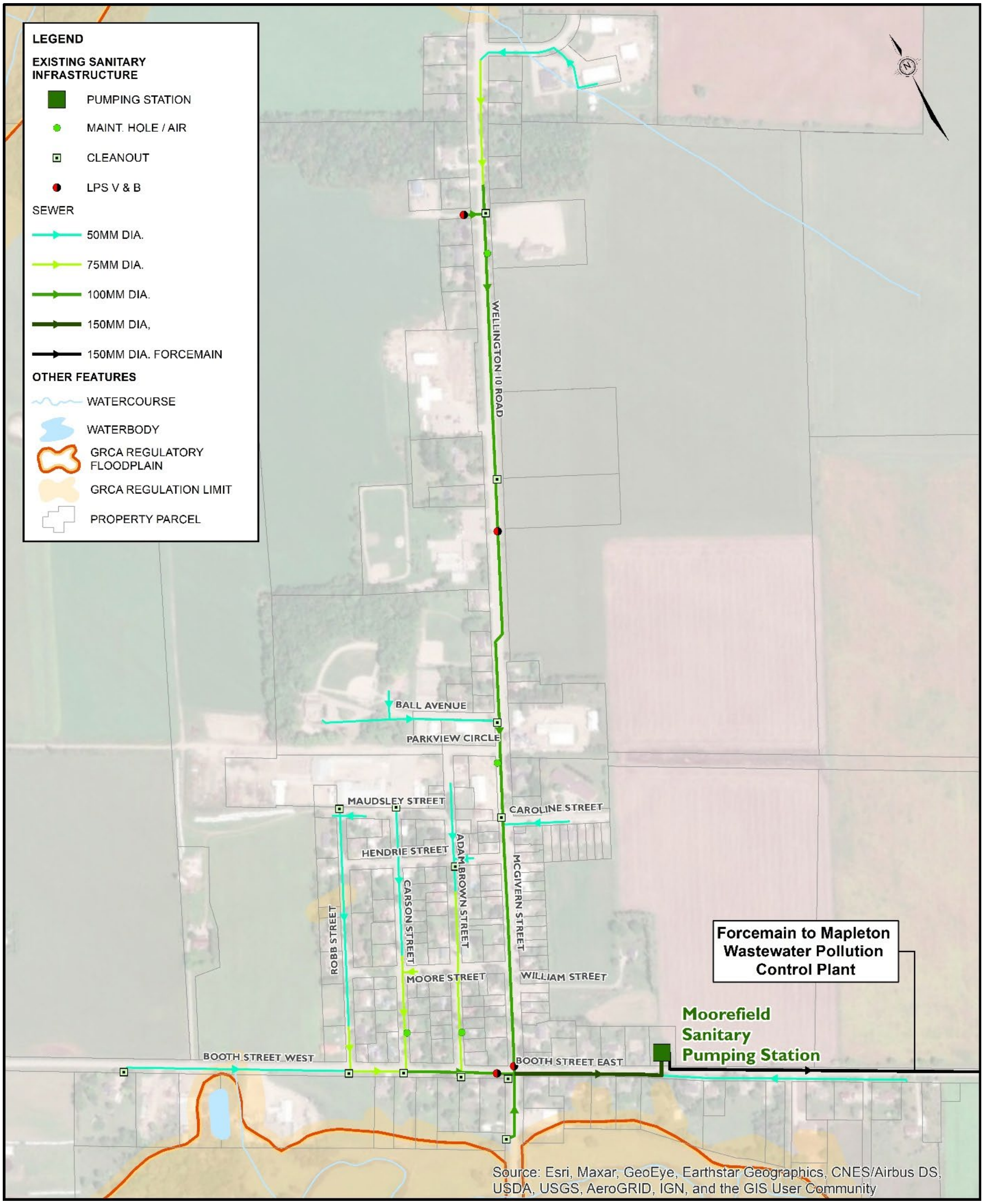

Figure 5-4: Moorefield Wastewater Collection System

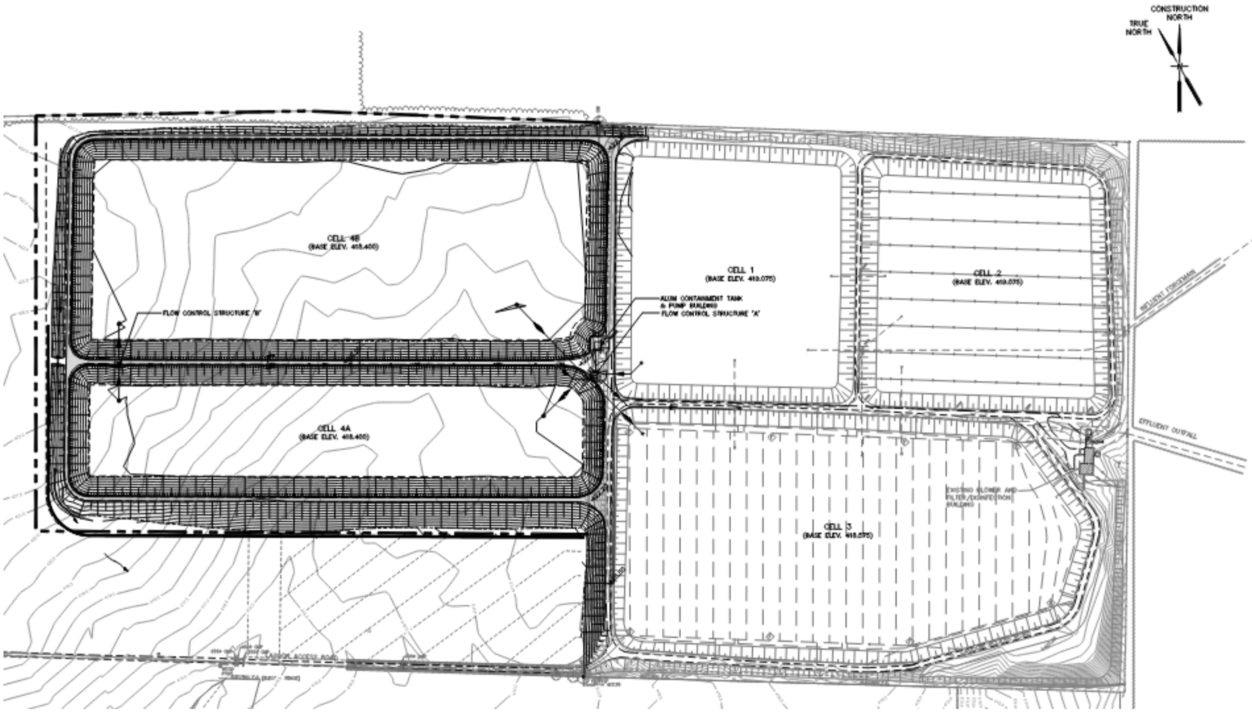

Figure 5-5: Mapleton WPCP Site Plan

6 Water System Criteria and Strategy Review

6.1 Water Demand Criteria

The design criteria utilized for the Mapleton Water and Wastewater Master Plan is based on historical records and updated information developed through the water and wastewater servicing review process with Township and Operations staff. The design criteria establish the parameters utilized to develop projected flows, evaluate system capacities, determine future needs, and determine the scheduling and implementation plan.

Table 6-1: Water Demand Criteria

PARAMETER	CRITERIA
Drayton Residential Consumption	300 L/cap/day
Moorefield Residential Consumption	300 L/cap/day

Table 6-2: MDD and PHD Factors (Government of Ontario, 2019)

Year	Drayton Population [1]	Drayton Max-Day Factor	Drayton Peak Factor	Moorefield Population [1]	Moorefield MDD Factor	Moorefield PH Factor
2026	3,200	2.00	3.38	900	2.75	4.13
2031	3,641	2.00	3.00	1,181	2.50	3.75
2036	3,779	2.00	3.00	1,531	2.50	3.75
2041	4,507	2.00	3.00	2,125	2.25	3.38
2046	4,793	2.00	3.00	2,349	2.25	3.38
2051	4,983	2.00	3.00	2,775	2.25	3.38

Notes:

1) Populations were linearly interpolated from the Population and Housing forecast in the Township of Mapleton Growth Management Summary
2) Interpolated from MECP Guidelines Reference Tables

6.2 Water Demand Projections

Utilizing the Township of Mapleton planning projections and water design criteria, the water demand projections for the Township of Mapleton are summarized in below in Table 6-3 and Table 6-4, respectively.

Table 6-3: Project Water Demands for Drayton

Year	ADD	ADD	MDD	MDD	PHD	PHD	MDD+FF	MDD+FF
	m^3/d	L/s	m^3/d	L/s	m^3/d	L/s	m^3/d	L/s
2026	1,161	13.43	2,321	26.86	3,923	45.40	10,529	122
2031	1,394	16.13	2,787	32.26	4,181	48.39	12,291	142
2036	1,536	17.77	3,071	35.55	4,607	53.32	12,575	146
2041	1,855	21.47	3,709	42.93	5,564	64.40	13,213	153
2046	1,940	22.46	3,881	44.92	5,821	67.38	14,681	170
2051	1,997	23.12	3,995	46.24	5,992	69.36	14,795	171

Table 6-4: Projected Water Demands for Moorefield

Year	ADD	ADD	MDD	MDD	PHD	PHD	MDD+FF	MDD+FF
	m^3/d	L/s	m^3/d	L/s	m^3/d	L/s	m^3/d	L/s
2026	270	3.13	743	8.59	1,115	12.91	4,026	47
2031	354	4.10	886	10.25	1,329	15.38	6,415	74
2036	459	5.32	1,148	13.29	1,722	19.93	7,974	92
2041	638	7.38	1,434	16.60	2,155	24.94	9,642	112
2046	705	8.16	1,586	18.35	2,382	27.57	9,794	113
2051	833	9.64	1,873	21.68	2,814	32.57	10,081	117

6.3 Design Criteria for System Components and Operation

6.3.1 Supply Capacity

6.3.1.1 Drayton

The Firm Rated Capacity of the well supplies should be able to deliver the Maximum Day demands. In addition, the Maximum Day Demands should not exceed the Permit to Take Water for the Drayton Drinking Water System.

The existing aquifer capacity under the existing PTTW will be adequate to accommodate growth in Drayton until 2051. However, the Firm Rated Capacity of the well supply system (i.e., the well supply capacity with the largest well out of service) will be exceeded before 2031.

6.3.1.2 Moorefield

The existing aquifer capacity under the existing PTTW will be adequate to accommodate growth in Moorefield until 2051.

Upon completion of the well rehabilitation and third well addition at the Moorefield Water System, the total taking rate for the system will be 30 L/s. Based on the ultimate flow projections for the maximum daily demand, there will be sufficient well capacity with one well pump offline.

6.3.2 Storage Capacity

6.3.2.1 Drayton

Recommended Storage Capacities for Drinking Water Systems providing Fire Protection are outlined in the MECP Design Guidelines. Based on these Guidelines, the recommended storage requirement for Drayton in 2051 will be:

Table 6-5: Drinking Water Storage Requirements for Drayton

Parameter	Criteria	Storage Requirement (m^3)
Fire Storage (A)	144 L/s for 2 hours	1,037
Equalization (B)	25% of MDD	999
Emergency (C)	25% of A + B	509
Total Storage Required	A + B + C	2,545

With the recent completion of the Drayton Elevated Tank, the existing storage capacity in Drayton is 2,805 m3. No additional storage will be required in Drayton by 2051.

6.3.2.2 Moorefield

The current Moorefield Drinking Water System has been developed to provide domestic demands only; the system does not provide sufficient flow for Fire Protection.

The following data in Table 6-6 is a summary of the water demands and storage volume calculations based on the 2051 population projections.

Table 6-6: Drinking Water Storage Volumes for Moorefield

Parameter	Criteria	Storage Requirement (m^3)
Fire Storage (A)	Not provided	0
Equalization (B)	25% of MDD	468
Emergency (C)	25% of A + B	117
Total Storage Required	A + B + C	585

Based on projected growth in Moorefield, no additional storage will be required for Equalization and Emergency once the current upgrade Project is completed.

If the decision is made to provide Fire Protection through the Moorefield Distribution System, then the updated storage requirements will be increased, as outlined below.

Table 6-7: Drinking Water Storage Volumes in Moorefield Including Fire Storage

Parameter	Criteria	Storage Requirement (m^3)
Fire Storage (A)	Not provided	792
Equalization (B)	25% of MDD	468
Emergency (C)	25% of A + B	315
Total Storage Required	A + B + C	1,575

In the event that the township decides to provide Fire Protection in Moorefield through the municipal Drinking Water System, there will be a deficiency is available storage. Approximately 790 m^3 of additional storage would be required.

6.3.3 Distribution Capacity

6.3.3.1 Drayton

A preliminary analysis of the Drayton water distribution system was completed to evaluate the performance of the existing distribution network for future growth conditions. The system was analyzed to full build out of the expected growth areas as per the Official Plan growth areas, modified to the GSP Group's 2022 Growth Management Study's recommendations.

Based on the preliminary analysis no upgrades are required in the existing system to provide a minimum fire flow of 79 L/s under Maximum Day Demands in accordance with MECP Guidelines.

In order to provide service to planned growth areas, local watermain extensions will be required, as described below. In addition, local watermain extensions through future development lands will be required from Main Street West to Drayton Industrial Drive and through the development lands from Main Street West to Wellington Road South, as shown depicted on Figure 5-1.

Note that the final routing of the watermains through the future development areas are subject to change based on development plans approved under the Planning Act.

6.3.3.2 Moorefield

To provide fire flow service to Moorefield, the Township would need to upgrade a significant portion of the water distribution system to provide adequate conveyance capacities, and hydrants would have to be installed on the distribution system to provide access for the Fire Department. In addition, a dedicated fire pump would need to be installed at the WTP pumphouse or an elevated storage facility would need to be provided to ensure that Fire Flows can be delivered in emergency situations.

6.4 Water Servicing Strategy Overview

The primary objectives of the water servicing strategy are as follows:

- Provide adequate flow and pressure to water customers.
- Provide adequate water storage, pumping capacity and standby power to meet emergency conditions.
- Maintain adequate water quality throughout the distribution system.
- Promote water conservation.
- Utilize reasonable planning design and costing criteria for establishing and evaluating servicing scenarios.

- Develop routing for new watermain extension within existing road allowance / utility corridors or coordinate watermain routing through development applications.
- For the community of Drayton, provide adequate fire flows, reliability and security throughout the distribution system.

It should also be noted that the timing of the various projects has been established based on anticipated growth rates in Mapleton and on a fiscally responsible capital works program. The Township will have the option to advance or defer specific projects depending upon the rate of growth experienced in Mapleton, or upon the petition by a developer (or group of developers) provided that the financial impacts of advancing certain projects are reviewed and mitigated through collection of Development Charges or through Front-End Financing arrangements.

6.5 Evaluation of Water Servicing Alternatives

A detailed comparative evaluation of the potential implementation options was completed based on the evaluation methodology developed. Each alternative has been assessed relative to the others and assigned a preliminary score relating to the potential net impact. The numerical scores obtained have been represented graphically with Harvey balls to communicate the information more clearly to the public.

The detailed evaluation matrices, included in Appendix D, describe the rationale and preliminary scoring assigned to each alternative for the water and wastewater servicing strategy.

6.5.1 Drayton Drinking Water Supply System

Three (3) Alternative strategies for the Drayton Drinking Water System were developed, in the following sections.

6.5.1.1 Alternative 1 – Increase Capacity of Existing Wells

For this Alternative, the Drayton Water Supply System will continue to rely on a single groundwater source. To meet demand, both wells will need to increase capacity and continue operating in duty/standby configuration. While this alternative is effective in terms of cost and constructability, it does not provide operational flexibility and requires more complex construction staging. In addition, this Alternative is considered to have a higher operational risk due to the limited redundancy in the supply system.

6.5.1.2 Alternative 2 – Construct a New Well at the WTP Site

For this Alternative, additional capacity will be provided through a third well constructed on the site of the existing water treatment plant, subject to confirmatory investigations.

The Drayton Water Supply System will continue to rely on a single groundwater source; however, advantages of this alternative include increased operational flexibility and redundancy, less complex construction staging, and maximized site capacity. This alternative also best aligns with planned infrastructure projects. The PTTW would need to be adjusted by 2046 as the current maximum taking rate is 45 L/s with a maximum two well pumps in operation.

6.5.1.3 Alternative 3 – Construct a New Well at a Different Site

This Alternative considers drilling a new well at a new site as well as constructing a new pumphouse. This alternative would address the concerns with expanding the water supply over two groundwater sources; however, this Alternative will have a much greater impact on the Technical, Economic, and Natural Environments.

A detailed evaluation of the Drayton Water Supply alternatives is provided in Appendix A and is summarized below in Table 6-8.

Table 6-8: Summary of Drayton Water Supply Alternatives

Alternatives	Score Representation	Ranking
Alternative 1 – Increase the capacity of the existing wells	◕	2
Alternative 2 – Construct a new well at the existing WTP site to increase supply capacity	●	1
Alternative 3 - Construct a new well on another site to increase supply capacity	◑	3

Alternative 2 – Building a new well to increase capacity is the preferred servicing alternative for Drayton’s Water Supply System.

6.5.2 Drayton Drinking Water Distribution System

The existing distribution system in Drayton has adequate supply capacity and pressure to provide for a full range of domestic demands, as well as adequate capacity to provide for Fire Protection for existing developments within the community.

To accommodate planned growth within the community of Drayton, watermain extensions will need to be provided to the new development areas. These watermain extensions will then connect to local watermain extensions constructed as part of the land subdivision process.

All watermain extensions identified within this Master Plan will be completed within existing road allowances and, as such, are considered to be Schedule A+ undertakings under the Municipal Class EA Process. Local watermain extensions within proposed development areas are subject to change based on the final Plan(s) of Subdivision as approved under the Planning Act.

6.5.3 Moorefield Drinking Water Supply System

The existing Moorefield Water Supply System is comprised of two (2) water supply wells, a water treatment plant, an at-grade storage facility to provide chlorine contact time for primary disinfection and for equalization storage, and a high lift pump station to convey drinking water to residents of Moorefield. The Drinking Water System has been developed to provide drinking water for domestic use only with limited supply capacity for Fire Protection. No hydrants have been provided in Moorefield to provide access to the distribution system by the Mapleton Fire Department.

Two (2) Alternative strategies for the Moorefield Drinking Water System were developed, as described in the following sections.

6.5.3.1 Alternative 1 – Limited Fire Protection

For Alternative 1 no change to the current operations of the Moorefield Water System will be implemented. Limited Fire protection capacity would be available; however, no hydrants would be installed on the distribution system. Fire services would continue to operate in the same manner as they currently do.

6.5.3.2 Alternative 2 – Provision of Fire Protection Service

To provide fire flow service to the urban center of Moorefield, the Township would need to upgrade a significant portion of the water distribution system to provide adequate conveyance capacities, and hydrants would have to be installed on the distribution system to provide access for the Fire Department. In addition, a dedicated fire pump would need to be installed at the WTP pumphouse or an elevated storage facility would need to be provided to ensure that Fire Flows can be delivered in emergency situations.

These upgrades will result in significant construction impacts, inconvenience to the existing residents, and would result in significant economic impacts. As such, no change to the water servicing strategy for Moorefield is recommended at this time.

Table 6-9 summarizes the detailed evaluation of the Moorefield Water Distribution and Storage alternatives considering the growth areas.

Table 6-9: Summary of Moorefield Water Distribution and Storage Alternatives

Alternatives	Score Representation	Ranking
Alternative 1 - No Fire Flow Service	●	1
Alternative 2 - Fire Flow Service	◕	2

Alternative 1 – No Fire Flow Service is the preferred servicing alternative for Moorefield's water storage and distribution system.

6.6 Recommended Water Servicing Strategy

The Water Servicing Strategy includes a number of separate and distinct projects that will provide an ultimate consolidated servicing scheme to maximize the use of existing infrastructure and provide capacity for new growth in designated growth areas of the Township.

For linear infrastructure Projects (i.e., watermain extensions), the proposed Projects should be coordinated with proposed sewer upgrades and/or extensions, and with local road improvement Projects wherever possible.

The Servicing Strategy is depicted on Figure 6 1 and a brief description of each of the Projects is provided below.

6.6.1 W-1 – New Well at Existing Drinking Water Supply Site

Construction of a third well pump would to be added to the Drayton Water Treatment Plant subject to confirmatory investigations. The new well should be fitted with a pump rated for 22.7 L/s to match the other two pumps at the site. Completion of this Project will increase the Firm Rated Capacity of the Well Supply to 45.4 L/s. The Project will include associated process piping and process mechanical upgrades at the existing pumphouse.

6.6.2 W-2 – Wellington Street South Water Distribution Extension

Construction of a 250 mm diameter watermain extension along Wellington Street South (Wellington County Road 11), to provide conveyance capacity to accommodate growth on the south-east quadrant of Drayton.

6.6.3 W-3 - Main Street West Water Distribution Extension

Construction of a 250 mm diameter watermain extension along Main Street West from Bedell Drive westerly to a new road, towards the Drayton Elevated Tank, near Drayton

Industrial Drive, to will provide water supply conveyance capacity and fire flow service to the existing and proposed industrial employment lands growth area.

6.6.4 W-4 - Main Street East Water Distribution Extension

Construction of a 200 mm dia. watermain extension along Main Street East (Wellington County Road 8), to provide conveyance capacity to planned residential growth in the southeast quadrant of Drayton.

6.7 Water Capital Program

The complete water capital program for the servicing strategies developed under the Township of Mapleton's Master Plan is provided in Table 6-10 and depicted in Figure 6-1.

Table 6-10: Water System Servicing Strategy

PROJECT NAME	PROJECT ID	LOCATION	CLASS EA SCHEDULE	COST ($MILLION)
Install new well at the existing DWS site to increase capacity	W-1	Drayton	B	$1.44
Water distribution extension at Wellington Street South	W-2	Drayton	A+	$0.20
Water distribution extension at Main Street West, near Drayton Industrial Drive	W-3	Drayton	A+	$0.69
Water distribution extension at Main Street East	W-4	Drayton	A+	$0.13
Total Estimated Capital Cost				**$2.46**

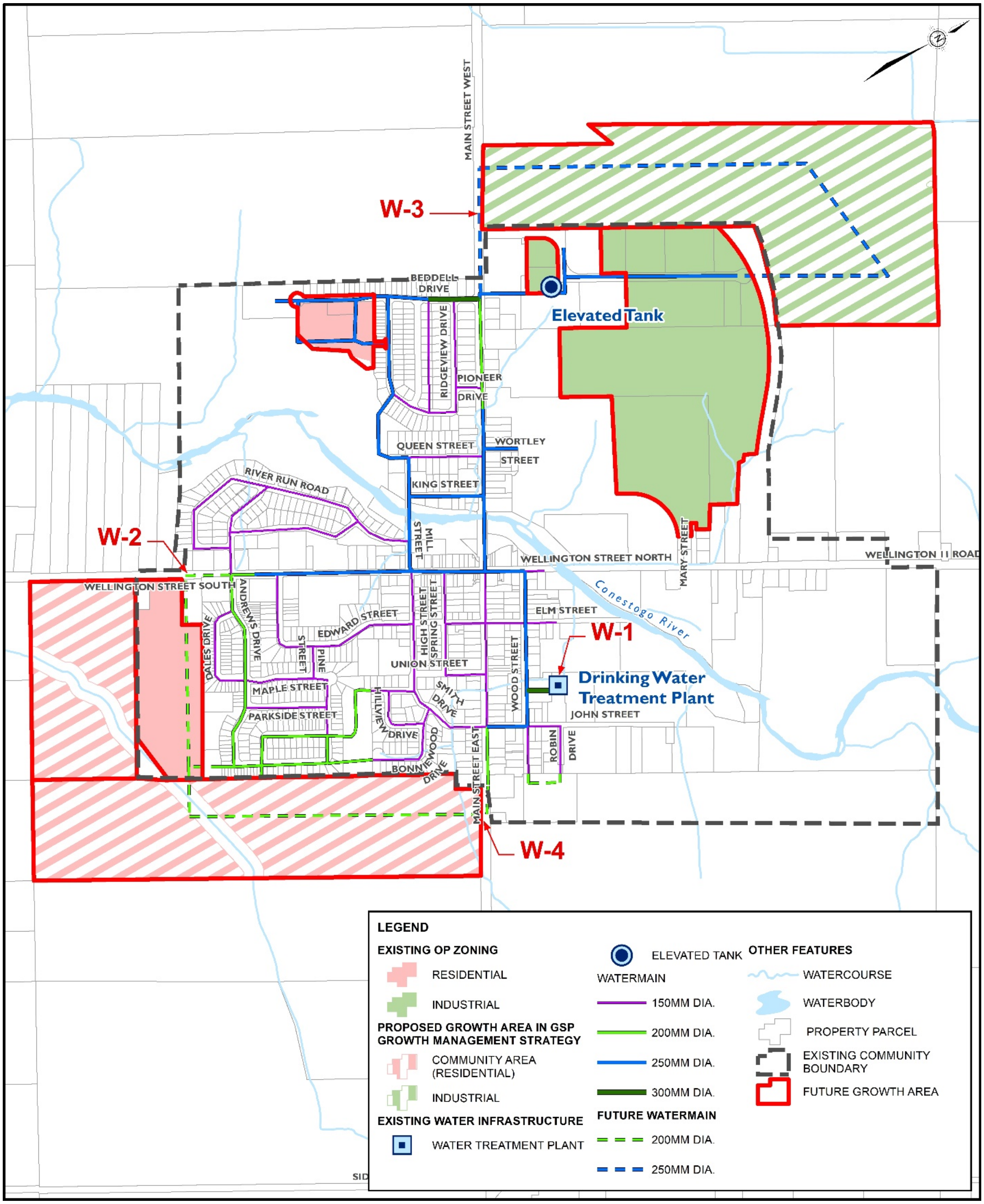

Figure 6-1: Drayton Water Servicing Strategy

7 Wastewater System Criteria and Strategy Review

7.1 Design Criteria

The design criteria utilized for the Master Plan is based on previous data, historical records and updated information developed through the water and wastewater servicing review process with Township staff.

The design criteria establish the parameters utilized to develop projected flows, evaluate system capacities, determine future needs, and determine the scheduling and implementation plan.

7.2 Unit Wastewater Flow Criteria

The design criteria utilized for the Master Plan is based on previous data, historical records and updated information developed through the wastewater servicing review process with Township staff.

The design criteria establish the parameters utilized to develop projected flows, evaluate system capacities, determine future needs, and determine the scheduling and implementation plan.

7.3 Design Criteria for System Components and Operation

7.3.1 Pump Station Capacity

Preliminary population planning estimates for Drayton indicate that the total ultimate (beyond 2051) service population within the existing urban boundaries will increase from the existing 1,502 people in 2018 to approximately 4,507 people by 2041. This will result in a total average day flow of 1,352 m^3/d at the ultimate service population. The design flows determined in TM1 for Drayton SPS, based on the projected population growth in the serviced area are summarized in Table 7-1.

Table 7-1: Proposed Design Criteria – Drayton Sewage Pumping Station

	Design Parameter / Value - 2041	Design Parameter / Value - 2051
Future Population	4,507	4,983
Average Per Capita Flow (L/person/d)	300	300
Average Flow (m^3/d)	1,352	1,495

	Design Parameter / Value - 2041	Design Parameter / Value - 2051
Peaking Factor	3.29	3.25
Peak Instantaneous Flow (m^3/d)	6,696 (77.5 L/s)	7,402 (85.7 L/s)

The existing firm capacity of the existing station is 34.0 L/s and both the 2041 and 2051 projections for peak flow are well above this capacity. The Drayton Pumping Station needs to be upgraded to service the existing and future growth within the community.

It is expected that the Moorefield SPS will reach its maximum capacity when the population of Moorefield reaches about 1,934 people which is expected to happen by 2040 based on the current Official Plan.

Table 7-2: Proposed Ultimate Design Criteria – Moorefield Sewage Pumping Station

	Design Parameter / Value - 2041	Design Parameter / Value - 2051
Future Population	2,125	2,775
Average Per Capita Flow (L/person/d)	225	225
Average Flow (m^3/d)	478	624
Peaking Factor	3.57	3.47
Max Daily Flow (m^3/d)	1,705 (19.7 L/s)	2,167 (25.1 L/s)

The existing forcemain from the Moorefield Pumping Station to the Mapleton WPCP is a 150 mm in diameter and approximately 4.96 km long constructed in 2007. At the current firm capacity of 14.1 L/s, the velocity in the existing forcemain would be approximately 0.8 m/s and there would be roughly 28.8 m headloss due to friction which are both within a reasonable range and the forcemain does not need upgrades to continue supporting the existing population. For the anticipated max daily flow for 2051 of 25.1 L/s, the velocity in the existing forcemain would be approximately 1.4 m/s and there would be 83.7 m (119 psi) headloss due to friction. Although the velocity in this scenario is acceptable, the headloss from friction would exceed the pipe strength capacity. As such, the existing forcemain does not have sufficient capacity to convey the projected 2051 flows.

7.3.2 Collection System Capacity

The Collection system in Drayton experiences high flow rates during wet-weather conditions which indicates that there are sources of rapid inflow; however, the sources of the rapid inflow are not known at this time. In 2022, the Township initiated a flow monitoring program to attempt to identify the source(s) of I&I in the system in order to better utilize the existing conveyance and treatment capacities within the wastewater system.

The existing collection system in Drayton has adequate capacity to convey the design wastewater from existing development within the community to the centralized sewage pumping station. The system also has sufficient hydraulic capacity to convey planned growth to the current Official Plan limits within the Community.

To accommodate planned and anticipated growth within the community of Drayton, sewer extensions will need to be provided to the new development areas. These sewer extensions will then connect to local sewers extensions constructed as part of the land subdivision process.

The preliminary calculations show that the existing low-pressure sewer network is capable of handling the existing flows although some areas experiencing velocities under the required scour velocity of 0.6 m/s. With the majority of the potential area for proposed development being located to the west of McGivern Street, all of the future flows were applied at one point on McGivern Street north of Ball Ave. On a preliminary basis to assess the capacity of the existing low-pressure sewer network in Moorefield would be able to accommodate the additional flows from the Future Development up to 2041. Calculations for the Ultimate population in 2051 show sections of the low-pressure sewer being above the recommended criteria of 185 ft of head and the Township would need to look into different servicing options beyond 2041.

Table 7-3: Evaluation of Moorefield Low-Pressure Sewer Capacity

	Existing	2041	2051
Population	607	2,125	2,775
Households	180	660	880
Max Pumps Operating	11	25	32
Maximum Flow (L/s) 1	7.6	17.3	22.2

7.3.3 Treatment Capacity

While wastewater conveyance systems are designed and rated to deliver peak wastewater flow to the treatment facilities, the treatment plants themselves are rated for average day flows based on traditional plant rating. Similar to water, plant expansions have been traditionally scheduled on a “just in time” basis. Additional capacity has been scheduled and installed in “steps” based on growth projections and in order to stagger capital expenditures. With potential fluctuations in flow requirements and the potential fluctuations in plant capacities due to operating conditions, loadings, equipment performance and emergency conditions, it has been noted that plant capacity can be reached sooner than anticipated.

It is anticipated that the Mapleton WPCP will need a capacity upgrade by 2026 from 900 m^3/d to 1,300 m^3/d. In order to meet this schedule, the Township should initiate an Addendum to the Class EA Study to modify the recommendations for nitrogen removal.

As outlined in TM 1, the wastewater demands will approach the capacity of the WPCP once the serviced population in Drayton and in Moorefield approach 4,100 persons, which is expected to occur in 2026. Addressing the Preferred Solution for providing additional treatment capacity > 1,300 m^3/d is beyond the scope of this Master Plan. It is recommended that a separate study be initiated at least three (3) years before the implementing a phosphorus removal upgrade.

7.4 Wastewater Flow Projections

Utilizing the Township of Mapleton planning projections and wastewater flow criteria, the wastewater flow projections for the Township of Mapleton are summarized in the following Table 7-4.

Table 7-4: Projected Average Day Flows - Treatment Capacity

Service Area Treatment Capacity	Average Day Flows (m3/d) - 2031	Average Day Flows (m^3/d) - 2041	Average Day Flows (m^3/d) - 2051
Total Average Day Flow to Mapleton WPCP	1,358	1,830	2,119

7.5 Constraints and Opportunities

7.5.1 Constraints

- Projected wastewater flows will exceed the existing rated capacity of the Drayton WPCP by 2026 assuming all committed residential units are constructed and occupied. There is currently no uncommitted Reserve Capacity within the Mapleton WPCP.
- The existing Drayton SPS is in poor condition with some mechanical components being inoperable, resulting in operational risks for the Township.

- The Drayton collection system experiences rapid inflow resulting in excessive flows to the Drayton SPS. Bypass pumping and haulage to the WPCP have occurred over the past few years.
- The existing low-pressure sewer system in Moorefield has adequate conveyance capacity to accommodate planned growth within the Planning Horizon. However, ongoing maintenance of the individual grinder pump stations represents a significant cost to the Township.

7.5.2 Opportunities

- Construction of a new or upgraded Drayton SPS will provide long-term capacity for wastewater servicing.
- Construction of emergency overflow storage at the Drayton SPS will reduce the risks of uncontrolled spills to the environment.
- Conducting an Inflow and Infiltration Reduction Study will assist in identification and potential reduction of sources of inflow into the system.
- Transfer maintenance obligations for all existing grinder pump stations to the beneficiary user(s) to reduce the ongoing operations costs for the Township.
- Planned upgrade of wastewater treatment facility to 1,300 m3/d capacity
- Future upgrade of wastewater treatment facility to 2,200 m3/d capacity

7.6 Wastewater Servicing Strategy Overview

The primary focus of the servicing strategy was to prioritize for infrastructure in those areas where growth is anticipated to occur first while maximizing the existing allowable conveyance and treatment capacities and providing enough flexibility to the Township for project implementation according to the geographical distribution of the future growth. In general, the wastewater servicing strategy is as follows:

- Provide reliable collection systems for conveyance of wastewater.
- Provide adequate peak flow storage, pumping capacity and standby power to meet emergency conditions.
- Optimize the treatment facility for planned growth and projected flows.
- Maintain adequate treated water quality.
- Utilize reasonable planning design and costing criteria for establishing and evaluating servicing scenarios.

It should also be noted that the timing of the various projects has been established based on anticipated growth rates in Drayton and Moorefield and on a fiscally responsible capital works program. The Township will have the option to advance or defer specific projects depending upon the rate of growth experienced in Drayton and Moorefield, or upon the petition by a developer (or group of developers) provided that the financial impacts of advancing certain projects are reviewed and mitigated through collection of Development Charges or through Front-End Financing arrangements.

7.7 Evaluation of Wastewater Servicing Alternatives

7.7.1 Wastewater Treatment – Mapleton WPCP

In 2017, the Township completed a Schedule C Class EA Study to identify the Preferred Design for expansion of the wastewater treatment facility. The Recommended Design included:

- Installation of a Submerged Aerated Growth Reactor (SAGR) system in the facultative lagoon.
- A new alum mixing tank; and,
- A new blower building.

In 2018, the Township retained CIMA+ to undertake a Peer Review of the proposed design. Some modifications to the Recommendations were provided including the preferred technology; a Moving Bed Bioreactor (MBBR) system. and pilot tested to verify their suitability.

In addition, the Township was able to re-rate the facility to accommodate a design flow of 900 m^3/d, which is only sufficient for the existing developments within the urban service areas of Drayton and Moorefield.

It is anticipated that the Mapleton WPCP will need a capacity upgrade by 2026 from 900 m^3/d to 1,300 m^3/d. In order to meet this schedule, the Township should initiate an Addendum to the Class EA Study to modify the recommendations for nitrogen removal. The wastewater demands will approach the capacity of the WPCP once the serviced population in Drayton and in Moorefield approach 4,100 persons, which is expected to occur in 2026.

Addressing the Preferred Solution for providing additional treatment Capacity is beyond the scope of this Master Plan. It is recommended that a separate Study be initiated at least three (3) years before the implementing a phosphorus removal upgrade.

7.7.2 Drayton Wastewater Collection System

The Collection system in Drayton experiences high flow rates during wet-weather conditions which indicates that there are sources of rapid inflow; however, the sources of the rapid inflow are not known at this time. In 2022, the Township initiated a flow monitoring program to attempt to identify the source(s) of I&I in the system in order to better utilize the existing conveyance and treatment capacities within the wastewater system.

The existing collection system in Drayton has adequate capacity to convey the design wastewater from existing development within the community to the centralized sewage pumping station. The system also has sufficient hydraulic capacity to convey planned growth to the current Official Plan limits within the Community.

To accommodate planned and anticipated growth within the community of Drayton, sewer extensions will need to be provided to the new development areas. These sewer extensions will then connect to local sewers extensions constructed as part of the land subdivision process.

A meeting was held between the Township, a local Developer, and their respective Agents on November 10, 2022, to discuss site specific issues for wastewater servicing. As a result of this meeting, the proposed sewer on Wellington Street South (County Road 11) will need to be lowered approximately 325 m west of Mill Street, to achieve an invert elevation of 411.0 at the frontage of the proposed development area.

All sewer extensions identified within this Master Plan will be completed within existing road allowances and, as such, are considered to be Schedule A+ undertakings under the Municipal Class EA Process. Local sewer extensions within proposed development areas are subject to change based on the final Plan(s) of Subdivision as approved under the Planning Act.

7.7.3 Drayton Sewage Pumping Station

Four (4) Alternatives were developed, however Alternative 1 to upgrade the existing SPS pumps will not meet the expanded capacity needs and may only temporarily mitigate potential health and safety and environmental impacts. Therefore, Alternative 1 will not be considered for further evaluation.

7.7.3.1 Alternative 2 - Construct New Pump Station on Township Owned Land on the West Side of the Conestoga River

The new Station would be sized to accommodate an interim capacity of 75 L/s, with provisions for a future upgrade to an ultimate capacity of 99 L/s.

This Alternative will provide the Township with an opportunity to locate the station further away from the Conestoga River to minimize the risk of flooding; however, the station would still be located within the Regional Floodline. The Station and the wet-well would be flood-proofed to avoid inflow into the station.

By constructing a new station offline from the existing station, the Township would be able to maintain service to the existing residents in Drayton until the new station is commissioned. The new station would be constructed to meet all current design requirements and guidelines.

7.7.3.2 Alternative 3 - Upgrade the Existing Pump Station and Construct New Pump Station on West Side of Conestoga River

For this Alternative, the existing SPS would be refurbished replace all existing equipment within the existing station and would be upgraded to provide service to all existing and new developments located east of the river. A new SPS would be constructed on the west side of the river to provide an outlet for all wastewater generated from existing developments and new growth on lands west of the Conestoga River. Construction of a new forcemain from the new pumping station would be required.

The advantage of this Alternative is that no new crossing of the Conestoga River would be required, and one (1) existing crossing would be eliminated. However, the Township would then need to operate and maintain two separate stations, and the existing station would still be subjected to periodic flooding due to its proximity to the river.

7.7.3.3 Alternative 4 - Construct New Pump Station with Emergency Storage on Township Owned Land on the West Side of the Conestoga River

This Alternative is essentially the same as Alternative 2, except with the addition of Emergency Overflow Storage. The Emergency Overflow Storage facility will provide additional resilience for the Collection system and will provide Operations staff with more time to respond in the event of an emergency situation (power failure, power loss, etc.). The disadvantage of this Alternative is the higher initial capital cost.

A detailed evaluation of the Alternatives is included in Appendix A and is summarized below in Table 7-5.

Table 7-5: Summary of Drayton SPS Upgrade Alternatives

Alternatives	Score Representation	Ranking
Alternative 2 – New SPS on the North Side of the River	●	2
Alternative 3 – Maintain the existing SPS and construct a new SPS on the North Side of the River	◕	3

Alternatives	Score Representation	Ranking
Alternative 4 – New SPS with onsite emergency storage	●	1

Alternative 3 – New SPS with Onsite Emergency Storage is the preferred alternative for Drayton SPS.

7.7.4 Moorefield Wastewater Collection System

Three (3) Alternative strategies for the Moorefield Collection System were developed, as follows.

7.7.4.1 Alternative 1 - Maintain the Low-Pressure Sewer System

Alternative 1 considers continuing use of individual grinder pumps and use of the low-pressure sewer system. This approach provides a cost-effective solution for the collection system expansion for growth in Moorefield. The design and construction of low-pressure sewers inherently results in lower per-capita flows to the WWTP due to negligible infiltration into the pressure sewers.

The disadvantage of the ongoing use of the low-pressure sewer system includes a reliance on mechanical components (pumps), potential for service interruptions and sewage overflows during power outages when no backup power is available, and the high cost to the Township for the supply and maintenance of the grinder pump cores.

7.7.4.2 Alternative 2 - Upgrade to a Gravity Collection System

Alternative 2 would remove many operational issues with the low-pressure sewer system; however, this alternative would be the most expensive requiring an extensive rebuild of the entire sanitary collection system in Moorefield. With a gravity collection system, the inlet elevation to the Moorefield SPS would need to be lowered, resulting in the need to replace the existing pumping station. As well, the design of gravity sewers needs to consider extraneous flows (infiltration) which would result in additional flow being conveyed to the pumping station and treatment plant. Conversion of the collection system in Moorefield from a low-pressure sewer system to a conventional gravity collection system would advance the timing to upgrade the treatment plant. As well, growth in Moorefield will be restricted due to the capacity of the existing forcemain until the forcemain is upgraded and/or twinned.

7.7.4.3 Alternative 3 – Hybrid Gravity and Low-Pressure Sewer System

Alternative 3 has the benefits of having a combined gravity and low-pressure sewer network, with the gravity section removing some of the community’s reliance on mechanical pumps. However, there remains the potential for service interruptions and sewage overflows during power outages, and the high cost to the Township for maintenance of the grinder pump cores. As well, the inlet elevation to the Moorefield SPS would need to be lowered, resulting in the need to replace the existing pumping station.

Alternative 1 – Maintaining and extending the Low-Pressure Sewer system is the preferred alternative for Moorefield's Collection System.

A detailed evaluation of the Alternatives is included in Appendix A and is summarized below in Table 7-6.

Table 7-6: Summary of Moorefield Collection System and Forcemain Alternatives

Alternatives	Score Representation	Ranking
Alternative 1 – Low-pressure Sewers	●	1
Alternative 2 – All Gravity Sewers	◕	2
Alternative 3 – Combination Gravity Sewer and Low-pressure Sewers	●	3

7.8 Recommended Wastewater Service Strategy

The Wastewater Servicing Strategy includes a number of separate and distinct projects that will provide an ultimate consolidated servicing scheme to maximize the use of existing infrastructure and provide capacity for new growth in designated growth areas of the Township. A brief description of each of the Projects is provided below.

Wherever possible, the alignments of new collection sewers and facilities have been planned based on the location of existing road allowances and/or servicing corridors in order to ensure that servicing can proceed without undue delays resulting from the need to acquire property. However, the Township has the option to construct the new facilities through new development lands if it can be shown to be cost effective to do so. In this event, the alignment of the facilities may be altered based on approved Secondary Plans and/or Approved Draft Plans of Subdivision. Should the facilities be implemented through new development lands, additional notification to the Public would be provided through the Planning Act notifications.

7.8.1 WW-1 – New Sewage Pumping Station with Emergency Storage

Construction of a new SPS to provide wastewater conveyance capacity for existing and new developments in Drayton, and to address the capacity limitations in the existing pumping station. The new SPS will include and emergency storage to provide additional protection against raw sewage spills to the Conestoga River.

7.8.2 WW-2 – Inflow/Infiltration Monitoring Program

An Inflow/Infiltration (I/I) monitoring program is currently in progress to collect flow data from throughout the collection system in Drayton. The study will identify the areas of Drayton that have higher inflow/infiltration rates into the sanitary collection system and will assist Township staff to establish a strategy to reduce inflow and infiltration into the collection and treatment systems.

7.8.3 WW-3 – Wellington Street South Wastewater Sewer Upgrade

Construction of a gravity collection system extension along Wellington Street South (Wellington County Road 8), will provide service connection an outlet to for the lands at the east side of Drayton being planned for residential development.

7.8.4 WW-4 – Main Street East Collection System Upgrade

Upgrade of the gravity collection system along Main Street West (Wellington County Road 11) between Wellington Street and the existing SPS to accommodate additional flows from the growth areas.

7.8.5 WW-5 – Main Street East Wastewater Gravity Sewer Upgrade

Upgrade of the gravity collection system along Main Street East (Wellington County Road 11) between Elm Street and John Street to accommodate additional flows from the growth areas.

7.8.6 WW-6 – Moorefield Sewage Pumping Station Upgrade

Upgrade of the existing SPS equipment to service the projected population of 2,000 persons, which is at the reasonable conveyance capacity of the forcemain. This will include pump upgrades, a new generator and supporting electrical equipment. Growth in Moorefield beyond 2,000 persons will require further study to establish additional conveyance capacity from Moorefield to the Mapleton WPCP.

7.8.7 WW-7 – Upgrade WWTP to 1,300 m3/d

Nitrogen removal upgrade the wastewater treatment facility to achieve a capacity of 1,300 m^3/d, as outlined in the Environmental Study Report dated November 2017. The Township should immediately proceed to complete an Addendum to the Class EA Study to change the Recommended Design for the Upgrades and should undertake the upgrades as soon as possible.

7.8.8 WW-8 – Future WWTP Upgrade to 2,200 m3/d

The proposed effluent total phosphorus objectives of 0.17 mg/L at an expanded capacity of 1,300 m^3/d, is achievable in the existing filters with optimized alum dosing but is nearing the limits of technology. The wastewater facility will need to be upgraded to a mechanical treatment plant to accommodate a design flow rate exceeding 1,300 m^3/d. A study should be initiated to determine the Preferred Solution for provision of Wastewater treatment Capacity In excess of 1,300 m^3/d.

7.9 Wastewater Capital Program

The complete wastewater capital program for the servicing strategies developed under the Township of Mapleton's Master Plan is provided in Table 7-7 and depicted in Figure 7-1 for Drayton, in Figure 7-2 for Moorefield, and in Figure 7-3 for the Township.

The Wastewater Master Plan succeeds the Development Charges By-Law and is based on more recent findings, further completion of related studies, further technical analysis and financial considerations. The wastewater servicing strategy has been substantially revised as a result of the provision of treatment capacity at the Mapleton WPCP. As a result, the Township's Development Charge bylaw will need to be reviewed.

Table 7-7: Wastewater System Servicing Strategy

PROJECT NAME	PROJECT ID	LOCATION	CLASS EA SCHEDULE	COST ($MILLION)
New SPS with emergency storage	WW-1	Drayton	B	$5.16
Inflow / Infiltration monitoring program	WW-2	Drayton	N/A	$0.38
Upgrade gravity sewers on Wellington Street South	WW-3	Drayton	A+	$0.70

PROJECT NAME	PROJECT ID	LOCATION	CLASS EA SCHEDULE	COST ($MILLION)
Upgrade gravity sewers on Main Street West near the existing SPS	WW-4	Drayton	A+	$0.45
Upgrade gravity sewers on Main Street East	WW-5	Drayton	A+	$0.30
Upgrade the existing SPS	WW-6	Moorefield	B	$0.40
Nitrogen removal upgrades	WW-7	Township	C	$5.80
Phosphorus Removal Expansion Study	WW-8	Township	C	$0.20
Total Estimated Capital Cost				$13.39

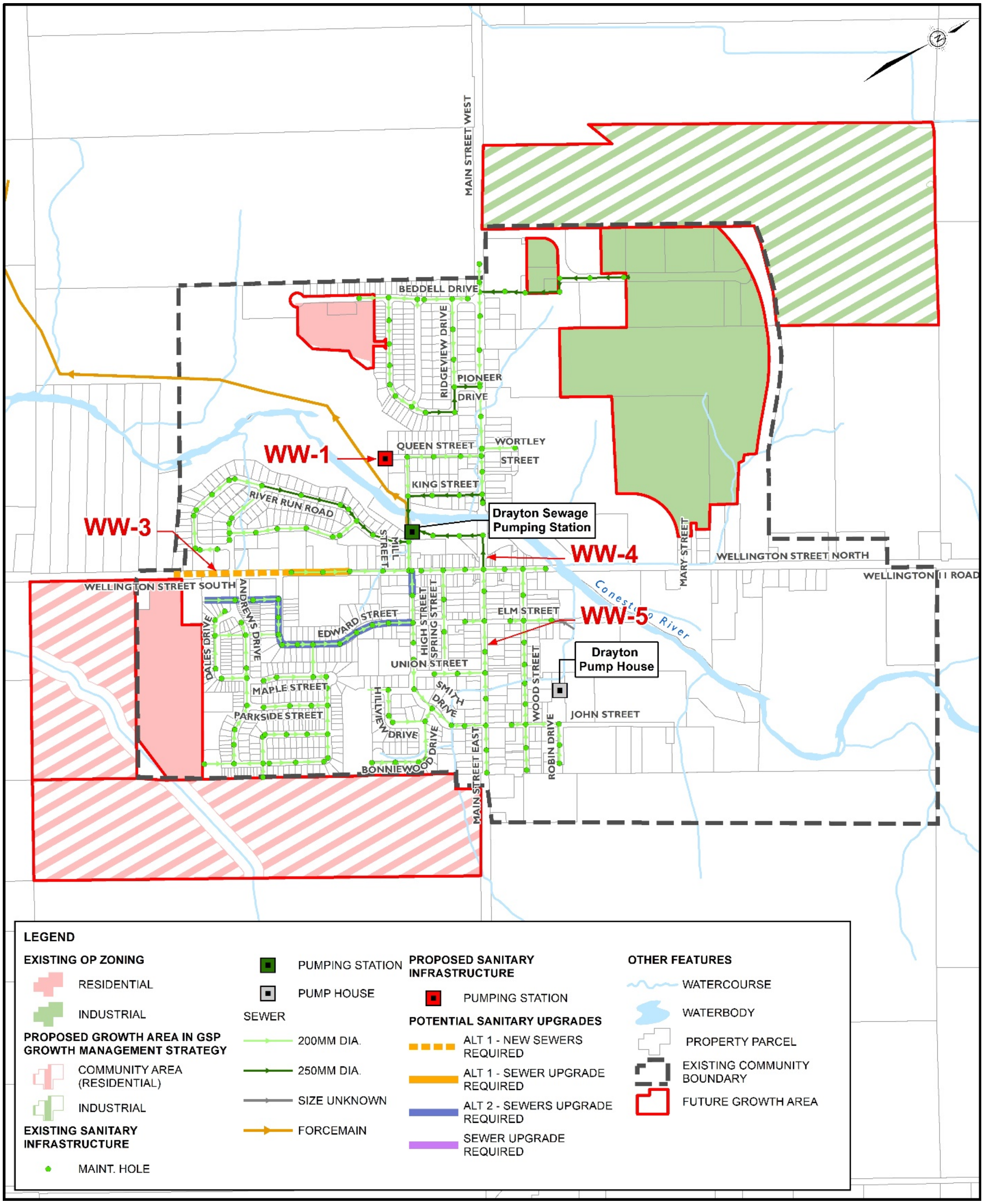

Figure 7-1: Preferred Wastewater Servicing Strategy - Drayton

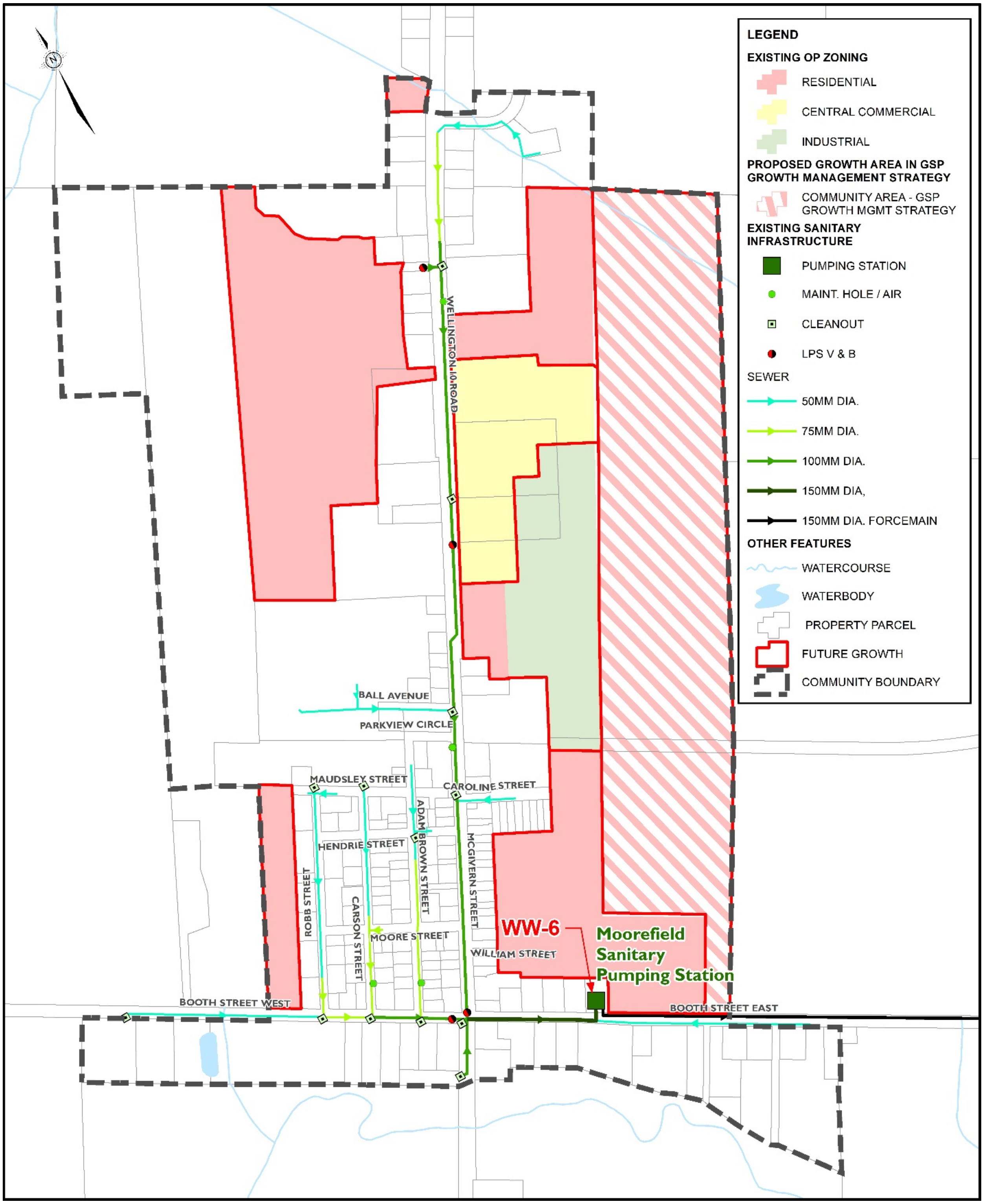

Figure 7-2: Preferred Wastewater Servicing Strategy - Moorefield

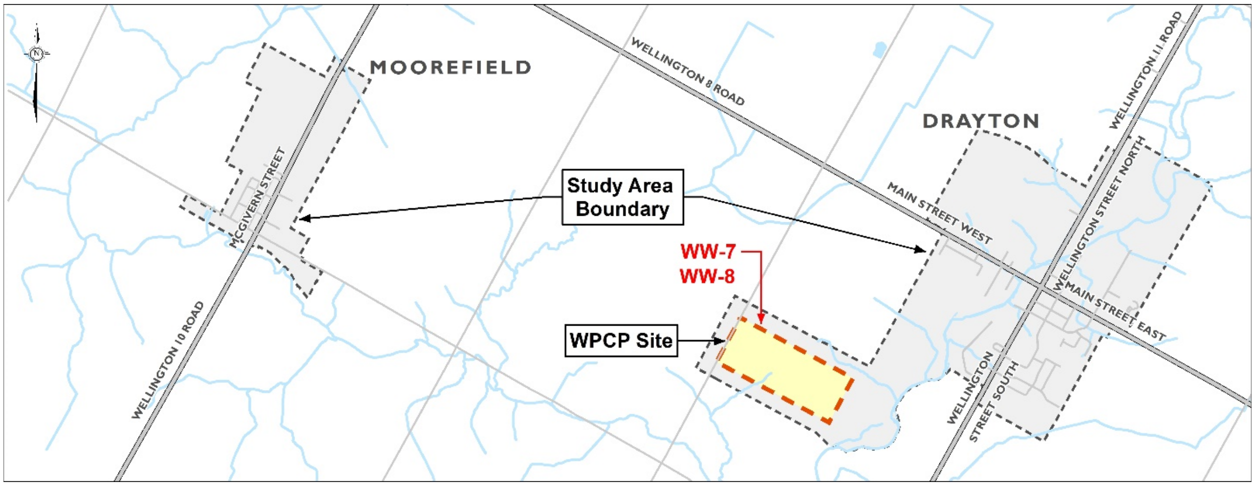

Figure 7-3: Preferred Wastewater Servicing Strategy – Township

8 Implementation Plan

The preferred water and wastewater servicing strategies will support the short- and long-term servicing needs of the approved growth areas and provide flexibility for servicing potential growth areas in the future. The strategies will also support meeting operational requirements, water quality and level of service objectives.

Upon completion of the Master Plan or Phase 2 of the EA process, Schedule A, A+ and B projects may proceed to Phase 5, Implementation, subject to finalization of the 30-day review period and assuming no Part II Orders are received. However, during implementation of some of these projects, additional study and analysis may be undertaken such as during the area servicing stages of development. While this work may address refinement to alignments, siting and minimizing environmental impacts, these projects will not require further planning under the Class EA process. The preferred water and wastewater strategies do not include any Schedule C projects requiring further planning under the Class EA process.

The following implementation requirements will be addressed during the subsequent steps (primarily during detailed design) of the projects:

- Finalization of property requirements
- Final refinement of infrastructure alignment and facility siting to ensure infrastructure is located outside regulated areas except for instances when it is unavoidable (watercourse crossings)
- Final refinement of construction methodologies including determination of crossing approaches including open cut, tunneling and structural supporting requirements
- Completion of additional supporting investigations including, but not limited to:
    - Geotechnical investigations to support determination of construction requirements for the infrastructure.
    - Hydrogeological investigations to evaluate potential impacts, to support mitigative requirements during construction and determine any dewatering requirements.
- Mitigation of potential construction related impacts including but not limited to:
    - Traffic control
    - Noise, vibration, and dust
    - Air pollution
    - Service interruption
    - Environmental and water disturbance or contamination

    - Siltation and erosion control
- Approval Requirements as required but not limited to:
    - Certificates of Approval from Ministry of Environment
    - Encroachment Permit from the Ministry of Transportation
    - Permit approvals from the Grand River Conservation Authority (GRCA)
    - Associated Planning Act Approvals
    - Temporary Permit to Take Water for construction dewatering from the Ontario Ministry of the Environment.

Based on the projections for water demand or wastewater flow requirements of the service areas, the project timing requirements were determined. This process took into consideration a logical extension of growth from the existing development. The evaluation of timing also took into consideration the availability of and need to maximize the use of existing infrastructure and best judgement on reasonable timing of subsequent expansions.

Project timing was also integrated with the results of recent studies, Class Environmental Assessments and reports, and where possible other road upgrade projects being planned by the County of Wellington and/or the Ministry of Transportation (MTO), to ensure that underground infrastructure was not scheduled after completion of road improvements.

Total project scheduling has been determined for each service area. Some project components have been initiated based on the updated servicing strategies and have been incorporated into recent budgets. Working within an affordability envelope, the Township has prioritized a list of essential projects that will commence detail design in 2023.

In order to provide for a reasonable range of development opportunity within the Township, the following sections outline the proposed Implementation Plan.

8.1 Drayton

In order to accommodate growth within Drayton, the proposed Implementation Plan for the projects was developed as summarized in Table 8-1.

Table 8-1: Implementation Plan for Drayton

PROJECT IDs	LOCATION	DESCRIPTION	COST ($MILLION)
Immediate			
WW-1	Drayton	New SPS with emergency storage	$5.16
WW-7	Drayton	Nitrogen removal upgrades	$5.80
		Immediate Estimated Cost (2023$)	**$10.96**
1-5 years			
W-1	Drayton	Install new well at the existing DWS site to increase capacity	$1.44
W-2	Drayton	Water distribution extension at Wellington Street South	$0.20
WW-2	Drayton	Inflow/Infiltration monitoring program	$0.38
WW-3	Drayton	Upgrade gravity sewers on Wellington Street South	$0.70
WW-8	Drayton	Class EA Study for Future Treatment Capacity Upgrades beyond 1,300 m^3/d	$0.25
		1-5 years Estimated Cost (2023$)	**$2.97**
6-10 years			
W-3	Drayton	Water distribution extension at Main Street West, near Drayton Industrial Drive	$0.69
W-4	Drayton	Water distribution extension at Main Street East	$0.13
WW-4	Drayton	Upgrade gravity sewers on Main Street West near the existing SPS	$0.45
WW-5	Drayton	Upgrade gravity sewers on Main Street East	$0.30
		6-10 years Estimated Cost (2023$)	**$1.57**
		Total Estimated Cost (2023$)	**$15.50**

A description of the key components and justification of the Water and Wastewater Servicing Implementation Plan is provided below:

- W-1 – Construction of a third well to be added to the Drayton Water Treatment Plant subject to confirmatory investigations. Project will include associated process piping and process mechanical upgrades at the existing pumphouse.
- W-2 - Construction of a 250mm dia. watermain extension along Wellington Street South (Wellington County Road 11), to provide conveyance capacity to accommodate growth on the south-east quadrant of Drayton.
- W-3 - Construction of a 250mm dia. watermain extension along Main Street West from Bedell Drive westerly to a new road to provide conveyance capacity to the proposed employment lands growth area.
- W-4 - Construction of a 200mm diameter watermain extension along Main Street East (Wellington County Road 8), to provide conveyance capacity to planned residential growth in the southeast quadrant of Drayton.
- WW-1 – Construction of a new SPS to provide wastewater conveyance capacity for existing and new developments in Drayton, and to address the capacity limitations in the existing pumping station. The new SPS will include emergency storage to provide additional protection against raw sewage spills to the Conestoga River.
- WW-2 – An Inflow/Infiltration (I/I) monitoring program is currently in progress to collect flow data throughout the collection system in Drayton. The study will identify the areas of Drayton that have higher inflow/infiltration rates into the sanitary collection system and will assist Town staff to establish a strategy to reduce inflow and infiltration into the collection and treatment systems.
- WW-3 - Construction of a gravity collection system extension along Wellington Street South (Wellington County Road 11), will provide an outlet for the lands at the east side of Drayton being planned for residential development.
- WW-4 – Upgrade of the gravity collection system along Main Street West (Wellington County Road 11) between Wellington Street and the existing SPS to accommodate additional flows from the growth areas.
- WW-5 - Upgrade of the gravity collection system along Main Street East (Wellington County Road 11) between Elm Street and John Street to accommodate additional flows from the growth areas.
- WW-7 – Nitrogen removal upgrade the wastewater treatment facility to achieve a capacity of 1,300 m^3/d, as outlined in the Environmental Study Report dated November 2017. Consideration of an Alternative Design for this planned Upgrade is currently underway.

- WW-8 – The proposed effluent total phosphorus objectives of 0.17 mg/L at an expanded capacity of 1,300 m^3/d, is achievable in the existing filters with optimized alum dosing but is nearing the limits of technology. The wastewater facility would need to be upgraded to a mechanical treatment plant beyond 1,300 m^3/d. A study should be completed leading up to this flow to further evaluate tertiary treatment options to replace the filters.

8.2 Moorefield

In order to accommodate growth within Moorefield, the proposed Implementation Plan for the projects was developed as summarized in Table 8-2.

Table 8-2: Implementation Plan for Moorefield

PROJECT IDs	LOCATION	DESCRIPTION	COST ($MILLION)
10+ years			
WW-6	Moorefield	Upgrade the existing SPS	$0.40
		Total Estimated Cost (2023$)	**$0.40**

A description of the key components and justification of the Moorefield Implementation Strategy is provided below:

- WW-6 – Upgrade of the existing SPS equipment to service the projected population of 2,000 persons, which is at the reasonable conveyance capacity of the forcemain. The upgrades would include new pumps, new generator and associated electrical equipment. Growth in Moorefield beyond 2,000 persons will require further study to establish additional conveyance capacity from Moorefield to the Mapleton WPCP.

8.3 Property Requirements

As much as possible, all recommended Projects are planned within existing treatment facility sites, road allowances and/or utility corridors. For the Drayton SPS upgrade project (WW-1), property acquisition may be required for the collection system routing to the new station.

The Township may wish to consider alternative routing of collection system to the new SPS facility between Queen and King Street’s to reduce the capital cost of the project. In the event that the alternative routes are considered, these property requirements shown below, will apply.

Table 8-3: Potential Property Requirements for Collection System Routing Alternatives

PROJECT ID	PROJECT NAME	ROUTE ALTERNATIVE	PROPERTY REQUIREMENTS	COMMENTS
WW-1	New SPS with emergency storage	2	Easement onto parcels at 25 and 27 Queen Street	Township will secure / purchase permanent easements prior to commencing detail design.
WW-1	New SPS with emergency storage	3	Easement onto parcels at 25 Queen Street	Township will secure / purchase permanent easement prior to commencing detail design.

9 References

CIMA+. (2018a). *Mapleton Wastewater Servicing Class EA Peer Review Report*. Drayton, ON: Township of Mapleton.

EXP. (2017). *Township of Mapleton - Mapleton Wastewater Servicing Class EA Environmental Study Report (ESR) Final*.

Government of Ontario. (2019). *Design Guidelines for Drinking Water Systems*. Toronto: Government of Ontario.

GSP Group. (2022). *Township of Mapleton Growth Management Summary - Final Report*. Township of Mapleton.

A

Appendix A: Technical Memorandum

Township of Mapleton

Mapleton Water and Wastewater Servicing Master Plan

Technical Memorandum 1 – Background Review and Problem / Opportunity Statement

Friday, March 10, 2023

20159 / T000974D

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Engineering for **people**

Technical Memorandum 1 – Background Review and Problem / Opportunity Statement

Mapleton Water and Wastewater Master Plan

Project no T000974D | File no 085

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1 Introduction

1.1 Background

The Township of Mapleton (Township) is a thriving rural municipality located within the County of Wellington in the heart of southwestern Ontario. The Township covers a land area of approximately 535.6 km^2 and has a population of 10,839 according to the 2021 Census. The Township has two (2) designated urban centres, namely Drayton and Moorefield, as well as seven (7) rural hamlets, including Alma, Glen Allan, Hollen, Lebanon, Rothsay, Wallenstein, and Yatton.

Drayton and Moorefield are serviced by both municipal drinking water systems (DWS) and wastewater collection and treatment systems. The Township owns two (2) DWS, Drayton DWS and Moorefield DWS, one (1) wastewater pollution control plant (WPCP), Mapleton WPCP, and two (2) sewage pumping stations (SPS), Drayton SPS and Moorefield SPS. The hamlets are not serviced by municipal drinking water systems or wastewater collection or treatment systems. At this time, only the urban centres (Drayton and Moorefield) will be the focus of this investigation as the hamlets will continue to remain on private services.

The Township has retained CIMA+ to develop a Master Servicing Plan to ensure that the Township can continue to deliver high quality and sustainable drinking water and wastewater services to meet the needs of the community now and into the future.

1.2 Purpose of Technical Memorandum No. 1

This technical memorandum (TM) will document the projected growth for the communities of Drayton and Moorefield and will document the Township's design criteria in terms of flow projections. These criteria will provide the basis for developing servicing strategies considering current challenges and compatibility with long term needs.

The purpose of this technical memorandum is as follows:

- Summarize available background information,
- Identify the problem/opportunity statement for the Master Plan, as required by the Municipal Class Environmp0ental Assessment (MCEA) process,
- Develop the study area boundary,
- Develop the planning and design criteria, and
- Document the existing systems.

Background documents that will be reviewed and incorporated into the Master Plan development will include, but not be limited to:

- 2015 Water and Wastewater Rate Study – Watson and Associates Ltd.
- 2016 Drayton Water Servicing Needs Class EA – RJ Burnside
- 2017 Development Charge Background Study – Watson and Associates Ltd.
- 2017 Mapleton Wastewater Servicing Class EA – EXP
- 2018 Mapleton Wastewater Servicing Class EA – Peer Review – CIMA+
- 2018 Drayton Sanitary Collection System – Capacity Review – CIMA+
- 2021 Wellington County Official Plan
- 2022 Township of Mapleton Growth Management Summary Final Report – GSP Group

2 Municipal Class Environmental Assessment (MCEA) Process

Municipalities in Ontario are subject to the provisions of the Environmental Assessment Act (EAA) and its requirements. The Ontario Municipal Engineers Association (MEA) Municipal Class Environmental Assessment document (October 2000, as amended in 2007, 2011 and 2015) provides municipalities with a five-phase planning procedure approved under the EAA to plan and undertake all municipal sewage, water, stormwater and transportation projects that occur frequently, are usually limited in scale and have a predictable range of environmental impacts and applicable mitigation measures.

2.1 Types of Projects

Based on the MCEA document, projects are classified as one of four potential types (or "Schedules") of undertakings. Each of the classifications requires a different level of review to complete the requirements of the Class EA, and thus comply with the EAA, as follows:

1) **Schedule "A" Projects** are limited in scale, have minimal adverse effects and include the majority of municipal water and wastewater operations and maintenance activities. These projects are pre-approved and may be implemented without further review under the Class EA process.
2) **Schedule "A+" Projects** are limited in scale, but where impact to the public may be more significant. These projects are pre-approved; however, the proponent is obligated to notify the public of infrastructure projects being implemented in their area. The public has the right to comment to the municipal officials/council in their area; however, considering that the projects are pre-approved, there is no appeal process to the Minister of the Environment for these projects.
3) **Schedule "B" Projects** have the potential for some adverse environmental effects. The proponent is required to undertake a screening process involving mandatory contact with the directly affected public and relevant review agencies to ensure that they are aware of the project and that their concerns are addressed, where possible.

   Schedule "B" Projects require that Phases 1 and 2 of the Class EA planning process (as shown in Figure 1) be followed, and that a Project File / Report be prepared and submitted for review by the public. If there are no outstanding concerns raised by the public and/or the review agencies, the proponent may proceed to implementation (Phase 5).

4) **Schedule “C” Projects** have the potential for significant environmental effects and must proceed under the full planning and documentation procedures (Phases 1 to 4) specified under the Municipal Class EA document. Schedule “C” projects require that an Environmental Study Report (ESR) be prepared and submitted for review by the public. If there are no outstanding concerns raised by the public and/or the review agencies, the proponent may proceed to implementation (Phase 5).

Under the Class EA planning process, there is an opportunity for the Minister or delegate to review the status of a project. Members of the public, stakeholders and review agencies may request the Minister or delegate to ask a proponent to comply with Section 16 Order of the Environmental Assessment Act (which addresses individual EAs), before proceeding with construction of a proposed project. This is known as a Section 16 Order Request.

Interested persons may provide written comments to the project team. All comments and concerns should be sent directly to the Proponent.

In addition, a request may be made to the Minister of the Environment, Conservation and Parks (MECP) for an order requiring a higher level of study (i.e. requiring an individual / comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Indigenous and treaty rights.

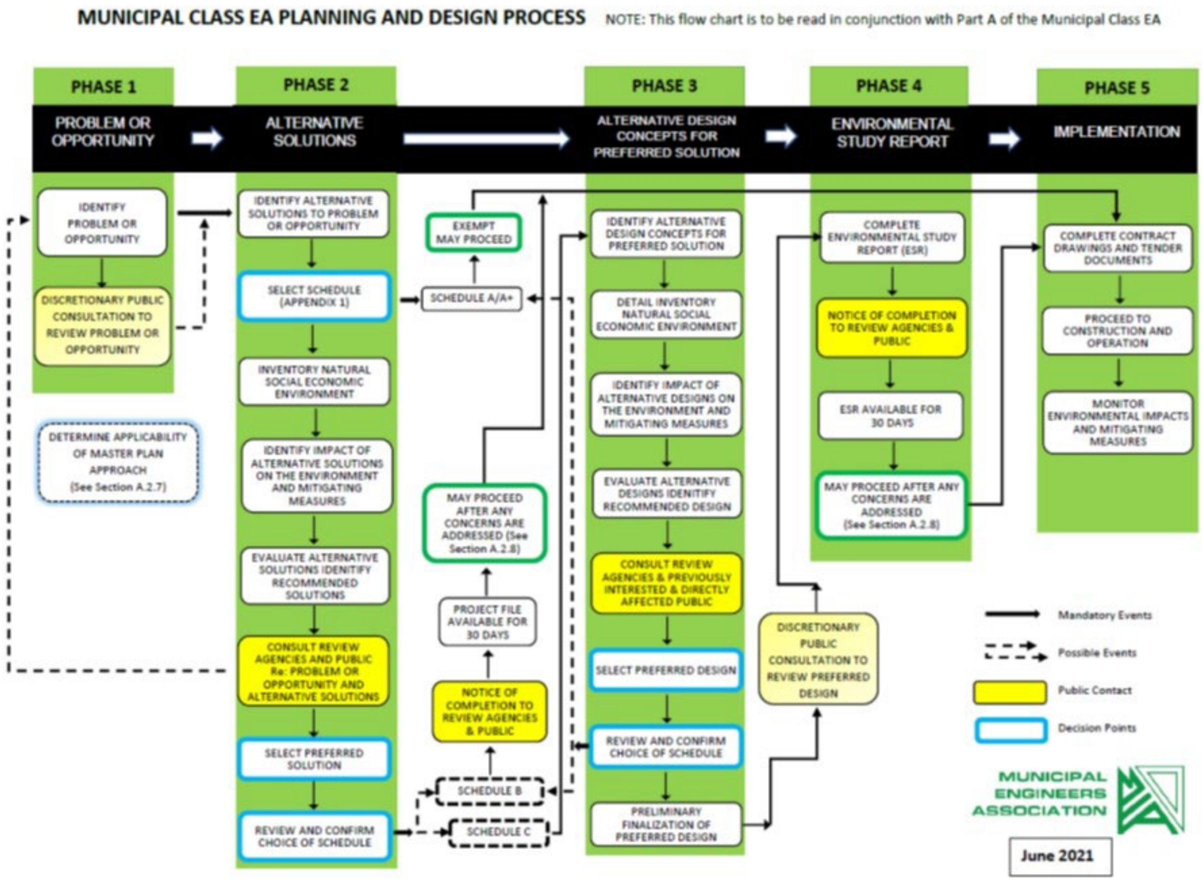

Figure 1: Municipal Class Environmental Assessment Process

2.2 Master Planning Process

Municipalities recognize the benefits of comprehensive, long-range planning exercises that examine problems and solutions for an overall system of municipal services. The Municipal Class EA for Water and Wastewater Projects recognizes the importance of master plans as the basis for sound environmental planning. The Class EA defines master plans as:

"Long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. These plans examine an infrastructure system(s) or group of related projects in order to outline a framework for planning for subsequent projects and/or developments."

Master plans have distinguishing features that set them apart from project specific studies. These features include the following:

- Master plans are broad in scope and focus on the analysis of a system for the purpose of outlining a framework for the provision of future works and developments.
- Specific projects recommended in a master plan are part of a larger management system and are distributed geographically throughout the study area. The implementation of specific projects may occur over an extended time frame.

According to the Class EA document, a master plan must at least satisfy the requirements of Phases 1 and 2 of the Class EA process and incorporate the five key principles of environmental planning, as identified in Section 2.1. The master plan must document public and agency consultation at each phase of the process and a reasonable range of alternative solutions must be identified and systematically evaluated. Key components of the Class EA planning process include:

- Consultation early and throughout the process,
- Determining a reasonable range of alternatives,
- Consideration of effects on the environment and ways to avoid/reduce the impacts,
- Systematic evaluation of the alternatives,
- Documentation of the process, and
- Traceable decision making.

The Municipal Class EA process clearly defines approaches for completion of Master Plans. These approaches are outlined below:

- Approach #1: Preparation of a Master Plan document at the conclusion of Phases 1 and 2 of the Municipal Class EA process. The Master Plan document would be made available for public comment prior to being approved by the municipality.
- Approach #2: Preparation of a Master Plan document at the conclusion of Phases 1 and 2 of the Municipal Class EA process where the level of investigation, consultation and documentation are sufficient to fulfill the requirements for Schedule B projects.
- Approach #3: Preparation of a Master Plan document at the conclusion of Phase 4 of the Municipal Class EA process. Only the Master Plan is prepared, and it documents Phases 1 to 4 of the Class EA process for Schedule B and/or Schedule C projects.

- Approach #4: Integration with the Planning Act. Preparation of a comprehensive Master Plan accompanied by master plans for specific sectors, satisfying early phases of the Class EA including Phases 1 and 2 for Schedule B projects and may satisfy, in addition, Phases 3 and 4 for Schedule C projects. Best suited when planning for a significant geographical area in the long term where interdependent decisions which impact servicing and land use are being made.

The Master Servicing Plan will be planned in accordance with the Municipal Class EA Approach #2.

2.3 Communication and Consultation

Public consultation is an important part of the Class EA Master Planning process. Successful public consultation programs play an important part of building and maintaining community trust, improving project decision-making, and notifying the community early. The purpose of the Communication and Consultation Plan is to outline the general approach to consultation and communication with the public and stakeholders during the Water and Wastewater Master Plan study.

All activities completed as part of the communication and consultation program will be summarized in detail and included as a separate section in the Master Plan study report. The communication and consultation sections will include as a minimum:

- Description of all stakeholder groups, as well as their needs and concerns
- Description of all engagement and communication and consultation tactics / strategies
- Final stakeholder list
- Copies of all communication and consultation material disseminated to each stakeholder group.

An overview of the consultation that will be performed during this project is described in the Communication and Consultation Plan (CIMA+, 2021c).

3 Background

3.1 Overview of Existing Facilities

3.1.1 Drayton Drinking Water System

3.1.1.1 Overview

The Drayton Drinking Water System is comprised of the Drinking Water Supply System (DWSS) and the Water Distribution System (WDS).

The Drayton DWSS consists of the Drayton Water Treatment Plant (WTP) and two (2) raw water wells all located at 60 Wood Street on Lot 1 Concession 1 in Drayton, Ontario.

The two (2) existing raw-water wells are both rated at 22.7 L/s and are operated under the Permit to Take Water No. 0758-98MLKT. The current firm rated capacity of the DWSS is 22.7 L/s (1,964 m^3/d) and total station capacity of 45.5 L/s (3,928 m^3/d), assuming both wells are in simultaneous operation.

The WTP consists of two (2) groundwater wells, one drinking water treatment facility with iron sequestration and disinfection, 405 m^3 of storage for disinfection and for equalization, and five (5) high-lift pumps connected to the distribution system with approximately 780 service connections (Drinking Water Works Permit (DWWP) No. 105-201, January 2017). Operational responsibility for the drinking water system has been contracted to the Ontario Clean Water Agency (OCWA). The demands are close or exceeding the current Permit To Take Water (PTTW). For the Drayton DWS the maximum peak flow rate in 2019 with 95% of the firm rated capacity for the facility.

The Drayton DWSS consists of two groundwater wells, one drinking water treatment facility providing iron sequestration and disinfection, an in-ground storage facility, and a high-lift pumping station discharging to the Drayton distribution system. A well pumphouse houses two groundwater wells and the treatment and control facilities. Each of the wells is equipped with a submersible well pump. Each of the well discharge pipes has two injection points: one for iron sequestration utilizing sodium silicate, and the other for sodium hypochlorite used for primary disinfection. Downstream of the injection points, the well water discharges into a common header that flows into a four-celled in-ground reservoir that provides chlorine contact time for primary disinfection, and equalization storage. Five high-lift pumps pump water from the reservoir to a common header to the distribution system. An overview of the Drayton DWS process is presented in Figure 2.

The Drayton Drinking water distribution system consists of approximately 12.4 km of local distribution mains ranging in size between 150mm and 300mm. The majority of the distribution system was constructed in 1987 or later, primarily using PVC pipe materials. There are currently approximately 2,800 customers connected to the Drayton distribution system. The system was planned to provide Fire protection to the residents and businesses in Drayton.

In 2016, the Township completed the Drayton Water Servicing Needs Municipal Class EA Study. This Study identified a deficit in available storage within the Drayton system recommended that the Township construct a new elevated water storage facility adjacent to Drayton Industrial Drive. The Drayton Elevated Tank is currently under construction and will provide approximately 2,400 m^3 of drinking water storage for equalization, fire protection, and emergency conditions. As part of the construction of the elevated tank, the Township is constructing a new Bulk Water Facility on Drayton Industrial Drive to provide access for the rural community to obtain drinking water.

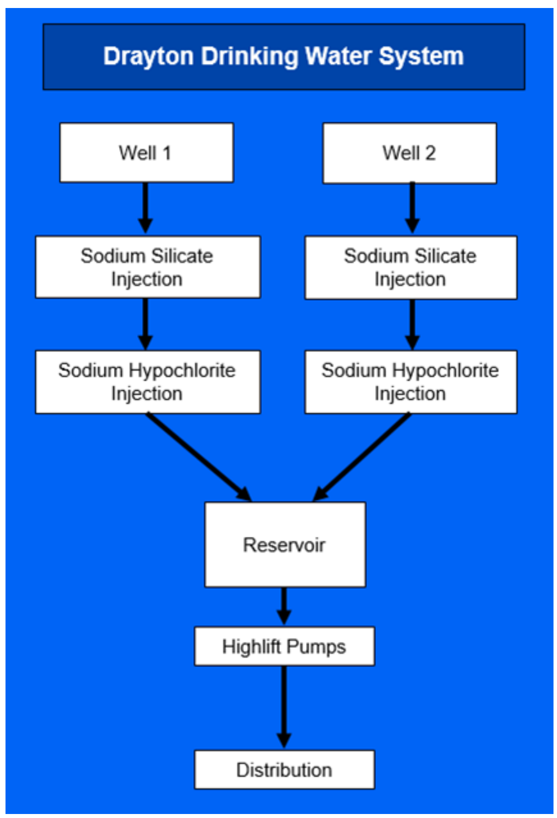

Figure 2: Overview of Drayton DWS Process System

3.1.1.2 Process Capacity Assessment

The Drayton DWSS contains two (2) wells and both are rated for 22.7 L/s. The PTTW for the Drayton DWS allows a maximum pump rate of 22.7 L/s for each well, for a firm rated capacity of 22.7 L/s (1,964 m^3/d) and total station capacity of 45.5 L/s (3,928 m^3/d), assuming both wells are in operation. The maximum peak flow rate in 2019 was 21.6 L/s which represents 95% of the firm rated capacity. The water is pumped into reservoir with a capacity of 405 m^3. The high lift pumping station has a design capacity of 3,928 m^3/d with a 150-kW standby generator. The first two high lift pumps (pumps 1 and 2) have a capacity of 15 L/s, the fourth pump (pump 4) has a capacity of 13 L/s, and the third and fifth pump (pump 3 and 5) have capacities of 45 L/s. Pump 3 is currently offline. The average day flow for treated water in 2019 was 411 m^3/d while the maximum day flow was 1,061 m^3/d, 27% of the design capacity.

3.1.1.3 Existing Conditions

CIMA+ performed a condition assessment of the Drayton DWSS in December 2020. The structural and architectural assets for the Drayton pumphouse and reservoir were observed to be in fair to good physical condition, except for the chemical containment curbs, which were identified to be in poor condition. Future upgrades and repairs recommended in the Conditional Assessment Study should be implemented with other capital projects identified, as appropriate (CIMA+, 2021a).

3.1.1.4 Ongoing and Planned Upgrades

Significant upgrades are currently underway for the Drayton drinking water system. The Township has awarded a construction contract of approximately $6,600,000, including the construction of a new elevated water tank to address an immediate water storage deficit in Drayton for equalization, fire, and emergency. Planned upgrades of the Drayton pumphouse are also underway including generator replacement, chemical transfer upgrades and electrical upgrades. Construction is scheduled to begin in 2023.

3.1.2 Moorefield Drinking Water System

3.1.2.1 Overview

The Moorefield Water Treatment Plant (WTP) is located at 5 Hillwood Drive in Moorefield, Ontario. The WTP consists of two (2) groundwater wells, one drinking water treatment facility, on-site storage for disinfection and equalization purposes, and three high-lift pumps directly connected to the distribution system with approximately 155 service connections (DWWP No. 105-202, November 2015). The two existing raw-water wells are operated under the Permit to Take Water No. 1401-9KXJW5. The Moorefield distribution system was not designed to provide Fire protection for the residents of Moorefield.

Operational responsibility for the drinking water system has been contracted to OCWA. Similar to Drayton, the water demand is close to or exceeding the current PTTW. For the Moorefield DWS, the maximum peak flow rate in 2017 was 98% of the rated capacity for the first well and exceeds capacity for the second well.

A well pumphouse houses the treatment and control facilities; located outside the pumphouse are the two groundwater wells each equipped with a submersible pump. Each of the well discharge pipes has an injection point for sodium hypochlorite disinfection. Following the injection points, the two discharge pipes combine into a common header that flows into the standpipe for equalization, chlorine contact requirements, and emergency storage. Four high-lift pumps pump water from the standpipe to a common header for distribution. The system is also equipped with three pressure tanks to maintain high-lift pump cycling times. An overview of the Moorefield DWS process is presented in Figure 3. Before entering the distribution system from these wells, the raw water is treated by adding a disinfectant to protect against microbial contaminants. The water is disinfected with sodium hypochlorite solution (chlorine). Similar to the Drayton DWS, the current Permit PTTW for the Moorefield DWS and the maximum peak flow rate in 2017 was 98% of the rated capacity for the first well and exceeds capacity for the second well.

The Moorefield Drinking Water distribution system consists of approximately 4.7 km of local distribution mains ranging in size between 50mm and 150 mm. The Township is currently planning to construct a new supply well, and to construct additional treated water storage at the Moorefield WTP to re-establish the full rated capacity of the Moorefield Drinking Water System. The upgrades to the Moorefield WTP are expected to be completed and commissioned before 2026.

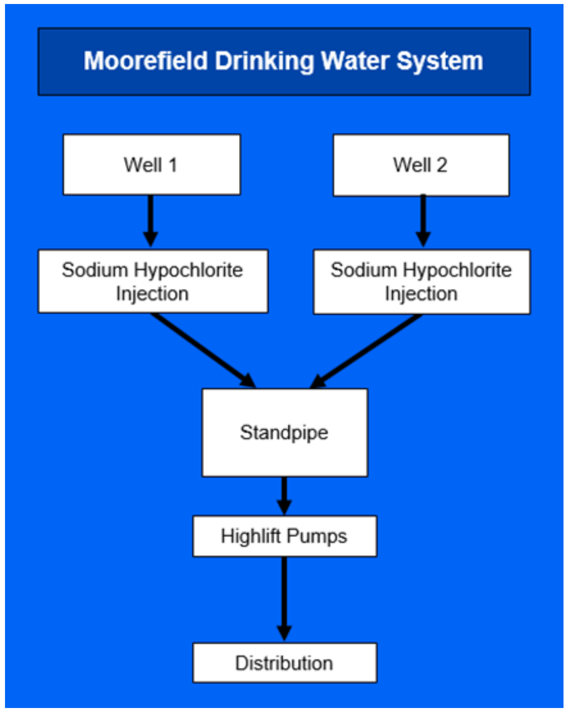

Figure 3: Overview of Moorefield DWS Process System

3.1.2.2 Process Capacity Assessment

The Moorefield DWS contains two (2) wells; the first well is rated for 11 L/s and the second well is rated for 7 L/s. The PTTW for the Moorefield DWS allows a maximum pump rate of 15.2 L/s per well. The rated capacity is 7 L/s with one well (605 m^3/d) and the total capacity is 18 L/s (1,555 m^3/d) with both wells. The maximum peak flow rate in 2017 was 10.8 L/s, which is 98% of the rated capacity for the first well and exceeds capacity for the second well. Water is pumped into a standpipe with a capacity of 387 m^3. The high lift pumping station has a design capacity of 1,555 m3/d with a 60-kW standby generator. All four high lift pumps have a capacity of 4 L/s and the three pressure tanks each have a capacity of 1,200 L. The average day flow for treated water in 2016 was 166 m^3/d while the maximum day flow was 354 m^3/d, 23% of the design capacity.

3.1.2.3 Existing Conditions

CIMA+ performed a condition assessment of the Moorefield DWS in December 2020. The structural and architectural assets for the Control Building were observed to mostly be in good physical condition with some assets in fair condition. A comprehensive summary of the condition assessment findings is available in the final report (CIMA+, 2021a).

3.1.2.4 Ongoing and Planned Upgrades

As of September 2021, the Township submitted an application to the Investing in Canada Infrastructure (ICIP) funding program to cover $5,000,000 in planned upgrades for the Moorefield DWS. The project commended in June 2022. The upgrades that would be funded by the program include:

- Rehabilitating the larger existing well and adding a third well to meet the PTTW and provide redundancy. All new submersible well pumps will be equipped with Variable Frequency Drives (VFDs).
- Twinning the existing standpipe to provide redundancy. The Township will need to confirm if fire protection volume will need to be accounted for.
- Replacing the high lift works with two (2) large pumps for fire flow and two (2) smaller pumps for everyday operations. All new high lift pumps will be equipped with VFDs.
- Replacing the generator, motor control centre (MCC) and automatic transfer switch (ATS) as needed to support the process upgrades.

3.1.3 Drayton Wastewater Collection System

3.1.3.1 Overview

Drayton is services with a conventional gravity collection system comprising approximately 11.5 km of 200 mm to 350 mm pipe sewers, maintenance holes and service lateral connections. The Drayton system conveys all wastewater to the Drayton Sewage Pumping Station located at 20 Mill Street in Drayton, Ontario. The station consists of a wet well with two (2) submersible sewage pumps (one standby), a generator building, a 60 kW standby diesel generator, a sanitary collection system, and a 200 mm diameter forcemain discharging to the influent structure at the Mapleton WPCP. The current firm rated capacity of the Drayton SPS is 34.0 L/s per pump.

3.1.3.2 Existing Conditions

A detailed investigation of the condition of the existing 200mm diameter forcemain from Drayton to the Mapleton WPCP should be included in the collection system study to verify the condition of the forcemain and determine if repairs/replacement should be undertaken.

To complete the study of the existing collection system and to develop a collection system plan, the following information would be required:

- Location, Size, and slope of all existing sewers within the community.
- CCTV investigation reports for all sewers.

- Identification of the areas of proposed future growth within the community.

The analysis of the existing collection system in Drayton and the development of a collection system plan should be prioritized over any other collection system upgrades in order to best allocate spending on system upgrades to promote community growth (CIMA+, 2018a).

3.1.3.3 Drayton SPS

3.1.3.3.1 Overview

Drayton is currently serviced by a conventional gravity collection system that was installed in the late 1980s. The gravity collection system drains to a single communal pumping station conveying flow to the Mapleton WPCP (CIMA+, 2018a). An overview of the Drayton SPS process is presented in Figure 4. Raw sewage flows through a 250 mm sanitary sewer to a manhole northwest of the Drayton SPS, then to the Drayton SPS wet well through a 350 mm inlet sewer. Two (2) submersible sewage pumps (one standby) in the Drayton SPS wet well pump sewage through a 200 mm forcemain for approximately 1.6 km to the inlet structure at the Mapleton WPCP. A 380 mm emergency overflow connects the Drayton SPS wet well to the Conestogo River. Operational responsibility for the Drayton SPS has been contracted to OCWA.

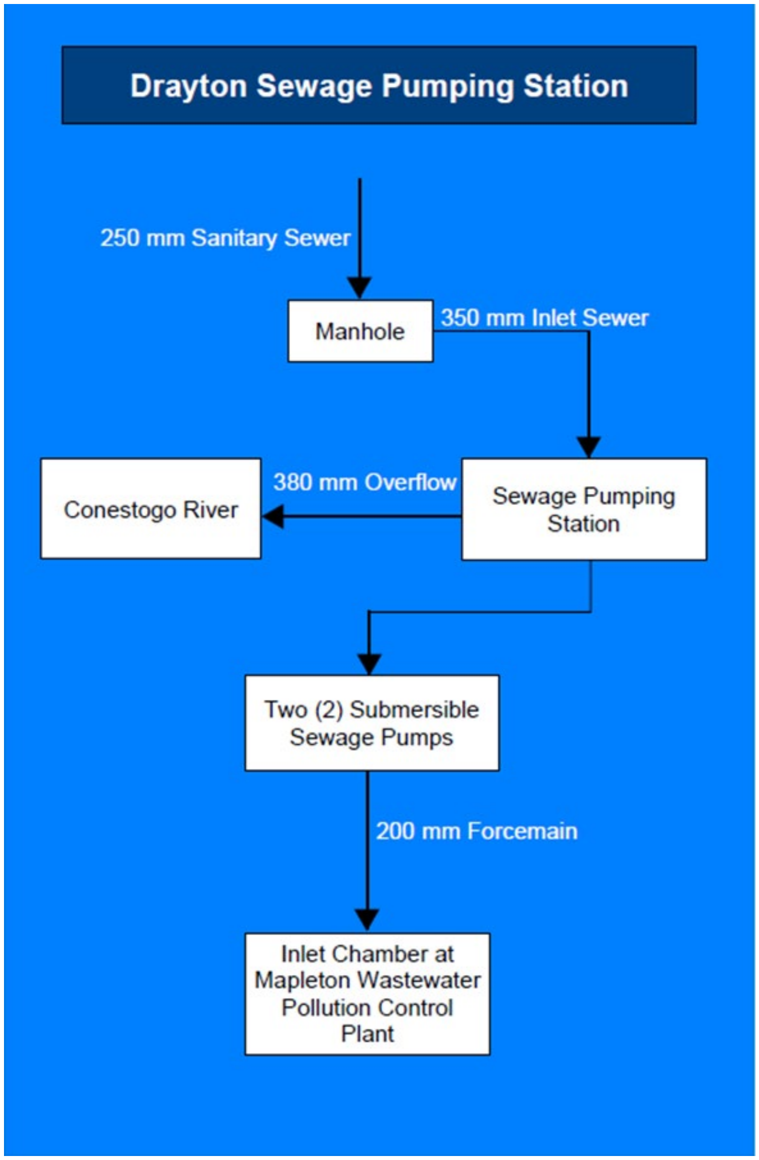

Figure 4: Overview of Drayton SPS Process System

3.1.3.3.2 Process Capacity Assessment

The Drayton SPS currently has a Firm Rated Capacity of 34.0 L/s for each pump (duty/standby). The station is exceeding its Firm Rated Capacity during peak wet weather flow events resulting in the duty and standby pumps operating together to keep up with incoming flows. Several peak wet flow events have necessitated emergency pumping at the SPS bypass with a pumper truck which is hauled directly to the Mapleton WPCP. This has caused increased maintenance at the facility for operations staff and poses a risk to the environment if either of the pumps were to fail during peak wet weather flows and raw sewage overflows to Conestogo River (CIMA+, 2018b). Figure 5 below shows the mean and max IH flows plotted with the design capacity of the Drayton SPS. Additional data was provided by OCWA for the hauled sewage from 2016-2020. These volumes were then averaged over the months the hauling occurred and then added to the max IH values shown below. The WPCP would have capacity to handle these maximum daily flows, however the conveyance system would not. An investigation into the wet weather Inflow and Infiltration (I&I) sources can be considered before upsizing the conveyance system.

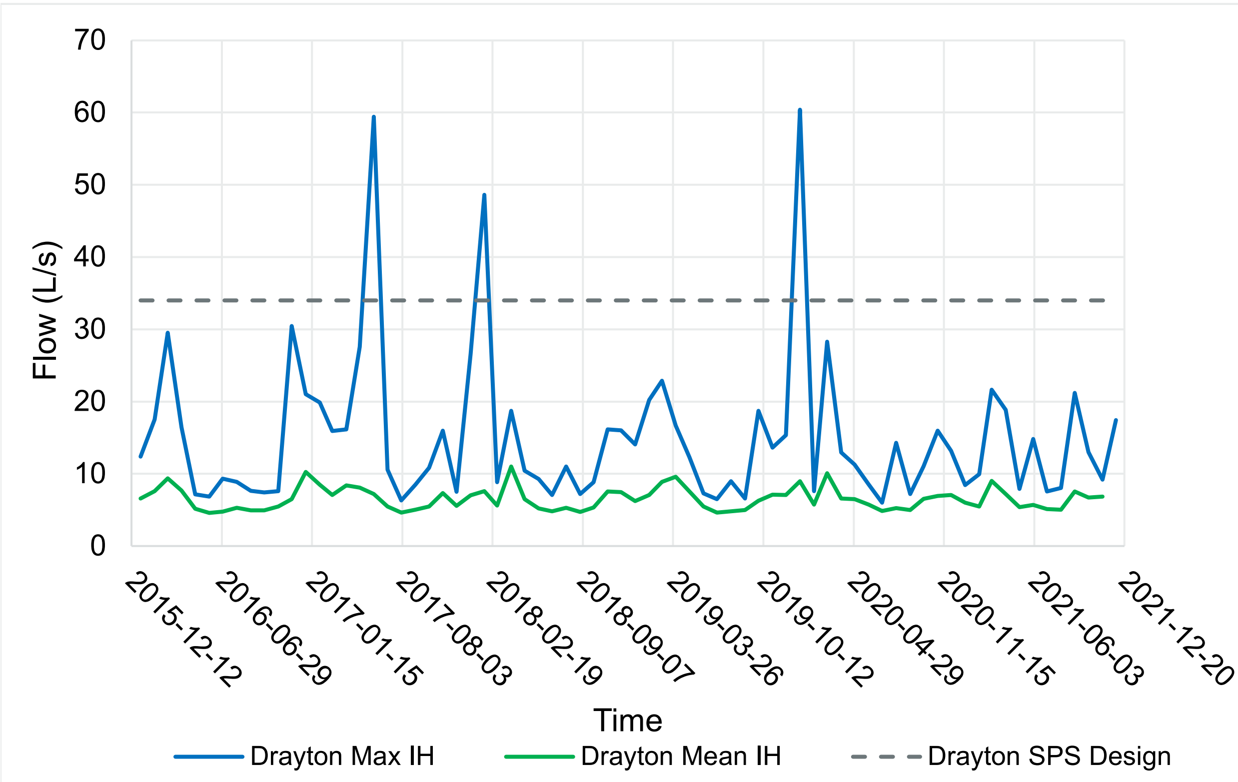

Figure 5: Mean and Max IH Flows with Drayton SPS Design Flow

3.1.3.3.3 Existing Conditions

CIMA+ performed a condition assessment of the Drayton SPS in January 2021.The building structural and architectural assets, building electrical assets and process electrical assets in the Drayton SPS were all observed to be in fair to good condition. The building mechanical assets, process piping and equipment assets, process instrumentation assets, and site works assets in the Drayton SPS were all observed to be in good condition.

A few minor short term asset replacement and repair projects were recommended as part of the condition assessment. A comprehensive summary of the condition assessment findings is available in the final report (CIMA+, 2021b).

3.1.3.3.4 Ongoing and Planned Upgrades

In addition to capacity concerns as described in Section 7.4.2, Drayton SPS also lacks centralized control via a PLC control panel. During the condition assessment, it was advised that a PLC control panel be installed in the future, as it would allow for centralized control via SCADA. Operating staff also indicated the need for an isolation valve at Drayton SPS to maintain or repair assets in the wet well. Currently, both Moorefield SPS and Drayton SPS must be bypassed to perform maintenance on either SPS's wet well equipment.

The Master Plan will evaluate long-term options for the Drayton SPS to meet current and future capacity requirements, integrate operational control, and provide station isolation.

3.1.4 Moorefield Wastewater Collection System

3.1.4.1 Overview

The collection system in the community of Moorefield is a small diameter low-pressure sewer system with individual grinder pump systems located on each serviced lot. All wastewater is directed to the Moorefield Sewage Pumping Station (SPS) located at 20 Booth Street East in Moorefield, Ontario. The system was installed in 2006 in an effort to alleviate contamination issues due to failing septic beds within the community (CIMA+, 2018a).

This type of system typically has a lower initial installation cost and can overcome challenges when topography is not conducive for construction of a conventional gravity system. In addition, systems constructed using low-pressure sewers typically have lower infiltration rates since the linear conveyance system is constructed with smaller diameter pipes rated for internal pressure. However, depending on the scale and type of planned development within the service area, the collection system may be a major barrier in development due to limitations imposed by a low-pressure communal collection system.

Depending on the scale and type of planned development within Moorefield, the collection system may be a barrier to growth. While the low-pressure sewer system does provide a cost-effective solution to the collection system requirements for Moorefield, there are many disadvantages to the system that should be considered before further expansion of the system is undertaken:

- High reliance on mechanical components (pumps).
- Potential for service interruptions and sewage overflows during power outages where no backup power is available.

- System relies on private homeowners to maintain the grinder pumps on each property. Public education is necessary, so property owners are aware of how to avoid blockages, perform maintenance, and how to deal with outages / emergencies.

3.1.4.2 Existing Conditions

In order to optimize the location and sizing of the gravity collection system to best service community growth areas, a comprehensive collection system study should be undertaken. The study would identify the growth areas within the community of Moorefield and provide a conceptual design for a gravity collection system necessary to meet the needs of the future growth. The study would also identify the best method of pumping sanitary sewage to the Mapleton WPCP.

3.1.4.3 Moorefield SPS

3.1.4.3.1 Overview

An overview of the Moorefield SPS process is presented in Figure 6. Raw sewage flows through two (2) 50 mm low pressure sewers to the Moorefield SPS wet well. Two (2) submersible pumps (one standby) in the Moorefield SPS wet well pump sewage through a 150 mm forcemain for approximately 5.0 km to the inlet structure at the Mapleton WPCP. A 200 mm overflow pipe is connected to the Moorefield SPS wet well and extends northwest to an outlet ditch. A 50 kW outdoor diesel generator set is installed at the SPS. The current firm rated capacity of the Moorefield SPS is 14.14 L/s per pump. Operational responsibility for the Moorefield SPS has been contracted to OCWA.

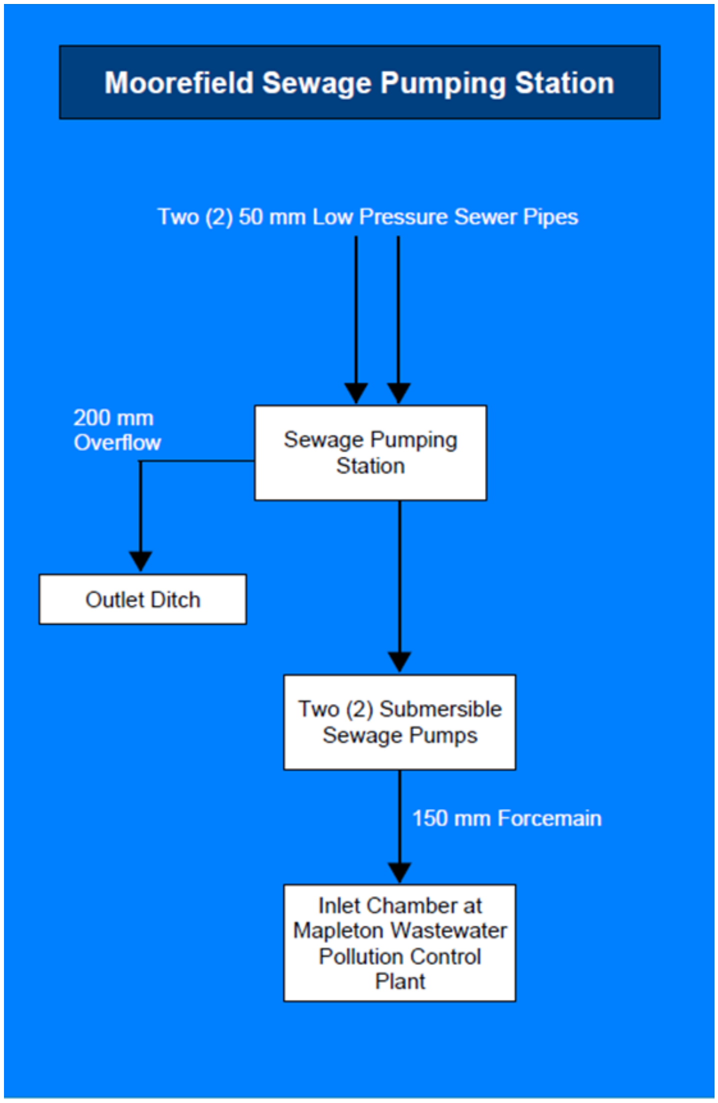

Figure 6: Overview of Moorefield SPS Process System

3.1.4.3.2 Existing Conditions

CIMA+ performed a condition assessment of the Moorefield SPS in January 2021. Overall, observable building structural, architectural, mechanical, and process electrical, equipment assets in the Moorefield SPS were observed to be in fair to good condition.

A few minor short term asset replacement and repair projects were recommended as part of the condition assessment. A comprehensive summary of the condition assessment findings is available in the final report (CIMA+, 2021b).

3.1.4.3.3 Ongoing and Planned Upgrades

No ongoing or planned upgrades have been identified for the Moorefield SPS. The Master Plan will further assess the capacity and asset renewal needs for the Moorefield SPS into the future to identify projects as required.

3.1.5 Mapleton Wastewater Treatment System

3.1.5.1 Overview

The Mapleton WPCP site is located at 7101 Sideroad 15 in Drayton, Ontario and is approximately 25 hectares. The lagoon-based treatment plant has a rated capacity of 900 m^3/d and consists of two (2) treatment cells (aerated and facultative) operated in series and three (3) storage cells operated in parallel or series. In addition, the Mapleton WPCP contains two (2) gravity flow control structures, two (2) alum dosing systems, a filter feed pumping station, tertiary sand filtration, UV disinfection, an effluent cascade aerator, and a 600 mm diameter effluent pipe to the outfall structure at the Conestogo River. Operational responsibility for the Mapleton WPCP has been contracted to OCWA.

The Mapleton Water Pollution Control Plant (WPCP) is a seasonal discharge lagoon-based plant with chemical phosphorus removal, tertiary sand filtration, and UV disinfection. Historic data and reports from OCWA Operators and the Township have confirmed that the facility has not always discharged in the early spring because Total Ammonia Nitrogen (TAN) limits could not be met due to insufficient nitrification in the winter. The plant was re-rated from 750 m^3/d to 900 m^3/d (ECA 1391-B38PLA, August 2, 2018) and has been a class EA review has been completed looking at re-rating the facility to 1,300 m^3/d.

An overview of the Mapleton WPCP process is presented in Figure 7. Wastewater pumped from Drayton SPS and Moorefield SPS enters the Mapleton WPCP at the influent flow splitter manhole, where it flows to aerated treatment Cell 2. Influent wastewater to the Mapleton WPCP is typical medium strength municipal sewage.

Flow passes from Cell 2 to a facultative treatment lagoon (Cell 1). Effluent from Cell 1 flows to Flow Control Structure “A” where it is dosed with alum for phosphorus precipitation and manually directed to any of the three storage lagoons (Cell 3, Cell 4A, or Cell 4B). During spring or fall seasonal discharge periods, flow is directed from Cell 3, Cell 4A, and Cell 4B through Flow Control Structure “A” to the Filter Feed Pump Station. Lagoon effluent is pumped through the second alum dosing point to tertiary treatment sand filters then flows by gravity through UV disinfection before being discharged to a swale, which flows overland to a wetland and then drains to the Conestogo River approximately 1 km upstream of Conestogo Lake. During spring or fall seasonal discharge periods, flow is directed from Cell 3, Cell 4A, and Cell 4B through Flow Control Structure “A” to the Filter Feed Pump Station. Lagoon effluent is pumped to tertiary treatment sand filters then flows by gravity through UV disinfection before being discharged to a swale, which flows overland to a wetland and then drains to the Conestogo River approximately 1 km upstream of Conestogo Lake.

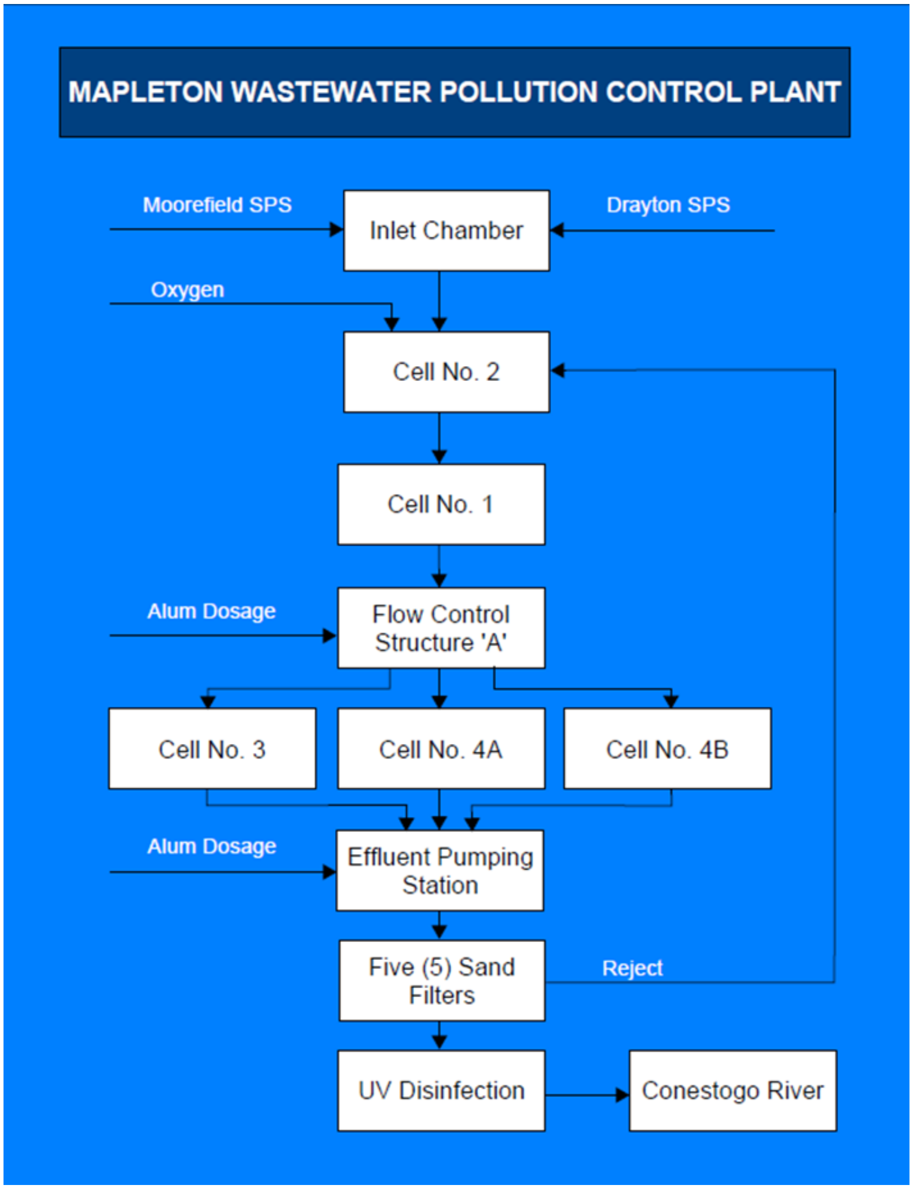

Figure 7: Overview of Mapleton WPCP Process System

3.1.5.2 Process Capacity Assessment

The Wastewater Servicing Class EA proposed an interim re-rating of the Mapleton WPCP to increase the rated capacity of the plant from 750 m^3/d to 900 m^3/d. The interim rating was proposed to accommodate growth pressures in the Township and allow the GRCA to implement a winter water quality monitoring program for the WPCP's receiving body (Conestogo River), which is required prior to the regulatory authorities approving the discharge limits at a flow of 1,300 m³/d (CIMA+, 2018a). Using the population projections for future growth estimates outlined in Section 6, the projected average daily wastewater flows to 2051 are shown below in Figure 8, along with suggested re-rating timeline for the WPCP capacity.

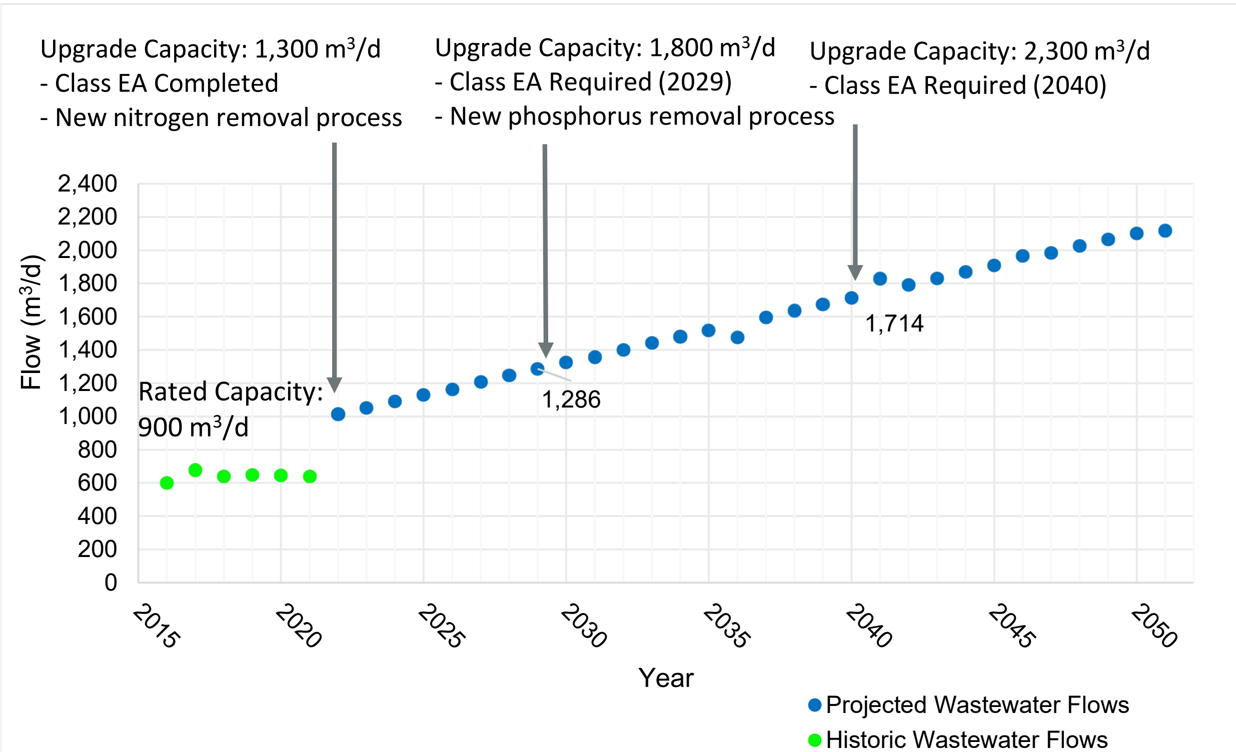

Figure 8: Mapleton WPCP Capacity Assessment

3.1.5.2.1 Lagoons

The existing lagoons at the Mapleton WPCP consists of a 21.2 ha waste stabilization pond system. Two (2) treatment cells are operated in series, the primary cell, Cell 2, is aerated and has an operating volume of 60,500 m³, and the secondary cell, Cell 1, is facultative and has an operating volume of 62,100 m³. The three (3) effluent treatment/ storage cells can be operated in parallel or series. The operating volumes of Cell 3, Cell 4A and Cell 4B are 131,700 m³, 77,600 m³ and 140,700 m³, respectively. The total operating volume of the lagoons is 472,600 m³ (CIMA+, 2018a).

3.1.5.2.2 Tertiary Sand Filters

The existing tertiary sand filters were installed in 2000 (two (2) filters) and 2002 (three (3) filters). Each filter is 2.0 m deep with a surface area of 4.65 m^2 and a design capacity of 800 m^3/d according to the current ECA (1391-B38PLA, August 2, 2018). The filters have a total capacity of 4,000 m^3/d or Peak Hourly Flow (PHF) of 167 m^3/h (CIMA+, 2018a).

3.1.5.2.3 UV Disinfection

The Mapleton WPCP disinfects effluent with two (2) Trojan UV 3000-B radiation units installed in series in the effluent channel of the filtration building, with a Peak Flow Rate of 4,000 m^3/d (167 m^3/h) (CIMA+, 2018a).

3.1.5.3 Raw Wastewater Characteristics and Loadings

Characterisation of raw wastewater is an important step in determining the preferred alternative during a wastewater treatment upgrade. By assessing influent loadings of organic material and nutrients (ammonia nitrogen and phosphorus) the design basis can be developed and used to evaluate the existing infrastructure and size new equipment. Historic raw influent wastewater concentrations from 2013-2017 are presented in Table 1. The Mapleton WPCP receives primarily domestic wastewater with medium to high strength of BOD_5, TSS, TP, and TKN as compared to the MOECC Design Guidelines for Sewage Works and Metcalf & Eddy (CIMA+, 2018a).

Table 1: Raw Wastewater Characteristics

Parameter	Site Wastewater Concentrations (mg/L)[1] Monthly Average	Site Wastewater Concentrations (mg/L)[1] 50th Percentile	Typical Wastewater Concentration (mg/L) MOECC[2]	Typical Wastewater Concentration (mg/L) Metcalf & Eddy Low Strength	Typical Wastewater Concentration (mg/L) Metcalf & Eddy Medium Strength	Typical Wastewater Concentration (mg/L) Metcalf & Eddy High Strength
BOD_5	236	237	150 – 200	133	200	400
TSS	222	224	150 – 200	130	195	389
TP	5.6	5.5	6.0 – 8.0	3.7	5.6	11.0
TKN	48	45	30 – 40	23	35	69

Notes:

1. OCWA Annual Reports (2013-2017)
2. MOECC Design Guidelines for Sewage Works

3.1.5.4 Effluent Compliance Limits and Objectives

The proposed effluent limits and objectives that accompany the ESR's recommendations to increase the Mapleton WPCP's rated capacity to 1,300 m^3/d are presented in Table 2. Although the Township, EXP, GRCA, and the MOECC discussed proposed effluent limits and objectives for the amended ECA submission (November 2017), no formal MOECC comments have been received confirming the proposed discharge limits for the plant. CIMA+ has not discussed the effluent limits with the MOECC.

The decrease in effluent limits necessitate a demonstration of the existing equipment performance optimization for addition of a treatment process for reliable nitrification. The proposed effluent TP objectives of 0.17 mg/L at an expanded capacity of 1,300 m^3/d, is achievable in the existing filters with optimized alum dosing, but this is nearing the limits of technology and would need to be upgraded for capacities > 1,300 m^3/d.

Table 2: Effluent Compliance and Limit Objectives

Parameter	Previous ECA (750m^3/d) Average Concentration (mg/L) Compliance Limits	Previous ECA (750m^3/d) Average Concentration (mg/L) Objectives	Interim RE-rating (9000m^3/d) Average Concentration (mg/L) Compliance Limits	Interim Re-rating (900m^3/d) Average Concentration (mg/L) Objectives	Expansion (1,300m^3/d) Average Concentration (mg/L) Compliance Limits	Expansion (1,300m^3/d) Average Concentration (mg/L) Objectives
$CBOD_5$	7.5 (Apr. & Oct.) 10.0 (Mar., Nov. & Dec.)	5.0	7.5 (Apr. & Oct.) 10.0 (Mar., Nov. & Dec.)	5.0	7.5 (Apr. & Oct.) 10.0 (Mar., Nov. & Dec.)	5.0
TSS	-	-	25	15	15	10
TAN (NH_4+NH_3)	5.0	3.0	5.0	3.0	3.0	1.0
TP	0.5	0.3	0.42 [2]	0.25 [2]	0.3	0.17
E.coli (CFU/100mL)	200	100	200	100	200	100
pH	6.0 – 9.5	6.5 – 8.5	6.0 – 9.5	6.5 – 8.5	6.0 – 9.5	6.5 – 8.5

Notes:

1. Assessment of Treatment Performance to Support Re-rating the Mapleton WPCP to 900 m^3/d (EXP Services Inc., 2018)
2. Response to MOECC and GRCA Feedback (EXP Services Inc., 2018)

3.1.5.5 Existing Conditions

The Township completed a condition assessment of the Mapleton WPCP in January 2021. Overall, assets throughout the facility were observed to be in fair to good condition. Based on input from operations, the process equipment assets are operating as intended.

A few minor short term asset replacement and repair projects were recommended as part of the condition assessment. A comprehensive summary of the condition assessment findings is available in the final report (CIMA+, 2021b).

3.1.5.6 Ongoing and Planned Upgrades

Overall, the Mapleton WPCP has performed well; however, improvements to the existing operation are required to reliably achieve effluent concentrations required for the expanded plant flow of 1,300 m^3/d. In the past, the plant has not fully used its spring discharge window due to high total ammonia nitrogen concentrations.

Cleanout of settled biosolids in the WPCP treatment/storage cells was recommended in the Peer Review Report (CIMA+, 2018) based on input from operations that the cells have not been cleaned out since installation. Through discussions with OCWA, it is understood that the storage cells (Cell 3, 4A, and 4B) have minimal biosolids accumulation. It was recommended that cleanout of Cell 2 align with replacement of the diffusers to allow for efficient constructability sequencing. Cleanout of Cell 1 was recommended in the short term to provide additional capacity for treatment and potential implementation of a nitrification treatment process in this cell.

In addition, the following opportunities for future upgrades at the Mapleton WPCP were identified during the previous studies and during the condition assessment:

- Increasing plant capacity to meet future requirements,
- Increasing discharge window based on Wastewater Servicing Class EA,
- Assessing the need to replace the sand filters to meet new TP discharge limits at higher plant capacity,
- Installing nitrification technology to meet new TAN discharge limits,
- Installing centralized control via a PLC control panel (SCADA),
- Replacement of diffusers, as required,
- Installing recirculation from the effluent of the Filter Building to Cell 2, and
- Mapleton WPCP Filter Building Refurbishment.

The Master Plan will evaluate long-term options for the Mapleton WPCP to meet current and future capacity/treatment requirements, integrate operational control, and provide asset renewal.

3.2 Review of Previous Projects and Studies

3.2.1 Drinking Water Systems

Drayton Raw Well PW-1 was drilled in 1960 (Water Well Record #6700114). Drayton Raw Well PW-2 was drilled in 1967 (Water Well Record #6700125). The Drayton DWS pumphouse was constructed in 1985. Upgrades to the facility were completed in 2004, including new High-Lift Pumps No. 1 and 2, new well discharge header including piping and appurtenances, and new high-lift pump header bypass including piping and appurtenances.

In 2016, the Township completed the Drayton Water Servicing Needs Class EA Study which recommended, among other things, the construction of a 250mm watermain crossing of the Conestogo River at Main Street, and the construction of a new Elevated Storage facility. The watermain crossing on Main Street has been constructed and commissioned, and a new elevated tank is under construction at 29 Drayton Industrial Drive. The elevated tank is scheduled to be in service in the fall of 2022.

Moorefield Raw Well PW-1 was drilled in 1985 and in 2002 was retrofitted with a larger casing (Water Well Record #6714414). Moorefield Raw Well PW-2 was drilled in 2002 (Water Well Record #6714415). The Moorefield DWS pumphouse was upgraded in 2007.

In 2020, the Township completed a condition assessment of the existing assets in their DWSs (CIMA+, 2021a). A comprehensive summary of the condition assessment findings is available in the final report (CIMA+, 2021a).

3.2.2 Wastewater Facilities

The Drayton SPS wet-well and generator building were originally constructed in 1984.

The Moorefield SPS was constructed in 2007. Operating staff indicated that many of the process piping and valves were replaced inside the wet well in 2020.

The Mapleton WPCP Cells 1, 2, and 3 were originally constructed in 1984 to treat wastewater from Drayton. In 2000, the Filter Feed Pump Station and two (2) tertiary sand filters were installed. Upgrades to the facility were completed in 2002, including installing three (3) additional sand filters and UV disinfection equipment.

Servicing to connect Moorefield to the lagoon was added in 2005 and 2006 after a Class EA concluded that the lots in Moorefield were too small for conventional on-lot or raised septic disposal systems and environmental concerns about contamination of a water course near the community.

Receiving water impact assessments were completed in 2003 and 2004 to assess impacts of the WPCP on the Conestogo River, and a report was prepared in 2005. The objective of this work was to re-rate the WPCP from 750 m^3/d to 900 m^3/d. The receiving water impact assessment was revised in 2007 and 2008 to address comments from the GRCA and MECP. Concerns held by the MECP include:

- Ability of Conestogo River to assimilate wastewater discharge in the summer when river flow is very low,
- Phosphorous levels in the Conestogo River that continuously exceed the Provincial Water Quality Objective for Total Phosphorus, resulting in the river being a Policy 2 area for phosphorus,
- That any increase in hydraulic loading at the WPCP would require a corresponding reduction in effluent phosphorus concentration, and
- Concern over the facilities ability to achieve discharge limits.

In 2010, a Schedule B Class EA was initiated because the facility was experiencing problems with poor effluent quality during the spring discharge periods, resulting in partial or full suspension of discharge. During the spring of 2011, the WPCP lagoons were ice covered resulting in ammonia concentrations above the effluent discharge criteria. As a result, operators could not discharge enough effluent in the Spring of 2011, and by September 2011 the wastewater volume increased to a critical level in advance of the fall discharge period. The MECP approved increased discharge in October and November 2011 to reduce risk of overflow at the plant. The Township implemented the preferred EA solution to install two additional lagoons, Cells 4A and 4B, in 2013 to provide additional storage capacity.

In 2011, an Alum Building was constructed for the first alum dosing point.

In 2013, the Township was required to undertake an infiltration and inflow study in Drayton as required by a Provincial Officer's Order. The Township undertook this study which helped to assess the status of the system. In 2013, the WPCP was operating at 95% of its rated capacity (712 m^3/d).

Through the Grand River Optimization Program, the GRCA and MECP evaluated the Mapleton WPCP in 2015 to identify opportunities to improve its performance and provide additional capacity. One of the conclusions was that meeting ammonia removal requirements is challenging with the existing lagoon system, due to the low wastewater temperatures during the winter / spring.

In 2015 the facility exceeded the safe storage limits of its lagoon. In order to address this risk, a provincial order (IBXVN3) was signed to allow the facility to extend its discharge until April 30 and increase its discharge flow rate to the minimum of 10:1 of the streamflow (up to the sand filtration and UV disinfection capacity of 4,000 m^3/d).

Blower upgrades were completed in 2016.

The Township completed a Wastewater Servicing Class EA in November 2017 to review options to address capacity constraints at the Mapleton WPCP and identify alternative treatment opportunities for the plant. The preferred treatment strategy recommended in the 2017 Class EA was to expand the plant's rated capacity to 1,300 m^3/d by installing a Submerged Attached Growth Reactor (SAGR) system in the facultative treatment lagoon (Cell 1) for improved ammonia removal (nitrification). The SAGR system is an established treatment technology in Ontario for cold weather nitrification at lagoon-based treatment plants.

Based on the recommendations of the Wastewater Servicing Class EA, the Mapleton WPCP was re-rated to 900 m3/d and the second alum dosing point was added in 2018.

CIMA+ completed a peer review of the 2017 Class EA and identified Moving Bed Biofilm Reactor (MBBR) as a potential polishing option for nitrification after utilizing the existing lagoons for BOD5 removal. The Peer Review Report found that MBBR offers a lower capital investment compared to SAGR but may require a longer implementation timeline since there are no full-scale systems operating in Ontario. A pilot demonstration of the MBBR system was completed in 2019 at the Mapleton WPCP to establish the design basis. The pilot testing program of the MBBR technology for ammonia removal in cold water was successfully achieved. A complete sampling campaign was efficient in showing that the MBBR technology is suitable for application for removing ammonia during the winter months and is a viable option to accommodate future growth, considering the lagoon system will require additional treatment with respect to ammonia. It was recommended that the Township complete an amendment to the 2017 Class EA and complete a preliminary design for the retrofit of the Mapleton WPCP.

In 2020, the Township completed a condition assessment of the existing assets in their SWSs and WPCP. A comprehensive summary of the condition assessment findings is available in the final report (CIMA+, 2021b).

3.3 Relevant Policies, Legislation, Regulations, and Permitting

In addition to the EA Act, there are several policies, legislation, regulations, and permitting that will be reviewed as part of this study. CIMA+ has identified and reviewed the following documents in the preliminary stages of the project:

- Environmental Protection Act, R.S.O. 1990, c. E.19,
- Planning Act, R.S.O. 1990, c. P.13,
- Ontario Water Resources Act, R.S.O. 1990, c. O.40,
- Species at Risk Act, S.C. 2002, c. 29,
- Clean Water Act, S.O. 2006, c. 22,
- Endangered Species Act, S.O. 2007, c. 6,
- Conservation Authorities Act (1990),
- Growth Plan for the Greater Golden Horseshoe (2017),
- Environmental Protection Act (1990),
- Ontario Heritage Act (1990),
- Migratory Birds Convention Act (1994),
- Electrical Safety Code (O.Reg. 164/99) under the Electricity Act, 1998,
- Ontario Flood Forecasting & Warning Program, GRCA, and
- Ontario Occupational Health and Safety Act (OHSA) and applicable regulations.

Below are permits and approvals that may be required during the detailed design and construction phases of the project.

Table 3: Relevant Permits and Approvals

Agency	Description of Permit / Approval
Fisheries and Oceans Canada	The impact of the project should be assessed through a Fisheries Act self-screening. A project review or authorization may apply if impacts to fish and aquatic habitat cannot be avoided or mitigated during design and construction.

Agency	Description of Permit / Approval
Ontario Ministry of Environment, Conservation and Parks	Revised Drinking Water Works Permits may be required for the Drayton DWS and Moorefield DWS if capacity increases are recommended during this study. Revised Environmental Compliance Approvals (ECAs), for sewage works and potentially air, may be required for Drayton SPS, Moorefield SPS, and Mapleton WPCP if the stations / plant capacity is increased. New standby power generators at Drayton SPS or Moorefield SPS are expected to be less than 700 kW and therefore will be an Environmental Activity and Sector Registry (EASR) eligible activity. Standby power generators of 700 kW or greater are required to have an ECA air. A Permit to Take Water may be required during construction activities if dewatering activities are required in excess of 400 m^3/d. An EASR may be required during construction if dewatering over 50 m^3/d but less than 400 m^3/d is required. Relocation permits, for wildlife or fish, may be required if removals are needed during construction. Permit or other authorization may be required to conduct an activity that could impact an endangered or threatened plant or animal or its habitat.
Ministry of Heritage, Tourism, Culture and Sport Industries	Archaeological and Cultural Heritage assessments, including fieldwork and reporting, are required to comply with the Ministry's 2011 Standards and Guidelines for Consultant Archaeologists. Additional surveys may be required contingent on the Ministry's review of the Project File Report.
Grand River Conservation Authority	Permits (O.Reg 150/06) are required to traverse all areas regulated by the GRCA and to comply with the Regulation of Development, Interference with Wetlands and Alterations to Shoreline and Watercourses. Construction staging plans will be required to consider impacts to the regulatory floodplain.

Agency	Description of Permit / Approval
Wellington County	A building permit will be required for alterations to the existing assets or construction of a new facility. Should any trees require removal, removal will comply with applicable municipal by-laws as well as with the federal Migratory Birds Convention Act (1994), respecting the applicable April 1 – August 31 nesting period for this zone.
Electrical Safety Authroity	All electrical installations, repairs, replacements or alterations in Ontario need to be done in compliance with the Ontario Electrical Safety Code, and all necessary Notifications ("permits") must be taken out. This creates a permanent record of the work and triggers a review process by the Electrical Safety Authority.

4 Study Area Development

The boundaries of the overall Master Plan study area are the boundaries of the Township as presented in Figure 9. While the Master Plan is intended to cover the entire Township, the study will focus on urban centres of Drayton, Moorefield and Alma. Drayton and Moorefield are currently serviced for municipal drinking water and sewage connections, whereas Alma does not have municipal servicing. Options to provide municipal servicing will be reviewed as part of this study.

Figure 9: Mapleton Water and Wastewater Servicing Master Plan Study Area

5 Population and Flow Projections

5.1 Master Plan Population Projection Design Basis

The first step in the Master Planning process is to document baseline population for the study area from existing data and establish population projections for the forecast planning period, up to 2051. Population projections and land use planning are critical to the development and evaluation of water and wastewater servicing alternatives developed through the Master Plan process.

Population projections are developed based on a combination of both best available planning information and professional judgement. Population projections form the basis of establishing water and wastewater flow projections which, in turn, dictate the water and wastewater servicing requirements. As part of the master planning exercise, these population projections need to be revised continuously to ensure the validity of the planning estimates according to actual development, conditions of servicing infrastructure, and growth experienced in the Township.

Several recent studies have presented figures for population projections in the Township. CIMA+ has compiled the available population projection data for the Township as a whole, Drayton, and Moorefield. Ultimately, the Township determined that the values shown in Table 4, taken from the Growth Management Summary Final Report (GSP Group, 2022), shall be used for the Mapleton Water and Wastewater Servicing Master Plan. These values align with the most recent County of Wellington Official Plan Update (County of Wellington, 2021).

Table 4: Mapleton Population Projects (GSP Group, 2022)

Year	Population Urban Settlement Area	Population Rural Area	Population Mapleton	Households Drayton	Households Moorefield	Households Rural	Households Mapleton
2026	-	8,300	11,800	960	270	2,240	3,540
2031	4,100	8,300	12,400	1,110	360	2,250	3,780
2036	-	8,300	12,900	1,190	470	2,260	3,960
2041	5,900	8,300	14,100	1,400	660	2,270	4,380
2046	-	8,300	14,600	1,510	740	2,280	4,600
2051	6,800	8,300	15,200	1,580	880	2,290	4,820

Table 5: Population Projections for Drayton and Moorefield (GSP Group, 2022)

Year	Pop / House [1]	Population Drayton [2]	Population Moorefield [2]	Population Mapleton	Households Drayton	Households Moorefield	Households Mapleton
2026	3.3	3,200	900	11,800	960	270	3,540
2031	3.3	3,641	1,181	12,400	1,110	360	3,780
2036	3.3	3,779	1,531	12,900	1,160	470	3,960
2041	3.2	4,507	2,125	14,100	1,400	660	4,380
2046	3.2	4,793	2,349	14,600	1,510	740	4,600
2051	3.2	4,983	2,775	15,200	1,580	880	4,820

Notes:

1. The population per household for is based on the population of Mapleton divided over the number of households.
2. Drayton and Moorefield's populations have been estimated using the Mapleton population / household ratio.

5.2 Population Distribution by Planning Areas

Based on the Wellington County Official Plan Update (July 2021), and the Township of Mapleton Growth Management Summary (January 2022), 82% of population growth in Wellington County will take place in 14 urban centres, including Drayton and Moorefield. The remainder will largely be directed mainly to hamlets and secondary agricultural areas.

Among the Wellington County's objectives for growth are the following points which are relevant to the Mapleton Water and Wastewater Servicing Master Plan:

- To take advantage of capacities in existing and planned water, wastewater, utilities and transportation systems.
- To encourage growth in urban areas.
- To identify and promote opportunities for growth in the built-up areas of urban centres through intensification and redevelopment where this can be accommodated, considering small town scale and historic streetscapes; and,
- To encourage more efficient use of land through increased densities in designated Greenfield areas of urban centres.

The County of Wellington Official Plan identifies Policy Areas for growth in Drayton and Moorefield and will be used as a basis for identifying infrastructure needs during the Master Planning process.

The employment growth value presented in the County of Wellington Official Plan (2021) does not specify the region within the Township to which employment growth will be directed. For the purposes of this study, it will be assumed that the majority of employment growth will occur within Drayton.

5.3 Water System Demand Design Basis

The water system demand projections are based on the population growth projections discussed above, as well as the approved industrial / commercial / institutional (ICI) expansion outlined in the 2016 Class EA (Burnside, 2016).

A design basis is developed to ensure that infrastructure upgrades are sized and timed to meet increasing water demands, as the demand increases. To ensure adequate services for the future, water demands are projected with an appropriate factor of safety and risk management.

5.3.1 Historic Water Demand

The historic treated water flows exiting the water treatment plants are shown in Table 6 and Table 7, where RD is raw data, BR is billing records, and AR is annual reports. Raw data for the Average Day Demand (ADD) and Maximum Day Demand (MDD) treated water flows was provided by the Township from 2016 to 2020. The Township also provided billing records (BR) for 2019, 2020, and 2021, which provided a second reference for ADD. The published annual reports were obtained as an additional reference for ADD and MDD.

A review of the data in Table 6 indicates that for the years 2019 and 2020, the Township experience between 12% and 15% unaccounted for water losses. Typically, unaccounted for water losses are generated through on-going maintenance of the system (flushing), system leakage, or unauthorized takings. The rate of unaccounted for water for the Drayton Drinking Water System is considered reasonable for a small system.

A review of the data in Table 7 indicates that for the years 2019 and 2020, the Township experience between 27% and 84% unaccounted for water losses from the Moorefield system. The rate of unaccounted for water for the Moorefield Drinking Water System is considered excessive, and the Township should pursue further investigations to reduce the level of unaccounted for water losses.

Table 6: Historical Demand for Drayton DWS

Year	ADD (m^3/d) RD	ADD (m^3/d) BR	ADD (m^3/d) AR	MDD (m^3/d) RD	MDD (m^3/d) RD	MDD (m^3/d) RD	Daily Consumption (L/cap-d) [1] RD	Daily Consumption (L/cap-d) [1] BR	Daily Consumption (L/cap-d) [1] AR
2016	347	-	-	538	-	-	152	-	-
2017	307	-	-	535	-	-	128	-	-
2018	364	-	364	588	-	596	144	-	144
2019	410	365	411	559	-	1061	156	138	163
2020	446	385	446	595	-	975	162	140	177
2021	451	388	451	586	-	820	157	135	171
Average	387	379	418	567	-	863	150	138	164

Notes:

1. The population for 2016 was taken from the Wellington County Official plan and linearly interpolated to the population in 2021 from the Township of Mapleton Growth Management Summary

Table 7: Historical Demand for Moorefield DWS

Year	ADD (m^3/d) RD	ADD (m^3/d) BR	ADD (m^3/d) AR	MDD (m^3/d) RD	MDD (m^3/d) RD	MDD (m^3/d) RD	Daily Consumption (L/cap-d) [1] RD	Daily Consumption (L/cap-d) [1] BR	Daily Consumption (L/cap-d) [1] AR
2016	173	-	-	258	-	-	393	-	-
2017	185	-	-	258	-	-	390	-	-
2018	196	-	196	277	-	277	387	-	387

Year	ADD (m^3/d) RD	ADD (m^3/d) BR	ADD (m^3/d) AR	MDD (m^3/d) RD	MDD (m^3/d) RD	MDD (m^3/d) RD	Daily Consumption (L/cap-d) [1] RD	Daily Consumption (L/cap-d) [1] BR	Daily Consumption (L/cap-d) [1] AR
2019	150	82	150	241	-	433	278	151	277
2020	105	83	105	162	-	253	184	145	184
2021	169	83	113	113	-	263	278	136	186
Average	163	82	141	239	-	307	318	144	258

Notes:

1. The population for 2016 was taken from the Wellington County Official plan and linearly interpolated to the population in 2021 from the Township of Mapleton Growth Management Summary

5.3.2 Water Demand Projections

Due to the large variation between the data sources and the two (2) urban centres, a daily consumption rate of 300 L/cap-d was selected for Drayton and Moorefield. This aligns with the daily consumption rate used for the 2016 Class EA (Burnside, 2016). Note, by making this assumption there is the risk of over-designing the capacity for the Drayton DWS and under-designing the capacity for the Moorefield DWS.

Based on the population projection from Section 5.1, the residential ADD was calculated for each year using the equation below:

$$Daily\ Consumption\ \left[\frac{L}{cap-d}\right] = 300$$

$$ADD\ \left[\frac{m^3}{d}\right] = Daily\ Consumption\ \left[\frac{L}{cap-d}\right] \times Population\ [cap]$$

The ICI demands for Drayton are predicted in the Class EA consider the period between 2016 and 2041. Therefore, it was assumed that the 2016 ADD already includes ICI, but then ICI growth begins linearly until 2041 and remains constant at the 2041 value until 2051. The increase in ICI demand from 2016 to 2041 and the equation which models the growth is shown in Figure 10.

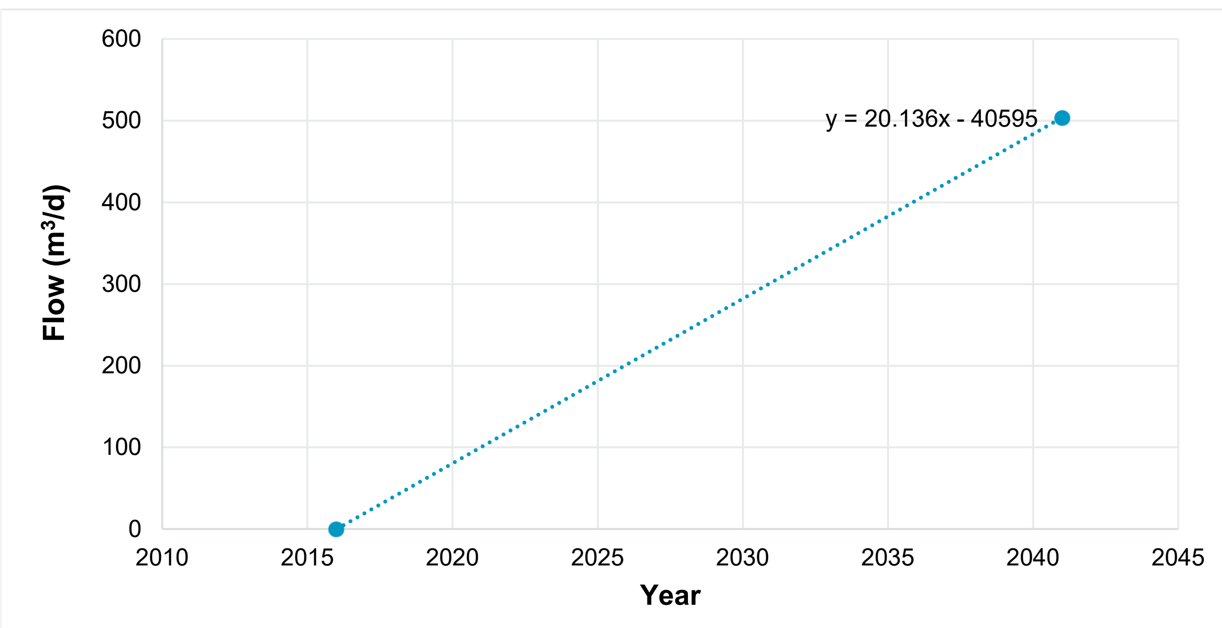

Figure 10: Linear Growth in ICI Demand in Drayton from 2016 to 2041

No ICI expansion is anticipated for Moorefield; therefore, the calculated ADD is representative of the total ADD for Moorefield. The total ADD for Drayton, which includes both residential and ICI, was calculated by summing the residential ADD and the ICI demand.

The Ontario guidelines were used for the MDD and peak hour demand (PHD) factors, shown in Table 8.

Table 8: MDD and PHD Factors (Government of Ontario, 2019)

Year	Drayton Population [1]	Drayton Max Day Factor	Drayton Peak Factor	Moorefield Population [1]	Moorefield MDD Factor	Moorefield PH Factor
2026	3,200	2.00	3.38	900	2.75	4.13
2031	3,641	2.00	3.00	1,181	2.50	3.75
2036	3,779	2.00	3.00	1,531	2.50	3.75
2041	4,507	2.00	3.00	2,125	2.25	3.38
2046	4,793	2.00	3.00	2,349	2.25	3.38
2051	4,983	2.00	3.00	2,775	2.25	3.38

Notes:

1. Populations were linearly interpolated from the Population and Housing forecast in the Township of Mapleton Growth Management Summary
2. Interpolated from Ontario Guidelines Reference Tables

The MDD and PHD were calculated using the equations below:

$$MDD\left[\frac{m^3}{d}\right] = ADD\left[\frac{m^3}{d}\right] \times MDD\ Factor$$

$$PHD\left[\frac{m^3}{d}\right] = ADD\left[\frac{m^3}{d}\right] \times PHD\ Factor$$

The projected water demands for Drayton and Moorefield are presented in Table 9 and Table 10, respectively.

Table 9: Projected Water Demand for Drayton

Year	ADD (m^3/d)	ADD (L/s)	MDD (m^3/d)	MDD (L/s)	PHD (m^3/d)	PHD (L/s)	MDD+FF (m^3/d)	MDD+FF (L/s)
2026	1,161	13.43	2,321	26.86	3,923	45.40	10,529	122
2031	1,394	16.13	2,787	32.26	4,181	48.39	12,291	142
2036	1,536	17.77	3,071	35.55	4,607	53.32	12,575	146
2041	1,855	21.47	3,709	42.93	5,564	64.40	13,213	153
2046	1,940	22.46	3,881	44.92	5,821	67.38	14,681	170
2051	1,997	23.12	3,995	46.24	5,992	69.36	14,795	171

Table 10: Project Water Demand for Moorefield

Year	ADD (m^3/d)	ADD (L/s)	MDD (m^3/d)	MDD (L/s)	PHD (m^3/d)	PHD (L/s)	MDD+FF (m^3/d)	MDD+FF (L/s)
2026	270	3.13	743	8.59	1,115	12.91	4,026	47
2031	354	4.10	886	10.25	1,329	15.38	6,415	74
2036	459	5.32	1,148	13.29	1,722	19.93	7,974	92
2041	638	7.38	1,434	16.60	2,155	24.94	9,642	112
2046	705	8.16	1,586	18.35	2,382	27.57	9,794	113
2051	833	9.64	1,873	21.68	2,814	32.57	10,081	117

5.4 Wastewater System Flow Design Basis

The wastewater system demand projections are based on the population growth projections discussed above and the historical wastewater generation rates. For the ICI wastewater flow contribution, the water demands outlined in Section 6.3.2 will be used.

A design basis is developed to ensure that infrastructure upgrades are sized and timed to meet increasing wastewater flows, as the flows increase. To ensure adequate services for the future, wastewater flows are projected with an appropriate factor of safety and risk management.

5.4.1 Historic Wastewater Flows

The Township of Mapleton contains two urban centers, Drayton and Moorefield, which are identified as areas for sustainable growth to support the surrounding agricultural lands. The historic wastewater flows are shown in Table 11 and Table 12.

A review of the above data indicates that for the years 2019 and 2020, the Township experience between 12% and 15% unaccounted for water losses. Typically, unaccounted for water losses are generated through on-going maintenance of the system (flushing), system leakage, or unauthorized takings. The rate of unaccounted for water for the Drayton Drinking Water System is considered reasonable for a small system.

Table 11: Historical Wastewater Flows for Drayton SPS

Year	Maximum (m^3/d) Min	Maximum (m^3/d) Avg	Maximum (m^3/d) Max	Mean (m^3/d) Min	Mean (m^3/d) Avg	Mean (m^3/d) Max	Peak Factor [1]	Pop'n [2]	Daily Generation (L/cap-d)
2016	594	1,065	2,160	398	525	811	4.11	2,285	230
2017	547	1,372	2,675	399	598	885	4.47	2,402	249
2018	613	1,245	2,835	409	563	951	5.03	2,518	224
2019	560	1,161	1,977	402	574	831	3.44	2,635	218
2020	521	1,300	4,083	421	571	870	7.15	2,751	208
2021	654	1,139	1,872	436	564	779	3.32	2,868	197
Average	521	1,229	4,083	398	566	951	4.84	-	221

Notes:

1. Peak factor does not include wet weather haulage volumes.
2. The population for 2016 was taken from the Wellington County Official plan and linearly interpolated to the population in 2021 from the Township of Mapleton Growth Management Summary

Table 12: Historical Wastewater Flows for Moorefield SPS

Year	Maximum (m^3/d) Min	Maximum (m^3/d) Avg	Maximum (m^3/d) Max	Mean (m^3/d) Min	Mean (m^3/d) Avg	Mean (m^3/d) Max	Peak Factor [1]	Pop'n [2]	Daily Generation (L/cap-d)
2016	88	110	138	65	75	89	1.83	440	171
2017	94	127	237	70	79	89	3.00	473	180

Year	Maximum (m^3/d) Min	Maximum (m^3/d) Avg	Maximum (m^3/d) Max	Mean (m^3/d) Min	Mean (m^3/d) Avg	Mean (m^3/d) Max	Peak Factor [1]	Pop'n [2]	Daily Generation (L/cap-d)
2018	100	129	182	43	77	104	2.35	507	176
2019	88	113	170	65	74	87	2.29	540	168
2020	93	129	289	69	76	97	3.82	574	172
2021	86	114	152	66	75	91	2.04	607	169
Average	86	120	289	43	76	104	2.66	-	173

Notes:

1. The population for 2016 was taken from the Wellington County Official plan and linearly interpolated to the population in 2021 from the Township of Mapleton Growth Management Summary

5.4.2 Wastewater Generation Projections

The Township of Mapleton has adopted Design guidelines for the design of wastewater infrastructure, as follows:

- Domestic Generation rate – 300 L/cap-d
- Peak Factor – Harmon Formula
- Infiltration Allowance - 0.2 L/s/ha

The MECP recommends that a sewage generation rate of 225-450 L/cap-d be used for sizing new sewers. Since the per capita rates for Drayton and Moorefield fall on the lower end of the range of MOECC recommended flowrates, we recommend assuming a future per capita flowrate of 300 L/cap-d for Drayton and 225 L/cap-d for Moorefield to allow for factor of safety within the flow estimate while satisfying MECP guidelines (CIMA+, 2018a).

As noted previously, the estimated future sanitary flow rate is based on a number of assumptions, which results in a high level of uncertainty in accurately predicting the future sewage demands. Given the best information now available on population projections and assuming the higher sewage generation rate, the estimated future (2031) average daily flow is projected to be approximately 1,358 m^3/d, which is elevated but similar the 1,300 m^3/d estimated flow in the 2017 Class EA study (CIMA+, 2018a). For the implications of these projected flows on the Mapleton WPCP, please see Section 7.3. The projected wastewater flows are shown in Table 13 and Figure 11 and Figure 12.

Table 13: Projected Wastewater Generation for Drayton and Moorefield

Year	Drayton Average Daily Flow (m^3/d)	Moorefield Average Daily Flow (m^3/d)	Total Average Daily Flow (m^3/d)
2026	960	203	1,163
2031	1,092	266	1,358
2036	1,134	344	1,478
2041	1,352	478	1,830
2046	1,438	529	1,966
2051	1,495	624	2,119

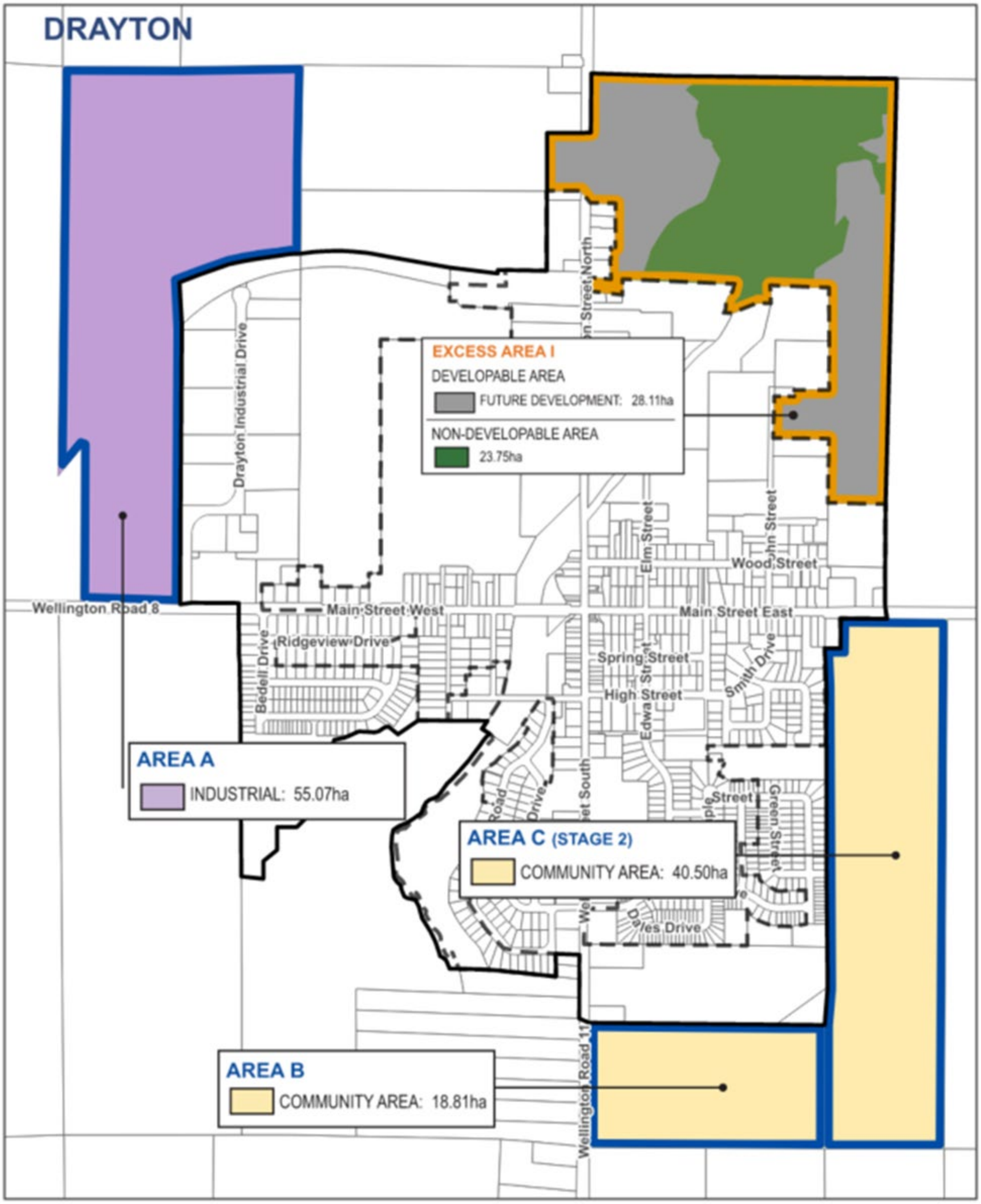

Figure 11: Drayton Mapping (GSP Group, 2022)

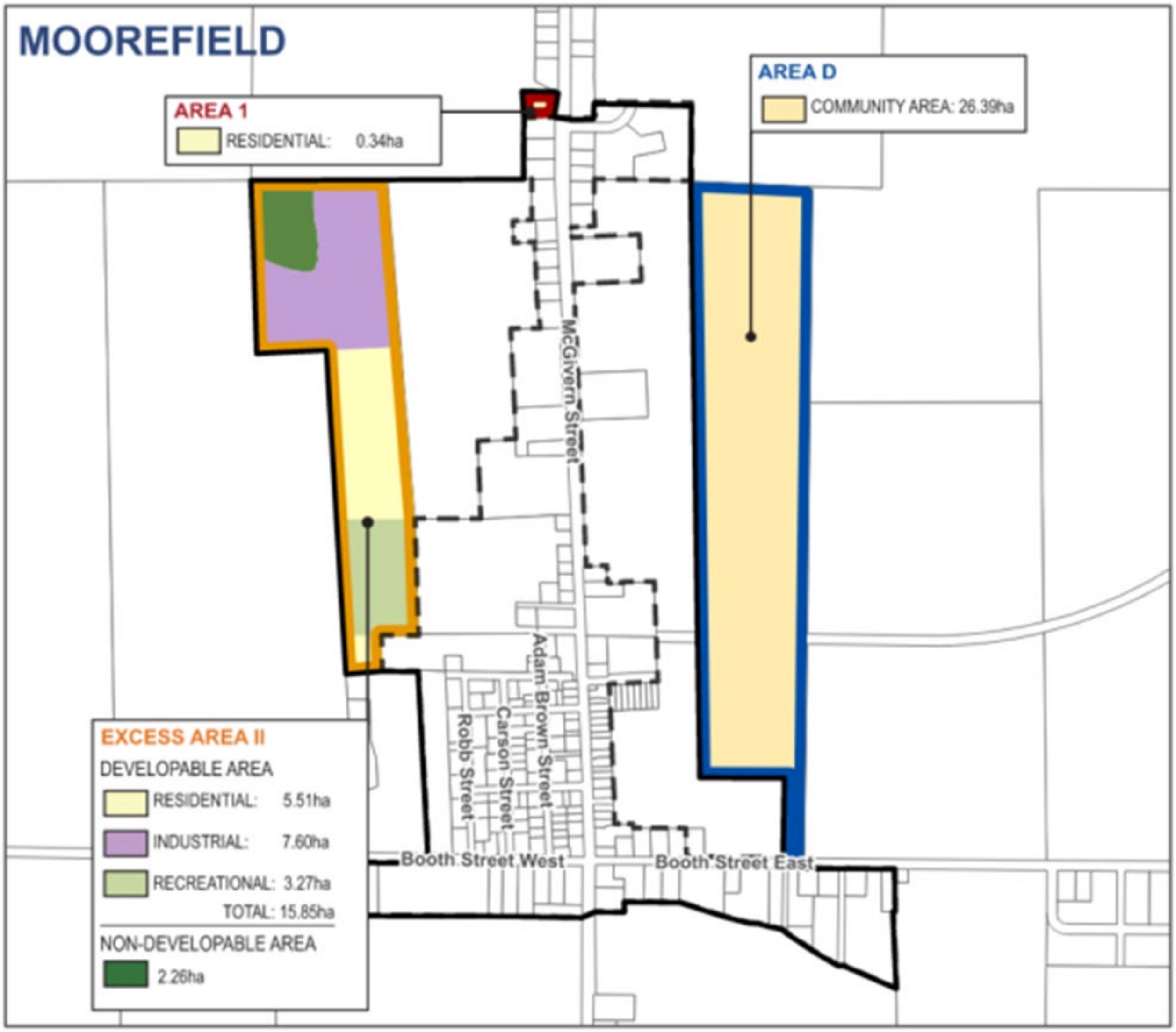

Figure 12: Moorefield Mapping (GSP Group, 2022)

5.5 Problem / Opportunity Statement

The purpose of the Problem / Opportunity Statement is to define the principal starting point in the undertaking of the MCEA Master Plan and assist in defining the scope of the project. The Mapleton water and wastewater systems require upgrades to ensure their continued reliable operation for the future.

As such, the Problem/Opportunity Statement has been defined as:

- Water and Wastewater infrastructure upgrades will be required to service future residential and non-residential lands as the Township's population expands to the year 2051,

- Infrastructure upgrades are required to provide Township and operations staff reliable, redundant, and flexible water and wastewater systems that meet current industry standards and best practices, and
- A comprehensive Water and Wastewater Master Plan will ensure implementation of a sustainable growth strategy.

6 References

Burnside. (2016). *Drayton Water Servicing Needs Municipal Class Environmental Assessment (Schedule B) Project File Report*. Drayton, ON: Township of Mapleton.

CIMA+. (2018a). *Mapleton Wastewater Servicing Class EA Peer Review Report*. Drayton, ON: Township of Mapleton.

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CIMA+. (2021a). *Inventory, Condition, and Capital Planning Assessment - Drayton Drinking Water System and Moorefield Drinking Water System*. Drayton, ON: Township of Mapleton.

CIMA+. (2021b). *Inventory, Condition, and Capital Planning Assessment - Drayton Sewage Pumping Station, Moorefield Sewage Pumping Station and Mapleton Wastewater Pollution Control Plant*. Drayton, ON: Township of Mapleton.

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EXP Services Inc. (2018). *Response to MOECC and GRCA Feedback*.

Government of Ontario. (2019*). Design Guidelines for Drinking Water Systems*. Toronto: Government of Ontario.

GSP Group. (2022). *Township of Mapleton Growth Management Summary - Final Report*. Township of Mapleton.

Township of Mapleton

Mapleton Water and Wastewater Servicing Master Plan

Technical Memorandum (TM) 2 – Development and Presentation of a Reasonable Range of Alternative Servicing Strategies

Friday, March 10, 2023

T000974D

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Engineering for **people**

Technical Memorandum 2 – Development and Presentation of a Reasonable Range of Alternative Servicing Strategies

Mapleton Water and Wastewater Servicing Master Plan

File no T000974D

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1 Introduction

1.1 Background

The Township of Mapleton is responsible for providing municipal drinking water and wastewater services to the residents in the urban centres of the township. The Township is undertaking a Water and Wastewater Servicing master Plan Study to develop a long-term and sustainable strategy for provision of municipal drinking water and wastewater services for existing and planned growth within the township.

As part of the Master Planning Process, five (5) technical memoranda will be prepared, as follows:

1. Technical Memo 1 – Background Conditions and Design Criteria
2. Technical Memo 2 – Development and presentation of a reasonable range of alternative servicing strategies.
3. Technical Memo 3 – Evaluation Framework
4. Technical Memo 4 – Evaluation of Alternatives
5. Technical Memo 5 – Implementation Plan

The findings outlined in the five Technical Memoranda will be summarized in a Project File Report which will be available for Public Review and comment.

1.2 Purpose of Technical Memorandum No. 2

The purpose of Technical Memorandum No.2 (TM2) is to develop and present a reasonable range of servicing strategies for further consideration under the Master Planning process, and to provide an opinion of probable costs of the servicing alternatives.

2 Existing Drinking Water Systems

This section provides an overview of the major existing water servicing facilities in Drayton and Moorefield and a description of key future capacity considerations which will provide a baseline for the development and assessment of alternative water servicing solutions. Additional details for key process design information for each of the components of the existing Drayton and Moorefield water and wastewater systems can be found in TM1– Background Review and Population Projections.

2.1 Drayton Drinking Water System

2.1.1 General

The Drayton Drinking water system consists of a Water Supply System comprised of two (2) raw water supply wells and a water treatment plant, two storage facilities, and a local distribution system. The Drayton Drinking Water System has been designed and constructed to provide Fire Protection for the residents in the community. Figure 2-4 below depicts the existing Drayton Drinking Water system.

2.1.2 Drayton Water Supply System

2.1.2.1 Well Supplies

The Drayton Water Treatment Plant (WTP) is located at 60 Wood Street in Drayton, Ontario, and is supplied raw water from two (2) on-site wells. The supply wells are operated under Permit to Take Water (PTTW) 0758-98MLKT, which allows a maximum rate of 22.7 L/s for each well, for a firm rated capacity 22.7 L/s (1,964 m^3/d) and total supply capacity of 45.4 L/s (3,931 m^3/d).

Table 2-1: Drayton Existing Well Supply Capacities

	Pump Capacity (L/s)	PTTW (L/s)
PW-1	23	22.7
PW-2	23	22.7
Total	46	45.5

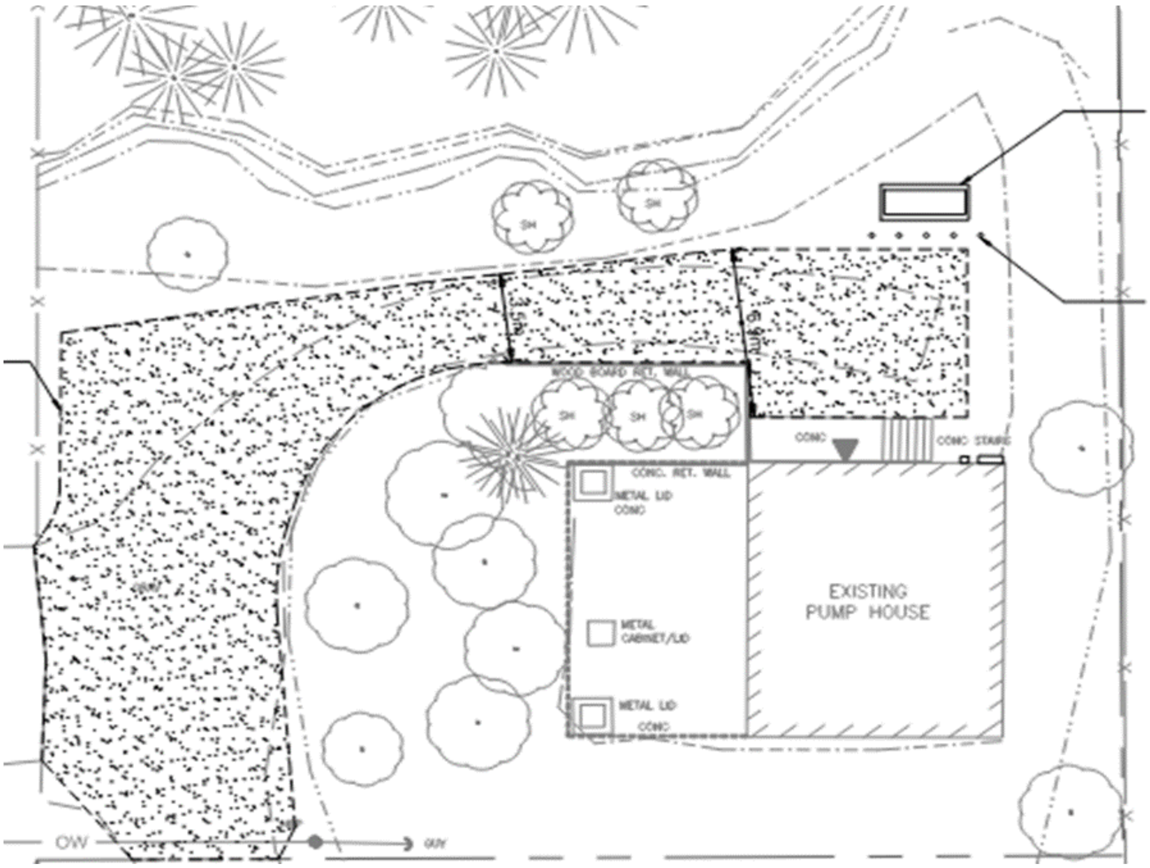

Figure 2-1: Drayton WTP Site Plan

2.1.2.2 Drayton Water Treatment Plant

The Drayton Drinking Water System (DWS) consists of two groundwater wells, one drinking water treatment facility within iron sequestration and disinfection, and a distribution system with approximately 780 service connections (Drinking Water Works Permit (DWWP) No. 105-201, January 2017).

The Township is currently planning to provide emergency back up power supply and to complete process and structural modifications to address issues identified in a recent condition assessment, the facility health and safety hazards associated with chemical deliveries. The upgrades to the DWS pumphouse includes the following major upgrades:

- Replacement of the diesel standby generator
- Replacement of the MCC
- Replacement of the ATS and other related electrical upgrades
- Isolate chemical equipment into a new room and improve ventilation
- Landscaping changes and driveway access.

The works are currently scheduled for completion in 2023. Upon completion of the pumphouse upgrades, spare space will be integrated into the electrical systems should it be determined that a third well pump will be required to meet the future growth demands.

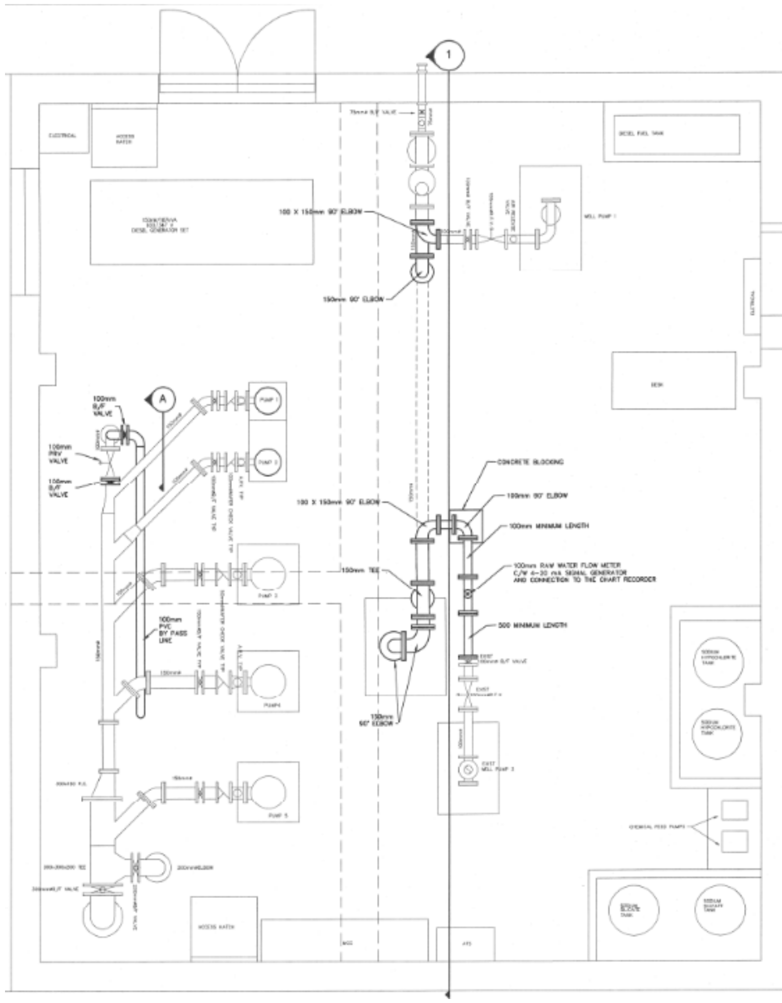

Figure 2-2: Drayton DWS Pumphouse Layout

2.1.3 Storage

The Drayton DWS currently has existing in-ground reservoir at the site of the WTP with a storage capacity of 405 m^3. This storage will be reused for primary disinfection of the drinking water and will not be considered for equalization or emergency use. The Drayton Elevated Tank, which is currently under construction at 29 Drayton Industrial Drive, will provide approximately 2,400 m^3 of additional drinking water storage for equalization, fire protection, and emergency conditions. Under normal operating conditions, the Elevated Tank fill cycle will be controlled by the high lift pumps at the Drayton WTP.

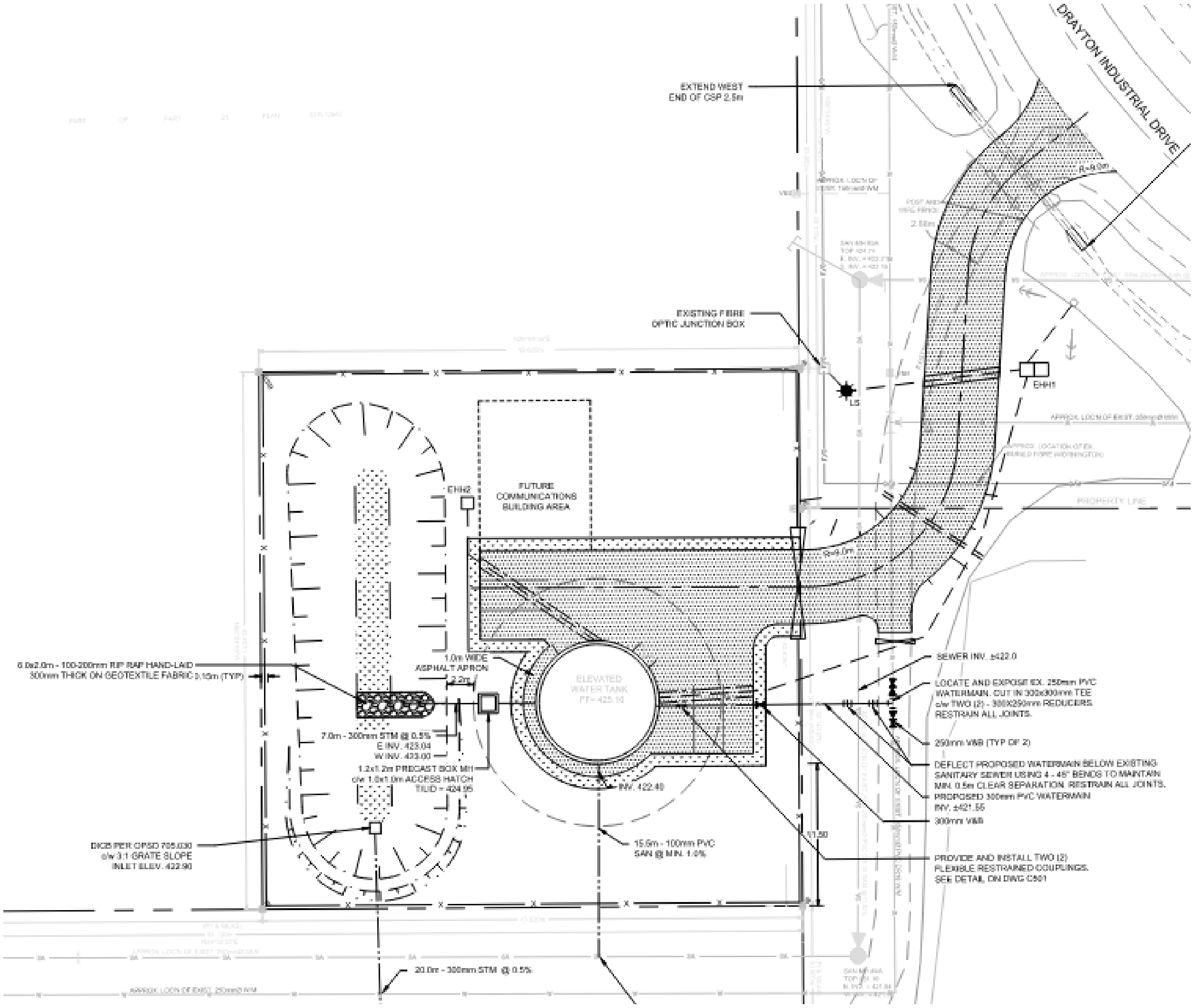

Figure 2-3: Drayton Elevated Tank Site Plan

Table 2-2: Drayton Existing Storage Capacities

Item	Volume (m^3)
Reservoir	405
Elevated Tank **(Construction to be completed late 2022)**	2,400
Total (late 2022)	2,805

2.1.4 Distribution

The existing distribution system consists of 12.4 km of 150 mm to 300 mm watermain, including appurtenances and service connections. As part of the construction of the Drayton Elevated Tank, a new Bulk Water Station will be provided to permit rural customers to obtain safe drinking water. The existing system serves customers between 400 m and 426 m in elevation (Burnside, 2016). The layout of the existing distribution system can be seen in Figure 2-4.

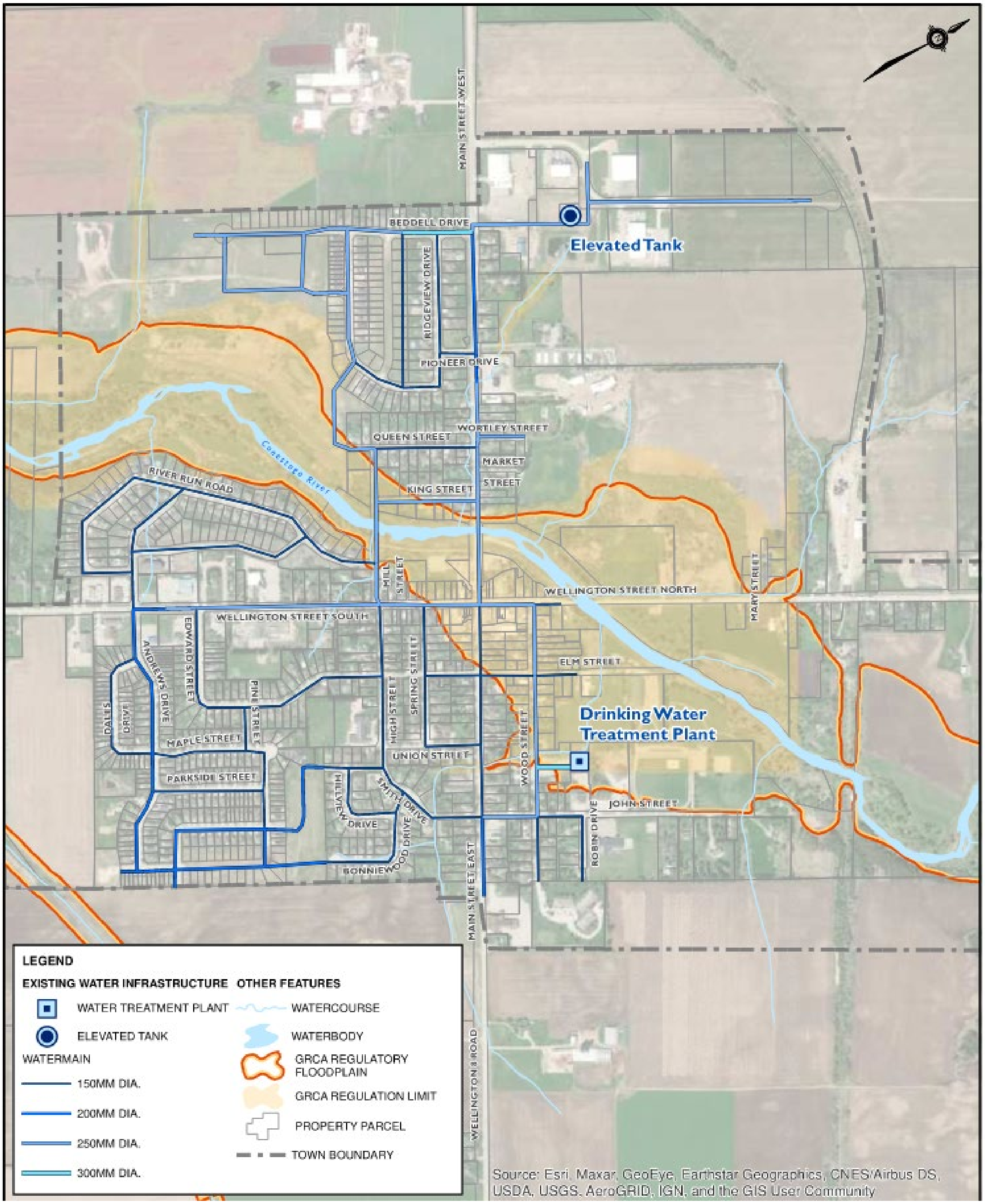

Figure 2-4: Drayton Drinking Water Distribution System

2.2 Moorefield Drinking Water System

2.2.1 General

The Moorefield Drinking Water System (DWS) consists of a water supply system comprised of two (2) raw water supply wells and a water treatment plant, one storage facility, and a local distribution system. According to MECP Guidelines provisions of fire protection service through the municipal drinking water system is a municipal decision. The Moorefield DWS has been analyzed with no provision for fire protection through the DWS. The Moorefield DWS has been designed and constructed to provide drinking water for domestic consumption only, and fire protection through the drinking water system is not provided.

2.2.2 Water Supply System

2.2.2.1 Well Supply

The Moorefield Drinking Water System is supplied from two (2) existing wells at the Moorefield Water Treatment Plant site located at 5 Hillwood Drive in Moorefield, Ontario. The first well pump is rated for 11 L/s and the second well is rated for 7 L/s (605 m^3/d). The PTTW for the Moorefield DWS allows a maximum pump rate of 15.2 L/s for each well, for a total of 30.4 L/s combined, but the existing pumps only have a total capacity of 18 L/s (1,555 m^3/d) combined. The existing firm capacity of the station is 7.0 L/s (605 m^3/d) with the largest pump out of service.

Table 2-3: Moorefield Existing Well Supply Capacities

	Pump Capacity (L/s)	PTTW (L/s)
PW-1	11.0	15.2
PW-2	7.0	15.2
Total	18.0	30.4

2.2.2.2 Water Treatment Plant

The high lift pumping station has a design capacity of 1,555 m^3/d with a 60-kW standby generator. All four high lift pumps have a capacity of 4 L/s and the three pressure tanks each have a capacity of 1,200 L.

The firm capacity for the groundwater supply is only 7.0 L/s (605 m^3/d), which is insufficient to meet current peak hour rate demands from the system (620 m^3/d, 2019). A recent Condition Assessment found that the well pumps and all associated piping and instrumentation need replacement to address corrosion and potential failure and service interruptions.

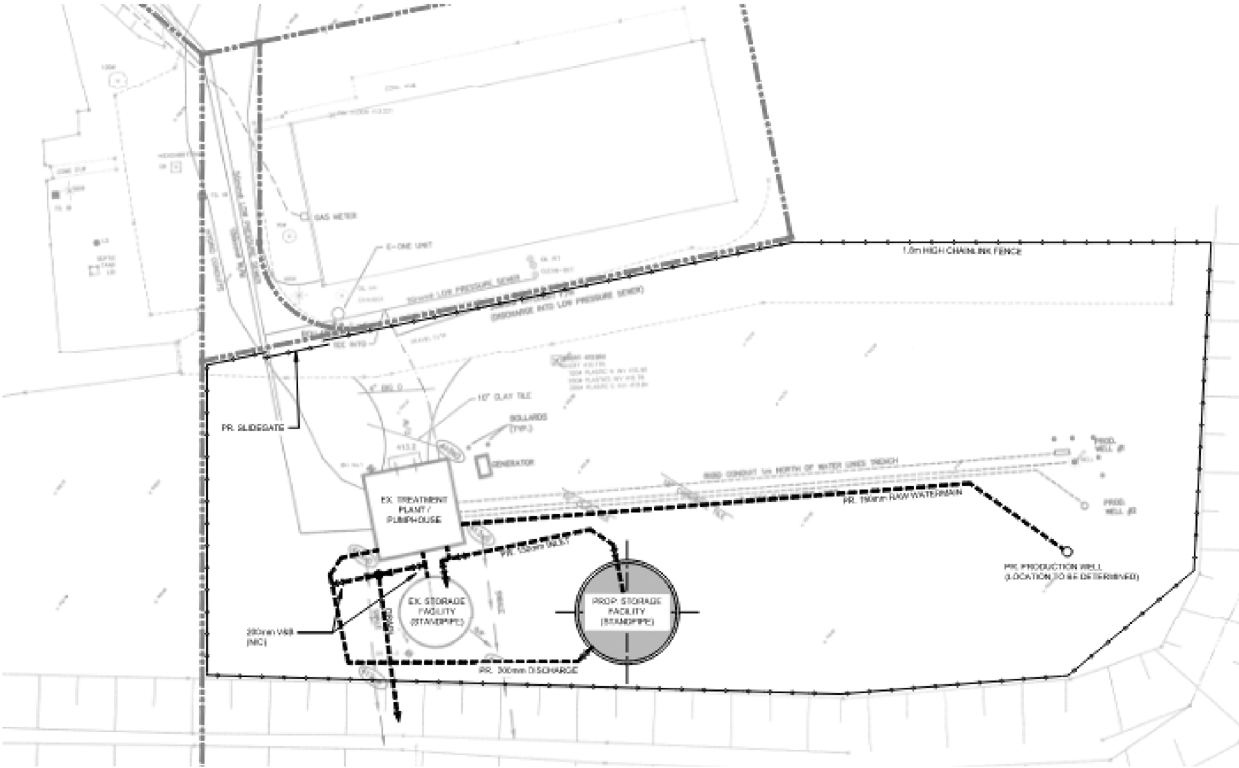

Figure 2-5: Moorefield Water Treatment Plant Site Plan

2.2.2.3 Storage

Water storage is currently provided by a single standpipe at the site of the WTP with a total capacity of 387 m^3. The standpipe is used for primary disinfection and equalization requirements.

2.2.2.4 Distribution

Moorefield's water distribution system consists of approximately 4.7 km of local distribution mains ranging in size between 50 mm and 150 mm, including appurtenances and service connections. There are no hydrants connected to the Moorefield DWS. Figure 2-6 below shows the Moorefield existing drinking water distribution system layout.

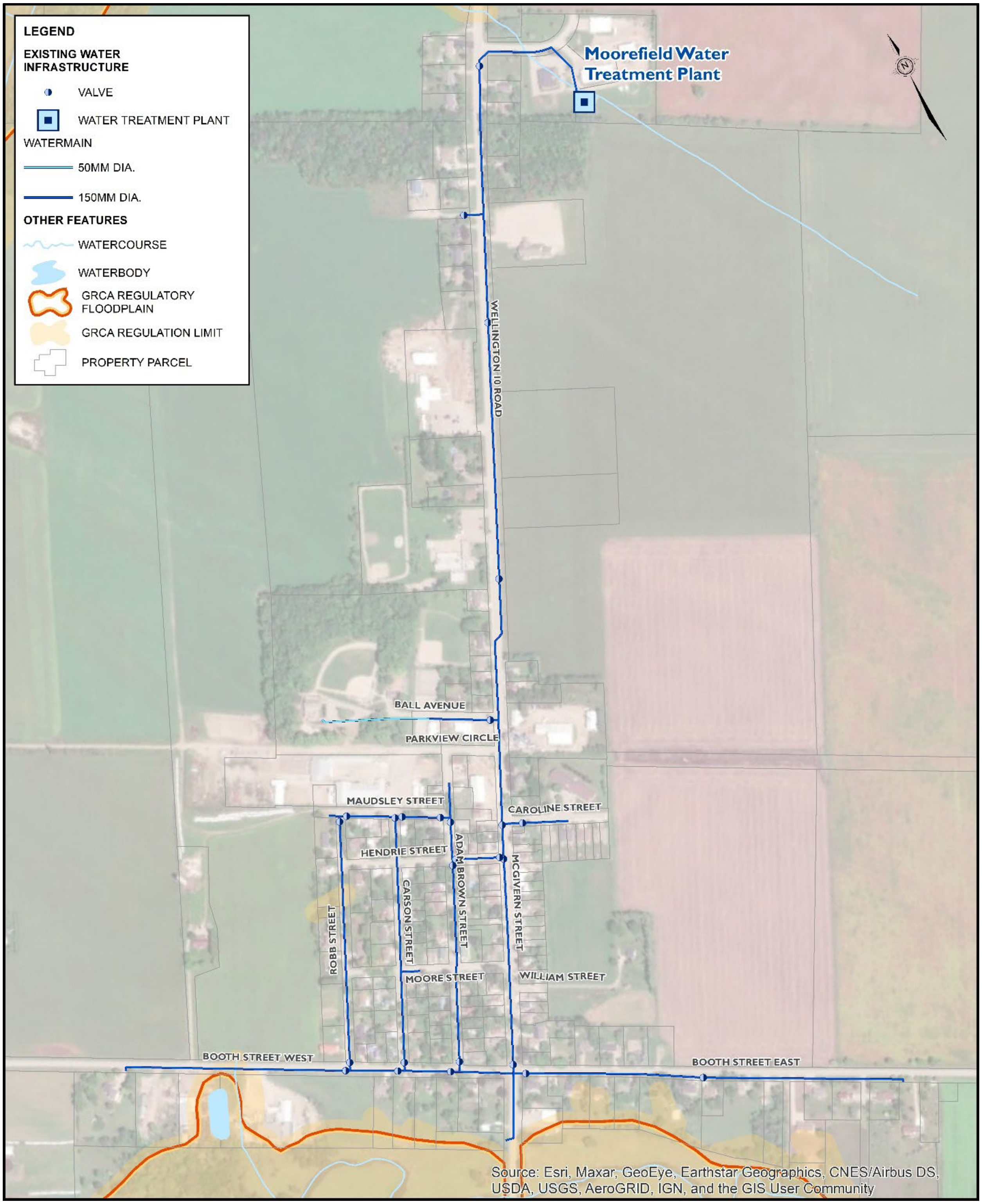

Figure 2-6: Moorefield Existing Water System

3 Existing Wastewater Servicing

3.1 Mapleton WPCP

The Mapleton WPCP is a five celled facultative lagoon treatment system that services both Drayton and Moorefield. A Schedule "C" Class EA completed in 2017 identified the future treatment needs based on forecasted growth for the communities of Moorefield and Drayton. Following the completion Class EA, the Township approved the facility re-rating from 750 m^3/d to 900 m^3/d (ECA 1391-B38PLA, August 2, 2018). A peer review of the Environmental Study Report (ESR) was completed in 2018 to confirm that the recommendations in the Class EA. It was suggested from the peer review that the upgrades to improve nitrogen removal and increase the capacity to 1,300 m^3/d be changed from a Submerged Aerated Growth Reactor (SAGR) system to a Moving Bed Bioreactor (MBBR) system. Plans have been initiated to upgrade the rated capacity of the WPCP to 1,300 m^3/d, but the upgrade has not been triggered yet. Timing for the upgrade to be identified in the Master Plan and as growth proceeds.

Overall, the Mapleton WPCP has performed well; however, improvements to the existing operation are required to reliably achieve effluent concentrations required for the expanded plant flow of 1,300 m^3/d. In the past, the plant has not fully used its spring discharge window due to high total ammonia nitrogen concentrations. In addition to this, the proposed effluent TP objectives at an expanded capacity of 1,300 m^3/d, is achievable in the existing filters with optimized alum dosing, but this is nearing the limits of technology and would need to be upgraded for capacities > 1,300 m^3/d by the year 2029.

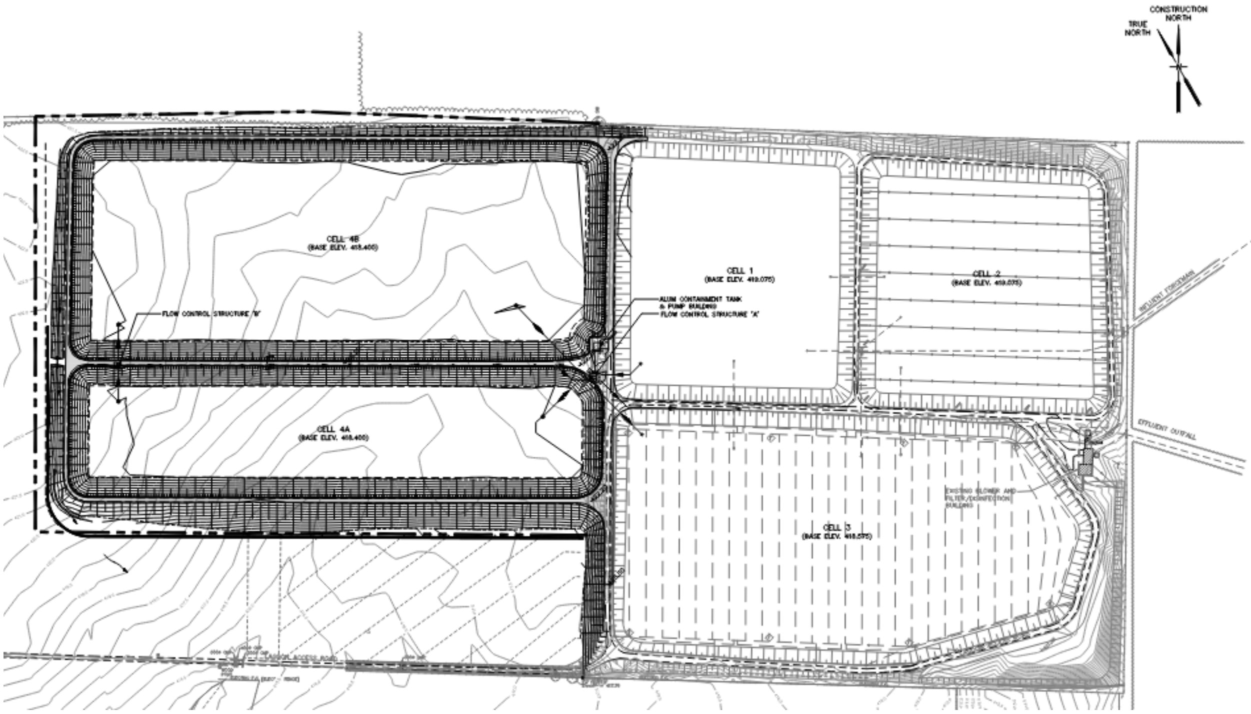

Figure 3-1: Mapleton WPCP Site Plan

3.1.1 Drayton Wastewater Collection System and SPS

Drayton is currently serviced by a conventional gravity collection system that drains to a single communal pumping station conveying flow to the Mapleton WPCP (CIMA+, 2018a).

Raw wastewater flows through a 250 mm sanitary sewer to a manhole northwest of the Drayton SPS, then to the Drayton SPS wet well through a 350 mm inlet sewer. Two (2) submersible sewage pumps (one standby) in the Drayton SPS wet well pump sewage through a 200 mm forcemain for approximately 1.7 km to the inlet structure at the Mapleton WPCP. A 380 mm emergency overflow connects the Drayton SPS wet well to the Conestogo River. The existing Drayton collection system is shown in Figure 3-2 below. Table 3-1 summarizes the key design information for the Drayton SPS.

Table 3-1: Drayton SPS Key Process Design Information

Unit Process	Design Parameter / Value
Number of Pumps	Two (2) submersible pumps (one standby)
Pump Capacity (each)	34.0 L/s TDH 42.0 m
Wet Well Operating Volume	4.24 m^3
Emergency Storage	14.5 m^3
Gravity Sewer Pipe Invert at SPS	394.50 m
Wet Well Bottom Level	392.246m

During the Drayton collection system study, CIMA+ was provided with anecdotal evidence indicating that the Drayton SPS is operating beyond its Firm Rated Capacity during peak wet weather flow events. Between 2012-2017, 44 events were recorded where the standby events have necessitated emergency pumping at the SPS bypass with pumper truck.

The Drayton sanitary sewer network consists of 11.5 km of gravity sewers, ranging in size between 200 mm – 350 mm, and 167 manholes (EXP, 2017). The existing Drayton collection system is shown in Figure 3-2. In 2018 CIMA+ completed a Drayton Sanitary Collection System Capacity Assessment of the existing sanitary system. The analysis of the existing collection system in Drayton identified that it is adequately sized for the current flows. In general, capacity is available in the sanitary collection system for the currently approved development in the Drayton. There are locations within the sewer network that may experience low flow velocities and may require more frequent flushing to prevent excessive solids deposition.

Figure 3-2: Existing Drayton Sanitary Collection System

3.1.2 Moorefield Wastewater Collection System and SPS

The existing wastewater collection system in Moorefield is a low-pressure sewer system with grinder pumps within each property pumping flows to the sewage pumping system. The Moorefield SPS was constructed in 2007. Operating staff indicated that many of the process piping and valves were replaced inside the wet well in 2020. Raw wastewater is conveyed from the Moorefield SPS to the Mapleton WPCP through a 150mm forcemain approximately 5.0km long. The emergency overflow from the pumping station consists of a 200mm diameter pipe discharging northwest to an outlet ditch. Table 6 summarizes the key design information for the Moorefield SPS. A layout of the existing Moorefield wastewater collection system can be seen in Figure 3-3.

Table 3-2: Moorefield SPS Key Process Design Information

Unit Process	Design Parameter / Value
Number of Pumps	Two (2) submersible pumps (one standby)
Pump Capacity (each)	14.14 L/s TDH 47.0 m
Wet Well Operating Volume	6.5 m^3
Low Pressure Sewer Pipe Invert at SPS	404.0 m
Wet Well Bottom Level	402.0 m

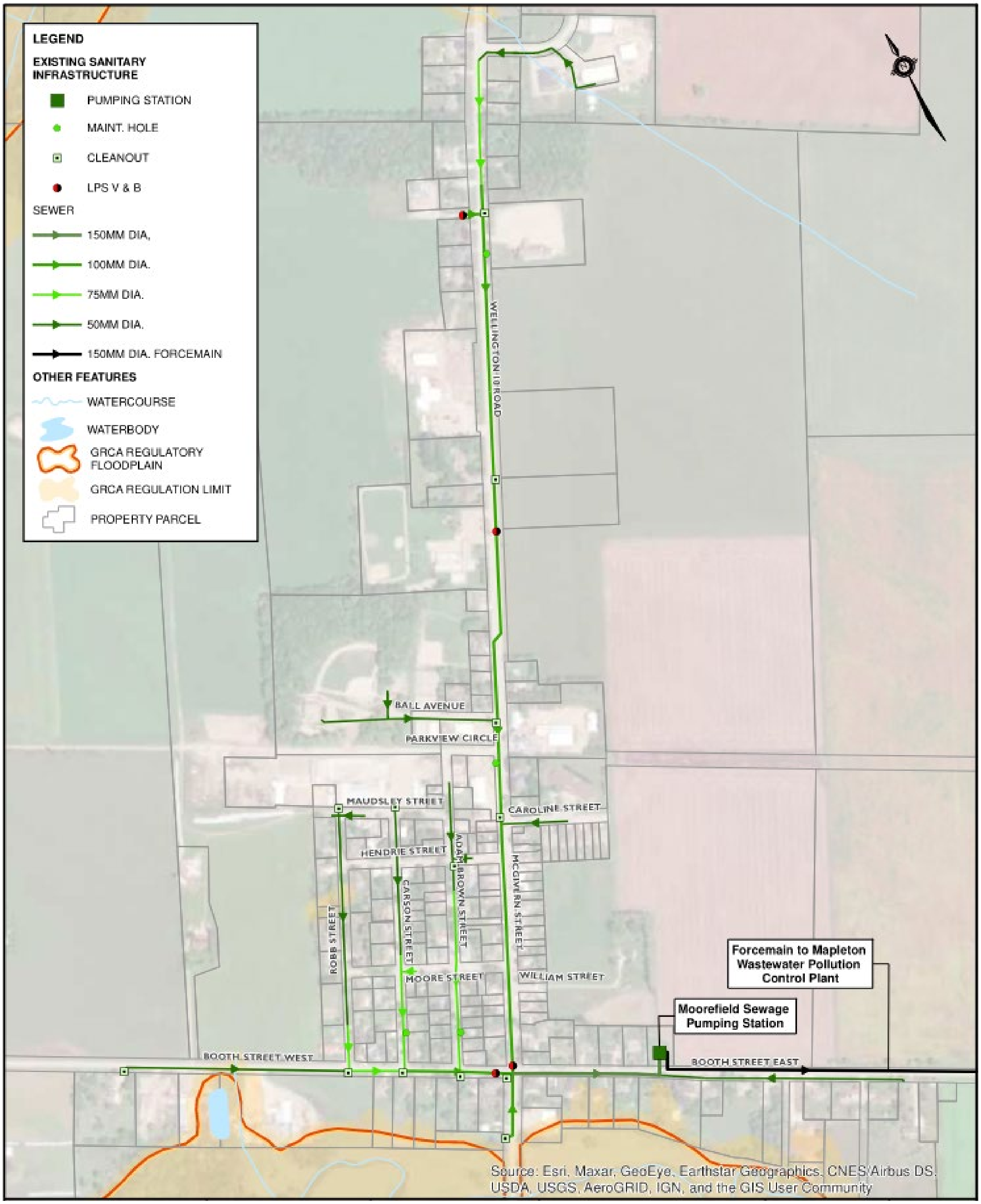

Figure 3-3: Moorefield Low-Pressure Sanitary System

4 Development of Alternative Solutions for Water Servicing

4.1 Drayton Drinking Water System

4.1.1 Future Growth

Preliminary population planning estimates for Drayton indicate that the total 2041 service population within the existing boundaries could increase from approximately 2,279 people to approximately 4,507 people. This will result in a total average day demand of 1,702 m^3/d (19.7 L/s) at the 2041 service population.

The Design flows determined in TM1 for Drayton drinking water system based on the projected population growth are summarized in Table 4-1.

Table 4-1: Drayton Ultimate Water Design Flows

Scenario	Population	Avg Day Demand (L/s)	Max Day Demand (L/s)	Peak Hr Demand (L/s)
Existing	2,868	7.9	15.8	23.7
Year 2041	4,507	19.7	39.3	59.0
Ultimate (Year 2051)	4,983	22.0	44.1	66.1
	Note: Max Day Factor = 2.0 per MECP Guidelines Peak Hour Factor = 3.0 per MECP Guidelines			

***Notes: Values are from TM1 and include ICI demands.**

According to the MECP Guidelines, the Firm Rated Capacity of the Water Supply System must be able to meet the projected Maximum Day Demands within the system. Peak Hour Demands and Emergency Demands may be met from storage, where storage is available. Table 4-2 below compares the current well capacities to the projected max day demand. The existing wells are able to supply the future demands for the Drayton Water System, but only if both wells are in operation.

Table 4-2: Drayton Projected Max Day Demand Compared to Rated Well Supply

	Population	Max Day Demand (L/s)	PTTW	Firm Well Capacity
Existing	2,868	15.8	Adequate	Adequate
Year 2041	4,507	39.3	Adequate	Inadequate
Ultimate (Year 2051)	4,983	44.1	Inadequate	Inadequate

Notes: Values are from TM1 and include ICI demands.

The Drayton Elevated Tank will increase Drayton's total storage capacity to 2,400 m^3 by the end of 2022. The design basis for the which the tank was constructed for drinking water storage for equalization, fire protection, and emergency condition.

4.1.2 Supply Alternatives

The existing well capacity under the PTTW will be adequate to accommodate growth in Drayton until 2051. However, the security of supply is at risk since there is no redundancy The existing Drinking Water System supply will not be able to service all the planned future development in Drayton.

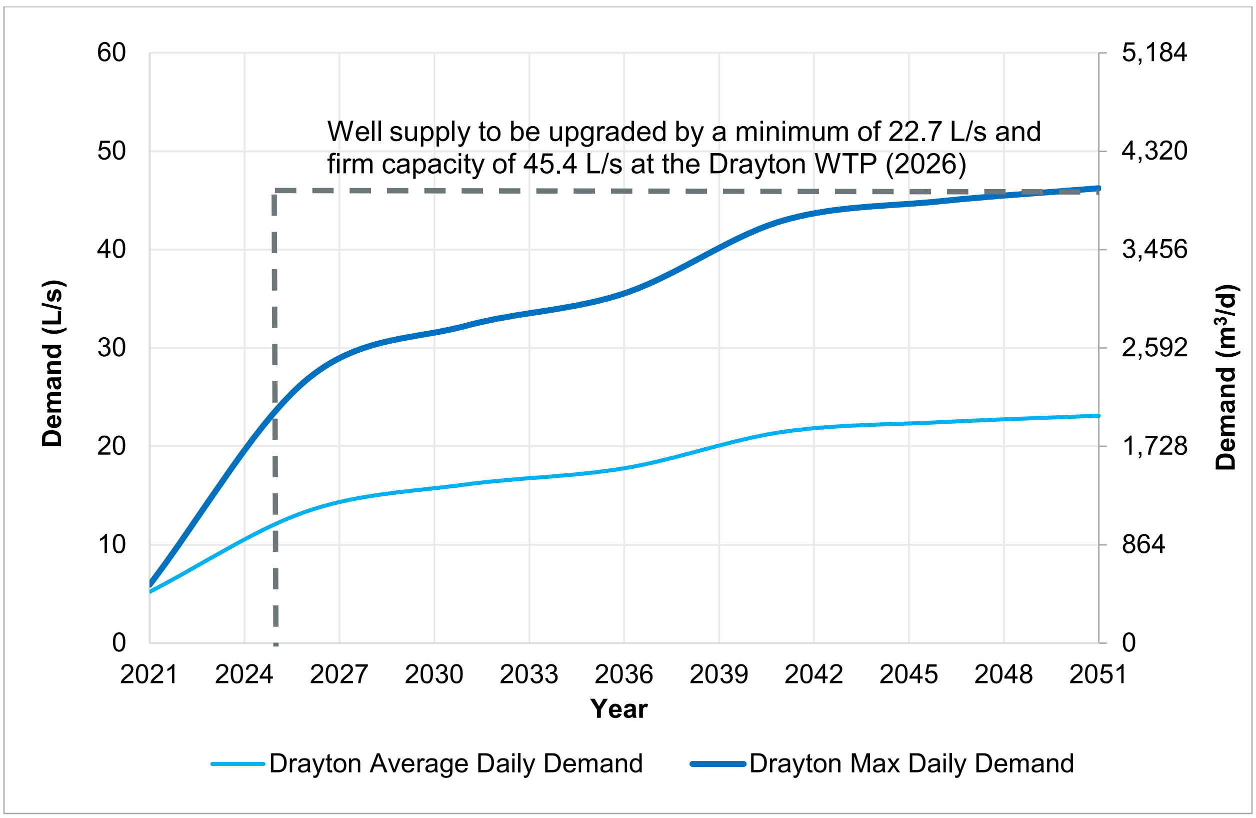

Figure 4-1: Water Demand in Drayton from 2021 to 2051

4.1.2.1 Alternative 1: Increase the Capacity of the Existing Wells

Alternative 1 involves increasing the capacity the existing wells are producing in the existing Drayton Drinking Water System building. To move forward with this option, an amendment to the current PTTW would be required to increase the existing well capacity of 22.7 L/s, the existing pumps and piping may need upgrades, and a hydrogeological investigation would be required to perform a pumping test of the aquifer and assess the implications of the increase well yields.

For Alternative 1, the Drayton Water Supply System will continue to rely on a single groundwater source and still have the associated concerns with security of supply.

4.1.2.2 Alternative 2: Build a New Well on the Existing Site to Increase Capacity

Alternative 2 involves development of an additional well on the same well site as the existing production wells. The additional well would be required to provide, along with the existing individual supply wells, a capacity of 22.7 L/s and would provide redundancy for 45.4 L/s with one pump out of service. The PTTW would therefore not need to be altered as the total taking rate would remain at 45.4 L/s and the Town would need to initiate a Schedule A MCEA undertaking to increase the system capacity. Additional investigations would need to be completed to confirm the capacity of the existing aquifer and where the additional well will be drilled. Due to spacing limitations, the current pumphouse would likely need to be expanding to accommodate a third well pump.

Although for Alternative 2, additional capacity would potentially be provided through the additional well, subject to confirmatory investigations, and again the Drayton Water Supply System will continue to rely on a single groundwater source.

Figure 4-2: Aerial View of Drayton DWS Pumphouse and Alternate Well Location

4.1.2.3 Alternative 3: Build a New Well on another site to Increase Capacity

Alternative 3 is to build a new well on a new site away from the existing Drayton DWS Site. This alternative would provide a secondary source of supply for the Drayton water system, at a separate well field location and provide additional supply capacity in the system. The total water production at the new well site would also have to be confirmed through additional testing to properly evaluate the feasibility of this alternative solution. A hydrogeological investigation to identify and develop test wells to determine the aquifer potential (i.e., well yield) would be required.

4.1.3 Storage

As discussed in Section 2.1.3, the construction of a new elevated tank at 29 Drayton Industrial Drive is in process at the time of this memo. Once its operational, Drayton's water storage needs will be sufficient until the year 2051 as outlined in Table 4-3.

Table 4-3: Drayton Storage Volume

Parameter	2031	2041	2051
Population	3,641	4,507	4,983
Equalization Storage	647	850	952
Fire Storage	792	792	900
Emergency Storage	360	410	463
Total Required Storage	1,799	2,052	2,315
Total Available Storage	2,400	2,400	2,400

4.1.4 Distribution Servicing Strategy

A preliminary analysis of the Drayton water distribution system was completed to evaluate the performance of the existing distribution network for future growth conditions. The system was analyzed to full build out of the expected growth areas as per the Official Plan growth areas, modified to the GSP Group's 2022 Growth Management Study's recommendations. Figure 4-3 shows the future growth areas used for the ultimate build out, with watermain loops through the future growth areas. The model was analyzed using WaterCAD under a single pressure zone. The model assumed a roughness co-efficient, C, of 130 for all pipes, and a demand of 300 L/cap/person/day in the growth areas for a population density of 40 ppha.

The target fire flow was set at 79 L/s as per previous requirements from the Fire Chief, established in the 2016 Water Servicing Needs EA (Burnside, 2016).

The analysis was completed for average day, maximum day, peak hour, and max day + fire demand scenarios. Based on the preliminary analysis no upgrades are required in the existing system to continue provide a fire flow of 79 L/s to all of Drayton and the future growth. To maintain the 79 L/s in the future growth areas, a new watermain loop 250mm in diameter would be required for the industrial area and a new watermain loop 200mm in diameter would be required for the residential growth areas to the south-east, these are depicted on Figure 4-3 below. The routing of watermains shown below may be subject to changes based on development plans approved under the Planning Act.

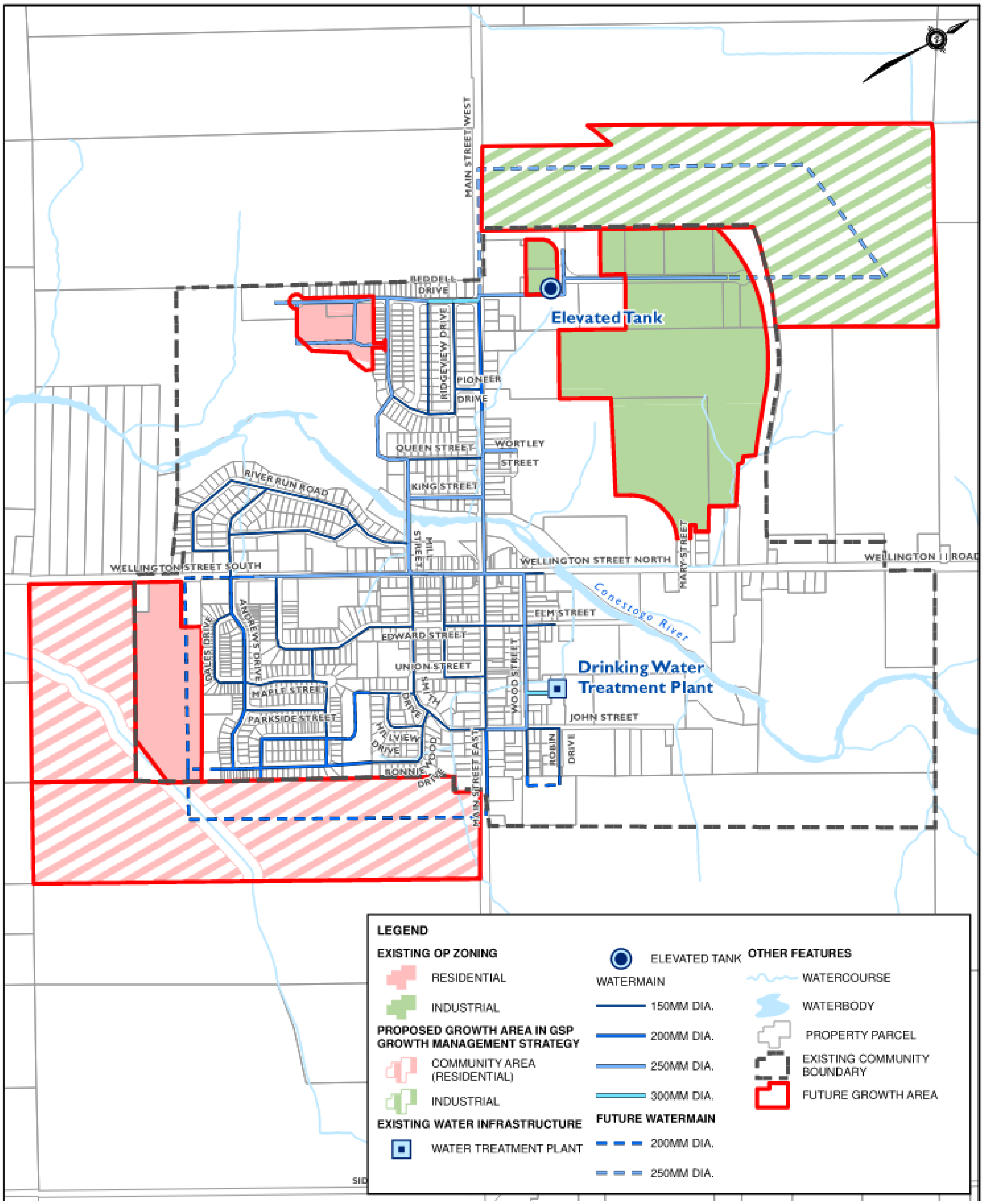

Figure 4-3: Drayton Distribution System Upgrades

4.2 Moorefield Drinking Water System

4.2.1 Future Growth

Preliminary population planning estimates for Moorefield indicate that the total 2041 service population within the existing boundaries could increase from approximately 600 people to approximately 2,125 people. This will result in a total average day flow of 640 m^3/d at the 2041 service population.

The Design flows determined in TM1 for Drayton drinking water system based on the projected population growth are summarized in Table 4-4.

Table 4-4: Moorefield Ultimate Water Design Flows

	Population	Avg Day Demand (L/s)	Max Day Demand (L/s)	Peak Hour Demand (L/s)
Existing	607	2.0	4.5	6.76
Year 2041	2,125	7.4	16.6	24.9
Ultimate (Year 2051)	2,775	9.6	21.7	32.6
Note: Max Day Factor = 2.25 per MECP Guidelines Peak Hour Factor = 3.38 per MECP Guidelines				

***Notes: Values are from TM1, and it is assumed there are no ICI demands.**

Table 4-5: Moorefield Projected Max Day Demand Compared to Rated Well Supply

	Population	Max Day Demand (L/s)	PTTW	Firm Well Capacity	Total Well Capacity
Existing	607	3.1	Adequate	Adequate	Adequate
Year 2041	2,125	16.6	Adequate	Adequate	Inadequate
Ultimate (Year 2051)	2,775	21.7	Inadequate	Inadequate	Inadequate

Note: [1] PTTW sufficient to meet maximum day demands but is inadequate to provide peak hour demands.

As seen in Table 4-5, the existing wells are able to supply the future demands for the Moorefield Water System, but only if both wells are in operation.

Currently the Moorefield does not provide fire protection to its residents through the municipal drinking water system. An analysis of the Moorefield water distribution system will be completed in Technical Memo 4 to evaluate the performance of the distribution network for future growth conditions and the provision of providing fire flow. The system will be analyzed to full build out of the expected growth areas as per the Official Plan with the modifications to the growth areas as suggested in the GSP Group's 2022 Growth Management Study. Figure 4-4 shows the future growth areas for the ultimate build out. The routing of watermains shown below may be subject to changes based on development plans approved under the Planning Act.

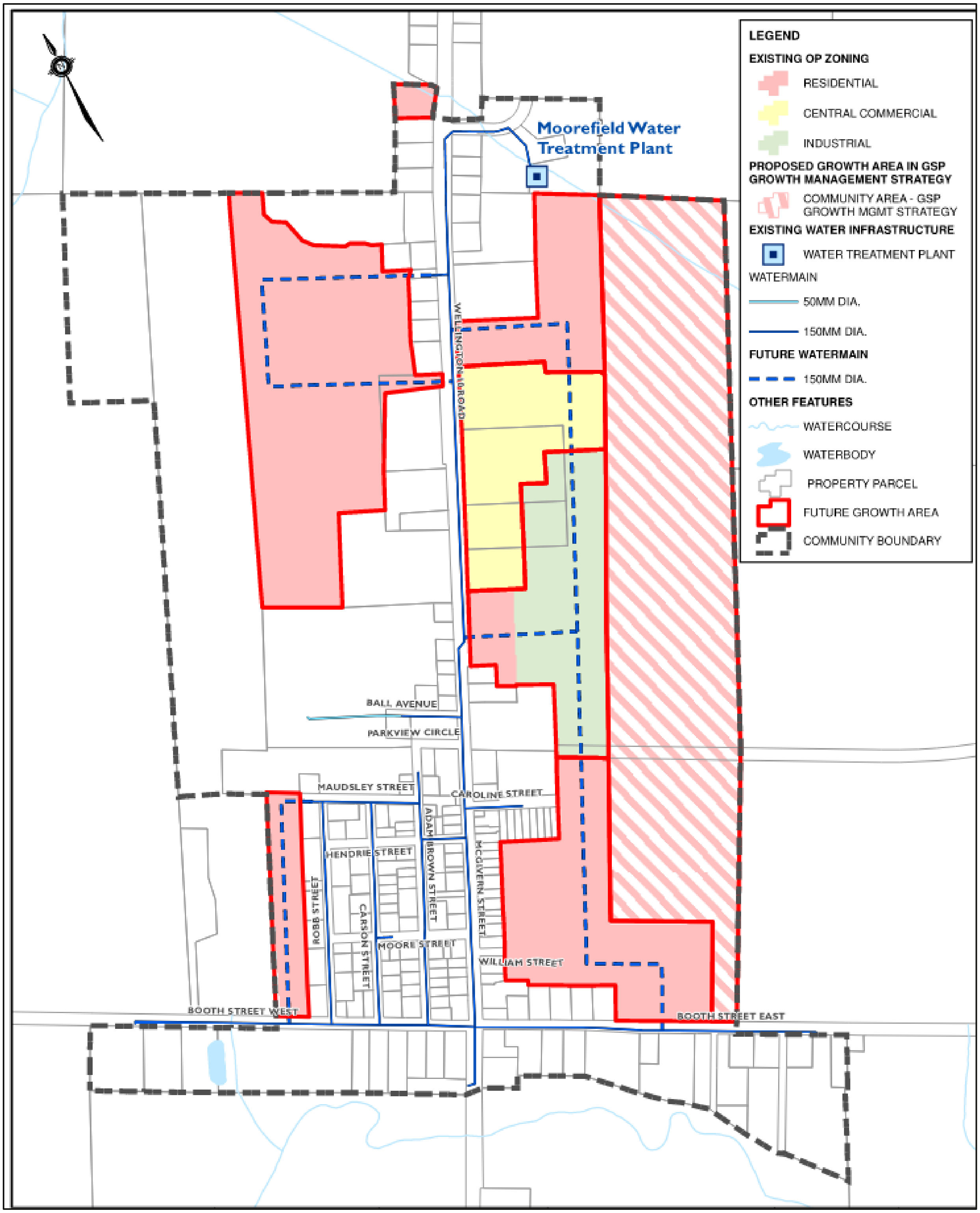

Figure 4-4: Moorefield Distribution System Upgrades – No Municipal Fire Protection

4.2.2 Supply

Upon completion of the well rehabilitation and third well addition at the Moorefield Water System, the total taking rate for the system will be 30 L/s. Based on the ultimate flow projections for the maximum daily demand, there would be sufficient well capacity with one well pump offline.

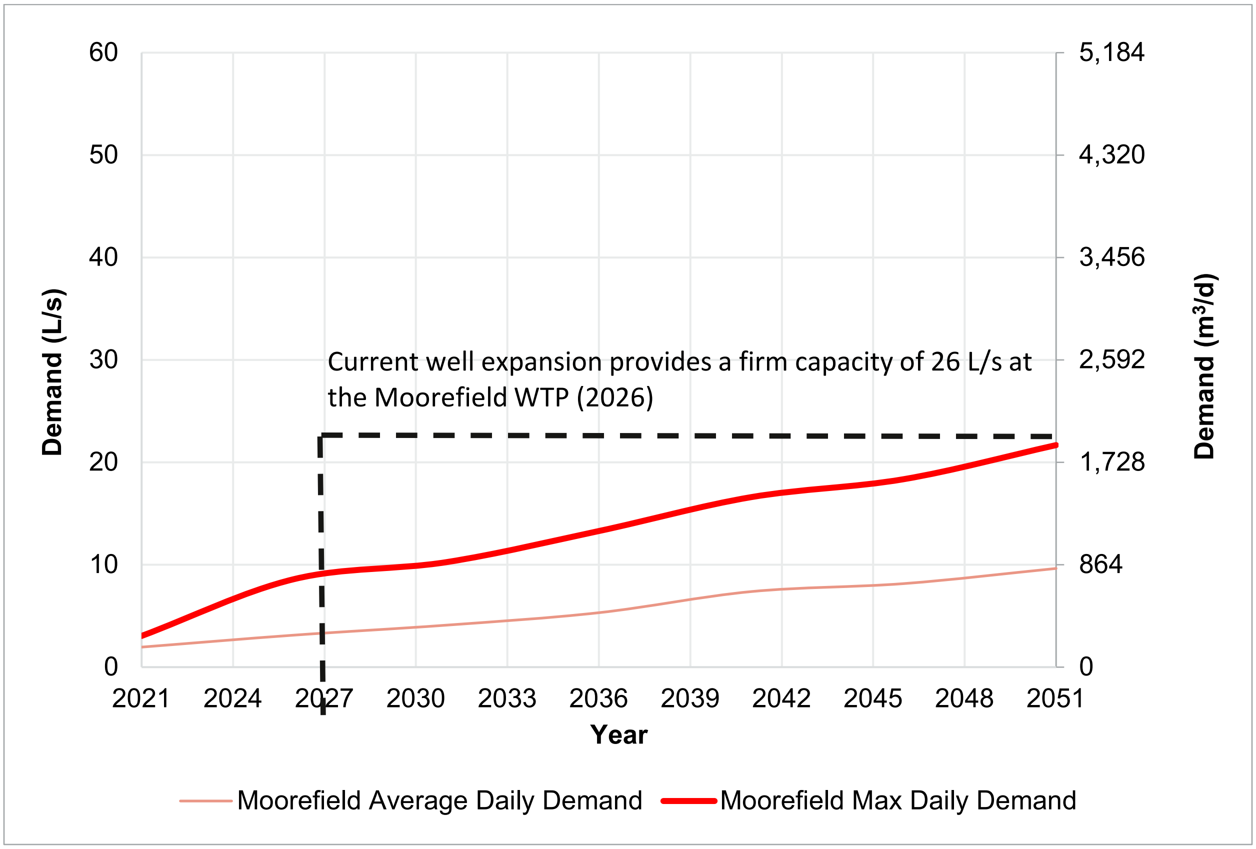

Figure 4-5: Water Demand in Moorefield from 2021 to 2051

4.2.3 Storage Alternatives

4.2.3.1 No Fire Protection from Drinking Water System

This alternative assumes that the Township does not elect to provide Fire Protection through the municipal drinking water system. This alternative would be for Mapleton to continue to provide water service to residents and business but does not make any upgrades to the distribution system to ensure fire flows in Moorefield.

During the condition assessment inspections, corrosion was found on the underground piping to and from the standpipe indicating that it should be replaced (CIMA+, 2021a). The expansion of the existing standpipe is currently being addressed in the Mapleton Water renewal project. Twinning the standpipe would provide redundant storage and a total storage capacity of 775 m^3, which exceeds the minimum volume required and provides a redundant tank. It should be noted that adding a second standpipe would be considered a Schedule B Class EA. Two tanks add redundancy to the storage system for security of supply. The option of building onto the existing storage tank was reviewed, however this option would not address the redundancy requirements for taking storage tanks off-line for emergency, cleaning, repair, etc.

Once the second standpipe is online, this would allow the existing standpipe to be taken offline, inspected, and repaired according to the recommendation in the condition assessment. Currently, the standpipe expansion does not account for future fire flow protection for Moorefield. The fire storage requirement would be based on the MECP guidelines and the projected 20-year population within the Moorefield community. Fire flow requirements for the distribution system design are generally estimated based on the latest version of "Water Supply for Public Fire Protection – A Guide to Recommended Practice," prepared by Fire Underwriters Survey. The storage requirements are primarily based upon the *MECP Guidelines for the Drinking-Water Systems*, where:

Total Storage Requirement = A + B + C

and: A = Fire Storage (Based on population and MECP Tables)

B = Equalization Storage (25% Maximum Day Demand)

C = Emergency Storage (25% of the sum of A + B)

The following Table 4-7 is a summary of the water demand and storage volume calculations assuming fire flow protection is accounted for in the Moorefield standpipe expansion at 20-year population projection and the ultimate service population projection. One alternative to achieve this additional volume would be to simply add another standpipe to make up the storage deficit and would be similar to the existing glass-fused-to-steel standpipes. The existing WTP has adequate space to accommodate an additional standpipe for this volume and could be integrated into the existing system relatively easily.

Table 4-6: Water Demand and Storage Volume Calculations for Moorefield Standpipe Expansion

Description	Existing	2031	2041	2051
Residential Population	607	1,181	2,125	2,775
Total Average Daily Demand (ADD), (m^3/d)	163	354	638	833

Description	Existing	2031	2041	2051
Total Maximum Daily Demand (MDD), (m^3/d)	263	886	1,434	1,873
Peak Hour Factor (MOE Section 3.4.2)	4.13	3.75	3.38	3.38
Peak Hour Demand (L/s)	8.7	15.4	24.9	32.6
Fire Flow L/s (MOE - Table 8-1)	0	0	0	0
Fire Flow Duration (hours)	0	0	0	0
Fire Storage (A) (m^3)	**0**	**0**	**0**	**0**
Equalization Storage (B) (m^3)	125	221	359	468
Emergency Storage (C) (m^3)	31	171	261	288
Total Storage Requirement (A+B+C) (m^3)	**156**	**392**	**620**	**756**
Minimum Volume for Primary Disinfection (m^3) [1]	9.3	16.4	26.6	34.7

Note: [1] Based on residual chlorine concentration of 1 mg/L, 5°C water temperature and 4-log virus removal CT requirement

4.2.3.2 Alternative 2: Fire Protection from Drinking Water System

This alternative would involve expanding the storage volume of the two existing standpipes by adding glass-fused-to-steel plates to extend the height. Additional site work would be required to support the additional weight of a larger standpipes, but the storage footprint would remain the same. There would not be any additional piping or changes to the operational sequences required. This alternative would also involve the upgrade of the existing distribution system including the installation of a fire pump and fire hydrants through out the existing service area to provide fire protection. It would also require larger diameter watermains be designed for all the future growth areas than if no fire flow was required. This alternative would involve building a new elevated storage tank to replace the current standpipes. Given the total storage volume, including fire flows required for the ultimate design period, an elevated tank becomes an effective alternative to consider. This elevated tower would be similar to the tower in Drayton but could be built on the existing WTP site given there is adequate space.

Typically, these tanks have thicker steel plates than bolted steel tanks and would be supported by a concrete pedestal. It is anticipated that a valve room could be housed in the base of the concrete pedestal to provide isolation valving for the tank, future top-up chlorination and re-circulation equipment and instruments to monitor water level and chlorine residual in the tank.

Table 4-7: Water Demand and Storage Volume Calculations for Moorefield

Description	Existing	2031	2041	2051
Residential Population	607	1,181	2,125	2,775
Total Average Daily Demand (ADD), (m^3/d)	163	354	638	833
Total Maximum Daily Demand (MDD), (m^3/d)	263	886	1,434	1,873
Peak Hour Factor (MOE Section 3.4.2)	4.13	3.75	3.38	3.38
Peak Hour Demand (L/s)	8.7	15.4	24.9	32.6
Fire Flow L/s (MOE - Table 8-1)	38	64	95	95
Fire Flow Duration (hours)	2.0	2.0	2.0	2.0
Fire Storage (A) (m^3)	**0**	**461**	**684**	**684**
Equalization Storage (B) (m^3)	125	221	359	468
Emergency Storage (C) (m^3)	31	171	261	288
Total Storage Requirement (A+B+C) (m^3)	**156**	**853**	**1,303**	**1,440**
Minimum Volume for Primary Disinfection (m^3) [1]	9.3	16.4	26.6	34.7

Note: [1] Based on residual chlorine concentration of 1 mg/L, 5°C water temperature and 4-log virus removal CT requirement

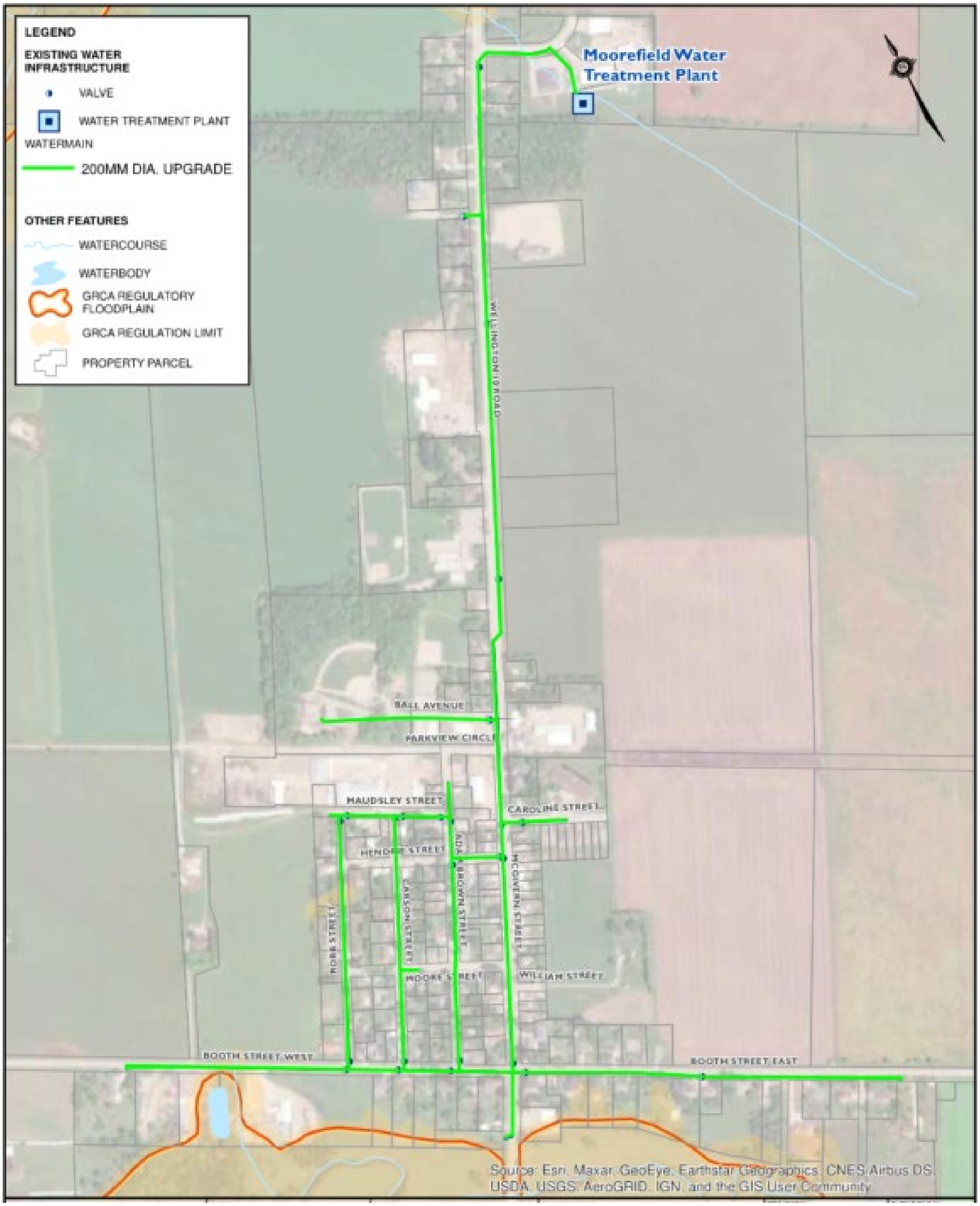

Figure 4-6: Fire Protection Upgrades

5 Development of Alternative Solutions for Wastewater Servicing

5.1 Wastewater Treatment - Mapleton WPCP

5.1.1 Future Growth

Preliminary population planning estimates for Mapleton indicate that the total ultimate (beyond 2051) service population within the existing urban boundaries could potentially increase from the existing 2,868 people in 2021 to approximately 7,754 people. This will result in a total average day flow of 2,119 m^3/d at the ultimate service population. For the design this Master Plan will use the 2041 projected flows for design with a population of 6,632 and total average daily flow of 1,830 m^3/d. The design flows determined in TM1 for Mapleton WPCP, based on the projected population growth in the serviced area are summarized in Table 5-1.

Table 5-1: Proposed Ultimate Design Criteria – Mapleton WPCP

Parameter	2031	2041	2051
Population	4,822	6,632	7,758
Projected Average Daily Flow	1,358 m^3/d	1,830 m^3/d	2,119 m^3/d
Projected Peak Factor	3.26	3.13	3.06
Projected Maximum Daily Flow	4,678 m^3/d	6,148 m^3/d	7,020 m^3/d
Projected total number of households for Drayton	1,110	1,400	1,580
Additional households for Drayton from 2021	260	550	730
Projected total number of households for Moorefield	360	660	880
Additional households for Moorefield from 2021	180	480	700

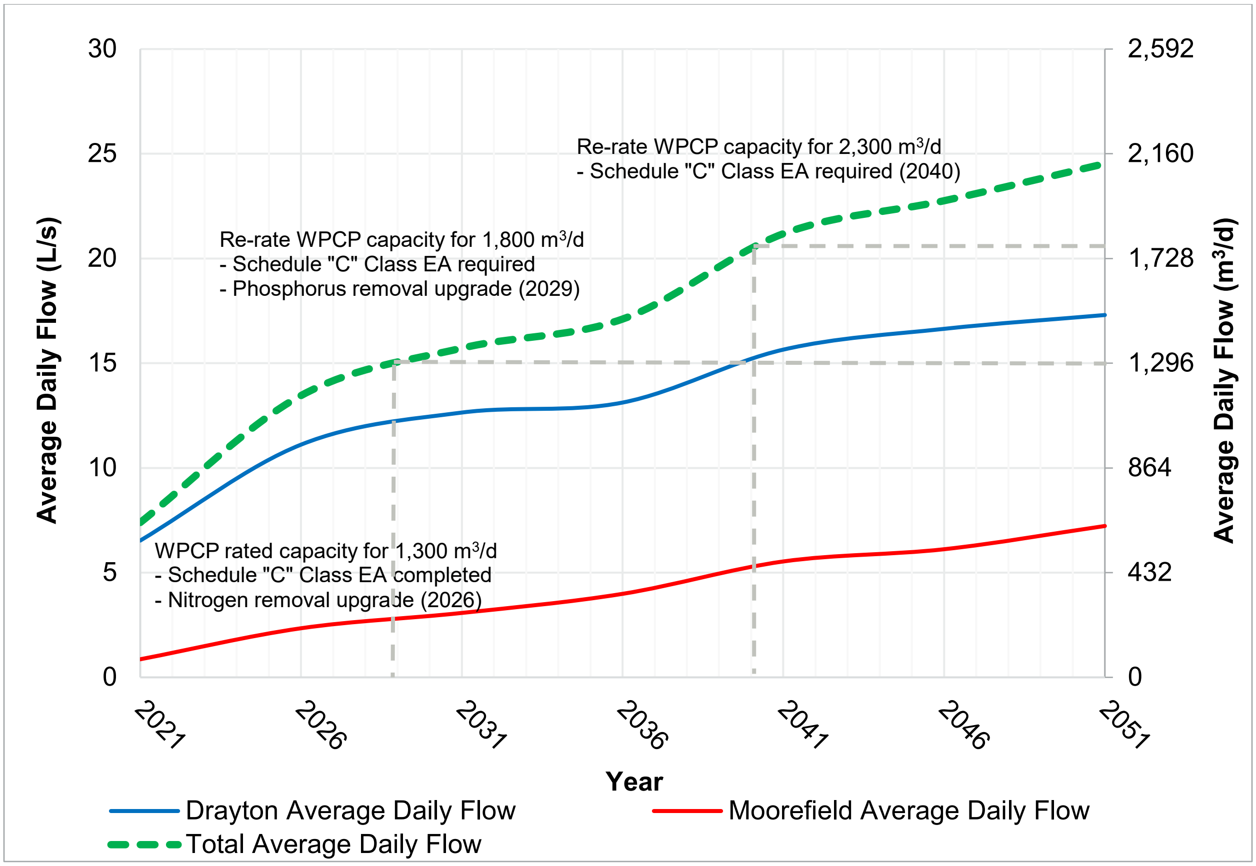

Figure 5-1: Projected Wastewater Flows for Mapleton WPCP

5.1.2 Nitrogen Removal Upgrades

Historic data and reports from the OCWA Operators and the Township have confirmed that the facility has not always discharged in the early spring because ammonia nitrogen limits could not be met due to insufficent nitrogen removal in the winter. (For example, there was no discharge in March 2017 due to ice cover and high ammonia nitrogen levels in the lagoons). The plant requires an additional treatment process to allow nitrogen removal during colder months, particularly with the proposed discharge window extension through January and February.

A moving bed biofilm reactor (MBBR) uses plastic carriers that provide a surface where a biofilm can grow. The plastic is usually a made of HDPE and would have a density close to water such that when it is mixed with aeration, it would enable good contact between the substrate in the raw wastewater and the biomass in the carriers. Since the biofilm carrier provides relatively large surface area for growth, the system can support a higher concentration of bacteria when compared to other processes. An MBBR could also be considered as a polishing option for nitrification after utilizing the existing lagoons for BOD_5 removal. This will reduce the cost and operating complexity of the MBBR alternative.

A pilot demonstration of the MBBR system was completed in 2019 at the Mapleton WPCP to establish the design basis for the expansion to 1,300 m^3/d. The pilot testing program of the MBBR technology for ammonia removal in cold water was successfully achieved. A complete sampling campaign was efficient in showing that the MBBR technology is suitable for application for removing ammonia during the winter months and is a viable option to accommodate future growth, considering the lagoon system will require additional treatment with respect to ammonia.

Proposed configurations of the MBBR tank include 4m or 5m in depth (depending on geotechnical requirements). The components of a polishing MBBR treatment alternative include:

- A concrete tank
- Stainless steel laterals and diffusers
- Blowers to provide oxygen for nitrification and mixing energy
- Cylindrical plastic carriers (25mm diameter) which float in the tank to provide a surface on which bacteria can grow.

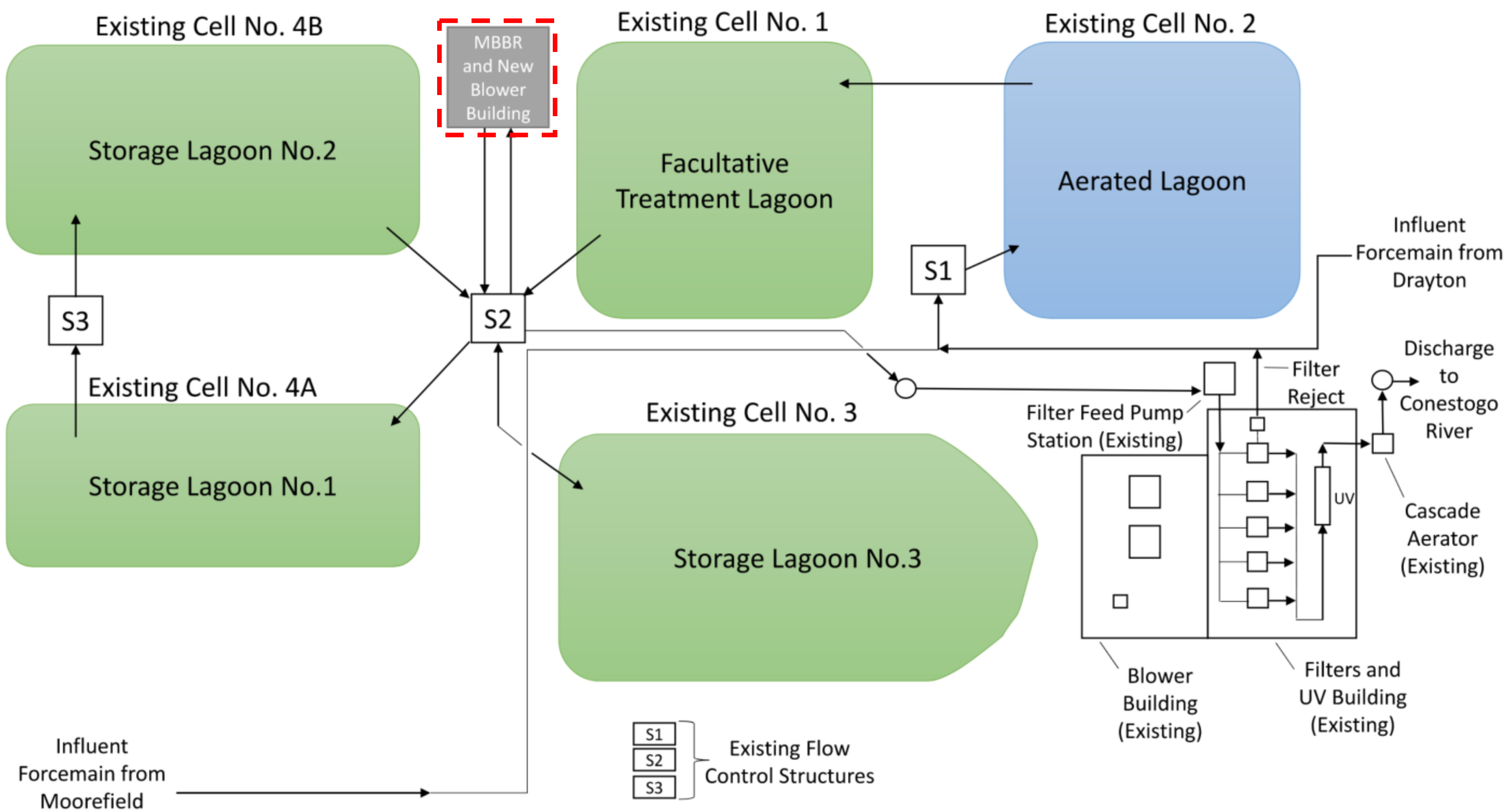

Figure 5-2: Preliminary MBBR Process Flow Diagram

5.1.3 Future Phosphorus Removal Alternatives

5.1.3.1 Alternative 1: Build a new mechanical treatment plant

A new mechanical plant would consist of the following new processes: screening, grit removal, aeration, and clarification; but would also make use of the existing optimized infrastructure for filtration, UV, and seasonal storage of treated effluent. The facultative lagoon treatment system could be abandoned in favour of a new mechanical plant based on conventional activated sludge processes. These processes may include a Sequencing Batch Reactor (SBR) or an extended aeration system. A new mechanical plant would consist of the following new processes:

- Screening
- Grit removal
- Aeration
- Clarification

The mechanical plant would also make use of the following but would also make use of the existing optimized infrastructure:

- Filtration
- UV
- Seasonal storage of treated effluent

Implementation of a mechanical plant would be possible given the current site and discharge criteria constraints at the Mapleton WPCP. However, the lagoons would still need to be maintained for seasonal storage due to the limitations of the receiving water.

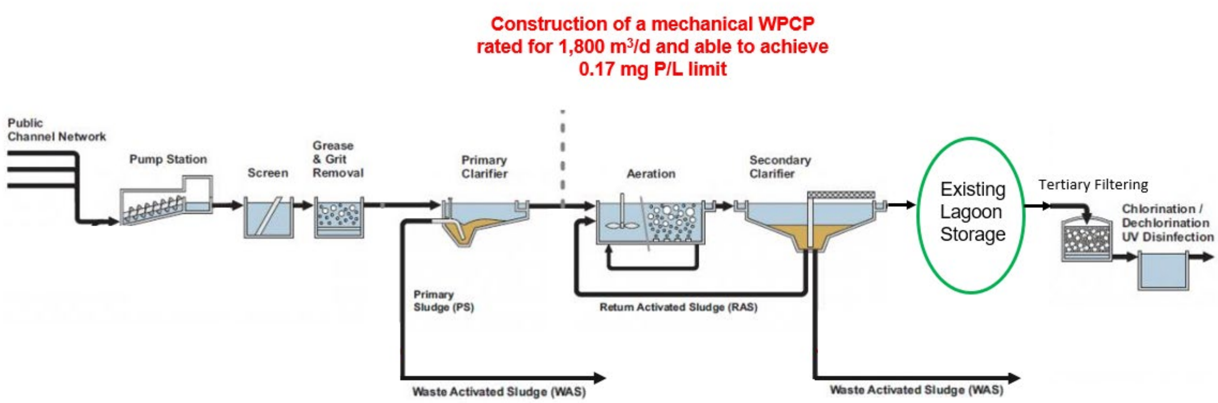

Figure 5-3: Alternative 1 – Build a New Mechanical Treatment Plant

5.1.3.2 Alternative 2: Phosphorus offsetting

Another alternative treatment solution that could be considered would be to treat the Township's agricultural industry and urban developments as non-point sources and offset the nutrient loadings to the Conestogo River. Phosphorus offsetting alternatives are being explored by the Region of Waterloo in the 2018 Wastewater Treatment Master Plan (CIMA+ and Hutchinson Environmental Sciences Ltd., 2018) and have been successfully implemented in other Ontario communities. Agriculture may contribute up to 75% of total phosphorus load to water courses from non-point sources. To reduce phosphorus loading from agricultural sources the following was recommended by the Canada-Ontario Agreement Partners (2017):

- Education within the agricultural sector to promote application of nutrients at the right time (i.e., less application during high runoff, non-growing season)
- Implementation of the "4Rs" program (i.e., right time, rate, source, and placement of nutrients)
- Work with agricultural sector to enhance and promote environmentally sustainable best practices including the use of cover crops during the non-growing season to reduce soil loss and field runoff
- Develop an Agricultural Soil Health and Conservation Strategy; and
- Develop a digital elevation model of the watershed to assist with environmental stewardship planning.

The GRCA does not have an existing phosphorus offsetting/trading policy or program; however, since 1998 it administers the Rural Water Quality Program (RWQP) on behalf of participating watershed municipalities to work with farmers to implement BMPs to improve water quality and mitigate phosphorus loadings (GRCA, 2013a). The program is considered to be very successful: since its inception, over 5,000 projects have been implemented throughout the Grand River watershed, with an estimation of 98% of enrolled farmers continuing in the program (Hutchinson Environmental Servcies Ltd. and CIMA+ Canada. , 2017).

Through the work that the GRCA has completed, the Conestogo sub-watershed was identified as a good candidate watershed where phosphorus offsetting can be implemented since it is a key source of phosphorus due to runoff of nutrients in the spring from livestock manure and fertilizer application (GRCA, 2013b). As such, phosphorus offsetting for WWTPs in this watershed could focus on implementing agricultural and rural non-farm BMPs to reduce phosphorus loads in spring runoff. Given the GRCA's successful program implementation history with the agricultural community, which represents most the Township's population, there is an opportunity for partnership between the Township and the GRCA to reduce nutrient loadings to the

Conestogo River. The proposed effluent TP objectives of 0.17 mg/L at an expanded capacity of 1,300 m^3/d, is achievable in the existing filters with optimized alum dosing, but this is nearing the limits of technology. As a result, investing in a phosphorus off-setting program will not offer the municipality value for this expansion; but could be considered for future expansions (i.e., 2029 flows).

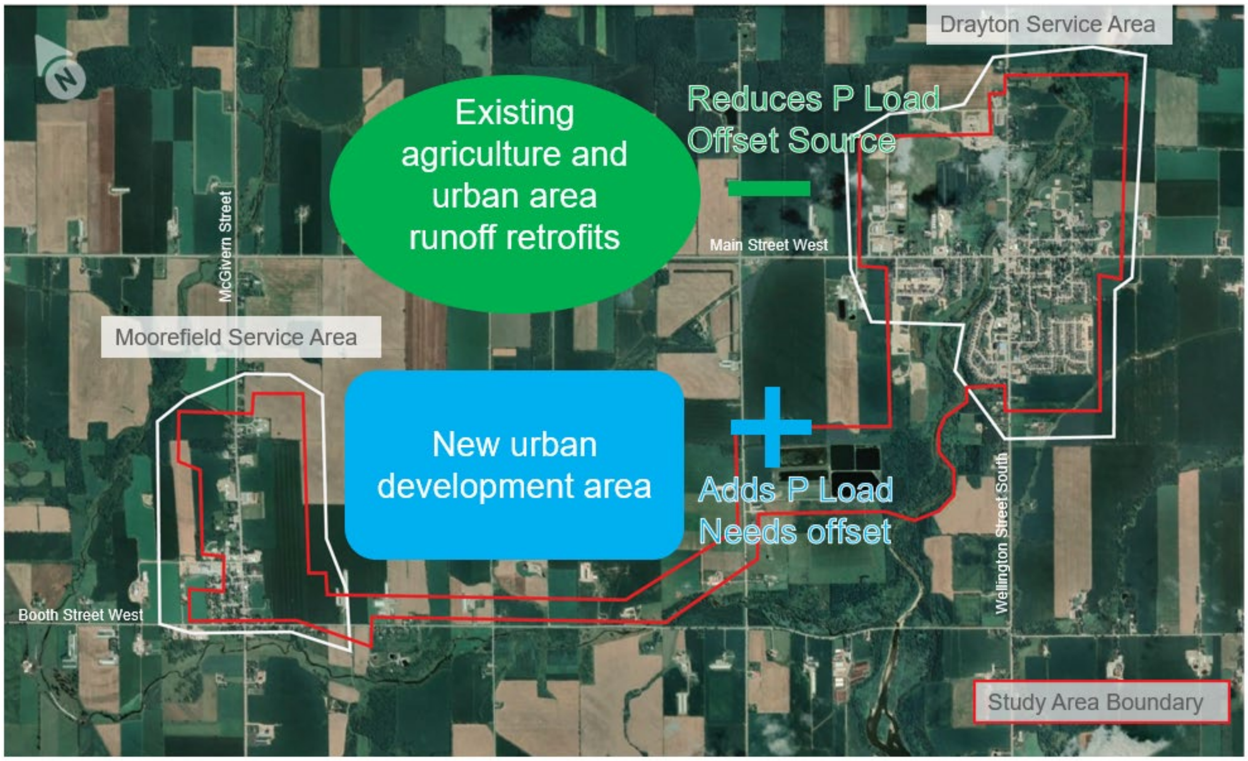

Figure 5-4: Alternative 2 – Phosphorus Offsetting Framework

5.2 Drayton Wastewater Collection System and SPS

5.2.1 Future Growth

Preliminary population planning estimates for Drayton indicate that the total ultimate (beyond 2051) service population within the existing urban boundaries will increase from the existing 1,502 people in 2018 to approximately 4,507 people by 2041. This will result in a total average day flow of 1,352 m^3/d at the ultimate service population. The design flows determined in TM1 for Drayton SPS, based on the projected population growth in the serviced area are summarized in Table 5-2.

Table 5-2: Proposed Ultimate Design Criteria – Drayton Sewage Pumping Station

	Design Parameter / Value	
	2041	2051
Future Population	4,507	4,983
Average Per Capita Flow (L/person/d)	300	300
Average Flow	1,352 m^3/d	1,495 m^3/d
Peaking Factor	3.29	3.25
Max Daily Flow	4,444 m^3/d (51.4 L/s)	4,853 m^3/d (56.2 L/s)
Peak Instantaneous Flow	6,696 m^3/d (77.5 L/s)	7,402 m^3/d (85.7 L/s)

The existing firm capacity of the existing station is 34.0 L/s and both the 2041 and 2051 projections for max daily flow are well above this capacity. The Drayton Pumping Station will need to be upgraded to service the future anticipated growth within the community and is already experiencing multiple overflow events in a given year.

The existing collection system was analyzed to confirm if there is sufficient capacity for the future growth. The GSP Growth Management report recommended the removal of potential residential development to the north-east of Drayton's build boundary due to constraints on developing these areas and suggested a repositioning of these lands to the south-east to accommodate forecasted growth to 2051. This analysis applied future residential growth to the existing designated areas in the south-east of Drayton, along with the additional areas recommended in the GSP report. The density of future development may vary so this analysis has assumed that all future development areas are developed to the Official Plan goal density of 40ppha. The design flow calculations for the Drayton Collection System are attached in Appendix B and are considered appropriate, but slightly conservative. Multiple scenarios were considered as connection points for the future residential, with all scenarios increasing the design flows above the full flowing capacity in some sections of the existing system.

The existing forcemain from the Drayton Pumping Station to the Mapleton WPCP is 200 mm in diameter and approximately 1.7 km long constructed in 1984. Preliminary calculations were performed to confirm the capacity of the forcemain in the future using the Hazen-Williams Equations with a roughness co-efficient C of 120.

For the anticipated maximum daily flow in 2041 of 51.4 L/s, the velocity in the existing forcemain would be approximately 1.64 m/s and there would be 27.1 m of headloss due to friction.

For the anticipated max daily flow for 2051 of 56.2 L/s, the velocity in the existing forcemain would be approximately 1.78 m/s and there would be 31.9 m of headloss due to friction.

Based on the above calculations it is expected that the existing forcemain from Drayton to the Mapleton WPCP has enough capacity to continue to remain in service up to 2051. Although the capacity of the forcemain is sufficient, the forcemain was constructed in 1984 and the Township may want to review the condition of the existing forcemain if it is to remain in service till 2051 which would be a 67-year service life.

5.2.2 SPS Alternatives

The current wastewater Infrastructure in Drayton is not sufficient to meet the future demands to service approved developments. In 2018, CIMA completed a Sanitary Sewer Collection System Capacity Assessment which evaluated the viable design alternatives will be evaluated on their ability to meet health and safety requirements, minimize environmental impacts, and meet the Township's commitments to servicing approved developments.

5.2.2.1 Alternative 1: Upgrade existing SPS

Alternative 1 is to upgrade the existing Drayton Sewage Pumping Station on the existing site. The upgrade would include new larger capacity pumps with variable frequency drive (VFD) motor starters to provide sufficient flexibility to pump a larger range in flows from the current and approved development areas. The existing site constraints including the size of the existing wet well and control building – which houses the generator and pump controls – will limit the ability to increase the capacity of the SPS. CIMA+ was advised that the original pumps were upsized approximately 15 years ago, and it is anticipated that the existing wet well does not have sufficient space to accommodate larger pumps. In addition, the increased power requirements of the new pumps and VFDs will make it very challenging to fit the larger motor starters and a larger generator inside the existing building footprint. It should be noted that under this option, the sanitary flows must cross the Conestogo River twice; once in a gravity sewer to the SPS, and a second time back across the river in a pressurized forcemain to convey flows to the WPCP. The original forcemain river crossing was replaced in 1994, and there is still some potential risk of failure associated with this crossing into the future. Upgrading the existing SPS pumps will not meet the expanded capacity needs and may only temporarily mitigate potential health and safety and environmental impacts. The existing generator would also need to be upgraded with TSSA certification.

5.2.2.2 Alternative 2: New SPS on the West Side of the River

This alternative involves constructing a new wet well on the west side of the Conestogo River, across from the existing Drayton SPS. The new wet well would be sized appropriately to accommodate the buildout flow of the entire community of Drayton while the new sewage pumps would be sized for the 20-year projected population.

The routing of existing sanitary sewer slopes toward the existing SPS site will require minimal alterations to existing infrastructure. A tie-in can be made to the existing SPS inlet manhole (PS1) to direct flow to the new wet well on the north side of the river with a section of new gravity sewer. There is sufficient undeveloped space on the north side of the river away from the existing residential neighbourhood to accommodate a new SPS, with sufficient buffer from existing residences. A SPS on the north side of the river will intercept the majority of the approved development flow prior to the sewer river crossing. Under this option, only a single river crossing is required to convey flow – by gravity – from the south side to the north side of the river. The portion of the existing gravity sewer and forcemain that crosses the river can be decommissioned and abandoned following the commissioning of the proposed SPS. This will minimize future maintenance and replacement requirements and mitigates the risk of having pressurized piping under the river. The new SPS can be constructed offline until commissioning and tie-in to the existing collection system and forcemain is required. The existing wet well and emergency overflow can be kept in place and used for emergency storage or for emergency pumping in the future.

There is available space on the west side of the river opposite the existing Drayton SPS for the possible construction of a new SPS. Discussions with landowners under an options agreement will need to be coordinated and land acquisition may be required if this option is carried forward. The new wet well design must maintain the river's existing flood capacity by appropriate grading. A new sanitary sewer river crossing from Mill St. to King St. will be required to divert flows from the existing SPS wet well to the new SPS.

Figure 5-5 below show the approximate location of the proposed SPS adjacent to a newly constructed parking lot and playground just off Queen Street.

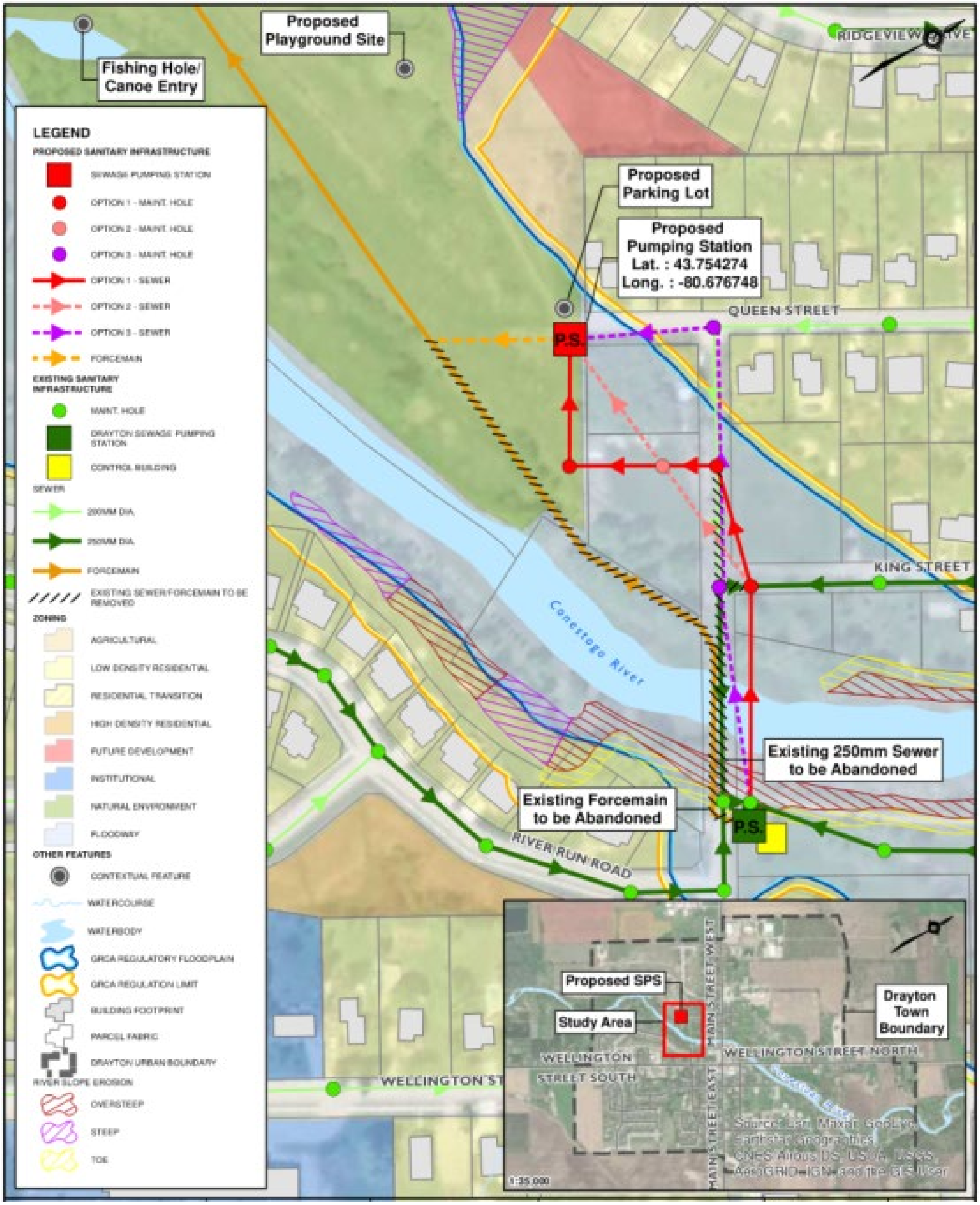

Figure 5-5: Location of the new Drayton SPS alternative on North side of the Conestoga River

5.2.2.3 Alternative 3: Maintain existing Drayton SPS and construct a new SPS on the West side of the River

This alternative involves constructing a new wet well on the west side of the Conestogo River, across from the existing Drayton SPS. The new wet well would be sized appropriately to accommodate the buildout flow for only a portion of Drayton while the existing SPS would remain in operation to service the portion of the community east of the River. This alternative would involve the twinning of the existing forcemain for the new SPS.

5.2.2.4 Alternative 4: New SPS with onsite emergency storage

This alternative involves the addition of an emergency storage volume to the new SPS to accommodate peak flow events. The station would include a wet well and an emergency storage tank to suppress the peak flows. The requirements for the new SPS on the west side of the river appears to include adequate space within the site to accommodate the added volume for emergency storage. Given that the existing Town-owned property is relatively flat and has adequate setback from the river, the installation of emergency storage should not require acquiring additional property. Washroom facilities can be integrated to the new SPS building that would service the adjacent playground site. An example of an emergency storage tank with a SPS wet well is shown below in Figure 5-6.

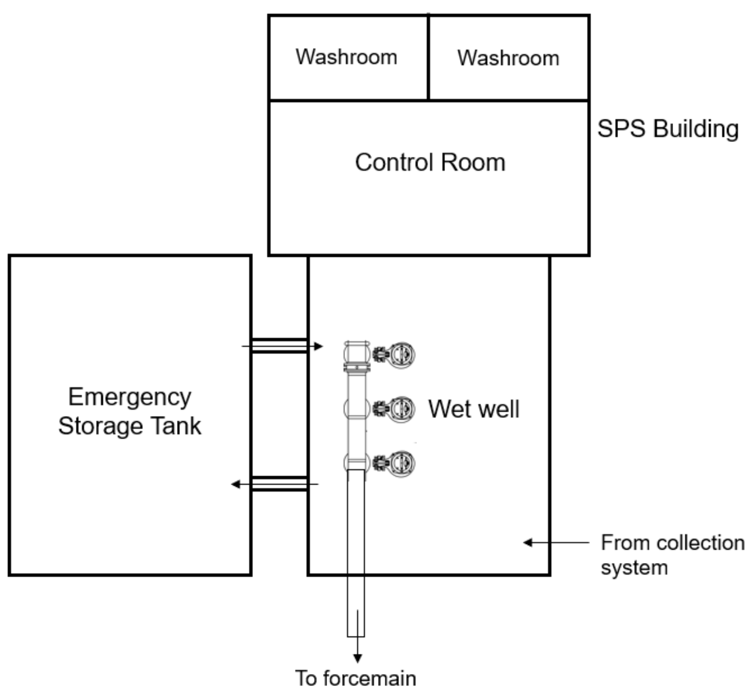

Figure 5-6: Alternative 4 Example for an Emergency Storage Tank and Wet Well Configuration for the New SPS

5.2.3 Collection System and Forcemain Alternatives

The existing gravity system does not have enough capacity to service all the future development areas in Drayton as identified in Section 5.2.1. Three alternatives have been preliminarily identified for consideration.

5.2.3.1 Alternative 1: Upgrade Existing Gravity Sewers

Alternative 1 would involve connecting the future growth areas to the existing gravity sewer system and upsizing the existing sewers which will be unable to handle the additional flows. This option is the simplest to move forward with in that it does not involve the addition of any equipment to be operated and maintained in the future. Further analysis should be completed to confirm if the existing topography supports the future growth areas using a gravity network to connect into the existing sewers. The Township can upgrade the size of these existing sewers as development progresses.

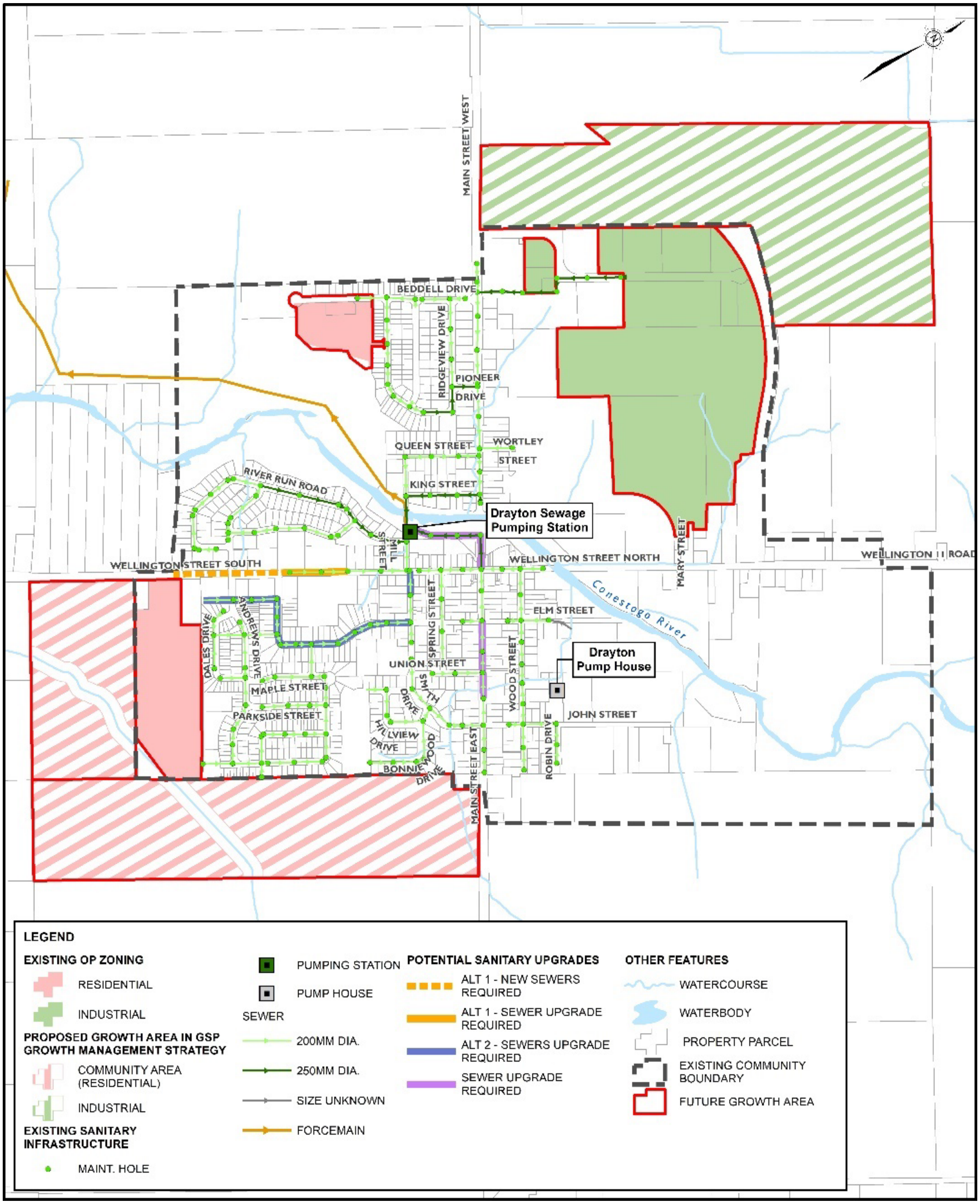

Figure 5-7: Drayton Wastewater Gravity Sewer Upgrades

5.2.3.2 Alternative 2: Build Local Pumping Station and Forcemain to the Existing Drayton SPS or New SPS

Alternative 2 would involve the construction of a new local pumping station within the future development areas and a new forcemain from the local pumping station to flows to either downstream of the gravity sewers that are over capacity or directly to the existing Drayton SPS site or a new SPS. This option would have the benefits of not requiring upgrades to the existing sewers or impacting service to the existing customers but would likely be more costly than Alternative 1 and require ongoing operation and maintenance into the future.

5.2.3.3 Alternative 3: Build Local Pumping Station and Forcemain to the Mapleton WPCP

Alternative 3 would involve the construction of a new local pumping station within the future development area along with the construction of a new forcemain directly to the Mapleton WPCP. This option has the benefits of not requiring upgrades to the existing sewers and will not put additional demand on the existing Drayton SPS and forcemain to the WPCP. This option would likely be more costly than Alternative 1, require ongoing operation and maintenance into the future, and may require the acquisition of additional land depending on the route of the forcemain to the WPCP.

5.3 Moorefield Wastewater Collection System and SPS

5.3.1 Future Growth

It is expected that the Moorefield SPS will reach its maximum capacity when the population of Moorefield reaches about 1,934 people which is expected to happen by 2040 based on the current Official Plan.

Table 5-3: Proposed Ultimate Design Criteria – Moorefield Sewage Pumping Station

	Design Parameter / Value	
	2041	2051
Future Population	2,125 people	2,775 people
Average Per Capita Flow	225 L/cap/d	225 L/cap/d
Average Flow	478 m^3/d	624 m^3/d
Peaking Factor	3.57	3.47
Max Daily Flow	1,705 m^3/d (19.7 L/s)	2,167 m^3/d (25.1 L/s)

The existing forcemain from the Moorefield Pumping Station to the Mapleton WPCP is a 150mm in diameter and approximately 4.96 km long constructed in 2007. Preliminary calculations were performed to confirm the capacity of the forcemain in the future using the Hazen-Williams Equations with a roughness co-efficient C of 120.

At the current firm capacity of 14.1 L/s, the velocity in the existing forcemain would be approximately 0.8 m/s and there would be roughly 28.8 m headloss due to friction which are both within a reasonable range and the forcemain does not need upgrades to continue supporting the existing population.

For the anticipated max daily flow in 2041 of 19.7 L/s, the velocity in the existing forcemain would be approximately 1.1 m/s and there would be 53.4 m of headloss due to friction.

For the anticipated max daily flow for 2051 of 25.1 L/s, the velocity in the existing forcemain would be approximately 1.4 m/s and there would be 83.7 m (119 psi) headloss due to friction. Although the velocity in this scenario is acceptable, the headloss from friction would exceed the pipe strength capacity. As such, the existing forcemain does not have sufficient capacity to convey the projected 2051 flows.

To assess the capacity off the existing low pressure sanitary sewer and if it is capable of supporting the future growth in Moorefield, an excel spreadsheet was created based on the EOne technical reference, Low Pressure Sewer Systems using Environment One Grinder Pumps (Corporation, Environment One) and existing record drawings of the Moorefield Sanitary Sewer network. The preliminary calculations show that the existing network is capable of handling the existing flows although some areas experiencing velocities under the required scour velocity of 0.6 m/s. With the majority of the potential area for proposed development being located to the west of McGivern Street, all of the future flows were applied at one point on McGivern Street north of Ball Ave. See Figure 2-2 for the layout of the existing low pressure sanitary system and the approximate location where future flows were applied for preliminary calculations, see Appendix B for calculations. On a preliminary basis to assess the capacity of the existing low-pressure sewer network in Moorefield would be able to accommodate the additional flows from the Future Development up to 2041. Calculations for the Ultimate population in 2051 show sections of the low-pressure sewer being above the recommended criteria of 185 ft of head and the Township would need to look into different servicing options beyond 2041.

Table 5-4: Evaluation of Moorefield Low-Pressure Sewer Capacity

	Existing	2041	2051
Population	607	2,125	2,775
Households	180	660	880
Max Pumps Operating	11	25	32
Maximum Flow [1]	7.6 L/s	17.3 L/s	22.2 L/s

Notes: [1] EOne manual suggests the use of 11gpm (0.7 L/s) per pump operating

5.3.2 SPS Alternatives

5.3.2.1 Alternative 1: Upgrade the existing SPS equipment

Alternative 1 is to upgrade the existing Moorefield Sewage Pumping Station equipment on the existing site. Additional flows from new developments in each study area will be directed to the existing pumping station. Upgrading the station at its current location to accommodate the planned growth, may be possible by replacing the pumps with high-capacity pumps equipped with variable frequency drives. The existing generator would also need to be upgraded with TSSA certification. Keeping the existing pumping station and wet well in operation during construction will be an important consideration.

5.3.2.2 Alternative 2: Build a New SPS on a New or Existing Site

Alternative 2 is to build an entirely new pumping station with capacity to pump ultimate design flows to the Mapleton WPCP. Building a new pumping station separate of the existing station will allow for the existing station to remain in service while the new station is being built. All future development flows will be directed to the new SPS, and the existing flows will be diverted to the new SPS once operational. Keeping the existing pumping the existing forcemain would likely also need to be upgraded or twinned in this scenario.

5.3.2.3 Alternative 3: Build a Local SPS and New Forcemain to the Mapleton WPCP

Alternative 3 would involve the construction of a new sewage pumping station and new forcemain to the existing Mapleton WPCP to service the new development areas. For this Alternative, the existing SPS would continue to operate to service existing developed areas, but new development flows would be directed to a new local pumping station so that the existing pumping station would not need to be upgraded. Pumped wastewater would be conveyed through the existing forcemain to the WPCP.

5.3.2.4 Alternative 4: Build a Local SPS and New Forcemain to the Existing Moorefield SPS Site, Upgrade the Existing Moorefield SPS and Forcemain

Alternative 4 would involve the construction of a new local sewage pumping station to service the new development areas to the North along with a new forcemain to the existing pumping station and upgrades to the existing Moorefield SPS. This option would give the option for the new developments to be serviced by gravity collection system to the new local pumping station and would not max out the capacity of the existing low-pressure sewer system. Flows would still be conveyed to the existing station and the existing station would need to be upgraded. The existing forcemain would likely also need to be upgraded or twinned in this scenario. Pumped wastewater would be conveyed through the existing forcemain to the WPCP.

5.3.3 Collection and Forcemain Alternatives

5.3.3.1 Alternative 1: Retain Servicing by Low-Pressure Sewers

Alternative 1 is to continue sanitary sewer collection through low-pressure sewers. Moorefield’s current sanitary sewer network is a low-pressure sewer making this option the most cost effective to move forward with for the servicing of future growth. Currently the low-pressure sewer is servicing about 600 people and all wastewater is directed to the Moorefield SPS on Booth Street East. Preliminary calculations suggest that some areas may not be achieving scour velocities in the existing low pressure forcemain, but the Township has not noted any issues in the existing network.

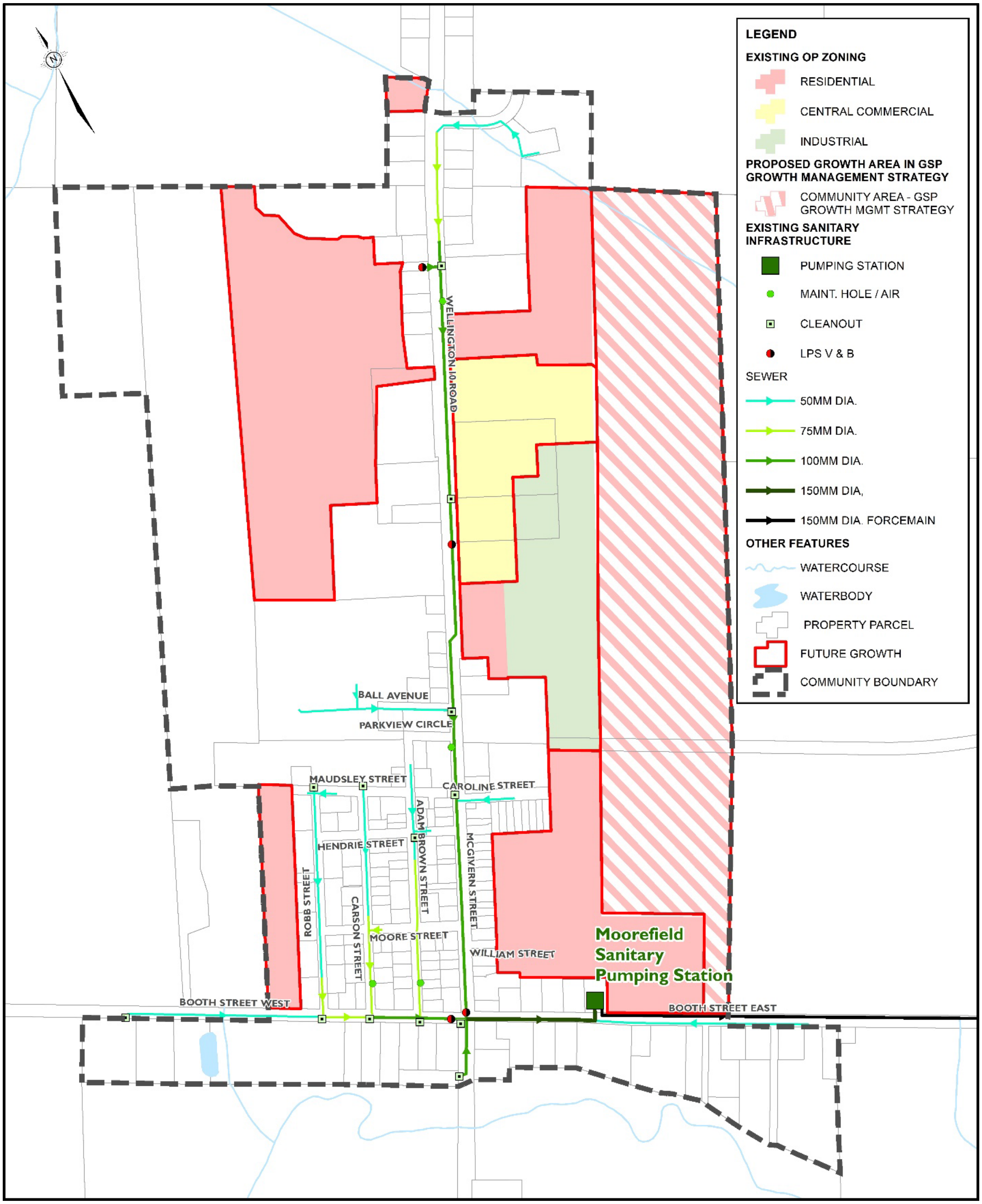

Figure 5-8: Moorefield Wastewater Low-Pressure Sewers

5.3.3.2 Alternative 2: Convert to Conventional Gravity Collection System

Alternative 2 would be to install gravity sewers in the entirety of Moorefield to replace and expand upon the current system, with all wastewater directed to the existing Moorefield SPS on Booth Street East. This alternative would remove the reliance on mechanical grinder pumps, the reliance on homeowners to operate and maintain these pumps and eliminate issues caused by potential power outages. Although this alternative removes many operational issues, it would be the most expensive, requiring a complete rebuild of the sanitary sewer system in Moorefield. The existing topography has the existing ground at the pumping station at 406m and some of the existing serviced area having existing ground elevations of 403.5m. If a gravity system were designed to service the whole community, it would be expected that the sewers could reach depths greater than 6m to work with the existing topography making this option more costly.

To service the entire community by gravity would also require that a new sewage pumping station be built or require major modifications to the existing pumping station and wet well to accommodate the new lower invert of a gravity main coming into the station.

The existing Moorefield SPS may not be well suited to service the entire community, especially if a communal gravity sewer is installed. As described in section 5.3.1, the Moorefield SPS is not adequately sized to service the community's needs to 2041, therefore, additional pumping stations may provide a better servicing alternative for the community.

5.3.3.3 Alternative 3: Hybrid Solution – Conventional Gravity Collection for New Development

An alternative to an entirely gravity or entirely low-pressure sewer network would be to do a combination of both. A trunk gravity sewer could be installed from the existing pumping station location on Booth Street East to McGivern Road, and then along McGivern Road to a location north of the Maryborough Public School depending on where it is expected future development would connect. The main areas of town and the existing low-pressure sewer could be modified to connect into the gravity sewer at different locations instead of pumping all of the way to the existing SPS.

5.4 Cost Estimates

Estimates of probable capital, operating and maintenance costs and life cycle costs have been developed for each associated water and wastewater servicing alternative.

5.4.1 Capital Costs

Capital costs generally include the following:

- Costs of upgrades to the existing treatment facilities, distribution and collections systems are specific to the requirement of each design concept developed under this study.
- Costs of new infrastructure, such as construction of pump stations, construction of subgrade tanks or pipe, and standby generators.
- Costs of major process equipment such as pumps, chemical systems, and instrumentation equipment.
- Demolition costs of existing infrastructure, specific to the requirement of each design concept.

The following general assumptions were made when developing the costs for the water servicing alternatives:

- Cost estimates are based on 2022 construction costs. Inflation and escalation for the actual expected prices at the time of construction cannot be accounted for at this time.
- Estimates of probable capital costs provided by CIMA+ have been developed on a conceptual design level and based on prices and data in CIMA+'s possession, as well as previous experience from projects of similar nature and scope.
- It is assumed that engineering cost is 15% of the total construction cost and contingency is assumed to be 30% of the total construction cost.
- In accordance with ASTM E 2516-06 (Standard Classification for Cost Estimate Classification System) the preliminary opinion of total project costs is anticipated to be within a range of -30% and +50%, based on a Class 5 level of accuracy. A Class 5 estimate is categorized as having completed between 0-2% project definition.
- All taxes (including the 13% HST) have been excluded.
- Any costs associated with necessary updates to the source water protection plan and pertinent hydraulic modeling have been excluded.

5.4.2 Operating and Maintenance Costs

The operating and maintenance costs accounted for electricity, chemical usage, and other general operating and maintenance cost for each facility. The O&M costs have been estimated based Town's historical consumption rates.

5.4.3 Life Cycle Costs

Life cycle costs (LCCs) were calculated based on a 20-year life expectancy. Life cycle costs have been estimated based on:

- A 20-year amortization period
- An inflation rate of 7% and an interest rate of 4%

Estimates of the 2022 capital costs, 2022 O&M costs, and the 20-year LCCs are summarized in Table 5-5 and Table 5-6.

Table 5-5: Summary of Cost Estimates for the Water Servicing Alternatives

Alternative	2023 Capital Cost	2023 Annual O&M Cost	20-Year Life Cycle Cost
Drayton Drinking Water System			
Supply Alternative 1: Increase the capacity of the existing wells	$894,000	$64,000	$3,095,000
Supply Alternative 2: Build a new well on the existing site to increase capacity	$1,439,000	$64,000	$3,660,000
Supply Alternative 3: Build a new well on another site to increase capacity	$2,351,000	$90,000	$5,485,000
Water distribution extension at Wellington Street South	$197,000	$14,000	$679,000
Water distribution extension at County Road 11, near Drayton Industrial Drive	$690,000	$14,000	$1,190,000
Water distribution extension at Main Street East	$131,000	$14,000	$611,000
Moorefield Drinking Water System			
Storage and Distribution Alternative 1: No Fire Flow Service	N/A	N/A	N/A
Storage and Distribution Alternative 2: Fire Flow Service	$10,174,000	$39,000	$11,858,000

Table 5-6: Summary of Cost Estimates for the Wastewater Servicing Alternatives

Alternative	2023 Capital Cost	2023 Annual O&M Cost	20-Year Life Cycle Cost
Mapleton WPCP			
Nitrogen Removal Upgrades with Moving Bed Bioreactor (MBBR) system	$5,800,000	$113,000	$9,837,000
Drayton SPS and Collection System			
SPS Alternative 1: Upgrade existing SPS	$2,825,000	$21,000	$3,638,000
SPS Alternative 2: Build a new SPS on the North side of the river	$3,231,000	$21,000	$4,058,000
SPS Alternative 3: Maintain existing Drayton SPS and construct a new SPS on the North side of the river	$3,724,000	$21,000	$4,569,000
SPS Alternative 4: Build a new SPS with onsite emergency storage	$5,157,580	$21,000	$6,053,000
Collection and Forcemain Alternative 1a: Upgrade gravity sewers on Wellington Street South	$701,000	$0	$726,000
Collection and Forcemain Alternative 1b: Upgrade gravity sewers on Main Street East near the existing Drayton SPS	$453,000	$0	$470,000
Collection and Forcemain Alternative 1c: Upgrade gravity sewers on Main Street East	$301,000	$0	$312,000
Collection and Forcemain Alternative 1: Upgrade existing gravity sewers (sum total of Alternative 1a, 1b and 1c)	$1,455,000	$0	$1,508,000
Collection and Forcemain Alternative 2: Build a local pumping station and forcemain	$2,709,000	$22,000	$3,552,000
Collection and Forcemain Alternative 3: Build Local Pumping Station and Forcemain to the Mapleton WPCP	$4,897,000	$22,000	$5,817,000

Alternative	2023 Capital Cost	2023 Annual O&M Cost	20-Year Life Cycle Cost
Moorefield SPS and Collection System			
SPS Alternative 1: Upgrade existing SPS equipment	$402,000	$15,000	$925,000
SPS Alternative 2: Build a new SPS on a new or existing site	$2,897,000	$21,000	$3,712,000
SPS Alternative 3: Build a Local SPS and New Forcemain to the Mapleton WPCP	$6,798,000	$20,000	$7,718,000
SPS Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, Upgrade the existing Moorefield SPS and forcemain	$9,483,000	$25,000	$10,838,000
Collection and Forcemain Alternative 1: Low-pressure sewers	$145,000	$0	$151,000
Collection and Forcemain Alternative 2: All gravity sewers	$1,088,000	$0	$1,127,000
Collection and Forcemain Alternative 3: Combination gravity sewer and low-pressure sewers	$7,801,000	$0	$8,079,000

6 Next Steps

The next steps of the project comprise the development of an evaluation framework to be used in the assessment of the alternative solutions and design concepts developed for this Master Plan. Alternative solutions, as outlined in this memorandum, will be screened in conformance with the methodology set up in evaluation framework. Alternative solutions that pass the screening step will be short-listed and carried forward for a more detailed assessment, otherwise the alternative solutions will be eliminated from further consideration. A separate technical memorandum will be prepared to document the proposed evaluation framework to be used in this Master Plan.

7 References

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A

Appendix A: Cost Estimates

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester		**Date:** 1-Dec-22
Revision No.:	0		**Revision Date:**

Costs for Tech Memo #2			
Water Servicing Alternatives	**Capital Cost Year 2023**	**O&M Costs Year 2023**	**Calculated Life Cycle Costs 20 Years**
Drayton Drinking Water System			
Supply			
Alternative 1: Increase the capacity of the existing wells	$894,000	$64,000	$3,095,000
Alternative 2: Build a new well on the existing site to increase capacity	$1,439,000	$64,000	$3,660,000
Alternative 3: Build a new well on another site to increase capacity	$2,351,000	$90,000	$5,485,000
Distribution			
Water distribution extension at Wellington Street South	$197,000	$14,000	$679,000
Water distribution extension at County Road 8, near Drayton Industrial Drive	$690,000	$14,000	$1,190,000
Water distribution extension at Main Street East	$131,000	$14,000	$611,000
Moorefield Drinking Water System			
Storage			
Alternative 1: Build another standpipe	$1,600,000	$5,000	$1,826,000
Alternative 2: Extend the exisitng standpipes	$1,015,000	$5,000	$1,221,000
Alternative 3: Build an elevated storage tank	$7,559,000	$29,000	$8,811,000
Distribution			
Alternative 1: No fire flow protection for watermains	N/A	N/A	N/A
Alternative 2: Watermains sized for fire flow	$3,343,000	$8,000	$3,733,000
Total			
Alternative 1: No fire flow protection	N/A	N/A	N/A
Alternative 2: Fire flow protection	$10,902,000	$37,000	$12,544,000
Wastewater Servicing Alternatives	**Capital Cost Year 2023**	**O&M Costs Year 2023**	**Calculated Life Cycle Costs 20 Years**
Mapleton WPCP			
Nitrogen Removal Upgrade with MBBR System	$5,800,000	$113,000	$9,837,000
Drayton SPS			
Alternative 2: New SPS on the North side of the river	$3,811,000	$22,000	$4,693,000
Alternative 3: Maintain existing Drayton SPS and construct a new SPS on the North side of the river	$4,640,000	$23,000	$5,585,000
Alternative 4: New SPS with onsite emergency storage	$5,157,580	$21,000	$6,053,000
Drayton Collection System and Forcemain			
Alternative 1a: Upgrade gravity sewers on Wellington Street South	$701,000	$0	$726,000
Alternative 1b: Upgrade gravity sewers on Main Street East near the existing Drayton SPS	$453,000	$0	$470,000
Alternative 1c: Upgrade gravity sewers on Main Street East	$301,000	$0	$312,000
Alternative 1: Upgrade the existing gravity sewers	$1,455,000	$0	$1,508,000
Alternative 2: Build a local pumping station and forcemain to the exisintg Drayton SPS or New SPS	$2,709,000	$22,000	$3,552,000
Alternative 3: Build a local pumping station and forcemain to the Mapleton WPCP	$4,897,000	$22,000	$5,817,000
Moorefield SPS			
Alternative 1: Upgrade existing SPS	$957,000	$18,000	$1,602,000
Alternative 2: Build a new SPS	$2,897,000	$21,000	$3,712,000
Alternative 3: Build a Local SPS and new forcemain to the Mapleton WPCP	$6,798,000	$20,000	$7,718,000
Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, upgrade the existing Moorefield SPS and forcemain	$9,483,000	$30,000	$10,838,000
Moorefield Collection System and Forcemain			
Alternative 1: Low-pressure sewers	$145,000	$0	$151,000
Alternative 2: All Gravity Sewers	$7,801,000	$0	$8,079,000
Alternative 3: Combination gravity sewer and low-pressure sewers	$1,088,000	$0	$1,127,000

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Increase the capacity of the existing wells

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 138,000	$ 138,000	incl.	$ -	$ 138,000		
Structural / Architectural	1	LS	$ 120,950	$ 120,950	incl.	$ -	$ 121,000		
Mechanical & HVAC	1	LS	$ 14,000	$ 14,000	incl.	$ -	$ 14,000		
Electrical, Instrumentation and Control	1	LS	$ 157,100	$ 157,100	incl.	$ -	$ 158,000		
Civil	1	LS	$ 185,000	$ 185,000	incl.	$ -	$ 185,000		
Sub-total Capital Cost =								**$ 616,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 616,000**	
Contingency (30%) =								**$ 185,000**	
Engineering and Construction (15%) =								**$ 93,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 894,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		108,916	kWh	$ 0.18	$ 19,605		$0.18/kWh, one 100 kW pump, 4 hr/d
					Sub-Total =	**$ 19,605**	
Chemical Systems		11,033	$/L	$ 0.75	$ 8,275		Average chlorine use for disinfection
		2,991	$/L	$ 0.75	$ 2,243		Average sodium silicate use for iron sequestration
					Sub-Total =	**$ 10,520**	
Miscellaneous O&M		1	LS	$ 1,380	$ 1,380		1% of Equipment Cost
					Sub-Total =	**$ 1,380**	
Labour		416	LS	$ 50	$ 20,800		$50/hr; 8 hr/wk
					Sub-Total =	**$ 20,800**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 53,000**	
Contingency (20%) =						**$ 11,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 64,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Increase the capacity of the existing wells

LIFE CYCLE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYCLE COST

Alternative 1: Increase the capacity of the existing wells

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$894,000		$64,000		
2024	$962,838	$925,806	$68,928	$66,277	$992,083
2025	$0	$0	$79,952	$73,920	$73,920
2026	$0	$0	$86,108	$76,550	$76,550
2027	$0	$0	$92,738	$79,273	$79,273
2028	$0	$0	$99,879	$82,093	$82,093
2029	$0	$0	$107,570	$85,014	$85,014
2030	$0	$0	$115,853	$88,038	$88,038
2031	$0	$0	$124,773	$91,171	$91,171
2032	$0	$0	$134,381	$94,414	$94,414
2033	$0	$0	$144,728	$97,773	$97,773
2034	$0	$0	$155,872	$101,252	$101,252
2035	$0	$0	$167,874	$104,854	$104,854
2036	$0	$0	$180,801	$108,584	$108,584
2037	$0	$0	$194,722	$112,447	$112,447
2038	$0	$0	$209,716	$116,448	$116,448
2039	$0	$0	$225,864	$120,591	$120,591
2040	$0	$0	$243,255	$124,881	$124,881
2041	$0	$0	$261,986	$129,324	$129,324
2042	$0	$0	$282,159	$133,925	$133,925
2043	$0	$0	$303,885	$138,689	$138,689
2044	$0	$0	$327,285	$143,623	$143,623
	Sub-Total NPV value =	$925,806		$2,169,140	
Total NPV value (20 years) =			**$3,095,000**		**$3,095,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a new well on the existing site to increase capacity

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 142,000	$ 142,000	incl.	$ -	$ 142,000		
Structural / Architectural	1	LS	$ 167,375	$ 167,375	incl.	$ -	$ 168,000		
Mechanical & HVAC	1	LS	$ 21,000	$ 21,000	incl.	$ -	$ 21,000		
Electrical, Instrumentation and Control	1	LS	$ 404,900	$ 404,900	incl.	$ -	$ 405,000		
Civil	1	LS	$ 256,000	$ 256,000	incl.	$ -	$ 256,000		
Sub-total Capital Cost =								**$ 992,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 992,000**	
Contingency (30%) =								**$ 298,000**	
Engineering and Construction (15%) =								**$ 149,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,439,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		108,916	kWh	$ 0.18	$ 19,605		$0.18/kWh, one 50 kW pump, 8 hr/d
					Sub-Total =	**$ 19,605**	
Chemical Systems		11,033	$/L	$ 0.75	$ 8,275		Average chlorine use for disinfection
		2,991	$/L	$ 0.75	$ 2,243		Average sodium silicate use for iron sequestration
					Sub-Total =	**$ 10,520**	
Miscellaneous O&M		1	LS	$ 1,420	$ 1,420		1% of Equipment Cost
					Sub-Total =	**$ 1,420**	
Labour		416	LS	$ 50	$ 20,800		$50/hr; 8 hr/wk
					Sub-Total =	**$ 20,800**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 53,000**	
Contingency (20%) =						**$ 11,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 64,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a new well on the existing site to increase capacity

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	44775
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 2: Build a new well on the existing site to increase capacity

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$1,439,000		$ 64,000		
2024	$1,549,803	$1,490,195	$68,928	$66,277	$1,556,472
2025	$0	$0	$79,952	$73,920	$73,920
2026	$0	$0	$86,108	$76,550	$76,550
2027	$0	$0	$92,738	$79,273	$79,273
2028	$0	$0	$99,879	$82,093	$82,093
2029	$0	$0	$107,570	$85,014	$85,014
2030	$0	$0	$115,853	$88,038	$88,038
2031	$0	$0	$124,773	$91,171	$91,171
2032	$0	$0	$134,381	$94,414	$94,414
2033	$0	$0	$144,728	$97,773	$97,773
2034	$0	$0	$155,872	$101,252	$101,252
2035	$0	$0	$167,874	$104,854	$104,854
2036	$0	$0	$180,801	$108,584	$108,584
2037	$0	$0	$194,722	$112,447	$112,447
2038	$0	$0	$209,716	$116,448	$116,448
2039	$0	$0	$225,864	$120,591	$120,591
2040	$0	$0	$243,255	$124,881	$124,881
2041	$0	$0	$261,986	$129,324	$129,324
2042	$0	$0	$282,159	$133,925	$133,925
2043	$0	$0	$303,885	$138,689	$138,689
2044	$0	$0	$327,285	$143,623	$143,623
	Sub-Total NPV value =	$1,490,195		$2,169,140	
	Total NPV value (20 years) =		**$3,659,400**		**$3,660,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a new well on another site to increase capacity

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 313,000	$ 313,000	incl.	$ -	$ 313,000		
Structural / Architectural	1	LS	$ 387,275	$ 387,275	incl.	$ -	$ 388,000		
Mechanical & HVAC	1	LS	$ 75,500	$ 75,500	incl.	$ -	$ 76,000		
Electrical, Instrumentation and Control	1	LS	$ 644,150	$ 644,150	incl.	$ -	$ 645,000		
Civil	1	LS	$ 199,000	$ 199,000	incl.	$ -	$ 199,000		
Sub-total Capital Cost =								**$ 1,621,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,621,000**	
Contingency (30%) =								**$ 486,300**	
Engineering and Construction (15%) =								**$ 243,200**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 2,350,500**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		108,916	kWh	$ 0.18	$ 19,605		$0.18/kWh, two 50 kW pumps, 4 hr/d
					Sub-Total =	**$ 19,605**	
Chemical Systems		11,033	$/L	$ 0.75	$ 8,275		Average chlorine use for disinfection
		2,991	$/L	$ 0.75	$ 2,243		Average sodium silicate use for iron sequestration
					Sub-Total =	**$ 10,520**	
Miscellaneous O&M		1	LS	$ 3,130	$ 3,130		1% of Equipment Cost
					Sub-Total =	**$ 3,130**	
Labour		832	LS	$ 50	$ 41,600		$50/hr; 16 hr/wk
					Sub-Total =	**$ 41,600**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 75,000**	
Contingency (20%) =						**$ 15,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 90,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a new well on another site to increase capacity

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 3: Build a new well on another site to increase capacity

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$2,350,500		$90,000		
2024	$2,531,489	$2,434,124	$96,930	$93,202	$2,527,325
2025	$0	$0	$112,432	$103,950	$103,950
2026	$0	$0	$121,089	$107,648	$107,648
2027	$0	$0	$130,413	$111,478	$111,478
2028	$0	$0	$140,455	$115,444	$115,444
2029	$0	$0	$151,270	$119,551	$119,551
2030	$0	$0	$162,918	$123,804	$123,804
2031	$0	$0	$175,462	$128,209	$128,209
2032	$0	$0	$188,973	$132,770	$132,770
2033	$0	$0	$203,524	$137,493	$137,493
2034	$0	$0	$219,195	$142,385	$142,385
2035	$0	$0	$236,073	$147,451	$147,451
2036	$0	$0	$254,251	$152,696	$152,696
2037	$0	$0	$273,828	$158,129	$158,129
2038	$0	$0	$294,913	$163,755	$163,755
2039	$0	$0	$317,621	$169,581	$169,581
2040	$0	$0	$342,078	$175,614	$175,614
2041	$0	$0	$368,418	$181,861	$181,861
2042	$0	$0	$396,786	$188,332	$188,332
2043	$0	$0	$427,339	$195,032	$195,032
2044	$0	$0	$460,244	$201,970	$201,970
	Sub-Total NPV value =	$2,434,124		$3,050,353	
	Total NPV value (20 years) =		**$5,484,500**		**$5,485,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil		LS	$ 135,000	$ 135,000	incl.	$ -	$ 135,000		*300m of 200mm watermain @ $900 / m*
Sub-total Capital Cost =								**$ 135,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 135,000**	
Contingency (30%) =								**$ 41,000**	
Engineering and Construction (15%) =								**$ 21,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 197,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh		$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L		$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS		$ -		
					Sub-Total =	**$ -**	
Labour		208	hr	$ 50	$ 10,400		$50/hr; 2 hr/wk
					Sub-Total =	**$ 10,400**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 11,000**	
Contingency (20%) =						**$ 3,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 14,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	`
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 1:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$197,000		$14,000		
2024	$212,169	$204,009	$15,078	$14,498	$218,507
2025	$0	$0	$17,489	$16,170	$16,170
2026	$0	$0	$18,836	$16,745	$16,745
2027	$0	$0	$20,286	$17,341	$17,341
2028	$0	$0	$21,849	$17,958	$17,958
2029	$0	$0	$23,531	$18,597	$18,597
2030	$0	$0	$25,343	$19,258	$19,258
2031	$0	$0	$27,294	$19,944	$19,944
2032	$0	$0	$29,396	$20,653	$20,653
2033	$0	$0	$31,659	$21,388	$21,388
2034	$0	$0	$34,097	$22,149	$22,149
2035	$0	$0	$36,722	$22,937	$22,937
2036	$0	$0	$39,550	$23,753	$23,753
2037	$0	$0	$42,595	$24,598	$24,598
2038	$0	$0	$45,875	$25,473	$25,473
2039	$0	$0	$49,408	$26,379	$26,379
2040	$0	$0	$53,212	$27,318	$27,318
2041	$0	$0	$57,309	$28,290	$28,290
2042	$0	$0	$61,722	$29,296	$29,296
2043	$0	$0	$66,475	$30,338	$30,338
2044	$0	$0	$71,593	$31,418	$31,418
	Sub-Total NPV value =	$204,009		$474,499	
	Total NPV value (20 years) =		**$678,600**		**$679,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil		LS	$ 1	$ 475,000	incl.	$ -	$ 475,000		*500m of 250mm watermain @ $950 / m*
Sub-total Capital Cost =								**$ 475,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 475,000**	
Contingency (30%) =								**$ 143,000**	
Engineering and Construction (15%) =								**$ 72,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 690,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh		$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L		$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS		$ -		
					Sub-Total =	**$ -**	
Labour		208	hr	$ 50	$ 10,400		$50/hr; 2 hr/wk
					Sub-Total =	**$ 10,400**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 11,000**	
Contingency (20%) =						**$ 3,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 14,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$690,000		$14,000		
2024	$743,130	$714,548	$15,078	$14,498	$729,046
2025	$0	$0	$17,489	$16,170	$16,170
2026	$0	$0	$18,836	$16,745	$16,745
2027	$0	$0	$20,286	$17,341	$17,341
2028	$0	$0	$21,849	$17,958	$17,958
2029	$0	$0	$23,531	$18,597	$18,597
2030	$0	$0	$25,343	$19,258	$19,258
2031	$0	$0	$27,294	$19,944	$19,944
2032	$0	$0	$29,396	$20,653	$20,653
2033	$0	$0	$31,659	$21,388	$21,388
2034	$0	$0	$34,097	$22,149	$22,149
2035	$0	$0	$36,722	$22,937	$22,937
2036	$0	$0	$39,550	$23,753	$23,753
2037	$0	$0	$42,595	$24,598	$24,598
2038	$0	$0	$45,875	$25,473	$25,473
2039	$0	$0	$49,408	$26,379	$26,379
2040	$0	$0	$53,212	$27,318	$27,318
2041	$0	$0	$57,309	$28,290	$28,290
2042	$0	$0	$61,722	$29,296	$29,296
2043	$0	$0	$66,475	$30,338	$30,338
2044	$0	$0	$71,593	$31,418	$31,418
	Sub-Total NPV value =	$714,548		$474,499	
	Total NPV value (20 years) =		**$1,189,100**		**$1,190,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester
Revision No.:	0

Date: 1-Dec-22
Revision Date:

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil		LS	$ 1	$ 90,000	incl.	$ -	$ 90,000		*100m of 200mm watermain @ $900 / m*
Sub-total Capital Cost =								**$ 90,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 90,000**	
Contingency (30%) =								**$ 27,000**	
Engineering and Construction (15%) =								**$ 14,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 131,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh		$ -		
	Sub-Total =					**$ -**	
Chemical Systems			$/L		$ -		
	Sub-Total =					**$ -**	
Miscellaneous O&M			LS		$ -		
	Sub-Total =					**$ -**	
Labour		208	hr	$ 50	$ 10,400		$50/hr; 2 hr/wk
	Sub-Total =					**$ 10,400**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 11,000**	
Contingency (20%) =						**$ 3,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 14,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$131,000		$14,000		
2024	$141,087	$135,661	$15,078	$14,498	$150,159
2025	$0	$0	$17,489	$16,170	$16,170
2026	$0	$0	$18,836	$16,745	$16,745
2027	$0	$0	$20,286	$17,341	$17,341
2028	$0	$0	$21,849	$17,958	$17,958
2029	$0	$0	$23,531	$18,597	$18,597
2030	$0	$0	$25,343	$19,258	$19,258
2031	$0	$0	$27,294	$19,944	$19,944
2032	$0	$0	$29,396	$20,653	$20,653
2033	$0	$0	$31,659	$21,388	$21,388
2034	$0	$0	$34,097	$22,149	$22,149
2035	$0	$0	$36,722	$22,937	$22,937
2036	$0	$0	$39,550	$23,753	$23,753
2037	$0	$0	$42,595	$24,598	$24,598
2038	$0	$0	$45,875	$25,473	$25,473
2039	$0	$0	$49,408	$26,379	$26,379
2040	$0	$0	$53,212	$27,318	$27,318
2041	$0	$0	$57,309	$28,290	$28,290
2042	$0	$0	$61,722	$29,296	$29,296
2043	$0	$0	$66,475	$30,338	$30,338
2044	$0	$0	$71,593	$31,418	$31,418
	Sub-Total NPV value =	$135,661		$474,499	
	Total NPV value (20 years) =		**$610,200**		**$611,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Update existing SPS

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 1	$ 706,250	incl.	$ -	$ 706,250		
Structural / Architectural	1	LS	$ 1	$ 423,750	incl.	$ -	$ 423,750		
Mechanical & HVAC	1	LS	$ 1	$ 141,250	incl.	$ -	$ 141,250		
Electrical, Instrumentation and Control	1	LS	$ 1	$ 565,000	incl.	$ -	$ 565,000		
Civil	1	LS	$ 1	$ 988,750	incl.	$ -	$ 988,750		
Sub-total Capital Cost =								**$ 2,825,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 2,825,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 8,000	$ 8,000		1% of Equipment Cost
					Sub-Total =	**$ 8,000**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 17,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 21,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Update existing SPS

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1: Update existing SPS

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$2,825,000		$21,000		
2024	$3,042,525	$2,925,505	$22,617	$21,747	$2,947,252
2025	$0	$0	$26,234	$24,255	$24,255
2026	$0	$0	$28,254	$25,118	$25,118
2027	$0	$0	$30,430	$26,011	$26,011
2028	$0	$0	$32,773	$26,937	$26,937
2029	$0	$0	$35,296	$27,895	$27,895
2030	$0	$0	$38,014	$28,888	$28,888
2031	$0	$0	$40,941	$29,915	$29,915
2032	$0	$0	$44,094	$30,980	$30,980
2033	$0	$0	$47,489	$32,082	$32,082
2034	$0	$0	$51,146	$33,223	$33,223
2035	$0	$0	$55,084	$34,405	$34,405
2036	$0	$0	$59,325	$35,629	$35,629
2037	$0	$0	$63,893	$36,897	$36,897
2038	$0	$0	$68,813	$38,209	$38,209
2039	$0	$0	$74,112	$39,569	$39,569
2040	$0	$0	$79,818	$40,977	$40,977
2041	$0	$0	$85,964	$42,434	$42,434
2042	$0	$0	$92,583	$43,944	$43,944
2043	$0	$0	$99,712	$45,507	$45,507
2044	$0	$0	$107,390	$47,126	$47,126
	Sub-Total NPV value =	$2,925,505		$711,749	
	Total NPV value (20 years) =		**$3,637,300**		**$3,638,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: New SPS on the North side of the river

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 1	$ 656,250	incl.	$ -	$ 657,000		
Structural / Architectural	1	LS	$ 1	$ 393,750	incl.	$ -	$ 394,000		
Mechanical & HVAC	1	LS	$ 1	$ 131,250	incl.	$ -	$ 132,000		
Electrical, Instrumentation and Control	1	LS	$ 1	$ 525,000	incl.	$ -	$ 525,000		
Civil	1	LS	$ 1	$ 918,750	incl.	$ -	$ 919,000		
Sub-total Capital Cost =								**$ 2,627,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 2,627,000**	
Contingency (30%) =								**$ 789,000**	
Engineering and Construction (15%) =								**$ 395,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 3,811,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 8,500	$ 8,500		1% of Equipment Cost
					Sub-Total =	**$ 8,500**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 18,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 22,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: New SPS on the North side of the river

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 2: New SPS on the North side of the river

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)
Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$3,811,000		$22,000		
2024	$4,104,447	$3,946,584	$23,694	$22,783	$3,969,366
2025	$0	$0	$27,483	$25,410	$25,410
2026	$0	$0	$29,600	$26,314	$26,314
2027	$0	$0	$31,879	$27,250	$27,250
2028	$0	$0	$34,333	$28,220	$28,220
2029	$0	$0	$36,977	$29,224	$29,224
2030	$0	$0	$39,824	$30,263	$30,263
2031	$0	$0	$42,891	$31,340	$31,340
2032	$0	$0	$46,193	$32,455	$32,455
2033	$0	$0	$49,750	$33,609	$33,609
2034	$0	$0	$53,581	$34,805	$34,805
2035	$0	$0	$57,707	$36,043	$36,043
2036	$0	$0	$62,150	$37,326	$37,326
2037	$0	$0	$66,936	$38,654	$38,654
2038	$0	$0	$72,090	$40,029	$40,029
2039	$0	$0	$77,641	$41,453	$41,453
2040	$0	$0	$83,619	$42,928	$42,928
2041	$0	$0	$90,058	$44,455	$44,455
2042	$0	$0	$96,992	$46,037	$46,037
2043	$0	$0	$104,461	$47,674	$47,674
2044	$0	$0	$112,504	$49,371	$49,371
	Sub-Total NPV value =	$3,946,584		$745,642	
	Total NPV value (20 years) =		**$4,692,300**		**$4,693,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Maintain existing Drayton SPS and construct a new SPS on the North side of the river

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 800,000	$ 800,000	incl.	$ -	$ 800,000		
Structural / Architectural	1	LS	$ 480,000	$ 480,000	incl.	$ -	$ 480,000		
Mechanical & HVAC	1	LS	$ 160,000	$ 160,000	incl.	$ -	$ 160,000		
Electrical, Instrumentation and Control	1	LS	$ 640,000	$ 640,000	incl.	$ -	$ 640,000		
Civil	1	LS	$ 1,120,000	$ 1,120,000	incl.	$ -	$1,120,000		
Sub-total Capital Cost =								**$ 3,200,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 3,200,000**	
Contingency (30%) =								**$ 960,000**	
Engineering and Construction (15%) =								**$ 480,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 4,640,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 9,500	$ 9,500		1% of Equipment Cost
					Sub-Total =	**$ 9,500**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 19,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 23,000**	

	CAPITAL AND OPERATION & MAINTENANCE COST		
Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Maintain existing Drayton SPS and construct a new SPS on the North side of the river

	LIFE CYLCE COST		
Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 3: Maintain existing Drayton SPS and construct a new SPS on the North side of the river

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$4,640,000		$23,000		
2024	$4,997,280	$4,805,077	$24,771	$23,818	$4,828,895
2025	$0	$0	$28,733	$26,565	$26,565
2026	$0	$0	$30,945	$27,510	$27,510
2027	$0	$0	$33,328	$28,489	$28,489
2028	$0	$0	$35,894	$29,502	$29,502
2029	$0	$0	$38,658	$30,552	$30,552
2030	$0	$0	$41,635	$31,639	$31,639
2031	$0	$0	$44,840	$32,764	$32,764
2032	$0	$0	$48,293	$33,930	$33,930
2033	$0	$0	$52,012	$35,137	$35,137
2034	$0	$0	$56,017	$36,387	$36,387
2035	$0	$0	$60,330	$37,682	$37,682
2036	$0	$0	$64,975	$39,022	$39,022
2037	$0	$0	$69,978	$40,411	$40,411
2038	$0	$0	$75,367	$41,848	$41,848
2039	$0	$0	$81,170	$43,337	$43,337
2040	$0	$0	$87,420	$44,879	$44,879
2041	$0	$0	$94,151	$46,476	$46,476
2042	$0	$0	$101,401	$48,129	$48,129
2043	$0	$0	$109,209	$49,841	$49,841
2044	$0	$0	$117,618	$51,615	$51,615
	Sub-Total NPV value =	$4,805,077		$779,535	
	Total NPV value (20 years) =		**$5,584,700**		**$5,585,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 4: New SPS with onsite emergency storage

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 889,145	$ 889,145	incl.	$ -	$ 889,145		
Structural / Architectural	1	LS	$ 533,487	$ 533,487	incl.	$ -	$ 533,487		
Mechanical & HVAC	1	LS	$ 177,829	$ 177,829	incl.	$ -	$ 177,829		
Electrical, Instrumentation and Control	1	LS	$ 711,316	$ 711,316	incl.	$ -	$ 711,316		
Civil	1	LS	$ 1,244,803	$ 1,244,803	incl.	$ -	$1,244,803		
Sub-total Capital Cost =								**$ 3,556,580**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2022) =								**$ 3,556,580**	
Contingency (30%) =								**$ 1,067,000**	
Engineering and Construction (15%) =								**$ 534,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2022) =								**$ 5,157,580**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 8,000	$ 8,000		1% of Equipment Cost
					Sub-Total =	**$ 8,000**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2022) =						**$ 17,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2022) =						**$ 21,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 4: New SPS with onsite emergency storage

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 4: New SPS with onsite emergency storage

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$5,157,580		$21,000		
2024	$5,554,714	$5,341,071	$22,617	$21,747	$5,362,818
2025	$0	$0	$26,234	$24,255	$24,255
2026	$0	$0	$28,254	$25,118	$25,118
2027	$0	$0	$30,430	$26,011	$26,011
2028	$0	$0	$32,773	$26,937	$26,937
2029	$0	$0	$35,296	$27,895	$27,895
2030	$0	$0	$38,014	$28,888	$28,888
2031	$0	$0	$40,941	$29,915	$29,915
2032	$0	$0	$44,094	$30,980	$30,980
2033	$0	$0	$47,489	$32,082	$32,082
2034	$0	$0	$51,146	$33,223	$33,223
2035	$0	$0	$55,084	$34,405	$34,405
2036	$0	$0	$59,325	$35,629	$35,629
2037	$0	$0	$63,893	$36,897	$36,897
2038	$0	$0	$68,813	$38,209	$38,209
2039	$0	$0	$74,112	$39,569	$39,569
2040	$0	$0	$79,818	$40,977	$40,977
2041	$0	$0	$85,964	$42,434	$42,434
2042	$0	$0	$92,583	$43,944	$43,944
2043	$0	$0	$99,712	$45,507	$45,507
2044	$0	$0	$107,390	$47,126	$47,126
	Sub-Total NPV value =	$5,341,071		$711,749	
	Total NPV value (20 years) =		**$6,052,900**		**$6,053,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1a: Upgrade gravity sewers on Wellington Street South

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 483,000	$ 483,000	incl.	$ -	$ 483,000		*200mm diameter @ 500m*
Sub-total Capital Cost =								**$ 483,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 483,000**	
Contingency (30%) =								**$ 145,000**	
Engineering and Construction (15%) =								**$ 73,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 701,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh		$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L		$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS		$ -		
					Sub-Total =	**$ -**	
Regulatory Requirements			LS		$ -		
					Sub-Total =	**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1a: Upgrade gravity sewers on Wellington Street South

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1a: Upgrade gravity sewers on Wellington Street South

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$701,000		$0		
2024	$754,977	$725,939	$0	$0	$725,939
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$725,939		$0	
	Total NPV value (20 years) =		**$726,000**		**$726,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1b: Upgrade gravity sewers on Main Street East near the existing Drayton SPS

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 311,850	$ 311,850	incl.	$ -	$ 312,000		
Sub-total Capital Cost =								**$ 312,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 312,000**	
Contingency (30%) =								**$ 94,000**	
Engineering and Construction (15%) =								**$ 47,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 453,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		0	kWh	$ -	$ -		
	Sub-Total =					**$ -**	
Chemical Systems			$/L		$ -		
	Sub-Total =					**$ -**	
Miscellaneous O&M		0	LS	$ -	$ -		
	Sub-Total =					**$ -**	
Regulatory Requirements			LS		$ -		
	Sub-Total =					**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1b: Upgrade gravity sewers on Main Street East near the existing Drayton SPS

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Stuart Winchester — **Date:** 2-Aug-22
Revision No.:	0 — **Revision Date:**

LIFE CYLCE COST

Alternative 1b: Upgrade gravity sewers on Main Street East near the existing Drayton SPS

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$453,000		$0		
2024	$487,881	$469,116	$0	$0	$469,116
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$469,116		$0	
	Total NPV value (20 years) =		**$469,200**		**$470,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1c: Upgrade gravity sewers on Main Street East

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 207,000	$ 207,000	incl.	$ -	$ 207,000		
Sub-total Capital Cost =								**$ 207,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 207,000**	
Contingency (30%) =								**$ 62,100**	
Engineering and Construction (15%) =								**$ 31,100**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 301,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh		$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L		$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS		$ -		
					Sub-Total =	**$ -**	
Regulatory Requirements			LS		$ -		
					Sub-Total =	**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1c: Upgrade gravity sewers on Main Street East

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Stuart Winchester — **Date:** 2-Aug-22
Revision No.:	**Revision Date:**

LIFE CYLCE COST

Alternative 1c: Upgrade gravity sewers on Main Street East

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$301,000		$0		
2024	$324,177	$311,709	$0	$0	$311,709
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$311,709		$0	
	Total NPV value (20 years) =		**$311,800**		**$312,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a local pumping station and forcemain to the exisintg Drayton SPS or New SPS

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$466,250	$ 466,250	incl.	$ -	$ 467,000		
Structural / Architectural	1	LS	$279,750	$ 279,750	incl.	$ -	$ 280,000		
Mechanical & HVAC	1	LS	$93,250	$ 93,250	incl.	$ -	$ 94,000		
Electrical, Instrumentation and Control	1	LS	$373,000	$ 373,000	incl.	$ -	$ 373,000		
Civil	1	LS	$652,750	$ 652,750	incl.	$ -	$ 653,000		
Sub-total Capital Cost =								**$ 1,867,000**	
							SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =	**$ 1,867,000**	
							Contingency (30%) =	**$ 561,000**	
							Engineering and Construction (15%) =	**$ 281,000**	
							TOTAL CAPITAL COST IN CURRENT YEAR (2023) =	**$ 2,709,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 8,300	$ 8,300		1% of Equipment Cost
					Sub-Total =	**$ 8,300**	
Regulatory Requirements		104	LS	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
					TOTAL O&M COST IN CURRENT YEAR (2023) =	**$ 18,000**	
					Contingency (20%) =	**$ 4,000**	
					TOTAL O&M COST IN CURRENT YEAR (2023) =	**$ 22,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a local pumping station and forcemain to the exisintg Drayton SPS or New SPS

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 2: Build a local pumping station and forcemain to the exisintg Drayton SPS or New SPS

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$2,709,000		$22,000		
2024	$2,917,593	$2,805,378	$23,694	$22,783	$2,828,161
2025	$0	$0	$27,483	$25,410	$25,410
2026	$0	$0	$29,600	$26,314	$26,314
2027	$0	$0	$31,879	$27,250	$27,250
2028	$0	$0	$34,333	$28,220	$28,220
2029	$0	$0	$36,977	$29,224	$29,224
2030	$0	$0	$39,824	$30,263	$30,263
2031	$0	$0	$42,891	$31,340	$31,340
2032	$0	$0	$46,193	$32,455	$32,455
2033	$0	$0	$49,750	$33,609	$33,609
2034	$0	$0	$53,581	$34,805	$34,805
2035	$0	$0	$57,707	$36,043	$36,043
2036	$0	$0	$62,150	$37,326	$37,326
2037	$0	$0	$66,936	$38,654	$38,654
2038	$0	$0	$72,090	$40,029	$40,029
2039	$0	$0	$77,641	$41,453	$41,453
2040	$0	$0	$83,619	$42,928	$42,928
2041	$0	$0	$90,058	$44,455	$44,455
2042	$0	$0	$96,992	$46,037	$46,037
2043	$0	$0	$104,461	$47,674	$47,674
2044	$0	$0	$112,504	$49,371	$49,371
	Sub-Total NPV value =	$2,805,378		$745,642	
	Total NPV value (20 years) =		**$3,551,100**		**$3,552,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a local pumping station and forcemain to the Mapleton WPCP

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 843,750	$ 843,750	incl.	$ -	$ 844,000		
Structural / Architectural	1	LS	$ 506,250	$ 506,250	incl.	$ -	$ 507,000		
Mechanical & HVAC	1	LS	$ 168,750	$ 168,750	incl.	$ -	$ 169,000		
Electrical, Instrumentation and Control	1	LS	$ 675,000	$ 675,000	incl.	$ -	$ 675,000		
Civil	1	LS	$ 1,181,250	$ 1,181,250	incl.	$ -	$1,182,000		
Sub-total Capital Cost =								**$ 3,377,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 3,377,000**	
Contingency (30%) =								**$ 1,013,100**	
Engineering and Construction (15%) =								**$ 506,600**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 4,897,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 8,819	$ 8,819		1% of Equipment Cost
					Sub-Total =	**$ 8,819**	
Regulatory Requirements		104	LS	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 18,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 22,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a local pumping station and forcemain to the Mapleton WPCP

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 3: Build a local pumping station and forcemain to the Mapleton WPCP

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$4,897,000		$22,000		
2024	$5,274,069	$5,071,220	$23,694	$22,783	$5,094,003
2025	$0	$0	$27,483	$25,410	$25,410
2026	$0	$0	$29,600	$26,314	$26,314
2027	$0	$0	$31,879	$27,250	$27,250
2028	$0	$0	$34,333	$28,220	$28,220
2029	$0	$0	$36,977	$29,224	$29,224
2030	$0	$0	$39,824	$30,263	$30,263
2031	$0	$0	$42,891	$31,340	$31,340
2032	$0	$0	$46,193	$32,455	$32,455
2033	$0	$0	$49,750	$33,609	$33,609
2034	$0	$0	$53,581	$34,805	$34,805
2035	$0	$0	$57,707	$36,043	$36,043
2036	$0	$0	$62,150	$37,326	$37,326
2037	$0	$0	$66,936	$38,654	$38,654
2038	$0	$0	$72,090	$40,029	$40,029
2039	$0	$0	$77,641	$41,453	$41,453
2040	$0	$0	$83,619	$42,928	$42,928
2041	$0	$0	$90,058	$44,455	$44,455
2042	$0	$0	$96,992	$46,037	$46,037
2043	$0	$0	$104,461	$47,674	$47,674
2044	$0	$0	$112,504	$49,371	$49,371
	Sub-Total NPV value =	$5,071,220		$745,642	
	Total NPV value (20 years) =		**$5,816,900**		**$5,817,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Build another standpipe

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 400,000	$ 400,000	100%	$ 400,000	$ 800,000		
Structural / Architectural	1	LS	$ 100,000	$ 100,000	incl.	$ -	$ 100,000		
Mechanical & HVAC	1	LS	$ 10,000	$ 10,000	50%	$ 5,000	$ 15,000		
Electrical, Instrumentation and Control	1	LS	$ 25,000	$ 25,000	50%	$ 12,500	$ 38,000		
Civil	1	LS	$ 150,000	$ 150,000	incl.	$ -	$ 150,000		
Sub-total Capital Cost =								**$ 1,103,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,103,000**	
Contingency (30%) =								**$ 330,900**	
Engineering and Construction (15%) =								**$ 165,500**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,599,400**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems		3,253	$/L	$ 0.75	$ 2,440		Chlroine contact for disinfection
					Sub-Total =	**$ 2,440**	
Miscellaneous O&M			LS	$ -	$ -		
					Sub-Total =	**$ -**	
Labour		12	hr	$ 50	$ 600		$50/hr; 1 hr/month
					Sub-Total =	**$ 600**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 4,000**	
Contingency (20%) =						**$ 1,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 5,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Build another standpipe

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1: Build another standpipe

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$1,599,400		$5,000		
2024	$1,722,554	$1,656,302	$5,385	$5,178	$1,661,480
2025	$0	$0	$6,246	$5,775	$5,775
2026	$0	$0	$6,727	$5,980	$5,980
2027	$0	$0	$7,245	$6,193	$6,193
2028	$0	$0	$7,803	$6,414	$6,414
2029	$0	$0	$8,404	$6,642	$6,642
2030	$0	$0	$9,051	$6,878	$6,878
2031	$0	$0	$9,748	$7,123	$7,123
2032	$0	$0	$10,498	$7,376	$7,376
2033	$0	$0	$11,307	$7,639	$7,639
2034	$0	$0	$12,178	$7,910	$7,910
2035	$0	$0	$13,115	$8,192	$8,192
2036	$0	$0	$14,125	$8,483	$8,483
2037	$0	$0	$15,213	$8,785	$8,785
2038	$0	$0	$16,384	$9,097	$9,097
2039	$0	$0	$17,646	$9,421	$9,421
2040	$0	$0	$19,004	$9,756	$9,756
2041	$0	$0	$20,468	$10,103	$10,103
2042	$0	$0	$22,044	$10,463	$10,463
2043	$0	$0	$23,741	$10,835	$10,835
2044	$0	$0	$25,569	$11,221	$11,221
	Sub-Total NPV value =	$1,656,302		$169,464	
	Total NPV value (20 years) =		**$1,825,800**		**$1,826,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Extend the exisitng standpipes

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 300,000	$ 300,000	100%	$ 300,000	$ 600,000		
Structural / Architectural	1	LS	$ 50,000	$ 50,000	incl.	$ -	$ 50,000		
Mechanical & HVAC	1	LS	$ -	$ -	50%	$ -	$ -		
Electrical, Instrumentation and Control	1	LS	$ -	$ -	50%	$ -	$ -		
Civil	1	LS	$ 50,000	$ 50,000	incl.	$ -	$ 50,000		
Sub-total Capital Cost =								**$ 700,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 700,000**	
Contingency (30%) =								**$ 210,000**	
Engineering and Construction (15%) =								**$ 105,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,015,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems		3,253	$/L	$ 0.75	$ 2,440		Chlroine contact for disinfection
					Sub-Total =	**$ 2,440**	
Miscellaneous O&M			LS	$ -	$ -		
					Sub-Total =	**$ -**	
Labour		12	hr	$ 50	$ 600		$50/hr; 1 hr/month
					Sub-Total =	**$ 600**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 4,000**	
Contingency (20%) =						**$ 1,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 5,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Extend the exisitng standpipes

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 2: Extend the exisitng standpipes

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$1,015,000		$5,000		
2024	$1,093,155	$1,051,111	$5,385	$5,178	$1,056,288
2025	$0	$0	$6,246	$5,775	$5,775
2026	$0	$0	$6,727	$5,980	$5,980
2027	$0	$0	$7,245	$6,193	$6,193
2028	$0	$0	$7,803	$6,414	$6,414
2029	$0	$0	$8,404	$6,642	$6,642
2030	$0	$0	$9,051	$6,878	$6,878
2031	$0	$0	$9,748	$7,123	$7,123
2032	$0	$0	$10,498	$7,376	$7,376
2033	$0	$0	$11,307	$7,639	$7,639
2034	$0	$0	$12,178	$7,910	$7,910
2035	$0	$0	$13,115	$8,192	$8,192
2036	$0	$0	$14,125	$8,483	$8,483
2037	$0	$0	$15,213	$8,785	$8,785
2038	$0	$0	$16,384	$9,097	$9,097
2039	$0	$0	$17,646	$9,421	$9,421
2040	$0	$0	$19,004	$9,756	$9,756
2041	$0	$0	$20,468	$10,103	$10,103
2042	$0	$0	$22,044	$10,463	$10,463
2043	$0	$0	$23,741	$10,835	$10,835
2044	$0	$0	$25,569	$11,221	$11,221
	Sub-Total NPV value =	$1,051,111		$169,464	
	Total NPV value (20 years) =		**$1,220,600**		**$1,221,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build an elevated storage tank

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 441,937	$ 441,937	incl.	$ -	$ 442,000		
Structural / Architectural	1	LS	$ 681,423	$ 681,423	incl.	$ -	$ 682,000		
Mechanical & HVAC	1	LS	$ 61,723	$ 61,723	incl.	$ -	$ 62,000		
Electrical, Instrumentation and Control	1	LS	$ 3,439,210	$ 3,439,210	incl.	$ -	$3,440,000		
Civil	1	LS	$ 586,369	$ 586,369	incl.	$ -	$ 587,000		
Sub-total Capital Cost =								**$ 5,213,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 5,213,000**	
Contingency (30%) =								**$ 1,563,900**	
Engineering and Construction (15%) =								**$ 782,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 7,558,900**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		87600	kWh	$ 0.18	$ 15,768		
					Sub-Total =	**$ 15,768**	
Chemical Systems		3,253	$/L	$ 0.75	$ 2,440		Chlroine contact for disinfection
					Sub-Total =	**$ 2,440**	
Miscellaneous O&M			LS	$ -	$ -		
					Sub-Total =	**$ -**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hrs/week
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 24,000**	
Contingency (20%) =						**$ 5,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 29,000**	

	CAPITAL AND OPERATION & MAINTENANCE COST		
Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build an elevated storage tank

	LIFE CYLCE COST		
Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 3: Build an elevated storage tank

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$7,558,900		$29,000		
2024	$8,140,935	$7,827,822	$31,233	$30,032	$7,857,854
2025	$0	$0	$36,228	$33,495	$33,495
2026	$0	$0	$39,018	$34,687	$34,687
2027	$0	$0	$42,022	$35,921	$35,921
2028	$0	$0	$45,258	$37,199	$37,199
2029	$0	$0	$48,743	$38,522	$38,522
2030	$0	$0	$52,496	$39,892	$39,892
2031	$0	$0	$56,538	$41,312	$41,312
2032	$0	$0	$60,891	$42,781	$42,781
2033	$0	$0	$65,580	$44,303	$44,303
2034	$0	$0	$70,630	$45,880	$45,880
2035	$0	$0	$76,068	$47,512	$47,512
2036	$0	$0	$81,925	$49,202	$49,202
2037	$0	$0	$88,234	$50,953	$50,953
2038	$0	$0	$95,027	$52,765	$52,765
2039	$0	$0	$102,345	$54,643	$54,643
2040	$0	$0	$110,225	$56,587	$56,587
2041	$0	$0	$118,712	$58,600	$58,600
2042	$0	$0	$127,853	$60,685	$60,685
2043	$0	$0	$137,698	$62,844	$62,844
2044	$0	$0	$148,301	$65,079	$65,079
	Sub-Total NPV value =	$7,827,822		$982,891	
	Total NPV value (20 years) =		**$8,810,800**		**$8,811,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Fire flow protection

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process		LS	1	$ 50,000	incl.	$ -	$ 50,000		*Fire pump, instrumentation, valves and accessories*
Civil		LS	1	$ 2,255,000	incl.	$ -	$ 2,255,000		*4,700 m of 200mm watermain @ $900 / m, Class EA Study Schedule A+, fire hydrants @$5,000 / ea with 90-120m intervals*
Sub-total Capital Cost =								**$ 2,305,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 2,305,000**	
Contingency (30%) =								**$ 691,500**	
Engineering and Construction (15%) =								**$ 345,800**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 3,342,300**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L	$ -	$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS	$ -	$ -		
					Sub-Total =	**$ -**	
Regulatory Requirements		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 6,000**	
Contingency (20%) =						**$ 2,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 8,000**	

	CAPITAL AND OPERATION & MAINTENANCE COST		
Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Fire flow protection

	LIFE CYLCE COST		
Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 2:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$ 3,342,300		$8,000		
2024	$3,599,657	$3,461,209	$8,616	$8,285	$3,469,493
2025	$0	$0	$9,994	$9,240	$9,240
2026	$0	$0	$10,763	$9,569	$9,569
2027	$0	$0	$11,592	$9,909	$9,909
2028	$0	$0	$12,485	$10,262	$10,262
2029	$0	$0	$13,446	$10,627	$10,627
2030	$0	$0	$14,482	$11,005	$11,005
2031	$0	$0	$15,597	$11,396	$11,396
2032	$0	$0	$16,798	$11,802	$11,802
2033	$0	$0	$18,091	$12,222	$12,222
2034	$0	$0	$19,484	$12,656	$12,656
2035	$0	$0	$20,984	$13,107	$13,107
2036	$0	$0	$22,600	$13,573	$13,573
2037	$0	$0	$24,340	$14,056	$14,056
2038	$0	$0	$26,214	$14,556	$14,556
2039	$0	$0	$28,233	$15,074	$15,074
2040	$0	$0	$30,407	$15,610	$15,610
2041	$0	$0	$32,748	$16,165	$16,165
2042	$0	$0	$35,270	$16,741	$16,741
2043	$0	$0	$37,986	$17,336	$17,336
2044	$0	$0	$40,911	$17,953	$17,953
	Sub-Total NPV value =	$3,461,209		$271,142	
	Total NPV value (20 years) =		**$3,732,400**		**$3,733,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Upgrade existing SPS

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 165,000	$ 165,000	incl.	$ -	$ 165,000		
Structural / Architectural	1	LS	$ 99,000	$ 99,000	incl.	$ -	$ 99,000		
Mechanical & HVAC	1	LS	$ 33,000	$ 33,000	incl.	$ -	$ 33,000		
Electrical, Instrumentation and Control	1	LS	$ 132,000	$ 132,000	incl.	$ -	$ 132,000		
Civil	1	LS	$ 231,000	$ 231,000	incl.	$ -	$ 231,000		
Sub-total Capital Cost =								**$ 660,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 660,000**	
Contingency (30%) =								**$ 198,000**	
Engineering and Construction (15%) =								**$ 99,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 957,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 5,100	$ 5,100		1% of Equipment Cost
					Sub-Total =	**$ 5,100**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 15,000**	
Contingency (20%) =						**$ 3,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 18,000**	

	CAPITAL AND OPERATION & MAINTENANCE COST	
Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Upgrade existing SPS

	LIFE CYLCE COST	
Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 1: Upgrade existing SPS

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$957,000		$18,000		
2024	$1,030,689	$991,047	$19,386	$18,640	$1,009,688
2025	$0	$0	$22,486	$20,790	$20,790
2026	$0	$0	$24,218	$21,530	$21,530
2027	$0	$0	$26,083	$22,296	$22,296
2028	$0	$0	$28,091	$23,089	$23,089
2029	$0	$0	$30,254	$23,910	$23,910
2030	$0	$0	$32,584	$24,761	$24,761
2031	$0	$0	$35,092	$25,642	$25,642
2032	$0	$0	$37,795	$26,554	$26,554
2033	$0	$0	$40,705	$27,499	$27,499
2034	$0	$0	$43,839	$28,477	$28,477
2035	$0	$0	$47,215	$29,490	$29,490
2036	$0	$0	$50,850	$30,539	$30,539
2037	$0	$0	$54,766	$31,626	$31,626
2038	$0	$0	$58,983	$32,751	$32,751
2039	$0	$0	$63,524	$33,916	$33,916
2040	$0	$0	$68,416	$35,123	$35,123
2041	$0	$0	$73,684	$36,372	$36,372
2042	$0	$0	$79,357	$37,666	$37,666
2043	$0	$0	$85,468	$39,006	$39,006
2044	$0	$0	$92,049	$40,394	$40,394
	Sub-Total NPV value =	$991,047		$610,071	
	Total NPV value (20 years) =			**$1,601,200**	**$1,602,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a new SPS

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 498,750	$ 498,750	incl.	$ -	$ 499,000		
Structural / Architectural	1	LS	$ 299,250	$ 299,250	incl.	$ -	$ 300,000		
Mechanical & HVAC	1	LS	$ 99,750	$ 99,750	incl.	$ -	$ 100,000		
Electrical, Instrumentation and Control	1	LS	$ 399,000	$ 399,000	incl.	$ -	$ 399,000		
Civil	1	LS	$ 698,250	$ 698,250	incl.	$ -	$ 699,000		
Sub-total Capital Cost =								**$ 1,997,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,997,000**	
Contingency (30%) =								**$ 600,000**	
Engineering and Construction (15%) =								**$ 300,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 2,897,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 7,600	$ 7,600		1% of Equipment Cost
					Sub-Total =	**$ 7,600**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 17,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 21,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a new SPS

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 2: Build a new SPS

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$2,897,000		$21,000		
2024	$3,120,069	$3,000,066	$22,617	$21,747	$3,021,813
2025	$0	$0	$26,234	$24,255	$24,255
2026	$0	$0	$28,254	$25,118	$25,118
2027	$0	$0	$30,430	$26,011	$26,011
2028	$0	$0	$32,773	$26,937	$26,937
2029	$0	$0	$35,296	$27,895	$27,895
2030	$0	$0	$38,014	$28,888	$28,888
2031	$0	$0	$40,941	$29,915	$29,915
2032	$0	$0	$44,094	$30,980	$30,980
2033	$0	$0	$47,489	$32,082	$32,082
2034	$0	$0	$51,146	$33,223	$33,223
2035	$0	$0	$55,084	$34,405	$34,405
2036	$0	$0	$59,325	$35,629	$35,629
2037	$0	$0	$63,893	$36,897	$36,897
2038	$0	$0	$68,813	$38,209	$38,209
2039	$0	$0	$74,112	$39,569	$39,569
2040	$0	$0	$79,818	$40,977	$40,977
2041	$0	$0	$85,964	$42,434	$42,434
2042	$0	$0	$92,583	$43,944	$43,944
2043	$0	$0	$99,712	$45,507	$45,507
2044	$0	$0	$107,390	$47,126	$47,126
	Sub-Total NPV value =	$3,000,066		$711,749	
	Total NPV value (20 years) =		**$3,711,900**		**$3,712,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a Local SPS and new forcemain to the Mapleton WPCP

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 1,171,250	$ 1,171,250	incl.	$ -	$ 1,172,000		
Structural / Architectural	1	LS	$ 702,750	$ 702,750	incl.	$ -	$ 703,000		
Mechanical & HVAC	1	LS	$ 234,250	$ 234,250	incl.	$ -	$ 235,000		
Electrical, Instrumentation and Control	1	LS	$ 937,000	$ 937,000	incl.	$ -	$ 937,000		
Civil	1	LS	$ 1,639,750	$ 1,639,750	incl.	$ -	$ 1,640,000		
Sub-total Capital Cost =								**$ 4,687,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 4,687,000**	
Contingency (30%) =								**$ 1,407,000**	
Engineering and Construction (15%) =								**$ 704,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 6,798,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		31536	kWh	$ 0.18	$ 5,676		$0.18/kWh, two 40 kW pumps, 12 hr/d
					Sub-Total =	**$ 5,676**	
Miscellaneous O&M		1	LS	$ 4,860	$ 4,860		1% of Equipment Cost
					Sub-Total =	**$ 4,860**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 16,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 20,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a Local SPS and new forcemain to the Mapleton WPCP

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 3: Build a Local SPS and new forcemain to the Mapleton WPCP

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$6,798,000		$20,000		
2024	$7,321,446	$7,039,852	$21,540	$20,712	$7,060,563
2025	$0	$0	$24,985	$23,100	$23,100
2026	$0	$0	$26,909	$23,922	$23,922
2027	$0	$0	$28,981	$24,773	$24,773
2028	$0	$0	$31,212	$25,654	$25,654
2029	$0	$0	$33,616	$26,567	$26,567
2030	$0	$0	$36,204	$27,512	$27,512
2031	$0	$0	$38,992	$28,491	$28,491
2032	$0	$0	$41,994	$29,504	$29,504
2033	$0	$0	$45,228	$30,554	$30,554
2034	$0	$0	$48,710	$31,641	$31,641
2035	$0	$0	$52,461	$32,767	$32,767
2036	$0	$0	$56,500	$33,933	$33,933
2037	$0	$0	$60,851	$35,140	$35,140
2038	$0	$0	$65,536	$36,390	$36,390
2039	$0	$0	$70,582	$37,685	$37,685
2040	$0	$0	$76,017	$39,025	$39,025
2041	$0	$0	$81,871	$40,414	$40,414
2042	$0	$0	$88,175	$41,851	$41,851
2043	$0	$0	$94,964	$43,340	$43,340
2044	$0	$0	$102,276	$44,882	$44,882
	Sub-Total NPV value =	$7,039,852		$677,856	
	Total NPV value (20 years) =		**$7,717,800**		**$7,718,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, upgrade the existing Moorefield SPS and forcemain

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 1,635,000	$ 1,635,000	incl.	$ -	$1,635,000		
Structural / Architectural	1	LS	$ 981,000	$ 981,000	incl.	$ -	$ 981,000		
Mechanical & HVAC	1	LS	$ 327,000	$ 327,000	incl.	$ -	$ 327,000		
Electrical, Instrumentation and Control	1	LS	$ 1,308,000	$ 1,308,000	incl.	$ -	$1,308,000		
Civil	1	LS	$ 2,289,000	$ 2,289,000	incl.	$ -	$2,289,000		
Sub-total Capital Cost =								**$ 6,540,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 6,540,000**	
Contingency (30%) =								**$ 1,962,000**	
Engineering and Construction (15%) =								**$ 981,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 9,483,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		63,072	kWh	$ 0.18	$ 11,353		$0.18/kWh, 40 kW pump, 24 hr/d
	Sub-Total =					**$ 11,353**	
Miscellaneous O&M		1	LS	$ 7,600	$ 7,600		1% of Equipment Cost
	Sub-Total =					**$ 7,600**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
	Sub-Total =					**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2022) =						**$ 25,000**	
Contingency (20%) =						**$ 5,000**	
TOTAL O&M COST IN CURRENT YEAR (2022) =						**$ 30,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, upgrade the existing Moorefield SPS and forcemain

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Stuart Winchester — **Date:** 2-Aug-22
Revision No.:	0 — **Revision Date:**

LIFE CYLCE COST

Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, upgrade the existing Moorefield SPS and forcemain

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$9,483,000		$30,000		
2024	$10,213,191	$9,820,376	$32,310	$31,067	$9,851,443
2025	$0	$0	$37,477	$34,650	$34,650
2026	$0	$0	$40,363	$35,883	$35,883
2027	$0	$0	$43,471	$37,159	$37,159
2028	$0	$0	$46,818	$38,481	$38,481
2029	$0	$0	$50,423	$39,850	$39,850
2030	$0	$0	$54,306	$41,268	$41,268
2031	$0	$0	$58,487	$42,736	$42,736
2032	$0	$0	$62,991	$44,257	$44,257
2033	$0	$0	$67,841	$45,831	$45,831
2034	$0	$0	$73,065	$47,462	$47,462
2035	$0	$0	$78,691	$49,150	$49,150
2036	$0	$0	$84,750	$50,899	$50,899
2037	$0	$0	$91,276	$52,710	$52,710
2038	$0	$0	$98,304	$54,585	$54,585
2039	$0	$0	$105,874	$56,527	$56,527
2040	$0	$0	$114,026	$58,538	$58,538
2041	$0	$0	$122,806	$60,620	$60,620
2042	$0	$0	$132,262	$62,777	$62,777
2043	$0	$0	$142,446	$65,011	$65,011
2044	$0	$0	$153,415	$67,323	$67,323
	Sub-Total NPV value =	$9,820,376		$1,016,784	
	Total NPV value (20 years) =		**$10,837,200**		**$10,838,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Low-pressure sewers

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 100,000	$ 100,000	incl.	$ -	$ 100,000		
Sub-total Capital Cost =								**$ 100,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 100,000**	
Contingency (30%) =								**$ 30,000**	
Engineering and Construction (15%) =								**$ 15,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 145,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems					$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS	$ -	$ -		
					Sub-Total =	**$ -**	
Regulatory Requirements			LS	$ -	$ -		
					Sub-Total =	**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Low-pressure sewers

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1: Low-pressure sewers

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$145,000		$0		
2024	$156,165	$150,159	$0	$0	$150,159
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$150,159		$0	
	Total NPV value (20 years) =		**$150,200**		**$151,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: All Gravity Sewers

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 5,380,000	$ 5,380,000	incl.	$ -	$ 5,380,000		*200mm diameter @ 4,700m, 1,200mm diameter manhole @ X each, reconfigure existing low-pressure sewer to connect to proposed gravity sewer*
Sub-total Capital Cost =								**$ 5,380,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 5,380,000**	
Contingency (30%) =								**$ 1,614,000**	
Engineering and Construction (15%) =								**$ 807,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 7,801,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		0	kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems		0	$/L	$ -	$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M		0	LS	$ -	$ -		
					Sub-Total =	**$ -**	
Regulatory Requirements		0	LS	$ -	$ -		
					Sub-Total =	**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: All Gravity Sewers

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Stuart Winchester — **Date:** 2-Aug-22
Revision No.:	0 — **Revision Date:**

LIFE CYLCE COST

Alternative 2:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$7,801,000		$0		
2024	$8,401,677	$8,078,536	$0	$0	$8,078,536
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$8,078,536		$0	
	Total NPV value (20 years) =		**$8,078,600**		**$8,079,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Combination gravity sewer and low-pressure sewers

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 750,000	$ 750,000	incl.	$ -	$ 750,000		*200mm diameter @ 1000m, 1,200mm diameter manhole @ X each, reconfigure existing low-pressure sewer to connect to proposed gravity sewer*
Sub-total Capital Cost =								**$ 750,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 750,000**	
Contingency (30%) =								**$ 225,000**	
Engineering and Construction (15%) =								**$ 113,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,088,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		0	kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems		0	$/L	$ -	$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M		0	LS	$ -	$ -		
					Sub-Total =	**$ -**	
Regulatory Requirements		0	LS	$ -	$ -		
					Sub-Total =	**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Combination gravity sewer and low-pressure sewers

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:		**Revision Date:**	

LIFE CYLCE COST

Alternative 2:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$1,088,000		$0		
2024	$1,171,776	$1,126,708	$0	$0	$1,126,708
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$1,126,708		$0	
	Total NPV value (20 years) =		**$1,126,800**		**$1,127,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Nitrification Upgrade with MBBR System

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material	% of Material	Total Labour			
Process	1	LS	$ 800,000	$ 800,000	incl.	$ -	$ 800,000		
Structural / Architectural	1	LS	$ 600,000	$ 600,000	incl.	$ -	$ 600,000		
Mechanical & HVAC	1	LS	$ 400,000	$ 400,000	incl.	$ -	$ 400,000		
Electrical, Instrumentation and Control	1	LS	$ 600,000	$ 600,000	incl.	$ -	$ 600,000		
Civil	1	LS	$ 1,600,000	$ 1,600,000	incl.	$ -	$ 1,600,000		
Sub-total Capital Cost =								**$ 4,000,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 4,000,000**	
Contingency (30%) =								**$ 1,200,000**	
Engineering and Construction (15%) =								**$ 600,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 5,800,000**	

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		200,000	kWh	$ 0.18	$ 36,000		Addition of blowers
					Sub-Total =	**$ 36,000**	
Chemical Systems		0	$/L	$ 1.00	$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M		1	LS	$ 8,000	$ 8,000		1% of Equipment Cost
					Sub-Total =	**$ 8,000**	
Regulatory Requirements		1	LS	$ 50,000	$ 50,000		EA Amendment
					Sub-Total =	**$ 50,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 94,000**	
Contingency (20%) =						**$ 19,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 113,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Nitrification Upgrade with MBBR System

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Nitrification Upgrade with MBBR System

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$5,800,000		$113,000		
2024	$6,246,600	$6,006,346	$121,701	$117,020	$6,123,366
2025	$0	$0	$141,165	$130,515	$130,515
2026	$0	$0	$152,034	$135,158	$135,158
2027	$0	$0	$163,741	$139,966	$139,966
2028	$0	$0	$176,349	$144,946	$144,946
2029	$0	$0	$189,928	$150,103	$150,103
2030	$0	$0	$204,552	$155,443	$155,443
2031	$0	$0	$220,303	$160,973	$160,973
2032	$0	$0	$237,266	$166,700	$166,700
2033	$0	$0	$255,535	$172,631	$172,631
2034	$0	$0	$275,212	$178,772	$178,772
2035	$0	$0	$296,403	$185,132	$185,132
2036	$0	$0	$319,226	$191,719	$191,719
2037	$0	$0	$343,806	$198,540	$198,540
2038	$0	$0	$370,280	$205,603	$205,603
2039	$0	$0	$398,791	$212,918	$212,918
2040	$0	$0	$429,498	$220,493	$220,493
2041	$0	$0	$462,569	$228,337	$228,337
2042	$0	$0	$498,187	$236,461	$236,461
2043	$0	$0	$536,548	$244,873	$244,873
2044	$0	$0	$577,862	$253,585	$253,585
	Sub-Total NPV value =	$6,006,346		$3,829,887	
	Total NPV value (20 years) =		**$9,836,300**		**$9,837,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Build a new mechanical treatment plant

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 3,045,366	$ 3,045,366	incl.	$ -	$ 3,046,000		
Structural / Architectural	1	LS	$ 2,284,024	$ 2,284,024	incl.	$ -	$ 2,285,000		
Mechanical & HVAC	1	LS	$ 1,522,683	$ 1,522,683	incl.	$ -	$ 1,523,000		
Electrical, Instrumentation and Control	1	LS	$ 2,284,024	$ 2,284,024	incl.	$ -	$ 2,285,000		
Civil	1	LS	$ 6,090,731	$ 6,090,731	incl.	$ -	$ 6,091,000		
Sub-total Capital Cost =								**$ 15,230,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 15,230,000**	
Contingency (30%) =								**$ 4,569,000**	
Engineering and Construction (15%) =								**$ 2,285,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 22,084,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		400,000	kWh	$ 0.18	$ 72,000		Upgrade of blowers, RAS pumps, screens, clarifier mechanisms
	Sub-Total =					**$ 72,000**	
Chemical Systems		36,500	$/L	$ 1.00	$ 36,500		Increase in Alum
	Sub-Total =					**$ 36,500**	
Miscellaneous O&M		1	LS	$ 30,454	$ 30,454		1% of Equipment Cost
	Sub-Total =					**$ 30,454**	
Regulatory Requirements		1	LS	$ 50,000	$ 50,000		EA and Amendment
	Sub-Total =					**$ 50,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 189,000**	
Contingency (20%) =						**$ 38,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 227,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Build a new mechanical treatment plant

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 1: Build a new mechanical treatment plant

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$22,084,000		$227,000		
2024	$23,784,468	$22,869,681	$244,479	$235,076	$23,104,757
2025	$0	$0	$283,578	$262,184	$262,184
2026	$0	$0	$305,414	$271,512	$271,512
2027	$0	$0	$328,931	$281,171	$281,171
2028	$0	$0	$354,258	$291,175	$291,175
2029	$0	$0	$381,536	$301,534	$301,534
2030	$0	$0	$410,915	$312,261	$312,261
2031	$0	$0	$442,555	$323,371	$323,371
2032	$0	$0	$476,632	$334,875	$334,875
2033	$0	$0	$513,332	$346,789	$346,789
2034	$0	$0	$552,859	$359,127	$359,127
2035	$0	$0	$595,429	$371,903	$371,903
2036	$0	$0	$641,277	$385,134	$385,134
2037	$0	$0	$690,655	$398,836	$398,836
2038	$0	$0	$743,836	$413,026	$413,026
2039	$0	$0	$801,111	$427,720	$427,720
2040	$0	$0	$862,797	$442,937	$442,937
2041	$0	$0	$929,232	$458,695	$458,695
2042	$0	$0	$1,000,783	$475,014	$475,014
2043	$0	$0	$1,077,843	$491,914	$491,914
2044	$0	$0	$1,160,837	$509,414	$509,414
	Sub-Total NPV value =	$22,869,681		$7,693,667	
	Total NPV value (20 years) =		**$30,563,400**		**$30,564,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Phosphorus offsetting program

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Allowance for Phosphorus Offsetting Program Implimentation	1	LS	$ 1	$ 341,000	incl.	$ -	$ 341,000		*Administration oversight for program implimentation, Class EA*
Sub-total Capital Cost =								**$ 341,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 341,000**	
Contingency (30%) =								**$ 102,300**	
Engineering and Construction (15%) =								**$ 51,200**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 494,500**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy					$ -		
					Sub-Total =	**$ -**	
Chemical Systems					$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M		1	LS	$ 200,000	$ 200,000		Administration oversight, monitoring, reporting, stakeholder meetings and ongoing education for developers and farmers.
					Sub-Total =	**$ 200,000**	
Regulatory Requirements					$ -		
					Sub-Total =	**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 200,000**	
Contingency (20%) =						**$ 40,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 240,000**	

	CAPITAL AND OPERATION & MAINTENANCE COST		
Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Phosphorus offsetting program

	LIFE CYLCE COST		
Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$494,500		$240,000		
2024	$532,577	$512,093	$258,480	$248,538	$760,631
2025	$0	$0	$299,818	$277,199	$277,199
2026	$0	$0	$322,904	$287,061	$287,061
2027	$0	$0	$347,768	$297,274	$297,274
2028	$0	$0	$374,546	$307,850	$307,850
2029	$0	$0	$403,386	$318,802	$318,802
2030	$0	$0	$434,447	$330,144	$330,144
2031	$0	$0	$467,899	$341,890	$341,890
2032	$0	$0	$503,928	$354,053	$354,053
2033	$0	$0	$542,730	$366,649	$366,649
2034	$0	$0	$584,520	$379,693	$379,693
2035	$0	$0	$629,528	$393,202	$393,202
2036	$0	$0	$678,002	$407,191	$407,191
2037	$0	$0	$730,208	$421,677	$421,677
2038	$0	$0	$786,434	$436,679	$436,679
2039	$0	$0	$846,990	$452,215	$452,215
2040	$0	$0	$912,208	$468,303	$468,303
2041	$0	$0	$982,448	$484,964	$484,964
2042	$0	$0	$1,058,097	$502,218	$502,218
2043	$0	$0	$1,139,570	$520,085	$520,085
2044	$0	$0	$1,227,317	$538,588	$538,588
	Sub-Total NPV value =	$512,093		$8,134,273	
	Total NPV value (20 years) =		**$8,646,400**		**$8,647,000**

B

Appendix B: Design Flow Calculations

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald

Date: 2023-02-21

Checked By:

Date:

Project: Drayton Sanitary Collection System - EXISTING

Project Number: T000974D

Municipality: Township of Mapleton

Domestic Flow 300 L/cap/d

Infiltration Allowar 0.2 L/s/ha

Peak Factor: Harmon's Formula

Manning's "n": 0.013

Population Dens 25 ppha

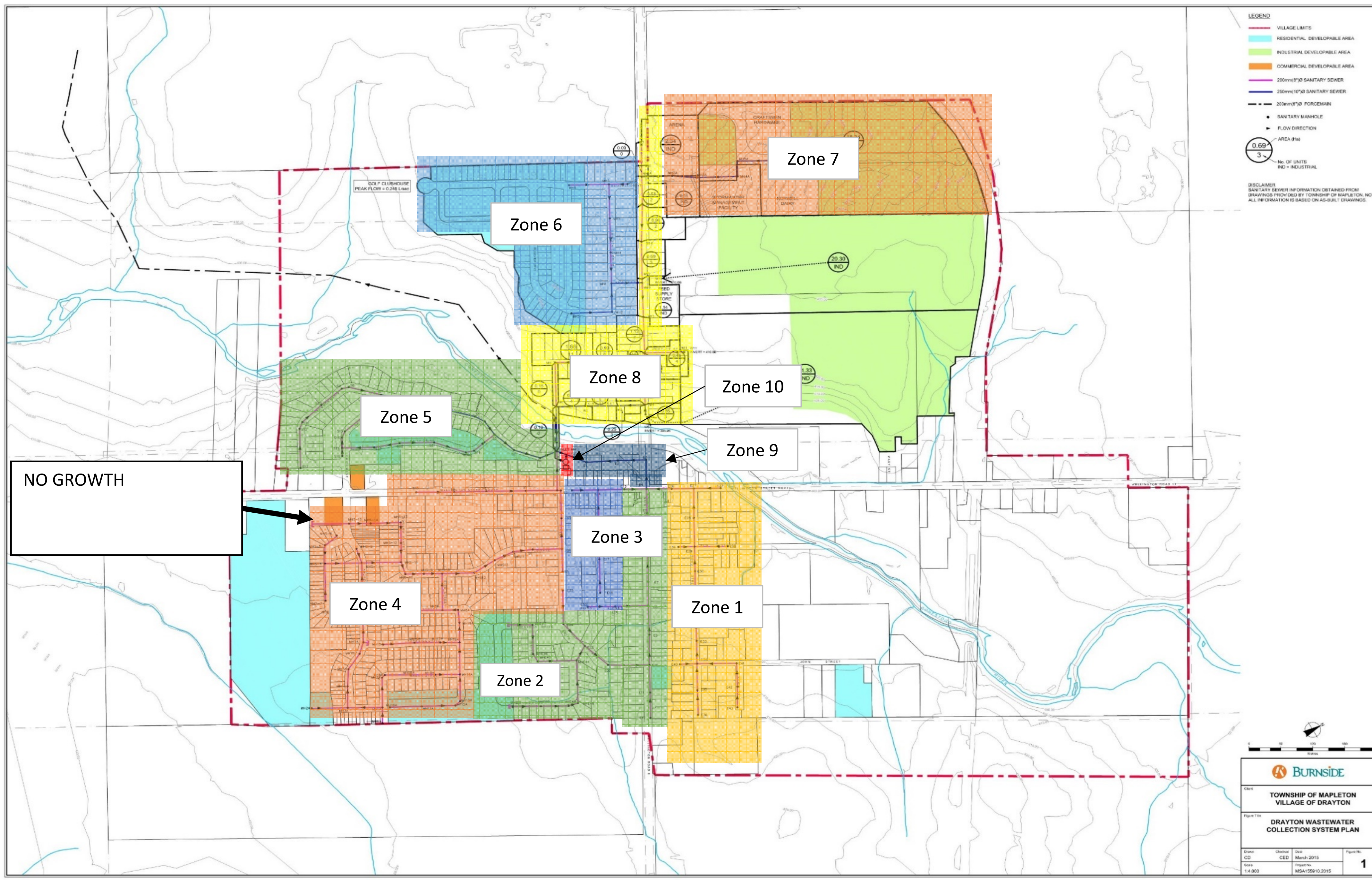
Total SAN Catchment Area

91.37 ha

Total Population

2802.00 ppl

3795.00



SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 1

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Robin St.	E43	E42	0.32	9	0.32	9	4.42	0.1	0.1	0.2	60.0	200	PVC	5.40	76.2	2.43	0.70
Robin St.	E42	E41	0.23	6	0.55	15	4.4	0.2	0.1	0.3	60.0	200	PVC	5.40	76.2	2.43	0.70
John St. (East)	E41	E34	0.43	11	0.98	26	4.36	0.4	0.2	0.6	105.0	200	PVC	0.40	20.7	0.66	0.00
John St. (West)	E40	E34	0.16	5	0.16	5	4.44	0.1	0.0	0.1	50.0	200	PVC	2.40	50.8	1.62	0.50
Elm St. (East)	E38	E29	0.26	7	0.26	7	4.43	0.1	0.1	0.2	95.0	200	PVC	0.40	20.7	0.66	0.20
Elm St. (West)	E39	E29	0.16	4	0.16	4	4.45	0.1	0.0	0.1	60.0	200	PVC	0.40	20.7	0.66	0.20
Wood St.	E36	E35	0.47	12	0.47	12	4.41	0.2	0.1	0.3	78.5	200	PVC	5.67	78.1	2.49	0.00
Wood St.	E35	E34	0.35	9	0.82	21	4.38	0.3	0.2	0.5	70.0	200	PVC	4.14	66.7	2.12	0.60
From John St. (East)		E34			0.98	26											
From John St. (West)		E34			0.16	5											
Wood St.	E34	E33	0.26	7	2.21	59	4.3	0.9	0.4	1.3	64.2	200	PVC	0.40	20.7	0.66	0.00
Wood St.	E33	E32	0.54	14	2.75	73	4.28	1.1	0.5	1.6	60.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E32	E31	0.26	7	3.01	80	4.27	1.2	0.6	1.8	56.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E31	E30	0.37	10	3.38	90	4.26	1.3	0.7	2	66.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E30	E29	0.33	9	3.71	99	4.24	1.5	0.7	2.2	66.0	200	PVC	1.31	37.5	1.19	0.60
From Elm St. (East)		E29			0.26	7											
From Elm St. (West)		E29			0.16	4											
Wood St.	E29	E28	0.50	13	4.62	123	4.22	1.8	0.9	2.7	77.8	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E28	E27	0.42	11	5.04	134	4.21	2	1.0	3	78.0	200	PVC	0.40	20.7	0.66	0.50
Wellington St. N	E37	E27	0.41	11	0.41	11	4.41	0.2	0.1	0.3	70.0	200	PVC	0.40	20.7	0.66	0.20
From Wood St.					5.04	134											
Wellington St. N	E27	E26	0.23	6	5.68	151	4.19	2.2	1.1	3.3	57.0	200	PVC	0.40	20.7	0.66	0.50
Wellington St. N	E26	E4	0.31	8	5.99	159	4.18	2.3	1.2	3.5	64.2	200	PVC	0.40	20.7	0.66	0.50

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 2

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Conestoga Dr.	18A	23A	0.37	10	0.37	10	4.41	0.2	0.1	0.3	66.4	200	PVC	1	32.8	1.04	0.30
Conestoga Dr.	23A	24A	0.16	4	0.53	14	4.4	0.2	0.1	0.3	48.9	200	PVC	0.5	23.2	0.74	0.20
Conestoga Dr.	24A	25A	0.16	5	0.69	19	4.38	0.3	0.1	0.4	11.7	200	PVC	0.50	23.2	0.74	0.30
Conestoga Dr.	25A	E47	0.28	7	0.97	26	4.36	0.4	0.2	0.6	Conestoga d	200	PVC	1.80	44	1.4	0.40
Hillview Dr.	E47	E46	0.38	10	1.35	36	4.34	0.5	0.3	0.8		200	PVC		0	0	#DIV/0!
Hillview Dr.	E46	E45	0.26	7	1.61	43	4.33	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Hillview Dr.	E45	E44	0.27	7	1.88	50	4.31	0.7	0.4	1.1		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	18A	20A	0.33	9	0.33	9	4.42	0.1	0.1	0.2	64	200	PVC	3.5	61.4	1.95	#N/A
Bonniewood Dr.	20A	21A	0.09	3	0.42	12	4.41	0.2	0.1	0.3	12	200	PVC	3	56.8	1.81	0.50
Bonniewood Dr.	21A	22A	0.09	3	0.51	15	4.4	0.2	0.1	0.3	11.4	200	PVC	3	56.8	1.81	0.50
Bonniewood Dr.	22A	E51	0.09	3	0.61	18	4.39	0.3	0.1	0.4	31.5+B.Dr.	200	PVC	4.00	65.6	2.09	0.60
Bonniewood Dr.	E51	E50	0.41	11	1.02	29	4.36	0.4	0.2	0.6		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E50	E49	0.29	8	1.31	37	4.34	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E49	E48	0.17	5	1.48	42	4.33	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E48	E44	0.43	11	1.92	53	4.31	0.8	0.4	1.2		200	PVC		0	0	#DIV/0!
From Conestoga/Hillview		E44			1.88	50											
Bonniewood Dr.	E44	E23	0.19	5	3.99	108	4.23	1.6	0.8	2.4		200	PVC		0	0	#DIV/0!
High St./Smith Dr.	E25	E24	0.97	25	0.97	25	4.37	0.4	0.2	0.6	82.5	200	PVC	4.48	69.4	2.21	0.70
Smith Dr.	E24	E23	0.47	12	1.44	37	4.34	0.6	0.3	0.9	35.5	200	PVC	5.98	80.2	2.55	0.80
From Bonniewood					3.99	108.00											
Smith Dr.	E23	E22	0.38	10	5.80	155.00	4.19	2.3	1.2	3.5	35	200	PVC	3.53	61.6	1.96	1.00
Smith Dr.	E22	E21	0.28	7	6.08	162	4.18	2.4	1.2	3.6	87	200	PVC	0.4	20.7	0.66	0.50
Smith Dr.	E21	E10	0.17	5	6.25	167	4.18	2.4	1.3	3.7	105	200	PVC	0.4	20.7	0.66	0.50
Union St.	E52	E20	0.34	9	0.34	9	4.42	0.1	0.1	0.2	60	200	PVC	4.15	66.8	2.13	0.60

Union St.	E20	E8	0.38	10	0.72	19	4.38	0.3	0.1	0.4	90	200	PVC	6.50	83.6	2.66	0.80
Edward St.	E19	E6	0.28	7	0.28	7.00	4.43	0.1	0.1	0.2	75	200	PVC	0.40	20.7	0.66	0.20
Main St. E.	E12	E11	1.33	34	1.33	34	4.35	0.5	0.3	0.8	66	200	PVC	4.37	68.6	2.18	0.70
Main St. E.	E11	E10	0.35	9	1.69	43	4.33	0.6	0.3	0.9	75	200	PVC	5.25	75.2	2.39	0.70
From Smith Dr.					6.25	167.00											
Main St. E.	E10	E9	0.53	14	8.47	224.00	4.13	3.2	1.7	4.9	78.9	200	PVC	1.40	38.8	1.24	0.80
Main St. E.	E9	E8	0.49	13	8.95	237	4.12	3.4	1.8	5.2	77	200	PVC	0.40	20.7	0.66	0.50
From Union St.					0.72	19.00											
Main St. E.	E8	E7	0.34	9	10.00	265.00	4.1	3.8	2.0	5.8	64.3	200	PVC	0.40	20.7	0.66	0.60
Main St. E.	E7	E6	0.54	14	10.54	279	4.09	4	2.1	6.1	92	200	PVC	0.40	20.7	0.66	0.60
From Edward St.					0.28	7.00											
Main St. E.	E6	E5	0.50	13	11.32	299.00	4.08	4.2	2.3	6.5	73	200	PVC	3.97	65.4	2.08	1.30
Main St. E.	E5	E4	0.33	9	11.65	308	4.07	4.4	2.3	6.7	83	200	PVC	0.50	23.2	0.74	0.60

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 3

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Spring St.	E18	E17	0.54	14	0.54	14	4.4	0.2	0.1	0.3	63	200	PVC	6.73	85.1	2.71	0.80
Spring St.	E17	E16	0.47	12	1.01	26	4.36	0.4	0.2	0.6	102.5	200	PVC	3.91	64.9	2.06	0.60
Spring St.	E16	E14	0.35	9	1.36	35	4.34	0.5	0.3	0.8	102.5	200	PVC	1.56	41	1.3	0.50
Wellington St.	E15	E14	0.30	8	0.30	8	4.42	0.1	0.1	0.2	65	200	PVC	4.39	68.7	2.19	0.70
from Spring St.					1.36	35											
Wellington St.	E14	E13	0.32	8	1.98	51	4.31	0.8	0.4	1.2	58.3	200	PVC	1.41	38.9	1.24	0.50
Wellington St.	E13	E4	0.21	6	2.19	57	4.3	0.9	0.4	1.3	60	200	PVC	0.4	20.7	0.66	0.30

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW (L/s)	INFILT. (L/s)	DESIGN FLOW (L/s)	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)					LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Green St.	MH6A	MH1A	0.08	2	0.08	2	4.46	0	0.0	0	42.2	200	PVC	0.45	22	0.7	0.20
Maple St.	MH2A	MH3A	0.14	4	0.14	4	4.45	0.1	0.0	0.1	41.1	200	PVC	0.46	22.2	0.71	0.20
From Green St.					0.08	2											
Maple St.	MH1A	MH3A	0.21	6	0.29	8	4.42	0.1	0.1	0.2	87.1	200	PVC	0.5	23.2	0.74	0.20
Dales Dr.	MH4A	MH1A	0.37	10	0.37	10	4.41	0.2	0.1	0.3	75.5	200	PVC	0.5	23.2	0.74	0.20
Dales Dr.	MHS-6	MHS-5	0.18	5	0.18	5	4.44	0.1	0.0	0.1		200	PVC		0	0	#DIV/0!
Dales Dr.	MHS-5	MHS-4	0.21	6	0.39	11	4.41	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
	MHS-7	MHS-4	0.48	12	0.48	12	4.41	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
Dales Dr.	MHS-4	MHS-1	0.19	5	1.06	28	4.36	0.4	0.2	0.6		200	PVC		0	0	#DIV/0!
Andrew Dr.	MHS-2	MHS-1	0.27	7	0.27	7	4.43	0.1	0.1	0.2		200	PVC		0	0	#DIV/0!
From Maple St./Green St.		MH3A			0.29	8											
From Maple St. (2A-3A)		MH3A			0.14	4											
Andrew Dr.	MH3A	MH4A	0.26	7	0.69	19	4.38	0.3	0.1	0.4	57.9	200	PVC	0.46	22.2	0.71	0.30
Andrew Dr.	MH4A	MH5A	0.23	6	0.92	25	4.37	0.4	0.2	0.6		200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH5A	MH7B	0.24	6	1.16	31	4.35	0.5	0.2	0.7	25+	200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH7B	MH7A	0.16	4	1.32	35	4.34	0.5	0.3	0.8	31	200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH7A	MH1A	0.30	8	1.62	43	4.33	0.6	0.3	0.9	82	200	PVC	0.5	23.2	0.74	0.40
From Dales Dr.		MH1A			0.37	10											
Andrew Dr.	MH1A	MHS-3	0.16	4	2.15	57	4.3	0.9	0.4	1.3		200	PVC		0	0	#DIV/0!
Andrew Dr.	MHS-3	MHS-1	0.33	9	2.48	66	4.29	1	0.5	1.5		200	PVC		0	0	#DIV/0!
From Dales Dr.		MHS-1			1.06	28											

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - EXISTING
Date:	2023-02-21		
Checked By:		Project Number:	T000974B
Date:		Municipality:	Township of Mapleton

Domestic Flow:	300	L/cap/d
Infiltration Allowanc	0.2	L/s/ha
Peak Factor:	Harmon's Formula	
Manning's "n":	0.013	
Population Densit	25	ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
from Andrew Dr.		MHS-1			0.27	7											
Andrew Dr./Edward St.	MHS-1	MHS-11	0.22	6	4.03	107	4.24	1.6	0.8	2.4		200	PVC		0	0	#DIV/0!
Green St.	MH1A	MH7A	0.20	5	0.20	5	4.44	0.1	0.0	0.1	79.7	200	PVC	0.5	23.2	0.74	0.20
Green St.	MH7A	MH8A	0.09	3	0.29	8	4.42	0.1	0.1	0.2	8.9	200	PVC	0.44	21.8	0.69	0.20
Green St.	MH8A	MH9BA	0.34	9	0.63	17	4.39	0.3	0.1	0.4	64.8	200	PVC	0.48	22.7	0.72	0.30
Green St.	MH9BA	MH9A	0.33	9	0.96	26	4.36	0.4	0.2	0.6	62	200	PVC	0.49	23	0.73	0.30
Green St.	MH9A	MH14A	0.25	7	1.21	33	4.35	0.5	0.2	0.7	61.6	200	PVC	0.46	22.2	0.71	0.30

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - EXISTING	Domestic Flow: 300 L/cap/d
Date:	2023-02-21			Infiltration Allowanc 0.2 L/s/ha
Checked By:		Project Number:	T000974B	Peak Factor: Harmon's Formula
Date:		Municipality:	Township of Mapleton	Manning's "n": 0.013
				Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Parkside Dr.	MH15A	MH16A	0.49	13	0.49	13	4.4	0.2	0.1	0.3	78.3	200	PVC	0.5	23.2	0.74	0.20
Parkside Dr.	MH16A	MH17A	0.31	8	0.80	21	4.38	0.3	0.2	0.5	65	200	PVC	0.48	22.7	0.72	0.30
Parkside Dr.	MH17A	MH18A	0.15	4	0.95	25	4.37	0.4	0.2	0.6	48.6	200	PVC	0.54	24.1	0.77	0.30
Maple St.	MH8A	MH7A	0.31	8	0.31	8	4.42	0.1	0.1	0.2	40	200	PVC	0.5	23.2	0.74	0.20
Maple St.	MH7A	MH5A	0.43	11	0.74	19	4.38	0.3	0.1	0.4	110	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH10A	MH11A	0.39	10	0.39	10	4.41	0.2	0.1	0.3	80	200	PVC	0.5	23.2	0.74	0.20
Maple St.	MH11A	MH12A	0.39	10	0.78	20	4.38	0.3	0.2	0.5	85	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH12A	MH13A	0.10	3	0.88	23	4.37	0.3	0.2	0.5	16.1	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH13A	MH14A	0.33	9	1.21	32	4.35	0.5	0.2	0.7	71.2	200	PVC	0.5	23.2	0.74	0.30
From Green St.					1.21	33											
Maple St.	MH14A	MH18A	0.29	8	2.71	73	4.28	1.1	0.5	1.6	85.1	200	PVC	0.5	23.2	0.74	0.40
From Parkside Dr.					0.95	25											
Maple St.	MH18A	MH19A	0.23	6	3.89	104	4.24	1.5	0.8	2.3	52.1	200	PVC	0.52	23.7	0.75	0.50
Maple St.	MH19A	MH6A	0.46	12	4.35	116	4.23	1.7	0.9	2.6	32.5+	200	PVC	0.5	23.2	0.74	0.50
Maple St.	MH6A	MH5A	0.10	3	4.45	119	4.22	1.7	0.9	2.6	42	200	PVC	0.5	23.2	0.74	0.50
From Maple St.					0.74	19											
Pine St.	MH5A	MHS-8	0.22	6	5.41	144	4.2	2.1	1.1	3.2	86	200	PVC	0.4	20.7	0.66	0.50
From 20-year flow	Future MH	MHs-15			0.00	0											
Easement S of Wellington	MHS-15	MHS-14	0.86	22	0.86	22.00	4.37	0.3	0.2	0.5		200	PVC		0	0	#DIV/0!
Easement S of Wellington	MHS-14	MHS-13	0.41	11	1.27	33	4.35	0.5	0.3	0.8		200	PVC		0	0	#DIV/0!
Edward St.	MHS-13	MHS-12	0.53	14	1.80	47	4.32	0.7	0.4	1.1	43.6	200	PVC	0.4	20.7	0.66	0.30
Edward St.	MHS-12	MHS-11	0.26	7	2.06	54	4.31	0.8	0.4	1.2	67.5	200	PVC	0.45	22	0.7	0.40
From Andrew Dr./Edward St.					4.03	107											

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Edward St.	MHS-11	MHS-10	0.37	10	6.46	171	4.17	2.5	1.3	3.8	22.6	200	PVC	0.4	20.7	0.66	0.50
Edward St.	MHS-10	MHS-9	0.24	6	6.70	177	4.17	2.6	1.3	3.9	42.5	200	PVC	0.4	20.7	0.66	0.50
Edward St.	MHS-9	MHS-8	0.27	7	6.97	184	4.16	2.7	1.4	4.1	45.2	200	PVC	0.38	20.2	0.64	0.50
From Pine St.					5.41	144											
Edward St.	MHS-8	MHS13	0.74	19	13.11	347	4.05	4.9	2.6	7.5	80.1	200	PVC	0.4	20.7	0.66	0.60
Edward St.	MHS13	MHS12	0.41	11	13.52	358	4.04	5	2.7	7.7	40.3	200	PVC	0.5	23.2	0.74	0.70
Edward St.	MHS12	MHS11	0.64	17	14.16	375	4.04	5.3	2.8	8.1	52.4	200	PVC	0.31	18.3	0.58	0.60
Edward St.	MHS11	S6	0.33	9	14.49	384	4.03	5.4	2.9	8.3	69.2	200	PVC	0.4	20.7	0.66	0.60
Edward St.	S6	S4	0.32	8	14.81	392	4.03	5.5	3.0	8.5	80	200	PVC	1.93	45.6	1.45	1.10

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
High St.	S5	S4	0.35	9	0.35	9	4.42	0.1	0.1	0.2	70	200	PVC	3.06	57.4	1.83	0.50
From Edward St.					14.81	392											
High St.	S4	S3	0.49	13	15.66	414	4.02	5.8	3.1	8.9	78.6	200	PVC	5.22	74.9	2.39	1.60
High St.	S3	S2	0.39	10	16.05	424	4.01	5.9	3.2	9.1	77	250	PVC	2.71	97.9	1.99	1.20
Wellington St.	S2	S1	0.03	1	16.08	425	4.01	5.9	3.2	9.1	9.5	200	PVC	5.58	77.5	2.47	1.70
Wellington St.	S10	S9	1.18	30	1.18	30	4.35	0.5	0.2	0.7	73	200	PVC	0.4	20.7	0.66	0.30
Wellington St.	S9	S8	0.71	18	1.89	48	4.32	0.7	0.4	1.1	83	200	PVC	0.4	20.7	0.66	0.30
Wellington St.	S8	S7	0.76	19	2.64	67	4.29	1	0.5	1.5	100	200	PVC	6.88	86	2.74	1.10
Wellington St.	S7	S1	0.36	9	3.00	76	4.27	1.1	0.6	1.7	80	200	PVC	2.86	55.5	1.77	0.80
From Wellington St.					16.08	425											
Mill St.	S1	Inlet MH	0.25	7	19.33	508	3.97	7	3.9	10.9	129	200	PVC	7.5	89.8	2.86	1.90

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 5

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Faith Dr.	S22	S21	0.50	13	0.50	13	4.4	0.2	0.1	0.3	85.5	200	PVC	1.03	33.3	1.06	0.30
Faith Dr.	S21	S20	0.41	11	0.91	24	4.37	0.4	0.2	0.6	82.8	200	PVC	1.91	45.3	1.44	0.40
Faith Dr.	S20	S19	0.01	1	0.91	25	4.37	0.4	0.2	0.6	21	200	PVC	5.46	76.6	2.44	0.70
Faith Dr.		S3	0.26	7	1.17	32	4.35	0.5	0.2	0.7	69	200	PVC	2.67	53.6	1.71	0.50
Faith Dr.	S22	S23	0.38	10	0.38	10	4.41	0.2	0.1	0.3	64	200	PVC	0.92	31.5	1	0.30
Faith Dr.	S23	S17	0.29	8	0.67	18	4.39	0.3	0.1	0.4	78.9	200	PVC	1.67	42.4	1.35	0.40
Andrews Dr. W	S18	S17	0.75	19	0.75	19	4.38	0.3	0.1	0.4	20.5	200	PVC	5.56	77.3	2.46	0.70
From Faith Dr.		S17			0.67	18											
Andrews Dr. W	S17	S16	0.10	3	1.52	40	4.33	0.6	0.3	0.9	28	200	PVC	5.61	77.7	2.47	0.70
Andrews Dr. W	S16	S15	0.10	3	1.62	43	4.33	0.6	0.3	0.9	17.8	200	PVC	4.83	72.1	2.29	0.70
Andrews Dr. W	S15	S14	0.52	13	2.13	56	4.3	0.8	0.4	1.2	100	200	PVC	6.31	82.4	2.62	0.80
Andrews Dr. W	S14	S7	0.09	3	2.22	59	4.3	0.9	0.4	1.3	32.3	200	PVC	2.25	49.2	1.57	0.70
River Run Rd.	S13	S12	1.00	26	1.00	26	4.36	0.4	0.2	0.6	103	200	PVC	1.08	34.1	1.08	0.40
River Run Rd.	S12	S11	0.10	3	1.10	29	4.36	0.4	0.2	0.6	18	200	PVC	0.8	29.3	0.93	0.40
River Run Rd.	S11	S10	0.39	10	1.49	39	4.34	0.6	0.3	0.9	67.9	200	PVC	8.13	93.5	2.98	0.90
River Run Rd.	S10	S9	0.37	10	1.86	49	4.32	0.7	0.4	1.1	65.8	200	PVC	6.33	82.5	2.63	0.80
River Run Rd.	S9	S8	0.14	4	2.00	53	4.31	0.8	0.4	1.2	17.4	200	PVC	5.58	77.5	2.47	1.00
River Run Rd.	S8	S7	0.38	10	2.38	63	4.29	0.9	0.5	1.4	81.8	200	PVC	2.41	50.9	1.62	0.70
From Andrews Dr. W		S7			2.22	59			0.4								
River Run Rd.	S7	S6	0.73	19	5.33	141	4.2	2.1	1.1	3.2	120	250	PVC	0.25	29.7	0.61	0.40
River Run Rd.	S6	S5	0.74	19	6.08	160	4.18	2.3	1.2	3.5	120	250	PVC	0.26	30.3	0.62	0.40
River Run Rd.	S5	S4	0.17	5	6.25	165	4.18	2.4	1.2	3.6	28	250	PVC	1.24	66.2	1.35	0.70
River Run Rd.	S4	S3	0.15	4	6.39	169	4.17	2.4	1.3	3.7	41.5	250	PVC	0.19	25.9	0.53	0.40

From Faith Dr.		S3			1.17	32											
River Run Rd.	S3	S2	0.27	7	7.82	208	4.14	3	1.6	4.6	63.8	250	PVC	0.2	26.6	0.54	0.40
River Run Rd.	S2	S1	0.30	8	8.13	216	4.14	3.1	1.6	4.7	67.5	250	PVC	0.45	39.9	0.81	0.50
River Run Rd.	S1	Inlet MH	0.08	2	8.21	218	4.13	3.1	1.6	4.7	58.5	250	PVC	0.74	51.2	1.04	0.60

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 6

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
"Block 45"	MH 927A	MH 322A	1.87	47	1.87	47	4.32	0.7	0.4	1.1	10.0	200	PVC	1.00	32.8	1.04	0.50
Unnamed Inner Easement	MH 931A	MH 320A	0.45	12	0.45	12	4.41	0.2	0.1	0.3	10.0	200	PVC	1.00	32.8	1.04	0.30
Street "A"	MH 308A	MH 307A	0.69	18	0.69	18	4.39	0.3	0.1	0.4	96.4	200	PVC	1.00	32.8	1.04	0.30
Bedell Dr.	MH 307A	MH 306A	0.52	13	1.21	31	4.35	0.5	0.2	0.7	86.6	200	PVC	0.50	23.2	0.74	0.30
Unnamed Inner Easement	MH 921A	MH 304A	0.62	16	0.62	16	4.39	0.2	0.1	0.3	10.0	200	PVC	1.00	32.8	1.04	0.30
Street "A"	MH 308A	MH 331A	0.81	21	0.81	21	4.38	0.3	0.2	0.5	95.0	200	PVC	2.10	47.5	1.51	0.50
Street "A"	MH 331A	MH 330A	0.80	20	1.61	41	4.33	0.6	0.3	0.9	95.0	200	PVC	4.80	71.9	2.29	0.70
Street "A"	MH 330A	MH 300A	0.16	4	1.77	45	4.32	0.7	0.4	1.1	25.6	200	PVC	0.60	25.4	0.81	0.40
					4.58	183											
Bedell Dr. (West)	MH8	MH6	0.81	21	5.39	204	4.14	2.9	1.1	4	100.0	200	PVC	0.46	22.2	0.71	0.50
Bedell Dr. (East)	MH7	MH6	0.38	10	0.38	10	4.41	0.2	0.1	0.3	47.0	200	PVC	2.40	50.8	1.62	0.50
Ridgeview Dr.																	
From Bedell Dr. (West))		MH6			5.39	204											
From Bedell Dr. (East))		MH6			0.38	10											
Ridgeview Dr.	MH6	MH5	0.98	25	6.75	239	4.12	3.4	1.4	4.8	90.0	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH5	MH4	1.12	28	7.87	267	4.1	3.8	1.6	5.4	90.0	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH4	MH1	0.56	14	8.43	281	4.09	4	1.7	5.7	82.0	200	PVC	8.10	93.3	2.97	1.60
Bedell Dr.	MH 324A	MH 322A	0.23	6	0.23	6	4.43	0.1	0.0	0.1	55.1	200	PVC	0.50	23.2	0.74	0.20
From "Block 45"		MH 322A			1.87	47											
Bedell Dr.	MH 322A	MH 321A	0.59	15	2.69	68	4.29	1	0.5	1.5	69.4	200	PVC	0.50	23.2	0.74	0.40
Bedell Dr.	MH 321A	MH 320A	0.60	15	3.29	83	4.26	1.2	0.7	1.9	70.2	200	PVC	0.50	23.2	0.74	0.40
From Easement		MH 320A			0.45	12											

Bedell Dr.	MH 320A	MH 306A	0.49	13	4.23	108	4.23	1.6	0.8	2.4	88.7	200	PVC	0.50	23.2	0.74	0.50
From Bedell Dr./ Street "A"		MH 306A			1.21	31											
Ridgeview Dr.	MH 306A	MH 305A	0.50	13	5.94	152	4.19	2.2	1.2	3.4	69.1	200	PVC	0.50	23.2	0.74	0.50
Ridgeview Dr.	MH 305A	MH 304A	0.60	15	6.54	167	4.18	2.4	1.3	3.7	71.3	200	PVC	0.50	23.2	0.74	0.50
From Unnamed Inner Easement		MH 304A			0.62	16											
Ridgeview Dr.	MH 304A	MH 303A	0.50	13	7.66	196	4.15	2.8	1.5	4.3	64.4	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH 303A	MH 302A	0.43	11	8.09	207	4.14	3	1.6	4.6	58.0	200	PVC	1.80	44.0	1.4	0.90
Ridgeview Dr.	MH 302A	MH 301A	0.57	15	8.66	222	4.13	3.2	1.7	4.9	38.2	200	PVC	1.00	32.8	1.04	0.70
Ridgeview Dr.	MH 301A	MH 300A	0.41	11	9.07	233	4.12	3.3	1.8	5.1	58.5	200	PVC	0.50	23.2	0.74	0.60
From Street "A"		MH 300A			1.77	45											
Ridgeview Dr.	MH 300A	MH 3	0.47	12	11.31	290	4.08	4.1	2.3	6.4	34.8	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH 3	MH 2	0.71	18	12.02	308	4.07	4.4	2.4	6.8	100.0	250	PVC	0.50	42.0	0.86	0.60
Ridgeview Dr.	MH 2	MH 1	0.95	24	12.97	332	4.06	4.7	2.6	7.3	75.0	250	PVC	0.50	42.0	0.86	0.60
From Ridgeview Dr.		MH 1			8.43	281											
Pioneer Dr.	MH 1	MH 9	0.20	6	21.60	619	3.92	8.4	4.3	12.7	78.0	250	PVC	0.50	42.0	0.86	0.70

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowance: 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Density: 50 ppha

Zone 7

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Drayton Industrial Dr.	MH7A	MH6A	9.05	453	9.05	453	4	6.3	1.8	8.1	100	250	PVC	0.3	32.6	0.66	0.50
Drayton Industrial Dr.	MH6A	MH5A	1.17	59	10.22	512	3.97	7.1	2.0	9.1	88	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH5A	MH4A	1.19	60	11.41	572	3.94	7.8	2.3	10.1	54	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH4A	MH3A	0.91	46	12.31	618	3.93	8.4	2.5	10.9	100	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH3A	MH2A	1.17	59	13.48	677	3.9	9.2	2.7	11.9	61	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH2A	MH1A	0.70	36	14.18	713	3.89	9.6	2.8	12.4	80	250	PVC	0.3	32.6	0.66	0.60

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 8

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Wortley St.	W11	W10	0.29	8	0.29	8	4.42	0.1	0.1	0.2	105	200	PVC	7.24	88.3	2.81	0.80
Queen St.	W9	W8	0.58	15	0.58	15	4.4	0.2	0.1	0.3	65	200	PVC	1.07	33.9	1.08	0.30
Queen St.	W8	W7	0.13	4	0.71	19	4.38	0.3	0.1	0.4	55	200	PVC	4	65.6	2.09	0.60
Main St. W	W5	W4	0.35	9	0.35	9	4.42	0.1	0.1	0.2	40	250	PVC	0.31	33.1	0.67	0.20
Queen St.	W9	MH	0.53	14	0.53	14	4.4	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
Mill St.	MH	W1	0.66	17	1.18	31	4.35	0.5	0.2	0.7		200	PVC		0	0	#DIV/0!
Main St. W	W17	W16	0.16	4	0.16	4	4.45	0.1	0.0	0.1	85	200	PVC	0.4	20.7	0.66	0.20
Main St. W	W16	MH1A	0.05	2	0.21	6	4.43	0.1	0.0	0.1	26	200	PVC	1.46	39.6	1.26	0.40
From Mapleton Industrial Park (Zone 7)		MH1A			14.18	713											
Main St. W	MH1A	W15	0.30	8	14.69	727	3.89	9.8	2.9	12.7	74	200	PVC	1.46	39.6	1.26	1.10
Main St. W	W15	W14	0.53	14	15.22	741	3.88	10	3.0	13	82.8	200	PVC	2.72	54.1	1.72	1.40
Main St. W	W14	W13	0.46	12	15.68	753	3.88	10.1	3.1	13.2	100	200	PVC	4.14	66.7	2.12	1.60
Main St. W	W13	MH9	0.02	1	15.71	754	3.88	10.2	3.1	13.3	7.3	200	PVC	4.25	67.6	2.15	1.70
From Pioneer Dr. (Zone 6)		MH9			21.60	619											
Main St. W	MH9	W12	0.60	16	37.91	1,389	3.7	17.8	7.6	25.4	92.7	200	PVC	4.25	67.6	2.15	2.00
Main St. W	W12	W10	0.62	16	38.53	1,405	3.7	18.1	7.7	25.8	100	200	PVC	2.7	53.9	1.72	1.70
From Wortley St.		W10			0.29	8											
Main St. W	W10	W7	0.06	2	38.88	1,415	3.7	18.2	7.8	26	16.77	200	PVC	1.67	42.4	1.35	1.40
From Queen St.		W7			0.71	19.00											
Main St. W	W7	W6	0.33	9	39.92	1,443	3.69	18.5	8.0	26.5	55.33	200	PVC	1.67	42.4	1.35	1.40
Main St. W	W6	W4	0.58	15	40.51	1,458	3.69	18.7	8.1	26.8	60.7	200	PVC	2.35	50.3	1.6	1.60
From Main St. W		W4			0.35	9											
King St.	W4	W3	0.14	4	41.00	1,471	3.69	18.8	8.2	27	70	250	PVC	0.31	33.1	0.67	0.70

King St.	W3	W2	0.40	11	41.40	1,482	3.68	18.9	8.3	27.2	80	250	PVC	0.31	33.1	0.67	0.70
King St.	W2	W1	0.41	11	41.81	1,493	3.68	19.1	8.4	27.5	74.5	250	PVC	0.31	33.1	0.67	0.70
From Mill St.		W1			1.18	31											
Mill St.	W1	Inlet MH	0.10	3	43.09	1,527	3.67	19.5	8.6	28.1	101.5	250	PVC	0.38	36.7	0.75	0.80

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 9

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Main St. W.																	
From Wellington St. (Zone 1)		E4			5.99	159											
From Wellington St. (Zone 2)		E4			11.65	308											
From Wellington St. (Zone 3)		E4			2.19	57											
Main St. W	E4	E3	0.31	8	20.14	532	3.96	7.3	4.0	11.3	111.5	250	PVC	0.37	36.2	0.74	0.70
Easement S. of Conestogo River	E3	E2	0.19	5	20.33	537	3.96	7.4	4.1	11.5	70	250	PVC	0.37	36.2	0.74	0.70
Easement S. of Conestogo River	E2	E1	0.25	7	20.57	544	3.96	7.5	4.1	11.6	70	250	PVC	0.37	36.2	0.74	0.70
Easement S. of Conestogo River	E1	MH PS1	0.15	4	20.72	548	3.95	7.5	4.1	11.6	74	250	PVC	0.37	36.2	0.74	0.70

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - EXISTING	Domestic Flow:	300 L/cap/d
Date:	2023-02-21			Infiltration Allowan	0.2 L/s/ha
Checked By:		Project Number:	T000974B	Peak Factor:	Harmon's Formula
Date:		Municipality:	Township of Mapleton	Manning's "n":	0.013
				Population Densit	25 ppha

Zone 10

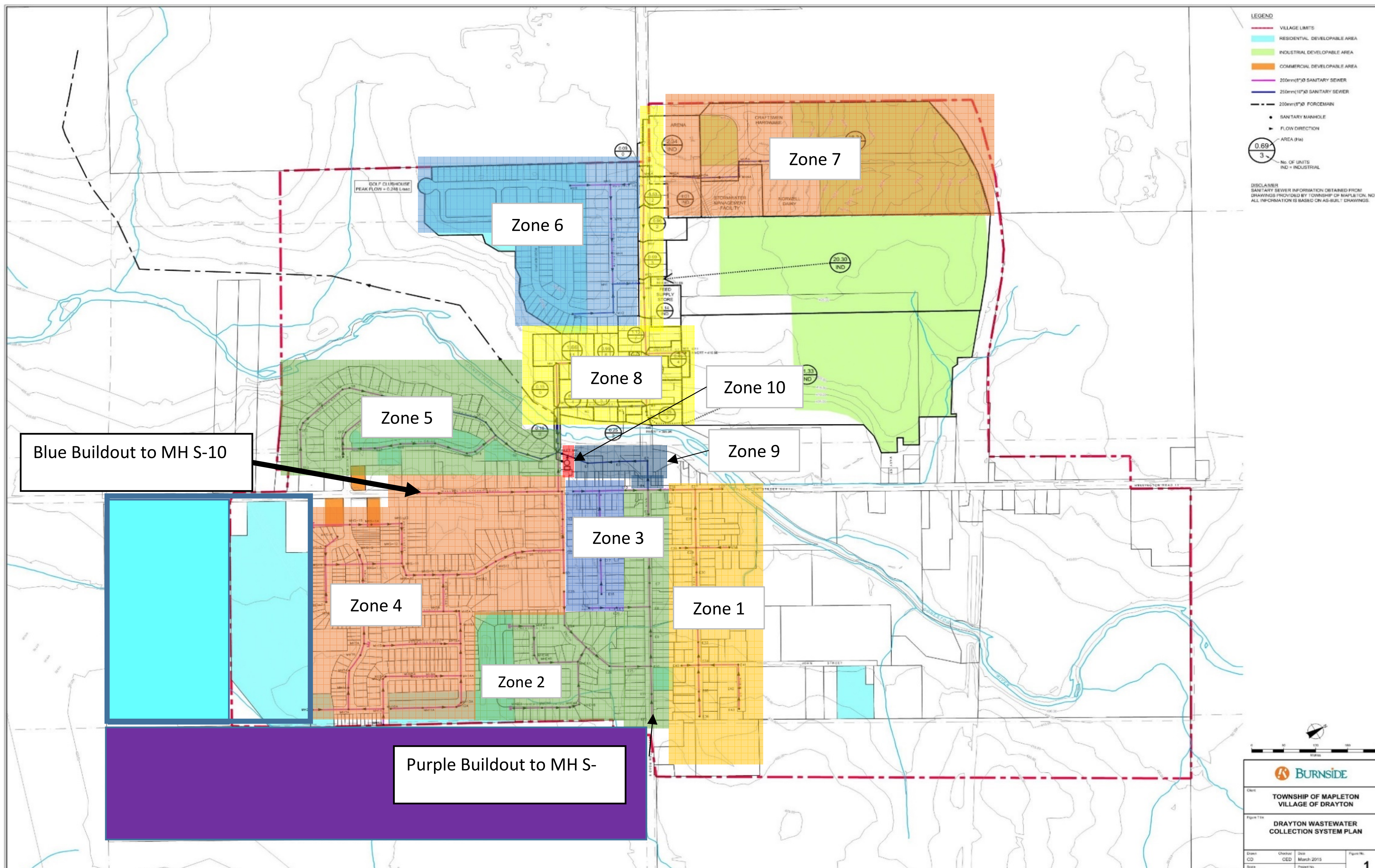
LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
From Mill St. (Zone 4)		Inlet MH			19.33	508											
From Mill St. (Zone 8)		Inlet MH			43.09	1,527											
From River Run Dr. (Zone 5)		Inlet MH			8.21	218											
Inlet MH - PS1	Inlet MH	PS1	0.03	1	70.64	2,254	3.54	27.7	14.1	41.8	13.5	375	PVC	0.31	97.6	0.88	0.80
From Zone 9		PS-1			20.72	548											
Pumping Station Inlet Pipe	PS1	Wet Well	0.00	0	91.37	2,802	3.47	33.8	18.3	52.1	6.5	350	PVC	0.4	92.3	0.96	1.00

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout	Domestic Flow	300 L/cap/d
			All growth occurs south-west of the Conestogo River, with all sewage directed to MH S-15 located within the easement south of Wellington Street.	Infiltration Allowar	0.2 L/s/ha
Date:	2023-02-21				
Checked By:		Project Number:	T000974B	Peak Factor:	Harmon's Formula
Date:		Municipality:	Township of Mapleton	Manning's "n":	0.013
				Population Dens	25 ppha

Total SAN Catchment Area
161.24 ha
Total Population
5597.00 ppl

3795.00



SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald

Date: 2023-02-21

Checked By:

Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout

Project Number: T000974B

Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d

Infiltration Allowan 0.2 L/s/ha

Peak Factor: Harmon's Formula

Manning's "n": 0.013

Population Densit 25 ppha

Zone 1

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Robin St.	E43	E42	0.32	9	0.32	9	4.42	0.1	0.1	0.2	60.0	200	PVC	5.40	76.2	2.43	0.70
Robin St.	E42	E41	0.23	6	0.55	15	4.4	0.2	0.1	0.3	60.0	200	PVC	5.40	76.2	2.43	0.70
John St. (East)	E41	E34	0.43	11	0.98	26	4.36	0.4	0.2	0.6	105.0	200	PVC	0.40	20.7	0.66	0.00
John St. (West)	E40	E34	0.16	5	0.16	5	4.44	0.1	0.0	0.1	50.0	200	PVC	2.40	50.8	1.62	0.50
Elm St. (East)	E38	E29	0.26	7	0.26	7	4.43	0.1	0.1	0.2	95.0	200	PVC	0.40	20.7	0.66	0.20
Elm St. (West)	E39	E29	0.16	4	0.16	4	4.45	0.1	0.0	0.1	60.0	200	PVC	0.40	20.7	0.66	0.20
Wood St.	E36	E35	0.47	12	0.47	12	4.41	0.2	0.1	0.3	78.5	200	PVC	5.67	78.1	2.49	0.00
Wood St.	E35	E34	0.35	9	0.82	21	4.38	0.3	0.2	0.5	70.0	200	PVC	4.14	66.7	2.12	0.60
From John St. (East)		E34			0.98	26											
From John St. (West)		E34			0.16	5											
Wood St.	E34	E33	0.26	7	2.21	59	4.3	0.9	0.4	1.3	64.2	200	PVC	0.40	20.7	0.66	0.00
Wood St.	E33	E32	0.54	14	2.75	73	4.28	1.1	0.5	1.6	60.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E32	E31	0.26	7	3.01	80	4.27	1.2	0.6	1.8	56.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E31	E30	0.37	10	3.38	90	4.26	1.3	0.7	2	66.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E30	E29	0.33	9	3.71	99	4.24	1.5	0.7	2.2	66.0	200	PVC	1.31	37.5	1.19	0.60
From Elm St. (East)		E29			0.26	7											
From Elm St. (West)		E29			0.16	4											
Wood St.	E29	E28	0.50	13	4.62	123	4.22	1.8	0.9	2.7	77.8	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E28	E27	0.42	11	5.04	134	4.21	2	1.0	3	78.0	200	PVC	0.40	20.7	0.66	0.50
Wellington St. N	E37	E27	0.41	11	0.41	11	4.41	0.2	0.1	0.3	70.0	200	PVC	0.40	20.7	0.66	0.20
From Wood St.					5.04	134											
Wellington St. N	E27	E26	0.23	6	5.68	151	4.19	2.2	1.1	3.3	57.0	200	PVC	0.40	20.7	0.66	0.50
Wellington St. N	E26	E4	0.31	8	5.99	159	4.18	2.3	1.2	3.5	64.2	200	PVC	0.40	20.7	0.66	0.50

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 2

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Conestoga Dr.	18A	23A	0.37	10	0.37	10	4.41	0.2	0.1	0.3	66.4	200	PVC	1	32.8	1.04	0.30
Conestoga Dr.	23A	24A	0.16	4	0.53	14	4.4	0.2	0.1	0.3	48.9	200	PVC	0.5	23.2	0.74	0.20
Conestoga Dr.	24A	25A	0.16	5	0.69	19	4.38	0.3	0.1	0.4	11.7	200	PVC	0.50	23.2	0.74	0.30
Conestoga Dr.	25A	E47	0.28	7	0.97	26	4.36	0.4	0.2	0.6	Conestoga d	200	PVC	1.80	44	1.4	0.40
Hillview Dr.	E47	E46	0.38	10	1.35	36	4.34	0.5	0.3	0.8		200	PVC		0	0	#DIV/0!
Hillview Dr.	E46	E45	0.26	7	1.61	43	4.33	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Hillview Dr.	E45	E44	0.27	7	1.88	50	4.31	0.7	0.4	1.1		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	18A	20A	0.33	9	0.33	9	4.42	0.1	0.1	0.2	64	200	PVC	3.5	61.4	1.95	#N/A
Bonniewood Dr.	20A	21A	0.09	3	0.42	12	4.41	0.2	0.1	0.3	12	200	PVC	3	56.8	1.81	0.50
Bonniewood Dr.	21A	22A	0.09	3	0.51	15	4.4	0.2	0.1	0.3	11.4	200	PVC	3	56.8	1.81	0.50
Bonniewood Dr.	22A	E51	0.09	3	0.61	18	4.39	0.3	0.1	0.4	31.5+B.Dr.	200	PVC	4.00	65.6	2.09	0.60
Bonniewood Dr.	E51	E50	0.41	11	1.02	29	4.36	0.4	0.2	0.6		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E50	E49	0.29	8	1.31	37	4.34	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E49	E48	0.17	5	1.48	42	4.33	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E48	E44	0.43	11	1.92	53	4.31	0.8	0.4	1.2		200	PVC		0	0	#DIV/0!
From Conestoga/Hillview		E44			1.88	50											
Bonniewood Dr.	E44	E23	0.19	5	3.99	108	4.23	1.6	0.8	2.4		200	PVC		0	0	#DIV/0!
High St./Smith Dr.	E25	E24	0.97	25	0.97	25	4.37	0.4	0.2	0.6	82.5	200	PVC	4.48	69.4	2.21	0.70
Smith Dr.	E24	E23	0.47	12	1.44	37	4.34	0.6	0.3	0.9	35.5	200	PVC	5.98	80.2	2.55	0.80
From Bonniewood					3.99	108.00											
Smith Dr.	E23	E22	0.38	10	5.80	155.00	4.19	2.3	1.2	3.5	35	200	PVC	3.53	61.6	1.96	1.00
Smith Dr.	E22	E21	0.28	7	6.08	162	4.18	2.4	1.2	3.6	87	200	PVC	0.4	20.7	0.66	0.50
Smith Dr.	E21	E10	0.17	5	6.25	167	4.18	2.4	1.3	3.7	105	200	PVC	0.4	20.7	0.66	0.50
Union St.	E52	E20	0.34	9	0.34	9	4.42	0.1	0.1	0.2	60	200	PVC	4.15	66.8	2.13	0.60

Union St.	E20	E8	0.38	10	0.72	19	4.38	0.3	0.1	0.4	90	200	PVC	6.50	83.6	2.66	0.80
Edward St.	E19	E6	0.28	7	0.28	7.00	4.43	0.1	0.1	0.2	75	200	PVC	0.40	20.7	0.66	0.20
			40.50	1620													
Main St. E.	E12	E11	1.33	34	41.83	1654	3.65	21	8.4	29.4	66	200	PVC	4.37	68.6	2.18	2.10
Main St. E.	E11	E10	0.35	9	42.19	1663	3.65	21.1	8.4	29.5	75	200	PVC	5.25	75.2	2.39	2.20
From Smith Dr.					6.25	167.00											
Main St. E.	E10	E9	0.53	14	48.97	1844.00	3.61	23.1	9.8	32.9	78.9	200	PVC	1.40	38.8	1.24	1.40
Main St. E.	E9	E8	0.49	13	49.45	1857	3.61	23.3	9.9	33.2	77	200	PVC	0.40	20.7	0.66	0.70
From Union St.					0.72	19.00											
Main St. E.	E8	E7	0.34	9	50.50	1885.00	3.61	23.6	10.1	33.7	64.3	200	PVC	0.40	20.7	0.66	0.70
Main St. E.	E7	E6	0.54	14	51.04	1899	3.6	23.7	10.2	33.9	92	200	PVC	0.40	20.7	0.66	0.70
From Edward St.					0.28	7.00											
Main St. E.	E6	E5	0.50	13	51.82	1919.00	3.6	24	10.4	34.4	73	200	PVC	3.97	65.4	2.08	2.10
Main St. E.	E5	E4	0.33	9	52.15	1928	3.6	24.1	10.4	34.5	83	200	PVC	0.50	23.2	0.74	0.80

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 3

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Spring St.	E18	E17	0.54	14	0.54	14	4.4	0.2	0.1	0.3	63	200	PVC	6.73	85.1	2.71	0.80
Spring St.	E17	E16	0.47	12	1.01	26	4.36	0.4	0.2	0.6	102.5	200	PVC	3.91	64.9	2.06	0.60
Spring St.	E16	E14	0.35	9	1.36	35	4.34	0.5	0.3	0.8	102.5	200	PVC	1.56	41	1.3	0.50
Wellington St.	E15	E14	0.30	8	0.30	8	4.42	0.1	0.1	0.2	65	200	PVC	4.39	68.7	2.19	0.70
from Spring St.					1.36	35											
Wellington St.	E14	E13	0.32	8	1.98	51	4.31	0.8	0.4	1.2	58.3	200	PVC	1.41	38.9	1.24	0.50
Wellington St.	E13	E4	0.21	6	2.19	57	4.3	0.9	0.4	1.3	60	200	PVC	0.4	20.7	0.66	0.30

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout	Domestic Flow:	300 L/cap/d
Date:	2023-02-21			Infiltration Allowanc	0.2 L/s/ha
Checked By:		Project Number:	T000974B	Peak Factor:	Harmon's Formula
Date:		Municipality:	Township of Mapleton	Manning's "n":	0.013
				Population Densit	25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Green St.	MH6A	MH1A	0.08	2	0.08	2	4.46	0	0.0	0	42.2	200	PVC	0.45	22	0.7	0.20
Maple St.	MH2A	MH3A	0.14	4	0.14	4	4.45	0.1	0.0	0.1	41.1	200	PVC	0.46	22.2	0.71	0.20
From Green St.					0.08	2											
Maple St.	MH1A	MH3A	0.21	6	0.29	8	4.42	0.1	0.1	0.2	87.1	200	PVC	0.5	23.2	0.74	0.20
Dales Dr.	MH4A	MH1A	0.37	10	0.37	10	4.41	0.2	0.1	0.3	75.5	200	PVC	0.5	23.2	0.74	0.20
Dales Dr.	MHS-6	MHS-5	0.18	5	0.18	5	4.44	0.1	0.0	0.1		200	PVC		0	0	#DIV/0!
Dales Dr.	MHS-5	MHS-4	0.21	6	0.39	11	4.41	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
	MHS-7	MHS-4	0.48	12	0.48	12	4.41	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
Dales Dr.	MHS-4	MHS-1	0.19	5	1.06	28	4.36	0.4	0.2	0.6		200	PVC		0	0	#DIV/0!
Andrew Dr.	MHS-2	MHS-1	0.27	7	0.27	7	4.43	0.1	0.1	0.2		200	PVC		0	0	#DIV/0!
From Maple St./Green St.		MH3A			0.29	8											
From Maple St. (2A-3A)		MH3A			0.14	4											
Andrew Dr.	MH3A	MH4A	0.26	7	0.69	19	4.38	0.3	0.1	0.4	57.9	200	PVC	0.46	22.2	0.71	0.30
Andrew Dr.	MH4A	MH5A	0.23	6	0.92	25	4.37	0.4	0.2	0.6		200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH5A	MH7B	0.24	6	1.16	31	4.35	0.5	0.2	0.7	25+	200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH7B	MH7A	0.16	4	1.32	35	4.34	0.5	0.3	0.8	31	200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH7A	MH1A	0.30	8	1.62	43	4.33	0.6	0.3	0.9	82	200	PVC	0.5	23.2	0.74	0.40
From Dales Dr.		MH1A			0.37	10											
Andrew Dr.	MH1A	MHS-3	0.16	4	2.15	57	4.3	0.9	0.4	1.3		200	PVC		0	0	#DIV/0!
Andrew Dr.	MHS-3	MHS-1	0.33	9	2.48	66	4.29	1	0.5	1.5		200	PVC		0	0	#DIV/0!
From Dales Dr.		MHS-1			1.06	28											

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
from Andrew Dr.		MHS-1			0.27	7											
Andrew Dr./Edward St.	MHS-1	MHS-11	0.22	6	4.03	107	4.24	1.6	0.8	2.4		200	PVC		0	0	#DIV/0!
Green St.	MH1A	MH7A	0.20	5	0.20	5	4.44	0.1	0.0	0.1	79.7	200	PVC	0.5	23.2	0.74	0.20
Green St.	MH7A	MH8A	0.09	3	0.29	8	4.42	0.1	0.1	0.2	8.9	200	PVC	0.44	21.8	0.69	0.20
Green St.	MH8A	MH9BA	0.34	9	0.63	17	4.39	0.3	0.1	0.4	64.8	200	PVC	0.48	22.7	0.72	0.30
Green St.	MH9BA	MH9A	0.33	9	0.96	26	4.36	0.4	0.2	0.6	62	200	PVC	0.49	23	0.73	0.30
Green St.	MH9A	MH14A	0.25	7	1.21	33	4.35	0.5	0.2	0.7	61.6	200	PVC	0.46	22.2	0.71	0.30

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout
Date:	2023-02-21		
Checked By:		Project Number:	T000974B
Date:		Municipality:	Township of Mapleton

Domestic Flow:	300	L/cap/d
Infiltration Allowanc	0.2	L/s/ha
Peak Factor:	Harmon's Formula	
Manning's "n":	0.013	
Population Densit	25	ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Parkside Dr.	MH15A	MH16A	0.49	13	0.49	13	4.4	0.2	0.1	0.3	78.3	200	PVC	0.5	23.2	0.74	0.20
Parkside Dr.	MH16A	MH17A	0.31	8	0.80	21	4.38	0.3	0.2	0.5	65	200	PVC	0.48	22.7	0.72	0.30
Parkside Dr.	MH17A	MH18A	0.15	4	0.95	25	4.37	0.4	0.2	0.6	48.6	200	PVC	0.54	24.1	0.77	0.30
Maple St.	MH8A	MH7A	0.31	8	0.31	8	4.42	0.1	0.1	0.2	40	200	PVC	0.5	23.2	0.74	0.20
Maple St.	MH7A	MH5A	0.43	11	0.74	19	4.38	0.3	0.1	0.4	110	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH10A	MH11A	0.39	10	0.39	10	4.41	0.2	0.1	0.3	80	200	PVC	0.5	23.2	0.74	0.20
Maple St.	MH11A	MH12A	0.39	10	0.78	20	4.38	0.3	0.2	0.5	85	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH12A	MH13A	0.10	3	0.88	23	4.37	0.3	0.2	0.5	16.1	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH13A	MH14A	0.33	9	1.21	32	4.35	0.5	0.2	0.7	71.2	200	PVC	0.5	23.2	0.74	0.30
From Green St.					1.21	33											
Maple St.	MH14A	MH18A	0.29	8	2.71	73	4.28	1.1	0.5	1.6	85.1	200	PVC	0.5	23.2	0.74	0.40
From Parkside Dr.					0.95	25											
Maple St.	MH18A	MH19A	0.23	6	3.89	104	4.24	1.5	0.8	2.3	52.1	200	PVC	0.52	23.7	0.75	0.50
Maple St.	MH19A	MH6A	0.46	12	4.35	116	4.23	1.7	0.9	2.6	32.5+	200	PVC	0.5	23.2	0.74	0.50
Maple St.	MH6A	MH5A	0.10	3	4.45	119	4.22	1.7	0.9	2.6	42	200	PVC	0.5	23.2	0.74	0.50
From Maple St.					0.74	19											
Pine St.	MH5A	MHS-8	0.22	6	5.41	144	4.2	2.1	1.1	3.2	86	200	PVC	0.4	20.7	0.66	0.50
From 20-year flow	Future MH	MHs-15			0.00	0											
Easement S of Wellington	MHS-15	MHS-14	0.86	22	0.86	22.00	4.37	0.3	0.2	0.5		200	PVC		0	0	#DIV/0!
Easement S of Wellington	MHS-14	MHS-13	0.41	11	1.27	33	4.35	0.5	0.3	0.8		200	PVC		0	0	#DIV/0!
Edward St.	MHS-13	MHS-12	0.53	14	1.80	47	4.32	0.7	0.4	1.1	43.6	200	PVC	0.4	20.7	0.66	0.30
Edward St.	MHS-12	MHS-11	0.26	7	2.06	54	4.31	0.8	0.4	1.2	67.5	200	PVC	0.45	22	0.7	0.40
From Andrew Dr./Edward St.					4.03	107											

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout	Domestic Flow:	300 L/cap/d
Date:	2023-02-21			Infiltration Allowanc	0.2 L/s/ha
Checked By:		Project Number:	T000974B	Peak Factor:	Harmon's Formula
Date:		Municipality:	Township of Mapleton	Manning's "n":	0.013
				Population Densit	25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Edward St.	MHS-11	MHS-10	0.37	10	6.46	171	4.17	2.5	1.3	3.8	22.6	200	PVC	0.4	20.7	0.66	0.50
Edward St.	MHS-10	MHS-9	0.24	6	6.70	177	4.17	2.6	1.3	3.9	42.5	200	PVC	0.4	20.7	0.66	0.50
Edward St.	MHS-9	MHS-8	0.27	7	6.97	184	4.16	2.7	1.4	4.1	45.2	200	PVC	0.38	20.2	0.64	0.50
From Pine St.					5.41	144											
Edward St.	MHS-8	MHS13	0.74	19	13.11	347	4.05	4.9	2.6	7.5	80.1	200	PVC	0.4	20.7	0.66	0.60
Edward St.	MHS13	MHS12	0.41	11	13.52	358	4.04	5	2.7	7.7	40.3	200	PVC	0.5	23.2	0.74	0.70
Edward St.	MHS12	MHS11	0.64	17	14.16	375	4.04	5.3	2.8	8.1	52.4	200	PVC	0.31	18.3	0.58	0.60
Edward St.	MHS11	S6	0.33	9	14.49	384	4.03	5.4	2.9	8.3	69.2	200	PVC	0.4	20.7	0.66	0.60
Edward St.	S6	S4	0.32	8	14.81	392	4.03	5.5	3.0	8.5	80	200	PVC	1.93	45.6	1.45	1.10

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
High St.	S5	S4	0.35	9	0.35	9	4.42	0.1	0.1	0.2	70	200	PVC	3.06	57.4	1.83	0.50
From Edward St.					14.81	392											
High St.	S4	S3	0.49	13	15.66	414	4.02	5.8	3.1	8.9	78.6	200	PVC	5.22	74.9	2.39	1.60
High St.	S3	S2	0.39	10	16.05	424	4.01	5.9	3.2	9.1	77	250	PVC	2.71	97.9	1.99	1.20
Wellington St.	S2	S1	0.03	1	16.08	425	4.01	5.9	3.2	9.1	9.5	200	PVC	5.58	77.5	2.47	1.70
			29.37	1175													
Wellington St.	S10	S9	1.18	30	30.55	1205	3.75	15.7	6.1	21.8	73	200	PVC	0.4	20.7	0.66	0.70
Wellington St.	S9	S8	0.71	18	31.26	1223	3.74	15.9	6.3	22.2	83	200	PVC	0.4	20.7	0.66	0.70
Wellington St.	S8	S7	0.76	19	32.01	1242	3.74	16.1	6.4	22.5	100	200	PVC	6.88	86	2.74	2.30
Wellington St.	S7	S1	0.36	9	32.37	1251	3.74	16.2	6.5	22.7	80	200	PVC	2.86	55.5	1.77	1.70
From Wellington St.					16.08	425											
Mill St.	S1	Inlet MH	0.25	7	48.70	1683	3.64	21.3	9.7	31	129	200	PVC	7.5	89.8	2.86	2.60

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 5

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Faith Dr.	S22	S21	0.50	13	0.50	13	4.4	0.2	0.1	0.3	85.5	200	PVC	1.03	33.3	1.06	0.30
Faith Dr.	S21	S20	0.41	11	0.91	24	4.37	0.4	0.2	0.6	82.8	200	PVC	1.91	45.3	1.44	0.40
Faith Dr.	S20	S19	0.01	1	0.91	25	4.37	0.4	0.2	0.6	21	200	PVC	5.46	76.6	2.44	0.70
Faith Dr.		S3	0.26	7	1.17	32	4.35	0.5	0.2	0.7	69	200	PVC	2.67	53.6	1.71	0.50
Faith Dr.	S22	S23	0.38	10	0.38	10	4.41	0.2	0.1	0.3	64	200	PVC	0.92	31.5	1	0.30
Faith Dr.	S23	S17	0.29	8	0.67	18	4.39	0.3	0.1	0.4	78.9	200	PVC	1.67	42.4	1.35	0.40
Andrews Dr. W	S18	S17	0.75	19	0.75	19	4.38	0.3	0.1	0.4	20.5	200	PVC	5.56	77.3	2.46	0.70
From Faith Dr.		S17			0.67	18											
Andrews Dr. W	S17	S16	0.10	3	1.52	40	4.33	0.6	0.3	0.9	28	200	PVC	5.61	77.7	2.47	0.70
Andrews Dr. W	S16	S15	0.10	3	1.62	43	4.33	0.6	0.3	0.9	17.8	200	PVC	4.83	72.1	2.29	0.70
Andrews Dr. W	S15	S14	0.52	13	2.13	56	4.3	0.8	0.4	1.2	100	200	PVC	6.31	82.4	2.62	0.80
Andrews Dr. W	S14	S7	0.09	3	2.22	59	4.3	0.9	0.4	1.3	32.3	200	PVC	2.25	49.2	1.57	0.70
River Run Rd.	S13	S12	1.00	26	1.00	26	4.36	0.4	0.2	0.6	103	200	PVC	1.08	34.1	1.08	0.40
River Run Rd.	S12	S11	0.10	3	1.10	29	4.36	0.4	0.2	0.6	18	200	PVC	0.8	29.3	0.93	0.40
River Run Rd.	S11	S10	0.39	10	1.49	39	4.34	0.6	0.3	0.9	67.9	200	PVC	8.13	93.5	2.98	0.90
River Run Rd.	S10	S9	0.37	10	1.86	49	4.32	0.7	0.4	1.1	65.8	200	PVC	6.33	82.5	2.63	0.80
River Run Rd.	S9	S8	0.14	4	2.00	53	4.31	0.8	0.4	1.2	17.4	200	PVC	5.58	77.5	2.47	1.00
River Run Rd.	S8	S7	0.38	10	2.38	63	4.29	0.9	0.5	1.4	81.8	200	PVC	2.41	50.9	1.62	0.70
From Andrews Dr. W		S7			2.22	59			0.4								
River Run Rd.	S7	S6	0.73	19	5.33	141	4.2	2.1	1.1	3.2	120	250	PVC	0.25	29.7	0.61	0.40
River Run Rd.	S6	S5	0.74	19	6.08	160	4.18	2.3	1.2	3.5	120	250	PVC	0.26	30.3	0.62	0.40
River Run Rd.	S5	S4	0.17	5	6.25	165	4.18	2.4	1.2	3.6	28	250	PVC	1.24	66.2	1.35	0.70
River Run Rd.	S4	S3	0.15	4	6.39	169	4.17	2.4	1.3	3.7	41.5	250	PVC	0.19	25.9	0.53	0.40

From Faith Dr.		S3			1.17	32											
River Run Rd.	S3	S2	0.27	7	7.82	208	4.14	3	1.6	4.6	63.8	250	PVC	0.2	26.6	0.54	0.40
River Run Rd.	S2	S1	0.30	8	8.13	216	4.14	3.1	1.6	4.7	67.5	250	PVC	0.45	39.9	0.81	0.50
River Run Rd.	S1	Inlet MH	0.08	2	8.21	218	4.13	3.1	1.6	4.7	58.5	250	PVC	0.74	51.2	1.04	0.60

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 6

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
"Block 45"	MH 927A	MH 322A	1.87	47	1.87	47	4.32	0.7	0.4	1.1	10.0	200	PVC	1.00	32.8	1.04	0.50
Unnamed Inner Easement	MH 931A	MH 320A	0.45	12	0.45	12	4.41	0.2	0.1	0.3	10.0	200	PVC	1.00	32.8	1.04	0.30
Street "A"	MH 308A	MH 307A	0.69	18	0.69	18	4.39	0.3	0.1	0.4	96.4	200	PVC	1.00	32.8	1.04	0.30
Bedell Dr.	MH 307A	MH 306A	0.52	13	1.21	31	4.35	0.5	0.2	0.7	86.6	200	PVC	0.50	23.2	0.74	0.30
Unnamed Inner Easement	MH 921A	MH 304A	0.62	16	0.62	16	4.39	0.2	0.1	0.3	10.0	200	PVC	1.00	32.8	1.04	0.30
Street "A"	MH 308A	MH 331A	0.81	21	0.81	21	4.38	0.3	0.2	0.5	95.0	200	PVC	2.10	47.5	1.51	0.50
Street "A"	MH 331A	MH 330A	0.80	20	1.61	41	4.33	0.6	0.3	0.9	95.0	200	PVC	4.80	71.9	2.29	0.70
Street "A"	MH 330A	MH 300A	0.16	4	1.77	45	4.32	0.7	0.4	1.1	25.6	200	PVC	0.60	25.4	0.81	0.40
					4.58	183											
Bedell Dr. (West)	MH8	MH6	0.81	21	5.39	204	4.14	2.9	1.1	4	100.0	200	PVC	0.46	22.2	0.71	0.50
Bedell Dr. (East)	MH7	MH6	0.38	10	0.38	10	4.41	0.2	0.1	0.3	47.0	200	PVC	2.40	50.8	1.62	0.50
Ridgeview Dr.																	
From Bedell Dr. (West))		MH6			5.39	204											
From Bedell Dr. (East))		MH6			0.38	10											
Ridgeview Dr.	MH6	MH5	0.98	25	6.75	239	4.12	3.4	1.4	4.8	90.0	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH5	MH4	1.12	28	7.87	267	4.1	3.8	1.6	5.4	90.0	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH4	MH1	0.56	14	8.43	281	4.09	4	1.7	5.7	82.0	200	PVC	8.10	93.3	2.97	1.60
Bedell Dr.	MH 324A	MH 322A	0.23	6	0.23	6	4.43	0.1	0.0	0.1	55.1	200	PVC	0.50	23.2	0.74	0.20
From "Block 45"		MH 322A			1.87	47											
Bedell Dr.	MH 322A	MH 321A	0.59	15	2.69	68	4.29	1	0.5	1.5	69.4	200	PVC	0.50	23.2	0.74	0.40
Bedell Dr.	MH 321A	MH 320A	0.60	15	3.29	83	4.26	1.2	0.7	1.9	70.2	200	PVC	0.50	23.2	0.74	0.40
From Easement		MH 320A			0.45	12											

Bedell Dr.	MH 320A	MH 306A	0.49	13	4.23	108	4.23	1.6	0.8	2.4	88.7	200	PVC	0.50	23.2	0.74	0.50
From Bedell Dr./ Street "A"		MH 306A			1.21	31											
Ridgeview Dr.	MH 306A	MH 305A	0.50	13	5.94	152	4.19	2.2	1.2	3.4	69.1	200	PVC	0.50	23.2	0.74	0.50
Ridgeview Dr.	MH 305A	MH 304A	0.60	15	6.54	167	4.18	2.4	1.3	3.7	71.3	200	PVC	0.50	23.2	0.74	0.50
From Unnamed Inner Easement		MH 304A			0.62	16											
Ridgeview Dr.	MH 304A	MH 303A	0.50	13	7.66	196	4.15	2.8	1.5	4.3	64.4	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH 303A	MH 302A	0.43	11	8.09	207	4.14	3	1.6	4.6	58.0	200	PVC	1.80	44.0	1.4	0.90
Ridgeview Dr.	MH 302A	MH 301A	0.57	15	8.66	222	4.13	3.2	1.7	4.9	38.2	200	PVC	1.00	32.8	1.04	0.70
Ridgeview Dr.	MH 301A	MH 300A	0.41	11	9.07	233	4.12	3.3	1.8	5.1	58.5	200	PVC	0.50	23.2	0.74	0.60
From Street "A"		MH 300A			1.77	45											
Ridgeview Dr.	MH 300A	MH 3	0.47	12	11.31	290	4.08	4.1	2.3	6.4	34.8	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH 3	MH 2	0.71	18	12.02	308	4.07	4.4	2.4	6.8	100.0	250	PVC	0.50	42.0	0.86	0.60
Ridgeview Dr.	MH 2	MH 1	0.95	24	12.97	332	4.06	4.7	2.6	7.3	75.0	250	PVC	0.50	42.0	0.86	0.60
From Ridgeview Dr.		MH 1			8.43	281											
Pioneer Dr.	MH 1	MH 9	0.20	6	21.60	619	3.92	8.4	4.3	12.7	78.0	250	PVC	0.50	42.0	0.86	0.70

SANITARY SEWER DESIGN SHEET

Designed By:
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowance: 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Density: 50 ppha

Zone 7

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Drayton Industrial Dr.	MH7A	MH6A	9.05	453	9.05	453	4	6.3	1.8	8.1	100	250	PVC	0.3	32.6	0.66	0.50
Drayton Industrial Dr.	MH6A	MH5A	1.17	59	10.22	512	3.97	7.1	2.0	9.1	88	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH5A	MH4A	1.19	60	11.41	572	3.94	7.8	2.3	10.1	54	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH4A	MH3A	0.91	46	12.31	618	3.93	8.4	2.5	10.9	100	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH3A	MH2A	1.17	59	13.48	677	3.9	9.2	2.7	11.9	61	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH2A	MH1A	0.70	36	14.18	713	3.89	9.6	2.8	12.4	80	250	PVC	0.3	32.6	0.66	0.60

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 8

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Wortley St.	W11	W10	0.29	8	0.29	8	4.42	0.1	0.1	0.2	105	200	PVC	7.24	88.3	2.81	0.80
Queen St.	W9	W8	0.58	15	0.58	15	4.4	0.2	0.1	0.3	65	200	PVC	1.07	33.9	1.08	0.30
Queen St.	W8	W7	0.13	4	0.71	19	4.38	0.3	0.1	0.4	55	200	PVC	4	65.6	2.09	0.60
Main St. W	W5	W4	0.35	9	0.35	9	4.42	0.1	0.1	0.2	40	250	PVC	0.31	33.1	0.67	0.20
Queen St.	W9	MH	0.53	14	0.53	14	4.4	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
Mill St.	MH	W1	0.66	17	1.18	31	4.35	0.5	0.2	0.7		200	PVC		0	0	#DIV/0!
Main St. W	W17	W16	0.16	4	0.16	4	4.45	0.1	0.0	0.1	85	200	PVC	0.4	20.7	0.66	0.20
Main St. W	W16	MH1A	0.05	2	0.21	6	4.43	0.1	0.0	0.1	26	200	PVC	1.46	39.6	1.26	0.40
From Mapleton Industrial Park (Zone 7)		MH1A			14.18	713											
Main St. W	MH1A	W15	0.30	8	14.69	727	3.89	9.8	2.9	12.7	74	200	PVC	1.46	39.6	1.26	1.10
Main St. W	W15	W14	0.53	14	15.22	741	3.88	10	3.0	13	82.8	200	PVC	2.72	54.1	1.72	1.40
Main St. W	W14	W13	0.46	12	15.68	753	3.88	10.1	3.1	13.2	100	200	PVC	4.14	66.7	2.12	1.60
Main St. W	W13	MH9	0.02	1	15.71	754	3.88	10.2	3.1	13.3	7.3	200	PVC	4.25	67.6	2.15	1.70
From Pioneer Dr. (Zone 6)		MH9			21.60	619											
Main St. W	MH9	W12	0.60	16	37.91	1,389	3.7	17.8	7.6	25.4	92.7	200	PVC	4.25	67.6	2.15	2.00
Main St. W	W12	W10	0.62	16	38.53	1,405	3.7	18.1	7.7	25.8	100	200	PVC	2.7	53.9	1.72	1.70
From Wortley St.		W10			0.29	8											
Main St. W	W10	W7	0.06	2	38.88	1,415	3.7	18.2	7.8	26	16.77	200	PVC	1.67	42.4	1.35	1.40
From Queen St.		W7			0.71	19.00											
Main St. W	W7	W6	0.33	9	39.92	1,443	3.69	18.5	8.0	26.5	55.33	200	PVC	1.67	42.4	1.35	1.40
Main St. W	W6	W4	0.58	15	40.51	1,458	3.69	18.7	8.1	26.8	60.7	200	PVC	2.35	50.3	1.6	1.60
From Main St. W		W4			0.35	9											
King St.	W4	W3	0.14	4	41.00	1,471	3.69	18.8	8.2	27	70	250	PVC	0.31	33.1	0.67	0.70

King St.	W3	W2	0.40	11	41.40	1,482	3.68	18.9	8.3	27.2	80	250	PVC	0.31	33.1	0.67	0.70
King St.	W2	W1	0.41	11	41.81	1,493	3.68	19.1	8.4	27.5	74.5	250	PVC	0.31	33.1	0.67	0.70
From Mill St.		W1			1.18	31											
Mill St.	W1	Inlet MH	0.10	3	43.09	1,527	3.67	19.5	8.6	28.1	101.5	250	PVC	0.38	36.7	0.75	0.80

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan(0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 9

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Main St. W.																	
From Wellington St. (Zone 1)		E4			5.99	159											
From Wellington St. (Zone 2)		E4			52.15	1928											
From Wellington St. (Zone 3)		E4			2.19	57											
Main St. W	E4	E3	0.31	8	60.64	2152	3.56	26.6	12.1	38.7	111.5	250	PVC	0.37	36.2	0.74	0.80
Easement S. of Conestogo River	E3	E2	0.19	5	60.83	2157	3.56	26.7	12.2	38.9	70	250	PVC	0.37	36.2	0.74	0.80
Easement S. of Conestogo River	E2	E1	0.25	7	61.07	2164	3.56	26.7	12.2	38.9	70	250	PVC	0.37	36.2	0.74	0.80
Easement S. of Conestogo River	E1	MH PS1	0.15	4	61.22	2168	3.56	26.8	12.2	39	74	250	PVC	0.37	36.2	0.74	0.80

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout	Domestic Flow:	300 L/cap/d
Date:	2023-02-21			Infiltration Allowanc	0.2 L/s/ha
Checked By:		Project Number:	T000974B	Peak Factor:	Harmon's Formula
Date:		Municipality:	Township of Mapleton	Manning's "n":	0.013
				Population Densit	25 ppha

Zone 10

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
From Mill St. (Zone 4)		Inlet MH			48.70	1,683											
From Mill St. (Zone 8)		Inlet MH			43.09	1,527											
From River Run Dr. (Zone 5)		Inlet MH			8.21	218											
Inlet MH - PS1	Inlet MH	PS1	0.03	1	100.01	3,429	3.39	40.4	20.0	60.4	13.5	375	PVC	0.31	97.6	0.88	0.90
From Zone 9		PS-1			61.22	2,168											
Pumping Station Inlet Pipe	PS1	Wet Well	0.00	0	161.24	5,597	3.2	62.2	32.2	94.4	6.5	350	PVC	0.4	92.3	0.96	1.10

Township of Mapleton

Mapleton Water and Wastewater Servicing Master Plan

Technical Memorandum (TM) 3 – Evaluation Framework

Friday, March 10, 2023

T000974D

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Engineering for **people**

Technical Memorandum 3 – Evaluation Framework

Mapleton Water and Wastewater Servicing Master Plan

File no T000974D

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1 Introduction

1.1 Background

The Township of Mapleton is responsible for providing municipal drinking water and wastewater services to the residents in the urban centres of the township. The Township is undertaking a Water and Wastewater Servicing master Plan Study to develop a long-term and sustainable strategy for provision of municipal drinking water and wastewater services for existing and planned growth within the township.

As part of the Master Planning Process, five (5) technical memoranda will be prepared, as follows:

1. Technical Memo 1 – Background Conditions and Design Criteria
2. Technical Memo 2 – Development and presentation of a reasonable range of alternative servicing strategies.
3. Technical Memo 3 – Evaluation Framework
4. Technical Memo 4 – Evaluation of Alternatives
5. Technical Memo 5 – Implementation Plan

The findings outlined in the five Technical Memoranda will be summarized in a project File Report which will be available for Public Review and comment.

1.2 Purpose of Technical Memorandum No. 3

The purpose of Technical Memorandum No.3 (TM3) is to describe the evaluation framework to be used for the assessment of potential alternative solutions, which will further provide the foundation for the selection of the preliminary preferred servicing solution.

2 Evaluation Framework

An evaluation framework should be developed to focus and clarify the decision-making process. A well-structured, comprehensive evaluation framework provides the foundation for a decision-making process that is sound, defensible, traceable, and consistent with the project objectives.

The proposed decision-making process for this Master Plan consists of the following major sequential steps:

1. Identification of Alternative Solutions – The first step allows the project team to identify a list of all available potential alternative solutions (TM2).
2. Development of Evaluation Categories and Criteria – The second step involves the development of categories and criteria that will be used to evaluate each alternative solution based on the project objectives (TM3).
3. Comparative Evaluation of Alternative Solutions – The third step evaluates and scores the alternative solutions using multi-criteria analysis (MCA) of the evaluation criteria (TM4).
4. Selection and Recommendation of Preferred Solution – The fourth step identifies the preferred solution based on the results of the comparative evaluation (TM4).

A schematic of the evaluation process is outlined in Figure 2-1.

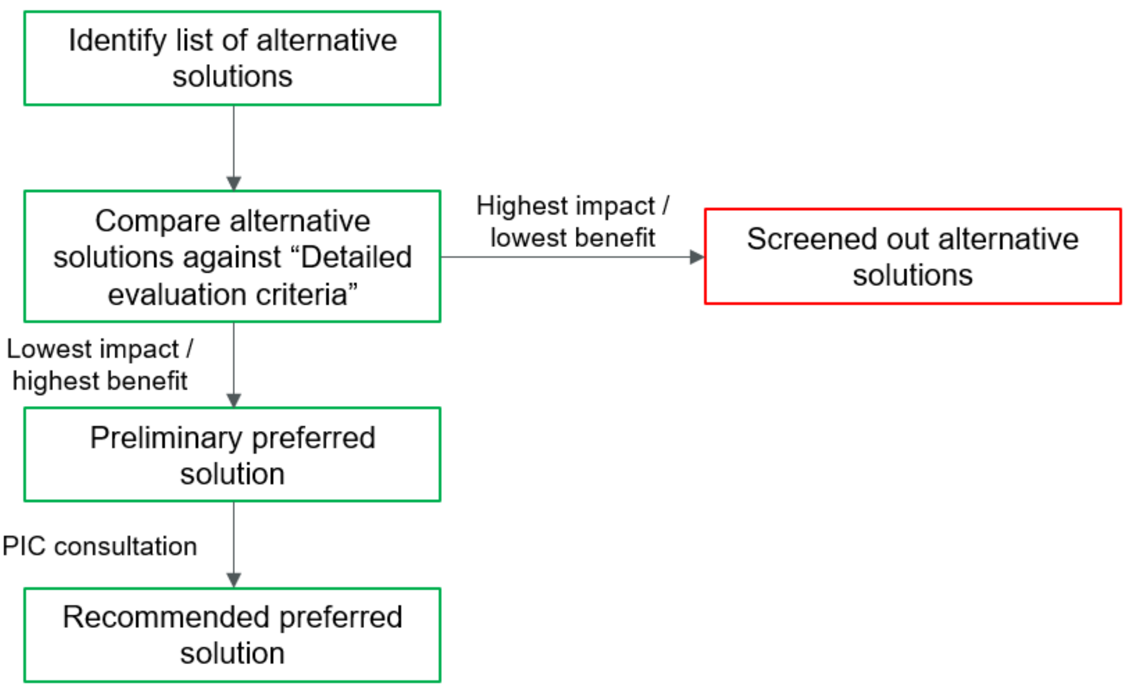

Figure 2-1: Overview of Evaluation Approach

2.1 Proposed Decision-Making Model

The proposed decision-making model for this Master Plan is centred on an MCA. The MCA provides a structured approach to determining the overall benefits and impacts among alternative solutions, where the solutions accomplish several objectives.

The MCA approach includes the following major components:

- **Evaluation Categories**: Evaluation categories group the evaluation criteria. Each category may be assigned a weighting factor to reflect its importance relative to the other categories.
- **Evaluation Criteria**: Within each category, a set of evaluation criteria is developed to reflect all important aspects and desirable objectives of a specific project. Indicators are identified and used to measure/assess the ability of each alternative solution to meet a specific objective.
- **Qualitative Rating**: Each alternative solution is assigned a rating that reflects its ability to meet each evaluation criterion relative to the performance of the other alternative solutions.

2.2 Evaluation Categories

The feasibility of each alternative solution will be assessed using an evaluation matrix. This enables a systematic and rational comparison of the alternatives and focuses on a set of criteria for four (4) main categories:

- Natural Environmental – 10%
- Socio-Cultural – 20%
- Technical/Operational – 40%
- Economic – 30%

Input will be requested from the Township and the public on the weighting factors assigned to each evaluation category. The weighting factors reflect the degree of importance of each category within the overall evaluation scheme. As such, the proposed factors are based on the specific characteristics and anticipated potential impacts of this project. Higher weighting is assigned to criteria that carry more influence on the comparative evaluation results.

The weighting factors are proposed based on the specific nature and anticipated potential impacts of the project. Higher weighting is assigned to criteria that carry more influence on the alternative evaluation results.

It is anticipated that the relative difference of impacts of each alternative on natural environmental and socio-cultural will be minor given the proposed alternatives are confined to the existing facility sites and utility corridors, so a lower weighting is assigned. It is anticipated there will be significant relative difference on technical/operational and economic impacts for each alternative, so these categories were weighted more heavily. Individual weighting factors to each of the evaluation criterion within the main categories can also be assigned, if necessary, in consultation with the Township.

Preliminary weighting factors assigned to main criteria categories will be presented to the public at the Public Information Centre for feedback and confirmation.

2.3 Evaluation Criteria, Rationale, and Indicators

Detailed criteria are identified within each main evaluation category, shown in Table 2-1. The criteria are intended to represent the specific aspects and considerations of each category that are most relevant to the project. Criteria are grouped by category with their respective descriptions and indicators to be used when assigning scores. The proposed criteria and indicators will be reviewed and agreed upon in consultation with the Township.

Table 2-1: Evaluation Criteria and Indicators

Criteria	Description	Indicators
Natural Environmental		**10%**
Natural Environmental Features	Potential impacts to existing natural environment	• Potential impacts from construction and operation to existing terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, etc. • Allow for phasing of construction activities in a way and at a time of year that would limit the negative impacts on the vegetation of the site and surrounding area

Criteria	Description	Indicators
Water Resources and Source Water Protection	Potential temporary and permanent effects on surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Impacts on the GRCA regulated floodplain • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use
Wildlife	Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health
Climate Change	Minimize contribution to climate change and maximize resiliency to extreme conditions	• Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands • Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) • Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts • Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) • Maintains adaptive capacity and resiliency of surrounding areas

Criteria	Description	Indicators
Socio-Cultural		**20%**
Health and Safety	Minimize potential impact of health and safety of operation staff and potential risks to public	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)
Nuisance (short-term) Impacts	Minimize potential short-term disruption during construction	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction
Aesthetic and Operational (long-term) Impacts	Potential long-term impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise, odour, air emissions, and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Distance between proposed infrastructure and the closest sensitive receptor(s) • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) • Ability to maintain characteristics of neighbourhood including property value and access to and aesthetics of public spaces
Impacts on Businesses	Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development

Criteria	Description	Indicators
Protects Cultural Heritage Features	Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities
Protects Archaeological Features	Minimizes impact to archaeological features	• Potential impact to archaeologically significant features
Technical/Operational		**40%**
Existing and Future Demands	Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices
Reliability and Security	Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure
Constructability	Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system and ongoing upgrades • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain servicing during construction • Ability to maximize existing footprint / site capacity

Criteria	Description	Indicators
Operational Complexity	Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing technologies • Complexity of processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements
Existing and Planned Infrastructure	Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades
Existing and Planned Land Use	Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership
Permits and Approvals	Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies
Financial/Economic		**30%**
Life Cycle Cost	20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period

2.4 Scoring Approach Rationale

The proposed evaluation framework consists of a descriptive or qualitative evaluation of alternative solutions / strategies and identification of advantages and disadvantages of each alternative solution with respect to the evaluation criteria. Comparisons and trade-offs can be made between alternatives. Trade-offs can involve forfeiting an advantage or accepting a disadvantage to address a higher priority consideration.

Some criteria will be evaluated using quantitative means, including costs and GHG generation. High-level estimates will be generated for these criteria, and they will be evaluated using a relative rating provided for each alternative as it compares to each of the other alternatives.

An evaluation matrix will be prepared describing the specific advantages and disadvantages that each solution offers for each criterion under consideration. Each solution will be compared relative to the others and assigned a preliminary score relating to the potential net impact, which intends to reflect the risk and/or potential impacts, and the impact that remains or is predicted to remain, after mitigation measures are in place.

The scoring legend is shown in Table 2-2.

Table 2-2: Scoring Legend

Performance Score	Score Representation	Description
5	●	Potential impacts are negligible, no mitigation is required. Most preferred.
4	◕	Potential impacts are minor and can be easily mitigated through implementation of standard mitigation measures.
3	◑	Potential impacts are moderate and implementation of a number of mitigation measures are required to reduce / eliminate the risks.
2	◔	Potential impacts are major, and implementation of extensive mitigation measures are required to reduce / eliminate the risks.
1	○	Potential impacts are significant, and implementation of substantial mitigation measures are required to reduce the risks; however, risk cannot be completed eliminated. Least preferred.

2.5 Selection of Preliminary Preferred Solutions

The total score within each category will be determined by summing the individual scores assigned to each evaluation criterion. Category scores will then be summed, with consideration to the relative weighting factor of each category, to determine the overall score of an alternative solution. The alternative solution with the highest final score is considered to provide the most overall benefits and thus, as the preliminary preferred solution for recommendation.

3 Next Steps

With the evaluation framework developed, the next steps are to confirm with the Township the weighting factors for each evaluation category as well as the criteria and indicators. Once the framework is finalized, the decision-making process will continue with the evaluation of available potential alternative solutions and selection of the preliminary preferred solution.

Engineering
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Township of Mapleton

Mapleton Water and Wastewater Servicing Master Plan

Technical Memorandum 4 – Evaluation of Alternatives

Tuesday, April 18, 2023

T000974D

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Engineering for **people**

Technical Memorandum 4 – Evaluation of Alternatives

Mapleton Water and Wastewater Servicing Master Plan

File no T000974D

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1 Introduction

1.1 Background

The Township support a mostly agricultural and rural population of approximately 11,000 residents. Following amalgamation in 1999 Mapleton identified its new vision and mission: "rooted in tradition, growing for the future." Three small hamlets (Drayton, Moorefield and Alma) make up the "urban" centres of the Township; however, only the urban centres of Drayton and Moorefield are currently serviced with communal drinking water and wastewater systems.

The Township of Mapleton is responsible for providing municipal drinking water and wastewater services to the residents in the urban centres of the Township. The Township is undertaking a Water and Wastewater Servicing Master Plan Study to develop a long-term and sustainable strategy for provision of municipal drinking water and wastewater services for existing and planned growth within the township.

As part of the Master Planning Process, five (5) technical memoranda will be prepared, as follows:

1. Technical Memo 1 – Background Conditions and Design Criteria
2. Technical Memo 2 – Development and presentation of a reasonable range of alternative servicing strategies.
3. Technical Memo 3 – Evaluation Framework
4. Technical Memo 4 – Evaluation of Alternatives
5. Technical Memo 5 – Implementation Plan

The findings outlined in the five Technical Memoranda will be summarized in a project File Report which will be available for Public Review and comment.

1.2 Purpose of Technical Memorandum No. 4

The purpose of this Technical Memorandum No. 4 (TM4) is to document the results of the comparative evaluation of alternative water and wastewater servicing strategies for the urban centers of Drayton and Moorefield.

2 Detailed Evaluation - Drinking Water Systems

A detailed comparative evaluation of the potential implementation options was completed based on the evaluation methodology developed in TM 3. Each alternative has been assessed relative to the others and assigned a preliminary score relating to the potential net impact. The numerical scores obtained have been represented graphically with Harvey balls to communicate the information more clearly to the public.

The detailed evaluation matrices, included in Appendix A, describe the rationale and preliminary scoring assigned to each alternative for the water and wastewater servicing strategy.

2.1 Drayton Drinking Water Supply System

As outlined in TM 2, three (3) Alternative strategies for the Drayton Drinking Water System were developed, as follows:

Alternative 1 – Increase Capacity of Existing Wells

For this Alternative, the Drayton Water Supply System will continue to rely on a single groundwater source. To meet demand, both wells will need to increase capacity and continue operating in duty/standby configuration. While this alternative is effective in terms of cost and constructability, it does not provide operational flexibility and requires more complex construction staging. In addition, this Alternative is considered to have a higher operational risk due to the limited redundancy in the supply system.

Alternative 2 – Construct a New Well at the WTP Site

For this Alternative, additional capacity will be provided through a third well constructed on the site of the existing water treatment plant, subject to confirmatory investigations. The Drayton Water Supply System will continue to rely on a single groundwater source; however, advantages of this alternative include increased operational flexibility and redundancy, less complex construction staging, and maximized site capacity. This alternative also best aligns with planned infrastructure projects. The PTTW would need to be adjusted by 2046 as the current maximum taking rate is 45 L/s with a maximum two well pumps in operation.

Alternative 3 – Construct a New Well at a Different Site

This Alternative considers drilling a new well at a new site as well as constructing a new pumphouse. This alternative would address the concerns with expanding the water supply over two groundwater sources; however, this Alternative will have a much greater impact on the Technical, Economic, and Natural Environments.

A detailed evaluation of the Drayton Water Supply alternatives is provided in Appendix A and is summarized below in Table 2-1.

Table 2-1: Summary of Drayton Water Supply Alternatives

Alternatives	Score Representation	Ranking
Alternative 1 – Increase the capacity of the existing wells	◕	2
Alternative 2 – Construct a new well at the existing WTP site to increase supply capacity	●	1
Alternative 3 - Construct a new well on another site to increase supply capacity	◑	3

Alternative 2 – Building a new well to increase capacity is the preferred servicing alternative for Drayton's Water Supply System. A Process schematic for the upgraded system is provided below in Figure 2-1.

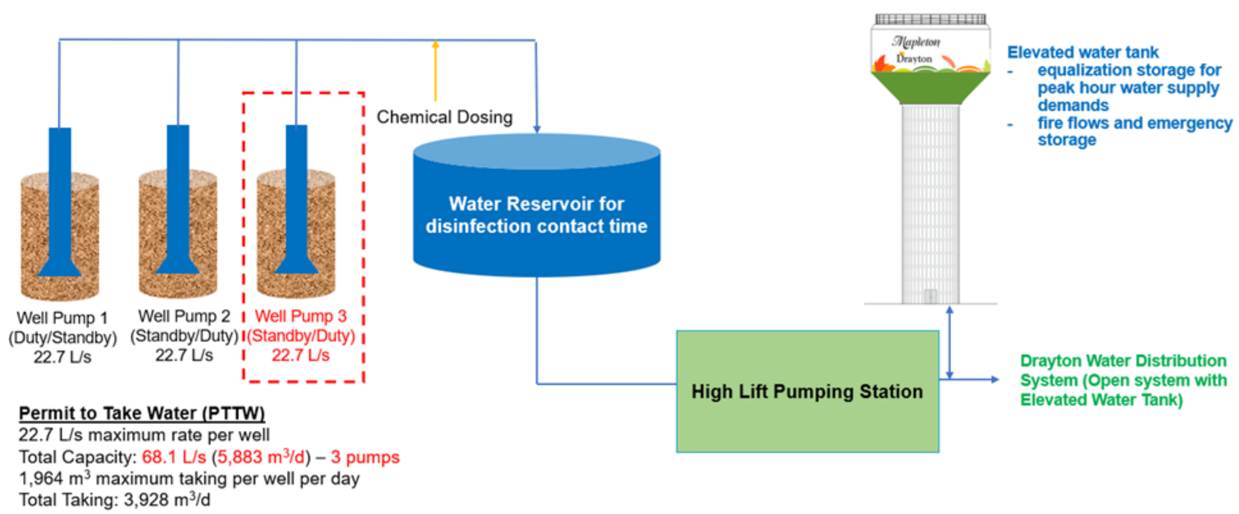

Figure 2-1: Build a New Well to Increase Supply Capacity

2.2 Drayton Drinking Water Distribution System

The existing distribution system in Drayton has adequate supply capacity and pressure to provide for a full range of domestic demands, as well as adequate capacity to provide for Fire Protection for existing developments within the community.

To accommodate planned growth within the community of Drayton, watermain extensions will need to be provided to the new development areas. These watermain extensions will then connect to local watermain extensions constructed as part of the land subdivision process.

All watermain extensions identified within this Master Plan will be completed within existing road allowances and, as such, are considered to be Schedule A+ undertakings under the Municipal Class EA Process. Local watermain extensions within proposed development areas are subject to change based on the final Plan(s) of Subdivision as approved under the Planning Act.

The recommended Distribution System Strategy is depicted below in Figure 2-2.

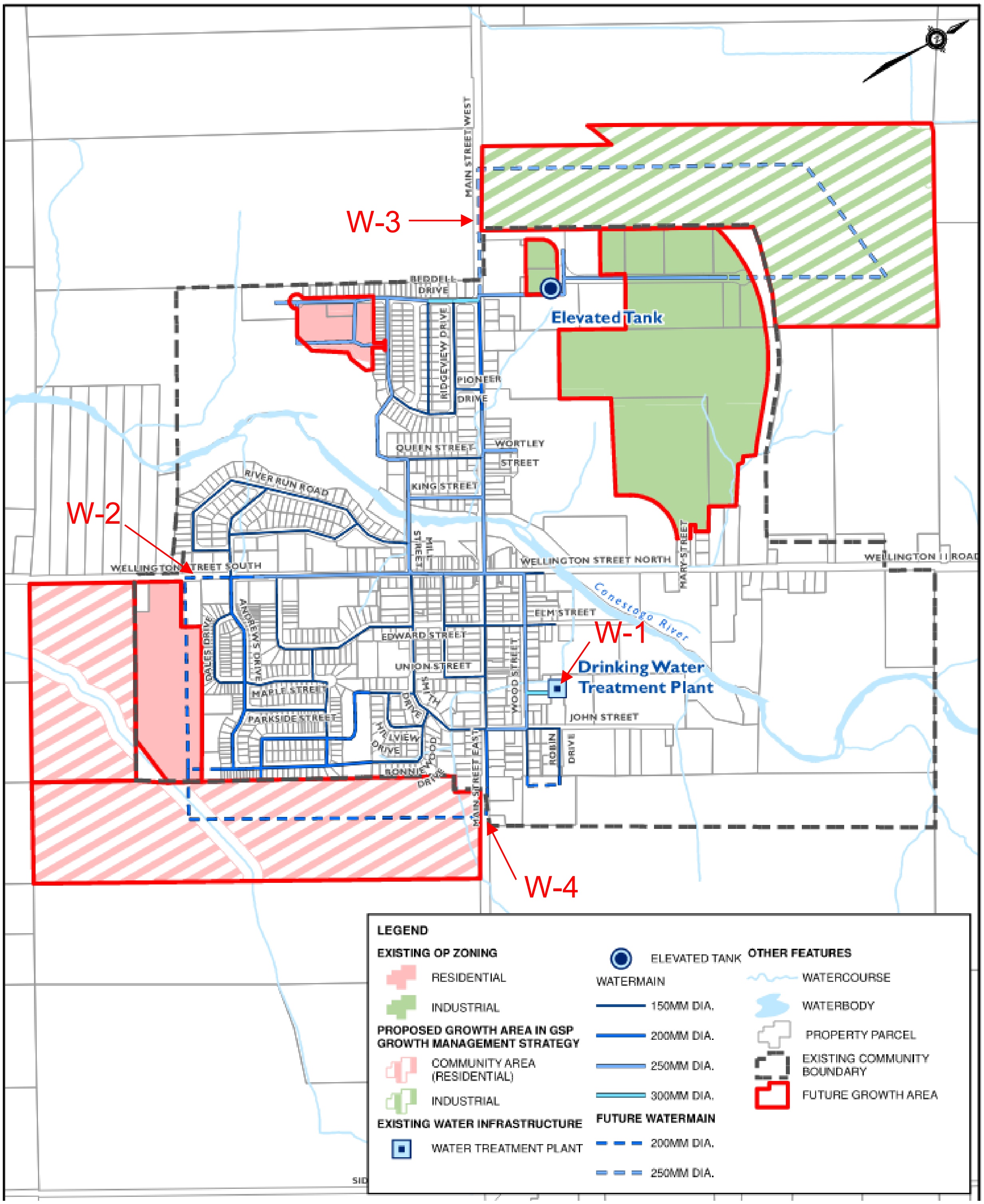

Figure 2-2: Drayton Drinking Water Distribution Strategy

2.3 Moorefield Drinking Water Supply System

The existing Moorefield Water Supply System is comprised of two (2) water supply wells, a water treatment plant, an at-grade storage facility to provide chlorine contact time for primary disinfection and for equalization storage, and a high lift pump station to convey drinking water to residents of Moorefield. The Drinking Water System has been developed to provide drinking water for domestic use only with limited supply capacity for Fire Protection. No hydrants have been provided in Moorefield to provide access to the distribution system by the Mapleton Fire Department.

At the time of writing this memorandum, the Township is proceeding with upgrades to the Moorefield Water Supply System to address operational and redundancy issues. Under this Program, the Township will:

1. Construct a new well on the site of the existing water treatment plant to ensure security of supply in the event of a well pump failure.
2. Construct a new at-grade water storage facility to provide additional contact time and equalization storage, and to provide system redundancy to facilitate maintenance of the storage facilities.
3. Modifications to the high lift pumping station.

As outlined in TM 2, two (2) Alternative strategies for the Moorefield Drinking Water System were developed, as follows:

Alternative 1 – Limited Fire Protection

For Alternative 1 no change to the current operations of the Moorefield Water System will be implemented. Limited Fire protection capacity would be available; however, no new hydrants would be installed on the distribution system. Fire services would continue to operate in the same manner as they currently do.

All planned growth areas within Moorefield have direct access to the existing distribution system in Moorefield. As such, no watermain extensions would be required within the existing rights-of-way to service future growth. All watermain extensions required to accommodate growth would be constructed under their respective Plans of Subdivision and as approved under the Planning Act.

Alternative 2 – Provision of Fire Protection Service

To provide fire flow service to the urban center of Moorefield, the Township would need to upgrade a significant portion of the water distribution system to provide adequate conveyance capacities, and hydrants would have to be installed on the distribution system to provide access for the Fire Department. In addition, a dedicated fire pump would need to be installed at the WTP pumphouse or an elevated storage facility would need to be provided to ensure that Fire Flows can be delivered in emergency situations.

These upgrades will result in significant construction impacts, inconvenience to the existing residents, and would result in significant economic impacts. As such, no change to the water servicing strategy for Moorefield is recommended at this time.

Alternative 1 – No Fire Flow Service is the preferred servicing alternative for Moorefield's water storage and distribution system.

Table 2-2 summarizes the detailed evaluation of the Moorefield Water Distribution and Storage alternatives considering the growth areas.

Table 2-2: Summary of Moorefield Water Distribution and Storage Alternatives

Alternatives	Score Representation	Ranking
Alternative 1 – Domestic Supplies Only	●	1
Alternative 2 – Domestic Supplies plus addition of Fire Protection	◕	2

2.4 Recommended Water Projects

The recommended Water Servicing Projects to accommodate growth in Mapleton are summarized below in Table 2-3.

Table 2-3: Recommended Water Servicing Projects

Project No.	Location	Description	Estimated Capital Cost
W-1	Drayton	Construction of new supply well at 60 Wood Street in Drayton.	$1.44
W-2	Drayton	Extension of 250 mm watermain on Wellington Street South from Andrews Drive to the frontage of the proposed development area near Community Mennonite Fellowship Church (approx. 300 m)	$0.20
W-3	Drayton	Extension of 250 mm watermain on Main Street West from Bedell Drive to north of Drayton Industrial Drive (approx. 500 m)	$0.69

Project No.	Location	Description	Estimated Capital Cost
W-4	Drayton	Extension of 200 mm watermain on Main Street East from east of John Street to the Christian Reform Church (approx. 100 m)	$0.13
Note: Recommended Projects exclude future watermain extensions on development lands			

3 Detailed Evaluation – Wastewater Systems

3.1 Wastewater Treatment – Mapleton WPCP

3.1.1 Background

In 2017, the Township completed a Schedule C Class EA Study to identify the Preferred Design for expansion of the wastewater treatment facility. The Recommended Design included:

- Installation of a Submerged Aerated Growth Reactor (SAGR) system in the facultative lagoon.
- A new alum mixing tank; and,
- A new blower building.

In 2018, the Township retained CIMA+ to undertake a Peer Review of the proposed design. Some modifications to the Recommendations were provided including the preferred technology; a Moving Bed Bioreactor (MBBR) system. and pilot tested to verify their suitability.

In addition, the Township was able to re-rate the facility to accommodate a design flow of 900 m^3/d, which is only sufficient for the existing developments within the urban service areas of Drayton and Moorefield.

3.1.2 Capacity Upgrades

The current rated capacity of the Mapleton WWTP is 900 m^3/d. With existing and committed development within Drayton and Moorefield, the full rated capacity of the WWTP has been allocated and there is no further capacity available to accommodate growth. As such, and as outlined in TM#1, the Township needs to initiate an Addendum to the Class EA Study to modify the recommended technology for nitrogen removal.

Addressing the Preferred Solution for providing additional Treatment Capacity beyond 1,300 m^3/d the scope of this Master Plan. It is recommended that the township maintain an Uncommitted Reserve Capacity Calculation as proposed developments are granted approvals under the Planning Act, and initiate a separate Study be initiated at least five (5) years before the projected demands reach 1,300 m^3/d.

3.2 Drayton Wastewater Collection System

3.2.1 Gravity Collection System

The Drayton Collection system has been constructed as a conventional gravity sewer system draining to a centralized sewage pumping station. Sewer pipe sizes range from 200mm diameter to 375mm diameter sewers.

The Collection system in Drayton experiences high flow rates during wet-weather conditions which indicates that there are sources of rapid inflow; however, the sources of the rapid inflow are not known at this time. In 2022, the Township initiated a flow monitoring program to attempt to identify the source(s) of I&I in the system in order to better utilize the existing conveyance and treatment capacities within the wastewater system.

The existing collection system in Drayton has adequate capacity to convey the design wastewater generated from existing development within the community to the centralized sewage pumping station. The system also has sufficient hydraulic capacity to convey planned growth to the current Official Plan limits within the Community.

To accommodate planned and anticipated growth within the community of Drayton, sewer extensions will need to be provided to the new development areas. These sewer extensions will then connect to local sewers extensions constructed as part of the land subdivision process.

A meeting was held between the Township, a local Developer, and their respective Agents on November 10, 2022, to discuss site specific issues for wastewater servicing. As a result of this meeting, the proposed sewer on Wellington Street South (County Road 11) will need to be lowered approximately 325 m west of Mill Street, to achieve an invert elevation of 411.0 at the frontage of the proposed development area.

All sewer extensions identified within this Master Plan will be completed within existing road allowances and, as such, are considered to be Schedule A+ undertakings under the Municipal Class EA Process. Local sewer extensions within proposed development areas are subject to change based on the final Plan(s) of Subdivision as approved under the Planning Act.

The recommended Collection System Strategy is depicted below in Figure 3-1.

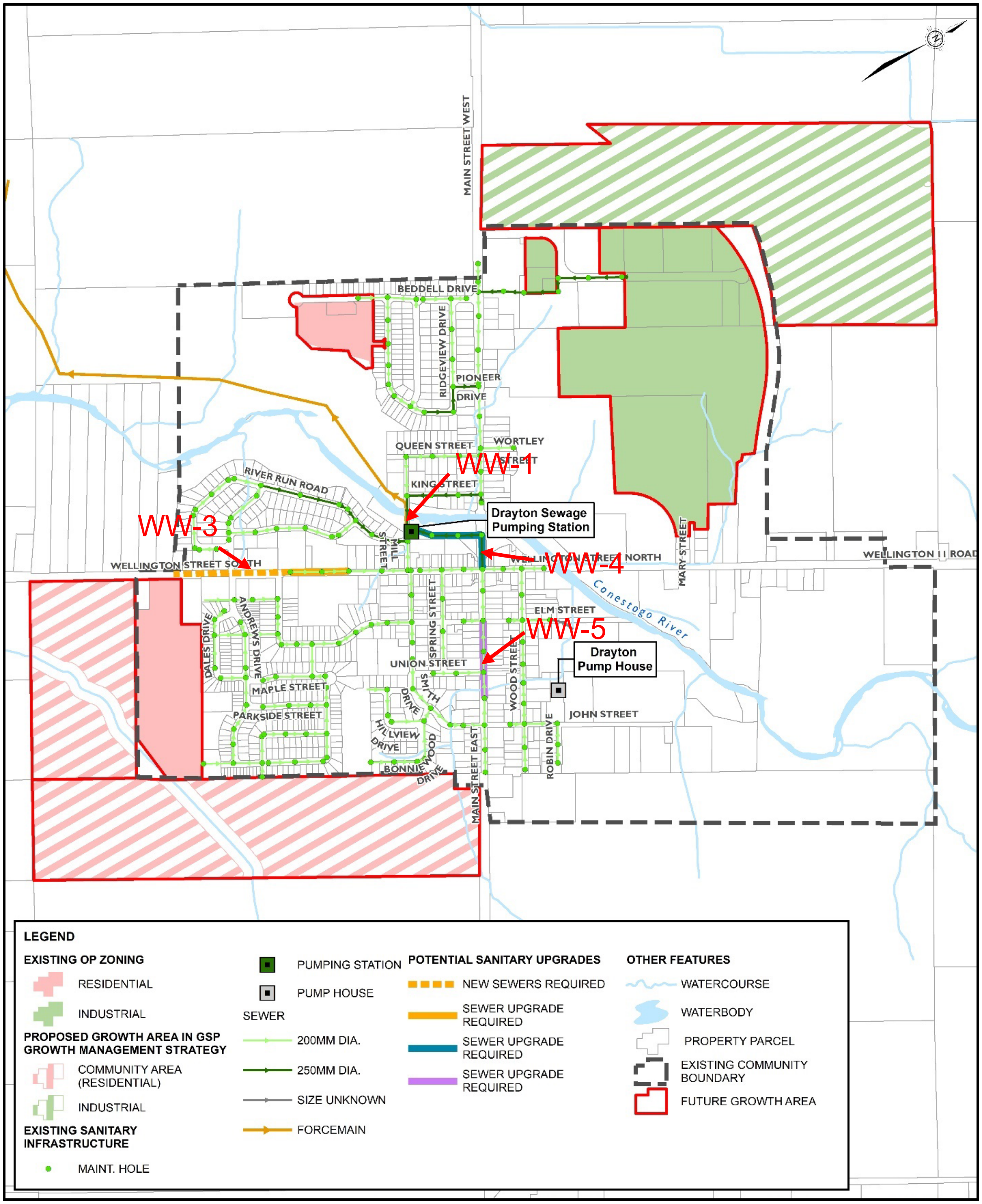

Figure 3-1: Drayton Collection System Strategy

3.2.2 Drayton Sewage Pumping Station

The Drayton SPS is located adjacent to Mill Street immediately adjacent to the Conestoga River. The existing station is located within the Regional Flood line for the Conestoga River.

All wastewater from existing developments west of the Conestogo River are conveyed by a sewer to the east side of the river to the existing pumping station, then pumped back to the west side of the river and ultimately to the Mapleton WPCP. Wastewater flows from the east side of the Conestoga River are conveyed to the pump station through sewers on mill Street and/or through an Open Space block adjacent to the Conestoga River from Main Street West.

The Drayton Sewage Pumping Station (SPS) has a firm rated capacity of 34 L/s, which is lower than the current design peak inflow rate and needs to be upgraded immediately to accommodate existing developments. The station should be upgraded to accommodate a minimum of twenty (20) years of growth within the community.

As identified in TM2, four (4) Alternatives were developed, however Alternative 1 to upgrade the existing SPS pumps will not meet the expanded capacity needs and may only temporarily mitigate potential health and safety and environmental impacts. Therefore, Alternative 1 will not be considered for further evaluation.

Alternative 2 – Construct New Pump Station on Township Owned Land on the West Side of the Conestoga River

The new Station would be sized to accommodate an interim capacity of 75 L/s, with provisions for a future upgrade to an ultimate capacity of 99 L/s.

This Alternative will provide the Township with an opportunity to locate the station further away from the Conestoga River to minimize the risk of flooding; however, the station would still be located within the Regional Floodline. The Station and the wet-well would be flood-proofed to avoid inflow into the station.

By constructing a new station offline from the existing station, the Township would be able to maintain service to the existing residents in Drayton until the new station is commissioned. The new station would be constructed to meet all current design requirements and guidelines.

Alternative 3 – Upgrade the Existing Pump Station and Construct New Pump Station on West Side of Conestoga River

For this Alternative, the existing SPS would be refurbished replace all existing equipment within the existing station and would be upgraded to provide service to all existing and new developments located east of the river. A new SPS would be constructed on the west side of the river to provide an outlet for all wastewater generated from existing developments and new growth on lands west of the Conestoga River. Construction of a new forcemain from the new pumping station would be required.

The advantage of this Alternative is that no new crossing of the Conestoga River would be required, and one (1) existing crossing would be eliminated. However, the Township would then need to operate and maintain two separate stations, and the existing station would still be subjected to periodic flooding due to its proximity to the river.

Alternative 4 – Construct New Pump Station with Emergency Storage on Township Owned Land on the West Side of the Conestoga River

This Alternative is essentially the same as Alternative 2, except with the addition of Emergency Overflow Storage. The Emergency Overflow Storage facility will provide additional resilience for the Collection system and will provide Operations staff with more time to respond in the event of an emergency situation (power failure, power loss, etc.). The disadvantage of this Alternative is the higher initial capital cost.

A detailed evaluation of the Alternatives is included in Appendix A and is summarized below in Table 3-1.

Table 3-1: Summary of Drayton SPS Upgrade Alternatives

Alternatives	Score Representation	Ranking
Alternative 2 – New SPS on the North Side of the River	●	2
Alternative 3 – Maintain the existing SPS and construct a new SPS on the North Side of the River	◕	3
Alternative 4 – New SPS with onsite emergency storage	●	1

Alternative 3 – New SPS with Onsite Emergency Storage is the preferred alternative for Drayton SPS.

3.3 Moorefield Wastewater Collection System

3.3.1 Collection System

As outlined in TM 2, three (3) Alternative strategies for the Moorefield Collection System were developed, as follows:

Alternative 1 – Maintain the low-pressure sewer system.

Alternative 1 considers continuing use of individual grinder pumps and use of the low-pressure sewer system. This approach provides a cost-effective solution for the collection system expansion for growth in Moorefield. The design and construction of low-pressure sewers inherently results in lower per-capita flows to the WWTP due to negligible infiltration into the pressure sewers.

The disadvantage of the ongoing use of the low-pressure sewer system includes a reliance on mechanical components (pumps), potential for service interruptions and sewage overflows during power outages when no backup power is available, and the high cost to the Township for maintenance and/or replacement of the grinder pump cores.

Alternative 2 – Upgrade to a gravity collection system

Alternative 2 would remove many operational issues with the low-pressure sewer system; however, this alternative would be the most expensive requiring an extensive rebuild of the sanitary collection system in Moorefield. As well, the design of gravity sewers needs to consider extraneous flows (infiltration) which would result in excess flows being conveyed to the pumping station and treatment plant. In addition, with the small size of the discharge forcemain from the Moorefield SPS, growth in Moorefield needs to be restricted to approximately 2,000 persons until the forcemain is upgraded and/or twinned. Finally, the inlet elevation to the Moorefield SPS would need to be lowered, resulting in the need to replace the existing pumping station.

Alternative 3 – Combination of a gravity collection system and low-pressure system

Alternative 3 has the benefits of having a combined gravity and low-pressure sewer network, with the gravity section removing some of the community's reliance on mechanical pumps. However, there remains the potential for service interruptions and sewage overflows during power outages, and the high cost to the Township for maintenance of the grinder pump cores. As well, the inlet elevation to the Moorefield SPS would need to be lowered, resulting in the need to replace the existing pumping station.

Alternative 1 – Low-Pressure Sewers is the preferred alternative for Moorefield's Collection System.

A detailed evaluation of the Alternatives is included in Appendix A and is summarized below in Table 3-2.

Table 3-2: Summary of Moorefield Collection System and Forcemain Alternatives

Alternatives	Score Representation	Ranking
Alternative 1 – Low-pressure Sewers	●	1
Alternative 2 – All Gravity Sewers	◕	2
Alternative 3 – Combination Gravity Sewer and Low-pressure Sewers	●	3

3.3.2 Moorefield Sewage Pumping Station

As outlined in TM 2, four (4) Alternative strategies for the Moorefield Sewage Pump Station were developed, as follows:

Alternative 1 – Upgrade the existing SPS equipment

For Alternative 1, the existing SPS and forcemain will be expanded to accommodate the increased wastewater flows. This alternative makes the best use of the existing infrastructure, it is cost-effective, and as the site has already been assessed there are few unknown impacts. However, due to the small size of the discharge forcemain from the Moorefield SPS, growth in Moorefield would need to be restricted to approximately 2,000 persons until the forcemain is upgraded and/or twinned.

Construction staging would be a key consideration while the upgrades to the Moorefield SPS are completed.

Alternative 2 – Build a New SPS

Alternative 2 involves building a new SPS to convey flows from new development areas to the Mapleton WPCP by tying into the existing forcemain. As this may be a new site, land acquisition may be required and there may be unknown impacts associated with source water protection, cultural heritage, and archaeological potential. There would also be increased operational and maintenance requirements and energy use to operate a second SPS.

Alternative 3 – Build a local pumping station and forcemain to the existing SPS and upgrading the forcemain to the Mapleton WPCP

Alternative 3 involves building a new Local SPS and second forcemain to convey flows from new development areas to an upgraded SPS and upgrading the forcemain to the Mapleton WPCP. Land acquisition and easements may be required for this is a new site and utility corridor. There may be unknown impacts associated with source water protection, cultural heritage, and archaeological potential of the new site. There would also be double the operational and maintenance requirements and energy use to operate a second SPS. The key advantage of this alternative is increased system reliability and security.

Alternative 4 – Build a local pumping station and forcemain to the Mapleton WPCP

Alternative 4 involves upgrading the existing SPS and forcemain, as well as constructing a new SPS to convey flows from new development areas to the Mapleton WPCP. As this is a new site and utility corridor, land acquisition is required and there are unknown impacts associated with source water protection, cultural heritage, and archaeological potential. There would also be double the operational and maintenance requirements and energy use to operate a second SPS, and complex construction staging. This alternative has the highest cost. The key advantage of this alternative is increased system reliability and security.

Alternative 1 – Expand SPS on Existing Site is the preferred alternative for Moorefield's SPS and Forcemain System.

A detailed evaluation of the Alternatives is included in Appendix A and is summarized below in Table 3-3.

Table 3-3: Summary of Moorefield SPS Alternatives

Alternatives	Score Representation	Ranking
Alternative 1 – Upgrade the existing SPS equipment	●	1
Alternative 2 – Build a new SPS	●	2
Alternative 3 - Build a Local SPS and New Forcemain to the Mapleton WPCP	◕	3
Alternative 4 - Build a Local SPS and new forcemain to the existing Moorefield SPS Site, upgrade the existing Moorefield SPS and forcemain	◕	4

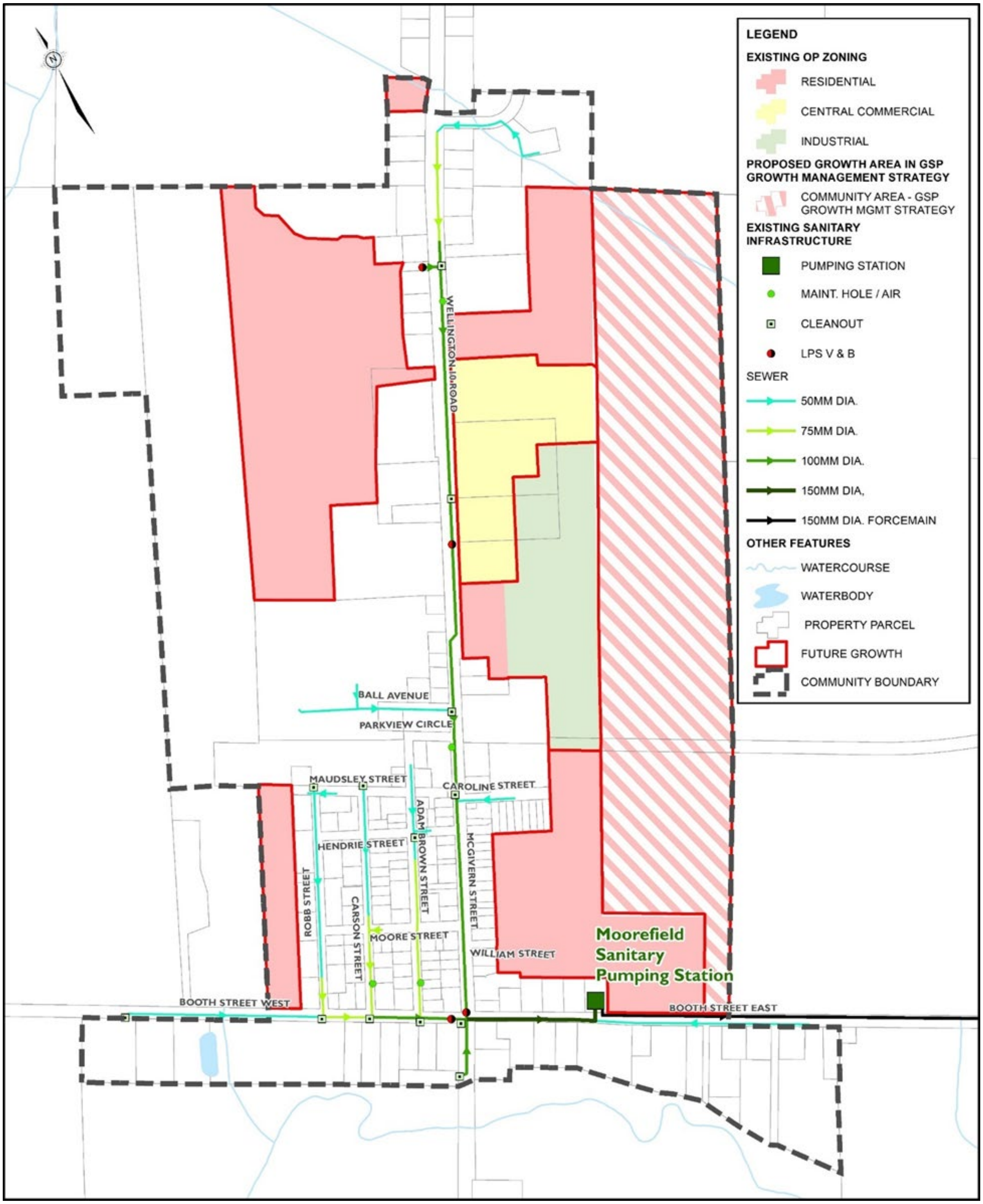

Figure 3-2: Moorefield Wastewater Low-Pressure Sewers

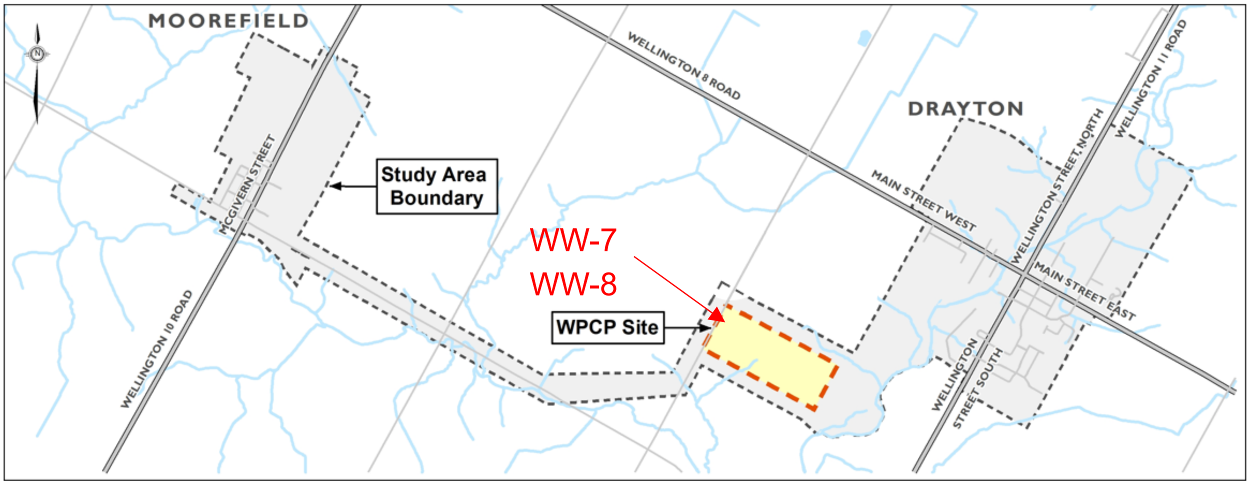

Figure 3-3: Wastewater Treatment Servicing Strategy

3.4 Recommended Wastewater Projects

The recommended Wastewater Servicing Projects to accommodate growth in Mapleton are summarized below in Table 3-4.

Table 3-4: Recommended Wastewater Servicing Projects

Project No.	Location	Description	Estimated Capital Cost
WW-1	Drayton	New SPS with emergency storage	\$4.37
WW-2	Drayton	Inflow/Infiltration monitoring program	\$0.38
WW-3	Drayton	Upgrade gravity sewers on Wellington Street South	\$0.70
WW-4	Drayton	Upgrade gravity sewers on Main Street West near the existing SPS	\$0.45
WW-5	Drayton	Upgrade gravity sewers on Main Street East	\$0.30
WW-6	Moorefield	Upgrade the existing SPS equipment	\$0.40
WW-7	Township	Nitrogen removal upgrades	\$5.80
WW-8	Township	Phosphorus Removal Expansion Study	\$0.20

A

Appendix A: Detailed Evaluation Matrix

Project	Mapleton W/WW Servicing Master Plan
Client:	Township of Mapleton
Project No.	T000974D
Prepared by:	Adam Moore, Emily Snoei
Creation date:	03-Aug-22

Detailed Evaluation for Servicing Alternatives

	Score	Score Representation	Ranking
Drayton Drinking Water System			
Supply Alternatives			
Alternative 1: Increase the Capacity of the Existing Wells	95.8	●	2
Alternative 2: Build a New Well on the Existing Site to Increase Capacity	96.3	●	1
Alternative 3: Build a New Well on another site to Increase Capacity	67.1	◕	3
Moorefield Drinking Water System			
Storage and Distribution Alternatives			
Alternative 1: No Fire Flow Service	95.0	●	1
Alternative 2: Fire Flow Service	65.1	◕	2
Wastewater System			
Phosphorus Removal Alternatives			
Alternative 1: Build a new mechanical treatment plant	74.0	◕	1
Alternative 2: Phosphorus offsetting	73.0	◕	2
Drayton Collection System			
SPS Alternatives			
Alternative 2: New SPS on the North Side of the River	77.1	◕	2
Alternative 3: Maintain exisitng SPS and Construct a New SPS on the North Side of the River	75.6	◕	3
Alternative 4: New SPS with onsite emergency storage	78.0	◕	1
Collection System and Forcemain Alternatives			
Alternative 1: Upgrade Existing Gravity Sewers	92.0	●	1
Alternative 2: Build Local Pumping Station and Forcemain to the Existing Drayton SPS or New SPS	72.7	◕	2
Alternative 3: Build Local Pumping Station and Forcemain to the Mapleton WPCP	65.0	◕	3
Moorefield Collection System			
SPS Alternatives			
Alternative 1: Expand SPS on Existing Site	98.1	●	1
Alternative 2: Build a New SPS on a New or Existing Site	85.8	●	2
Alternative 3: Build a Local SPS and New Forcemain to the Mapleton WPCP	77.5	◕	3
Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, Upgrade the Existing Moorefield SPS and forcemain	71.6	◕	4
Collection System and Forcemain Alternatives			
Alternative 1: Low-pressure Sewers	91.2	●	1
Alternative 2: All Gravity Sewers	71.2	◕	3
Alternative 3: Combination Gravity Sewer and Low-pressure Sewers	87.6	●	2

Matrix 1: Detailed Evaluation of Drayton Water Servicing Alternatives				Supply Alternatives											
Category	Weight	Criteria	Indicators	Alternative 1: Increase the Capacity of the Existing Wells				Alternative 2: Build a New Well on the Existing Site to Increase Capacity				Alternative 3: Build a New Well on another site to Increase Capacity			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	This option does not involve works outside of the existing building footprint, therefore no disturbance to existing vegetation is expected.	5.0	2.5	●	There is available area on site to accommodate the new well without disturbance to the existing wells or the surrounding environment. Vegetation removal is not expected other than existing ornamental grass on site. Construction area will be re-sodded post-construction.	4.5	2.3	●	A site for the new well and WTP would need to be located. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.0	1.5	◑
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	There are no other vulnerable areas within or in the vicinity of the existing site. Minimal or negligible impact would be expected to existing water resources. Use of existing well at current permitted rated capacity of 22.7 L/s is in line with the existing source water protection plan and policies. Existing well is currently permitted for a max. water taking of 22.7 L/s, which represents approx. 50% of total additional supply capacity need of 44.1 L/s. Hydrogeological investigation would be required to confirm yield. Recent testing indicates that water quality from existing well is of high quality with treatment required for disinfection and potentially iron sequestration.	4.5	2.3	●	There are no other vulnerable areas within or in the vicinity of the existing site. Minimal or negligible impact would be expected to existing water resources. Hydrogeological investigation would be required to determine optimal location on site for the new well and to confirm the water quality. It is expected the water quality would be comaprable to the existing wells as they are all on the same site.	4.5	2.3	●	It is unknown if there are areas within or in the vicinity of the new WTP site that would be vulnerable. A source water protection plan would need to be developed for the new WTP site as well as a PTTW. A hydrogeoloigcal investigation would need to be completed to test the water quality from the new well and the required treatment for disinfection and potentially iron sequestration.	3.0	1.5	◑
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the majority of work is contained inside the existing building and will not disrupt any additional habitats.	5.0	2.5	●	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work will is contained on the existing site and will not disrupt any additional habitats and does not have any protected species.	5.0	2.5	●	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new WTP site. An aquatic and species survey would need to be conducted.	4.0	2.0	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding	New equipment is not energy intensive and will follow the same operational practices as existing. Small increase in energy requirements as now 1/2 pumps will be pumping at a higher rate. None of the upgrades are expected to increase GHG emissions. Vegetation or tree removal, other than ornamental grass, is not expected as part of the project, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●	New equipment is not energy intensive and will follow the same operational practices as existing. Small increase in energy requirements as now 2/3 pumps will operate at one time. None of the upgrades are expected to increase GHG emissions. Vegetation or tree removal, other than ornamental grass, is not expected as part of the project, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●	Treatment requirements are yet to be determined, but will likely follow the same operational practices as the existing well house. New equipment is unlikely to be energy intensive. New WTP site is expected to double the total GHG emissions produced by the Drayton Supply System. Vegetation or tree removal, other than ornamental grass, may be required, therefore small effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.0	1.5	◑
Maximum Sub-total Score - Natural Environment						9.5				9.3				6.5	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Special training requirements / certification of staff • Safety requirements	This option uses the existing treatment technologies. Current operator training and safety requirements are sufficient.	5.0	3.3	◕	This option uses the existing treatment technologies. Current operator training and safety requirements are sufficient.	5.0	3.3	●	Treatment requirements must be determined, however significant changes to existing treatment technologies are not expected. Current operator training and safety requirements are likely sufficient.	4.0	2.7	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction trucks will be on site for the delivery of equipment and materials. Most short-term construction impacts from noise and dust will be contained within the WTP. Appropriate standard construction techniques and mitigation measures will be implemented.	4.5	3.0	◑	Construction trucks will be on site for drilling the new well and the delivery of construction materials and equipment to expand the WTP. Medium-term construction impacts from noise and dust are expected during the drilling of third well and WTP expansion. Appropriate standard construction techniques and mitigation measures will be implemented.	4.0	2.7	●	Construction trucks will be on site for drilling the new well and the delivery of construction materials and equipment to build the new WTP. Medium-term construction impacts from noise and dust are expected during the drilling of new well and construction of new WTP. Appropriate construction techniques and mitigatio measures will be implemented.	3.5	2.3	◕
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	Minimal long-term noise and visual effects on sensitive receptors during operation. Maintaining the existing building footprint preserves views of the natural landscape and maintains the existing distance between the proposed infrastructure and the closest sensitive receptors. Minimal to no increase in air emissions anticipated.	4.5	3.0	◑	Minimal long-term noise and visual effects on sensitive receptors during operation. Larger building footprint is a low impact, preserves views of the natural landscape and maintains the existing distance between the proposed infrastructure and the closest sensitive receptors. Minimal to no increase in air emissions anticipated.	4.5	3.0	●	There may be long-term noise and visual effects on sensitive receptors during construction and operation. New site will need to be assessed for closest sensitive receptors.	3.5	2.3	◕
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Retrofitting and upgrading the existing system will be able to maintain some of the existing assets and result in the least interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	5.0	3.3	●	Adding a third well to the existing system will be able to maintain some of the existing assets and result in the least interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	5.0	3.3	●	Building a new system will require new assets and result in some interference with current uses and access to the residential properties in the vicinity; thus, lowering public support.	3.0	2.0	◑
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	Construction will be constrained to the existing site, which is previously disturbed and retains little to no curtural hertitage, minimizing potential for impacts.	5.0	3.3	●	Construction will be constrained to the existing site, which is previously disturbed and retains little to no curtural hertitage, minimizing potential for impacts.	5.0	3.3	●	Construction will take place at a new WTP site, which is unknown if there is cultural heritage impacts.	4.0	2.7	●
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	Construction will be constrained to the existing site, which is previously disturbed and retains little to no archaeological potential, minimizing potential for impacts.	5.0	3.3	●	Construction will be constrained to the existing site, which is previously disturbed and retains little to no archaeological potential, minimizing potential for impacts.	5.0	3.3	●	Construction will take place at a new WTP site, which is unknown if there is archaeological potential or impacts.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural						19.3				19.0				14.7	

Category	Weight	Criteria	Indicators	Alternative 1: Increase the Capacity of the Existing Wells				Alternative 2: Build a New Well on the Existing Site to Increase Capacity				Alternative 3: Build a New Well on another site to Increase Capacity			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices	4.5	5.1	●	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. New well will likley be able to supply the Town's water service for the long-term and required less mainteance in the short- to medium-term. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.7	●	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. New well will likley be able to supply the Town's water service for the long-term and required less mainteance in the short-to medium-term. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.7	●
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	Existing production wells already in place. Wells have been recently tested to confirm yield and are currently permitted for 22.7 L/s. With a few upgrades and modifications to existing facilities, the wells could increase capacity and reduce likelihood of mechanical breakdown / disrupted service. As the existing wells are nearly 40 years old, more frequent well service and maintenance may be required in the short- and long-term unless upgraded. Limited operational redundancy and flexibility.	3.5	3.5	◕	New production well will increase firm capacity of Drayton supply and provide added operational redundancy flexibility, reducing the likelihood of process upset / disrupted service. However, does not reduce likelihood of mechanical breakdown for existing wells.	4.5	4.5	●	New well site would need to be investigated and confirm its yield. The new site would provide greater water security for the Town, reducing the likelihood to process upset / disrupted service. However, operational redundancy is not provided on new WTP site for ease of maintenance and cleaning.	4.0	4.0	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be shortest. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Scalability and future expansion is limited within the existing building footprint. A third well may be required to further increase supply capacity / redundancy. Construction will be staged to minimize process disruption during construction (upgrade one pump while the other is online, and vice versa). This alternative maximizes the existing building footprint with capacity for future expansion in the site.	4.0	4.0	●	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be moderate. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Potential for scalability and future expansion by increasing pump rates of all wells to further increase supply capacity / redundancy. Construction will be staged to minimize process disruption during construction (install third well while existing wells continue operating as usual). This alternative maximizes the existing building footprint and site capacity.	5.0	5.0	●	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be the longest. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are somewhat unknown but expected to be manageable. Potential for scalability and future expansion at new site. Construction will be staged to minimize process disruption during construction. This alternative does not maximize the existing building footprint and site capacity.	3.5	3.5	◕
		Water Quality Considerations: Ability to meet water quality considerations as per provincial and federal guidelines	• Maximize water stability in distribution system • Flexibility to respond to variable raw water quality • Flexibility for future objectives	Treated water quality will continue to comply with all regulations. Since this alternative treats a groundwater source, low organics are expected. The system will be programmed to calculate CT and the plant will shutdown in the case that chlorine residual is lower than minimum required in order to maintain disinfection at all times.	5.0	5.0	●	Treated water quality will continue to comply with all regulations. Since this alternative treats a groundwater source, low organics are expected. The system will be programmed to calculate CT and the plant will shutdown in the case that chlorine residual is lower than minimum required in order to maintain disinfection at all times.	5.0	5.0	●	Treated water quality will continue to comply with all regulations. Since this alternative will treat a groundwater source, low organics are expected. The system will be programmed to calculate CT and the plant will shutdown in the case that chlorine residual is lower than minimum required in order to maintain disinfection at all times.	5.0	5.0	●
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	This alternative is fully compatible with current operations and will continue existing operational and maintenance practices, reducing overall complexity. However, no additional operational flexibility. This option involves fewer operational or monitoring requirements. The existing wells are nearly 40 years old, unless upgraded more frequent well service and maintenance may be required in the short- and long-term.	4.5	4.5	●	Proposed supply option is fully compatible with current operations, maintaining existing operational and maintenance practices and reducing overall complexity. Additional operational flexibility for well pumping. This option involves minimal additional operational or monitoring requirements.	5.0	5.0	●	Proposed treatment technologies likely to be fully compatible with current operations, maintaining existing operational and maintenance practices and reducing overall complexity. This option doubles the operational or monitoring requirements to service the overall Drayton supply system.	3.0	3.0	◑
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Existing WTP structure and wells to be upgraded, optimizing existing infrastructure. Aligns with all other planned infrastructure projects, but does not make use of provision for third well.	4.5	4.5	●	Existing WTP structure and wells to be used with third well. Aligns with all other planned infrastructure projects, as provision for third well is currently being installed under a current project.	5.0	5.0	●	Existing WTP structure and wells to be used with new WTP and well. Aligns with all other planned infrastructure projects.	4.0	4.0	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	It is expected to reuse significant portions of infrastructure from the existing plant with upgrades to the piping, valves and instrumentation. No new land would need to be acquired.	5.0	5.7	●	It is expected to reuse significant portions of infrastructure from the existing plant with addition of the new well and associated equipment. No new land would need to be purchased.	5.0	5.7	●	A new WTP site would need to be selected and a treatment system build. New land would need to be purchased.	2.0	2.3	◔
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	Existing PTTW would need to be amended to increase single pump capacity. Time spent is expected to moderate.	4.0	4.6	●	Existing PTTW may not need to be amended. Third well will be pumped at same single well capacity as existing, therefore well taking capacity remains the same as existing total well taking capacity. Time spent is expected to be minimal.	5.0	5.7	●	A new PTTW would need to be created for the new site. Time spent is expected to be longer than an amendment.	3.0	3.4	◑
Maximum Sub-total Score - Technical / Operational						**36.9**				**41.6**				**30.9**	
Financial / Economic	**30**	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	20-year life cycle cost of $3,095,000	5	30.0	●	20-year life cycle cost of $3,660,000	4.41	26.5	●	20-year life cycle cost of $5,485,000	2.5	15.0	◑
Maximum Sub-total Score - Financial / Economic						**30.0**				**26.5**				**15.0**	
Total Overall Maximum Weighted Score		**100**				**95.8**	●			**96.3**	●			**67.1**	◕

Matrix 2: Detailed Evaluation of Moorefield Water Servicing Alternatives — **Storage and Distribution Alternatives**

Category	Weight	Criteria	Indicators	Alternative 1: No Fire Flow Service				Alternative 2: Fire Flow Service			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	No change to existing distribution system or natural environment.	5.0	2.5	●	Some vegetation removal would be expected to install fire hydrants throughout the Town. Minimal vegetation removal would be required to upsize watermains as existing utility corridor, predominently below roadways, would be used. Construction area would be re-sodded post-construction. For the elevated tank, there is available area on site to accommodate the new elevated tower without disturbance to the existing contact pipe or the surrounding environment. Some vegetation removal would be expected. Construction area will be re-sodded post-construction.	4.0	2.0	●
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	No change to existing distribution system or source water protection.	5.0	2.5	●	While the distribution system pipes may be upsized and hydrants will be installed, no impact to source water protection is anticipated. For the elevated tank, there are no other vulnerable areas within or in the vicinity of the existing site. Minimal or negligible impact would be expected to existing water resources.	4.5	2.3	●
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	No change to existing distribution system. No impacts to wildlife.	5.0	2.5	●	Some impact to wildlife and habitat is possible as a result of installing fire hydrants throughout the Town. Minimal wildlife impact is expected to upsize watermains as existing utility corridor, predominently below roadways, would be used.	4.0	2.0	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas	No change to existing distribution system or contribution to climate change.	5.0	2.5	●	New equipment increases energy requirements due to added pumping for fire flow. Additional chemical usage for elevated tank may minimally increase GHG emissions due to increased frequency of chemical deliveries. Some vegetation removal would be expected, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.0	2.0	●
Maximum Sub-total Score - Natural Environment						**10.0**				**8.3**	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	This alternative does not change the existing distribution system. Current operator training and safety requirements would be sufficient.	5.0	3.3	●	Fire flow is currently provided in Drayton. Operators should be familiar with this hydrants, fire pumps, etc. so current operator training and safety requirements would be sufficient. For the elevated tank, this option uses the same storage technology as Drayton. Current operator training and safety requirements to service the Drayton Elevated Tank would be sufficient for this alternative.	5.0	3.3	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction is not required for this alternative. No short-term impacts.	5.0	3.3	●	Construction trucks will be around Town for the delivery of construction materials and equipment to the various sites for upsized piping and fire hydrants. Medium-term construction impacts from noise and dust. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	Fire protection will continue to be provided from existing source. No long-term visual or noise effects.	5.0	3.3	●	Long-term visual and noise effects on sensitive receptors. All sites will need to be assessed for closest sensitive receptors.	2.5	1.7	◑
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Fire protection must continue to be provided from existing source. No impacts on businesss anticipated.	5.0	3.3	●	Providing fire hydrants and upsizing pipes will result in some interference, particularly on roadways and surrounding area. Construction to be staged to prevent disruptions with current uses. Building a new elevated tank will result in some interference and the current standpipes would be decommissioned in stages to prevent disruptions with current uses but will not interfere with access to the residential properties in the vicinity.	4.0	2.7	●
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	No change to the existing distribution system. No impact to cultural heritage features.	5.0	3.3	●	Construction will take place at a multiple new sites (fire hydrants), which is unknown if there is cultural heritage impacts. For the elevated tank, construction will be constrained to the existing site, which is previously disturbed and retains little to no curtural hertitage, minimizing potential for impacts.	4.5	3.0	●
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	No change to the existing distribution system. No impact to archaeological features.	5.0	3.3	●	Construction will take place at a new WTP site and existing corridors for the watermains, which is unlikely archaeological potential or impacts.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural						**20.0**				**15.3**	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	Distribution does not meet long-term fire flow requirements. Fire protection continues to be provided from existing source.	4.0	4.0	●	Meets the long-term fire flow requirements to service the projected population and growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices	5.0	5.0	●
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	Existing fire protection source provides limited security and reliability as fire flow storage reservoir must be replenished before each event. Existing fire protection method (water carried by fire truck to fire) not as robust as distribution system equipped with fire flow.	3.0	3.0	◑	Distribution system equipped with fire flow is a robust, proven solution and provides system security and reliability. A single elevated tank does not provide redundancy. Regularly scheduled assessments of the coatings are recommended. Re-coating of interior and exterior surfaces will be required after approximately 15-20 years. Concrete pedestal is essentially maintenance-free.	5.0	5.0	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	No construction or constructability concerns.	5.0	5.0	●	Fire flow service will require upgrades to the existing system, including additional treated water storage, fire pump, upsized distribution pipes, and fire hydrants throughout Town. Medium- to long-term construction period is anticipated. Construction phasing will be required to maintain servicing through construction. Fire flow service will be scalable for future expansion and upgrades. Fire flow service will maximize the existing system footprint and site capacity. For the elevated tank, Significantly longer construction period than alternatives due to linear construction methodology and progress can be affected by inclement weather. Heavy machinery required to construct. More labour intensive to construct. Cannot accommodate accessories after the tank has been constructed without damage to coatings. More Contractors with expertise in welded steel potable water tanks, and coatings for potable water tanks. Cannot typically accommodate an increase in height of steel tank. Water servicing can be maintained with existing standpipes until the elevated tower is completed. Maximizes site capacity but does not maximize existing infrastructure.	4.0	4.0	●
		Water Quality Considerations: Ability to meet water quality considerations as per provincial and federal guidelines	• Maximize water stability in distribution system • Flexibility to respond to variable raw water quality • Flexibility for future objectives	No impact on water quality.	5.0	5.0	●	Fire flow service is not expected to impact water quality. Shorter operating range means better pressures in the distribution system. Low risk of dead zones developing.	5.0	5.0	●
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	Compatible with the existing system. Operational complexity and flexibility remains the same. Operation and maintenance requirements will increase as the servicing area and likelihood for fires increases.	4.0	4.0	●	Fire flow service will require upgrades to the existing system, including additional treated water storage, fire pump, upsized distribution pipes, and fire hydrants throughout Town. Operational complexity and flexibility is comparable to no fire flow service / existing system. Reduced operation and maintenance requirements compared to no fire flow service / existing system. For the elevated tank, a valve room can be designed in the base of the pedestal. Shorter operating range means better pressures in the distribution system. More Contractors with expertise in welded steel potable water tanks, and coatings for potable water tanks.	4.5	4.5	●
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Uses existing infrastructure and aligns with all other planned infrastructure projects.	4.0	4.0	●	Optimizes existing infrastructure and aligns with all other planned infrastructure projects. Consistent design with the Drayton Elevated Tank but would remove standpipe expansion planned for the current Moorefield Water System Renewal project.	4.0	4.0	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	Land acquisition not required.	5.0	5.0	●	Land acquisition not required, but easements may be needed for fire hydrants.	4.5	4.5	●
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	No permits required.	5.0	5.0	●	Some permits may be required, time spent expected to be minimal. Many permits required to build an elevated tank.	3.5	3.5	◕
Maximum Sub-total Score - Technical / Operational						**35.0**				**35.5**	
Financial / Economic	30	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	Not life cycle costs associated	5	30.0	●	20-year life cycle cost of $12,544,000	1	6.0	○
Maximum Sub-total Score - Financial / Economic						**30.0**				**6.0**	
Total Overall Maximum Weighted Score		100				**95.0**	●			**65.1**	◕

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives				Phosphorus Removal Alternatives							
Category	Weight	Criteria	Indicators	Alternative 1: Build a new mechanical treatment plant				Alternative 2: Phosphorus offsetting			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	There is available area on site to accommodate the additional equipment without disturbance to the existing lagoons or surrounding environment. Some vegetation removal would be expected. Construction area will be re-sodded post-construction.	4.0	2.0	●	Phosphorus offsetting would positively impact natural environmental features. May increase greenspace with the implementation of Low Impact Developments (LIDs) to offset phosphorus and eliminate load that would have gone to the Mapleton WPCP for treatment. Mapleton WPCP to remain as existing, no additional impact on natural environment.	4.0	2.0	●
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	The new mechanical treatment equipment will be located on the existing site. It is possible the source water protection plan would need to be updated for the added infrastructure. Minimal impacts to water resources and source water protection are expected.	4.5	2.3	●	Phosphorus offsetting would positively impact water resources and source water protection. Implementation of LIDs to offset phosphorus could also eliminate load that would have gone to the Mapleton WPCP for treatment. Mapleton WPCP to remain as existing, no additional impact on water resources.	4.5	2.3	●
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work will is contained to the existing locations and will not disrupt any additional habitats and does not have any protected species.	4.5	2.3	●	Potential for positive impacts to wildlife (including species at risk) or identified habitat locations for these species as phosphorus offsetting may improve quality of environment/habitat. Mapleton WPCP to remain as existing, no additional impact on wildlife.	4.5	2.3	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas	Greenhouse gas generation will be limited to the wastewater treatment plant process. The use of additional process equipment would increase energy requirements and GHGs compared to the existing lagoons.	3.0	1.5	◑	It is expected energy requirements would remain the same as the WPCP would remain unaltered. Greenhouse gas generation will be limited to the wastewater treatment plant process. Phosphorus off-setting facilities are aesthetically attractive and provide opportunities for carbon offsetting and climate change mitigation. Additioanlly, provides increased resilience of communities to climate change and LIDs help mitigate climate change impacts.	4.0	2.0	●
Maximum Sub-total Score - Natural Environment						**8.0**				**8.5**	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	Negligible impacts to public. Upgrades will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator. Impacts to operators are based on the final process selection (beyond scope), but are anticipated to require operations staff to be certified to treat either a Class 2 or Class 3 treatment plant.	4.5	3.0	●	Negligible impacts to public and operations. Upgrades to the WPCP would be required regardless of phopsohrus off-setting program implimentationg.	4.5	3.0	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction trucks will be on site for the delivery of construction materials and equipment. Increased traffic through the site and on the plant access road during the construction period. Construction noise and dust is unlikely to impact neighbours as impact will be focused on the existing plant area. Short-term construction impacts from noise and dust will be moderate resulting from installation of the new equipment. Appropriate standard construction techniques and mitigation measures will be implemented.	4.0	2.7	●	Upgrades to the WPCP would be required regardless of phopsohrus off-setting program implimentation. Noise and dust production is possible from non-point sources adapting to phosphorus offsetting.	4.0	2.7	●
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	The construction of a new mechanical plant would consist of some architectural modifications to part of the buildings and exisitng lagoons. All of these changes would be confined to the existing WPCP and are not expected to impact views of natural landscapes. Existing distance between infrastructure and closest sensitive receptor to be maintained. Process upgrades will address current noise concerns and no increase in WPCP noise is anticipated. The upgrades would not be anticipated to cause an increase in plant odours. New headworks facilities would be designed with improved odour control measures.	4.0	2.7	●	Upgrades to the WPCP would be required regardless of phopsohrus off-setting program implimentation, which adds operational complexity. Positive long-term impacts throughout Township due to reduced phosphorus loading from non-point sources and implementation of LIDs.	4.0	2.7	●
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Retrofitting and upgrading the existing system will be able to maintain some of the existing assets and result in the least interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	5.0	3.3	●	Some businesses may be required to modify operational practices to meet phosphorus offsetting requirements, which may reduce public support.	4.0	2.7	●
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	Construction will be constrained to the existing site, which is previously disturbed and retains little to no curtural heritage, minimizing potential for impacts.	5.0	3.3	●	Unknown curtural hertitage impacts.	3.0	2.0	◑
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	Construction will be constrained to the existing site, which is previously disturbed and retains little to no archaeological potential, minimizing potential for impacts.	5.0	3.3	●	Unknown archaeological impacts.	3.0	2.0	◑
Maximum Sub-total Score - Socio-Cultural						**15.0**				**13.0**	

Category	Weight	Criteria	Indicators	Alternative 1: Build a new mechanical treatment plant				Alternative 2: Phosphorus offsetting			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.0	●	Does not meet the long-term capacity requirements to service the projected population and ICI growth in the servicing areas.	1.0	1.0	○
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	Mechanical treatment infrastructure may reduce the likelihood of disrupted service, process upset, and/or mechanical breakdown. Upgrades will provide operational redundancy for maintenance.	5.0	5.0	●	Maintains existing system reliability and security. Phosphorus offsetting provides redundancy in case of an elevated phosphorus load in effluent.	4.0	4.0	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	Upgrades are compatible with the existing system. Long construction period is expected due to the scope of the expansion. Ease of implementation will be based on final process selection; conversion of existing tanks to new processes may require complex construction sequencing. Risks are anticipated to be manageable. Upgrades allow for scalability and future expansion. Construction will be staged to minimize process disruption during construction.	4.0	4.0	●	Phosphorus offsetting does not change the existing system, thus it is compatible. Moderate implementation period for phosphorus offsetting. Implementation based on community engagement is unknown. Unknown scalability for future growth and expansion.	3.0	3.0	◑
		Water Quality Considerations: Ability to meet water quality considerations as per provincial and federal guidelines	• Proven record of phosphorus removal performance • Flexibility to respond to variable raw water quality • Flexibility for future objectives	Mechanical treatment plants across Ontario meet low phosphorus effluent criteria year-round when designed and operated within MOECC design guidelines.	5.0	5.0	●	A monitoring program would need to be established by the Town, GRCA, local area municipalities, or a local field representative (e.g., farmers) to ensure the phopshorus offsetting program is being implimented appropriately. The monitoring program should be developed by the Town, GRCA, and approved by MOECC. OMAFRA and GRCA would be retained for a role in engaging and educating the agricultural community.	3.5	3.5	◕
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	Increased operational complexity and high maintenance requirements. System will require a full-time operator on-site to maintain the biological treatment processes.	3.5	3.5	◕	Added complexity from monitoring both the WPCP and the off-setting program.	3.0	3.0	◑
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Existing lagoon system will be retrofitted to accommodate a conventional activated sludge process, incorporating existing infrastructure. Aligns with the other infastructure projects.	4.5	4.5	●	Changes would be required to the current WPCP regardless of the off-setting program implimentation. Phosphorus offsetting aligns with Township's climate change mitigation, neutrality, and resilience goals.	4.0	4.0	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	Land acquisition is not anticipated. Existing site has adequate space for a new mechanical treatment plant. However, adding the necessary headworks building, aeration tanks, and clarifiers will occupy significant space. Existing storage lagoons will still be required onsite due to seasonal discharge requirements.	4.5	4.5	●	New developments would need to integrate phopshorus offsetting techniques, therefore, it is anticipated additonal land would need to be purchased for the phosphorus offsetting program.	1.0	1.0	○
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	All works occur on the existing WPCP site. MECP approval is required to expand the plant capacity. Time spent expected to be moderate.	4.5	4.5	●	Additional approvals would be required from the MECP for the phosphorus offsetting program, increasing time spent.	2.0	2.0	◔
Maximum Sub-total Score - Technical / Operational						**36.0**				**21.5**	
Financial / Economic	**30**	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	20-year life cycle cost of $30,564,000	2.5	15.0	◑	20-year life cycle cost of $8,647,000	5	30.0	●
Maximum Sub-total Score - Financial / Economic						**15.0**				**30.0**	
Total Overall Maximum Weighted Score		**100**				**74.0**	◕			**73.0**	◕

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives

SPS Alternatives

Category	Weight	Criteria	Indicators	Alternative 2: New SPS on the North Side of the River				Alternative 3: Maintain exisitng SPS and Construct a New SPS on the North Side of the River				Alternative 4: New SPS with onsite emergency storage			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	Constructing a new SPS will impact the environment. However, measures can be taken to minimize impacts by maintaining the river's flood capacity and minimizing sediment erosion. This alternative will require a new sanitary sewer river crossing which will further impact the environment, but eliminates risk of forcemain river crossing. No other river crossings are anticipated in the future.	2.5	1.3	◑	Constructing a new SPS will impact the environment. However, measures can be taken to minimize impacts by maintaining the river's flood capacity and minimizing sediment erosion. This alternative will require a new sanitary sewer river crossing which will further impact the environment, but eliminates risk of forcemain river crossing. Wet well/dry well requires larger building footprint than Alternative 2. No other river crossings are anticipated in the future. Emergency storage provides overflow protection.	3.0	1.5	◑	Constructing a new SPS will impact the environment. However, measures can be taken to minimize impacts by maintaining the river's flood capacity and minimizing sediment erosion. This alternative will require a new sanitary sewer river crossing which will further impact the environment, but eliminates risk of forcemain river crossing. Wet well/dry well requires larger building footprint than Alternative 2. No other river crossings are anticipated in the future. Emergency storage provides overflow protection.	4.5	2.3	●
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	The new SPS site is located in close proximity to the river, but with more buffer than the existing SPS. A source water protection plan would need to be developed for the new SPS site.	3.0	1.5	◑	The new SPS site is located in close proximity to the river, but with more buffer than the existing SPS. A source water protection plan would need to be developed for the new SPS site. Equalization is provided by emergency storage for peak hour flows to prevent overflow and enhance source water protection.	3.0	1.5	◑	The new SPS site is located in close proximity to the river, but with more buffer than the existing SPS. A source water protection plan would need to be developed for the new SPS site. Equalization is provided by emergency storage for peak hour flows to prevent overflow and enhance source water protection.	4.5	2.3	●
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	Little to no impacts to wildlife. Lower risk to fisheries and aquatic health with no forcemain river crossing.	3.0	1.5	◑	Little to no impacts to wildlife. Higher risk to fisheries and aquatic health with the exisitng forcemain river crossing.	3.0	1.5	◑	Little to no impacts to wildlife. Lower risk to fisheries and aquatic health with no forcemain river crossing. Emergency storage provides overflow protection.	4.5	2.3	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas	New equipment is not energy intensive and will follow the same operational practices as existing. Upgrades are not expected to increase GHG emissions. Some vegetation removal is expected, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.0	2.0	●	New equipment is not energy intensive and will follow the same operational practices as existing. Upgrades are not expected to increase GHG emissions, however hauling may still be required occasionally which is associated with emissions. Vegetation or tree removal, other than ornamental grass, is not expected as part of the project, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4	2.0	●	New equipment is not energy intensive and will follow the same operational practices as existing. Upgrades are not expected to increase GHG emissions. Some vegetation removal is expected, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●
Maximum Sub-total Score - Natural Environment						**6.3**				**6.5**				**9.0**	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	Construction of a new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public. New SPS would not be directly adjacent to residences and walkway, reducing risk to public. This site has the potential for more buffer between the SPS and river.	4.5	3.0	●	Construction of a new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public. New SPS would not be directly adjacent to residences and walkway, reducing risk to the public. This site has the potential for more buffer between the SPS and river with emergency storage providing additional overflow protection. Upgrade of the exisitng SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public. The SPS is directly adjacent to existing residences and public walkway but all equipment will be located inside fencing with a lock to minimize risk to public. Overflow is an ongoing risk during peak hour flows which may impact operators and the public.	5.0	3.3	●	Construction of a new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public. New SPS would not be directly adjacent to residences and walkway, reducing risk to the public. This site has the potential for more buffer between the SPS and river with emergency storage providing additional overflow protection.	5.0	3.3	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while building the SPS. Appropriate standard construction techniques and mitigation measures will be implemented.	3.5	2.3	◕	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while building the SPS and emergency storage. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while building the SPS and emergency storage. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	There may be long-term noise and visual effects on sensitive receptors during operation. New SPS site will need to be assessed for closest sensitive receptors.	3.5	2.3	◕	Little long-term noise and visual effects on sensitive receptors during operation. Larger building footprint is a low impact, preserves views of the natural landscape and maintains the existing distance between the proposed infrastructure and the closest sensitive receptors.	4.0	2.7	●	There may be long-term noise and visual effects on sensitive receptors during operation. New SPS site will need to be assessed for closest sensitive receptors. Emergency storage tank may reduce impacts during peak hour flow events by providing equalization. Larger building footprint for wet well/dry well may have greater visual impacts than Alternative 2.	4.0	2.7	●
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Disruptions to businesses during construction and operation minimized as existing SPS will be used until new SPS is built.	3.5	2.3	◕	Disruptions to businesses during construction and operation minimized as existing SPS will be used until new SPS is built. Retrofitting and upgrading the existing SPS will be able to maintain some of the existing assets and result in little interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	4.5	3.0	●	Disruptions to businesses during construction and operation minimized as existing SPS will be used until new SPS is built.	4.5	3.0	●
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site. Upgrade to existing SPS will be constrained to the existing site, which is previously disturbed and retains little to no curtural heritage, minimizing potential for impacts.	4.0	2.7	●	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site. Upgrade to existing SPS will be constrained to the existing site, which is previously disturbed and retains little to no curtural heritage, minimizing potential for impacts.	4.0	2.7	●	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural						**15.3**				**16.3**				**16.3**	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	The new SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps). However, wet well volume will not change and hauling is possible during peak hour flows.	3.5	4.0	◕	The new SPS will be sized appropriately for a portion of the full buildout (wet well) and 20-year capacity (pumps). The upgrades SPS will be sized appropriately for the 20-year capacity (pumps). However, wet well volume will not change and hauling is possible during peak hour flows.	3.5	4.0	◕	The new SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps) with emergency storage for peak hour flow equalization.	5.0	5.7	●
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	A new SPS would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Potential to increase operational redundancy.	3.5	4.0	◕	An upgraded station would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Having two stations in service provide some redundancy.	4.5	5.1	●	An upgraded station would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Emergency storage provides operational redundancy and peak flow suppression.	5.0	5.7	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	New SPS is compatible with existing system. Moderate construction duration compared to other alternatives. There are few constructability challenges with adequate setback from the river. The new SPS has potential for scalability. Able to maintain servicing at existing SPS while new SPS is constructed. Does not maximize existing or new site capacity.	3.5	4.0	◕	The new SPS is compatible with existing system. Construction will have to be stagged with the existing station upgrades. Able to maintain servicing at existing SPS while new SPS is constructed. Does not maximize existing site capacity, but maximizes new site capacity.	4.5	5.1	●	The new SPS is compatible with existing system. Longest construction duration compared to other alternatives. Some constructability challenges with emergency storage tank and wet well footrpints, but adequate setback from the river. The new SPS and emergency storage has potential for scalability. Able to maintain servicing at existing SPS while new SPS is constructed. Does not maximize existing site capacity, but maximizes new site capacity.	4.5	5.1	●
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	New SPS is compatible with existing system. Reduced operational complexity due to reduced likelihood of hauling or operator intervention. New SPS will decrease operational and maintenance requirements. Eliminates operational and maintenance risk associated with the forcemain river crossing. Ability to use existing forcemain and no additonal costs associated with an upgraded river crossing. Would eliminate the existing operational and maintenance issues with the exisitng SPS.	4.0	4.6	●	New SPS is compatible with existing system. Reduced operational complexity due to reduced likelihood of hauling or operator intervention. New SPS will decrease operational and maintenance requirements. Does not eliminate the existing operational and maintenance issues with the existing SPS. An upgraded station would increase operational reliability and would be able to help surpress peak flows.	4.0	4.6	●	New SPS is compatible with existing system. Reduced operational complexity due to reduced likelihood of hauling or operator intervention. New SPS will decrease operational and maintenance requirements. Eliminates operational and maintenance risk associated with the forcemain river crossing. Ability to use existing forcemain and no additonal costs associated with an upgraded river crossing. Would eliminate the existing operational and maintenance issues with the existing SPS. An upgraded station would increase operational reliability and would be able to surpress peak flows.	5.0	5.7	●
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Aligns with planned infrastructure projects, optimizes some existing infrastructure.	3.5	4.0	◕	Aligns with planned infrastructure projects and goals, optimizes some existing infrastructure.	5.0	5.7	●	Aligns with planned infrastructure projects and goals, optimizes some existing infrastructure.	5.0	5.7	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	May require easement acquisition due to SPS collection system routing may extend onto private property.	4.5	5.1	●	May require easement acquisition due to SPS collection system routing may extend onto private property.	4.5	5.1	●	May require easement acquisition due to SPS collection system routing may extend onto private property.	4.5	5.1	●
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	Moderate amount of time may be required to obtain permits.	4.0	4.6	●	Moderate amount of time may be required to obtain permits.	4.0	4.6	●	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational						**30.3**				**34.3**				**37.7**	
Financial / Economic	30	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	20-year life cycle cost of $4,058,000	4.20	25.2	●	20-year life cycle cost of $4,569,000	3.09	18.5	◑	20-year life cycle cost of $6,053,000	2.5	15.0	◑
Maximum Sub-total Score - Financial / Economic						**25.2**				**18.5**				**15.0**	
Total Overall Maximum Weighted Score	**100**					**77.1**	◕			**75.6**	◕			**78.0**	◕

Collection System and Forcemain Alternatives

Criteria	Alternative 1: Upgrade Existing Gravity Sewers				Alternative 2: Build Local Pumping Station and Forcemain to the Existing Drayton SPS or New SPS				Alternative 3: Build Local Pumping Station and Forcemain to the Mapleton WPCP			
	Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environmental Features: Potential impacts to existing natural environment	This option does not involve works at locations beyond the existing sewers. Vegetation removal is not expected other than ornamental grasses. Grass will be re-sodded post-construction.	4.5	2.3	●	A site for the new local SPS would have to be located. If connected to existing SPS, existing forcemain would be required to cross the river. If connected to new SPS, a second forcemain would be required to cross the river, increasing risk of leaking. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.0	1.5	◑	A site for the new local SPS would have to be located. A second forcemain would be required to cross the river to the Mapleton WPCP, increasing risk of leaking. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.0	1.5	◑
Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	The gravity sewers have minimal impacts on water resources and source water protection. Replacing the pipe decreases the likelihood of pipe leaking and consequential impacts.	4.5	2.3	●	It is unknown if there are areas within or in the vicinity of the new SPS site that would be vulnerable. A source water protection plan may need to be developed for the new SPS site.	3.0	1.5	◑	It is unknown if there are areas within or in the vicinity of the new SPS site that would be vulnerable. A source water protection plan may need to be developed for the new SPS site.	3.0	1.5	◑
Wildlife: Protects wildlife and species at risk	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work will is contained to the existing locations and will not disrupt any additional habitats and does not have any protected species.	4.5	2.3	●	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new local SPS and forcemain. An aquatic and species survey would need to be conducted.	3.5	1.8	◕	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new local SPS and forcemain. An aquatic and species survey would need to be conducted.	3.5	1.8	◕
Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	New equipment follows the same operational practices as existing. Does not require energy or produce GHG emissions. Vegetation removal is not expected other than ornamental grasses, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●	New equipment is not energy intensive and will follow the same operational practices as existing. Second SPS will double the total GHG emissions produced by Drayton collection system. Some vegetation removal is possible, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	2.5	1.3	◑	New equipment is not energy intensive and will follow the same operational practices as existing. Second SPS will double the total GHG emissions produced by Drayton collection system. Some vegetation removal is possible, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	2.5	1.3	◑
Maximum Sub-total Score - Natural Environment			**9.0**				**6.0**				**6.0**	
Health and Safety: Minimize potential impact of health and safety of operation staff	Upsized gravity sewers will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●	Construction of a new local SPS and forcemain will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●	Construction of a new local SPS and forcemain will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●
Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while replacing the pipe. Appropriate standard construction techniques and mitigation measures will be implemented.	3.5	2.3	◕	Construction trucks will be on site for the delivery of construction materials and equipment. Long-term construction impacts from noise and dust are expected while building the new local SPS and forcemain to the Drayton SPS. Appropriate standard construction techniques and mitigation measures will be implemented.	2.5	1.7	◑	Construction trucks will be on site for the delivery of construction materials and equipment. Long-term construction impacts from noise and dust are expected while building the new local SPS and forcemain to the WPCP. Appropriate standard construction techniques and mitigation measures will be implemented.	2.0	1.3	◔
Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	No expected long-term noise or visual effects on sensitive receptors during operation.	5.0	3.3	●	There may be long-term noise and visual effects on sensitive receptors during construction and operation. New site will need to be assessed for closest sensitive receptors.	3.5	2.3	◕	There may be long-term noise and visual effects on sensitive receptors during construction and operation. New site will need to be assessed for closest sensitive receptors.	3.5	2.3	◕
Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	Some disruption to roadway access is possible while replacing sewer pipes. Construction will be phased to minimize disruptions.	3.0	2.0	◑	Some disruption to roadway access is possible while routing forcemain and building new SPS. Construction will be phased to minimize service disruptions.	3.0	2.0	◑	Some disruption to roadway access is possible while routing forcemain and building new SPS. Construction will be phased to minimize service disruptions.	3.0	2.0	◑
Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	Construction will be constrained to the existing locations, which is previously disturbed and retains little to no curtural heritage, minimizing potential for impacts.	4.5	3.0	●	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●
Protects Archaeological Features: Minimizes impact to archaeological features	Construction will be constrained to the existing locations, which is previously disturbed and retains little to no archaeological potential, minimizing potential for impacts.	4.5	3.0	●	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural			**17.0**				**14.7**				**14.3**	
Existing and Future Demands: Able to meet existing and future demands and aligns with existing and planned infrastructure	The new gravity sewers will be sized appropriately for the ultimate buildout.	4.0	4.6	●	The new SPS will be sized appropriately for the ultimate buildout (wet well, forcemain) and 20-year capacity (pumps).	5.0	5.7	●	The new SPS will be sized appropriately for the ultimate buildout (wet well, forcemain) and 20-year capacity (pumps).	5.0	5.7	●
Reliability and Security: Provides reliability, security, and robustness	New upsized gravity sewers would increase operational reliability, reduce inflow/infiltration that may increase flows, and reduce the likelihood or disrupted service, process upset, or mechanical breakdown.	4.0	4.6	●	A new local SPS and forcemain would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Potential to increase operational redundancy in part of the collection system.	4.0	4.6	●	A new local SPS and forcemain would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Second forcemain to WPCP increases operational redundancy and system robustness.	4.5	5.1	●
Constructability: Maximize ease of construction and facilitate integration with existing system(s)	Upsized gravity sewers are compatible with the existing system. Shortest construction duration compared to other alternatives. Few constructability challenges, limited potential for scalability. Construction staging is possible to maintain service. Maximizes existing infrastructure.	4.0	4.6	●	The new local SPS and forcemain is compatible with the existing system. Medium- to long-term construction duration compared to other alternatives. Potential for scalability and future expansion. Able to maintain servicing at existing SPS while new local SPS is constructed. Does not maximize exising infrastructure	3.5	4.0	◕	The new local SPS and forcemain is compatible with the existing system. Medium- to long-term construction duration compared to other alternatives. Potential for scalability and future expansion. Able to maintain servicing at existing SPS while new local SPS is constructed. Does not maximize exising infrastructure	3.5	4.0	◕
Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	Sewer upgrades are compatible with existing system. Upsized gravity sewer will maintain the same low operational and maintenance requirements.	4.5	5.1	●	New local SPS increases operational complexity and operational and monitoring requirements.	3.0	3.4	◑	New local SPS increases operational complexity and operational and monitoring requirements.	3.0	3.4	◑
Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	Optimizes existing infrastructure. Aligns with planned infrastructure projects.	5.0	5.7	●	Does not optimize existing infrastructure. Does not align with planned infrastructure projects.	3.0	3.4	◑	Does not optimize existing infrastructure. Does not align with planned infrastructure projects.	3.0	3.4	◑
Existing and Planned Land Use: Aligns with existing and planned land use	Land acquisition is not anticipated.	5.0	5.7	●	Land acquisition is anticipated.	3.0	3.4	◑	Land acquisition is anticipated.	3.0	3.4	◑
Permits and Approvals: Ease of permits and approvals	Time spent is expected to be minimal.	5.0	5.7	●	Moderate amount of time may be required to obtain permits.	4.0	4.6	●	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational			**36.0**				**29.1**				**29.7**	
Life Cycle Cost: 20-year life cycle cost	20-year life cycle cost of $1,508,000	5	30.0	●	20-year life cycle cost of $3,552,000	3.81	22.9	◕	20-year life cycle cost of $5,817,000	2.5	15.0	◑
Maximum Sub-total Score - Financial / Economic			**30.0**				**22.9**				**15.0**	
Total Overall Maximum Weighted Score			**92.0**	●			**72.7**	◕			**65.0**	◕

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives

Category	Weight	Criteria	Indicators	SPS Alternatives Alternative 1: Expand SPS on Existing Site				Alternative 2: Build a New SPS on a New or Existing Site				Alternative 3: Build a Local SPS and New Forcemain to the Mapleton WPCP				Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site,			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	Construction expected to be constrained to existing SPS site and forcemain corridor. Vegetation removal not expected, other than ornamental grasses. Construction area to be resodded post-construction.	4.5	2.3	●	A site for the new local SPS must be located, or the new SPS can be located at the existing site which likely has adequate space. For a new site, a second forcemain to the Mapleton WPCP must be added. For the existing site, the existing forcemain could be upgraded or a second forcemain could be added in the existing utilities corridor. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.5	1.8	◕	A site for the new local SPS must be located and a forcemain routed to the Mapleton WPCP. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.0	1.5	◑	A site for the new local SPS must be located and a forcemain routed to the existing SPS. Vegetation removal may be required. Construction area will be re-sodded post-construction.	2.5	1.3	◑
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	Currently SPS does not impact source water protection areas. Expanded SPS not expected to change source water protection.	5.0	2.5	●	It is unknown if there are areas within or in the vicinity of the new SPS site that would be vulnerable. A source water protection plan may need to be developed for the new SPS site.	3.0	1.5	◑	It is unknown if there are areas within or in the vicinity of the new SPS site that would be vulnerable. A source water protection plan may need to be developed for the new SPS site.	3.0	1.5	◑	It is unknown if there are areas within or in the vicinity of the new SPS site that would be vulnerable. A source water protection plan may need to be developed for the new SPS site.	3.0	1.5	◑
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work will is contained on the existing site and will not disrupt any additional habitats and does not have any protected species.	5.0	2.5	●	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new SPS site. An aquatic and species survey would need to be conducted.	3.5	1.8	◕	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new SPS and forcemain sites. An aquatic and species survey would need to be conducted.	3.5	1.8	◕	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new SPS and forcemain sites. An aquatic and species survey would need to be conducted.	3.0	1.5	◑
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas	New equipment is not energy intensive and will follow the same operational practices as existing. None of the upgrades are expected to increase GHG emissions. Vegetation or tree removal, other than ornamental grass, is not expected as part of the project, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●	New equipment is not energy intensive and will follow the same operational practices as existing. New SPS is expected to double the total GHG emissions produced by the Moorefield Collection System. Vegetation or tree removal other than ornamental grass may be required, therefore small effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.5	1.8	◕	New equipment is not energy intensive and will follow the same operational practices as existing. New SPS is expected to double the total GHG emissions produced by the Moorefield Collection System. Vegetation or tree removal other than ornamental grass may be required, therefore small effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.5	1.8	◕	New equipment is not energy intensive and will follow the same operational practices as existing. New SPS is expected to double the total GHG emissions produced by the Moorefield Collection System. Vegetation or tree removal other than ornamental grass may be required, therefore small effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.5	1.8	◕
Maximum Sub-total Score - Natural Environment						9.5				6.8				6.5				6.0	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	Upgrade of the existing SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●	The upgraded SPS and new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●	The new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●	The upgraded SPS and new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction trucks will be on site for the delivery of construction materials and equipment. Short-term construction impacts from noise and dust are expected while expanding the existing SPS and forcemain. Appropriate standard construction techniques and mitigation measures will be implemented.	4.5	3.0	●	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while building the new SPS and forcemain. Appropriate standard construction techniques and mitigation measures will be implemented.	3.5	2.3	◕	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while building the new SPS and forcemain to the Mapleton WPCP. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑	Construction trucks will be on site for the delivery of construction materials and equipment. Long-term construction impacts are expected while upgrading the existing SPS and forcemain, and building the new SPS and forcemain. Appropriate standard construction techniques and mitigation measures will be implemented.	2.5	1.7	◑
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	Minimal long-term noise and visual effects on sensitive receptors during operation. Maintaining the existing building footprint preserves views of the natural landscape and maintains the existing distance between the proposed infrastructure and the closest sensitive receptors. Minimal to no increase in air emissions anticipated.	5.0	3.3	●	There may be long-term noise and visual effects on sensitive receptors during construction and operation of new SPS on a new site. If existing site is used, long-term visual effects and minimal noise effects are expected. New SPS site will need to be assessed for closest sensitive receptors.	4.0	2.7	●	There may be long-term noise and visual effects on sensitive receptors during construction and operation of new SPS on a new site. New SPS site will need to be assessed for closest sensitive receptors.	4.0	2.7	●	May be long-term noise and visual effects on sensitive receptors during construction and operation of new SPS, minimal effects for upgraded SPS. New SPS site will need to be assessed for closest sensitive receptors.	4.5	3.0	●
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Retrofitting and upgrading the existing SPS will be able to maintain some of the existing assets and result in little interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	4.5	3.0	●	Little disruption to businesses during construction and operation as existing SPS will be used until new SPS is built. Little interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	5.0	3.3	●	Little disruption to businesses during construction and operation as existing SPS will be used until new SPS is built. Little interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	5.0	3.3	●	Little disruption to businesses during construction and operation as existing SPS will be used until new SPS is built. Retrofitting and upgrading the existing SPS will be able to maintain some of the existing assets and result in little interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	4.5	3.0	●
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	Construction will be constrained to the existing site, which is previously disturbed and retains little to no curtural heritage, minimizing potential for impacts.	5.0	3.3	●	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS and forcemain sites.	4.0	2.7	●	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	Construction will be constrained to the existing site, which is previously disturbed and retains little to no archaeological potential, minimizing potential for impacts.	5.0	3.3	●	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS and forcemain sites.	4.0	2.7	●	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural						19.3				17.0				16.7				16.3	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	The upgraded SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps).	5.0	6.7	●	The upgraded SPS and new SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps).	5.0	5.7	●	The new SPS will be sized appropriately for the buildout (wet well, forcemain) and 20-year capacity (pumps).	5.0	5.7	●	The upgraded SPS and new SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps).	5.0	5.7	●
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	An upgraded SPS would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. No change to operational redundancy.	4.5	5.1	●	The new SPS would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Use of existing forcemain does not increase operational redundancy.	4.5	5.1	●	The new SPS and forcemain would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Second forcemain increases operational redundancy.	5.0	5.7	●	The upgraded SPS and new SPS would increase operational reliability and redundancy, and reduce the likelihood of disrupted service, process upset, or mechanical breakdown.	5.0	5.7	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be shortest. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Scalability and future expansion may become limited on this site. Construction will be staged to minimize process disruption during construction. This alternative maximizes the existing building footprint with capacity for future expansion in the site.	4.5	5.1	●	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be moderate. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Scalability and future expansion may become limited on the existing site, unknown for a new site. Construction will be staged to minimize process disruption during construction. This alternative may maximize the existing site capacity if the existing site is used.	4.0	4.6	●	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be moderate. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Scalability and potential for future expansion is unknown for a new site. Construction will be staged to minimize process disruption during construction. This alternative does not maximize the existing building footprint or site capacity.	3.5	4.0	◕	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be the longest. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Scalability and potential for future expansion is unknown for a new site. Construction will be staged to minimize process disruption during construction. This alternative maximizes the existing building footprint	3.0	3.4	◑
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	Upgraded SPS will maintain same operational and maintenance requirements.	5.0	5.7	●	The addition of the new SPS will increase operational and maintenance requirements as two stations will now require maintenance.	4.0	4.6	●	The addition of the new SPS will increase operational and maintenance requirements as two stations will now require maintenance.	4.0	4.6	●	The addition of the new SPS will increase operational and maintenance requirements as two stations will now require maintenance.	4.0	4.6	●
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Optimizes existing infrastructure and aligns with planned infrastructure projects.	4.5	5.1	●	Optimizes existing infrastructure and aligns with planned infrastructure projects.	5.0	5.7	●	Makes use of existing infrastructure and aligns with planned infrastructure projects.	4.5	5.1	●	Makes use of existing infrastructure and aligns with planned infrastructure projects.	4.5	5.1	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	Optimizes existing property ownership, does not require land acquistion.	5.0	5.7	●	Optimizes existing property ownership, land acquistion may be required.	4.5	5.1	●	Land acquisition may be required.	4.0	4.6	●	Optimizes existing property ownership, land acquistion may be required.	4.5	5.1	●
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	Time spent is expected to be minimal.	5.0	5.7	●	Moderate amount of time may be required to obtain permits.	4.0	4.6	●	Moderate amount of time may be required to obtain permits.	4.0	4.6	●	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational						39.2				35.4				34.3				34.3	
Financial / Economic	30	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	20-year life cycle cost of $1,602,000	5	30.0	●	20-year life cycle cost of $3,712,000	4.4	26.6	●	20-year life cycle cost of $7,718,000	3.34	20.1	◕	20-year life cycle cost of $10,838,000	2.5	15.0	◑
Maximum Sub-total Score - Financial / Economic						30.0				26.6				20.1				15.0	
Total Overall Maximum Weighted		100				98.1	●			85.8	●			77.5	◕			71.6	◕

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives — Collection System and Forcemain Alternatives

Category	Weight	Criteria	Indicators	Alternative 1: Low-pressure Sewers — Rationale	Score 1 to 5	Weighted Score		Alternative 2: All Gravity Sewers — Rationale	Score 1 to 5	Weighted Score		Alternative 3: Combination Gravity Sewer and Low-pressure Sewers — Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	This option does not involve works at locations beyond the existing sewers. Vegetation removal is not expected other than ornamental grasses. Grass will be re-sodded post-construction.	4.5	2.3	●	This alternative involves replacing all existing buried sewers with gravity sewers. Vegetation removal and significant excavation is expected, as some sites may reach depths of 6 m. Grass will be re-sodded post-construction.	2.5	1.3	◑	This alternative involves installing a trunk gravity sewer to which the low-pressure sewer will connect, buried below roadways. Vegetation removal is not expected, other than ornamental grass. Grass will be re-sodded post-construction.	3.5	1.8	◕
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	The low-pressure sewers have minimal impacts on water resources and source water protection. However, an assessment may be required for new sites to determine the impacts.	4.5	2.3	●	The gravity sewers would like be located in the same locations as the existing low pressure sewers as much as possible. Minimal impacts on water resources and source water protection are expected. However, an assessment may be required for new or modified sites to determine the impacts, especially for sites that may reach depths up to 6 m.	3.5	1.8	◕	The low-pressure sewers have minimal impacts on water resources and source water protection. However, an assessment may be required for new low pressure sewer sites and for the trunk gravity sewer site to determine the impacts.	4.0	2.0	●
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	Impact to wildlife (including species at risk) or identified habitat locations for these species is possible for expansions to the system at new sites.	4.5	2.3	●	Some impact to wildlife and habitat is possible as a result of installing new gravity sewers throughout the Town. Minimal wildlife impact is expected to replace sewers in existing utility corridors, but there may be impacts for new corridors.	3.5	1.8	◕	Impact to wildlife (including species at risk) or identified habitat locations for these species is possible for expansions to the system at new sites. Minimal impact is expected for the trunk gravity sewer as it will be installed below roadways.	4.0	2.0	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas	New equipment follows the same operational practices as existing. Does not require energy or produce GHG emissions. Vegetation removal is not expected other than ornamental grasses, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●	New equipment would decrease energy requirements by removing individual pumps and relying on gravity. Minimal GHG emissions during operation, however requirement for significant construction and excavation would increase GHG emissions during construction. Some vegetation removal would be expected, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.0	1.5	◑	New equipment would slightly decrease energy requirements by lowering pump rate required from individual pumps and relying on gravity for the trunk main. Slightly decreased GHG emissions during operation. Vegetation removal is not expected other than ornamental grasses, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●
Maximum Sub-total Score - Natural Environment						9.0				6.3				8.0	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	Any upgrades or expansions to the low pressure sewers will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●	Gravity sewers will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	4.5	3.0	●	Any upgrades or expansions to the low pressure sewers and trunk gravity sewer will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	4.5	3.0	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction trucks will be on site for the delivery of construction materials and equipment. Short-term construction impacts from noise and dust are expected. Appropriate standard construction techniques and mitigation measures will be implemented.	4.5	3.0	●	Construction trucks will be on site for the delivery of construction materials and equipment. Long-term construction impacts from noise and dust are expected while replacing the sewers. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while expanding the sewers and installing the trunk main. Appropriate standard construction techniques and mitigation measures will be implemented.	4.0	2.7	●
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	Minimal expected long-term noise or visual effects on sensitive receptors during operation. Long-term effort from property owners to maintain household pumps for continued servicing.	4.0	2.7	●	Minimal expected long-term noise or visual effects on sensitive receptors during operation.	4.5	3.0	●	No expected long-term noise or visual effects on sensitive receptors during operation. Long-term effort from property owners to maintain household pumps for continued servicing.	3.5	2.3	◕
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Minimal disruption to roadway access is possible while installing new sewer pipes. Construction will be phased to minimize disruptions.	4.5	3.0	●	Significant disruption to roadway access is possible while replacing sewer pipes. Construction will be phased to minimize disruptions.	3.5	2.3	◕	Significant disruption to roadway access for designated roads is possible while installing trunk gravity sewers. Construction will be phased to minimize disruptions.	4.0	2.7	●
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	For new sites (system expansion), unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	●
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	For new sites (system expansion), unknown impact to archaeologically significant features given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to archaeologically significant features given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to archaeologically significant features given these studies have not been completed for the new sites.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural						17.3				15.7				16.0	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.7	●	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.7	●	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	4.5	5.1	●
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	Low pressure sewers are not a widely used technology and as such are less robust and reliable. This alternative will maintain the same moderate operational reliability and redundancy, as well as the high reliance on mechanical components (grinder pumps). Additionally, the number of pumps that can come on at the same time (forcemain sharing) is limited.	3.0	3.4	◑	Gravity sewers are a widely used technology due to their simplicity, reliability, and robustness. This alternative would improve system security and operational reliability.	5.0	5.7	●	Low pressure sewers are not a widely used technology and as such are less robust and reliable. Gravity sewers are a widely used technology due to their simplicity, reliability, and robustness. This alternative would improve system security and operational reliability by adding the trunk gravity sewer.	4.5	5.1	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be the shortest. Ease of implementation is expected to go smoothly, some phasing may be required. Scalability and potential for future expansion is possible, but eventually, past the planning horizon, the population may increase enough that a switch to gravity sewers is required. Construction will be staged to minimize process disruption during construction. This alternative maximizes the existing infrastructure.	4.0	4.6	●	Upgrades are not compatible with the existing system, instead the existing system would be replaced. Construction period for this alternative is expected to be the longest, as the entire system would be replaced and some pipes must be buried up to 6 m. Implementation will invove complex construction sequencing. Scalability and potential for future expansion is possible. Construction will be staged to minimize process disruption during construction. This alternative does not maximize the existing infrastructure.	2.5	2.9	◑	Upgrades are somewhat compatible with the existing system. Construction period for this alternative is expected to be moderate. Implementation will invove complex construction sequencing. Scalability and potential for future expansion is possible. Construction will be staged to minimize process disruption during construction. This alternative maximizes the existing infrastructure.	3.5	4.0	◕
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	Sewer upgrades are compatible with existing system. This alternative will maintain the same moderate operational and maintenance requirements and reliance on power, and the associated issues. Public education is necessary, so property owners are aware of how to avoid blockages, perform maintenance, and how to deal with outages/emergencies.	4.0	4.6	●	Upgrades are not compatible with the existing system, instead the existing system would be replaced. Decreased system complexity and increased operational flexibility due to utilization of gravity. Minimal operation and maintenance requirements.	4.0	4.6	●	Upgrades are somewhat compatible with the existing system. Decreased system complexity and increased operational flexibility due to utilization of trunk gravity sewer. This alternative will maintain most of the same moderate operational and maintenance requirements and reliance on power, and the associated issues. Trunk sewer may reduce requirements.	4.5	5.1	●
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Optimizes existing infrastructure. Aligns with planned infrastructure projects.	5.0	5.7	●	Does not optimize with existing infrastructure or align with planned infrastructure.	4.5	5.1	●	Optimizes existing infrastructure. Aligns with planned infrastructure projects.	5.0	5.7	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	Land acquisition is possible.	4.5	5.1	●	Land acquisition is possible.	4.5	5.1	●	Land acquisition is possible.	4.5	5.1	●
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	Time spent is expected to be minimal.	5.0	5.7	●	Time spent is expected to be moderate.	4.5	5.1	●	Time spent is expected to be moderate.	4.5	5.1	●
Maximum Sub-total Score - Technical / Operational						34.9				34.3				35.4	
Financial / Economic	30	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	20-year life cycle cost of $151,000	5	30.0	●	20-year life cycle cost of $8,079,000	2.5	15.0	◑	20-year life cycle cost of $1,127,000	4.69	28.2	●
Maximum Sub-total Score - Financial / Economic						30.0				15.0				28.2	
Total Overall Maximum Weighted		100				91.2	●			71.2	◕			87.6	●

Engineering
for **people**

Township of Mapleton

Mapleton Water and Wastewater Servicing Master Plan

Technical Memorandum 5 – Implementation Plan

Friday, April 14, 2023

T000974D

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Engineering for **people**

Technical Memorandum 5 – Implementation Plan

Mapleton Water and Wastewater Servicing Master Plan

File no T000974D

PREPARED BY:

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1 Introduction

1.1 Background

The Township support a mostly agricultural and rural population of approximately 11,000 residents. Following amalgamation in 1999 Mapleton identified its new vision and mission: "rooted in tradition, growing for the future." Three small hamlets (Drayton, Moorefield and Alma) make up the "urban" centres of the Township; however, only the urban centres of Drayton and Moorefield are currently serviced with communal drinking water and wastewater systems.

The Township of Mapleton is responsible for providing municipal drinking water and wastewater services to the residents in the urban centres of the Township. The Township is undertaking a Water and Wastewater Servicing master Plan Study to develop a long-term and sustainable strategy for provision of municipal drinking water and wastewater services for existing and planned growth within the township.

As part of the Master Planning Process, five (5) Technical Memoranda will be prepared, as follows:

1. Technical Memo 1 – Background Conditions and Design Criteria
2. Technical Memo 2 – Development of reasonable alternative servicing strategies.
3. Technical Memo 3 – Evaluation Framework
4. Technical Memo 4 – Evaluation of Alternatives
5. Technical Memo 5 – Implementation Plan

The findings outlined in the five Technical Memoranda will be summarized in a project File Report which will be available for Public Review and comment.

1.2 Purpose of Technical Memorandum No. 5

The purpose of this Technical Memorandum No. 5 (TM5) is to provide an implementation plan for the preferred water and wastewater servicing alternatives for both Drayton and Moorefield. A description of each alternative, as well as major infrastructure / process requirements, opinion of probable costs and the basis for cost allocations are also presented and discussed throughout this memo to support the evaluation of the alternatives.

2 Implementation Plan

The preferred water and wastewater servicing strategies will support the short and long-term servicing needs of the approved growth areas and provide flexibility for servicing potential growth areas in the future. The strategies will also support meeting operational requirements, water quality and level of service objectives.

Upon completion of the Master Plan or Phase 2 of the EA process, Schedule A, A+ and B projects may proceed to Phase 5, Implementation, subject to finalization of the 30-day review period and assuming no Part II orders are received. However, during implementation of some of these projects, additional study and analysis may be undertaken such as during the area servicing stages of development. While this work may address refinement to alignments, siting and minimizing environmental impacts, these projects will not require further planning under the Class EA process.

Based on the projections for water demand or wastewater flow requirements of the service areas and condition assessment studies, the project timing requirements were determined. This process took into consideration a logical extension to the growth areas from the existing urban boundaries for both Drayton and Moorefield. The evaluation of timing also took into consideration the availability of and need to maximize the use of existing infrastructure and best judgement on reasonable timing of subsequent expansions.

Total project scheduling has been determined for both water and wastewater servicing. Project components have been initiated based on the servicing strategies and have been incorporated into recent budgets.

In order to provide for a reasonable range of development opportunity within the Town, the following sections outline the proposed Implementation Plan.

2.1 Water Servicing

In order to accommodate growth within Drayton, the proposed Implementation Plan for the projects were developed as summarized in Table 2-1.

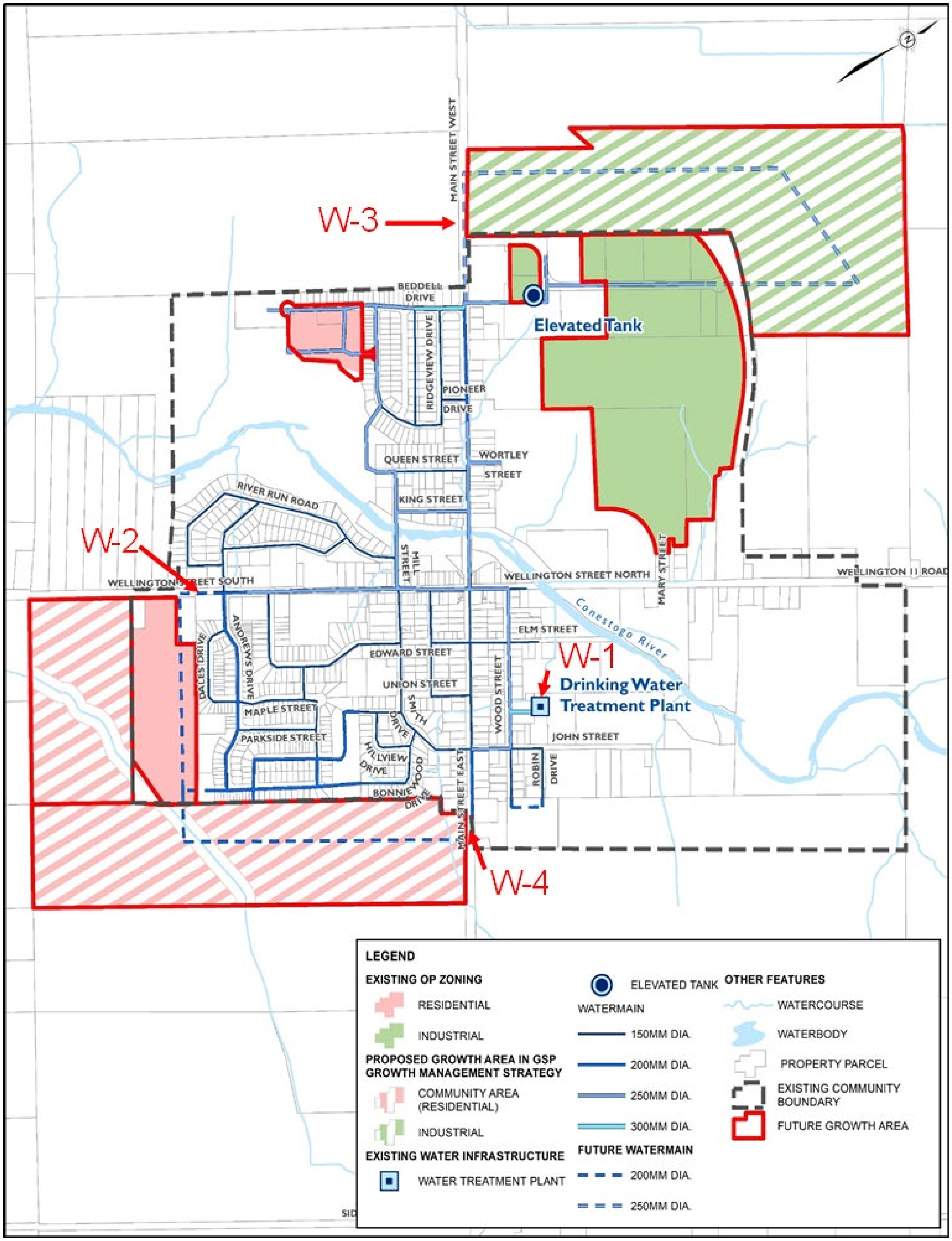


Figure 2-1: Drayton Water Servicing Implementation Plan

Table 2-1: Water Servicing Implementation Strategy

Proj. Id's	Description	Location	Start of Const'n	Ea Sched	Cost (2022 $M)	Comments
W-1	Install new well at the existing DWS site to increase capacity	Drayton	1-5 years	B	$1.44	
W-2	Water distribution extension at Wellington Street South	Drayton	1-5 years	A+	$0.20	Timing for project subject to progress of development application(s). Work to be coordinated with WW-3
W-3	Water distribution extension at Main Street West, near Drayton Industrial Drive	Drayton	6-10 years	A+	$0.69	
W-4	Water distribution extension at Main Street East	Drayton	6-10 years	A+	$0.13	Timing for project subject to progress of development application(s). Work to be coordinated with WW-4
				Total Estimated Capital Cost (2023$)	**$2.46M**	

A description of the key components and justification of the Water Servicing Implementation Strategy is provided below:

- W-1 – Construction of a third well to be added to the Drayton Water Treatment Plant subject to confirmatory investigations. Project will include associated process piping and process mechanical upgrades at the existing pumphouse.
- W-2 - Construction of a 250mm dia. watermain extension along Wellington Street South (Wellington County Road 11), to provide conveyance capacity to accommodate growth on the south-east quadrant of Drayton.
- W-3 - Construction of a 250mm dia. watermain extension along Main Street West from Bedell Drive westerly to a new road to provide conveyance capacity to the proposed employment lands growth area.
- W-4 - Construction of a 200mm dia. watermain extension along Main Street East (Wellington County Road 8), to provide conveyance capacity to planned residential growth in the southeast quadrant of Drayton.

2.2 Wastewater Servicing

In order to accommodate growth within Drayton and Moorefield, the Implementation Plan was developed for wastewater servicing projects are summarized in Table 2-2.

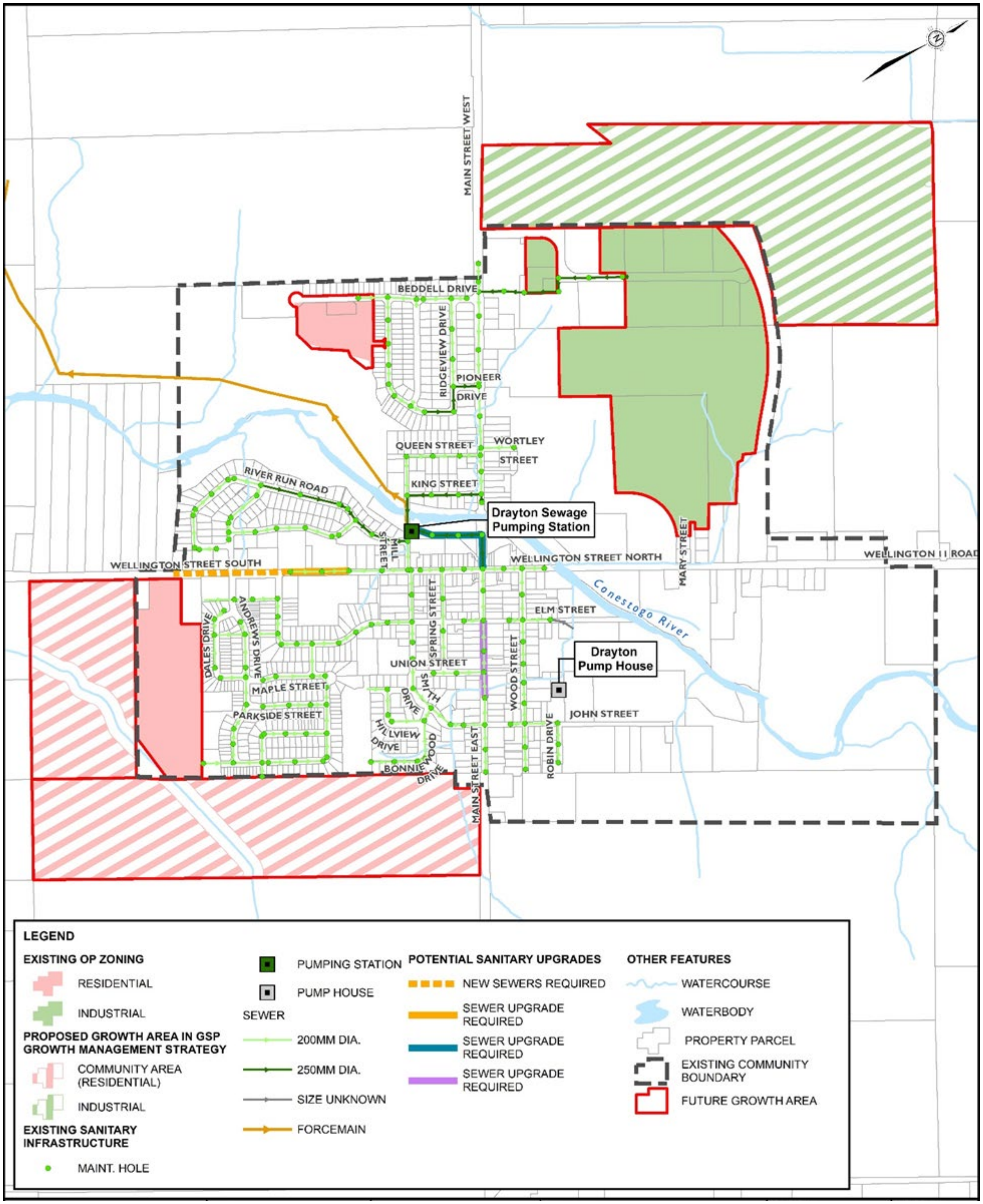


Figure 2-2: Drayton Wastewater Servicing Implementation Plan

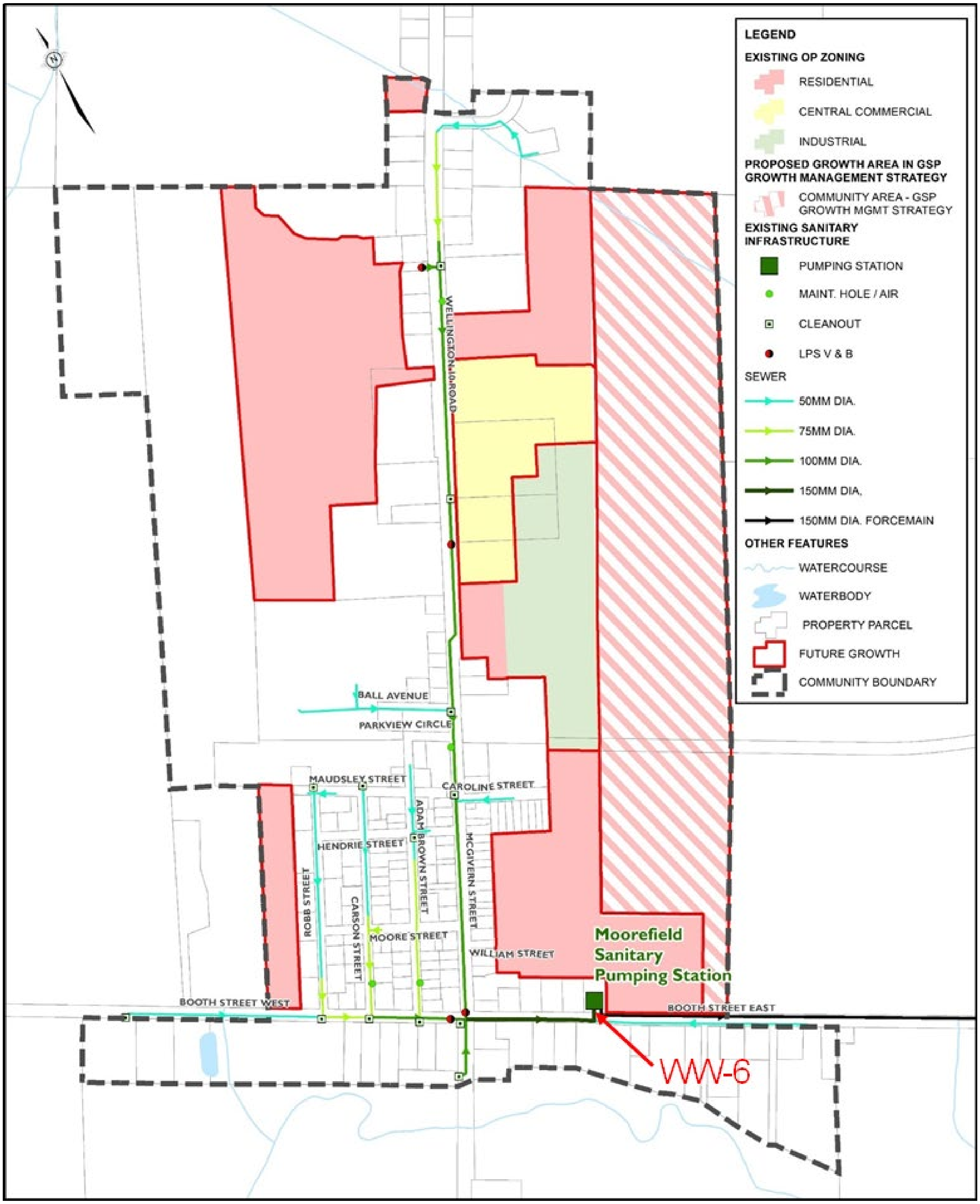


Figure 2-3: Moorefield Wastewater Servicing Implementation Plan

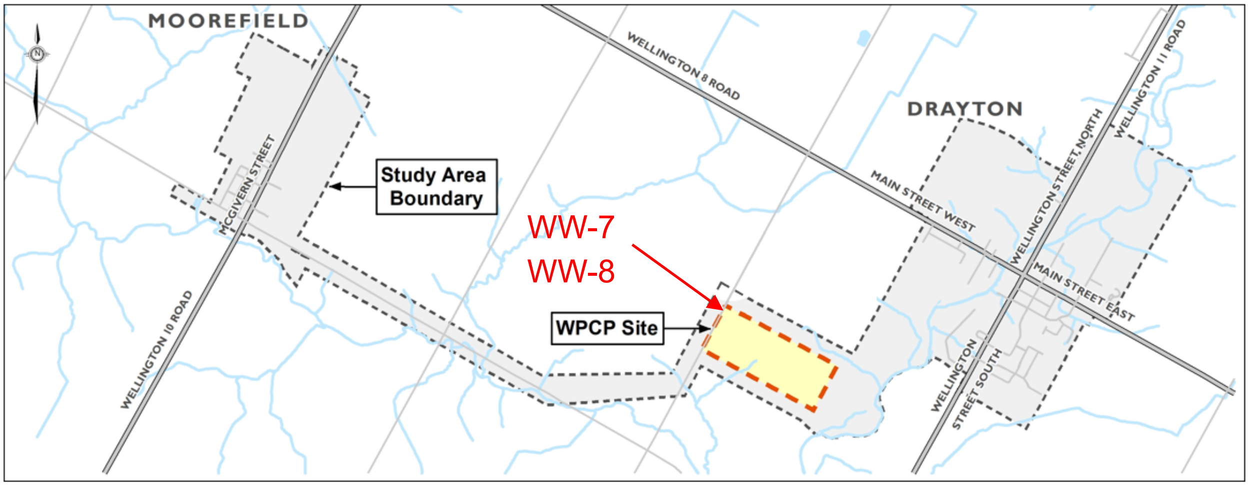


Figure 2-4: Township Wastewater Servicing Implementation Plan

Table 2-2: Wastewater Servicing Implementation Strategy

Project Id's	Description	Location	Start of Const'n	EA Schedule	Cost ($Million)	Comments
WW-1	New SPS with emergency storage	Drayton	Immediate	B	$5.16	Existing facility at end of its service life. Capacity limitations in existing pump station under wet-weather conditions
WW-2	Inflow/Infiltration monitoring program	Drayton	1-5	N/A	$0.38	Ongoing
WW-3	Upgrade gravity sewers on Wellington Street South	Drayton	1-5	A+	$0.70	Timing for project subject to progress of development application(s). Work to be coordinated with W-2
WW-4	Upgrade gravity sewers on Main Street West near the existing SPS	Drayton	6-10	A+	$0.45	Timing for project subject to progress of development application(s). Work to be coordinated with W-4
WW-5	Upgrade gravity sewers on Main Street East	Drayton	6-10	A+	$0.30	Timing for project subject to progress of development application(s). Work to be coordinated with W-4
WW-6	Upgrade the existing SPS equipment	Moorefield	10+	B	$0.40	
WW-7	Nitrogen removal upgrades	Township	1-5	C	$5.80	
WW-8	Phosphorus Removal Expansion Study	Township	6-10	C	$0.20	A study should be completed within 3 years of the capacity re-rating.
		Total Estimated Capital Cost (2023$)			**$13.39M**	

A description of the key components and justification of the Implementation Strategy is provided below.

- WW-1 – Construction of a new SPS to provide wastewater conveyance capacity for existing and new developments in Drayton, and to address the capacity limitations in the existing pumping station. The new SPS will include and emergency storage to provide additional protection against raw sewage spills to the Conestoga River.
- WW-2 – An Inflow/Infiltration (I/I) monitoring program is currently in progress to collect flow data throughout the collection system in Drayton. The study will identify the areas of Drayton that have higher inflow/infiltration rates into the sanitary collection system and will assist Town staff to establish a strategy to reduce inflow and infiltration into the collection and treatment systems.
- WW-3 - Construction of a gravity collection system extension along Wellington Street South (Wellington County Road 11), will provide an outlet for the lands at the east side of Drayton being planned for residential development.
- WW-4 – Upgrade of the gravity collection system along Main Street West (Wellington County Road 11) between Wellington Street and the existing SPS to accommodate additional flows from the growth areas.
- WW-5 - Upgrade of the gravity collection system along Main Street East (Wellington County Road 8) between Elm Street and John Street to accommodate additional flows from the growth areas.
- WW-6 – Upgrade of the existing SPS equipment to service the projected population of 2,000 persons, which is at the reasonable conveyance capacity of the forcemain. Growth in Moorefield beyond 2,000 persons will require further study to establish additional conveyance capacity from Moorefield to the Mapleton WPCP.
- WW-7 – Nitrogen removal upgrade the wastewater treatment facility to achieve a capacity of 1,300 m^3/d, as outlined in the Environmental Study Report dated November 2017. Consideration of an Alternative Design for this planned Upgrade is currently underway.
- WW-8 – The proposed effluent total phosphorus objectives of 0.17 mg/L at an expanded capacity of 1,300 m^3/d, is achievable in the existing filters with optimized alum dosing but is nearing the limits of technology. The wastewater facility would need to be upgraded to a mechanical treatment plant beyond 1,300 m^3/d. A study should be completed leading up to this flow to further evaluate tertiary treatment options to replace the filters.

As much as possible, all recommended Projects are planned within existing treatment facility sites, road allowances and/or utility corridors. For the Drayton SPS upgrade project (WW-1), property acquisition may will be required for the collection system routing to the new station. The Town may wish to consider alternative routing of collection system to the new SPS facility between Queen and King Street's to reduce the capital cost of the project. In the event that the alternative routes are considered, these property requirements shown below, will apply.

Table 2-3: Potential Property Requirements for Collection System Routing Alternatives

Project Id	Project Name	Route Alternative	Property Requirements	Comments
WW-1	New SPS with emergency storage	2	Easement onto parcels at 25 and 27 Queen Street	Town will secure / purchase permanent easements prior to commencing detail design.
WW-1	New SPS with emergency storage	3	Easement onto parcels at 25 Queen Street	Town will secure / purchase permanent easement prior to commencing detail design.

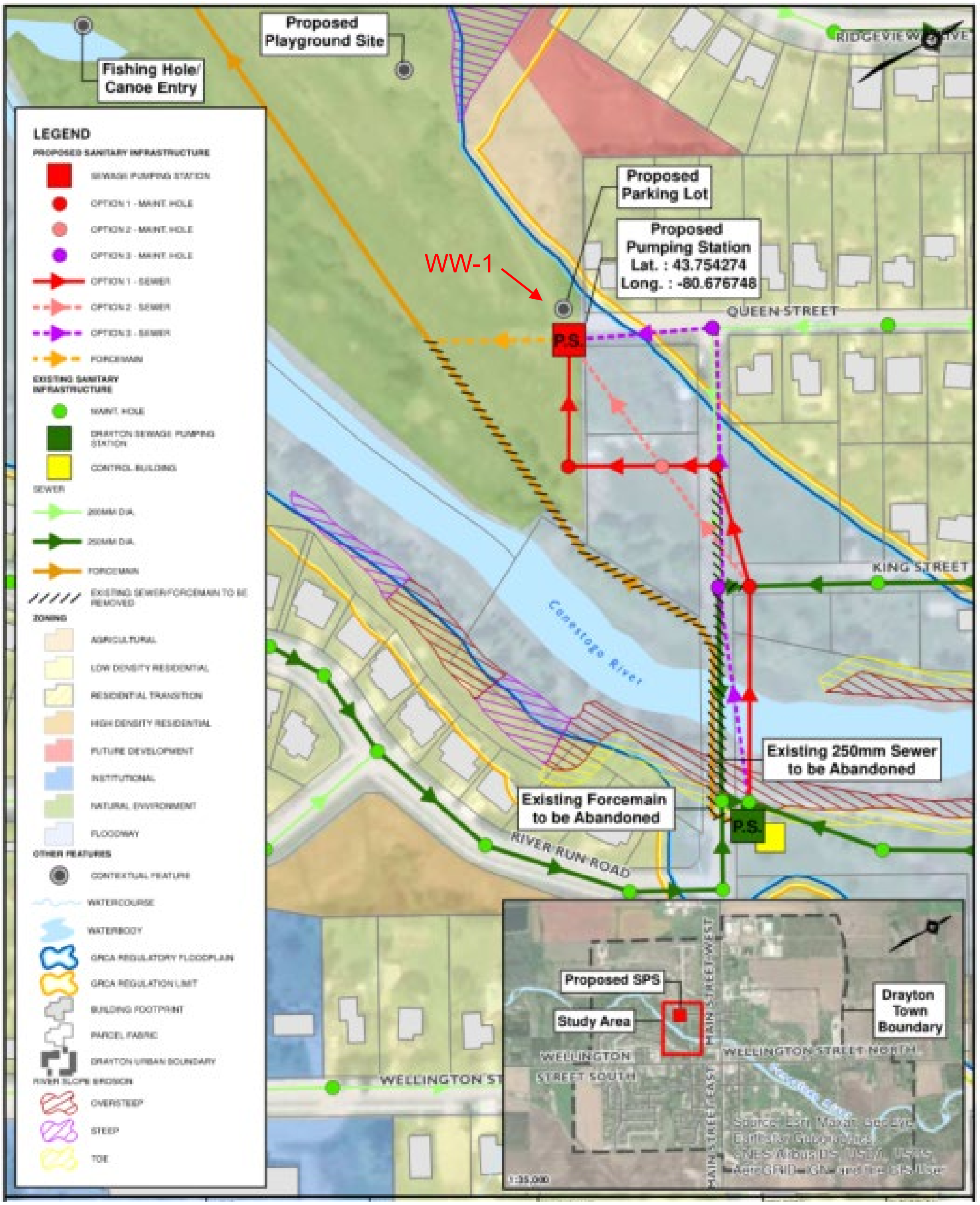


Figure 2-5: Drayton SPS Study Area and Collection System Routing Alternative

3 Next Steps

The following implementation requirements will be addressed during the subsequent steps (primarily during detailed design) of the projects:

- Finalization of property requirements;
- Final refinement of infrastructure alignment and facility siting to ensure infrastructure is located outside regulated areas except for instances when it is unavoidable (watercourse crossings);
- Final refinement of construction methodologies including determination of crossing approaches including open-cut, tunneling and structural supporting requirements;
- Completion of additional supporting investigations including but not limited to:
    - Geotechnical investigations to support determination of construction requirements for the infrastructure;
    - Hydrogeological investigations to evaluate potential impacts, to support mitigative requirements during construction and determine any dewatering requirements;
    - Updated Natural and Cultural Heritage Studies in support of the final Site Selection for planned water and wastewater facilities;
    - Archeological Assessments for potential sites for water and wastewater facilities.
- Mitigation of potential construction related impacts including but not limited to:
    - Traffic control.
    - Noise, vibration and dust.
    - Air pollution.
    - Service interruption.
    - Environmental and water disturbance or contamination.
    - Siltation and erosion control.
- Approval Requirements as required but not limited to:
    - Environmental Compliance Approval from Ministry of Environment, Conservation and Parks.
    - Permit approvals from the Grand River Conservation Authority (GRCA);
    - Associated Planning Act Approvals.

Temporary Permit to Take Water for construction dewatering from the Ministry of the Environment, Conservation and Parks.

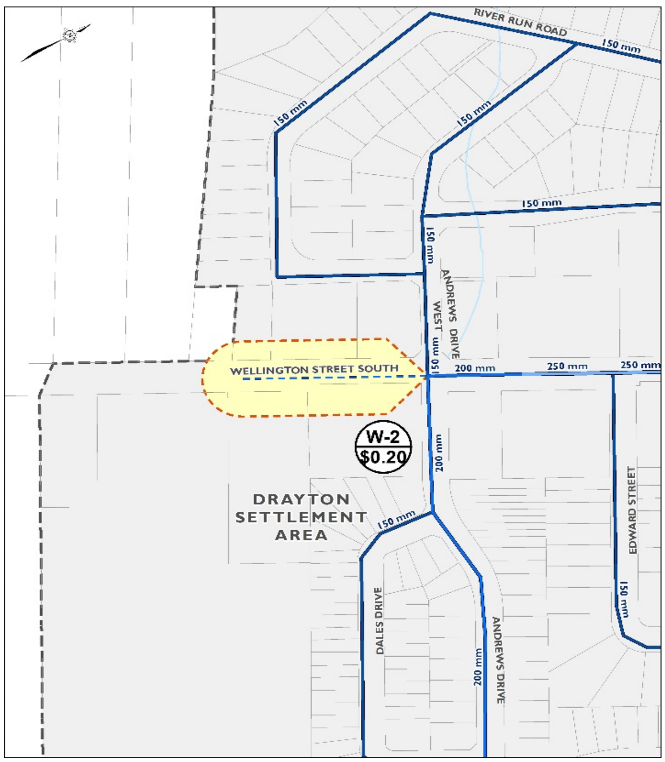
B

Appendix B: Project Datasheets

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN RECOMMENDED PROJECT DATA SHEET (WATER)			
Project Name:	New well at Existing Drinking Water Supply site to increase capacity	Project No.:	**W-1**
Project Timing:	2024-2028		
Project Location:	Drayton		
Project Description:	Construction of a third well pump would to be added to the Drayton Water Treatment Plant subject to confirmatory investigations . Project will include associated process piping and process mechanical upgrades at the existing pumphouse.		

Project Details:		
Prerequisites:	N/A	
Opportunities:	N/A	
Class EA Schedule:	B[1]	
Preliminary Design Data:	New third well constructed rated for 22.7 L/s	
Land Acquisition:	N/A	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	-
	Growth:	$1.44
	Total:	$1.44

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN RECOMMENDED PROJECT DATA SHEET (WATER)			
Project Name:	Wellington Street South Water Distribution Extension	Project No.:	**W-2**
Project Timing:	2024-2028		
Project Location:	Drayton		
Project Description:	Construction of a 250mm diameter watermain extension along Wellington Street South (Wellington County Road 11), to provide conveyance capacity to accommodate growth on the south-east quadrant of Drayton		

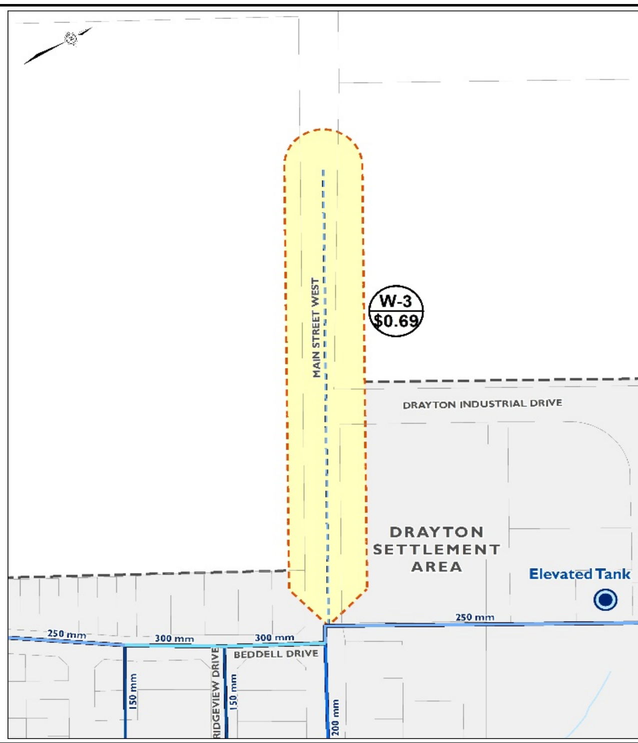


Project Details:

Prerequisites:	N/A	
Opportunities:	Work to be coordinated with WW-3 and potential road work with Wellington County.	
Class EA Schedule:	A+	
Preliminary Design Data:	150m of 250mm diameter watermain	
Land Acquisition:	Project will not exceed existing utility corridor and road allowance	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	-
	Growth:	$0.20
	Total:	$0.20

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN
RECOMMENDED PROJECT DATA SHEET (WATER)

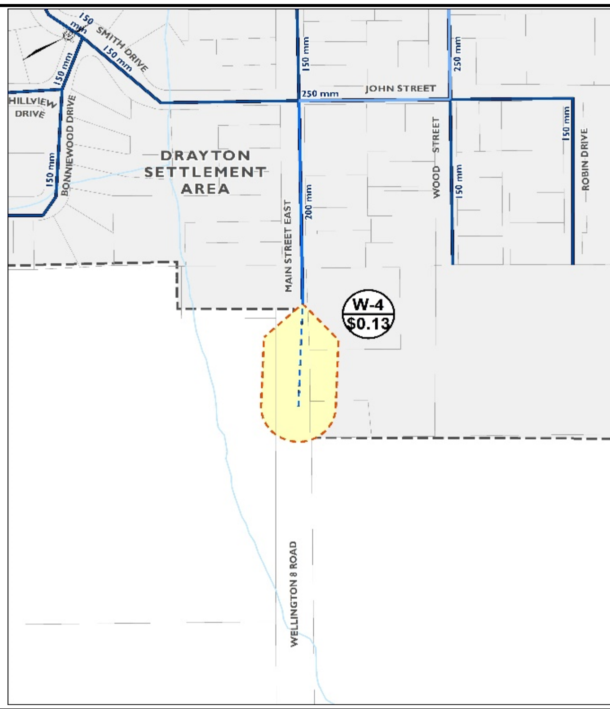
Project Name:	Main Street West Water Distribution Extension	Project No.:	**W-3**
Project Timing:	2029-2033		
Project Location:	Drayton		
Project Description:	Construction of a 250mm diameter watermain extension along Main Street West from Bedell Drive westerly to a new road , towards the Drayton Elevated Tank, near Drayton Industrial Drive,to will provide water supplyconveyance capacity and fire flow service to the existing and proposed industrial employment lands growth area.		



Project Details:

Prerequisites:	N/A	
Opportunities:	Combine with potential road work with Wellington County.	
Class EA Schedule:	A+	
Preliminary Design Data:	400m of 250mm diameter watermain	
Land Acquisition:	Project will not exceed existing utility corridor and road allowance	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	-
	Growth:	$0.69
	Total:	$0.69

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN RECOMMENDED PROJECT DATA SHEET (WATER)			
Project Name:	Main Street East Water Distribution Extension	Project No.:	**W-4**
Project Timing:	2029-2033		
Project Location:	Drayton		
Project Description:	Construction of a 200mm diameter watermain extension along Main Street East (Wellington County Road 8), to provide conveyance capacity to planned residential growth in the southeast quadrant of Drayton.		

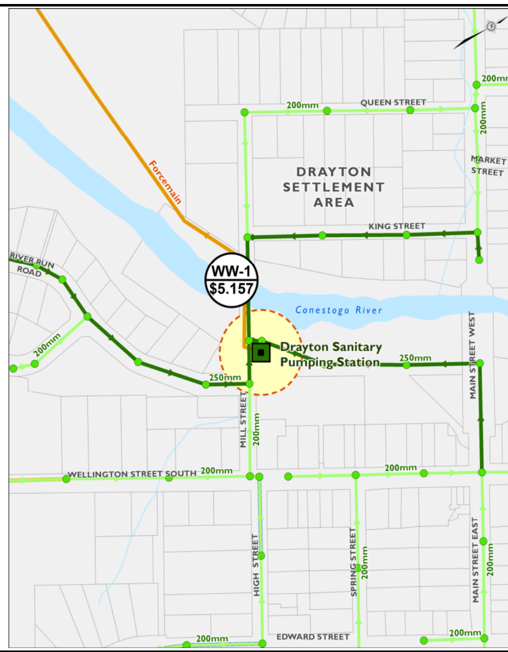


Project Details:

Prerequisites:	N/A	
Opportunities:	Combine with Wastewater Project No. WW-4 and potential road work with Wellington County.	
Class EA Schedule:	A+	
Preliminary Design Data:	120m of 200mm diameter watermain	
Land Acquisition:	Project will not exceed existing utility corridor and road allowance	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	-
	Growth:	$0.13
	Total:	$0.13

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN
RECOMMENDED PROJECT DATA SHEET (WASTEWATER)

Project Name:	New Sewage Pumping Station with Emergency Storage	Project No.:	**WW-1**
Project Timing:	Immediate		
Project Location:	Drayton		
Project Description:	Construction of a new SPS to provide wastewater conveyance capacity for existing and new developments in Drayton, and to address the capacity limitations in the existing pumping station. The new SPS will include and emergency storage to provide additional protection against raw sewage spills to the Conestoga River.		



Project Details:

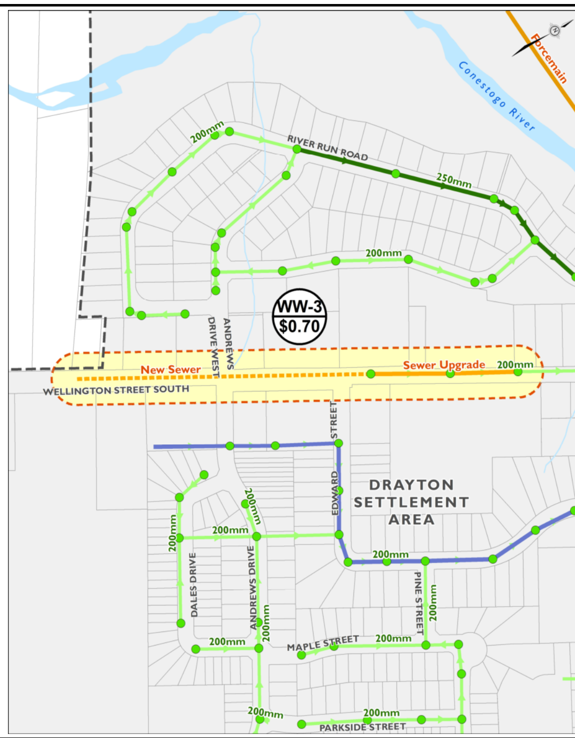
Prerequisites:	N/A	
Opportunities:	N/A	
Class EA Schedule:	B	
Preliminary Design Data:	Three submersible sewage pumps (one standby), Pumping Capacity 100.0 L/s at 42.0m TDH, Emergency Storage of 216 m^3	
Land Acquisition:	N/A	
Easement Acquisition:	Potential easements onto parcels at 25 and 27 Queen Street	
Estimated Capital Cost ($million):	Existing Development:	$2.968
	Growth:	$2.189
	Total:	$5.157

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN RECOMMENDED PROJECT DATA SHEET (WASTEWATER)			
Project Name:	Inflow/Infiltration Monitoring Program	Project No.:	**WW-2**
Project Timing:	2024-2028		
Project Location:	Drayton		
Project Description:	An Inflow/Infiltration (I/I) monitoring program is currently in progress to collect flow data from throughout the collection system in Drayton. The study will identify the areas of Drayton that have higher inflow/infiltration rates into the sanitary collection systemsystem and will assist Town staff to establish a strategy to reduce inflow and infiltration into the collection and treatment systems.		

Project Details:		
Prerequisites:	N/A	
Opportunities:	N/A	
Class EA Schedule:	N/A	
Preliminary Design Data:	N/A	
Land Acquisition:	N/A	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	$0.38
	Growth:	-
	Total:	$0.38

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN
RECOMMENDED PROJECT DATA SHEET (WASTEWATER)

Project Name:	Wellington Street South Wastewater Sewer Upgrade	Project No.:	**WW-3**
Project Timing:	2024-2028		
Project Location:	Drayton		
Project Description:	Construction of a gravity collection system extension along Wellington Street South (Wellington County Road 11), will provide service connection to the outlet for the lands at the east side of Drayton being planned for residential development		

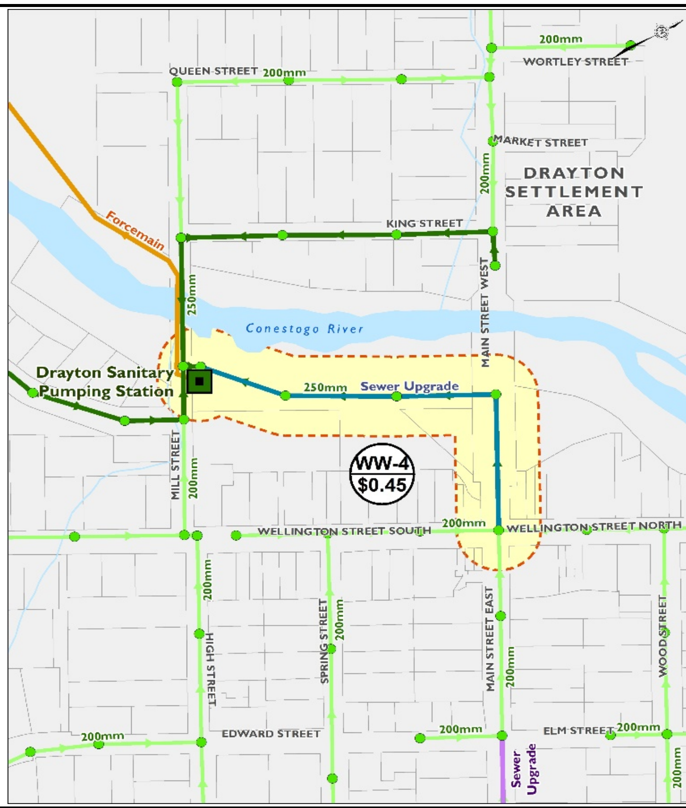


Project Details:

Prerequisites:	N/A	
Opportunities:	Work to be coordinated with W-2 and potential road work with Wellington County.	
Class EA Schedule:	A+	
Preliminary Design Data:	500m of 200mm Diameter Sewer	
Land Acquisition:	Project will not exceed existing utility corridor and road allowance	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	-
	Growth:	$0.70
	Total:	$0.70

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN
RECOMMENDED PROJECT DATA SHEET (WASTEWATER)

Project Name:	Main Street East Collection System Upgrade	Project No.:	**WW-4**
Project Timing:	2029-2033		
Project Location:	Drayton		
Project Description:	Upgrade of the gravity collection system along Main Street West (Wellington County Road 11) between Wellington Street and the existing SPS to accommodate additional flows from the growth areas		

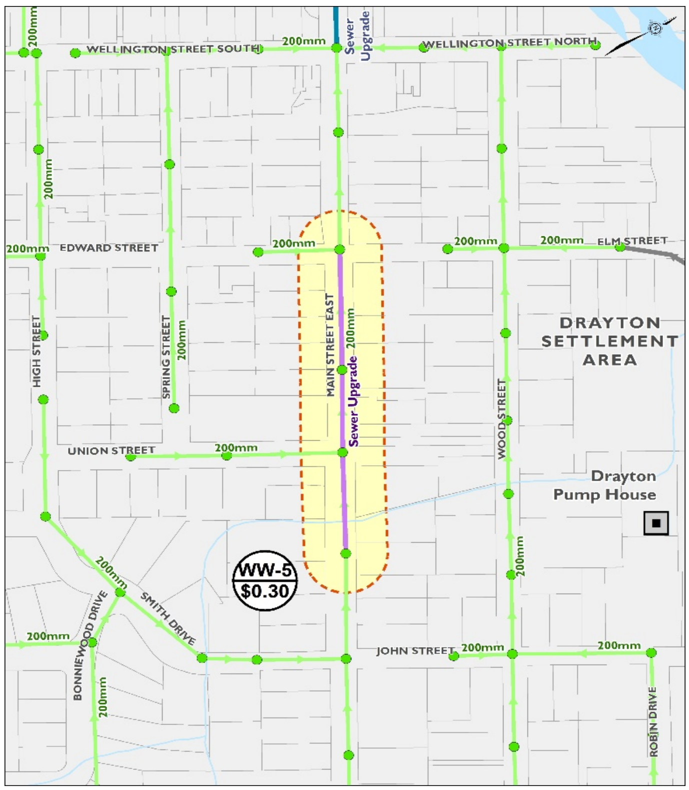


Project Details:

Prerequisites:	N/A	
Opportunities:	N/A	
Class EA Schedule:	A+	
Preliminary Design Data:	350m of 250mm Diameter Sewer	
Land Acquisition:	Project will not exceed existing utility corridor and road allowance	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	-
	Growth:	$0.45
	Total:	$0.45

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN
RECOMMENDED PROJECT DATA SHEET (WASTEWATER)

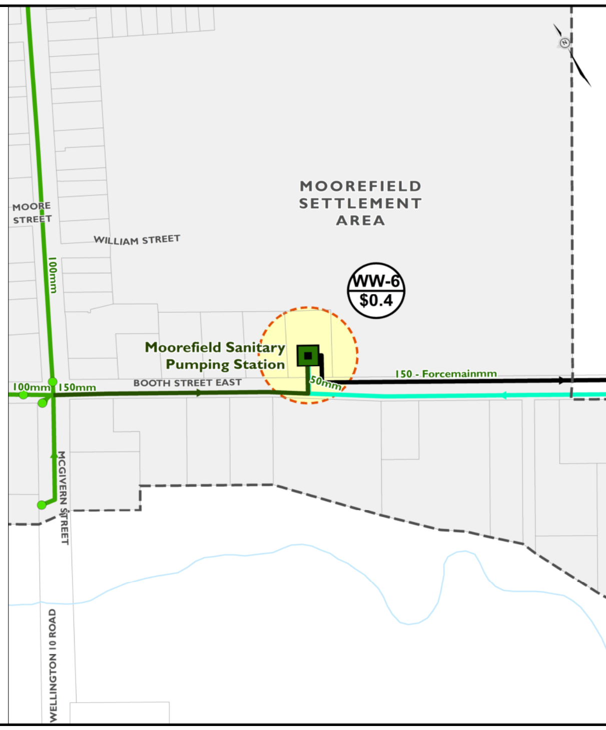
Project Name:	Main Street East Wastewater Gravity Sewer Upgrade	Project No.:	**WW-5**
Project Timing:	2029-2034		
Project Location:	Drayton		
Project Description:	Upgrade of the gravity collection system along Main Street East (Wellington County Road 8) between Elm Street and John Street to accommodate additional flows from the growth areas.		



Project Details:		
Prerequisites:	N/A	
Opportunities:	Work to be combined with W-4 and potential road work with Wellington County.	
Class EA Schedule:	A+	
Preliminary Design Data:	250m of 200mm Diameter Sewer	
Land Acquisition:	Project will not exceed existing utility corridor and road allowance	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	-
	Growth:	$0.30
	Total:	$0.30

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN
RECOMMENDED PROJECT DATA SHEET (WASTEWATER)

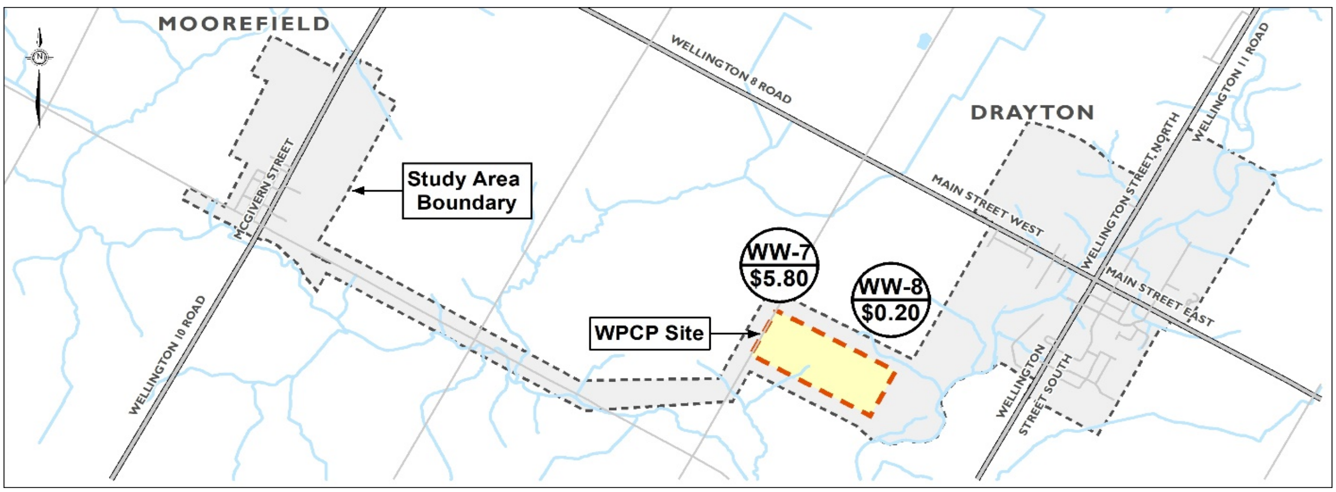
Project Name:	Moorefield Sewage Pumping Station Upgrade	Project No.:	**WW-6**
Project Timing:	2033-2034		
Project Location:	Moorefield		
Project Description:	Upgrade of the existing SPS equipment to service the projected population of 2,000 persons, which is at the reasonable conveyance capacity of the forcemain. Growth in Moorefield beyond 2,000 persons will require further study to establish additional conveyance capacity from Moorefield to the Mapleton WPCP		



Project Details:

Prerequisites:	N/A	
Opportunities:	N/A	
Class EA Schedule:	B	
Preliminary Design Data:	Two submersible sewage pumps (one standby), Pumping Capacity 26 L/s at 47.0m TDH	
Land Acquisition:	N/A	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	-
	Growth:	$0.40
	Total:	$0.40

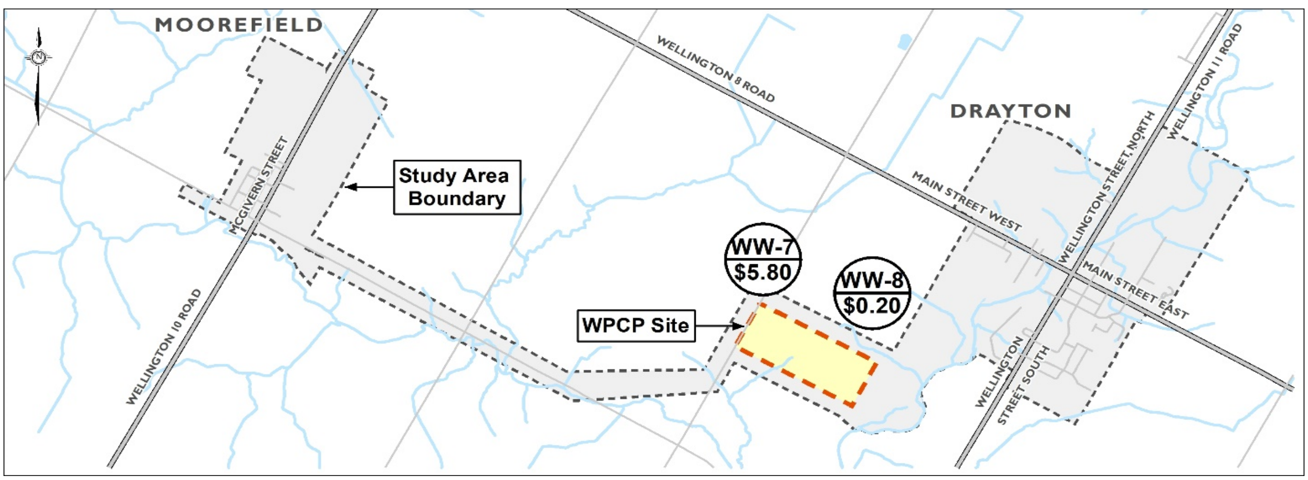
MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN RECOMMENDED PROJECT DATA SHEET (WASTEWATER)			
Project Name:	Nitrogen Removal Upgrades	Project No.:	**WW-7**
Project Timing:	Immediate		
Project Location:	Township of Mapleton		
Project Description:	Nitrogen removal upgrade the wastewater treatment facility to achieve a capacity of 1,300 m^3/d, as outlined in the Environmental Study Report dated November 2017. Consideration of an Alternative Design for this planned upgrade is currently underway.		



Project Details:		
Prerequisites:	N/A	
Opportunities:	N/A	
Class EA Schedule:	C	
Preliminary Design Data:	Upgrade would increase the facility's treatment capacity up to 1,300 m^3/d. A MBBR system is the chosen technology and a pilot study has already been completed.	
Land Acquisition:	N/A	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	-
	Growth:	$5.80
	Total:	$5.80

MAPLETON WATER AND WASTEWATER SERVICING MASTER PLAN
RECOMMENDED PROJECT DATA SHEET (WASTEWATER)

Project Name:	Mechanical Treatment Plant and Phosphorus Removal Upgrade	Project No.:	**WW-8**
Project Timing:	2029		
Project Location:	Township of Mapleton		
Project Description:	The proposed effluent total phosphorus objectives of 0.17 mg/L at an expanded capacity of 1,300 m^3/d, is achievable in the existing filters with optimized alum dosing but is nearing the limits of technology. The wastewater facility would need to be upgraded to a mechanical treatment plant beyond 1,300 m^3/d. A study should be completed leading up to this flow to further evaluate tertiary treatment options to replace the filters.		



Project Details:

Prerequisites:	WW-7	
Opportunities:	N/A	
Class EA Schedule:	A+	
Preliminary Design Data:	Plant would be expanded to > 1,300 m^3/d capacity.	
Land Acquisition:	N/A	
Easement Acquisition:	N/A	
Estimated Capital Cost ($million):	Existing Development:	-
	Growth:	$0.20
	Total:	$0.20

C

Appendix C: Public Consultation

Township of Mapleton

Mapleton Water and Wastewater Servicing Master Plan

Consultation Records

Tuesday, April 18, 2023

T000974D

CIMA+

900-101 Frederick Street
Kitchener, ON N2H 6R2
T 519 772 2299 **F** 519 772 2298
cima.ca

Contact

Stuart Winchester
Stuart.winchester@cima.ca
T 519 772 2299

Engineering for **people**

Consultation Records

Mapleton Water and Wastewater Servicing Master Plan

File no T000974D

PREPARED BY:

Adam Moore, M.A.Sc., P.Eng.

VERIFIED BY:

Stuart Winchester, P.Eng.

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1 Project Stakeholders

A stakeholder list was compiled for the project, representing all parties that were expected to have an interest or regulatory authority over some portion of the project. The stakeholder list was comprised of members of the public, adjacent property owners, government review agencies, municipal staff, Indigenous communities, and any other organizations or individuals that expressed an interest in the project.

Table 1 provides a list of stakeholders that received notification of project information throughout the study. Table 2 provides a list of those that requested to be removed from the stakeholder list, or cases where correspondence was returned to sender.

Table 1: Project Stakeholders

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
Federal Agency	Environment Canada				Environmental Assessment and Approvals Branch 2 St. Clair Avenue West, Floor 12A	Toronto	ON	M4V 1L5
Federal Agency	Environment Canada	Robert	Dobos	EA Section Manager, Ontario Region	867 Lakeshore Road PO Box 5050	Burlington	ON	L7R 4A6
Provincial Agencies	Ministry of the Environment Conservation and Parks	--	--	Regional EA and Planning Coordinator				
Provincial Agencies	Ministry of Northern Development, Mines, Natural Resources and Forestry	Khatera	Safi	District Business Coordinator	1 Stone Rd. W., Ontario Government Building	Guelph	ON	N1G 4Y2
Provincial Agencies	Ministry of Agriculture, Food and Rural Affairs	Dan	Carlow	Manager, Innovation, Engineering and Program Delivery, Western Region	581 Huron St.	Stratford	ON	N5A 5T8
Provincial Agencies	Ministry of Tourism, Culture and Sport	Karla	Barboza	Team Lead - Heritage	401 Bay Street, Suite 1700	Toronto	ON	M7A 0A7
Provincial Agencies	Ministry of Tourism, Culture and Sport	Kathryn	Bryant	Team Lead, Archaology Program	401 Bay Street, Suite 1700	Toronto	ON	M7A 0A7
Provincial Agencies	Ministry of Municipal Affairs and Housing	Tyler	Shantz	Planner	659 Exeter Road, 2nd Flr.	London	ON	N6E 1L3
Provincial Agencies	Ministry of Municipal Affairs and Housing	Erick	Boyd	Manager, Community Planning and Development	659 Exeter Road, 2nd Flr.	London	ON	N6E 1L3
Provincial Agencies	Ministry of Infrastructure	Payal	Kapur	Manager, Program Delivery Unit	777 Bay St, 4th Flr., Suite 425	Toronto	ON	M5G 2E5

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
Provincial Agencies	Ministry of Transportation	Michael	Nadeau	Manager, Engineering Office	659 Exeter Road	London	ON	N6E 1L3
Provincial Agencies	Infrastructure Ontario	Lisa	Myslicki	Environmental Specialist	1 Dundas Street West	Toronto	ON	M5G 2L5
Provincial Agencies	Ontario Provincial Police	Jennifer	Davey	Administrative Assistant	777 Memorial Avenue	Orillia	ON	L3V 7V3
Conservation Authorities	Grand River Conservation Authority	Ben	Kissner	Planner			ON	
Indigenous Communities	Metis Nation of Ontario			Consultation Assessment Coordinator			ON	
Indigenous Communities	Grand River Metis Council	Jennifer	Parkinson	President	65 Hanson Road	Kitchener	ON	N2C 2H6
Indigenous Communities	Mississaugas of the Credit First Nation	Mark	LaForme	Director, Department of Consultation and	2789 Mississauga Road, RR#6	Hagersville	ON	N0A 1H0
Indigenous Communities	Mississaugas of the Credit First Nation	Abby	LaForme	Accommodation Consultation Manager	2789 Mississauga Road, RR#6	Hagersville	ON	N0A 1H0
Indigenous Communities	Mississaugas of the Credit First Nation	Megan	DeVries	Archaeological Coordinator	2789 Mississauga Road, RR#6	Hagersville	ON	N0A 1H0
Indigenous Communities	Six Nations of the Grand River	Lonny	Bomberry	Director	2498 Chiefswood Road, P.O. Box 5000	Ohsweken	ON	N0A 1M0
Indigenous Communities	Six Nations of the Grand River	Tanya	Hill-Montour	Archaeological Supervisor		Ohsweken	ON	N0A 1M0
Indigenous Communities	Six Nations of the Grand River	Tayler	Hill	Director Trainee		Ohsweken	ON	N0A 1M0
Indigenous Communities	Six Nations of the Grand River	Lauren	Jones	Wildlife and Stewardship Assistant	2498 Chiefswood Road, P.O. Box 5000	Ohsweken	ON	N0A 1M0

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
Indigenous Communities	Six Nations of the Grand River	Peter	Graham	"Consultation Supervisor (Land Use unit)/Land Use Officer"	2498 Chiefswood Road, P.O. Box 5000	Ohsweken	ON	N0A 1M0
Indigenous Communities	Aamjiwnaang First Nation	Jamie	Maness	Band Manager	978 Tashmoo Avenue	Sarnia	ON	N7T 7H5
Indigenous Communities	Walpole Island First Nation, Bkejwanong Territory	Charles	Sampson	Chief	117 Tahgahoning Road	Wallaceburg	ON	N8A 4K9
Indigenous Communities	Walpole Island First Nation, Bkejwanong Territory	Dean	Jacobs	Consultation Manager	117 Tahgahoning Road	Wallaceburg	ON	N8A 4K9
Indigenous Communities	Chippewas of Kettle and Stony Point	Jason	Henry	Chief	6247 Indian Lane	Lambton Shores	ON	N0N 1J2
Indigenous Communities	Chippewas of Kettle and Stony Point	Valerie	George		6247 Indian Lane	Lambton Shores	ON	N0N 1J2
Indigenous Communities	Chippewas of the Thames First Nation	Fallon	Burch	Consultation Coordinator	320 Chippewa Road	Muncey	ON	N0L1Y0
Indigenous Communities	Chippewas of Nawash First Nation	Michael	Earl	Senior Administrative	135 Lakeshore Boulevard	Neyaashiinigmiing	ON	N0H 2T0
Indigenous Communities	Chippewas of Nawash First Nation	Pam	Linklater	Officer	135 Lakeshore Boulevard	Neyaashiinigmiing	ON	N0H 2T0
Indigenous Communities	Saugeen Ojibway Nation	Emily	Martin	Manager of Operations				
Indigenous Communities	Saugeen First Nation	Lester	Anoquot	Chief				

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
Indigenous Communities	Saugeen First Nation	Trish	Meekins	Band Administrator				
Indigenous Communities	Saugeen First Nation	Leona	Roote	Executive Assistant			ON	
Municipal Agencies	Wellington County	Aldo	Salis	Director of Planning and Development	74 Woolwich St	Guelph	ON	N1H 3T9
Municipal Agencies	Wellington County	Scott	Wilson	Chief Administrative Officer	74 Woolwich St	Guelph	ON	N1H 3T9
Municipal Agencies	Wellington Dufferin Guelph Public Health	N.J.	Mercer	Medical Officer of Health	160 Chancellors Way	Guelph	ON	N1G 0E1
Municipal Agencies	"Drayton Fire Station Moorefield Fire Station"	Rick	Richardson	Mapleton Fire Department	12 Main Street West 5 Hilwood Drive	Drayton Moorefield	ON	N0G 1P0 N0G 2K0
Municipal Agencies	Guelph-Wellington Paramedic Service	Stephen	Dewar		16 Main Street	Drayton	ON	N0G 1P0
Utility Providers	Enbridge Gas Distribution Inc.	Joanne	Van Panhuis	Supervisor	500 Consumers Road	North York	ON	M2J 1P8
Utility Providers	Trans Canada Pipeline	Kaitlin	Webber	Planner	442 Brant Street, Suite 204	Burlington	ON	L7R 2G4
Utility Providers	Rogers Communications	Marion	Wright	Planning Coordinator	3573 Wolfedale Road	Mississauga	ON	L5C 5T6
Utility Providers	Bell Canada	Wendy	Lefebvre	Design Manager	5115 Creekbank Road West, 3rd Flr.	Mississauga	ON	L4W 5R1
Utility Providers	Bell Canada	Lena	Demarco	Regional Director	5025 Creekbank Road, 5th Flr., Building A, Mail Room Number M3	Mississauga	ON	L4W 0B6

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
Utility Providers	Mornington Communications Cooperative Limited	Doug	Benton		21 Wellington Street South, Unit 4	Drayton	ON	N0G 1P0
Utility Providers	Hydro One Inc.	Nairm	McQueen	Manager	483 Bay St., North Tower 14th Flr.	Toronto	ON	M5G 2P5
Utility Providers	Hydro One Networks Inc.	Walter	Kloostra	Manager	483 Bay St., 15th Flr.	Toronto	ON	M5G 2P5
Utility Providers	Hydro One Networks Inc.	Maha	Mankal	Distribution Work Management WO2	763 Athlone Ave., 2nd Floor	Woodstock	ON	N4V 0B6
Community Stakeholders	Upper Grand District School Board	Emily	Bumbacco	Planning Technician	500 Victoria Road North	Guelph	ON	N1E 6K2
Community Stakeholders	Reid's Heritage Homes	Kevin	Fergin	Vice President of Development	6783 Wellington Road 34, RR 22	Cambridge	ON	N3C 2V4
Community Stakeholders	Meritech Engineering	Abraham	Barrios	--		--		
Community Stakeholders	Activa Holdings Inc	Peter	Armbruster	--		--		
Community Stakeholders	Allen Remley Homes	Allen	Remley	--		--		
Community Stakeholders	Apex Building & Contracting	Duane Derrick	Martin	--		--		
Community Stakeholders	Charlie Spaling Contracting	Charlie	Spaling	--		--		
Community Stakeholders	Emerald Homes	Rick	Trapp	--		--		
Community Stakeholders	G L Carpentry	Gerald	Lichty	--		--		
Community Stakeholders	Glenaviland Development Corp	Trevor Fred	Prior	--		--		
Community Stakeholders	Jeff Duimering Carpentry Ltd	Jeff	Duimering	--		--		

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
Community Stakeholders	Mornington Communications Cooperative Limited			--		--		
Community Stakeholders	Van De Pol's	Frank	Van De Pol	--		--		
Community Stakeholders	Wellingdale Construction	John	Mohle	--		--		
Community Stakeholders	Wellington Construction Contractors Inc.	Jim	Koetsier	--		--		
Community Stakeholders	Moorefield Excavating	Kim	Pilon	--	6297 Wellington Road 109 South	Moorefield	ON	N0G 1Z0
Resident	--	Heather	Smith	--	--	--	--	--
Resident	--	Nathan	Duimering	--	--	--	--	--
Resident	--	Srinivasa	Kunuthur	--	47 Carriage Crossing	Drayton	ON	N0G 1P0
Resident	--	Amanda	Reid	--	--	--	--	--

2 Project Notices and Advertisements

This project included three (3) notices: Notice of Study Commencement and Notice of Public Consultation Centre; and Notice of Study Completion. All notices were prepared following the Township of Mapleton's standard format and mailed hard copy to those on the stakeholder list that provided a mailing address, and by an email distributed by the Region. A draft of the email blast was provided to the Township.

The Notice of Commencement was not direct mailed to Private Residences due to the size of the study area. When the Notice of Public Information Centre was issued, a radius around the proposed project sites was determined and residences within the radius received a direct mail copy of the notice.

All notices were published on two dates in local newspapers, posted on social media, and posted on the project website in accessible PDF format. A Public Service Announcement was also arranged by the Township.

The notices had the following requirements:

- Name and address of the proponent
- A brief description of the project which outlined the nature of the problem or opportunity and the need for a solution
- A study area map
- The Freedom of Information and Protection of Privacy (FIPPA) disclaimer
- Reference to the project following the requirements of the Master Plan
- Details of when and where information was available to the public
- Date of first publication

Distribution of the Notices to the Ministry of the Environment, Conservation and Parks (MECP) followed the new submission format mandated as of May 1, 2018.

The notices were also published in the local newspaper, The Wellington Advertiser. Copies of the notices and advertisements are provided as Figures 1 through 4.

Notice of Commencement

Township of Mapleton

Water and Wastewater Master Plan

What is this study all about?

The Township of Mapleton (Township) is initiating a Master Plan Study for water and wastewater servicing within the Township, to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The Master Plan will help the Township support healthy communities by identifying long-term strategies and initiatives to provide infrastructure for water and wastewater servicing needs to 2041 and beyond in a cost-effective and sustainable manner.

How is this study being done?

This study is proceeding in accordance with the requirements of the Municipal Class EA process (October 2000, amended in 2007, 2011, and 2015), which is an approved process under the Ontario Environmental Assessment Act. This Master Plan will fulfill the requirements for select Schedule B projects and become the basis for any future Schedule C projects identified through the Master Plan.

How can I participate in this study?

Stakeholder and public engagement, and consultation are key components of the Master Planning process. Public engagement opportunities will be promoted in local newspapers, and on the Township's website.

Interested parties are invited to sign-up for project updates

If you would like to receive further information about the Mapleton Water and Wastewater Master Plan study or would like to sign up for the study's notifications, please contact:

Sam Mattina, C.E.T., CMM III
Director of Public Works
Township of Mapleton
7275 Sideroad 16
Drayton, ON N0G 1P0
Phone: 519-638-3313 ext. 041
E-mail: smattina@mapleton.ca

Erin Longworth, M.Eng., P.Eng., PMP
Consultant Project Manager
CIMA+
101 Frederick Street, Suite 900
Kitchener, ON N2H 6R2
Phone: 519-772-2299 ext. 6250
E-mail: Erin.Longworth@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

This notice was first issued on August 5, 2021.

Figure 1: Notice of Study Commencement – Issued August 5, 2021

Notice of Public Information Centre

Township of Mapleton
Water and Wastewater Master Plan

What is this study all about?

The Township of Mapleton (Township) is undertaking a Master Plan Study for water and wastewater servicing within the Township, to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The Master Plan will help the Township support healthy communities by identifying long-term strategies and initiatives to provide infrastructure for water and wastewater servicing needs to 2041 and beyond in a cost-effective and sustainable manner. This Master Plan is being completed in accordance with the Municipal Class Environmental Assessment (Class EA) - Approach 2 Planning Process for Master Plans, which is approved under the Ontario Environmental Assessment Act, and will satisfy Phases 1 and 2 of the planning process.

Join us for our Public Information Centre!

Public and review agency consultation is a key element in the Master Plan process.
The Town will be holding an in-person Public Information Centre (PIC) to introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

Date: Wednesday, October 12, 2022
Time: 5:00 p.m. to 8:00 p.m.
Location: Town Council Chambers (7275 Side Rd 16, Drayton, ON N0G 1P0)

Do you want to be involved?

Please visit the project webpage for more information (https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan). Contact the project team members below if you have questions or comments, wish to obtain more information on the project, or would like to be included on the Project Contact List. We are interested in hearing from you about this project.

Manny Baron
Chief Administrative Officer
Township of Mapleton
7275 Sideroad 16
Drayton, ON N0G 1P0
Phone: 519-638-3313 ext. 024
E-mail: mbaron@mapleton.ca

Adam Moore M.A.Sc., P.Eng.
Consultant Project Engineer
CIMA+
101 Frederick Street, Suite 900
Kitchener, ON N2H 6R2
Phone: 519-772-2299 ext. 6209
E-mail: adam.moore@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record. This Notice first issued September 28, 2022.

Figure 2: Notice of Public Information Centre Issued September 28, 2022

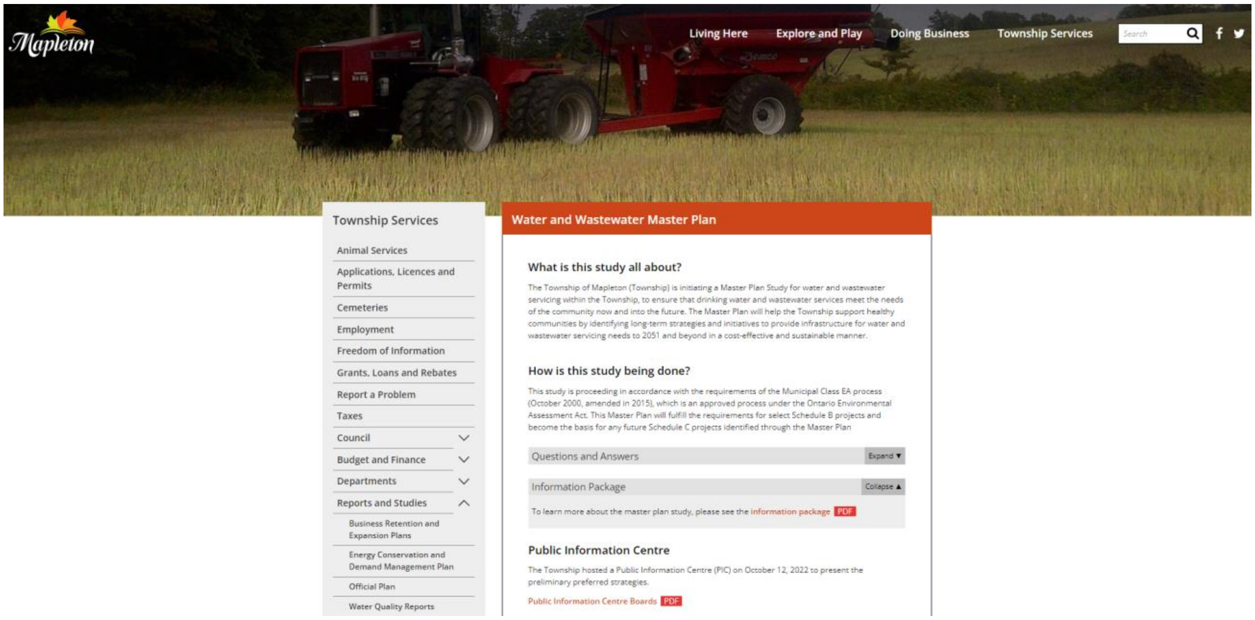

Figure 3: Notice of Public Information Centre Advertised on the Township of Mapleton Website September 28, 2022

THE WELLINGTON ADVERTISER
FREE PRESS – NEWS WEEKLY™

EDITION(s): September 29 & October 6
By: Alicia Roza

Mapleton TOWNSHIP
Rooted in tradition. Growing for the future.

NOTICE OF VIRTUAL PUBLIC INFORMATION CENTRE

TOWNSHIP OF MAPLETON WATER AND WASTEWATER MASTER PLAN

The Township of Mapleton (Township) is undertaking a Master Plan Study for water and wastewater servicing within the Township, to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The Master Plan will help the Township support healthy communities by identifying long-term strategies and initiatives to provide infrastructure for water and wastewater servicing needs to 2041 and beyond in a cost-effective and sustainable manner.

The Town is hosting a Public Information Centre (PIC) on Wednesday, October 12, 2022 from 5:00 p.m. to 8:00 p.m. at the Town Council Chambers. The purpose of the PIC will be to introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

We are interested in hearing from you about this project. Please contact either of the project team members below if you have questions or comments, wish to obtain more information on the project, or would like to be included on the Project Contact List.

Manny Baron P.Eng.
Chief Administrative Officer
Township of Mapleton
7275 Sideroad 16 900
Drayton, ON N0G 1P0 6R2
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All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

Figure 4: Notice of Public Information Centre Advertised September 29 and October 6, 2022 in The Wellington Advertiser

Notice of Completion

Township of Mapleton
Water and Wastewater Master Plan

What is this study all about?

The Township of Mapleton (Township) is initiating a Master Plan Study for water and wastewater servicing within the Township, to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The Master Plan will help the Township support healthy communities by identifying long-term strategies and initiatives to provide infrastructure for water and wastewater servicing needs to 2041 and beyond in a cost-effective and sustainable manner.

How is this study being done?

This study is proceeding in accordance with the requirements of the Municipal Class EA process (October 2000, amended in 2007, 2011, and 2015), which is an approved process under the Ontario Environmental Assessment Act. This Master Plan will fulfill the requirements for select Schedule B projects and become the basis for any future Schedule C projects identified through the Master Plan.

How can I participate in this study?

Stakeholder and public engagement, and consultation are key components of the Master Planning process. Public engagement opportunities will be promoted in local newspapers, and on the Township's website.

Interested parties are invited to sign-up for project updates

If you would like to receive further information about the Mapleton Water and Wastewater Master Plan study or would like to sign up for the study's notifications, please contact:

Jamie Morgan
Director of Public Works
Township of Mapleton
7275 Sideroad 16
Drayton, ON N0G 1P0
Phone: 519-638-3313 ext. 041
E-mail: jmorgan@mapleton.ca

Adam Moore M.A.Sc., P.Eng.
Consultant Project Manager
CIMA+
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Phone: 519-772-2299 ext. 6209
E-mail: adam.moore@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

Figure 5: Draft Notice of Study Completion

3 Public Information Centre

The public meeting for this Master Plan study was held on Wednesday, October 12, 2022 from 5:00 to 7:00 pm and was held in the Council Chambers at the Township of Mapleton office on Sideroad 16 in Drayton. The meeting allowed all members of the public and stakeholders that may have an interest in the project to learn more about the need for the project, the Master Plan process, preliminary findings in the study area and to provide feedback on the information presented. The meeting was held near the study area in anticipation that residents within the study area would attend. The PIC format included display boards, handout materials, comment sheets and an attendance register. A PIC summary was provided to the Township within 1 week of the close of the commenting period. Draft presentation material was made available to the Township, including draft PIC boards and an information package two (2) weeks prior to the event.

Mapleton TOWNSHIP
Rooted in tradition. Growing for the future.

Welcome

Township of Mapleton Water/Wastewater Master Plan

Public Information Centre
October 12, 2022

CIMA+

Objectives of this Public Information Centre

- To present:
  - Background project information
  - Drivers for water and wastewater servicing strategies
  - Key water and wastewater servicing constraints and opportunities
  - Preliminary preferred water and wastewater servicing strategies
- To receive comments from the public and interested review agencies about the preliminary preferred servicing strategies

Drayton Elevated Tank

Mapleton TOWNSHIP Rooted in tradition. Growing for the future. CIMA+

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

What is this Study About?

- The Township of Mapleton is developing a Water and Wastewater Master Plan to ensure that the Township can continue to deliver high quality and sustainable drinking water and wastewater services to meet the needs of the community now and into the future.
- The Water and Wastewater Master Plan will identify the preferred water and wastewater servicing strategies necessary to support existing and future growth needs to 2051
- Key aspects of this analysis will include:
  - Review of growth trends and current development pressures
  - Development of overall servicing strategies for planned growth areas
  - Development of a detailed schedule for facility upgrade requirements, including property, expansion needs and other upgrades
  - Addressing system reliability, effective operational capacities and energy efficiency

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

What is a Water and Wastewater Master Plan

- Master Plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles.
- Master Plans address infrastructure requirements on a community scale. Local servicing plans for individual developments is considered through Planning Act approvals – i.e., Plans of Subdivision, Site Plans, etc.
- Key objectives of a Master Plan include:
  - Development of an overall servicing strategy for the planning horizon, based on updated growth projections.
  - Develop a list of specific projects to best meet the overall system needs.
  - Provide a capital implementation program for the preferred servicing strategies.
  - Follow key principles of successful environmental planning, as per the Municipal Class Environmental Assessment process.

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Study Process and Timelines

The Master Plan process is being undertaken in accordance with the **Municipal Class Environmental Assessment** (Class EA) – Approach 2 process for Master Plans.

Public participation is an integral part of the Class EA process. This meeting provides an opportunity for the public to participate in the process.

Public, agency, stakeholder and Indigenous Community consultation is embedded throughout this process and around key milestones.

EA Phase 1 Problem and Opportunity

- Initiate the Master Plan
- Review existing conditions, growth projections, future needs
- Identify and describe the problem and opportunities

EA Phase 2 Alternative Solutions

- Evaluate alternative strategies to address the needs
- Identify a preferred strategy
- Consult with public, stakeholders, agencies and Indigenous Communities

EA Documentation – Approach 2

- Finalize the Master Plan
- Document all aspects of decision-making and public feedback
- Minimum 30-day public review period

Design and Implementation (Future)

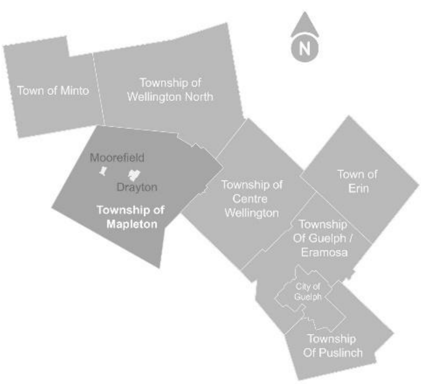
- Complete the design of solutions recommended in the Master Plan
- Property acquisition and utility relocation as needed
- Initiate construction

Continuous Consultation

- Notice of Study Commencement **August 2021**
- Online Project Information Package August 2022
- Public Information Centre October 2022
- Notice of Study Completion December 2022

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Community Context and Growth Projections



Within the County of Wellington land area of approximately 535.6 km²

Mapleton	Dayton	Moorefield
10,839	2,569	620

The Master Planning process will document baseline population and growth projections to 2051. These projections and land use planning are critical to the development of efficient and cost-effective water and wastewater servicing strategies.

- According to the Official Plan for the County of Wellington, population is projected to grow in the County from 95,805 persons to 140,000 persons by 2041.
- 82% of this growth will be focused in 14 urban centres, including Drayton and Moorefield
- Wellington County's policies for growth relevant to the Mapleton Water and Wastewater Master Plan include:

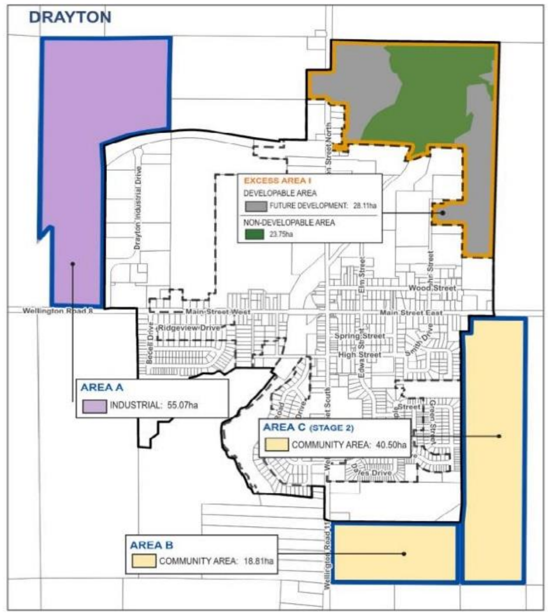
- Provide the infrastructure for growth in an environmentally and fiscally responsible manner
- Encourage growth to urban areas and in particular to those with municipal sewer and water services
- Promote intensification while preserving historic streetscapes
- Encourage increased densities in designated Greenfield areas of urban centres

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Community Context and Growth Areas

The Township's Planned Growth Areas for Drayton are shown on the adjacent Figure.

Note that the Growth Management Study approved by the Township identified the "Excess Area" is removed from development consideration for Drayton and Area's A, B and C will be added to accommodate employment and residential growth.



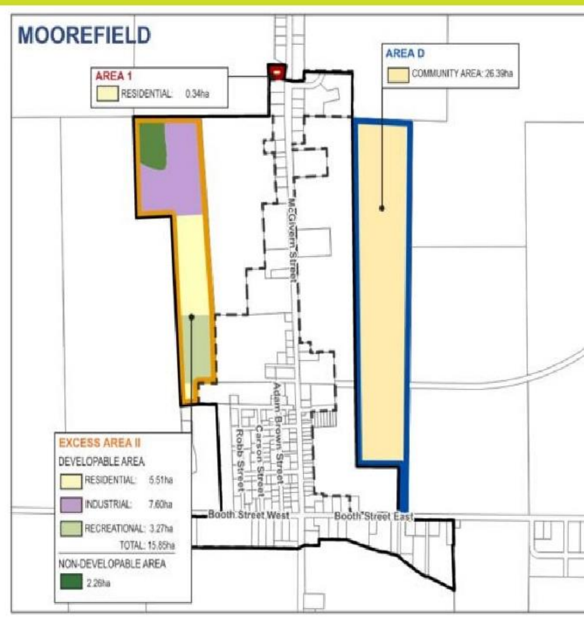
Mapping Source: GSP Group. (2022). Township of Mapleton Growth Management Summary - Final Report. Township of Mapleton.

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Community Context and Growth Areas

The Growth Management Study identified Area's 1, D and an excess area 2 be added to accommodate employment and residential growth in Moorefield.

Planned Growth Areas are shown on the adjacent Figure.



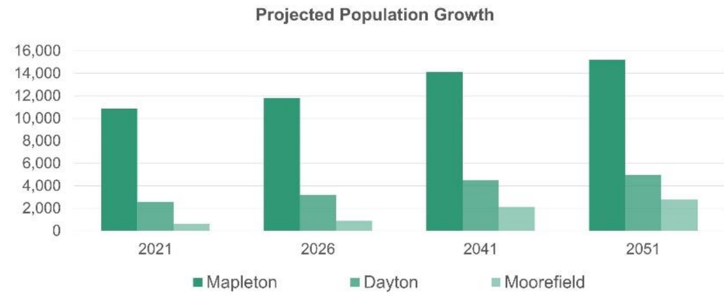
Mapping Source: GSP Group. (2022). Township of Mapleton Growth Management Summary - Final Report. Township of Mapleton.

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Growth Projections

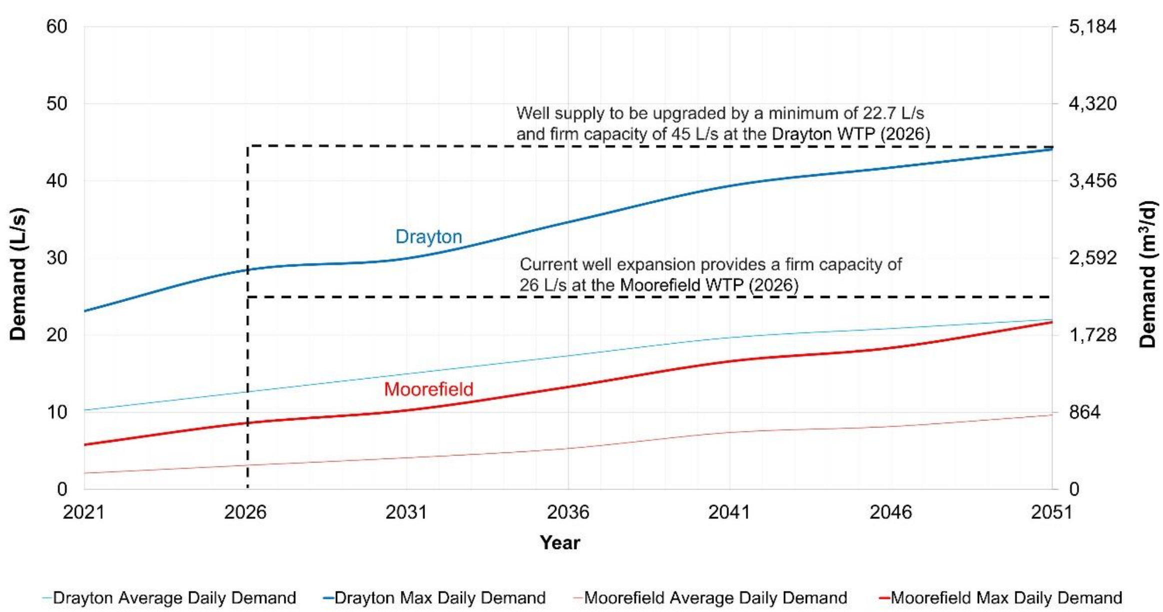
	Existing Population (2021)	Projected Population (2026)	Projected Population (2041)	Projected Population (2051)
Drayton	2,569	3,200	4,507	4,983
Moorefield	620	900	2,125	2,775
Sub-Total – Urban Areas	3,189	4,100	6,632	7,758
Rural and Hamlet Areas	7,650	7,700	7,468	7,442
Total – Township	10,839	11,800	14,100	15,200

Note: Growth Projections taken from Township of Mapleton Growth Management Study – Final Report (GSP Group, 2022), and vary slightly from the County Official Plan estimates.



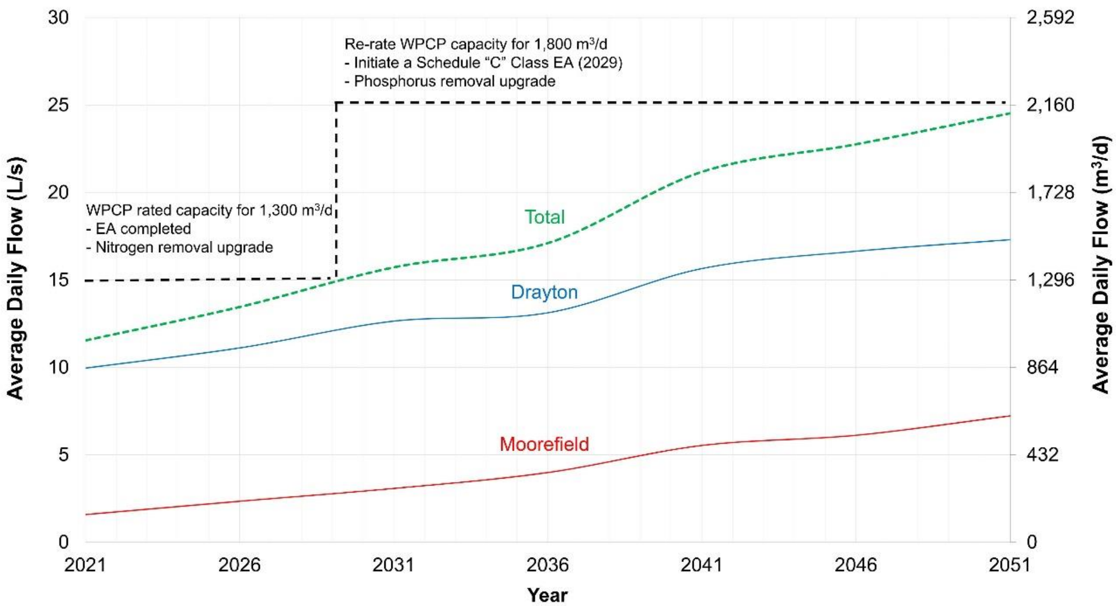
Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Water Demand Projections - Drayton & Moorefield



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

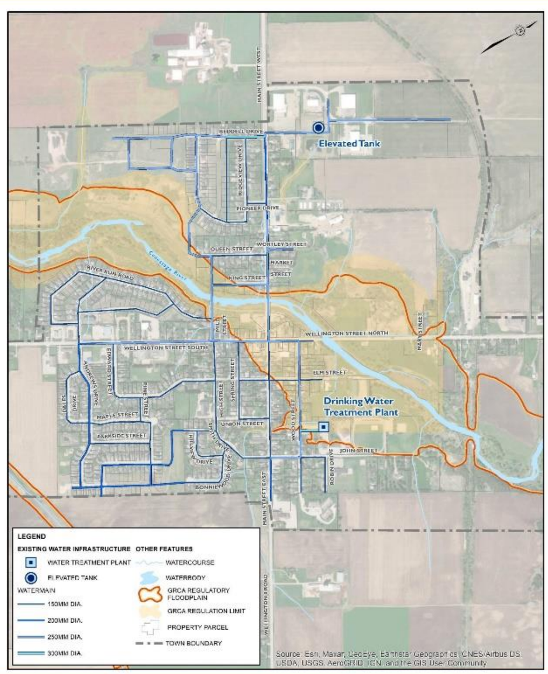
Wastewater Flow Projections - Drayton & Moorefield



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Existing Drinking Water System - Drayton

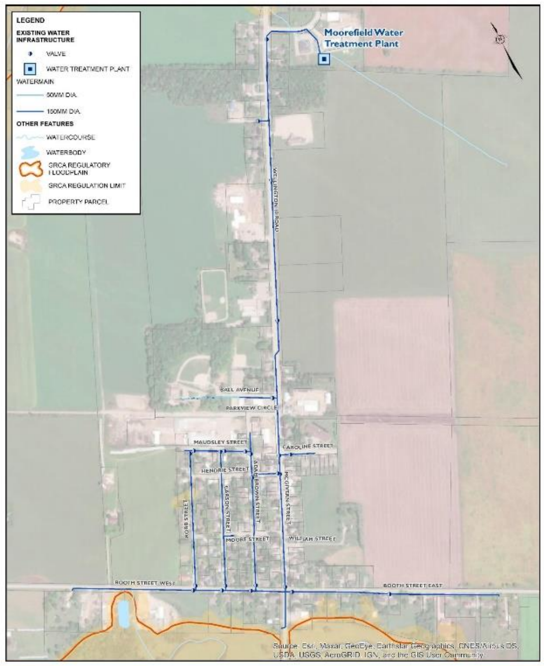
- Drayton is supplied with drinking water from the Drayton Water Treatment Plant (WTP) located at 60 Wood Street. The WTP consists of two (2) raw water wells, with iron sequestration, chlorine disinfection and high-lift pump station connected to the distribution system.
- The Drinking Water Distribution System consists of approximately 12.4 km of PVC watermains ranging in size from 150mm to 300mm diameter, along with associated appurtenances and service connections
- The Drayton Water Distribution System was designed and constructed to provide Fire protection throughout the community
- The Township is currently constructing a new 2,400 m^3 elevated storage tank at 29 Drayton Industrial Drive to address the shortfall in available storage within the system. The Elevated Tank is expected to be in service in the fall of 2022.



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Existing Drinking Water System - Moorefield

- Moorefield is supplied with drinking water from the Moorefield Water Treatment Plant (WTP) located at 5 Hillwood Drive in Moorefield. The WTP currently consists of two (2) raw water wells, high-lift pumping station, and a 387 m^3 storage facility for chlorine contact and equalization storage.
- The Township is currently in the process of upgrading the WTP to address the shortfall in supply capacity and equalization storage within the system. Construction of an additional well and rehabilitation of an existing well will be completed. In addition, a new 400 m^3 standpipe will be constructed, and process modifications will be completed within the pumphouse. The upgraded facility is expected to be in service by 2026.
- The Moorefield Water Distribution System consists of approximately 4.7 km of PVC watermains ranging in size from 50mm to 150mm diameter, along with associated appurtenances and service connections. Fire protection is not provided through the municipal drinking water system.



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Water Servicing Constraints and Opportunities

Constraints

- The existing Drinking Water Supply System in Drayton does not have sufficient capacity to meet future demands.
- Growth areas in A, B and C in Drayton have no direct access to the drinking water distribution system.

Opportunities

- Completion of the Drayton Elevated Tank will help regulate the distribution system pressures.
- Construct a new well in the area of the existing Drayton WTP when maximum day demands approach 28 L/s to increase water supply capacity.
- Watermain extensions on County Road 8 and County Road 11 will provide direct drinking water to Growth Areas A, B and C.
- The Moorefield Drinking Water System will have sufficient capacity to accommodate growth.

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

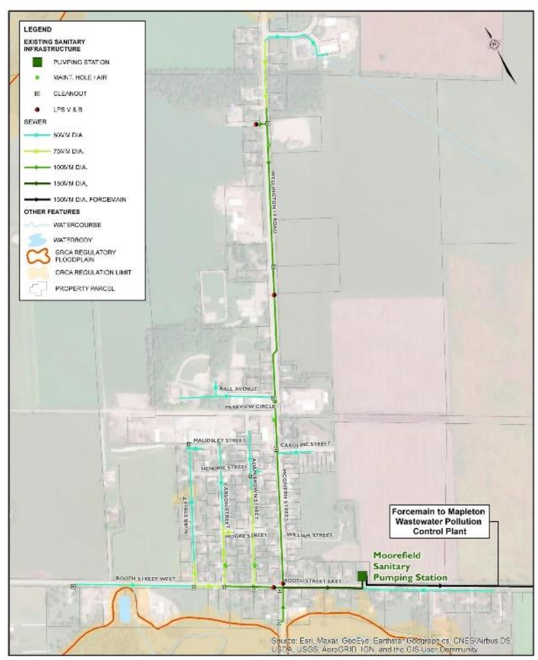
Existing Wastewater Collection System - Drayton

- Drayton is serviced with a conventional gravity collection system that conveys wastewater from each serviced property to a centralized sewage pumping station located at 20 Mill Street.
- The Drayton Sewage Pumping Station (SPS) was originally constructed in 1984 as a duplex submersible station with a rated capacity of 34 L/s. The SPS is currently in good to fair condition.
- The Drayton SPS discharges raw sewage to the Mapleton WWTP through a 1,600 m long 200mm diameter forcemain.
- The existing sewage pumping station occasionally experiences high inflow rates, and requires by-pass pumping and trucking of sewage to prevent raw sewage discharge directly to Conestogo Creek.

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Existing Wastewater Collection System - Moorefield

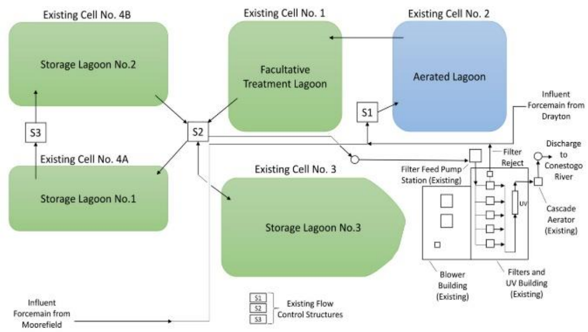
- Moorefield is serviced with a low-pressure sewer system that conveys wastewater from each serviced property to a centralized sewage pumping station located at 20 Booth Street.
- Each serviced property has an individual grinder pump that conveys the raw sewage through small diameter sewers (forcemains).
- The existing Moorefield Sewage Pumping Station (SPS) was constructed in as a duplex submersible station. Raw sewage is conveyed to the Mapleton WPCP through a 5,000 m long 150 mm diameter forcemain. The SPS is currently in fair condition.



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Existing Wastewater Treatment System

- Wastewater from both Drayton and Moorefield is conveyed to a seasonal discharge lagoon treatment plant
- In 2017, the Township completed an Environmental Assessment for the expansion of the Mapleton Water Pollution Control Plant (WPCP) that reviewed options to address capacity constraints at the Mapleton WPCP and identify alternative treatment options for the plant
- In 2018, the Mapleton WPCP was re-rated to a capacity of 900 m^3/d



Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Wastewater Servicing Constraints and Opportunities

Constraints

- Projected wastewater flows are anticipated to exceed the rated capacity of the Drayton SPS by 2026.
- The existing Drayton SPS is in poor condition with some mechanical components being inoperable, resulting in operational risks for the Township.
- The Drayton collection system experiences rapid inflow resulting in excessive flows to the Drayton SPS. Bypass pumping and haulage to the WPCP have occurred over the past few years.
- The existing low-pressure sewer system in Moorefield has adequate conveyance capacity to accommodate planned growth within the Planning Horizon. However, ongoing maintenance of the individual grinder pump stations represents a significant cost to the Township.
- The wastewater facility has capacity limitations that impacts its discharge schedule.

Opportunities

- Construction of a new or upgraded Drayton SPS will provide long term capacity for wastewater servicing.
- Construction of emergency overflow storage at the Drayton SPS will reduce the risks of spills to the environment.
- Conducting an Inflow and Infiltration Reduction Study will assist in identification of sources of inflow into the system, which may then be addressed to restore available conveyance capacity in the system.
- Transfer maintenance obligations for all existing grinder pump stations to the beneficiary user(s).
- Planned upgrade of wastewater treatment facility to 1,300 m^3/d capacity
- Future upgrade of wastewater treatment facility to 1,800 m^3/d capacity

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Water Servicing Objectives

- Provide adequate flow and pressure to water customers
- Provide adequate water storage, pumping capacity and standby power to meet emergency conditions
- Maintain adequate water quality throughout the distribution system
- Promote water conservation
- Utilize reasonable planning design and costing criteria for establishing and evaluating servicing scenarios
- Develop routing for new watermain extension within existing road allowance/utility corridors, or coordinate watermain routing through development applications

In addition, for the community of Drayton:

- Provide adequate fire flows, reliability and security throughout the distribution system

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Wastewater Servicing Objectives

- Provide reliable collection systems for conveyance of wastewater
- Provide adequate peak flow storage, pumping capacity and standby power to meet emergency conditions
- Optimize the treatment facility for planned growth and projected flows
- Maintain adequate treated water quality
- Utilize reasonable planning design and costing criteria for establishing and evaluating servicing scenarios.

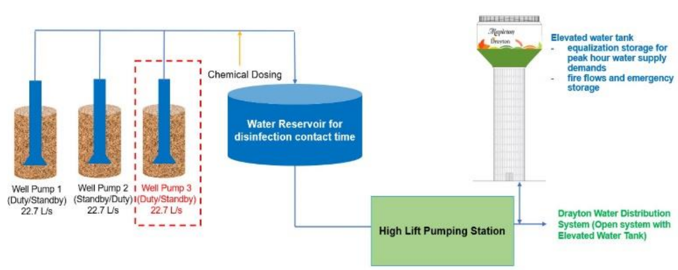
Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

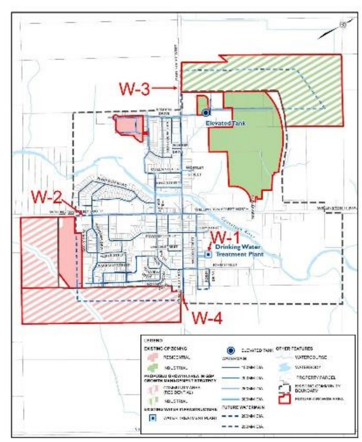
Evaluation Criteria

Factor Area	Consideration
Natural Environment	• Potential impacts to existing natural environment • Potential temporary and permanent effects on surface water and groundwater quantity / quality • Resiliency to extreme conditions and ability to minimize greenhouse gas emissions • Protects wildlife and species at risk • Minimize contribution to climate change and maximize resiliency to extreme conditions
Socio-Cultural	• Minimize potential impact of health and safety of operation staff and potential risks to public • Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property) • Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities • Minimizes short-term and long-term impacts to business sector • Minimizes impact to cultural heritage features • Minimizes impact to archaeological features
Technical/Operational	• Able to meet existing and future demands and aligns with existing and planned infrastructure • Provides reliability, security, and robustness • Ease of construction and integration with existing system(s) • Improve operational efficiencies and operational and monitoring requirements • Aligns with existing and planned infrastructure • Aligns with existing and planned land use • Ease of permits and approvals
Economic	• Life cycle cost

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Water Servicing Strategy - Drayton





Water Supply Alternative

- Build a new well at the existing DWS site to increase water supply capacity and redundancy

Water Distribution Strategy

- Construct water main extensions to the projected growth areas:
  - Wellington Street South
  - Main Street West, near Drayton Industrial Drive
  - Main Street East

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Water Servicing Strategy - Capital Program

Project ID	Project Name	Years in Service	Location	Class EA Schedule	Cost ($ Million)
W-1	Install new well at the existing DWS site to increase capacity	1-5	Drayton	Schedule B	$1.44
W-2	Water distribution extension at Wellington Street South	5-10	Drayton	Schedule A+	$0.20
W-3	Water distribution extension at Main Street West, near Drayton Industrial Drive	5-10	Drayton	Schedule A+	$0.69
W-4	Water distribution extension at Main Street East	5-10	Drayton	Schedule A+	$0.13

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

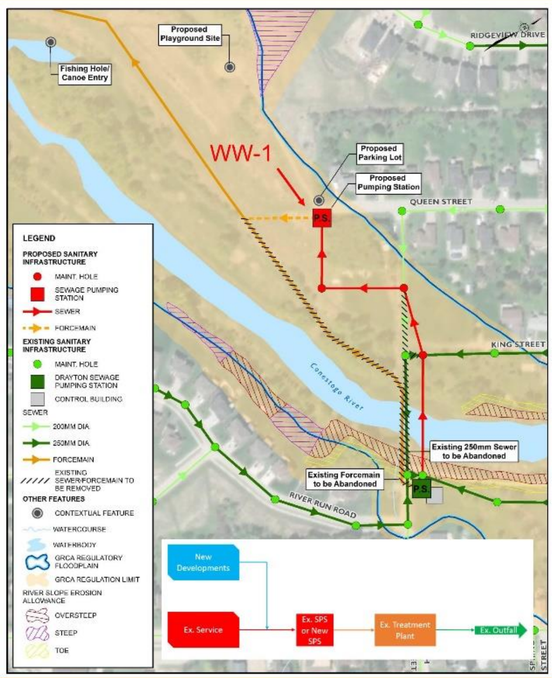
Wastewater Servicing Strategy - Drayton

Drayton Sewage Pump Station (SPS) Alternative

- Construct a new SPS across the Conestoga River near Queen Street
- New SPS to include emergency storage volume to suppress peak flow events

Drayton Inflow/Infiltration (I&I) Monitoring Program

- Install flow monitoring equipment to access I&I sources for 5 years

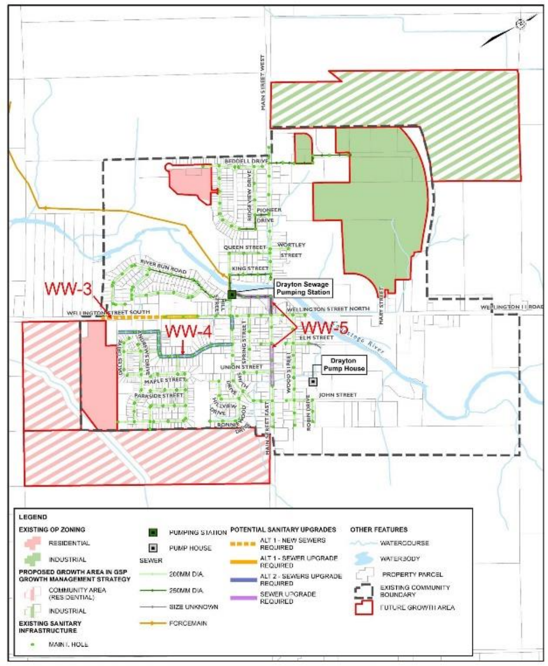


Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Wastewater Servicing Strategy - Drayton

Drayton Collection System and Forcemain Alternative

- Upgrade the existing collection system
  - Wellington Street South
  - Edward Street
  - Main Street East

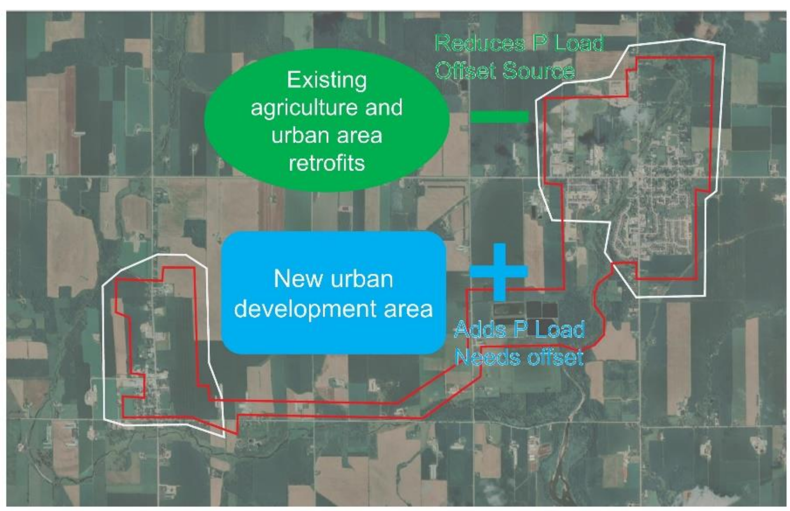


Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Wastewater Servicing Strategy - Drayton

Wastewater Treatment

- The EA completed by the Town in 2017 concluded that the nitrogen removal upgrades be implemented for the WPCP to increase rated capacity to 1,300 m^3/d
- A Schedule "C" EA study should be competed prior to 2029 to access phosphorus removal upgrades and increase capacity beyond 1,300 m^3/d



Phosphorus off-setting concept

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

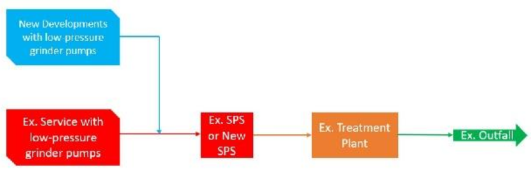
Wastewater Servicing Strategy - Moorefield

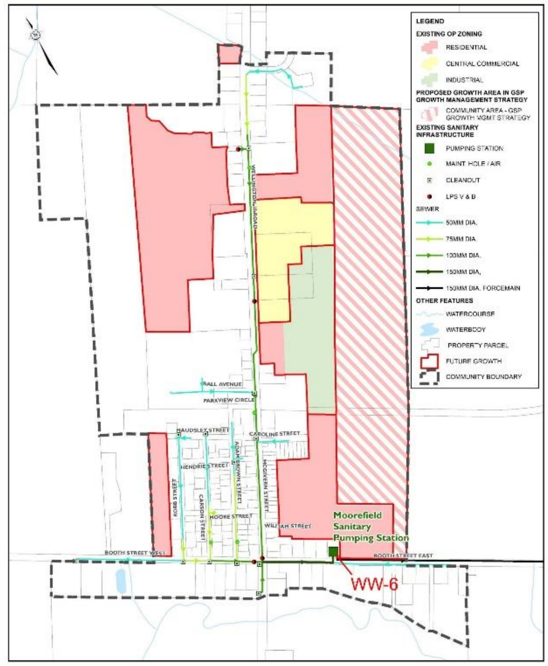
Moorefield Collection System and Forcemain Alternative

- Continue to expand the low-pressure sewer system
- Investigate forcemain headloss and potential upgrades

Moorefield SPS Alternative

- Upgrade the existing SPS to meet future wastewater flows
- Further investigation into the forcemain upgrades and emergency storage





Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Wastewater Servicing Strategy - Capital Program

Project ID	Project Name	Years in Service	Location	Class EA Schedule	Cost ($ Million)
WW-1	New SPS with onsite emergency storage	1-5	Drayton	Schedule B	$4.37
WW-2	Inflow/Infiltration monitoring program	1-5	Drayton	N/A	$0.38
WW-3	Collection System Alternative 1 – upgrade gravity sewers on Wellington Street South	5-10	Drayton	Schedule A+	$0.70
WW-4	Collection System Alternative 2 – upgrade gravity sewers on Edward Street	5-10	Drayton	Schedule A+	$1.21
WW-5	Upgrade gravity sewers on Main Street East	5-10	Drayton	Schedule A+	$0.75
WW-6	Upgrade the existing SPS	1-5	Moorefield	Schedule B	$0.96

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Next Steps and How to Stay Involved

Next Steps

- Compile information and comments received from you and other stakeholders
- Confirm and finalize the preferred servicing strategies
- Respond to other questions and comments we receive
- Document the water and wastewater servicing strategy update and public consultation process
- File the documentation on the public record for a 30-day review period

How to Participate

Review project updates

These displays along with other project updates will be posted on the project webpage:

https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan

Talk to us

Town staff and project team members are here today to chat about the project and answer questions. Come and say hello!

Complete a comment sheet

To provide feedback on the displayed material

Contact us directly

Manny Baron CAO Township of Mapleton mbaron@mapleton.ca	Adam Moore, M.A.Sc., P.Eng. Consultant Project Engineer CIMA+ Adam.moore@cima.ca

Township of Mapleton - Water/Wastewater Master Plan
Public Information Centre - October 12, 2022

Thank You!

we appreciate your time and interest in this project

Township of Mapleton Water and Wastewater Master Plan
Public Information Centre - October 12, 2022 | Council Chambers, 7275 Side Rd 16

Sign-in is optional. If you wish to be added to the project contact list, please provide an email address.

First Name	Last Name	Mailing Address	Email Address

Personal information on this sign in sheet is being collected under the authority of the Municipal Act, 2001, as amended, for the purposes of adding you to the project contact list. By providing your email or mailing address, you will be added to the project contact list and receive subsequent information in relation to this project. Questions regarding the collection of personal information should be directed to the offices of the CAO or Director of Public Works, Township of Mapleton, 7275 Sideroad 16, Drayton, ON N0G 1P0; Telephone (519) 638-3313; Fax (519) 638-5113.

Township of Mapleton
Water and Wastewater Master Plan
Public Information Centre
October 12, 2022
Council Chambers, 7275 Side Rd 16

Please provide your comments below. Use the back of this sheet if you need more space.

Contact Information Optional. Please provide an address if you wish to be added to the project contact list.
Name:
Mailing and/or Email Address:

Personal information on this sign in sheet is being collected under the authority of the Municipal Act, 2001, as amended, for the purposes of adding you to the project contact list. By providing your email or mailing address, you will be added to the project contact list and receive subsequent information in relation to this project. Questions regarding the collection of personal information should be directed to the offices of the CAO or Director of Public Works, Township of Mapleton, 7275 Sideroad 16, Drayton, ON N0G 1P0; Telephone (519) 638-3313; Fax (519) 638-5113.

4 First Nations Consultation

Identification of First Nations and Indigenous communities followed provincial guidance provided by MECP, which was updated on October 4, 2021. This included review of the Aboriginal and Treaty Rights Information System (ATRIS).

Initial consultation with First Nations / Indigenous Communities included written correspondence introducing the project and identifying the project contacts. This correspondence was sent on Township letterhead by email, followed by CIMA+ mailing a hard-copy version of the Notice.

In cases where receipt of the correspondence was not confirmed, follow up phone calls were made by CIMA+.

CIMA+ maintained a detailed record of indigenous consultation, including all communication records, as seen in Table 2, materials prepared, and documents issued.

Correspondence with all First Nation Communities was tracked throughout the project. A detailed correspondence log is provided in Table 2 below, and transcripts for each correspondence record can be found in Appendix C-5.

Table 2: Summary of Responses from First Nations

First Nation	First Nation Correspondence	Project Team Correspondence
Record #1 – Metis Nation of Ontario	n/a	August 5, 2021 – Notice of Commencement sent via mail
		August 13, 2021 – Notice of Commencement sent via email
		December 16, 2021 – Called Linda Norheim to ask if Metis Nation of Ontario (MNO) had received Notice of Commencement.
		December 16, 2021 – Called Justin Hunt to ask if MNO had received the Notice of Commencement.

First Nation	First Nation Correspondence	Project Team Correspondence
	December 16, 2021 – Ms. Norheim advised a follow up call to Justin Hunt.	December 16, 2021 – Mr. Hunt noted that MNO receives a significant number of notices and would reach out with any questions or concerns. Noted that consultations@metisnation.org is to be kept on the email list for future notices and project updates
		September 26, 2022 – Notice of PIC Sent via email.
Record #2 – Grand River Metis Council		September 26, 2022 – Notice of PIC Sent via email.
	September 28, 2022 – Jennifer Parkinson responded and directed the notice of PIC to be sent to consultations@metisnation.org	September 28, 2022 – Acknowledged and sent notice of PIC to consultations@metisnation.org
Record #3 – Mississaugas of the Credit First Nation	n/a	August 5, 2021 – Notice of Commencement sent via mail.
		August 13, 2021 – Notice of Commencement sent via email.
		December 7, 2021 – Called and left message with Chief LaForme's secretary to reach out to Erin Longworth with any initial questions or concerns regarding the study.

First Nation	First Nation Correspondence	Project Team Correspondence
		December 7, 2021 – Followed up with phone call to ask if Ms. Sault had received the Notice of Commencement and had any preliminary questions or concerns. Ms. Sault noted that if any Schedule B projects are identified through the Master Plan, Mississaugas of the Credit First Nation (MCFN) should be notified and engaged before the archaeological, cultural heritage, and environmental fields studies.
		September 26, 2022 – Notice of PIC Sent via email.
Record #4 – Six Nations of The Grand River	n/a	August 5, 2021 – Notice of Commencement sent via mail.
		August 13, 2021 – Notice of Commencement sent via email
		December 7, 2021 – Followed up with phone call to ask if Chief Hill had received the Notice of Commencement and had any preliminary questions or concerns.
	December 7, 2021 – Chief Hill's secretary suggested to call Lonny Bomberry with the Land and Resource Department.	December 7, 2021 – Followed up with phone call to ask if Mr. Bomberry had received the Notice of Commencement and had any preliminary questions or concerns.
	December 7, 2021 – Spoke with Mr. Bomberry who asked me to email the notice to Robbin Vanstone (rvanstone@sixnations.ca).	September 26, 2022 – Notice of PIC Sent via email.

First Nation	First Nation Correspondence	Project Team Correspondence
Record #5 – Aamjiwnaang First Nation	n/a	November 24, 2021 – Notice of Commencement sent via mail.
		December 7, 2021 – Followed up with phone call. Receptionist noted that it is best to reach Mr. Maness by email.
		December 16, 2021 – Notice of Commencement sent via email.
		September 26, 2022 – Notice of PIC Sent via email.
Record #6 – Walpole Island First Nation, Bkejwanong Territory	n/a	November 24, 2021 – Notice of Commencement sent via mail.
		December 7, 2021 – Followed up with phone call.
	December 7, 2021 – Secretary noted that Chief Sampson is out of the office today and requested that I reach out to Melissa Day.	December 7, 2021 – Followed up with phone call. Left a message with Melissa Day asking her to reach out to Erin Longworth with any initial questions or concerns regarding the study.
		September 26, 2022 – Notice of PIC Sent via email.
Record #7 – Chippewas of Kettle and Stony Point	n/a	November 24, 2021 – Notice of Commencement sent via mail.
		December 7, 2021 – Followed up with phone call. Spoke with Valerie George
	December 7, 2021 – Valerie George asked for a follow up notice via email.	December 16, 2021 – Notice of Commencement sent via email.
		September 26, 2022 – Notice of PIC Sent via email.

First Nation	First Nation Correspondence	Project Team Correspondence
Record #8 - Chippewas of the Thames First Nation		November 24, 2021 – Notice of Commencement sent via mail.
		December 7, 2021 – Followed up with phone call. Spoke with Fallon Burch.
	December 7, 2021 – Fallon Burch noted that the mailed notice had not been received yet and asked for a follow up notice via email.	December 16, 2021 – Notice of Commencement sent via email.
	August 19, 2022 – Directed consultation contact to NationsConnect.ca	August 19, 2022 – Acknowledged and completed request through NationsConnect
		September 26, 2022 – Notice of PIC Sent via email.
Record #9 - Chippewas of Nawash First Nation		November 24, 2021 – Notice of Commencement sent via mail.
		December 7, 2021 – Followed up with phone call.
	December 7, 2021 - Receptionist noted that Ms. Linklater was not available and Directed to leave a message with Michael Earl.	December 7, 2021 – Followed up with phone call. Left a message with Michael Earl asking him to reach out to Erin Longworth with any initial questions or concerns regarding the study.
		December 16, 2021 – Notice of Commencement sent via email.
Record #10 – Saugeen Ojibway Nation		September 26, 2022 – Notice of PIC Sent via email.
	October 18 2022 – Requested to no longer engage in consultation for this project	

First Nation	First Nation Correspondence	Project Team Correspondence
Record #11 – Saugeen First Nation	n/a	September 26, 2022 – Notice of PIC Sent via email.

The MECP also recommends that a following preliminary assessment checklist be completed to identify potential Indigenous community interests and rights (). No indicators were identified.

Table 3: Indigenous Community Interests and Rights Checklist

Question	Yes	No	Notes
Are you aware of concerns from Indigenous communities about your project or a similar project in the area? The types of concerns can range from interested inquiries to environmental complaints, and even to land use concerns. You should consider whether the interest represents on-going, acute and/or widespread concern.			
Is your project occurring on Crown land, or is it close to a water body? Might it change access to either?			
Is the project located in an open or forested area where hunting or trapping could take place?			
Does the project involve the clearing of forested land?			
Is the project located away from developed, urban areas?			

Question	Yes	No	Notes
Is your project close to, or adjacent to, an existing reserve? Projects in areas near reserves may be of interest to the Indigenous communities living there.			
Will the project affect Indigenous peoples' ability to access areas of significance to them?			
Is the area subject to a land claim? Information about land claims filed in Ontario is available from the Ministry of Aboriginal Affairs; information about land claims filed with the federal government is available from Aboriginal Affairs and Northern Development Canada.			
Does the project have the potential to impact any archaeological sites?			

5 Correspondence Records

Correspondence with all stakeholders was tracked throughout the project. A detailed correspondence log is provided in Table 5 below, followed by transcripts for each correspondence record.

Table 4: Project Correspondence Log

Stakeholder	Stakeholder Correspondence	Project Team Correspondence
Record # - Grand River Conservation Authority		September 26, 2022 – Notice of PIC set via email.
	October 26, 2022 – Requested to be notified for further development of project	
Record # - Ministry of Environment Conservation and Parks		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
	October 4, 2021 – Acknowledgement of PIC	
Record # - Ministry of Northern Development, Mines, Natural Resources and Forestry		September 26, 2022 – Notice of PIC Sent via email.
Record # - Ministry of Agriculture, Food, and Rural Affairs		September 26, 2022 – Notice of PIC Sent via email.
Record # - Ministry of Tourism, Culture and Sport		September 26, 2022 – Notice of PIC Sent via email.
Record # - Ministry of Municipal Affairs and Housing		September 26, 2022 – Notice of PIC Sent via email.
Record # - Ministry of Infrastructure		September 26, 2022 – Notice of PIC Sent via email.
Record # - Ministry of Transportation		September 26, 2022 – Notice of PIC Sent via email.
	September 28, 2022 – Acknowledgement of PIC, asked to be added as a directly affected stakeholder	October 11, 2022 – Added to contact list
Record # - Infrastructure Ontario		September 26, 2022 – Notice of PIC Sent via email.
	September 28, 2022 – Acknowledgement of PIC, asked to continue being contacted for consultation	October 11, 2022 – Added to contact list
Record # - Ontario Provincial Police		September 26, 2022 – Notice of PIC Sent via email.
Record # – Wellington County	n/a	September 26, 2022 – Notice of PIC Sent via email.
Record # – Wellington Dufferin Guelph Public Health	n/a	September 26, 2022 – Notice of PIC Sent via email.
Record # – Drayton/Moorefield Fire Station		September 26, 2022 – Notice of PIC Sent via email.
	September 26, 2022 – Requested to be notified about project information	September 27, 2022 – Added to the stakeholder list

Stakeholder	Stakeholder Correspondence	Project Team Correspondence
Record # – Guelph-Wellington Paramedic Service	n/a	September 26, 2022 – Notice of PIC Sent via email.
Record # – Enbridge Gas Distribution Inc.	n/a	September 26, 2022 – Notice of PIC Sent via email.
Record # – Trans Canada Pipeline	n/a	September 26, 2022 – Notice of PIC Sent via email.
Record # – Rogers Communications	n/a	September 26, 2022 – Notice of PIC Sent via email.
Record # – Bell Canada	n/a	September 26, 2022 – Notice of PIC Sent via email.
Record # – Mornington Communications Cooperative Limited	n/a	September 26, 2022 – Notice of PIC Sent via email.
Record # – Hydro One Inc.	n/a	August 18, 2022 – Notice of addition to mailing list and project webpage update
		August 19, 2022 – Notice of project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Upper Grand District School Board	n/a	August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Reid's Heritage Homes		August 18, 2022 – Notice of addition to mailing list and project webpage update
	September 23, 2021 – Requested to be added to the Stakeholder List	September 24, 2021 – Confirmed request and Stakeholder List updated
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Meritech Engineering		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Activa Holdings Inc.		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # Allen Remley Homes		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Apex Building & Contracting		August 18, 2022 – Notice of addition to mailing list and project webpage update

Stakeholder	Stakeholder Correspondence	Project Team Correspondence
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Charlie Spaling Contracting		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Emerald Homes		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – G L Carpentry		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Glenaviland Development Corp.		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Jeff Duimering Carpentry Ltd.		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Van De Pol's		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Wellingdale Construction Contractors Inc.		August 18, 2022 – Notice of addition to mailing list and project webpage update
		September 26, 2022 – Notice of PIC Sent via email.
Record # – Moorefield Excavating		
Record # - Heather Smith		August 18, 2022 – Notice of addition to mailing list and project webpage update

C-1

Appendix C-1: Public Notices

Notice of Commencement

Township of Mapleton

Water and Wastewater Master Plan

What is this study all about?

The Township of Mapleton (Township) is initiating a Master Plan Study for water and wastewater servicing within the Township, to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The Master Plan will help the Township support healthy communities by identifying long-term strategies and initiatives to provide infrastructure for water and wastewater servicing needs to 2041 and beyond in a cost-effective and sustainable manner.

How is this study being done?

This study is proceeding in accordance with the requirements of the Municipal Class EA process (October 2000, amended in 2007, 2011, and 2015), which is an approved process under the Ontario Environmental Assessment Act. This Master Plan will fulfill the requirements for select Schedule B projects and become the basis for any future Schedule C projects identified through the Master Plan.

How can I participate in this study?

Stakeholder and public engagement, and consultation are key components of the Master Planning process. Public engagement opportunities will be promoted in local newspapers, and on the Township's website.

Interested parties are invited to sign-up for project updates

If you would like to receive further information about the Mapleton Water and Wastewater Master Plan study or would like to sign up for the study's notifications, please contact:

Sam Mattina, C.E.T., CMM III
Director of Public Works
Township of Mapleton
7275 Sideroad 16
Drayton, ON N0G 1P0
Phone: 519-638-3313 ext. 041
E-mail: smattina@mapleton.ca

Erin Longworth, M.Eng., P.Eng., PMP
Consultant Project Manager
CIMA+
101 Frederick Street, Suite 900
Kitchener, ON N2H 6R2
Phone: 519-772-2299 ext. 6250
E-mail: Erin.Longworth@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

This notice was first issued on August 5, 2021.

Notice of Public Information Centre

Township of Mapleton
Water and Wastewater Master Plan

What is this study all about?

The Township of Mapleton (Township) is undertaking a Master Plan Study for water and wastewater servicing within the Township, to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The Master Plan will help the Township support healthy communities by identifying long-term strategies and initiatives to provide infrastructure for water and wastewater servicing needs to 2041 and beyond in a cost-effective and sustainable manner. This Master Plan is being completed in accordance with the Municipal Class Environmental Assessment (Class EA) - Approach 2 Planning Process for Master Plans, which is approved under the Ontario Environmental Assessment Act, and will satisfy Phases 1 and 2 of the planning process.

Join us for our Public Information Centre!

Public and review agency consultation is a key element in the Master Plan process.
The Town will be holding an in-person Public Information Centre (PIC) to introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

Date: Wednesday, October 12, 2022
Time: 5:00 p.m. to 8:00 p.m.
Location: Town Council Chambers (7275 Side Rd 16, Drayton, ON N0G 1P0)

Do you want to be involved?

Please visit the project webpage for more information (https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan). Contact the project team members below if you have questions or comments, wish to obtain more information on the project, or would like to be included on the Project Contact List. We are interested in hearing from you about this project.

Manny Baron
Chief Administrative Officer
Township of Mapleton
7275 Sideroad 16
Drayton, ON N0G 1P0
Phone: 519-638-3313 ext. 024
E-mail: mbaron@mapleton.ca

Adam Moore M.A.Sc., P.Eng.
Consultant Project Engineer
CIMA+
101 Frederick Street, Suite 900
Kitchener, ON N2H 6R2
Phone: 519-772-2299 ext. 6209
E-mail: adam.moore@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record. This Notice first issued September 28, 2022.

C-2

Appendix C-2: Public Information Centre Materials

Welcome

Township of Mapleton Water/Wastewater Master Plan

Public Information Centre
October 12, 2022

Objectives of this Public Information Centre

- To present:
  - Background project information
  - Drivers for water and wastewater servicing strategies
  - Key water and wastewater servicing constraints and opportunities
  - Preliminary preferred water and wastewater servicing strategies
- To receive comments from the public and interested review agencies about the preliminary preferred servicing strategies

Drayton Elevated Tank

What is this Study About?

- The Township of Mapleton is developing a Water and Wastewater Master Plan to ensure that the Township can continue to deliver high quality and sustainable drinking water and wastewater services to meet the needs of the community now and into the future.
- The Water and Wastewater Master Plan will identify the preferred water and wastewater servicing strategies necessary to support existing and future growth needs to 2051
- Key aspects of this analysis will include:
  - Review of growth trends and current development pressures
  - Development of overall servicing strategies for planned growth areas
  - Development of a detailed schedule for facility upgrade requirements, including property, expansion needs and other upgrades
  - Addressing system reliability, effective operational capacities and energy efficiency

What is a Water and Wastewater Master Plan

- Master Plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles.
- Master Plans address infrastructure requirements on a community scale. Local servicing plans for individual developments is considered through Planning Act approvals – i.e., Plans of Subdivision, Site Plans, etc.
- Key objectives of a Master Plan include:
  - Development of an overall servicing strategy for the planning horizon, based on updated growth projections.
  - Develop a list of specific projects to best meet the overall system needs.
  - Provide a capital implementation program for the preferred servicing strategies.
  - Follow key principles of successful environmental planning, as per the Municipal Class Environmental Assessment process.

Study Process and Timelines

The Master Plan process is being undertaken in accordance with the **Municipal Class Environmental Assessment** (Class EA) – Approach 2 process for Master Plans.

Public participation is an integral part of the Class EA process. This meeting provides an opportunity for the public to participate in the process.

Public, agency, stakeholder and Indigenous Community consultation is embedded throughout this process and around key milestones.

EA Phase 1 Problem and Opportunity

- Initiate the Master Plan
- Review existing conditions, growth projections, future needs
- Identify and describe the problem and opportunities

EA Phase 2 Alternative Solutions

- Evaluate alternative strategies to address the needs
- Identify a preferred strategy
- Consult with public, stakeholders, agencies and Indigenous Communities

EA Documentation – Approach 2

- Finalize the Master Plan
- Document all aspects of decision-making and public feedback
- Minimum 30-day public review period

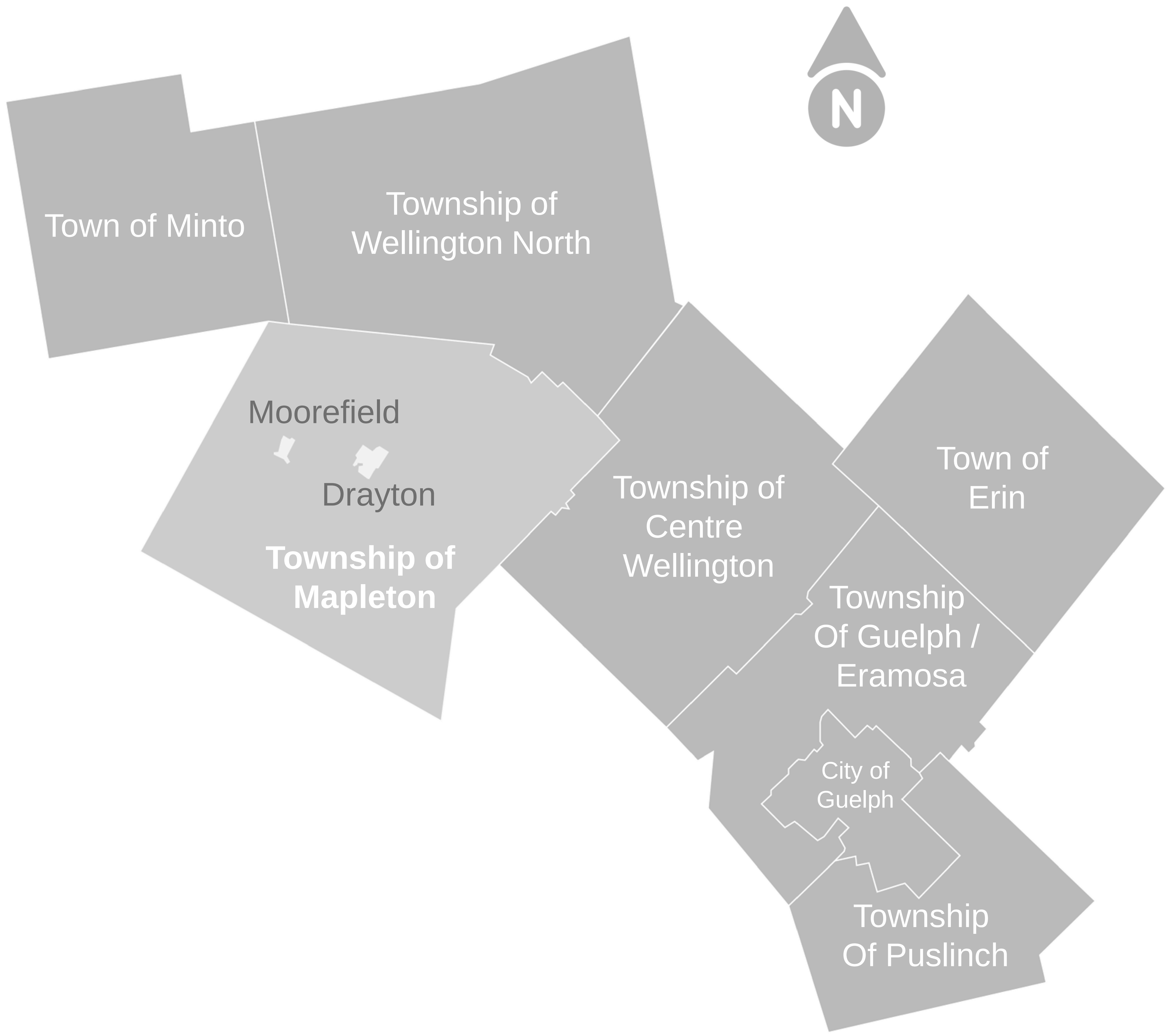
Design and Implementation (Future)

- Complete the design of solutions recommended in the Master Plan
- Property acquisition and utility relocation as needed
- Initiate construction

Continuous Consultation

- Notice of Study Commencement **August 2021**
- Online Project Information Package August 2022
- Public Information Centre October 2022
- Notice of Study Completion December 2022

Community Context and Growth Projections



Within the County of Wellington land area of approximately 535.6 km^2

Mapleton	Dayton	Moorefield
10,839	2,569	620

The Master Planning process will document baseline population and growth projections to 2051. These projections and land use planning are critical to the development of efficient and cost-effective water and wastewater servicing strategies.

- According to the Official Plan for the County of Wellington, population is projected to grow in the County from 95,805 persons to 140,000 persons by 2041.
- 82% of this growth will be focused in 14 urban centres, including Drayton and Moorefield
- Wellington County's policies for growth relevant to the Mapleton Water and Wastewater Master Plan include:

Provide the infrastructure for growth in an environmentally and fiscally responsible manner

Encourage growth to urban areas and in particular to those with municipal sewer and water services

Promote intensification while preserving historic streetscapes

Encourage increased densities in designated Greenfield areas of urban centres

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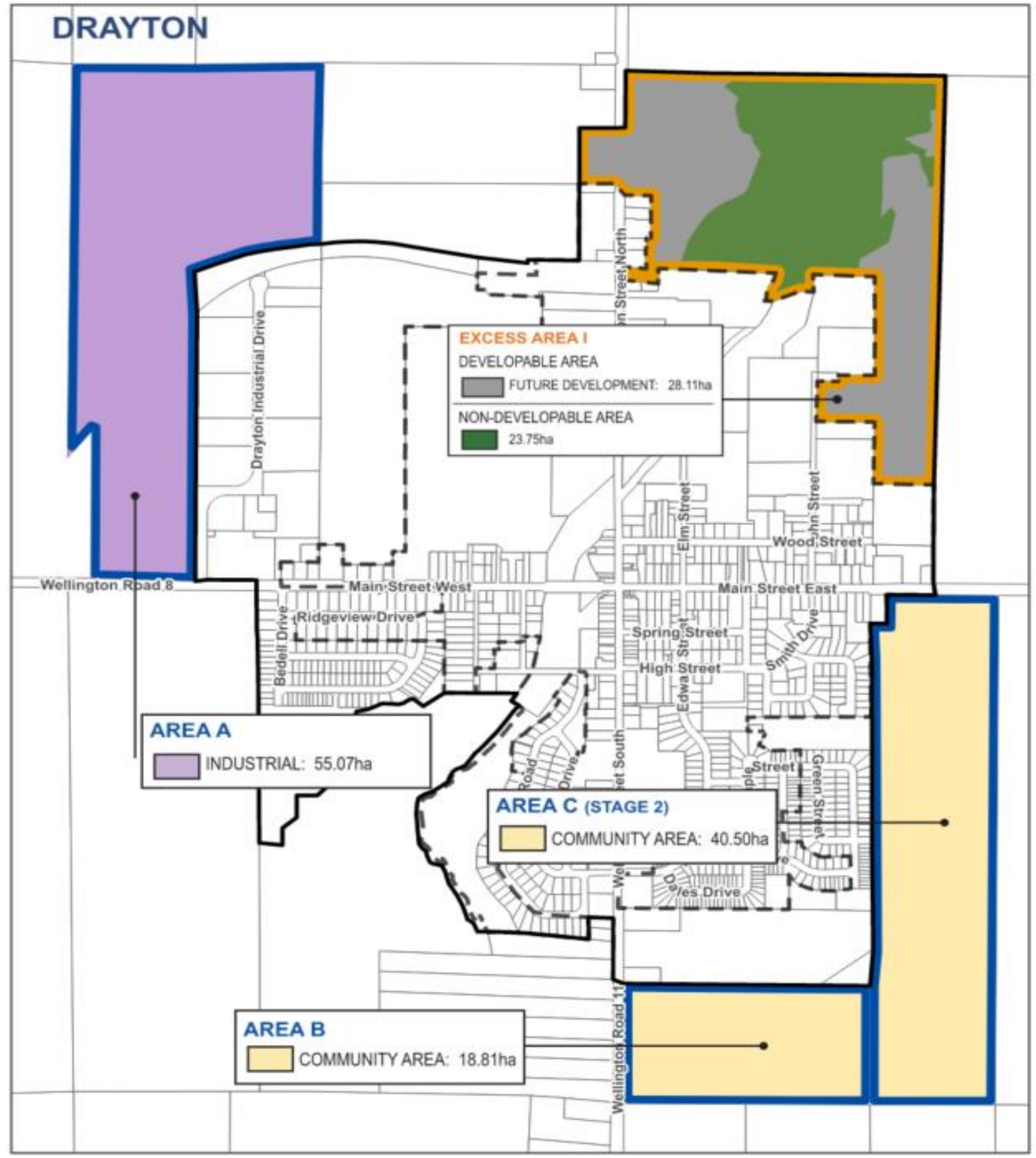
Community Context and Growth Areas

The Township's Planned Growth Areas for Drayton are shown on the adjacent Figure.

Note that the Growth Management Study approved by the Township identified the "Excess Area" is removed from development consideration for Drayton and Area's A, B and C will be added to accommodate employment and residential growth.



Mapping Source: GSP Group. (2022). Township of Mapleton Growth Management Summary - Final Report. Township of Mapleton.

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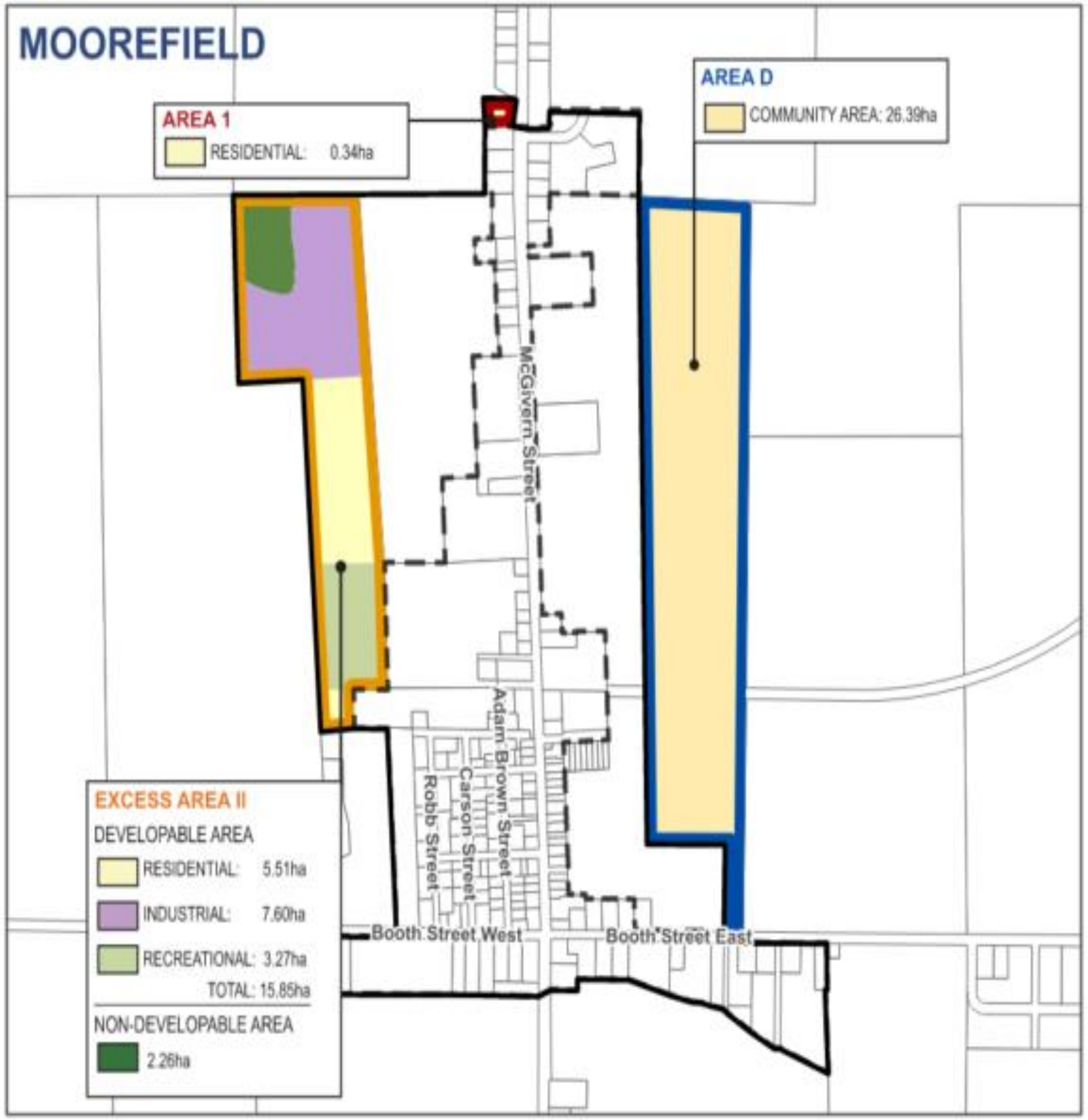
Community Context and Growth Areas

The Growth Management Study identified Area's 1, D and an excess area 2 be added to accommodate employment and residential growth in Moorefield.

Planned Growth Areas are shown on the adjacent Figure.

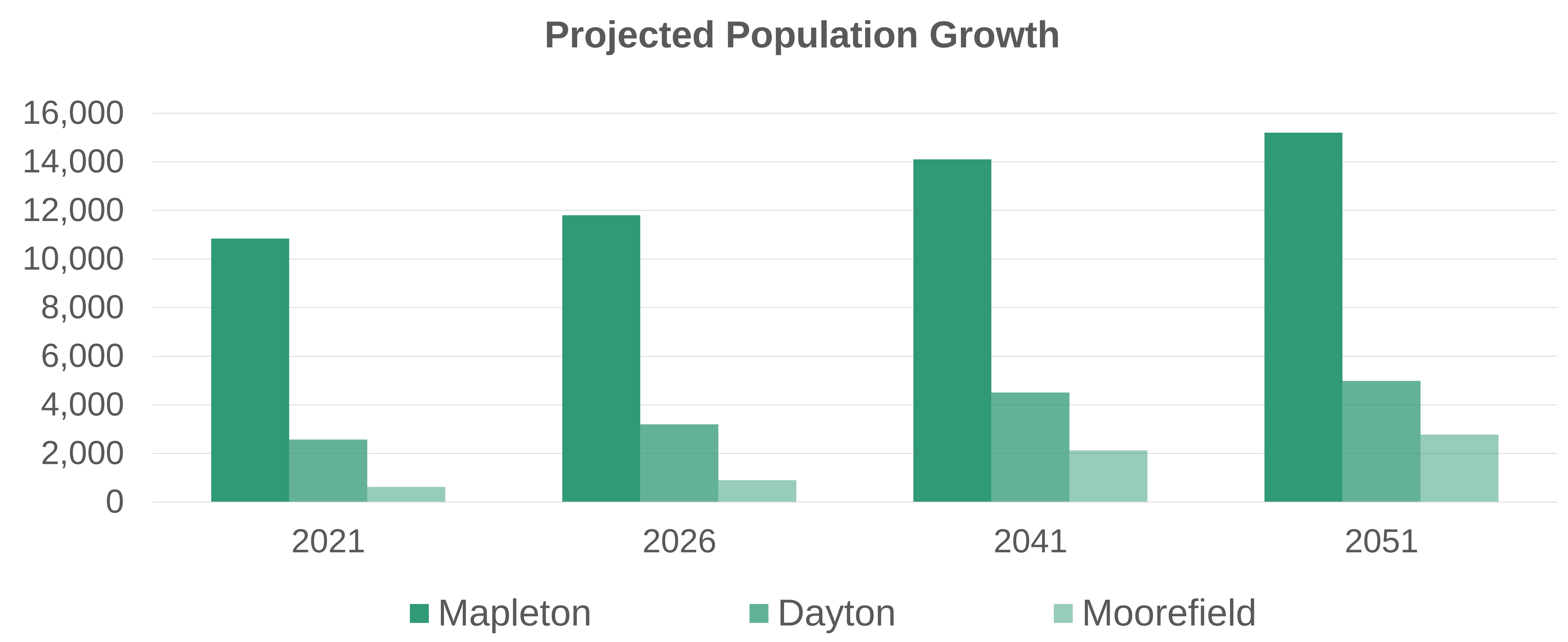


Mapping Source: GSP Group. (2022). Township of Mapleton Growth Management Summary - Final Report. Township of Mapleton.

Growth Projections

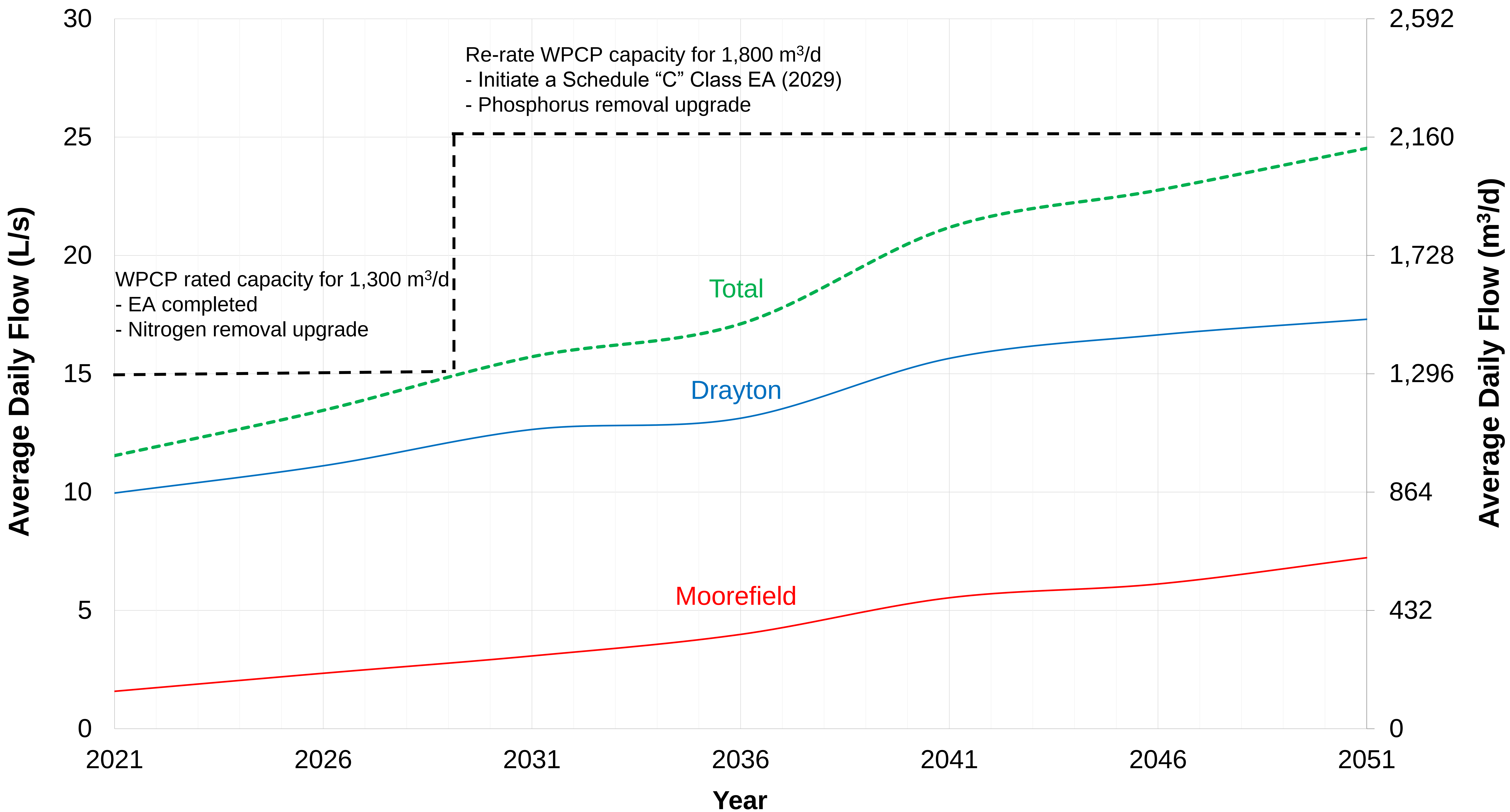
	Existing Population (2021)	Projected Population (2026)	Projected Population (2041)	Projected Population (2051)
Drayton	2,569	3,200	4,507	4,983
Moorefield	620	900	2,125	2,775
Sub-Total – Urban Areas	3,189	4,100	6,632	7,758
Rural and Hamlet Areas	7,650	7,700	7,468	7,442
Total – Township	10,839	11,800	14,100	15,200

Note: Growth Projections taken from Township of Mapleton Growth Management Study – Final Report (GSP Group, 2022), and vary slightly from the County Official Plan estimates.



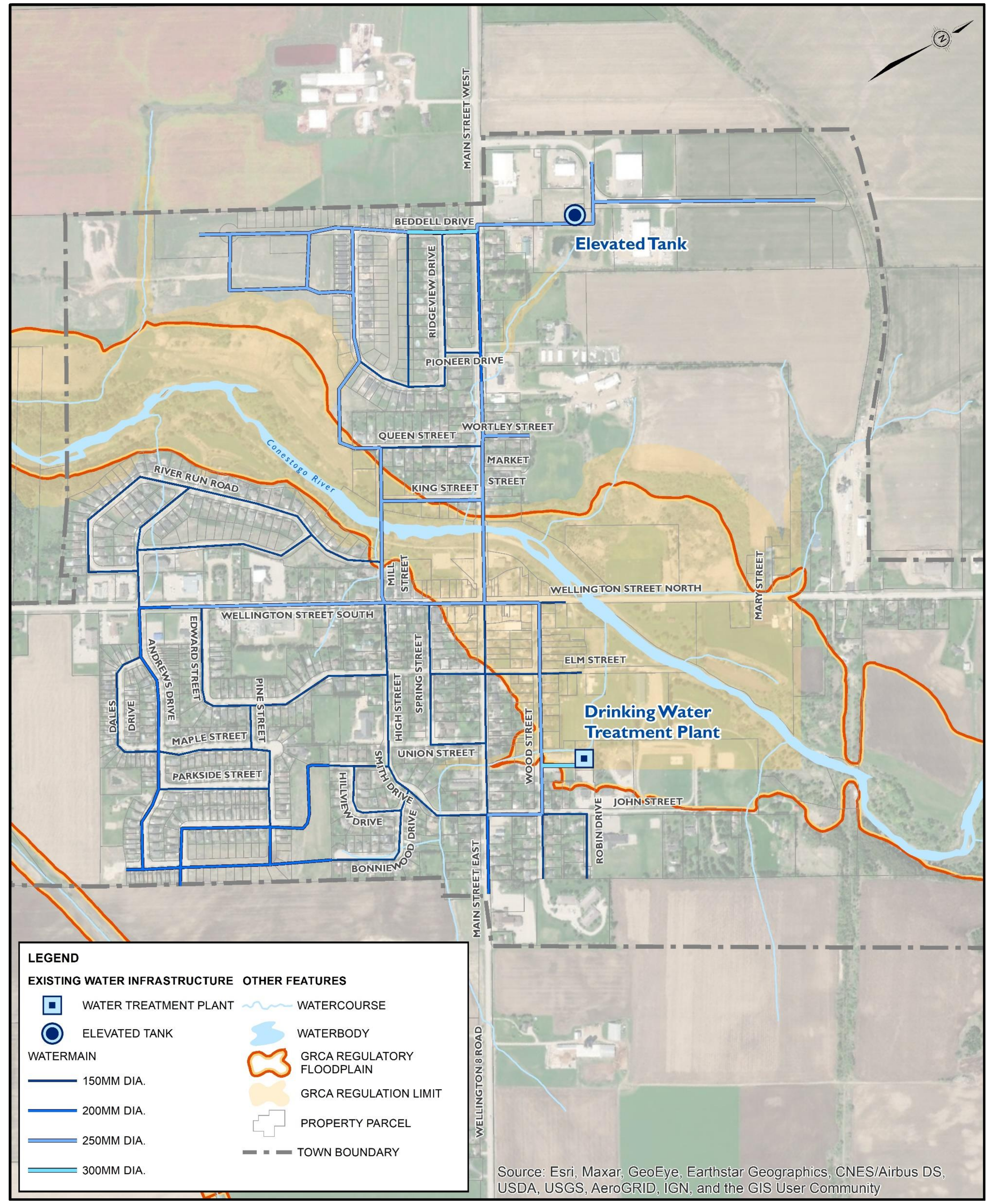
Water Demand Projections - Drayton & Moorefield

Wastewater Flow Projections - Drayton & Moorefield



Existing Drinking Water System - Drayton

- Drayton is supplied with drinking water from the Drayton Water Treatment Plant (WTP) located at 60 Wood Street. The WTP consists of two (2) raw water wells, with iron sequestration, chlorine disinfection and high-lift pump station connected to the distribution system.
- The Drinking Water Distribution System consists of approximately 12.4 km of PVC watermains ranging in size from 150mm to 300mm diameter, along with associated appurtenances and service connections
- The Drayton Water Distribution System was designed and constructed to provide Fire protection throughout the community
- The Township is currently constructing a new 2,400 m^3 elevated storage tank at 29 Drayton Industrial Drive to address the shortfall in available storage within the system. The Elevated Tank is expected to be in service in the fall of 2022.



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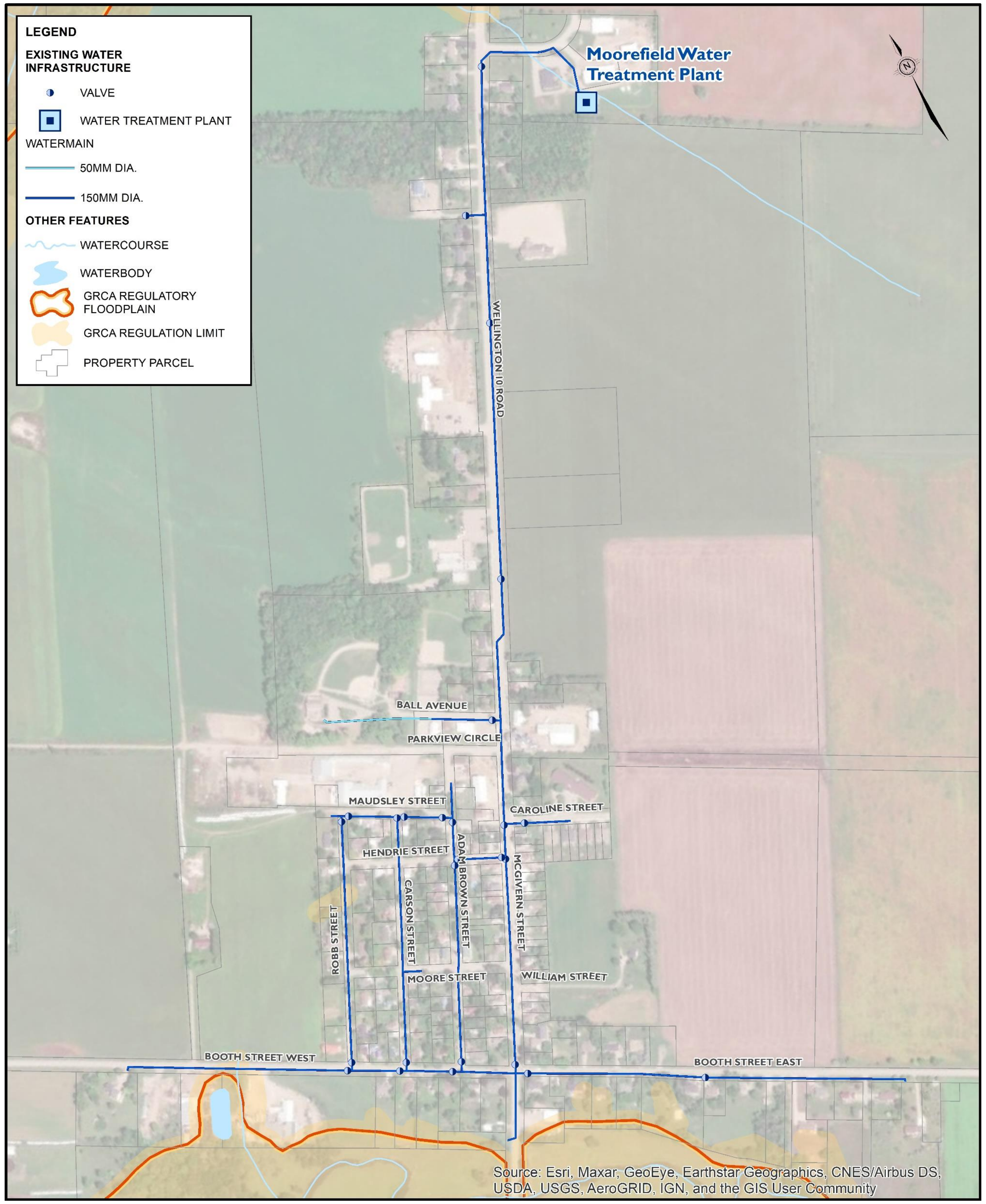
Existing Drinking Water System - Moorefield

- Moorefield is supplied with drinking water from the Moorefield Water Treatment Plant (WTP) located at 5 Hillwood Drive in Moorefield. The WTP currently consists of two (2) raw water wells, high-lift pumping station, and a 387 m^3 storage facility for chlorine contact and equalization storage.
- The Township is currently in the process of upgrading the WTP to address the shortfall in supply capacity and equalization storage within the system. Construction of an additional well and rehabilitation of an existing well will be completed. In addition, a new 400 m^3 standpipe will be constructed, and process modifications will be completed within the pumphouse. The upgraded facility is expected to be in service by 2026.
- The Moorefield Water Distribution System consists of approximately 4.7 km of PVC watermains ranging in size from 50mm to 150mm diameter, along with associated appurtenances and service connections. Fire protection is not provided through the municipal drinking water system.



Mapleton TOWNSHIP Rooted in tradition. Growing for the future.

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Water Servicing Constraints and Opportunities

Constraints

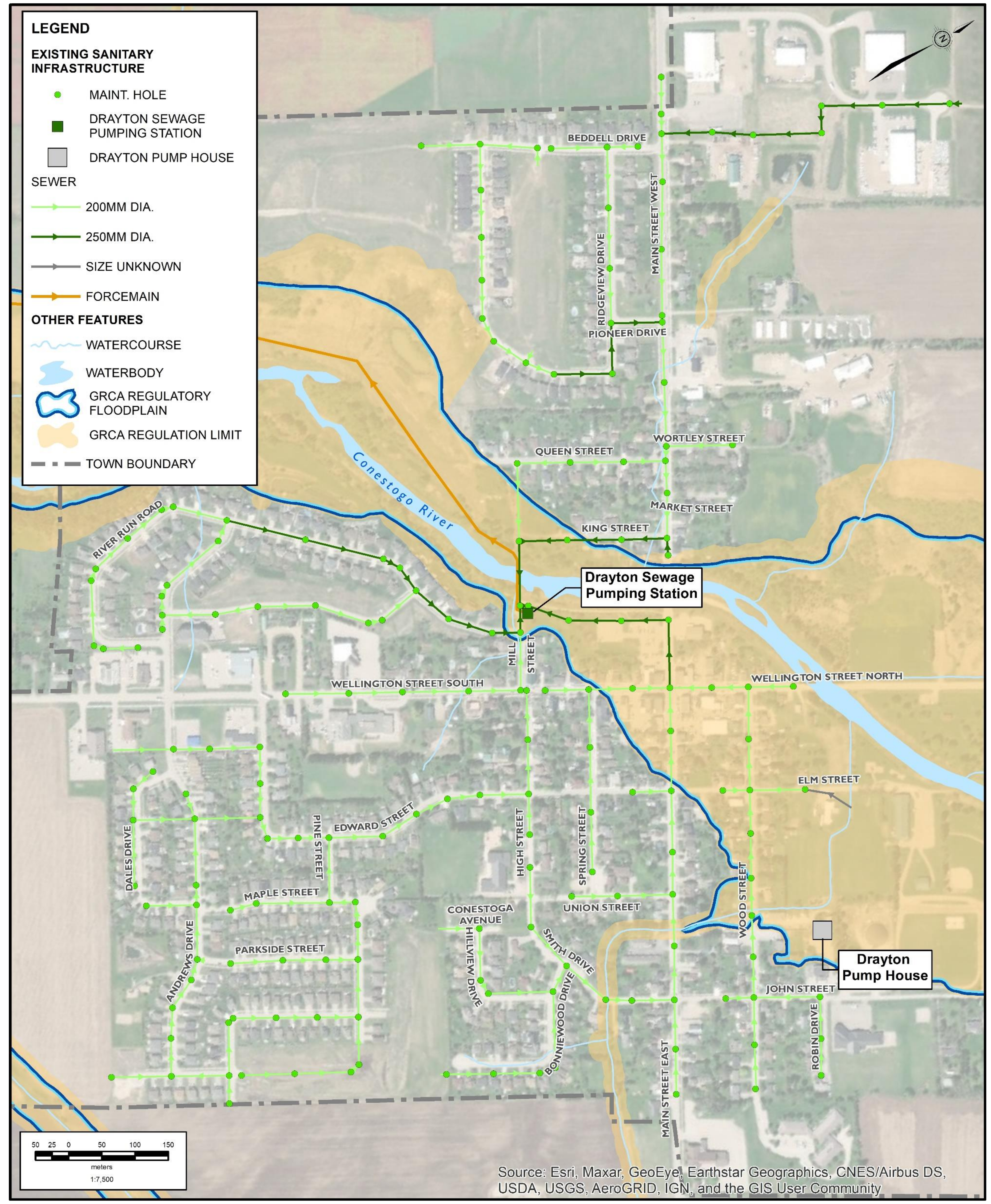
- The existing Drinking Water Supply System in Drayton does not have sufficient capacity to meet future demands.
- Growth areas in A, B and C in Drayton have no direct access to the drinking water distribution system.

Opportunities

- Completion of the Drayton Elevated Tank will help regulate the distribution system pressures.
- Construct a new well in the area of the existing Drayton WTP when maximum day demands approach 28 L/s to increase water supply capacity.
- Watermain extensions on County Road 8 and County Road 11 will provide direct drinking water to Growth Areas A, B and C.
- The Moorefield Drinking Water System will have sufficient capacity to accommodate growth.

Existing Wastewater Collection System - Drayton

- Drayton is serviced with a conventional gravity collection system that conveys wastewater from each serviced property to a centralized sewage pumping station located at 20 Mill Street.
- The Drayton Sewage Pumping Station (SPS) was originally constructed in 1984 as a duplex submersible station with a rated capacity of 34 L/s. The SPS is currently in good to fair condition.
- The Drayton SPS discharges raw sewage to the Mapleton WWTP through a 1,600 m long 200mm diameter forcemain.
- The existing sewage pumping station occasionally experiences high inflow rates, and requires by-pass pumping and trucking of sewage to prevent raw sewage discharge directly to Conestogo Creek.



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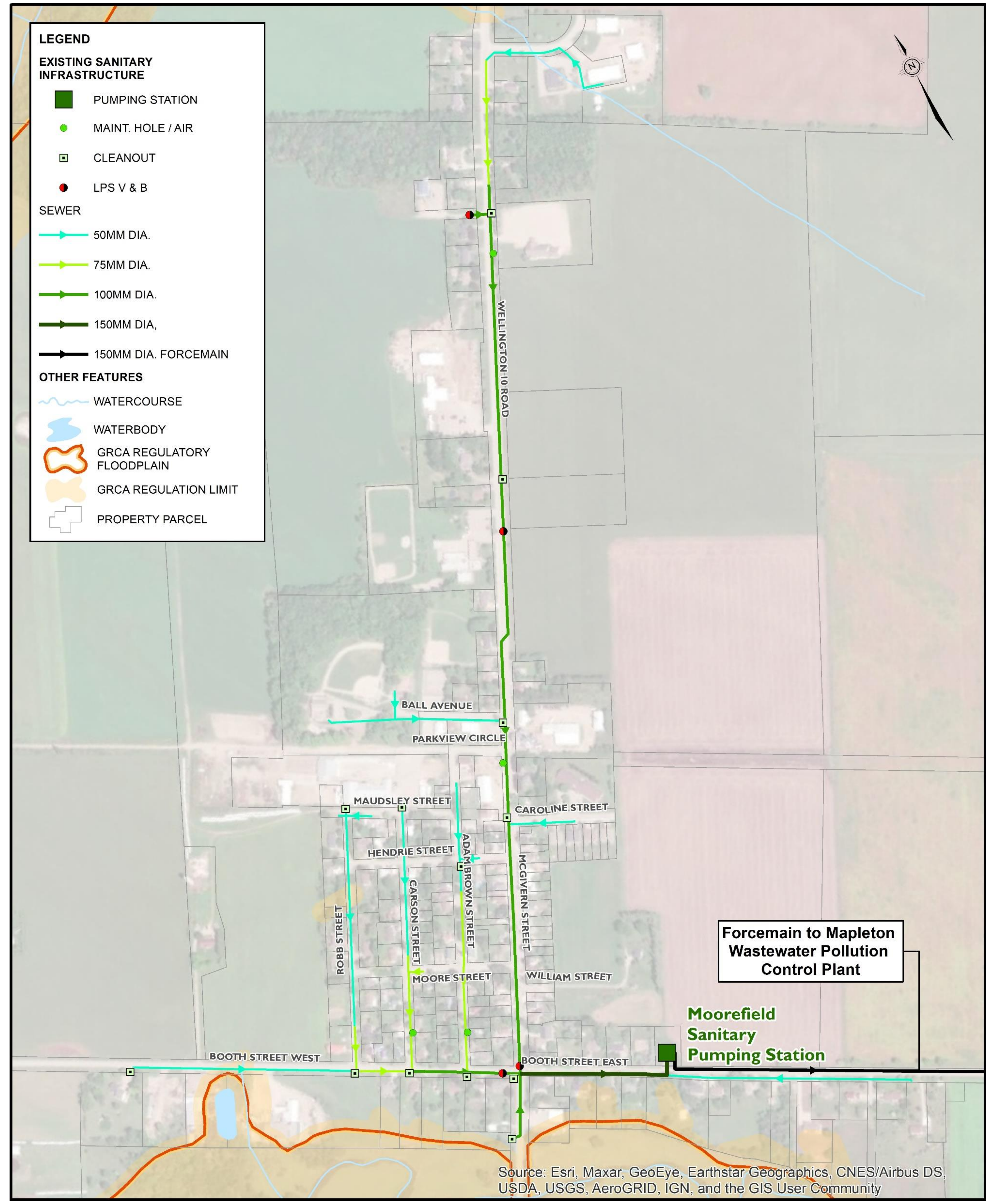
Existing Wastewater Collection System - Moorefield

- Moorefield is serviced with a low-pressure sewer system that conveys wastewater from each serviced property to a centralized sewage pumping station located at 20 Booth Street.
- Each serviced property has an individual grinder pump that conveys the raw sewage through small diameter sewers (forcemains).
- The existing Moorefield Sewage Pumping Station (SPS) was constructed in as a duplex submersible station. Raw sewage is conveyed to the Mapleton WPCP through a 5,000 m long 150 mm diameter forcemain. The SPS is currently in fair condition.



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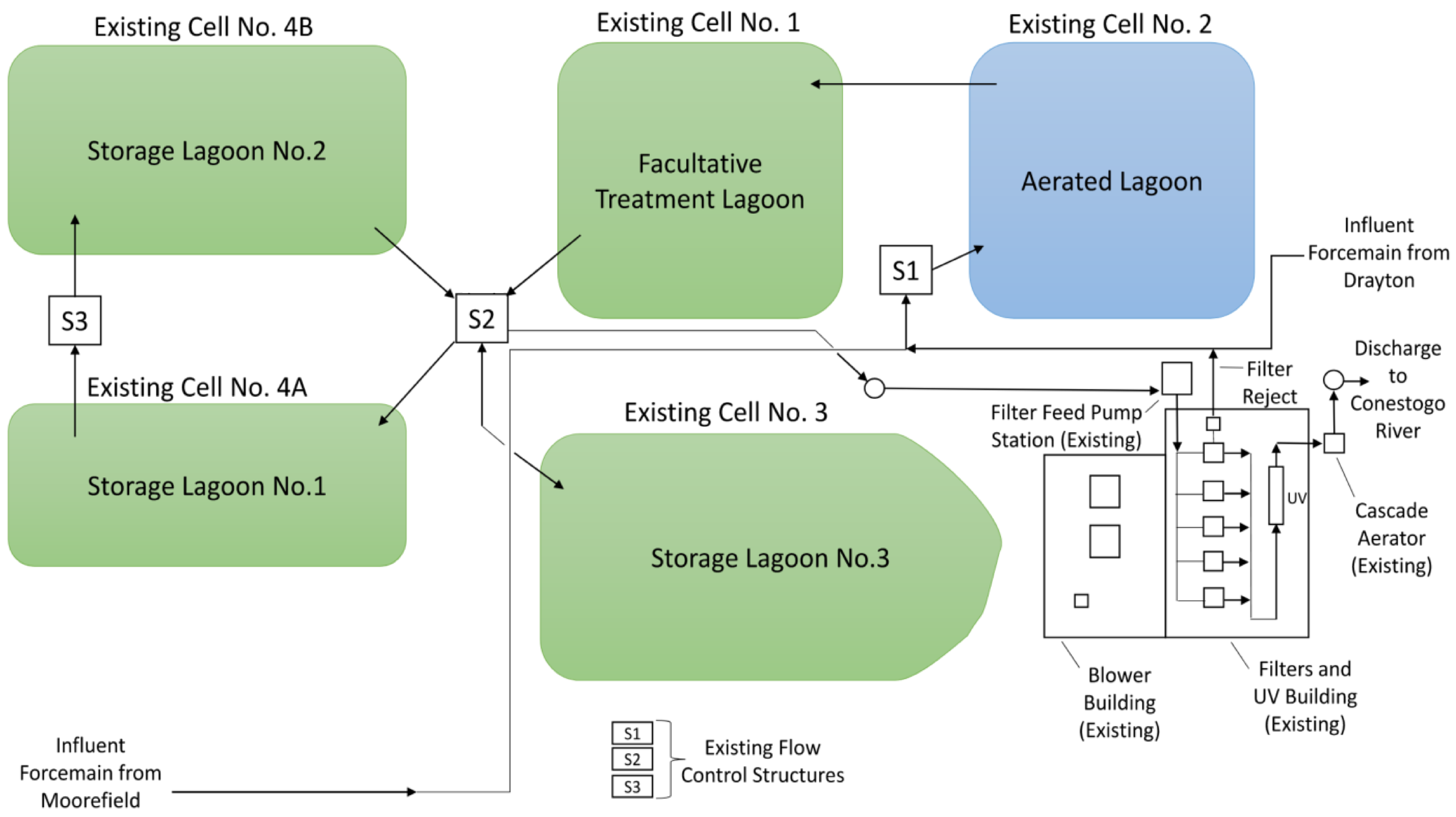
Existing Wastewater Treatment System

- Wastewater from both Drayton and Moorefield is conveyed to a seasonal discharge lagoon treatment plant
- In 2017, the Township completed an Environmental Assessment for the expansion of the Mapleton Water Pollution Control Plant (WPCP) that reviewed options to address capacity constraints at the Mapleton WPCP and identify alternative treatment options for the plant
- In 2018, the Mapleton WPCP was re-rated to a capacity of 900 m^3/d



Wastewater Servicing Constraints and Opportunities

Constraints

- Projected wastewater flows are anticipated to exceed the rated capacity of the Drayton SPS by 2026.
- The existing Drayton SPS is in poor condition with some mechanical components being inoperable, resulting in operational risks for the Township.
- The Drayton collection system experiences rapid inflow resulting in excessive flows to the Drayton SPS. Bypass pumping and haulage to the WPCP have occurred over the past few years.
- The existing low-pressure sewer system in Moorefield has adequate conveyance capacity to accommodate planned growth within the Planning Horizon. However, ongoing maintenance of the individual grinder pump stations represents a significant cost to the Township.
- The wastewater facility has capacity limitations that impacts its discharge schedule.

Opportunities

- Construction of a new or upgraded Drayton SPS will provide long term capacity for wastewater servicing.
- Construction of emergency overflow storage at the Drayton SPS will reduce the risks of spills to the environment.
- Conducting an Inflow and Infiltration Reduction Study will assist in identification of sources of inflow into the system, which may then be addressed to restore available conveyance capacity in the system.
- Transfer maintenance obligations for all existing grinder pump stations to the beneficiary user(s).
- Planned upgrade of wastewater treatment facility to 1,300 m^3/d capacity
- Future upgrade of wastewater treatment facility to 1,800 m^3/d capacity

Water Servicing Objectives

- Provide adequate flow and pressure to water customers
- Provide adequate water storage, pumping capacity and standby power to meet emergency conditions
- Maintain adequate water quality throughout the distribution system
- Promote water conservation
- Utilize reasonable planning design and costing criteria for establishing and evaluating servicing scenarios
- Develop routing for new watermain extension within existing road allowance/utility corridors, or coordinate watermain routing through development applications

In addition, for the community of Drayton:

- Provide adequate fire flows, reliability and security throughout the distribution system

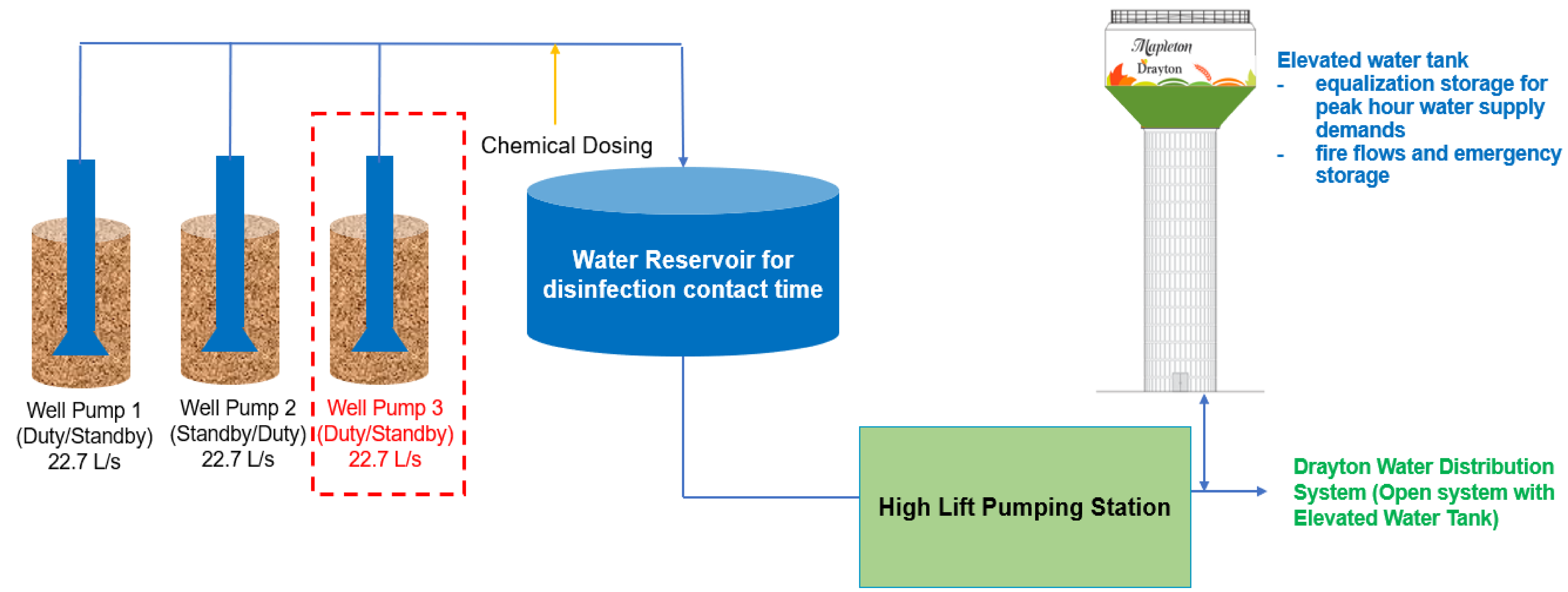
Wastewater Servicing Objectives

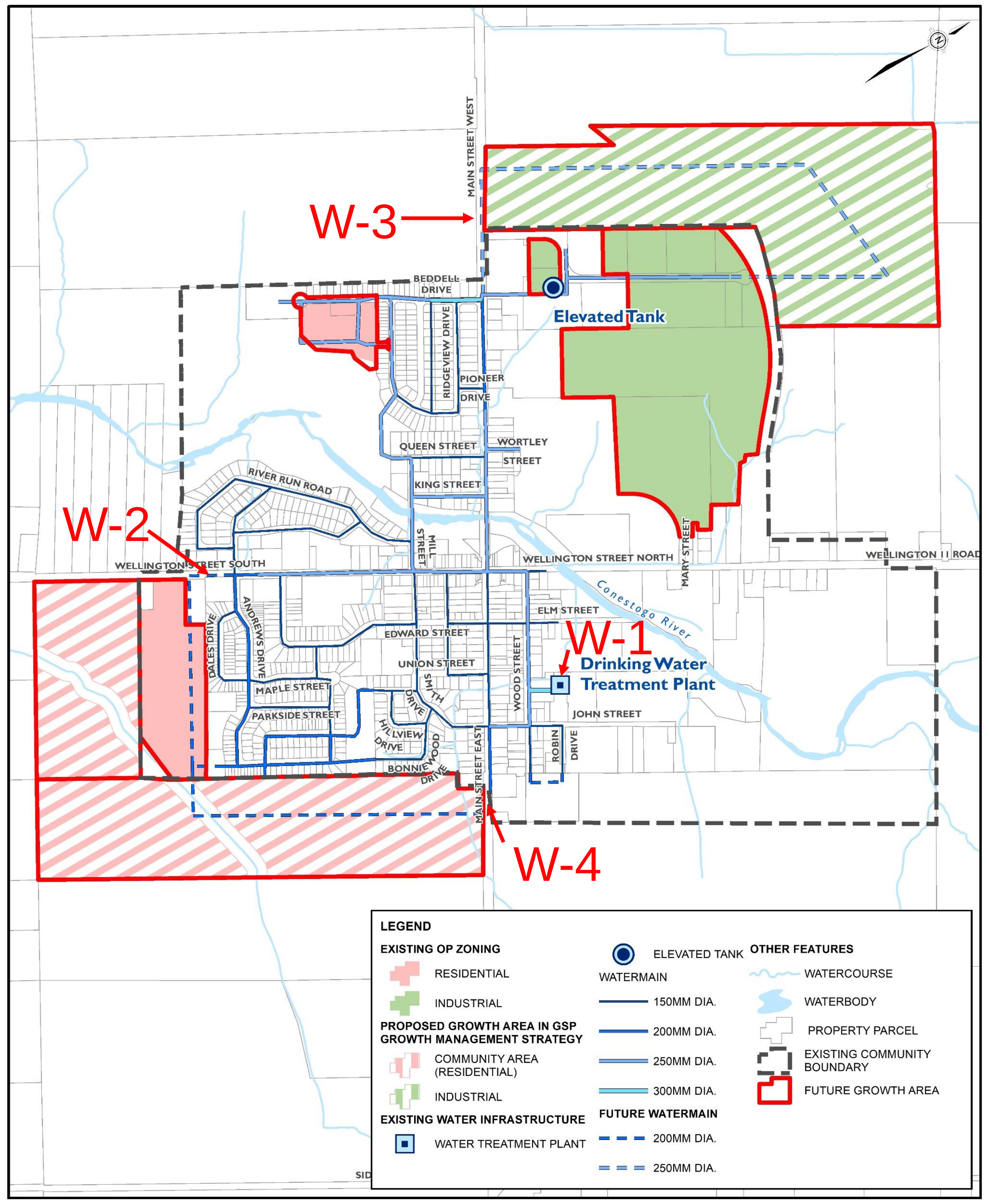
- Provide reliable collection systems for conveyance of wastewater
- Provide adequate peak flow storage, pumping capacity and standby power to meet emergency conditions
- Optimize the treatment facility for planned growth and projected flows
- Maintain adequate treated water quality
- Utilize reasonable planning design and costing criteria for establishing and evaluating servicing scenarios.

Evaluation Criteria

Factor Area	Consideration
Natural Environment	• Potential impacts to existing natural environment • Potential temporary and permanent effects on surface water and groundwater quantity / quality • Resiliency to extreme conditions and ability to minimize greenhouse gas emissions • Protects wildlife and species at risk • Minimize contribution to climate change and maximize resiliency to extreme conditions
Socio-Cultural	• Minimize potential impact of health and safety of operation staff and potential risks to public • Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property) • Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities • Minimizes short-term and long-term impacts to business sector • Minimizes impact to cultural heritage features • Minimizes impact to archaeological features
Technical/Operational	• Able to meet existing and future demands and aligns with existing and planned infrastructure • Provides reliability, security, and robustness • Ease of construction and integration with existing system(s) • Improve operational efficiencies and operational and monitoring requirements • Aligns with existing and planned infrastructure • Aligns with existing and planned land use • Ease of permits and approvals
Economic	• Life cycle cost

Water Servicing Strategy - Drayton





Water Supply Alternative

- Build a new well at the existing DWS site to increase water supply capacity and redundancy

Water Distribution Strategy

- Construct water main extensions to the projected growth areas:
  - Wellington Street South
  - Main Street West, near Drayton Industrial Drive
  - Main Street East

Water Servicing Strategy - Capital Program

Project ID	Project Name	Years in Service	Location	Class EA Schedule	Cost ($ Million)
W-1	Install new well at the existing DWS site to increase capacity	1-5	Drayton	Schedule B	$1.44
W-2	Water distribution extension at Wellington Street South	5-10	Drayton	Schedule A+	$0.20
W-3	Water distribution extension at Main Street West, near Drayton Industrial Drive	5-10	Drayton	Schedule A+	$0.69
W-4	Water distribution extension at Main Street East	5-10	Drayton	Schedule A+	$0.13

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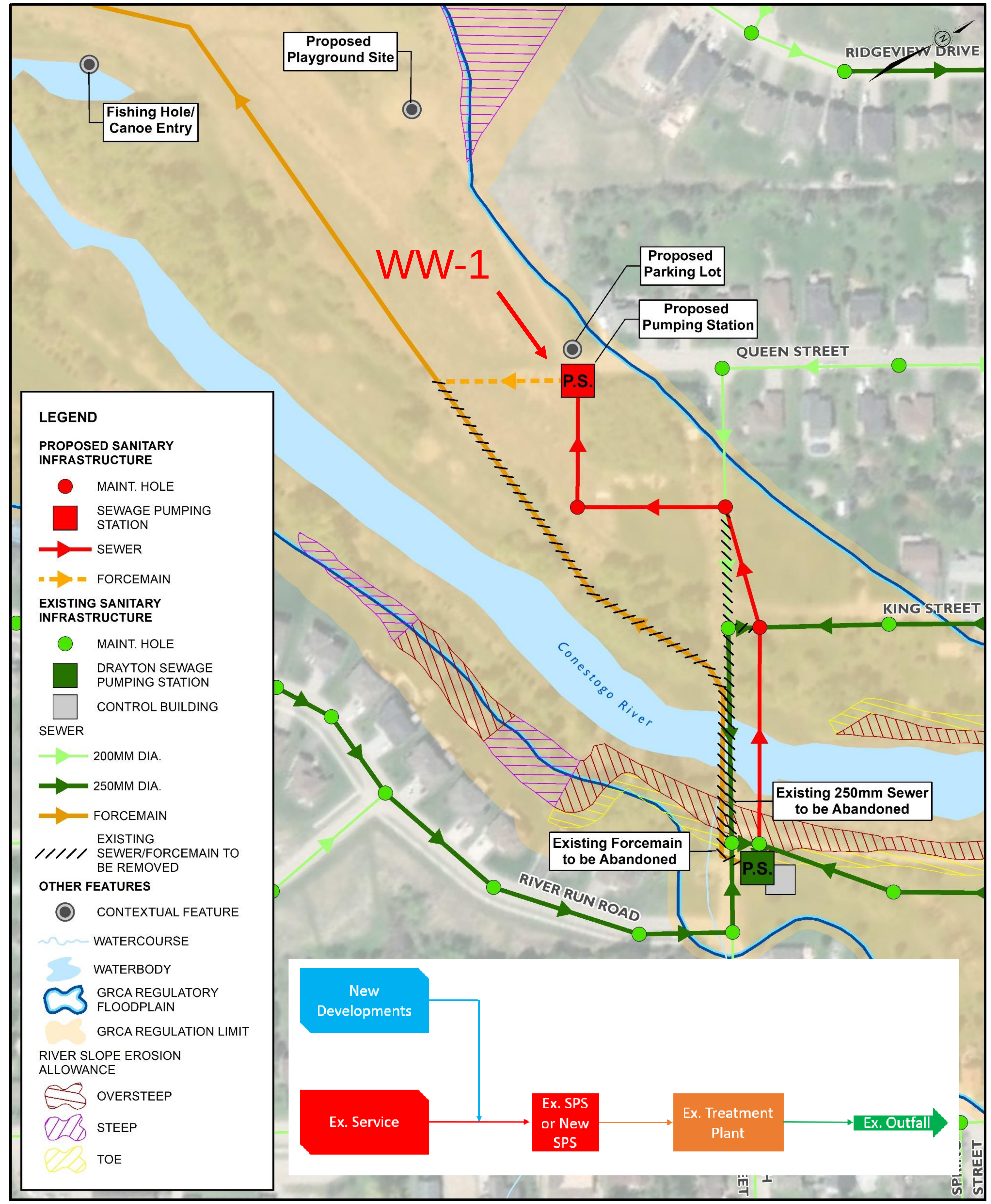
Wastewater Servicing Strategy - Drayton

Drayton Sewage Pump Station (SPS) Alternative

- Construct a new SPS across the Conestoga River near Queen Street
- New SPS to include emergency storage volume to suppress peak flow events

Drayton Inflow/Infiltration (I&I) Monitoring Program

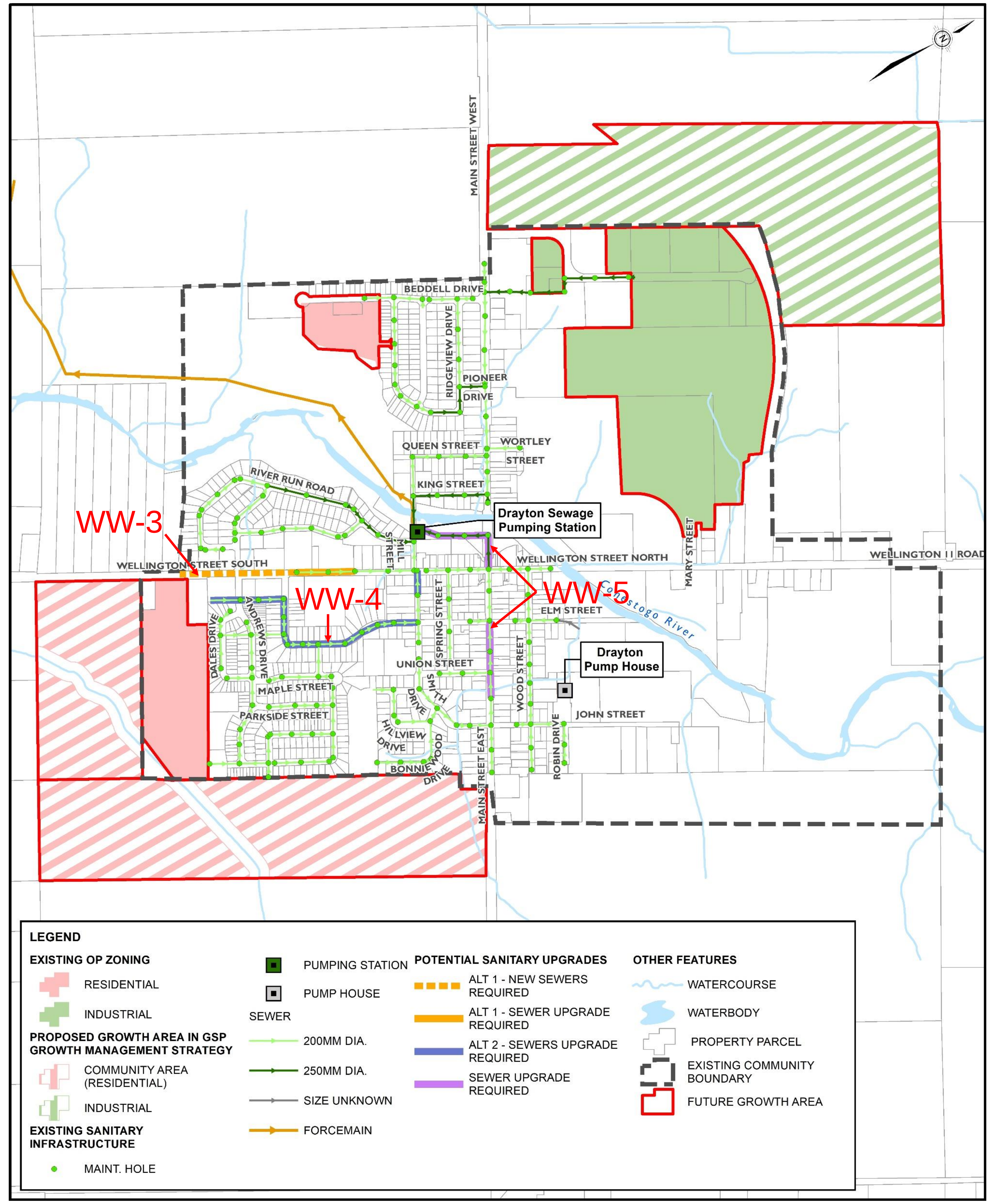
- Install flow monitoring equipment to access I&I sources for 5 years



Wastewater Servicing Strategy - Drayton

Drayton Collection System and Forcemain Alternative

- Upgrade the existing collection system
  - Wellington Street South
  - Edward Street
  - Main Street East



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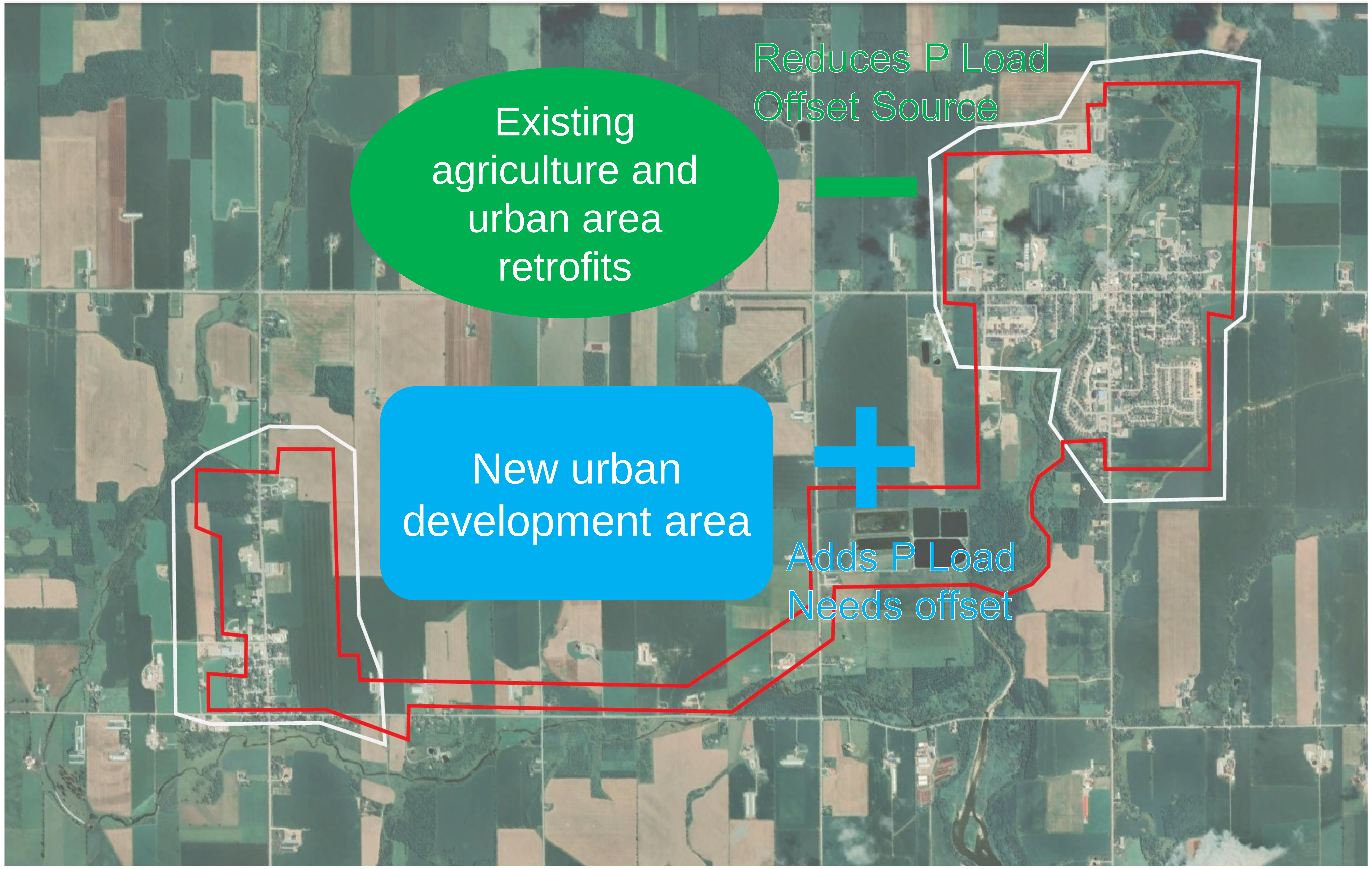
Wastewater Servicing Strategy - Drayton

Wastewater Treatment

- The EA completed by the Town in 2017 concluded that the nitrogen removal upgrades be implemented for the WPCP to increase rated capacity to 1,300 m^3/d
- A Schedule "C" EA study should be competed prior to 2029 to access phosphorus removal upgrades and increase capacity beyond 1,300 m^3/d



Phosphorus off-setting concept

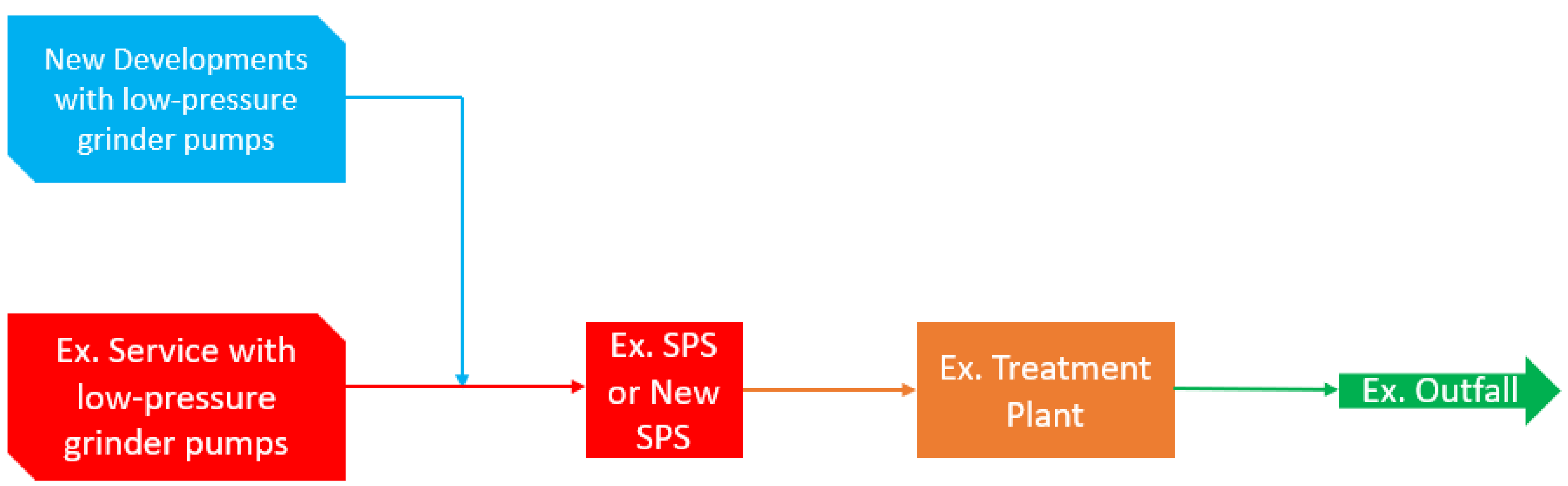
Wastewater Servicing Strategy - Moorefield

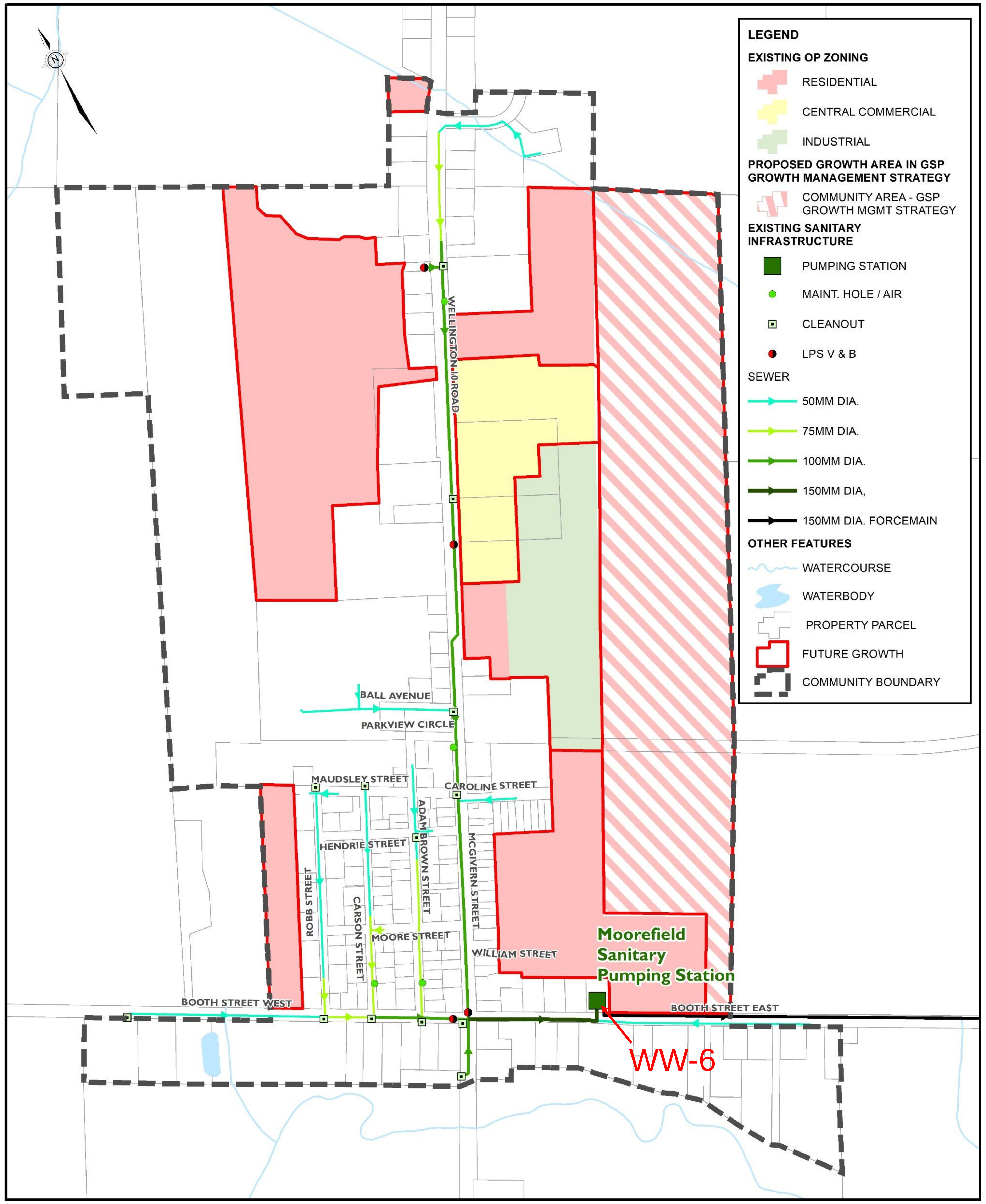
Moorefield Collection System and Forcemain Alternative

- Continue to expand the low-pressure sewer system
- Investigate forcemain headloss and potential upgrades

Moorefield SPS Alternative

- Upgrade the existing SPS to meet future wastewater flows
- Further investigation into the forcemain upgrades and emergency storage





Wastewater Servicing Strategy - Capital Program

Project ID	Project Name	Years in Service	Location	Class EA Schedule	Cost ($ Million)
WW-1	New SPS with onsite emergency storage	1-5	Drayton	Schedule B	$4.37
WW-2	Inflow/Infiltration monitoring program	1-5	Drayton	N/A	$0.38
WW-3	Collection System Alternative 1 – upgrade gravity sewers on Wellington Street South	5-10	Drayton	Schedule A+	$0.70
WW-4	Collection System Alternative 2 – upgrade gravity sewers on Edward Street	5-10	Drayton	Schedule A+	$1.21
WW-5	Upgrade gravity sewers on Main Street East	5-10	Drayton	Schedule A+	$0.75
WW-6	Upgrade the existing SPS	1-5	Moorefield	Schedule B	$0.96

Next Steps and How to Stay Involved

Next Steps

- Compile information and comments received from you and other stakeholders
- Confirm and finalize the preferred servicing strategies
- Respond to other questions and comments we receive
- Document the water and wastewater servicing strategy update and public consultation process
- File the documentation on the public record for a 30-day review period

How to Participate

Review project updates

These displays along with other project updates will be posted on the project webpage:

https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan

Talk to us

Town staff and project team members are here today to chat about the project and answer questions. Come and say hello!

Complete a comment sheet

To provide feedback on the displayed material

Contact us directly

Manny Baron
CAO
Township of Mapleton
mbaron@mapleton.ca

Adam Moore, M.A.Sc., P.Eng.
Consultant Project Engineer
CIMA+
Adam.moore@cima.ca

Thank You!

we appreciate your time and
interest in this project

Public Information Centre Presentation Transcript

Slide 1 – Title Slide

Hello and welcome to the Public Information Centre for the Township of Mapleton Water and Wastewater Servicing Master Plan. My name is Alejandra Boyer, and I will be presenting on behalf of CIMA+ and the Township of Mapleton. CIMA+ was the consultant selected by the Township to complete the Master Plan.

Before we begin, some housekeeping notes. This video will be available on the Township of Mapleton website as of November 4th, 2022. On the Township's website, there is a transcript of my narration for this presentation, and a PDF copy of the slides. If you have any questions or comments, please send them to Manny Baron or Adam Moore whose contact information is in this presentation or fill out a comment form provided on the Township's website and submit it to the project team.

Slide 2 – Objectives of this Public Information Centre

Public consultation and engagement are integral to Municipal Class Environmental Assessment studies. We are holding this session to provide the public with opportunities to learn more about the Municipal Class Environmental Assessment Process that this project has followed.

The goals of this Public Information Centre are to provide an update on the project background information, provide an overview of the drivers for water and wastewater servicing, provide key constraints and opportunities and preliminary preferred alternative servicing strategies and receive public input.

Slide 3 – What is this Study About?

To better understand the project, we ask the following questions.

1, What are we doing? Developing a Water and Wastewater Master Plan to identify the preferred water and wastewater servicing strategies necessary to support existing and future growth needs to 2051.

2, Why are we doing it? The Township of Mapleton is developing a Water and Wastewater Master Plan to ensure that the Township can continue to deliver high quality and sustainable drinking water and wastewater services to meet the needs of the community now and into the future.

Key aspects of this analysis will include:

- Review of growth trends and current development pressures
- Development of overall servicing strategies for planned growth areas
- Development of a detailed schedule for facility upgrade requirements, including property, expansion needs and other upgrades
- Addressing system reliability, effective operational capacities and energy efficiency

Slide 4 – What is a Water and Wastewater Master Plan

Master Plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles.

Master Plans address infrastructure requirements on a community scale. Local servicing plans for individual developments is considered through Planning Act approvals – i.e., Plans of Subdivision, Site Plans, etc.

Key objectives of a Master Plan include:

- Development of an overall servicing strategy for the planning horizon, based on updated growth projections.
- Develop a list of specific projects to best meet the overall system needs.
- Provide a capital implementation program for the preferred servicing strategies.
- Follow key principles of successful environmental planning, as per the Municipal Class Environmental Assessment process.

Slide 5 – Study Process and Timelines

Municipalities recognize the benefits of comprehensive, long-range planning exercises that examine problems and solutions for an overall system of municipal services. The Municipal Class EA for Water and Wastewater Projects recognizes the importance of master plans as the basis for sound environmental planning.

Master plans have distinguishing features that set them apart from project specific studies. These features include the following:

- Master plans are broad in scope and focus on the analysis of a system for the purpose of outlining a framework for the provision of future works and developments.
- Specific projects recommended in a master plan are part of a larger management system and are distributed geographically throughout the study area. The implementation of specific projects may occur over an extended time frame.

According to the Class EA document, a master plan must at least satisfy the requirements of Phases 1 and 2 of the Class EA process and incorporate the five key principles of environmental planning, as identified in Section 2.1. The master plan must document public and agency consultation at each phase of the process and a reasonable range of alternative solutions must be identified and systematically evaluated. Key components of the Class EA planning process include:

- Consultation early and throughout the process,
- Determining a reasonable range of alternatives,
- Consideration of effects on the environment and ways to avoid/reduce the impacts,
- Systematic evaluation of the alternatives,
- Documentation of the process, and
- Traceable decision making.

The Master Servicing Plan will be planned in accordance with the Municipal Class EA Approach #2 which includes: preparation of a Master Plan document at the conclusion of Phases 1 and 2 of the Municipal Class EA process where the level of investigation, consultation and documentation are sufficient to fulfill the requirements for Schedule B projects.

Public consultation is an important part of the Class EA Master Planning process. Successful public consultation programs play an important part of building and maintaining community trust, improving project decision-making, and notifying the community early. The purpose of the Communication and Consultation Plan is to outline the general approach to consultation and communication with the public and stakeholders during the Water and Wastewater Master Plan study.

All activities completed as part of the communication and consultation program will be summarized in detail and included as a separate section in the Master Plan study report. The communication and consultation sections will include as a minimum:

- Description of all stakeholder groups, as well as their needs and concerns

- Description of all engagement and communication and consultation tactics/strategies
- Final stakeholder list
- Copies of all communication and consultation material disseminated to each stakeholder group.

Slide 6 – Community Context and Growth Projections

The Township of Mapleton (Township) is a thriving rural municipality located within the County of Wellington in the heart of southwestern Ontario. According to the Official Plan for the County of Wellington, population is projected to grow in the County from 95,805 persons to 140,000 persons by 2041. 82% of this growth will be focused in 14 urban centres, including Drayton and Moorefield**.** Drayton and Moorefield are serviced by both municipal drinking water systems (DWS) and wastewater collection and treatment systems.

Wellington County's policies for growth relevant to the Mapleton Water and Wastewater Master Plan include:

- Provide the infrastructure for growth in an environmentally and fiscally responsible manner
- Encourage growth to urban areas and in particular to those with municipal sewer and water services
- Promote intensification while preserving historic streetscapes
- Encourage increased densities in designated Greenfield areas of urban centres

Slide 7 – Community Context and Growth Areas

The County of Wellington Official Plan identifies Policy Areas for growth in Drayton and Moorefield and will be used as a basis for identifying infrastructure needs during the Master Planning process. The employment growth value presented in the County of Wellington Official Plan (2021) does not specify the region within the Township to which employment growth will be directed. For the purposes of this study, it will be assumed that the majority of employment growth will occur within Drayton.

The Township's Planned Growth Areas for Drayton is shown on the Figure shown here.

The Growth Management Study approved by the Township identified the “Excess Area” is removed from development consideration for Drayton and Area’s A, B and C will be added to accommodate employment and residential growth.

Slide 8 – Community Context and Growth Areas

Similar to Drayton, the Growth Management Study identified Moorefield’s growth areas shown here in this figure. Area’s 1, D and an excess area 2 be added to accommodate employment and residential growth in Moorefield.

Slide 9 – Growth Projections

The first step in the Master Planning process is to document baseline population for the study area from existing data and establish population projections for the forecast planning period, up to 2051. Population projections and land use planning are critical to the development and evaluation of water and wastewater servicing alternatives developed through the Master Plan process.

Population projections are developed based on a combination of both best available planning information and professional judgement. Population projections form the basis of establishing water and wastewater flow projections which, in turn, dictate the water and wastewater servicing requirements. As part of the master planning exercise, these population projections need to be revised continuously to ensure the validity of the planning estimates according to actual development, conditions of servicing infrastructure, and growth experienced in the Township.

Several recent studies have presented figures for population projections in the Township. CIMA+ has compiled the available population projection data for the Township as a whole, Drayton, and Moorefield. Ultimately, the Township determined that the values taken from the Growth Management Summary Final Report, shall be used for the Mapleton Water and Wastewater Servicing Master Plan. These values align with the most recent County of Wellington Official Plan Update.

Slide 10 – Water Demand Projections – Drayton & Moorefield

Due to the large variation between the data sources and the two urban centers, a daily consumption rate of 300 Litres/capita-day was selected for Drayton and 225 Litres/capita-day was selected for Moorefield. The Ontario guidelines were used for the maximum daily demand. Based on these projected demands and shown on this figure, the well supply for Drayton will need to be upgraded by a minimum of 22.7 Litres/second and will have a firm capacity of 45 Litres/second. For Moorefield, the current well expansion will provide a firm capacity of 26 Litres/second.

Slide 11 – Wastewater Flow Projections – Drayton & Moorefield

The wastewater system demand projections are based on the population growth projections discussed above and the historical wastewater generation rates. A design basis is developed to ensure that infrastructure upgrades are sized and timed to meet increasing wastewater flows, as the flows increase. To ensure adequate services for the future, wastewater flows are projected with an appropriate factor of safety and risk management.

Since the per capita rates for Drayton and Moorefield fall on the lower end of the range of MOECC recommended flowrates, a flowrate of 300 Litres/capita-day for Drayton and 225 Litres/capita-day for Moorefield were used to allow for a factor of safety within the flow estimate while satisfying MECP guidelines. Based on these projected flows and shown on this figure, improvements to the existing operation are required to reliably achieve effluent concentrations required for the expanded plant flow of 1,300 m^3/d. In the past, the plant has not fully used its spring discharge window due to high total ammonia nitrogen concentrations. In addition to this, the proposed effluent TP objectives at an expanded capacity of 1,300 m^3/d, is achievable in the existing filters with optimized alum dosing, but this is nearing the limits of technology and would need to be upgraded for capacities > 1,300 m^3/d by the year 2029.

Slide 12 – Existing Drinking Water System – Drayton

Drayton is supplied with drinking water from the Drayton Water Treatment Plant (WTP) located at 60 Wood Street. The WTP consists of two (2) raw water wells, with iron sequestration, chlorine disinfection and high-lift pump station connected to the distribution system. The Drinking Water Distribution System, shown in this figure, consists of approximately 12.4 km of PVC watermains ranging in size from 150mm to 300mm diameter, along with associated appurtenances and service connections. The Drayton

Water Distribution System was designed and constructed to provide Fire protection throughout the community. The Township is currently constructing a new 2,400 m3 elevated storage tank at 29 Drayton Industrial Drive to address the shortfall in available storage within the system. The Elevated Tank is expected to be in service in the fall of 2022.

Slide 13 – Existing Drinking Water System – Moorefield

Moorefield is supplied with drinking water from the Moorefield Water Treatment Plant (WTP) located at 5 Hillwood Drive in Moorefield. The WTP currently consists of two (2) raw water wells, high-lift pumping station, and a 387 m^3 storage facility for chlorine contact and equalization storage. The Township is currently in the process of upgrading the WTP to address the shortfall in supply capacity and equalization storage within the system. Construction of an additional well and rehabilitation of an existing well will be completed. In addition, a new 400 m3 standpipe will be constructed, and process modifications will be completed within the pumphouse. The upgraded facility is expected to be in service by 2026. The Moorefield Water Distribution System, shown in this figure, consists of approximately 4.7 km of PVC watermains ranging in size from 50mm to 150mm diameter, along with associated appurtenances and service connections. Fire protection is not provided through the municipal drinking water system.

Slide 14 – Water Servicing Constraints and Opportunities

From our initial assessment of the existing water systems in both Drayton and Moorefield, some constraints are identified:

- The existing Drinking Water Supply System in Drayton does not have sufficient capacity to meet future demands, and
- The growth areas, B and C in Drayton have no direct access to the drinking water.

With this, opportunities are available to address these constraints:

- Completion of the Drayton Elevated Tank will help regulate the distribution system pressures.
- Construct a new well in the area of the existing Drayton WTP when maximum day demands approach 28 L/s to increase water supply capacity.
- Watermain extensions on County Road 8 and County Road 11 will provide direct drinking water to Growth Areas A, B and C.
- The Moorefield Drinking Water System will have sufficient capacity to accommodate growth.

Slide 15 – Existing Wastewater Collection System - Drayton

Wastewater is generated at homes and businesses through everyday activities like showering, flushing the toilet, or washing the dishes. When it leaves our homes and businesses it enters the Town’s underground network of sewers. Wastewater flows through sewers by gravity from areas of high-elevation to areas of low-elevation. Drayton is serviced with a conventional gravity collection system, shown in this figure, that conveys wastewater from each serviced property to a centralized sewage pumping station located at 20 Mill Street. The Drayton Sewage Pumping Station (SPS) was originally constructed in 1984 as a duplex submersible station with a rated capacity of 34 L/s. The SPS is currently in good to fair condition. The Drayton SPS discharges raw sewage to the Mapleton WWTP through a 1,600 m long 200mm diameter forcemain. The existing sewage pumping station occasionally experiences high inflow rates and requires by-pass pumping and trucking of sewage to prevent raw sewage discharge directly to Conestogo Creek.

Slide 16 – Existing Wastewater Collection System – Moorefield

Unlike Drayton, Moorefield is serviced with a low-pressure sewer system that conveys wastewater from each serviced property to a centralized sewage pumping station located at 20 Booth Street. Each serviced property has an individual grinder pump that conveys the raw sewage through small diameter sewers (forcemains), shown here. The existing Moorefield Sewage Pumping Station (SPS) was constructed in as a duplex submersible station. Raw sewage is conveyed to the Mapleton WPCP through a 5,000 m long 150 mm diameter forcemain. The SPS is currently in fair condition.

Slide 17 – Existing Wastewater Treatment System

Wastewater from both Drayton and Moorefield is conveyed to a seasonal discharge lagoon treatment plant. The Mapleton WPCP site is located at 7101 Sideroad 15 in Drayton and is approximately 25 hectares. A process schematic of the treatment process is shown here. The lagoon-based treatment plant consists of two (2) treatment cells (aerated and facultative) operated in series and three (3) storage cells operated in parallel or series. In addition, the Mapleton WPCP contains two (2) gravity flow control structures, two (2) alum dosing systems, a filter feed pumping station, tertiary sand filtration, UV disinfection, an effluent cascade aerator, and a 600 mm diameter effluent pipe to the outfall structure at the Conestogo River. In 2017, the Township completed an Environmental Assessment for the expansion of the Mapleton Water Pollution Control Plant (WPCP) that reviewed options to address capacity constraints at the Mapleton WPCP and identify alternative treatment options for the plant. In 2018, the Mapleton WPCP was re-rated to a capacity of 900 m^3/d.

Slide 18 – Wastewater Servicing Constraints and Opportunities

From our initial assessment of the existing water systems in both Drayton and Moorefield, some constraints are identified:

- Projected wastewater flows are anticipated to exceed the rated capacity of the Drayton SPS by 2026.
- The existing Drayton SPS is in poor condition with some mechanical components being inoperable, resulting in operational risks for the Township.

- The Drayton collection system experiences rapid inflow resulting in excessive flows to the Drayton SPS. Bypass pumping and haulage to the WPCP have occurred over the past few years.

- The existing low-pressure sewer system in Moorefield has adequate conveyance capacity to accommodate planned growth within the Planning Horizon. However, ongoing maintenance of the individual grinder pump stations represents a significant cost to the Township.

- The wastewater facility has capacity limitations that impacts its discharge schedule. With this, opportunities are available to address these constraints:

With this, opportunities are available to address these constraints:

- Construction of a new or upgraded Drayton SPS will provide long term capacity for wastewater servicing
- Construction of emergency overflow storage at the Drayton SPS will reduce the risks of spills to the environment
- Conducting an Inflow and Infiltration Reduction Study will assist in identification of sources of inflow into the system, which may then be addressed to restore available conveyance capacity in the system
- Transfer maintenance obligations for all existing grinder pump stations to the beneficiary user(s)
- Planned upgrade of wastewater treatment facility to 1,300 m^3/d capacity
- Future upgrade of wastewater treatment facility to 1,800 m^3/d capacity

Slide 19 – Water Servicing Objectives

In addition to the various constraints and opportunities identified, from a water system servicing perspective, a number of considerations had to be taken into account. The following is a list of water servicing objectives developed for Drayton and Moorefield.

- Provide adequate flow and pressure to water customers
- Provide adequate water storage, pumping capacity and standby power to meet emergency conditions
- Maintain adequate water quality throughout the distribution system
- Promote water conservation
- Utilize reasonable planning design and costing criteria for establishing and evaluating servicing scenarios

- Develop routing for new watermain extension within existing road allowance/utility corridors, or coordinate watermain routing through development applications

In addition, for the community of Drayton:

- Provide adequate fire flows, reliability and security throughout the distribution system

Slide 20 – Wastewater Servicing Objectives

Similarly, on the wastewater side a series of objectives were developed to service the wastewater infrastructure for growth.

- Provide reliable collection systems for conveyance of wastewater
- Provide adequate peak flow storage, pumping capacity and standby power to meet emergency conditions
- Optimize the treatment facility for planned growth and projected flows
- Maintain adequate treated water quality
- Utilize reasonable planning design and costing criteria for establishing and evaluating servicing scenarios

Slide 21 – Evaluation Criteria

Detailed evaluation criteria were used in the assessment of the alternative solutions. Four (4) main criteria categories were identified to include environmental, social-cultural, technical, and economic considerations.

Specific factors were considered within each of the four (4) criteria categories.

Factors related to the environmental criteria included:

- Potential impacts to existing natural environment
- Potential temporary and permanent effects on surface water and groundwater quantity / quality
- Resiliency to extreme conditions and ability to minimize greenhouse gas emissions

- Protects wildlife and species at risk
- Minimize contribution to climate change and maximize resiliency to extreme conditions

Factors related to the social-cultural criteria included:

- Minimize potential impact of health and safety of operation staff and potential risks to public
- Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)
- Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities
- Minimizes short-term and long-term impacts to business sector
- Minimizes impact to cultural heritage features
- Minimizes impact to archaeological features

Factors related to the technical criteria included:

- Able to meet existing and future demands and aligns with existing and planned infrastructure
- Provides reliability, security, and robustness
- Ease of construction and integration with existing system(s)
- Improve operational efficiencies and operational and monitoring requirements
- Aligns with existing and planned infrastructure
- Aligns with existing and planned land use
- Ease of permits and approvals

Finally, life cycle costs from capital, installation and operation and maintenance costs were considered as part of the economic category.

Slide 22 – Water Servicing Strategy – Drayton

For water servicing alternatives in Drayton, only water supply and distribution alternatives were evaluated. Water storage requirements would be met with the construction of the Drayton elevated tank.

For water supply, the preferred alternative involves development of an additional well on the same well site as the existing production wells, shown on the left side figure. The additional well would be required to provide, along with the existing individual supply wells, a capacity of 22.7 L/s and would provide redundancy for 45.4 L/s with one pump out of service. The PTTW would therefore need to be altered for a total flow of 45.4 L/s. Additional investigations would need to be completed to confirm the capacity of the existing aquifer and where the additional well will be drilled. Due to spacing limitations, the current pumphouse would likely need to be expanding to accommodate a third well pump. This alternative provides additional capacity through a third well, subject to confirmatory investigations. Again, the Drayton Water Supply System will continue to rely on a single groundwater source and still have the associated concerns with security of supply. However, advantages of this alternative include increased operational flexibility and redundancy, less complex construction staging, and maximized site capacity. This alternative also best aligns with planned infrastructure projects.

A preliminary analysis of the Drayton water distribution system was completed to evaluate the performance of the existing distribution network for future growth conditions. The system was analyzed to full build out of the expected growth areas as per the Official Plan growth areas. The figure on the right side shows the future growth areas used for the ultimate build out, with watermain loops through the future growth areas.

The analysis was completed for average day, maximum day, peak hour, and max day + fire demand scenarios. Based on the preliminary analysis no upgrades are required in the existing system to continue provide a fire flow of 79 L/s to all of Drayton and the future growth. To maintain the 79 L/s in the future growth areas, a new watermain loop 250mm in diameter would be required for the industrial area and a new watermain look 200mm in diameter would be required for the residential growth areas to the south-east.

Slide 23 – Water Servicing Strategy – Capital Program

A summary of the water servicing strategy capital programs are shown here. Capital costs generally include the following:

- Costs of upgrades to the existing treatment facilities, distribution and collections systems are specific to the requirement of each design concept developed under this study
- Costs of new infrastructure, such as construction of pump stations, construction of subgrade tanks or pipe, and standby generators
- Costs of major process equipment such as pumps, chemical systems, and instrumentation equipment

The following general assumptions were made when developing the costs for the water servicing alternatives:

- Cost estimates are based on 2022 construction costs. Inflation and escalation for the actual expected prices at the time of construction cannot be accounted for at this time
- Estimates of probable capital costs provided by CIMA+ have been developed on a conceptual design level and based on prices and data in CIMA+'s possession, as well as previous experience from projects of similar nature and scope
- It is assumed that engineering cost is 15% of the total construction cost and contingency is assumed to be 30% of the total construction cost
- The preliminary opinion of total project costs is anticipated to be within a range of -30% and +50%, based on a Class 5 level of accuracy. A Class 5 estimate is categorized as having completed between 0-2% project definition.

All taxes (including the 13% HST) have been excluded

Slide 24 – Wastewater Servicing Strategy – Drayton

For the wastewater servicing strategy, the chosen alternative for the Drayton sewage pump station (SPS) involves constructing a new station on the north side of the Conestogo River, across from the existing Drayton SPS. The station would include a wet well, dry well, an emergency storage tank to suppress the peak flows and be sized appropriately to accommodate the buildout flow of the entire community of Drayton while the new sewage pumps would be sized for the 20-year projected population. A SPS on the north side of the river will intercept the majority of the approved development flow prior to the sewer river crossing. Under this option, only a single river crossing is required to convey flow – by gravity – from the south side to the north side of the river. The portion of the existing gravity sewer and forcemain that crosses the river can be decommissioned and abandoned following the commissioning of the proposed SPS. This will minimize future maintenance and replacement requirements and mitigates the risk of having pressurized piping under the river.

The figure on the right shows the approximate location of the proposed SPS adjacent to a newly constructed parking lot and playground just off Queen Street. The routing of the collection system to the new SPS alternative are currently being explored.

CIMA+ is currently undertaking a study to determine where there is inflow and infiltration (I/I) from wet-weather events that have been impacting the existing SPS. This study will determine the areas of Drayton that have significant I/I and outline options to reduce these flows on the sewage collection system. Therefore, the ultimate design peak instantaneous flow and storage volume implications for the SPS are yet to be determined.

Slide 25 – Wastewater Servicing Strategy – Drayton

The selected alternative for the Drayton collection system would involve connecting the future growth areas to the existing gravity sewer system and upsizing the existing sewers which will be unable to handle the additional flows. This alternative is the simplest to move forward with in that it does not involve the addition of any equipment to be operated and maintained in the future. Further analysis should be completed to confirm if the existing topography supports the future growth areas using a gravity network to connect into the existing sewers. The Township can upgrade the size of these existing sewers as development progresses. Shown in the figure on the right, the collection system segments on Wellington Street South, Edward Street and Main Street East would be upsized.

Slide 26 – Wastewater Servicing Strategy – Drayton

Phosphorus offsetting represents one alternative to reduce expansion costs associated with enhanced point-source treatment technologies. This alternative would involve treating the Township’s agricultural industry and urban development as a non-point source phosphorus offset to reduce nutrient loadings to the Conestogo River. Through the work that the GRCA has completed, the Conestogo sub-watershed was identified as a good candidate watershed where phosphorus offsetting can be implemented since it is a key source of phosphorus due to runoff of nutrients in the spring from livestock manure and fertilizer application. As such, phosphorus offsetting for the WPCP could focus on implementing agricultural and rural non-farm best management practices to reduce phosphorus loads in spring runoff. For urban developments, retrofit opportunities to off-set additional phosphorus load using stormwater controls ponds, engineered wetlands, low-impact-developments (LIDs), rainwater harvesting, and green roofs could be implemented. It is recommended as a next step that an investigation be completed to access how a phosphorus off-settling program could be applied for the Town.

Slide 27 – Wastewater Servicing Strategy – Moorefield

For the collection system in Moorefield, the selected alternative is to continue sanitary sewer collection through low-pressure sewers. Moorefield's current sanitary sewer network is a low-pressure sewer making this alternative simple to move forward with for the servicing of future growth. Currently the low-pressure sewer is servicing about 600 people and all wastewater is directed to the Moorefield SPS on Booth Street East.

The sewage pump station (SPS) would also be expanded. Additional flows from new developments in each study area will be directed to the existing pumping station, expanded at the current site. The capacity of the existing pumping station will be increased by construction of a new wet well and pumping station on the existing site to accommodate planned growth. Expanding the station at its current location may be possible by replacing the pumps with high-capacity pumps equipped with variable frequency drives. An investigation would be required to determine the headlosses in the existing forcemain to determine the maximum capacity of the SPS.

Slide 28 – Wastewater Servicing Strategy – Capital Program

A summary of the wastewater servicing strategy capital programs are shown here. Capital costs generally include the following:

- Costs of upgrades to the existing treatment facilities, distribution and collections systems are specific to the requirement of each design concept developed under this study
- Costs of new infrastructure, such as construction of pump stations, construction of subgrade tanks or pipe, and standby generators
- Costs of major process equipment such as pumps, chemical systems, and instrumentation equipment

The following general assumptions were made when developing the costs for the water servicing alternatives:

- Cost estimates are based on 2022 construction costs. Inflation and escalation for the actual expected prices at the time of construction cannot be accounted for at this time

- Estimates of probable capital costs provided by CIMA+ have been developed on a conceptual design level and based on prices and data in CIMA+'s possession, as well as previous experience from projects of similar nature and scope
- It is assumed that engineering cost is 15% of the total construction cost and contingency is assumed to be 30% of the total construction cost
- The preliminary opinion of total project costs is anticipated to be within a range of -30% and +50%, based on a Class 5 level of accuracy. A Class 5 estimate is categorized as having completed between 0-2% project definition.
- All taxes (including the 13% HST) have been excluded

Slide 29 – Next Steps and How to Stay Involved

Thank you for participating in this virtual Public Consultation Centre for the Township of Mapleton Water and Wastewater Servicing Master Plan!

After completing this Public Information Centre, the next steps for the project team will be to review and consider public input received during this Public Consultation Centre and confirm the preferred alternative solution for the Spring Valley Sewage Pumping Station. A **Project File Report** will be prepared to document findings of this study and will be available to the public for a 30-day review period. We encourage you to review all Public Information Centre material available on our website.

Would you like to provide input on the preliminary preferred alternative solution for the Mapleton Water and Wastewater Master Plan? Do you have any questions, comments, or want to stay up to date?

Please submit any comments or questions that you may have by email or phone to Manny Baron or Adam Moore before November 15, 2022.

Manny Baron is the Chief Administrative Officer with the Township of Mapleton. His mailing address is 7275 Sideroad 16, Drayton, ON, N0G 1P0. Manny can be reached via email at mbaron@mapleton.ca.

Adam Moore, M.A.Sc., P.Eng. is the Consultant Project Engineer with CIMA+. His mailing address is 101 Frederick Street, Suite 900, Kitchener, Ontario, N2H 6R2. Adam can be reached via email at adam.moore@cima.ca.

On behalf of the entire project team, thank you for your interest in this Project and for participating in this Public Information Centre.

Q&A

1. **Why do we need a W/WW Master Plan?**
   Based on the 2021 County of Wellington Official Plan, considerable growth is coming to the region. Our current water and wastewater infrastructure will not be enough to meet the growing demands coming from new communities and businesses, and infrastructure upgrades are required to provide Township and operations staff reliable, redundant, and flexible systems that meet current industry standards and best practices.

2. **Will the improvement of water and wastewater encourage further development in the area?**
   A comprehensive Water and Wastewater Master Plan will ensure implementation of a sustainable growth strategy in accordance the Regional Official Plan. The 2021 County of Wellington Official Plan encourages controlled growth in existing urban areas but at the same time, intends to retain the quality and character of Wellington's small urban places. Growth and change will be managed so that existing and future residents enjoy healthy, efficient, and sustainable communities.

3. **Will this study impact existing private groundwater wells?**
   Only the two designated urban centres (Drayton and Moorefield) are serviced by both municipal drinking water systems and wastewater collection and treatment systems. At this time, Drayton and Moorefield will be the focus of this investigation as the hamlets will continue to remain on private services. No impacts on existing private groundwater wells are anticipated.

4. **Are there any financial implications from these projects on existing residents?**
   This project is intended to support growth and address existing water and wastewater issues. A big part of the rational for this study is due to growth and as such new development will pay through development charges. The general purpose of Development Charges By-law 2020-026 as amended, is to recover the capital costs associated with residential and non-residential growth within the Township of Mapleton. For more information on the development charges, please see the updated 2020 Development Charges Background Study through the Townships website.

   We are also aware that both the Provincial and Federal governments frequently provide grants to municipalities to invest in new infrastructure that protects the environment or promotes growth. Whenever possible these avenues will be pursued.

5. **What is the EA process and how long will the study take?**
   The Environmental Assessment (EA) process is a planning tool used to identify the possible effects of proposed infrastructure projects on the environment. The Ontario Environmental Assessment Act requires Ontario municipalities to complete an EA when undertaking capital works projects. Municipalities in Ontario have the benefit of using the process for certain municipal road, water and wastewater projects. Over the long term, environmental assessments provide decision makers with the kind of information they need to approve projects that are suitable with a healthy, sustainable environment for both present and future generations.

   Municipalities recognize the benefits of comprehensive, long-range planning exercises that examine problems and solutions for an overall system of municipal services. The Municipal Class EA for Water and Wastewater Projects recognizes the importance of master plans as the basis for sound environmental planning. The Master Servicing Plan will be planned in accordance with the Municipal Class EA Phases 1 and 2 of the Municipal Class EA process where the level of investigation, consultation and documentation are sufficient to fulfill the requirements for Schedule B projects.

Following completion of this Class EA Master Plan in March 2023, design of the water and wastewater servicing upgrade are anticipated to start in Summer 2023.

6. **Will there be any construction related impacts (such as traffic, noise, dust, and vibration) that I should be aware of?**
   At this time, no construction related impacts are expected. Traffic will be expected for the duration of the construction period but will be within the limits of local noise bylaws.

7. **How is the public being consulted and how can I get involved?**
   Public consultation is an important part of the Class EA Master Planning process. Successful public consultation programs play an important part of building and maintaining community trust, improving project decision-making, and notifying the community early.

   You can review the Project Information Package to learn about the study and provide any questions or comments you may have to Adam Moore (adam.moore@cima.ca). On October 12, 2022, the Town will be hosting an in-person Public Information Centre (PIC) where we will present the preliminary preferred strategies. The Notice of the PIC will be advertised and sent directly to those on the study mailing list. Please also contact Adam if you would like to be added to the study mailing list.

8. **What are the next steps after the EA approval?**
   Once the Plan is completed and approved by Council, we will initiate the implementation of the strategy identified in the Master Plan. This includes carrying out appropriate policy and program recommendations, maintaining existing wastewater infrastructure, and building new infrastructure in accordance with the Class Environmental Assessments process.

Web Content

Water and Wastewater Master Plan

What is this study all about?

The Township of Mapleton (Township) is initiating a Master Plan Study for water and wastewater servicing within the Township, to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The Master Plan will help the Township support healthy communities by identifying long-term strategies and initiatives to provide infrastructure for water and wastewater servicing needs to 2041 and beyond in a cost-effective and sustainable manner.

How is this study being done?

This study is proceeding in accordance with the requirements of the Municipal Class EA process (October 2000, amended in 2007, 2011, and 2015), which is an approved process under the Ontario Environmental Assessment Act. This Master Plan will fulfill the requirements for select Schedule B projects and become the basis for any future Schedule C projects identified through the Master Plan.

Questions and Answers

Expand ▼

INSERT Q&A HERE

Information Package

Expand ▼

To learn about the Master Plan study, please see the Information Package PDF

Public Information Centre

The Town will be hosting a Public Information Centre (PIC) on October 12, 2022 to present the preliminary preferred strategies. The Notice of the PIC will be advertised in the local newspaper and sent directly to those on the study mailing list.

Contact Us

Expand ▼

Please contact project team below if you have any questions, would like to provide comments about the study, or if you would like to be added to the study mailing list.

Sam Mattina, Director of Public Works
Township of Mapleton
smattina@mapleton.ca

Adam Moore, Project Manager
CIMA+
Adam.moore@cima.ca

Social Media Blast

For Monday August 22

The Township of Mapleton is initiating a Master Plan Study for water and wastewater servicing. Check out the updated project webpage to see what the study is all about and take a look at the information package that we just posted!

https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan

For Thursday August 25

Are you interested in learning about the Water/Wastewater Master Plan study for the Township of Mapleton? Do you have some questions? Take a look at the information package that was just posted as well as some Q&As that might respond some of those questions.

https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan

For Wednesday August 31

We want to hear from you! Check out the information package for the Water/Wastewater Master Plan Study. If you are interested in receiving future updates, be sure to contact the project team so you can be added to the project mailing list!

https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan

THE WELLINGTON ADVERTISER
FREE PRESS ~ NEWS WEEKLY™

EDITION(s): September 29 & October 6
By: Alicia Roza

Mapleton TOWNSHIP
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NOTICE OF VIRTUAL PUBLIC INFORMATION CENTRE

TOWNSHIP OF MAPLETON WATER AND WASTEWATER MASTER PLAN

The Township of Mapleton (Township) is undertaking a Master Plan Study for water and wastewater servicing within the Township, to ensure that drinking water and wastewater services meet the needs of the community now and into the future. The Master Plan will help the Township support healthy communities by identifying long-term strategies and initiatives to provide infrastructure for water and wastewater servicing needs to 2041 and beyond in a cost-effective and sustainable manner.

The Town is hosting a Public Information Centre (PIC) on Wednesday, October 12, 2022 from 5:00 p.m. to 8:00 p.m. at the Town Council Chambers. The purpose of the PIC will be to introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

We are interested in hearing from you about this project. Please contact either of the project team members below if you have questions or comments, wish to obtain more information on the project, or would like to be included on the Project Contact List.

Manny Baron P.Eng.
Chief Administrative Officer
Township of Mapleton
7275 Sideroad 16 900
Drayton, ON N0G 1P0 6R2
Phone: 519-638-3313 ext. 024
E-mail: mbaron@mapleton.ca

Adam Moore M.A.Sc.,
Consultant Project Engineer
CIMA+
101 Frederick Street, Suite
Kitchener, ON N2H
Phone: 519-772-2299 ext. 6209
E-mail: adam.moore@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

C-3

Appendix C-3: Public Correspondence

Adam Moore

From: Sam Mattina <SMattina@mapleton.ca>
Sent: September 15, 2021 4:58 PM
To: Heather Smith
Cc: Gregg Davidson; Larry Wheeler; Manny Baron; Iva Danilovic; Erin Longworth; Kyle Davis
Subject: RE: Mapleton Water and Wastewater Master Plan
Attachments: Mapleton Water and Wastewater Master Plan -Notice of Commencement.pdf

EXTERNAL EMAIL

Good afternoon Heather;
Thank you for your message.

Firstly allow me to inform you that you did not miss the public meeting for the water and wastewater master plan. The meeting has not yet occurred and in fact has not yet been scheduled. Please be assured, that now that you have requested to be informed throughout the Master Plan process, you will added to the list and will be notified of significant dates and milestones.
With regards to the deadline to submit comments, that too has not yet been established. The Master Plan Process is just beginning and will last a number of months. Once the actual Master Plan document is released, that is when the 30 day comment deadline period begins.
Having said that, you are welcome to submit comments at any time through me or directly to our Engineers at CIMA+ who are overseeing the process. I have copied Erin Longworth, Master Plan Lead Engineer in this email. Also for your convenience, I am attaching a copy of the Notice of Water and Wastewater Master Plan commencement that was recently issued.

With regards to your further note pertaining to the Draft Source Water Protection Plan for Centre Wellington, (e.g., includes Alma in the new WHPA-Q for Centre Wellington), submitted comments back in March, I have worked with Kyle Davis, Wellington Source Water Protection, Risk management official to compile a response addressing the items outside the scope of the GRCA's prevue. I will send you that reply under separate email. I will also copy Kyle in this email, to answer your question below regarding the posting of the June minutes and the original draft (or the final draft) of the Centre Wellington Chapter of the Source Water Protection Plan

Trusting this is acceptable.
Best regards,
Sam

Mapleton TOWNSHIP Rooted in tradition. Growing for the future.

Sam Mattina C.E.T., CMM III
Director of Public Works
Township of Mapleton
7275 Sideroad 16, Drayton, ON
519.638.3313 x 041
www.mapleton.ca

From: Heather Smith <heatherandbill@outlook.com>
Sent: September 14, 2021 10:14 PM

To: Sam Mattina <SMattina@mapleton.ca>
Cc: Gregg Davidson <gdavidson@mapleton.ca>; Larry Wheeler <LWheeler@mapleton.ca>
Subject: Mapleton Water and Wastewater Master Plan

Dear Sam,

My understanding is that there was a public meeting today (Sept 14) about the new **Mapleton Wastewater Master Plan.** I was unable to attend the meeting.

I'm an Alma resident. I want to submit written comments about the WWMP. For the next two weeks I won't have reliable internet access to complete the references etc for the letter. **What is the deadline to submit written comments**?

As an aside, the Mapleton Mayor, Township Clerk, and Council Members are aware of many of my concerns because they were copied on the March 8, 2021 letter that I submitted to Grand River Conservation regarding the Draft Source Water Protection Plan for Centre Wellington (e.g., includes Alma in the new WHPA-Q for Centre Wellington). You should be able to access a copy of the that letter from the Township Clerk or the Mayor. I assume that my letter was also attached to the June 17, 2021 meeting agenda for the Lake Erie Source Protection Region. Unfortunately I can't currently access that website to verify true:
https://calendar.sourcewater.ca/default/Index?StartDate=06/01/2021
I received positive feedback from Kyle Davis (Wellington Source Water Protection) about my March letter shortly prior to that June meeting. I don't know why those meeting minutes haven't been posted yet, or why the original draft (or the final draft) for the Centre Wellington Chapter of the Source Water Protection Plan hasn't been posted yet.

Best regards,
Heather Smith

Adam Moore

From:	Adam Moore
Sent:	September 26, 2022 3:13 PM
To:	Adam Moore
Subject:	Town of Mapleton Water/Wastewater Master Plan - Notice of PIC
Attachments:	T000974D-090-220926-PN-Notice of PIC-e01.pdf

Good afternoon,

The Town of Mapleton is holding an in-person **Public Information Centre** (PIC) for the Water and Wastewater Master Plan Municipal Class Environmental Assessment. The PIC will introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. Further details about the PIC and how to provide comments are included in the attached Notice.

If you have any questions or feedback, please do not hesitate to contact us by responding to this email.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From:	Adam Moore
Sent:	August 18, 2022 2:47 PM
To:	Adam Moore
Cc:	Iva Danilovic
Subject:	Township of Mapleton Water/Wastewater Master Plan Study Update

Good afternoon,

You are receiving this email because you have requested to be added to the project mailing list for the Township of Mapleton's Water and Wastewater Master Plan study. We have updated the project webpage (linked below) to include an information package with important background material and details for next steps.

https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan

Details about a future Public Information Centre (PIC), planned for mid-October are posted in the webpage update but please note that a separate Notice of the PIC will be advertised in the local newspaper and sent to you directly in late September.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From: Adam Moore
Sent: August 18, 2022 2:41 PM
To: Adam Moore
Cc: Iva Danilovic
Subject: Township of Mapleton Water/Wastewater Master Plan Study Update

Good afternoon,

The Township of Mapleton is undertaking a Water and Wastewater Master Plan study to ensure that drinking water and wastewater services meet the needs of the community now and into the future. We have updated the project webpage (linked below) to include an information package with important background material and details for next steps.

https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan

Details about a Public Information Centre (PIC) are posted in the webpage update but please note that a separate Notice of the PIC will be advertised in the local newspaper and sent to you in late September.
Please do not hesitate to contact us by responding to this email if you have any questions.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From: Adam Moore
Sent: September 7, 2022 7:19 AM
To: nrduimering
Subject: RE: Township of Mapleton Water/Wastewater Master Plan

Hi Nathan,

Thanks for reaching out. We'll have you added to the Master Plan contact list.
I have also left some comments to your questions below.

Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: nrduimering <nrduimering@gmail.com>
Sent: September 6, 2022 12:54 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: Township of Mapleton Water/Wastewater Master Plan

EXTERNAL EMAIL

Good afternoon Adam,

My name is Nathan Duimering and I live at 7108 Sideroad 15, Mapleton, directly across from the Mapleton Wastewater Treatment Plant and I wish to be added to the EA contact List.

I also have a few questions regarding the study and potential plans for the WWTP:

- What category Class EA does this project fall under? [AM] This will be a Schedule C undertaking.

- What additions/changes are planned for the WWTP? [AM] Please refer to the Schedule C ESR Prepared by exp Services, as amended by CIMA+ dated June 2018.

- Does this EA plan to increase the ECA approved discharge rates? [AM] No.

- What mitigation efforts are planned to coincide with changes and/or an increase in discharge rates? [AM] We are looking at alternatives for enhancing phosphorus removal for the wastewater facility.

Thank you.

Nathan Duimering

7108 Sideroad 15

R.R.#2

Moorefield, ON

N0G 2K0

Home: 519-638-2996

Cel: 519-574-6964

nrduimering@gmail.com

Adam Moore

From: Kim Pilon <kim@moorefieldex.ca>
Sent: October 17, 2022 3:19 PM
To: Adam Moore
Cc: Jerry Roubos; billou@hsfx.ca; Manny Baron
Subject: RE: Mapleton Water and Wastewater Master Plan

EXTERNAL EMAIL

Adam,

Some comments following the PIC:

Wastewater Comments:

1. Generally it seems positive that the existing lagoons, considering upgrades, are capable of handling population growth until 2051. I would like to see some information/timelines on the required upgrades making sure projects are completed in a timely manner to ensure development isn't held up due to lack of capacity. The growth projection in each town is very consistent. However if subdivisions come forward large chunks of capacity could be requested (for allocation) and quickly resulting in lack of capacity. I'd like to see how many residential units are already committed/available as opposed to daily flow numbers. I know in Moorefield there are new businesses that have constructed septic systems due to lack of capacity at the lagoons. This has been costly for them. Likewise existing development land in drayton that may already be draft plan approved but currently lacks capacity.
2. The Moorefield sewage pump station has limits that are unknown at this time. I suggest a pump study be recommended to see how much flow the forcemain can handle before the efficiency of the forcemain comes into play. Who will be responsible for the upgrade to the station/forcemain. Is the footprint of the pump station (land) large enough to accommodate future upgrades if not, consider how much land is required and see if the existing site is the right location. Also consider future possibilities of accommodating gravity sewers for new developments.
3. Should future road reconstruction consider gravity sewers for residents? Or does the town plan to perpetually leave existing residents on grinder pump systems?

Water Comments Moorefield:

1. The study seems to lack discussion around fire protection or lack there of for Moorefield. If Moorefield experiences the projected growth into 2051 (greater then existing Drayton population 2021) then within the timeframe, that this report covers, Moorefield should likely be considered for fire protection. This might be done in phases. I am speaking from the perspective of a new development in Moorefield. I don't believe it would be good practice to build a new subdivision without considering fire protection. This might mean 'bagged' hydrants until such time that fire protection is available but new subdivisions should be built with this upgrade in mind. A timeline for upgrades and associated costs should be included.
2. Lack of fire protection in Moorefield with limit development opportunities in the industrial/ commercial sectors within town.

3. The slides seem to be missing a constraints/opportunities slide similar to Drayton, see comments above.

Thanks,

Kim Pilon, P.Eng.
Cell:519-386-4857

From: Adam Moore <Adam.Moore@cima.ca>
Sent: October 11, 2022 11:53 AM
To: Kim Pilon <kim@moorefieldex.ca>
Subject: RE: Mapleton Water and Wastewater Master Plan

Kim,

Please see the attached PIC notice.

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

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Do you really need to print this email? Let's protect the environment!

From: Kim Pilon <kim@moorefieldex.ca>
Sent: October 11, 2022 11:51 AM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: RE: Mapleton Water and Wastewater Master Plan

EXTERNAL EMAIL

Can I get a copy of the PIC notice?

Thanks,

Kim Pilon, P.Eng.
Cell:519-386-4857

From: Adam Moore <Adam.Moore@cima.ca>
Sent: October 11, 2022 11:48 AM

To: Kim Pilon <kim@moorefieldex.ca>
Subject: RE: Mapleton Water and Wastewater Master Plan

Hi Kim,

Thanks for your interest in the Mapleton Water/Wastewater Master Plan. We have added you to the contact list.

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Engineering for people

KINCENTRIC Best Employer CANADA 2019

From: Kim Pilon <kim@moorefieldex.ca>
Sent: October 11, 2022 11:39 AM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: Mapleton Water and Wastewater Master Plan

EXTERNAL EMAIL

Hi Adam,

Could you add me to the mailing list for mapleton water and wastewater master plan?

Thanks,

Kim Pilon, P.Eng.
Cell:519-386-4857

6297 Wellington Rd 109S
RR 3 Harriston ON, N0G 1Z0

Adam Moore

From: Kunuthur Srinivasa Reddy <kunuthursrinivasa@gmail.com>
Sent: October 14, 2022 7:59 AM
To: Adam Moore
Subject: Fwd: Srinivasa Reddy, best of The Water Network (October 7 - 14)

EXTERNAL EMAIL

Hello Adam Moore,
Please find herein the content on small hydrometer for domestic use to generate energy, which might serve as a supplement to major hydel energy.
I am not sure whether or not it could be of potential use in Grand River Conservation Areas in Ontario. Please explore its use based on your expertise on water technology.
With regards,

Prof. Srinivasa Kunuthur
47, Carriage Crossing, Drayton NOGIPO

---------- Forwarded message ---------
From: **Trudi Schifter** <contact@aquaspe.com>
Date: Fri, Oct 14, 2022 at 1:50 PM
Subject: Srinivasa Reddy, best of The Water Network (October 7 - 14)
To: Srinivasa Reddy Kunuthur <kunuthursrinivasa@gmail.com>

Read Online October 14 2022

Hi Srinivasa Reddy,

Our editors have selected the top content of the last week for you - see below.

Trudi Schifter
Founder & CEO AquaSPE AG

Trending Technology

[Launch of Water Monitoring Satellite]

Surface Water and Ocean Topography (SWOT) satellite, a pathfinder mission about Earth's water that will use new technology to address climate change and its impact on our environment.

By NASA

[Solving FOG at Wastewater Facilities]

Pretreatment at facilities that accept FOG provide an ecological and cost-effective process that diverts FOG from the waste stream. The system's ability to separate FOG into pasteurized water, advanced biofuel (ABF) and batter reduces costs while generating revenue.

By Greasezilla

[Small Hydropower Plant In Stream Behind Homes]

Micro hydropower is often unexploited and has the potential to generate energy from as little as 80 centimeters of gradient.

By Turbulent

View New Products

Editors Choice

[Containerized Water Treatment Solutions]

Marmon Industrial Water is one of the oldest and most trusted global water solutions providers. Previously under the Ecodyne Limited and Graver Water Systems names, MIW has a combined history of over 180 years in the water purification industry.

By Marmon Industrial Water

[Devastating 69% drop in Wildlife Populations]

Mammals, birds, amphibians, reptiles and fish — have seen a devastating 69% drop on average since 1970 according to WWF's Living Planet Report (LPR) 2022.

By WWF

[Decisive Action Drives Development]

Western restrictions on the sale of advanced chips to China, despite causing some pain in the short term, could prove a blessing for China in the long run. "Beggar-thy-neighbor" is not a viable policy option for any country, however powerful.

By Professor Asit Biswas

View More Articles

Knowledge Exchange

[Dreaming the Possible with Data]

By Natasha Wiseman

[Nigeria: NCDC Calls for Improved Water Sanitation, As Cholera Kills 233 in 2022]

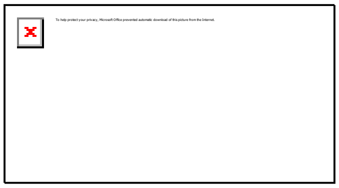
By AllAfrica

View More Case Studies

Featured Jobs

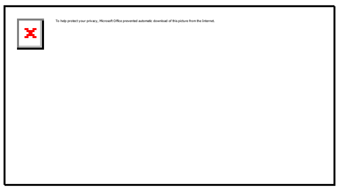
Regional Sales Rep Turkey

Turkey. by nijhuis



Mechatronics Engineer

Amsterdam, Netherlands
by Aquablu



Lead Data Scientist

Sydney, Australia by Vapar

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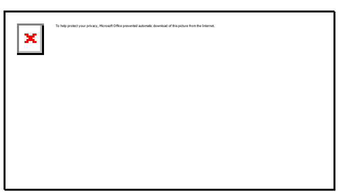
Featured Events



Data & Future of Water
Nov 3 2022

London, UK

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Featured Bid

Water Treatment Plant Study

Michigan USA

VIEW MORE BIDS

Questions

Removal of Nickel

Removal of nickel during the softening with lime or soda of underground water.

By Helene Allemane

Removing Algae from Catchment Tanks

Rapid solution to remove algae from large volume rainwater catchment tanks, preferably physical rather than chemical.

By Iain Brewster

View More Questions

From: Kunuthur Srinivasa Reddy <kunuthursrinivasa@gmail.com>
Sent: October 13, 2022 10:33 AM
To: Adam Moore
Subject: Re: Water and Wastewater management: Longterm strategies and initiatives

EXTERNAL EMAIL

Hello Adam Moore,
Thank you so much for facilitating the contacts with the G.R.C.A., and O.C.W.A.. I will revert to you, once I make a perceptible progress with them in sharing the initiatives to resolve the issue of water quality including the used water (waste?). I realize, you are the ultimate authority being at the delivery point to provide safe, and healthy water to the public and to green the environment. My hearty congratulations to you for the technical input provided yesterday with crystal clarity.
With regards,
Prof. Srinivasa Kunuthur

On Thu, Oct 13, 2022 at 6:00 PM Adam Moore <Adam.Moore@cima.ca> wrote:

> Hi Srinivasa,
>
> Pleasure meeting you last night at the Mapleton Water/Wastewater Master Plan PIC. As discussed, below is one contact I have for the GRCA. They may be able to point you to the right person regarding some strategies for natural areas for the Mapleton WPCP discharge area near the Conestoga River.
>
> Grand River Conservation Authority (GRCA)
>
> **Ben Kissner, M.Sc., MCIP, RPP**
>
> Resource Planner
>
> Grand River Conservation Authority
>
> 400 Clyde Road, PO Box 729

Cambridge, ON N1R 5W6

Office: 519-621-2763 ext. 2237

Toll-free: 1-866-900-4722

Fax: 519-621-4844

www.grandriver.ca | Connect with us on social

Here are the contacts for the operations company for the Mapleton WPCP that may be able to provide a tour of the lagoon facility.

Ontario Clean Water Agency (OCWA)

Don Irvine

dirvine@ocwa.com

Dwight Hallahan

dirvine@ocwa.com

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Kunuthur Srinivasa Reddy <kunuthursrinivasa@gmail.com>
Sent: October 12, 2022 4:26 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Manny Baron <mbaron@mapleton.ca>
Subject: Re: Water and Wastewater management: Longterm strategies and initiatives

EXTERNAL EMAIL

Thank you, looking forward to it.

Prof. Srinivasa Kunuthur

On Tue, Oct 11, 2022, 8:44 AM Adam Moore <Adam.Moore@cima.ca> wrote:

Hello Srinivasa,

Thank you for your interest in the Mapleton Water/Wastewater Master Plan. We have added you to the contact list.

See you at the Public Information Center on Wednesday.

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Kunuthur Srinivasa Reddy <kunuthursrinivasa@gmail.com>
Sent: October 10, 2022 1:55 PM
To: Manny Baron <mbaron@mapleton.ca>
Cc: Adam Moore <Adam.Moore@cima.ca>
Subject: Water and Wastewater management: Longterm strategies and initiatives

Water of Mapleton is hard by nature and necessitates physical, chemical and biological remediation.

Physical remediation is done by dilution with soft water, which is practically difficult and a costly process.

Chemical remediation using softeners is again costly being cumulative but necessary to live with, as hard water can lead to urological and nephrological health issues which afflict kidneys by forming stones of calcium carbonate, calcium oxalate in composition.

Whereas, biological remediation methods are cheaper, economical and long lasting as mentioned below.

1. Planting of trees extensively all along the peripherals of water bodies. The trees suggested are Tamarind, Neem, Ficus, Eucalyptus to mention a few. The roots of these trees have the capacity to reduce the total dissolved salts present in the water. Plants by nature, are endowed with enormous capacity to adapt to varied climatic conditions in any part of the world. Of course, no doubt it is a long drawn process, but offers a permanent solution.

2. The powder made from the seeds of Strychnos potatorum is an excellent biofilter that absorbs salts present in water and makes it safe for drinking.

3. Fish of diverse varieties are versatile in improving the quality of waters that are saltish and unsuitable for drinking. They can be cultivated in ponds, lakes and other water bodies.

4. As a precautionary measure to prevent stone formation in kidneys, it is beneficial to drink lime juice, tamarind juice and consume tamarind and amla fruits, being sold in Canada as they serve to neutralize calcium salts such as calcium carbonate and calcium oxalate etc.

I would love to attend, participate and be involved in the meeting scheduled for Wednesday 12th Oct 2022 to be hosted at the Town Council Chambers.

Please respond to this mail, to confirm my attendance.

Thank you,

With regards,

Prof. Srinivasa Kunuthur

Soil Scientist

47, Carriage Crossing, Drayton

Mapletown, Wellington County

NOG 1PO

12th Oct 2022 from 5 pm to 8 pm, being hosted at the Town Council Chambers.

Adam Moore

From: Erin Longworth
Sent: September 24, 2021 9:08 AM
To: Kevin Fergin
Cc: Sam Mattina; Amy Langford
Subject: RE: Township of Mapleton - Water and Wastewater Master Plan

Good Morning Kevin,

Thanks for your email. We will add you to the study contact list. As the project is in early stages, there isn't currently any further information available, but you will receive future notices as part of the contact list and will be able to access information as it becomes available.

Thank you for your interest in the project.

Best Regards,

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Kevin Fergin <kfergin@heritagehomes.com>
Sent: Thursday, September 23, 2021 10:47 PM
To: Sam Mattina <smattina@mapleton.ca>; Erin Longworth <Erin.Longworth@cima.ca>
Subject: Township of Mapleton - Water and Wastewater Master Plan

EXTERNAL EMAIL

Good evening, San & Erin.

Further to the Notice of Commencement issued on August 5, 2021 for the Township of Mapleton - Water and Wastewater Master Plan, please include us in all study notifications and kindly provide any further information that is available.

Thank you.

Kevin Fergin, P.Eng.

Vice President of Development | **Reid's Heritage Homes**
6783 Wellington Road 34, RR 22, Cambridge ON N3C 2V4
T: 519.658.6656 ext. 229 | C: 519.501.9891 | kfergin@heritagehomes.com

C-4

Appendix C-4: Agency Consultation

Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

1st Floor
135 St. Clair Avenue W
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax.: 416 314-8452

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations environnementales

Rez-de-chaussée
135, avenue St. Clair Ouest
Toronto ON M4V 1P5
Tél. : 416 314-8001
Téléc. : 416 314-8452

Ontario

October 4, 2021

Sam Mattina
Township of Mapleton

Erin Longworth
CIMA+

Re: **Township of Mapleton, Water and Wastewater Master Plan**
Municipal Class Environmental Assessment Master Plan
Response to Notice of Commencement

Dear Sam Mattina and Erin Longworth,

This letter is in response to the Notice of Commencement for the above noted project. The Ministry of the Environment, Conservation and Parks (MECP) acknowledges that the Township of Mapleton has indicated that the study is following the approved environmental planning process for a Master Plan project under the Municipal Class Environmental Assessment (Class EA).

The **updated (February 2021)** attached "Areas of Interest" document provides guidance regarding the ministry's interests with respect to the Class EA process. Please address all areas of interest in the EA documentation at an appropriate level for the EA study. Proponents who address all the applicable areas of interest can minimize potential delays to the project schedule. **Further information is provided at the end of the Areas of Interest document relating to recent changes to the Environmental Assessment Act through Bill 197, Covid-19 Economic Recovery Act 2020.**

The Crown has a legal duty to consult Aboriginal communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and contemplates conduct that may adversely impact that right. Before authorizing this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of this duty to project proponents while retaining oversight of the consultation process.

The proposed project may have the potential to affect Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. Where the Crown's duty to consult is triggered in relation to the proposed project**, the MECP is delegating the procedural aspects of rights-based consultation to the proponent through this letter.** The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit.

Based on information provided to date and the Crown`s preliminary assessment the proponent is required to consult with the following communities who have been identified as potentially affected by the proposed project:

- Aamjiwnaang First Nation
- Bkejwanong (Walpole Island)
- Chippewas of Kettle and Stony Point
- Chippewas of the Thames First Nation
- Chippewas of Nawash First Nation and Saugeen First Nation, which are represented by the Saugeen Ojibway Nation (SON) Environment Committee.
- Mississaugas of the Credit First Nation
- Six Nations of the Grand River (both the Elected Council and Haudenosaunee Confederacy Chiefs Council)

Steps that the proponent may need to take in relation to Aboriginal consultation for the proposed project are outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process". Additional information related to Ontario's Environmental Assessment Act is available online at: www.ontario.ca/environmentalassessments.

Please also refer to the attached document "A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities" for further information, including the MECP's expectations for EA report documentation related to consultation with communities.

The proponent must contact the Director of Environmental Assessment Branch (EABDirector@ontario.ca) under the following circumstances subsequent to initial discussions with the communities identified by MECP:

- Aboriginal or treaty rights impacts are identified to you by the communities
- You have reason to believe that your proposed project may adversely affect an Aboriginal or treaty right
- Consultation with Indigenous communities or other stakeholders has reached an impasse
- A Part II Order request is expected on the basis of impacts to Aboriginal or treaty rights

The MECP will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role you will be asked to play should additional steps and activities be required.

A draft copy of the report should be sent directly to me prior to the filing of the final report, allowing a minimum of 30 days for the ministry's technical reviewers to provide comments.

Please also ensure a copy of the final notice is sent to the ministry's West Central Region EA notification email account (eanotification.wcregion@ontario.ca) after the draft report is reviewed and finalized.

Should you or any members of your project team have any questions regarding the material above, please contact me at joan.delvillarcuicas@ontario.ca or 365-889-1180.

Yours truly,

Joan Del Villar C
Regional Environmental Planner – West Central Region

cc Katy Potter, Supervisor, Environmental Assessment Services, MECP
Jeff Burdon, Guelph District Manager, MECP
Lisa Williamson, Guelph District Supervisor, MECP
Clarissa Whitelaw, Guelph District Supervisor, MECP
Stephanie Ferraro, Guelph District Supervisor, MECP

Attach: Areas of Interest
A Proponent's Introduction to the Delegation of Procedural Aspects of Consultation with Aboriginal Communities

AREAS OF INTEREST (v. February 2021)

It is suggested that you check off each section after you have considered / addressed it.

☐ **Planning and Policy**

- Projects located in MECP Central Region are subject to **A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020).** Parts of the study area may also be subject to the Oak Ridges Moraine Conservation Plan (2017), Niagara Escarpment Plan (2017), Greenbelt Plan (2017) or Lake Simcoe Protection Plan (2014). Applicable plans and the applicable policies should be identified in the report, and the proponent should describe how the proposed project adheres to the relevant policies in these plans.

- The **Provincial Policy Statement (2020)** contains policies that protect Ontario's natural heritage and water resources. Applicable policies should be referenced in the report, and the proponent should describe how the proposed project is consistent with these policies.

- In addition to the provincial planning and policy level, the report should also discuss the planning context at the municipal and federal levels, as appropriate.

☐ **Source Water Protection**

The *Clean Water Act*, 2006 (CWA) aims to protect existing and future sources of drinking water. To achieve this, several types of vulnerable areas have been delineated around surface water intakes and wellheads for every municipal residential drinking water system that is located in a source protection area. These vulnerable areas are known as a Wellhead Protection Areas (WHPAs) and surface water Intake Protection Zones (IPZs). Other vulnerable areas that have been delineated under the CWA include Highly Vulnerable Aquifers (HVAs), Significant Groundwater Recharge Areas (SGRAs), Event-based modelling areas (EBAs), and Issues Contributing Areas (ICAs). Source protection plans have been developed that include policies to address existing and future risks to sources of municipal drinking water within these vulnerable areas.

Projects that are subject to the Environmental Assessment Act that fall under a Class EA, or one of the Regulations, have the potential to impact sources of drinking water if they occur in designated vulnerable areas or in the vicinity of other at-risk drinking water systems (i.e. systems that are not municipal residential systems). MEA Class EA projects may include activities that, if located in a vulnerable area, could be a threat to sources of drinking water (i.e. have the potential to adversely affect the quality or quantity of drinking water sources) and the activity could therefore be subject to policies in a source protection plan. Where an activity poses a risk to drinking water, policies in the local source protection plan may impact how or where that activity is undertaken. Policies may prohibit certain activities, or they may require risk management measures for these activities. Municipal Official Plans, planning decisions, Class EA projects (where the project includes an activity that is a threat to drinking water) and prescribed instruments must conform with policies that address significant risks to drinking water and must have regard for policies that address moderate or low risks.

- In October 2015, the MEA Parent Class EA document was amended to include reference to the Clean Water Act (Section A.2.10.6) and indicates that proponents undertaking a Municipal Class EA project must identify early in their process whether a project is or could potentially be occurring with a vulnerable area. **Given this requirement, please include a section in the report on source water protection.**
    - The proponent should identify the source protection area and should clearly document how the proximity of the project to sources of drinking water (municipal or other) and any delineated vulnerable areas was considered and assessed. Specifically, the report should discuss whether or not the project is located in a vulnerable area and provide applicable details about the area.

    - If located in a vulnerable area, proponents should document whether any project activities are prescribed drinking water threats and thus pose a risk to drinking water (this should be consulted on with the appropriate Source Protection Authority). Where an activity poses a risk to drinking water, the proponent must document and discuss in the report how the project adheres to or has regard to applicable policies in the local source protection plan. This section should then be used to inform and be reflected in other sections of the report, such as the identification of net positive/negative effects of alternatives, mitigation measures, evaluation of alternatives etc.

- While most source protection plans focused on including policies for significant drinking water threats in the WHPAs and IPZs it should be noted that even though source protection plan policies may not apply in HVAs, these are areas where aquifers are sensitive and at risk to impacts and within these areas, activities may impact the quality of sources of drinking water for systems other than municipal residential systems.

- In order to determine if this project is occurring within a vulnerable area, proponents can use this mapping tool: http://www.applications.ene.gov.on.ca/swp/en/index.php. Note that various layers (including WHPAs, WHPA-Q1 and WHPA-Q2, IPZs, HVAs, SGRAs, EBAs, ICAs) can be turned on through the "Map Legend" bar on the left. The mapping tool will also provide a link to the appropriate source protection plan in order to identify what policies may be applicable in the vulnerable area.

- For further information on the maps or source protection plan policies which may relate to their project, proponents must contact the appropriate source protection authority. **Please consult with the local source protection authority to discuss potential impacts on drinking water. Please document the results of that consultation within the report and include all communication documents/correspondence.**

More Information

For more information on the *Clean Water Act*, source protection areas and plans, including specific information on the vulnerable areas and drinking water threats, please refer to Conservation Ontario's website where you will also find links to the local source protection plan/assessment report.

A list of the prescribed drinking water threats can be found in section 1.1 of Ontario Regulation 287/07 made under the *Clean Water Act*. In addition to prescribed drinking water threats, some source protection plans may include policies to address additional "local" threat activities, as approved by the MECP.

- [ ] **Climate Change**

The document "Considering Climate Change in the Environmental Assessment Process" (Guide) is now a part of the Environmental Assessment program's Guides and Codes of Practice. The Guide sets out the MECP's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. Proponents should review this Guide in detail.

- **The MECP expects proponents of Class EA projects to:**

    1. Consider during the assessment of alternative solutions and alternative designs, the following:
        a. the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation); and
        b. resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).
    2. Include a discrete section in the report detailing how climate change was considered in the EA.

How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered.

- The MECP has also prepared another guide to support provincial land use planning direction related to the completion of energy and emission plans. The "Community Emissions Reduction Planning: A Guide for Municipalities" document is designed to educate stakeholders on the municipal opportunities to reduce energy and greenhouse gas emissions, and to provide guidance on methods and techniques to incorporate consideration of energy and greenhouse gas emissions into municipal activities of all types. We encourage you to review the Guide for information.

Air Quality, Dust and Noise

- If there are sensitive receptors in the surrounding area of this project, a quantitative air quality/odour impact assessment will be useful to evaluate alternatives, determine impacts and identify appropriate mitigation measures. The scope of the assessment can be determined based on the potential effects of the proposed alternatives, and typically includes source and receptor characterization and a quantification of local air quality impacts on the sensitive receptors and the environment in the study area. The assessment will compare to all applicable standards or guidelines for all contaminants of concern. **Please contact this office for further consultation on the level of Air Quality Impact Assessment required for this project if not already advised.**

- If a quantitative Air Quality Impact Assessment is not required for the project, the MECP expects that the report contain a qualitative assessment which includes:

    - A discussion of local air quality including existing activities/sources that significantly impact local air quality and how the project may impact existing conditions;
    - A discussion of the nearby sensitive receptors and the project's potential air quality impacts on present and future sensitive receptors;
    - A discussion of local air quality impacts that could arise from this project during both construction and operation; and
    - A discussion of potential mitigation measures.

- As a common practice, "air quality" should be used an evaluation criterion for all road projects.

- Dust and noise control measures should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the study area are not adversely affected during construction activities.

- The MECP recommends that non-chloride dust-suppressants be applied. For a comprehensive list of fugitive dust prevention and control measures that could be applied, refer to *Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities* report prepared for Environment Canada. March 2005.

- The report should consider the potential impacts of increased noise levels during the operation of the completed project. The proponent should explore all potential measures to mitigate significant noise impacts during the assessment of alternatives.

Ecosystem Protection and Restoration

- Any impacts to ecosystem form and function must be avoided where possible. The report should describe any proposed mitigation measures and how project planning will protect and enhance the local ecosystem.

- Natural heritage and hydrologic features should be identified and described in detail to assess potential impacts and to develop appropriate mitigation measures. The following sensitive environmental features may be located within or adjacent to the study area:
    - Key Natural Heritage Features: Habitat of endangered species and threatened species, fish habitat, wetlands, areas of natural and scientific interest (ANSIs), significant valleylands,

significant woodlands; significant wildlife habitat (including habitat of special concern species); sand barrens, savannahs, and tallgrass prairies; and alvars.
  - Key Hydrologic Features: Permanent streams, intermittent streams, inland lakes and their littoral zones, seepage areas and springs, and wetlands.
  - Other natural heritage features and areas such as: vegetation communities, rare species of flora or fauna, Environmentally Sensitive Areas, Environmentally Sensitive Policy Areas, federal and provincial parks and conservation reserves, Greenland systems etc.

We recommend consulting with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO) and your local conservation authority to determine if special measures or additional studies will be necessary to preserve and protect these sensitive features. In addition, you may consider the provisions of the Rouge Park Management Plan if applicable.

- [ ] **Species at Risk**

- The Ministry of the Environment, Conservation and Parks has now assumed responsibility of Ontario's Species at Risk program. Information, standards, guidelines, reference materials and technical resources to assist you are found at https://www.ontario.ca/page/species-risk.

- The Client's Guide to Preliminary Screening for Species at Risk (Draft May 2019) has been attached to the covering email for your reference and use. Please review this document for next steps.

- For any questions related to subsequent permit requirements, please contact SAROntario@ontario.ca.

- [ ] **Surface Water**

- The report must include enough information to demonstrate that there will be no negative impacts on the natural features or ecological functions of any watercourses within the study area. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g. spills, erosion, pollution) are mitigated as part of the proposed undertaking.

- Additional stormwater runoff from new pavement can impact receiving watercourses and flood conditions. Quality and quantity control measures to treat stormwater runoff should be considered for all new impervious areas and, where possible, existing surfaces. The ministry's Stormwater Management Planning and Design Manual (2003) should be referenced in the report and utilized when designing stormwater control methods. **A Stormwater Management Plan should be prepared as part of the Class EA process** that includes:

  - Strategies to address potential water quantity and erosion impacts related to stormwater draining into streams or other sensitive environmental features, and to ensure that adequate (enhanced) water quality is maintained
  - Watershed information, drainage conditions, and other relevant background information
  - Future drainage conditions, stormwater management options, information on erosion and sediment control during construction, and other details of the proposed works
  - Information on maintenance and monitoring commitments.

- Ontario Regulation 60/08 under the *Ontario Water Resources Act* (OWRA) applies to the Lake Simcoe Basin, which encompasses Lake Simcoe and the lands from which surface water drains into Lake Simcoe. If the proposed sewage treatment plant is listed in Table 1 of the regulation, the report should describe how the proposed project and its mitigation measures are consistent with the requirements of this regulation and the OWRA.

- Any potential approval requirements for surface water taking or discharge should be identified in the report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, except for certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information. Additionally, an Environmental Compliance Approval under the OWRA is required for municipal stormwater management works.

Groundwater

- The status of, and potential impacts to any well water supplies should be addressed. If the project involves groundwater takings or changes to drainage patterns, the quantity and quality of groundwater may be affected due to drawdown effects or the redirection of existing contamination flows. In addition, project activities may infringe on existing wells such that they must be reconstructed or sealed and abandoned. Appropriate information to define existing groundwater conditions should be included in the report.

- If the potential construction or decommissioning of water wells is identified as an issue, the report should refer to Ontario Regulation 903, Wells, under the OWRA.

- Potential impacts to groundwater-dependent natural features should be addressed. Any changes to groundwater flow or quality from groundwater taking may interfere with the ecological processes of streams, wetlands or other surficial features. In addition, discharging contaminated or high volumes of groundwater to these features may have direct impacts on their function. Any potential effects should be identified, and appropriate mitigation measures should be recommended. The level of detail required will be dependent on the significance of the potential impacts.

- Any potential approval requirements for groundwater taking or discharge should be identified in the report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information.

- Consultation with the railroad authorities is necessary wherever there is a plan to use construction dewatering in the vicinity of railroad lines or where the zone of influence of the construction dewatering potentially intercepts railroad lines.

Excess Materials Management

- In December 2019, MECP released a new regulation under the Environmental Protection Act, titled "On-Site and Excess Soil Management" (O. Reg. 406/19) to support improved management of excess construction soil. This regulation is a key step to support proper management of excess soils, ensuring valuable resources don't go to waste and to provide clear rules on managing and reusing excess soil. New risk-based standards referenced by this regulation help to facilitate local beneficial reuse which in turn will reduce greenhouse gas emissions from soil transportation, while ensuring strong protection of human health and the environment. The new regulation is being phased in over time, with the first phase in effect on January 1, 2021. For more information, please visit https://www.ontario.ca/page/handling-excess-soil.

- The report should reference that activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014).

- All waste generated during construction must be disposed of in accordance with ministry requirements

- **Contaminated Sites**

- Any current or historical waste disposal sites should be identified in the report. The status of these sites should be determined to confirm whether approval pursuant to Section 46 of the EPA may be required for land uses on former disposal sites. We recommend referring to the MECP's D-4 guideline for land use considerations near landfills and dumps.
  - Resources available may include regional/local municipal official plans and data; provincial data on large landfill sites and small landfill sites; Environmental Compliance Approval information for waste disposal sites on Access Environment.

- Other known contaminated sites (local, provincial, federal) in the study area should also be identified in the report (Note – information on federal contaminated sites is found on the Government of Canada's website).

- The location of any underground storage tanks should be investigated in the report. Measures should be identified to ensure the integrity of these tanks and to ensure an appropriate response in the event of a spill. The ministry's Spills Action Centre must be contacted in such an event.

- Since the removal or movement of soils may be required, appropriate tests to determine contaminant levels from previous land uses or dumping should be undertaken. If the soils are contaminated, you must determine how and where they are to be disposed of, consistent with *Part XV.1 of the Environmental Protection Act* (EPA) and Ontario Regulation 153/04, Records of Site Condition, which details the new requirements related to site assessment and clean up. Please contact the appropriate MECP District Office for further consultation if contaminated sites are present.

- **Servicing, Utilities and Facilities**

- The report should identify any above or underground utilities in the study area such as transmission lines, telephone/internet, oil/gas etc. The owners should be consulted to discuss impacts to this infrastructure, including potential spills.

- The report should identify any servicing infrastructure in the study area such as wastewater, water, stormwater that may potentially be impacted by the project.

- Any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste must have an Environmental Compliance Approval (ECA) before it can operate lawfully. Please consult with MECP's Environmental Permissions Branch to determine whether a new or amended ECA will be required for any proposed infrastructure.

- We recommend referring to the ministry's environmental land use planning guides to ensure that any potential land use conflicts are considered when planning for any infrastructure or facilities related to wastewater, pipelines, landfills or industrial uses.

- **Mitigation and Monitoring**

- Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met. Mitigation measures should be clearly referenced in the report and regularly monitored during the construction stage of the project. In addition, we encourage proponents to conduct post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly.

- Design and construction reports and plans should be based on a best management approach that centres on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas.

- The proponent's construction and post-construction monitoring plans must be documented in the report, as outlined in Section A.2.5 and A.4.1 of the MEA Class EA parent document.

Consultation

- The report must demonstrate how the consultation provisions of the Class EA have been fulfilled, including documentation of all stakeholder consultation efforts undertaken during the planning process. This includes a discussion in the report that identifies concerns that were raised and **describes how they have been addressed by the proponent** throughout the planning process. The report should also include copies of comments submitted on the project by interested stakeholders, and the proponent's responses to these comments (as directed by the Class EA to include full documentation).

- Please include the full stakeholder distribution/consultation list in the documentation.

Class EA Process

- If this project is a Master Plan: there are several different approaches that can be used to conduct a Master Plan, examples of which are outlined in Appendix 4 of the Class EA. **The Master Plan should clearly indicate the selected approach for conducting the plan**, by identifying whether the levels of assessment, consultation and documentation are sufficient to fulfill the requirements for Schedule B or C projects. Please note that any Schedule B or C projects identified in the plan would be subject to Part II Order Requests under the Environmental Assessment Act, although the plan itself would not be. **Please include a description of the approach being undertaken (use Appendix 4 as a reference).**

- If this project is a Master Plan: Any identified projects should also include information on the MCEA schedule associated with the project.

- The report should provide clear and complete documentation of the planning process in order to allow for transparency in decision-making.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment (including planning, natural, social, cultural, economic, technical). The report should include a level of detail (e.g. hydrogeological investigations, terrestrial and aquatic assessments, cultural heritage assessments) such that all potential impacts can be identified, and appropriate mitigation measures can be developed. Any supporting studies conducted during the Class EA process should be referenced and included as part of the report.

- Please include in the report a list of all subsequent permits or approvals that may be required for the implementation of the preferred alternative, including but not limited to, MECP's PTTW, EASR Registrations and ECAs, conservation authority permits, species at risk permits, MTO permits and approvals under the *Impact Assessment Act*, 2019.

- Ministry guidelines and other information related to the issues above are available at http://www.ontario.ca/environment-and-energy/environment-and-energy. We encourage you to review all the available guides and to reference any relevant information in the report.

Amendments to the EAA through the Covid-19 Economic Recovery Act, 2020

Once the EA Report is finalized, the proponent must issue a Notice of Completion providing a minimum 30-day period during which documentation may be reviewed and comment and input can be submitted to the proponent. The Notice of Completion must be sent to the appropriate MECP Regional Office email address (for projects in MECP Southwest Region, the email is eanotification.swregion@ontario.ca).

The public has the ability to request a higher level of assessment on a project if they are concerned about potential adverse impacts to constitutionally protected Aboriginal and treaty rights. In addition, the Minister may issue an order on his or her own initiative within a specified time period. The Director (of the Environmental Assessment Branch) will issue a Notice of Proposed Order to the proponent if the Minister is considering an order for the project within 30 days after the conclusion of the comment period on the Notice of Completion. At this time, the Director may request additional information from the proponent. Once the requested information has been received, the Minister will have 30 days within which to make a decision or impose conditions on your project.

Therefore, the proponent cannot proceed with the project until at least 30 days after the end of the comment period provided for in the Notice of Completion. Further, the proponent may not proceed after this time if:

- a Part II Order request has been submitted to the ministry regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, or
- the Director has issued a Notice of Proposed order regarding the project.

Please ensure that the Notice of Completion advises that outstanding concerns are to be directed to the proponent for a response, and that in the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Part II Order requests on those matters should be addressed in writing to:

Minister Jeff Yurek
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3
minister.mecp@ontario.ca

and

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

A PROPONENT'S INTRODUCTION TO THE DELEGATION OF PROCEDURAL ASPECTS OF CONSULTATION WITH ABORIGINAL COMMUNITIES

DEFINITIONS

The following definitions are specific to this document and may not apply in other contexts:

Aboriginal communities – the First Nation or Métis communities identified by the Crown for the purpose of consultation.

Consultation – the Crown's legal obligation to consult when the Crown has knowledge of an established or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. This is the type of consultation required pursuant to s. 35 of the *Constitution Act, 1982*. Note that this definition does not include consultation with Aboriginal communities for other reasons, such as regulatory requirements.

Crown – the Ontario Crown, acting through a particular ministry or ministries.

Procedural aspects of consultation – those portions of consultation related to the process of consultation, such as notifying an Aboriginal community about a project, providing information about the potential impacts of a project, responding to concerns raised by an Aboriginal community and proposing changes to the project to avoid negative impacts.

Proponent – the person or entity that wants to undertake a project and requires an Ontario Crown decision or approval for the project.

I. PURPOSE

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that may adversely impact that right. In outlining a framework for the duty to consult, the Supreme Court of Canada has stated that the Crown may delegate procedural aspects of consultation to third parties. This document provides general information about the Ontario Crown's approach to delegation of the procedural aspects of consultation to proponents.

This document is not intended to instruct a proponent about an individual project, and it does not constitute legal advice.

II. WHY IS IT NECESSARY TO CONSULT WITH ABORIGINAL COMMUNITIES?

The objective of the modern law of Aboriginal and treaty rights is the *reconciliation* of Aboriginal peoples and non-Aboriginal peoples and their respective rights, claims and interests. Consultation is an important component of the reconciliation process.

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. For example, the Crown's duty to consult is triggered when it considers issuing a permit, authorization or approval for a project which has the potential to adversely impact an Aboriginal right, such as the right to hunt, fish, or trap in a particular area.

The scope of consultation required in particular circumstances ranges across a spectrum depending on both the nature of the asserted or established right and the seriousness of the potential adverse impacts on that right.

Depending on the particular circumstances, the Crown may also need to take steps to accommodate the potentially impacted Aboriginal or treaty right. For example, the Crown may be required to avoid or minimize the potential adverse impacts of the project.

III. THE CROWN'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

The Crown has the responsibility for ensuring that the duty to consult, and accommodate where appropriate, is met. However, the Crown may delegate the procedural aspects of consultation to a proponent.

There are different ways in which the Crown may delegate the procedural aspects of consultation to a proponent, including through a letter, a memorandum of understanding, legislation, regulation, policy and codes of practice.

If the Crown decides to delegate procedural aspects of consultation, the Crown will generally:

- Ensure that the delegation of procedural aspects of consultation and the responsibilities of the proponent are clearly communicated to the proponent;
- Identify which Aboriginal communities must be consulted;
- Provide contact information for the Aboriginal communities;
- Revise, as necessary, the list of Aboriginal communities to be consulted as new information becomes available and is assessed by the Crown;
- Assess the scope of consultation owed to the Aboriginal communities;
- Maintain appropriate oversight of the actions taken by the proponent in fulfilling the procedural aspects of consultation;
- Assess the adequacy of consultation that is undertaken and any accommodation that may be required;
- Provide a contact within any responsible ministry in case issues arise that require direction from the Crown; and
- Participate in the consultation process as necessary and as determined by the Crown.

IV. THE PROPONENT'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

Where aspects of the consultation process have been delegated to a proponent, the Crown, in meeting its duty to consult, will rely on the proponent's consultation activities and documentation of those activities. The consultation process informs the Crown's decision of whether or not to approve a proposed project or activity.

A proponent's role and responsibilities will vary depending on a variety of factors including the extent of consultation required in the circumstance and the procedural aspects of consultation the Crown has delegated to it. Proponents are often in a better position than the Crown to discuss a project and its potential impacts with Aboriginal communities and to determine ways to avoid or minimize the adverse impacts of a project.

A proponent can raise issues or questions with the Crown at any time during the consultation process. If issues or concerns arise during the consultation that cannot be addressed by the proponent, the proponent should contact the Crown.

a) What might a proponent be required to do in carrying out the procedural aspects of consultation?

Where the Crown delegates procedural aspects of consultation, it is often the proponent's responsibility to provide notice of the proposed project to the identified Aboriginal communities. The notice should indicate that the Crown has delegated the procedural aspects of consultation to the proponent and should include the following information:

- a description of the proposed project or activity;
- mapping;
- proposed timelines;
- details regarding anticipated environmental and other impacts;
- details regarding opportunities to comment; and
- any changes to the proposed project that have been made for seasonal conditions or other factors, where relevant.

Proponents should provide enough information and time to allow Aboriginal communities to provide meaningful feedback regarding the potential impacts of the project. Depending on the nature of consultation required for a project, a proponent also may be required to:

- provide the Crown with copies of any consultation plans prepared and an opportunity to review and comment;
- ensure that any necessary follow-up discussions with Aboriginal communities take place in a timely manner, including to confirm receipt of information, share and update information and to address questions or concerns that may arise;
- as appropriate, discuss with Aboriginal communities potential mitigation measures and/or changes to the project in response to concerns raised by Aboriginal communities;
- use language that is accessible and not overly technical, and translate material into Aboriginal languages where requested or appropriate;
- bear the reasonable costs associated with the consultation process such as, but not limited to, meeting hall rental, meal costs, document translation(s), or to address technical & capacity issues;
- provide the Crown with all the details about potential impacts on established or asserted Aboriginal or treaty rights, how these concerns have been considered and addressed by the proponent and the Aboriginal communities and any steps taken to mitigate the potential impacts;
- provide the Crown with complete and accurate documentation from these meetings and communications; and
- notify the Crown immediately if an Aboriginal community not identified by the Crown approaches the proponent seeking consultation opportunities.

b) What documentation and reporting does the Crown need from the proponent?

Proponents should keep records of all communications with the Aboriginal communities involved in the consultation process and any information provided to these Aboriginal communities.

As the Crown is required to assess the adequacy of consultation, it needs documentation to satisfy itself that the proponent has fulfilled the procedural aspects of consultation delegated to it. The documentation required would typically include:

- the date of meetings, the agendas, any materials distributed, those in attendance and copies of any minutes prepared;
- the description of the proposed project that was shared at the meeting;
- any and all concerns or other feedback provided by the communities;
- any information that was shared by a community in relation to its asserted or established Aboriginal or treaty rights and any potential adverse impacts of the proposed activity, approval or disposition on such rights;
- any proposed project changes or mitigation measures that were discussed, and feedback from Aboriginal communities about the proposed changes and measures;
- any commitments made by the proponent in response to any concerns raised, and feedback from Aboriginal communities on those commitments;
- copies of correspondence to or from Aboriginal communities, and any materials distributed electronically or by mail;
- information regarding any financial assistance provided by the proponent to enable participation by Aboriginal communities in the consultation;
- periodic consultation progress reports or copies of meeting notes if requested by the Crown;
- a summary of how the delegated aspects of consultation were carried out and the results; and
- a summary of issues raised by the Aboriginal communities, how the issues were addressed and any outstanding issues.

In certain circumstances, the Crown may share and discuss the proponent's consultation record with an Aboriginal community to ensure that it is an accurate reflection of the consultation process.

c) Will the Crown require a proponent to provide information about its commercial arrangements with Aboriginal communities?

The Crown may require a proponent to share information about aspects of commercial arrangements between the proponent and Aboriginal communities where the arrangements:

- include elements that are directed at mitigating or otherwise addressing impacts of the project;
- include securing an Aboriginal community's support for the project; or
- may potentially affect the obligations of the Crown to the Aboriginal communities.

The proponent should make every reasonable effort to exempt the Crown from confidentiality provisions in commercial arrangements with Aboriginal communities to the extent necessary to allow this information to be shared with the Crown.

The Crown cannot guarantee that information shared with the Crown will remain confidential. Confidential commercial information should not be provided to the Crown as part of the consultation record if it is not relevant to the duty to consult or otherwise required to be submitted to the Crown as part of the regulatory process.

V. WHAT ARE THE ROLES AND RESPONSIBILITIES OF ABORIGINAL COMMUNITIES' IN THE CONSULTATION PROCESS?

Like the Crown, Aboriginal communities are expected to engage in consultation in good faith. This includes:

- responding to the consultation notice;
- engaging in the proposed consultation process;
- providing relevant documentation;
- clearly articulating the potential impacts of the proposed project on Aboriginal or treaty rights; and
- discussing ways to mitigates any adverse impacts.

Some Aboriginal communities have developed tools, such as consultation protocols, policies or processes that provide guidance on how they would prefer to be consulted. Although not legally binding, proponents are encouraged to respect these community processes where it is reasonable to do so. Please note that there is no obligation for a proponent to pay a fee to an Aboriginal community in order to enter into a consultation process.

To ensure that the Crown is aware of existing community consultation protocols, proponents should contact the relevant Crown ministry when presented with a consultation protocol by an Aboriginal community or anyone purporting to be a representative of an Aboriginal community.

VI. WHAT IF MORE THAN ONE PROVINCIAL CROWN MINISTRY IS INVOLVED IN APPROVING A PROPONENT'S PROJECT?

Depending on the project and the required permits or approvals, one or more ministries may delegate procedural aspects of the Crown's duty to consult to the proponent. The proponent may contact individual ministries for guidance related to the delegation of procedural aspects of consultation for ministry-specific permits/approvals required for the project in question. Proponents are encouraged to seek input from all involved Crown ministries sooner rather than later.

400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6
Phone: 519.621.2761 **Toll free:** 866.900.4722 **Fax:** 519.621.4844 **Online:** www.grandriver.ca

October 26, 2022

Sam Mattina, C.E.T.
Director of Public Works
Township of Mapleton
7275 SideRoad 16,
Drayton, ON N0G 1P0

Adam Moore, M.A.Sc., P.Eng
Consultant Project Engineer
CIMA+
900-101 Frederick Street,
Kitchener, ON N2H 6R2

Dear Sam Mattina and Adam Moore

Re: Township of Mapleton Water and Wastewater Master Plan
Notice of Public Information Centre

Thank-you for circulating our office the Public Information Centre for the Township of Mapleton Water and Wastewater Master Plan. We request that our office remains notified of any information pertaining to the Master Plan as it becomes available.

The study area contains natural hazard and natural heritage features including the Grand River and its tributaries, floodplain, and areas with slope hazards as well as the regulated allowances to these features. The study area is also adjacent to several wetland features.

These features and their allowances are regulated under Ontario Regulation 150/06. Any future development within the regulated areas may require the issuance of a Development, Interference with Wetlands and Alterations to Shorelines and Watercourses permit from GRCA. A copy of our resource mapping is attached for your reference.

Should you have any further questions or comments, please contact Ben Kissner at 519-621-2763 x2237.

Sincerely,

Ben Kissner, M.Sc., MCIP, RPP
Resource Planner
Grand River Conservation Authority

Ministry of Heritage, Sport, Tourism and Culture Industries

Programs and Services Branch
400 University Ave, 5th Flr
Toronto, ON M7A 2R9
Tel: 613.242.3743

Ministère des Industries du Patrimoine, du Sport, du Tourisme et de la Culture

Direction des programmes et des services
400, av. University, 5e étage
Toronto, ON M7A 2R9
Tél: 613.242.3743

September 9, 2021 EMAIL ONLY

Erin Longworth, M.Eng., P.Eng., PMP
Consultant Project Manager
CIMA+
101 Frederick Street, Suite 900
Kitchener, ON N2H 6R2
Erin.Longworth@cima.ca

MHSTCI File	**:**	**0014845**
Proponent	**:**	**The Township of Mapleton**
Subject	**:**	**Notice of Commencement - Master Plan**
Project	**:**	**Water and Wastewater Master Plan**
Location	**:**	**The Township of Mapleton**

Dear Erin Longworth:

Thank you for providing the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) with the Notice of Commencement for this project. MHSTCI's interest in this master plan relates to it's mandate of conserving Ontario's cultural heritage, which includes archaeological resources, built heritage resources and cultural heritage landscapes.

MHSTCI understands that master plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. The Municipal Class Environmental Assessment (MCEA) outlines a framework for master plan and associated studies which should recognize the planning and design Process of this Class EA and should incorporate the key principles of successful environmental assessment planning identified in Section A.1.1. The master planning process will, at minimum, address Phases 1 and 2 of the Planning and Design Process of the MCEA.

This letter provides advice on how to incorporate consideration of cultural heritage in the above-mentioned master planning process by outlining the technical cultural heritage studies and the level of detail required to address cultural heritage in master plans. In accordance with the MCEA, cultural heritage resources should be identified early in the process in order to determine known and potential resources and potential impacts.

Master Plan Summary

The Township of Mapleton (Township) is initiating a Master Plan Study for water and wastewater servicing within the Township, to ensure that drinking water and wastewater services meet the needs of the community now and into the future. This study is proceeding in accordance with the requirements of the Municipal Class EA process (October 2000, amended in 2007, 2011, and 2015), which is an approved process under the Ontario Environmental Assessment Act. This Master Plan will fulfill the requirements for select Schedule B projects and become the basis for any future Schedule C projects identified through the Master Plan.

Identifying Cultural Heritage Resources

MHSTCI understands that the level of investigation, consultation and documentation in this master plan is sufficient to fulfill the requirements for Schedule B MCEA undertakings and would provide the basis for future investigations for the specific Schedule C MCEA undertakings identified within it. In regards to cultural heritage resources the Master Plan Document should;

- identify existing baseline environmental conditions,
- identify expected environmental impacts and,
- Include measures to mitigate potential negative impacts.

Archaeological Resources

Schedule B MCEA undertakings included as part of the master plan should be screened using the MHSTCI *Criteria for Evaluating Archaeological Potential* to determine if an archaeological assessment is needed. If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) should be undertaken by an archaeologist licensed under the Ontario Heritage Act and submitted for MHSTCI review prior to the completion of the master plan.

Built Heritage Resources and Cultural Heritage Landscapes

A Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment will be undertaken for the entire study area during the planning phase and will be summarized in the EA Report. This study will:

1. Describe the existing baseline cultural heritage conditions within the study area by identifying all known or potential built heritage resources and cultural heritage landscapes, including a historical summary of the study area. MHSTCI has developed screening criteria that may assist with this exercise: *Criteria for Evaluating for Potential Built Heritage Resources and Cultural Heritage Landscapes*.

2. Identify preliminary potential project-specific impacts on the known and potential built heritage resources and cultural heritage landscapes that have been identified. The report should include a description of the anticipated impact to each known or potential built heritage resource or cultural heritage landscape that has been identified.

3. Recommend measures to avoid or mitigate potential negative impacts to known or potential built heritage resources and cultural heritage landscapes. The proposed mitigation measures are to inform the next steps of project planning and design.

For Schedule B MCEAs undertaken as part of the master plan, where a known or potential built heritage resource or cultural heritage landscape may be directly and adversely impacted, and where it has not yet been evaluated for Cultural Heritage Value or Interest (CHVI), completion of a Cultural Heritage Evaluation Report (CHER) is required to fully understand its CHVI and level of significance. The CHER must be completed as part of the final EA report. If a potential resource is found to be of CHVI, then a Heritage Impact Assessment (HIA) will need to be undertaken and included in the final EA report. Our Ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. Please send the HIA to MHSTCI for review and make it available to local organizations or individuals who have expressed interest in review.

While some cultural heritage landscapes are contained within individual property boundaries, others span across multiple properties. For certain cultural heritage landscapes, it will be more appropriate for the CHER and HIA to include multiple properties, in order to reflect the extent of that cultural heritage landscape in its entirety.

Community input should be sought to identify locally recognized and potential cultural heritage resources. Sources include, but are not limited to, municipal heritage committees, community heritage registers, historical societies and other local heritage organizations.

Cultural heritage resources are often of critical importance to Indigenous communities. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities includes a discussion about known or potential cultural heritage resources that are of value to them.

Environmental Assessment Reporting

Technical cultural heritage studies are to be undertaken by a qualified person who has expertise, recent experience, and knowledge relevant to the type of cultural heritage resources being considered and the nature of the activity being proposed. Please advise MHSTCI whether any technical heritage studies will be completed for this master plan and provide them to MHSTCI before issuing a Notice of Completion.

Please send any notices, information and documentation to both Karla and I:

- Karla Barboza, Team Lead - Heritage (Acting) | Heritage Planning Unit (Heritage, Sport, Tourism and Culture Industries) | 416-314-7120 | karla.barboza@ontario.ca
- Joseph Harvey, Heritage Planner | Heritage Planning Unit (Heritage, Sport, Tourism and Culture Industries) | 613-242-3743 | joseph.harvey@ontario.ca

Thank you for consulting MHSTCI on this project. Please continue to do so through the master plan process and contact myself with any questions or clarification.

Sincerely,

Joseph Harvey
Heritage Planner
joseph.harvey@ontario.ca

Copied to: Sam Mattina, Director of Public Works, Township of Mapleton

Please notify MHSTCI if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the *Ontario Heritage Act* and the Standards and Guidelines for Consultant Archaeologists.

If human remains are encountered, all activities must cease immediately and the local police as well as the Registrar, Burials of the Ministry of Government and Consumer Services must be contacted. In situations where human remains are associated with archaeological resources, MHSTCI should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

Client's Guide to Preliminary Screening for Species at Risk

Ministry of the Environment, Conservation and Parks

Species at Risk Branch, Permissions and Compliance

DRAFT - May 2019

Table of Contents

1.0 Purpose, Scope, Background and Context

1.1 Purpose of this Guide

This guide has been created to:

- help clients better understand their obligation to gather information and complete a preliminary screening for species at risk before contacting the ministry,
- outline guidance and advice clients can expect to receive from the ministry at the preliminary screening stage,
- help clients understand how they can gather information about species at risk by accessing publicly available information housed by the Government of Ontario, and
- provide a list of other potential sources of species at risk information that exist outside the Government of Ontario.

It remains the client's responsibility to:

- carry out a preliminary screening for their projects,
- obtain best available information from all applicable information sources,
- conduct any necessary field studies or inventories to identify and confirm the presence or absence of species at risk or their habitat,
- consider any potential impacts to species at risk that a proposed activity might cause, and
- comply with the *Endangered Species Act* (ESA).

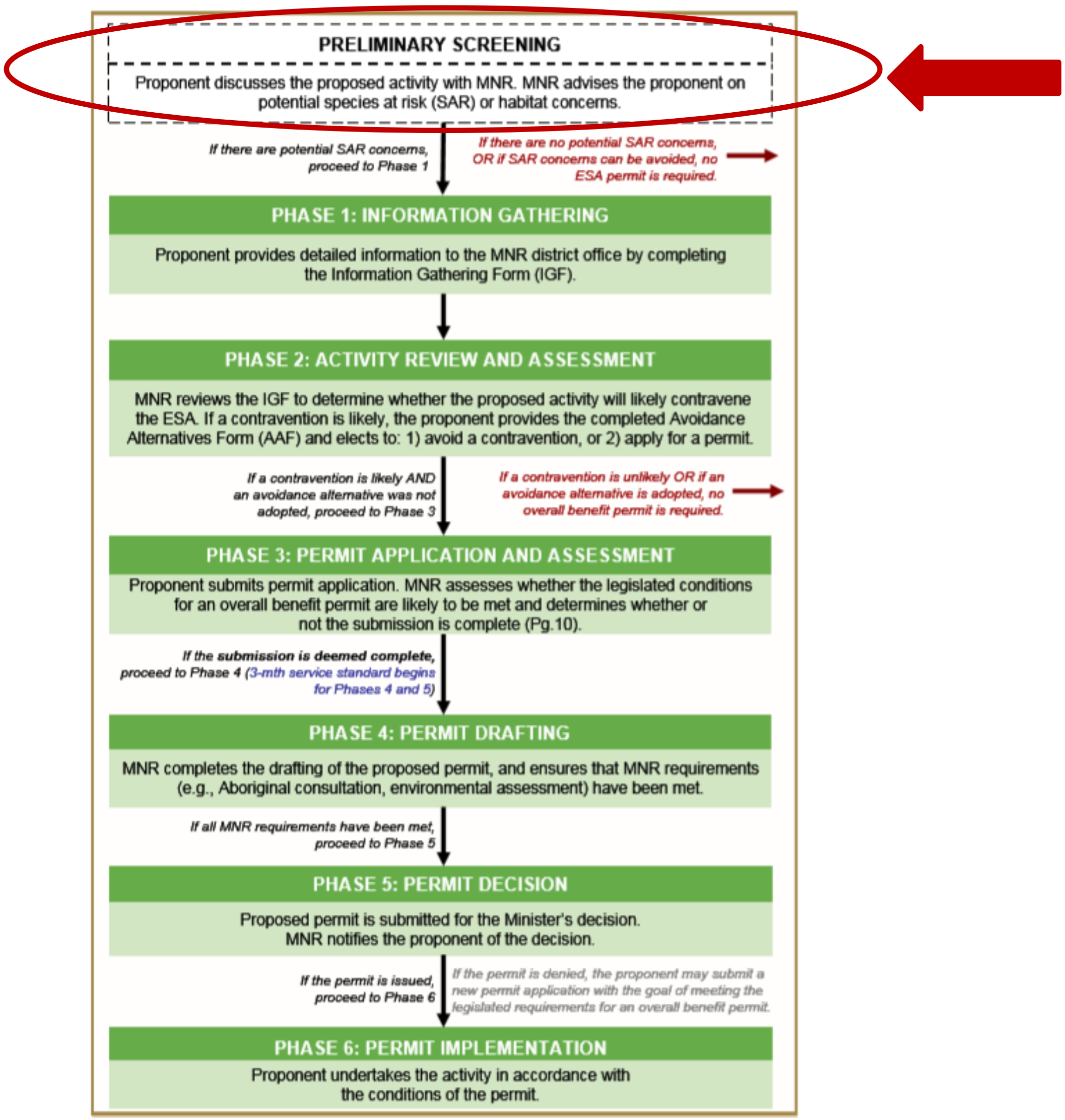
To provide the most efficient service, clients should initiate species at risk screenings and seek information from all applicable information sources identified in this guide, at a minimum, prior to contacting Government of Ontario ministry offices for further information or advice.

1.2 Scope

This guide is a resource for clients seeking to understand if their activity is likely to impact species at risk or if they are likely to trigger the need for an authorization under the ESA. It is not intended to circumvent any detailed site surveys that may be necessary to document species at risk or their habitat nor to circumvent the need to assess the impacts of a proposed activity on species at risk or their habitat. This guide is not an exhaustive list of available information sources for any given area as the availability of information on species at risk and their habitat varies across the province. This guide is intended to support projects and activities carried out on Crown and private land, by private landowners, businesses, other provincial ministries and agencies, or municipal government.

1.3 Background and Context

To receive advice on their proposed activity, clients must first determine whether any species at risk or their habitat exist or are likely to exist at or near their proposed activity, and whether their proposed activity is likely to contravene the ESA. Once this step is complete, clients may contact the ministry at SAROntario@ontario.ca to discuss the main purpose, general methods, timing and location of their proposed activity as well as information obtained about species at risk and their habitat at, or near, the site. At this stage, the ministry can provide advice and guidance to the client about potential species at risk or habitat concerns, measures that the client is considering to avoid adverse effects on species at risk or their habitat and whether additional field surveys are advisable. This is referred to as the “Preliminary Screening” stage. For more information on additional phases in the diagram below, please refer to the *Endangered Species Act Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits* policy available online at [https://www.ontario.ca/page/species-risk-overall-benefit-permits.](https://www.ontario.ca/page/species-risk-overall-benefit-permits) Please note: any reference to MNR in the diagram is replaced by MECP.



2.0 Roles and Responsibilities

To provide the most efficient service, clients should initiate species at risk screenings and seek information from all applicable information sources identified in this guide prior to contacting Government of Ontario ministry offices for further information or advice.

Step 1: Client seeks information regarding species at risk or their habitat that exist, or are likely to exist, at or near their proposed activity by referring to all applicable information sources identified in this guide.

Step 2: Client reviews and consider guidance on whether their proposed activity is likely to contravene the ESA (see section 3.4 of this guide for guidance on what to consider).

Step 3: Client gathers information identified in the checklist in section 4 of this guide.

Step 4: Client contacts the ministry at SAROntario@ontario.ca to discuss their preliminary screening. Ministry staff will ask the client questions about the main purpose, general methods, timing and location of their proposed activity as well as information obtained about species at risk and their habitat at, or near, the site. Ministry staff will also ask the client for their interpretation of the impacts of their activity on species at risk or their habitat as well as measures the client has considered to avoid any adverse impacts.

Step 5: Ministry staff will provide advice on next steps.

Option A: Ministry staff may advise the client they can proceed with their activity without an authorization under the ESA where the ministry is confident that:

- no protected species at risk or habitats are likely to be present at or near the proposed location of the activity; or
- protected species at risk or habitats are known to be present but the activity is not likely to contravene the ESA; or
- through the adoption of avoidance measures, the modified activity is not likely to contravene the ESA.

Option B: Ministry staff may advise the client to proceed to Phase 1 of the overall benefit permitting process (i.e. Information Gathering in the previous diagram), where:

- there is uncertainty as to whether any protected species at risk or habitats are present at or near the proposed location of the activity; or
- the potential impacts of the proposed activity are uncertain; or
- ministry staff anticipate the proposed activity is likely to contravene the ESA.

3.0 Information Sources

Land Information Ontario (LIO) and the Natural Heritage Information Centre (NHIC) maintain and provide information about species at risk, as well as related information about fisheries, wildlife, crown lands, protected lands and more. This information is made available to organizations, private individuals, consultants, and developers through online sources and is often considered under various pieces of legislation or as part of regulatory approvals and planning processes.

The information available from LIO or NHIC and the sources listed in this guide should not be considered as a substitute for site visits and appropriate field surveys. Generally, this information can be regarded as a starting point from which to conduct further field surveys, if needed. While this data represents best available current information, it is important to note that a lack of information for a site does not mean that species at risk or their habitat are not present. There are many areas where the Government of Ontario does not currently have information, especially in more remote parts of the province. The absence of species at risk location data at or near your site does not necessarily mean no species at risk are present at that location. On-site assessments can better verify site conditions, identify and confirm presence of species at risk and/or their habitats.

Information on the location (i.e. observations and occurrences) of species at risk is considered sensitive and therefore publicly available only on a 1km square grid as opposed to as a detailed point on a map. This generalized information can help you understand which species at risk are in the general vicinity of your proposed activity and can help inform field level studies you may want to undertake to confirm the presence, or absence of species at risk at or near your site.

Should you require specific and detailed information pertaining to species at risk observations and occurrences at or near your site on a finer geographic scale; you will be required to demonstrate your need to access this information, to complete data sensitivity training and to obtain a Sensitive Data Use License from the NHIC. Information on how to obtain a license can be found online at https://www.ontario.ca/page/get-natural-heritage-information.

Many organizations (e.g. other Ontario ministries, municipalities, conservation authorities) have ongoing licensing to access this data so be sure to check if your organization has this access and consult this data as part of your preliminary screening if your organization already has a license.

3.1 Make a Map: Natural Heritage Areas

The Make a Natural Heritage Area Map (available online at https://www.ontario.ca/page/make-natural-heritage-area-map provides public access to natural heritage information, including species at risk, without the user needing to have Geographic Information System (GIS) capability. It allows users to view and identify generalized species at risk information, mark areas of interest, and create and print a custom map directly from the web application. The tool also shows topographic information such as roads, rivers, contours and municipal boundaries.

Users are advised that sensitive information has been removed from the natural areas dataset and the occurrences of species at risk has been generalized to a 1-kilometre grid to mitigate the risks to the species (e.g. illegal harvest, habitat disturbance, poaching).

The web-based mapping tool displays natural heritage data, including:

- Generalized Species at risk occurrence data (based on a 1-km square grid),
- Natural Heritage Information Centre data.

Data cannot be downloaded directly from this web map; however, information included in this application is available digitally through Land Information Ontario (LIO) at https://www.ontario.ca/page/land-information-ontario.

3.2 Land Information Ontario (LIO)

Most natural heritage data is publicly available. This data is managed in a large provincial corporate database called the LIO Warehouse and can be accessed online through the LIO Metadata Management Tool at https://www.javacoeapp.lrc.gov.on.ca/geonetwork/srv/en/main.home. This tool provides descriptive information about the characteristics, quality and context of the data. Publicly available geospatial data can be downloaded directly from this site.

While most data are publicly available, some data may be considered highly sensitive (i.e. nursery areas for fish, species at risk observations) and as such, access to some data maybe restricted.

3.3 Additional Species at Risk Information Sources

- The Breeding Bird Atlas can be accessed online at http://www.birdsontario.org/atlas/index.jsp?lang=en
- eBird can be accessed online at https://ebird.org/home
- iNaturalist can be accessed online at https://www.inaturalist.org/
- The Ontario Reptile and Amphibian Atlas can be accessed online at https://ontarionature.org/programs/citizen-science/reptile-amphibian-atlas
- Your local Conservation Authority. Information to help you find your local Conservation Authority can be accessed online at https://conservationontario.ca/conservation-authorities/find-a-conservation-authority/

  Local naturalist groups or other similar community-based organizations
- Local Indigenous communities
- Local land trusts or other similar Environmental Non-Government Organizations
- Field level studies to identify if species at risk, or their habitat, are likely present or absent at or near the site.
- When an activity is proposed within one of the continuous caribou ranges, please be sure to consider the caribou Range Management Policy. This policy includes figures and maps of the continuous caribou range, can be found online at https://www.ontario.ca/page/range-management-policy-support-woodland-caribou-conservation-and-recovery

3.4 Information Sources to Support Impact Assessments

- Guidance to help you understand if your activity is likely to adversely impact species at risk or their habitat can be found online at https://www.ontario.ca/page/policy-guidance-harm-and-harass-under-endangered-species-act and https://www.ontario.ca/page/categorizing-and-protecting-habitat-under-endangered-species-act
- A list of species at risk in Ontario is available online at https://www.ontario.ca/page/species-risk-ontario. On this webpage, you can find out more about each species, including where is lives, what threatens it and any specific habitat protections that apply to it by clicking on the photo of the species.

4.0 Check-List

Please feel free to use the check list below to help you confirm you have explored all applicable information sources and to support your discussion with Ministry staff at the preliminary screening stage.

- ✓ Land Information Ontario (LIO)
- ✓ Natural Heritage Information Centre (NHIC)
- ✓ The Breeding Bird Atlas
- ✓ eBird
- ✓ iNaturalist
- ✓ Ontario Reptile and Amphibian Atlas
- ✓ List Conservation Authorities you contacted:____________________________________

  ____
- ✓ List local naturalist groups you contacted:______________________________________

  ____
- ✓ List local Indigenous communities you contacted:________________________________

  ____
- ✓ List any other local land trusts or Environmental Non-Government Organizations you contacted:____

  ____
- ✓ List and field studies that were conducted to identify species at risk, or their habitat, likely to be present or absent at or near the site: ______________________________________

  ____
- ✓ List what you think the likely impacts of your activity are on species at risk and their habitat (e.g. damage or destruction of habitat, killing, harming or harassing species at risk):____

  ____

Adam Moore

From:	Harvey, Joseph (MHSTCI) <Joseph.Harvey@ontario.ca>
Sent:	September 9, 2021 12:39 PM
To:	Erin Longworth
Cc:	Barboza, Karla (MHSTCI); Sam Mattina
Subject:	File 0014845: Notice of Study Commencement - Water and Wastewater Master Plan for the Township of Mapleton
Attachments:	2021-09-09_WWMP-Mapleton-MHSTCI-Ltr.pdf

EXTERNAL EMAIL

Erin Longworth,

Please find attached MHSTCI's initial advice for the above referenced undertaking. Do not hesitate to contact me with any questions or concerns.

Regards,

Joseph Harvey | Heritage Planner (A)
Heritage, Tourism and Culture Division | Programs and Services Branch | Heritage Planning Unit
Ministry of Heritage, Sport, Tourism and Culture Industries
613.242.3743
Joseph.Harvey@ontario.ca

Adama Moore

From:	Sam Mattina <SMattina@mapleton.ca>
Sent:	August 3, 2021 9:28 AM
To:	Wanda Patton
Cc:	Erin Longworth
Subject:	FW: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad
Attachments:	FINAL - T000974D-090-210730-PN-Notice of Commencement-Final-e01.docx

EXTERNAL EMAIL

Please proceed with the attached version.
Thanks Wanda.

Mapleton TOWNSHIP Rooted in tradition. Growing for the future.
Sam Mattina C.E.T., CMM III
Director of Public Works
Township of Mapleton
7275 Sideroad 16, Drayton, ON
519.638.3313 x 041
www.mapleton.ca

From: Wanda Patton <wpatton@mapleton.ca>
Sent: August 3, 2021 9:25 AM
To: Sam Mattina <SMattina@mapleton.ca>
Subject: FW: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

The paper has just confirmed that they can fit the advertisement into this weeks paper.
They will wait our FINAL version.

Wanda

From: Sam Mattina <SMattina@mapleton.ca>
Sent: August 3, 2021 9:01 AM
To: Wanda Patton <wpatton@mapleton.ca>
Cc: Erin Longworth <Erin.Longworth@cima.ca>
Subject: FW: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

Thanks Wanda

Sam Mattina C.E.T., CMM III
Director of Public Works

Township of Mapleton
7275 Sideroad 16, Drayton, ON
519.638.3313 x 041
www.mapleton.ca

From: Wanda Patton <wpatton@mapleton.ca>
Sent: August 3, 2021 8:59 AM
To: Sam Mattina <SMattina@mapleton.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

I've already sent them a draft for sizing.

From: Sam Mattina <SMattina@mapleton.ca>
Sent: August 3, 2021 8:58 AM
To: Wanda Patton <wpatton@mapleton.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

Hi Wanda;
There is no attachment. In the interest of time, send it through and we will look at the proof when it comes.
Thanks.

Sam Mattina C.E.T., CMM III
Director of Public Works

Township of Mapleton
7275 Sideroad 16, Drayton, ON
519.638.3313 x 041
www.mapleton.ca

From: Wanda Patton <wpatton@mapleton.ca>
Sent: August 3, 2021 8:46 AM
To: Sam Mattina <SMattina@mapleton.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad
Importance: High

Hi Sam,
The advertisement I have seems to be lined up well. Can you please how you want it aligned on the page?
I've changed the date to August 5, 2021 and will see if they will accept it for this week for publishing after I hear from you about the alignment issue.

Wanda

From: Sam Mattina <SMattina@mapleton.ca>
Sent: July 30, 2021 5:27 PM
To: Wanda Patton <wpatton@mapleton.ca>
Cc: Erin.Longworth@cima.ca
Subject: Re: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

Hi Wanda
Sorry I missed this earlier.
I read the notice and the content is fine except it needs to be aligned properly on the page.
Let's get it to the paper at first opportunity, (confirm publish date) and post on website.
Thank you.

Sam Mattina
Director of Public Works
Township of Mapleton

On Jul 30, 2021, at 4:38 PM, Wanda Patton <wpatton@mapleton.ca> wrote:

LAST CALL
Do you want this in the paper next week?
If so, please review and approve asap. The paper is closing in 20 minutes.

Wanda

From: Wanda Patton
Sent: July 30, 2021 12:11 PM
To: Sam Mattina <SMattina@mapleton.ca>
Subject: FW: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad
Importance: High

Sam,
With this being a long weekend, the advertisement must be submitted to the paper today (if you want it published next week).
**Aly is not in the office today, so I will also need to find a contact person at the paper.
Can you please review and approve the advertisement so that I can move forward or advise if you wish to wait a week.

Thank you,
Wanda

From: Wanda Patton
Sent: July 30, 2021 9:41 AM
To: Sam Mattina <SMattina@mapleton.ca>
Subject: FW: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad
Importance: High

Hi Sam,

Attached is the Notice of Commencement from CIMA for your review and approval.
I see that Aly is away today, so I will submit directly to the paper once I receive your approval.

Wanda

From: Erin Longworth <Erin.Longworth@cima.ca>
Sent: July 30, 2021 9:19 AM
To: Wanda Patton <wpatton@mapleton.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

Sounds good, thanks Wanda.

I've attached the final notice with August 4th as an issue date. I have provided in Word format – I assume that would be the easiest to work with?

Sam and Manny have seen this before and didn't have any comments at that time, but definitely understand the need for a final sign-off before it is issued to the public.

Thanks for your help!
Erin

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

<image001.jpg>

From: Wanda Patton <wpatton@mapleton.ca>
Sent: Friday, July 30, 2021 8:26 AM
To: Erin Longworth <Erin.Longworth@cima.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

EXTERNAL EMAIL

Hello Erin,
If we can get it to the paper today, the earliest they could publish would be August 4th.

Let's aim to get it all wrapped up by noon today if possible.

Sam will need to approve it before I can send it to our staff liaison for submission to the paper.

Wanda

From: Erin Longworth <Erin.Longworth@cima.ca>
Sent: July 30, 2021 8:23 AM
To: Wanda Patton <wpatton@mapleton.ca>
Cc: Sam Mattina <SMattina@mapleton.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

Hi Wanda,

Thanks for the info!
If we submit the Notice today, do you know when it would be able to be first published? I just have to update it to include that date at the bottom of the Notice.
It is ready to go otherwise.

Thanks,
Erin

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

<image001.jpg>

From: Wanda Patton <wpatton@mapleton.ca>
Sent: Wednesday, July 28, 2021 5:21 PM
To: Erin Longworth <Erin.Longworth@cima.ca>
Cc: Sam Mattina <smattina@mapleton.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

EXTERNAL EMAIL

Hi Erin,
We have one staff person that is the main contact for advertising with our local paper.
You can send me your notice and I will follow through at this end with our contact person.
The local paper prefers having all advertising submitted no later than Friday if possible. Earlier if there is a long weekend to content with.

Regards,
Wanda

From: Sam Mattina <SMattina@mapleton.ca>
Sent: July 28, 2021 5:13 PM
To: Erin Longworth <Erin.Longworth@cima.ca>
Cc: Manny Baron <mbaron@mapleton.ca>; Iva Danilovic <Iva.Danilovic@cima.ca>; Wanda Patton <wpatton@mapleton.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

Hi Erin;

Please work directly with my Admin Assistant Wanda Patton to advertise in the Wellington Advertiser. We will pay for the ad directly. We have no special arrangements to my knowledge, other than a few favours possibly in the bank?
I have copied Wanda in this email.
Thank you

<image002.jpg>

From: Erin Longworth <Erin.Longworth@cima.ca>
Sent: July 28, 2021 4:25 PM
To: Sam Mattina <SMattina@mapleton.ca>
Cc: Manny Baron <mbaron@mapleton.ca>; Iva Danilovic <Iva.Danilovic@cima.ca>
Subject: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

Hi Sam,

Hope you're enjoying your summer!

I wanted to touch base on issuing the Notice of Commencement. We will need the Notice to be placed in two sequential issues of the local publication – I'm guessing this is the Wellington Advertiser. I'm not sure if there are any Township specific publications?

Is coordination with the newspaper something you would handle on your end? I know sometimes Municipalities have agreements with publications to include Notices and municipal news items free or at reduced rates, so it may be beneficial for you or someone within the Township to handle this coordination if these agreements are in place. If not, and you would like us to handle it, we can absolutely do that as well if you could provide a contact for the newspaper.

Please let me know how you typically handle this and we will go from there.

Thanks!
Erin

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

<image001.jpg>

<T000974D-090-210730-PN-Notice of Commencement-Final-e01.docx>

Adam Moore

From:	Erin Longworth
Sent:	August 13, 2021 9:59 AM
Cc:	Sam Mattina
Subject:	Notice of Study Commencement - Water and Wastewater Master Plan for the Township of Mapleton
Attachments:	Mapleton Water and Wastewater Master Plan -Notice of Commencement-FINAL AODA.pdf

Municipal Class Environmental Assessment Master Plan Study

Hello,

This email is regarding the Municipal Class Environmental Assessment (Class EA) Master Plan Study that the Township of Mapleton is undertaking to plan for water and wastewater servicing within the Township.

Notice of Study Commencement

A Municipal Class EA Master Plan study has been initiated to ensure that drinking water and wastewater services meet the needs of the community now and into the future. Attached is a copy of the Notice of Study Commencement with additional project details.

Thank you and regards,

Erin Longworth

Attachments:

1. Notice of Study Commencement

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From:	Adam Moore
Sent:	October 11, 2022 8:51 AM
To:	Naso, Valerie (IO)
Cc:	Manny Baron
Subject:	RE: IO EA Notification Response: Town of Mapleton Water and Wastewater Master Plan - Notice of Public Information Centre

Hi Valerie,

Thank you for the update below. There are no provincial government properties affected in the study area.
We will add the email below to our contact list for notifications.

Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Naso, Valerie (IO) <Valerie.Naso@infrastructureontario.ca>
Sent: September 28, 2022 3:54 PM
To: Manny Baron <mbaron@mapleton.ca>; Adam Moore <Adam.Moore@cima.ca>
Subject: IO EA Notification Response: Town of Mapleton Water and Wastewater Master Plan - Notice of Public Information Centre

EXTERNAL EMAIL

Good afternoon,

Thank you for sending us the Notice of Public Information Centre for the Water and Wastewater Master Plan project located in the Town of Mapleton.

It is ultimately the proponent's responsibility to verify if provincial government property is within the study area. Title documents may identify owners of provincial government property as any of the following:

- His Majesty the King
- Her Majesty the Queen
- Hydro One
- Hydro One Networks Inc.
- Management Board Secretariat (MBS)
- Minister of Economic Development, Employment and Infrastructure (MEDEI)
- Minister of Energy and Infrastructure (MEI)
- Minister of Government and Consumer Services (MGCS)
- Minister of Infrastructure (MOI)
- Minister of Natural Resources and Forestry (MNRF)
- Minister of Public Infrastructure Renewal (PIR)
- Minister of Public Works
- Minister of Transportation (MTO)
- Ontario Lands Corporation (OLC)
- Ontario Realty Corporation (ORC)

If provincial government property in the study area is not required for the project, please continue to consult us as a directly affected stakeholder. However, if government property is required for the project, the proponent should contact us so that we can advise about requirements for obtaining government property.

Additionally, please remember to send notices to our dedicated notice email address: noticereview@infrastructureontario.ca

Regards,

Valerie

Infrastructure Ontario

Valerie Naso (she, her)
Infrastructure Ontario
Co-op, Environmental Management
valerie.naso@infrastructureontario.ca
Phone: +1 647-695-5119
www.infrastructureontario.ca

Adam Moore

From:	Erin Longworth
Sent:	August 16, 2021 12:14 PM
To:	eanotification.wcregion@ontario.ca
Cc:	Sam Mattina
Subject:	RE: Township of Mapleton, MEA Class EA, Water & Wastewater Master Plan
Attachments:	streamlined_ea_project_information_form-Mapleton W&WW Master Plan-Notice of Commencement.xlsx; Mapleton Water and Wastewater Master Plan -Notice of Commencement-FINAL AODA.pdf

Apologies, I realized that the Notice was not attached to the previous email. Have now attached both the notice and the form.
Sorry for the inconvenience.

Regards,

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Erin Longworth
Sent: Monday, August 16, 2021 12:12 PM
To: eanotification.wcregion@ontario.ca
Cc: Sam Mattina <SMattina@mapleton.ca>
Subject: Township of Mapleton, MEA Class EA, Water & Wastewater Master Plan

Hello,

Please find attached the Notice of Study Commencement and completed project information form for the above noted project.

Thank you and regards,

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From:	Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Sent:	October 4, 2021 12:24 PM
To:	Sam Mattina; Erin Longworth
Cc:	Potter, Katy (MECP); Burdon, Jeff (MECP); Williamson, Lisa (MECP); Whitelaw, Clarissa (MECP); Ferraro, Stefanie (MECP)
Subject:	RE: Township of Mapleton, MEA Class EA, Water & Wastewater Master Plan
Attachments:	Township of Mapleton Water and Wastewater Master Plan _Acknowledgment Letter.pdf; Client Guide to Preliminary Screening-May 2019.pdf; Mapleton Water and Wastewater Master Plan -Notice of Commencement-FINAL AODA.pdf

EXTERNAL EMAIL

Good afternoon Sam Mattina and Erin Longworth,

Please see attached Acknowledgement letter and attachments.

Best regards,

Joan Del Villar Cuicas
Regional Environmental Planner
Project Review Unit | Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks
Joan.delvillarcuicas@ontario.ca | Phone: 365-889-1180

From: Erin Longworth <Erin.Longworth@cima.ca>
Sent: August 16, 2021 12:14 PM
To: EA Notices to WCRegion (MECP) <eanotification.wcregion@ontario.ca>
Cc: Sam Mattina <smattina@mapleton.ca>
Subject: RE: Township of Mapleton, MEA Class EA, Water & Wastewater Master Plan

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Apologies, I realized that the Notice was not attached to the previous email. Have now attached both the notice and the form.
Sorry for the inconvenience.

Regards,

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Do you really need to print this email? Let's protect the environment!

From: Erin Longworth
Sent: Monday, August 16, 2021 12:12 PM
To: eanotification.wcregion@ontario.ca
Cc: Sam Mattina <SMattina@mapleton.ca>
Subject: Township of Mapleton, MEA Class EA, Water & Wastewater Master Plan

Hello,

Please find attached the Notice of Study Commencement and completed project information form for the above noted project.

Thank you and regards,

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Do you really need to print this email? Let's protect the environment!

CONFIDENTIALITY WARNING This email is confidential. If you are not the intended recipient, please notify the sender immediately and delete it in its entirety.

Adam Moore

From: Adam Moore
Sent: September 26, 2022 4:24 PM
To: Rick Richardson
Subject: RE: Water and Waste Water Master Plan

Hi Rick,

You will be included on the notification list.

Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Rick Richardson <RRichardson@mapleton.ca>
Sent: September 26, 2022 3:22 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: Water and Waste Water Master Plan

EXTERNAL EMAIL

Adam,
I would like to be notified about future project information regarding this Master Plan. I will be there on October 12, 2022 at 5pm in the Council Chambers.

Rick Richardson
Fire Chief

Township of Mapleton
7275 Sideroad 16, Drayton, ON
519.638.3313 x 020

www.mapleton.ca

Adamm Moore

From: Erin Longworth
Sent: July 30, 2021 9:19 AM
To: Wanda Patton
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad
Attachments: T000974D-090-210730-PN-Notice of Commencement-Final-e01.docx

Sounds good, thanks Wanda.

I've attached the final notice with August 4th as an issue date. I have provided in Word format – I assume that would be the easiest to work with?

Sam and Manny have seen this before and didn't have any comments at that time, but definitely understand the need for a final sign-off before it is issued to the public.

Thanks for your help!
Erin

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Wanda Patton <wpatton@mapleton.ca>
Sent: Friday, July 30, 2021 8:26 AM
To: Erin Longworth <Erin.Longworth@cima.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

EXTERNAL EMAIL

Hello Erin,
If we can get it to the paper today, the earliest they could publish would be August 4th.
Let's aim to get it all wrapped up by noon today if possible.

Sam will need to approve it before I can send it to our staff liaison for submission to the paper.

Wanda

From: Erin Longworth <Erin.Longworth@cima.ca>
Sent: July 30, 2021 8:23 AM
To: Wanda Patton <wpatton@mapleton.ca>
Cc: Sam Mattina <SMattina@mapleton.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

Hi Wanda,

Thanks for the info!
If we submit the Notice today, do you know when it would be able to be first published? I just have to update it to include that date at the bottom of the Notice.
It is ready to go otherwise.

Thanks,
Erin

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Wanda Patton <wpatton@mapleton.ca>
Sent: Wednesday, July 28, 2021 5:21 PM
To: Erin Longworth <Erin.Longworth@cima.ca>
Cc: Sam Mattina <smattina@mapleton.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

EXTERNAL EMAIL

Hi Erin,

We have one staff person that is the main contact for advertising with our local paper.
You can send me your notice and I will follow through at this end with our contact person.
The local paper prefers having all advertising submitted no later than Friday if possible. Earlier if there is a long weekend to content with.

Regards,
Wanda

From: Sam Mattina <SMattina@mapleton.ca>
Sent: July 28, 2021 5:13 PM
To: Erin Longworth <Erin.Longworth@cima.ca>
Cc: Manny Baron <mbaron@mapleton.ca>; Iva Danilovic <Iva.Danilovic@cima.ca>; Wanda Patton <wpatton@mapleton.ca>
Subject: RE: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

Hi Erin;

Please work directly with my Admin Assistant Wanda Patton to advertise in the Wellington Advertiser. We will pay for the ad directly. We have no special arrangements to my knowledge, other than a few favours possibly in the bank?
I have copied Wanda in this email.
Thank you

Mapleton TOWNSHIP Rooted in tradition. Growing for the future.

Sam Mattina C.E.T., CMM III
Director of Public Works
Township of Mapleton
7275 Sideroad 16, Drayton, ON
519.638.3313 x 041
www.mapleton.ca

From: Erin Longworth <Erin.Longworth@cima.ca>
Sent: July 28, 2021 4:25 PM
To: Sam Mattina <SMattina@mapleton.ca>
Cc: Manny Baron <mbaron@mapleton.ca>; Iva Danilovic <Iva.Danilovic@cima.ca>
Subject: W/WW Master Plan - Notice of Study Commencement - Newspaper Ad

Hi Sam,

Hope you're enjoying your summer!

I wanted to touch base on issuing the Notice of Commencement. We will need the Notice to be placed in two sequential issues of the local publication – I'm guessing this is the Wellington Advertiser. I'm not sure if there are any Township specific publications?

Is coordination with the newspaper something you would handle on your end? I know sometimes Municipalities have agreements with publications to include Notices and municipal news items free or at reduced rates, so it may be beneficial for you or someone within the Township to handle this coordination if these agreements are in place. If not, and you would like us to handle it, we can absolutely do that as well if you could provide a contact for the newspaper.

Please let me know how you typically handle this and we will go from there.

Thanks!
Erin

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From: Adam Moore
Sent: September 26, 2022 3:13 PM
To: Adam Moore
Subject: Town of Mapleton Water/Wastewater Master Plan - Notice of PIC
Attachments: T000974D-090-220926-PN-Notice of PIC-e01.pdf

Good afternoon,

The Town of Mapleton is holding an in-person **Public Information Centre** (PIC) for the Water and Wastewater Master Plan Municipal Class Environmental Assessment. The PIC will introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. Further details about the PIC and how to provide comments are included in the attached Notice.

If you have any questions or feedback, please do not hesitate to contact us by responding to this email.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From: Adam Moore
Sent: August 19, 2022 9:19 AM
To: Adam Moore
Subject: Township of Mapleton Water/Wastewater Master Plan Study Update

Good afternoon,

The Township of Mapleton is undertaking a Water and Wastewater Master Plan study to ensure that drinking water and wastewater services meet the needs of the community now and into the future. We have updated the project webpage (linked below) to include an information package with important background material and details for next steps.

https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan

Details about a Public Information Centre (PIC) are posted in the webpage update but please note that a separate Notice of the PIC will be advertised in the local newspaper and sent to you in late September.

Please do not hesitate to contact us by responding to this email if you have any questions.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From: Ben Kissner <bkissner@grandriver.ca>
Sent: October 26, 2022 11:53 AM
To: Adam Moore
Subject: RE: Town of Mapleton Water/Wastewater Master Plan - Notice of PIC
Attachments: Mapleton W WW MP - GRCA Coments.pdf

EXTERNAL EMAIL

Good morning,

GRCA comments on this project at this time are simply the request that we continue to be notified as this project develops further. I have prepared the attached letter to represent this request.

Regards,
Ben

Ben Kissner, M.Sc., MCIP, RPP
Resource Planner
Grand River Conservation Authority
400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6
Office: 519-621-2763 ext. 2237
Toll-free: 1-866-900-4722
Fax: 519-621-4844
www.grandriver.ca | Connect with us on social

From: Adam Moore <Adam.Moore@cima.ca>
Sent: September 26, 2022 3:13 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: Town of Mapleton Water/Wastewater Master Plan - Notice of PIC

Good afternoon,

The Town of Mapleton is holding an in-person **Public Information Centre** (PIC) for the Water and Wastewater Master Plan Municipal Class Environmental Assessment. The PIC will introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. Further details about the PIC and how to provide comments are included in the attached Notice.

If you have any questions or feedback, please do not hesitate to contact us by responding to this email.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Engineering for **people**

Do you really need to print this email? Let's protect the environment!

C-5

Appendix C-5: First Nation Consultation

Township of Mapleton

First Nation, Metis and Inuit Communities Consultation Record

Mapleton Water and Wastewater Servicing Master Plan

Tuesday, April 18, 2023

T000974D

CIMA+

900-101 Frederick Street
Kitchener, ON N2H 6R2
T 519-772-2299 **F** 519-772-2298
cima.ca

Contact

Stuart Winchester
stuart.winchester@cima.ca
T 519-772-2299

Engineering for **people**

Table of Contents

1 Introduction

Identification of Indigenous communities followed provincial guidance provided by the Ministry of Environment, Conservation and Parks (MECP). This included review of the Aboriginal and Treaty Rights Information System.

Initial consultation with Indigenous Communities included written correspondence introducing the project and identifying the project contacts. A hard-copy version of the Notice of Commencement was sent by mail on August 5th, 2021 and November 24th, 2021. An email was sent on August 13th, 2021 and December 16th, 2021 that included a digital copy of the Notice of Commencement.

In cases where receipt of the correspondence was not confirmed, follow up phone calls were made by CIMA+.

CIMA+ maintained a detailed record of Indigenous consultation, including all communication records, as seen in the following sections, materials prepared and documents issued.

2 Consultation with Metis Nation of Ontario

Land, Resources and Consultation Department:

- August 5, 2021 – Notice of Commencement sent via mail.
- August 13, 2021 – Notice of Commencement sent via email.
- December 16, 2021 – Called Linda Norheim to ask if Metis Nation of Ontario (MNO) had received Notice of Commencement. Ms. Norheim advised a follow up call to Justin Hunt.
- December 16, 2021 – Called Justin Hunt to ask if MNO had received the Notice of Commencement. Mr. Hunt noted that MNO receives a significant number of notices and would reach out with any questions or concerns. Noted that consultations@metisnation.org is to be kept on the email list for future notices and project updates.
- September 26, 2022 – Notice of PIC Sent via email.

3 Consultation with Mississaugas of the Credit First Nation

Chief R. Stacey LaForme:

- August 5, 2021 – Notice of Commencement sent via mail.
- August 13, 2021 – Notice of Commencement sent via email.

- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- December 7, 2021 – Called and left message with Chief LaForme's secretary to reach out to Erin Longworth with any initial questions or concerns regarding the study.
- September 26, 2022 – Notice of PIC Sent via email.

Fawn Sault, Consultation Manager:

- August 5, 2021 – Notice of Commencement sent via mail.
- August 13, 2021 – Notice of Commencement sent via email.
- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- December 7, 2021 – Followed up with phone call to ask if Ms. Sault had received the Notice of Commencement and had any preliminary questions or concerns. Ms. Sault noted that if any Schedule B projects are identified through the Master Plan, Mississaugas of the Credit First Nation (MCFN) should be notified and engaged before the archaeological, cultural heritage, and environmental fields studies.
- September 26, 2022 – Notice of PIC Sent via email.

4 Consultation with Six Nations of the Grand River

Chief Mark Hill

- August 5, 2021 – Notice of Commencement sent via mail.
- August 13, 2021 – Notice of Commencement sent via email.
- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- December 7, 2021 – Followed up with phone call to ask if Chief Hill had received the Notice of Commencement and had any preliminary questions or concerns. Spoke with Chief Hill’s secretary who asked me to call Lonny Bomberry with the Land and Resource Department.

Lonny Bomberry, Director, Land and Resource Department:

- August 5, 2021 – Notice of Commencement sent via mail.
- August 13, 2021 – Notice of Commencement sent via email.

- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- December 7, 2021 – Followed up with phone call to ask if Mr. Bomberry had received the Notice of Commencement and had any preliminary questions or concerns. Spoke with Mr. Bomberry who asked me to email the notice to Robbin Vanstone (rvanstone@sixnations.ca).

Robbin Vanstone, Consultation Supervisor of Land Use Unit

- August 5, 2021 – Notice of Commencement sent via mail.
- August 13, 2021 – Notice of Commencement sent via email.
- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- September 26, 2022 – Notice of PIC Sent via email.

5 Consultation with Haudenosaunee Confederacy

Hohahes Leroy Hill, Secretary, Six Nations Haudenosaunee Confederacy Chiefs Council:

- August 5, 2021 – Notice of Commencement sent via mail.
- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- December 7, 2021 – Followed up with phone call. There was no answer and the voicemail box was full.

6 Consultation with Aamjiwnaang First Nation

Jamie Maness, Band Manager:

- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- November 24, 2021 – Notice of Commencement sent via mail.
- December 7, 2021 – Followed up with phone call. Receptionist noted that it is best to reach Mr. Maness by email.
- December 16, 2021 – Notice of Commencement sent via email.
- September 26, 2022 – Notice of PIC Sent via email.

7 Consultation with Walpole Island First Nation, Bkejwanong Territory

Chief Charles Sampson:

- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- November 24, 2021 – Notice of Commencement sent via mail.
- December 7, 2021 – Followed up with phone call. Secretary noted that Chief Sampson is out of the office today and requested that I reach out to Melissa Day.

Administration:

- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- November 24, 2021 – Notice of Commencement sent via mail.
- December 7, 2021 – Followed up with phone call. Left a message with Melissa Day asking her to reach out to Erin Longworth with any initial questions or concerns regarding the study.
- September 26, 2022 – Notice of PIC Sent via email.

8 Consultation with Kettle and Stony Point First Nation

Chief Jason Henry:

- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- November 24, 2021 – Notice of Commencement sent via mail.
- December 7, 2021 – Followed up with phone call. Spoke with Valerie George who asked for a follow up notice via email.
- December 16, 2021 – Notice of Commencement sent via email.

Administration:

- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- November 24, 2021 – Notice of Commencement sent via mail.
- December 7, 2021 – Followed up with phone call. Spoke with Valerie George who asked for a follow up notice via email.
- December 16, 2021 – Notice of Commencement sent via email.
- September 26, 2022 – Notice of PIC Sent via email.

Valerie George:

- October 4, 2021 – Letter received from Joan Del Villar Cuicas, MECP, dated October 4, 2021 noting the inclusion of proper, meaningful consultation with Aboriginal communities.
- December 7, 2021 – Spoke with Valerie George who asked for a follow up notice via email.
- December 16, 2021 – Notice of Commencement sent via email.
- September 26, 2022 – Notice of PIC Sent via email.

9 Consultation with Chippewas of the Thames First Nation

Fallon Burch, Consultation Coordinator:

- November 24, 2021 – Notice of Commencement sent via mail.
- December 7, 2021 – Followed up with phone call. Spoke with Fallon Burch who noted that the mailed notice had not been received yet and asked for a follow up notice via email.
- December 16, 2021 – Notice of Commencement sent via email.
- August 19, 2022 – Directed consultation contact to NationsConnect.ca, Acknowledged and completed request through NationsConnect
- September 26, 2022 – Notice of PIC Sent via email.

10 Consultation with Chippewas of Nawash First Nation

Michael Earl, Senior Administrative Officer:

- November 24, 2021 – Notice of Commencement sent via mail.

- December 7, 2021 – Followed up with phone call. Left a message with Michael Earl asking him to reach out to Erin Longworth with any initial questions or concerns regarding the study.
- December 16, 2021 – Notice of Commencement sent via email.

Pam Linklater, Manager of Operations:

- November 24, 2021 – Notice of Commencement sent via mail.
- December 7, 2021 – Followed up with phone call. Receptionist noted that Ms. Linklater was not available today and directed me to leave a message with Michael Earl.
- December 16, 2021 – Notice of Commencement sent via email.
- September 26, 2022 – Notice of PIC Sent via email.

Adam Moore

From: Jennifer Parkinson <president@grandrivermetis.ca>
Sent: September 28, 2022 5:11 PM
To: Adam Moore
Subject: Re: Town of Mapleton Water/Wastewater Master Plan - Notice of PIC

EXTERNAL EMAIL

Thank you, Adam

Marsii, Merci, Thank you, Miigwetch
Jennifer Parkinson
President
MNO Grand River Métis Council
www.grandrivermetiscouncil.com

Sent from my iPhone

> On Sep 28, 2022, at 4:13 PM, Adam Moore <Adam.Moore@cima.ca> wrote:
>
> Thanks for the clarification, Jennifer. I have resent the notice to that email.
>
> Regards,
>
> **ADAM MOORE,** M.A.Sc., P.Eng.
> Project Engineer / Infrastructure – Water and Wastewater
>
> **T** 519-772-2299 ext. 6209 **M** 519-830-7015
> 900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA
>
> Engineering for people
>
> 30 YEARS
>
> KINCENTRIC Best Employer CANADA 2019
>
> Do you really need to print this email? Let's protect the environment!

From: Jennifer Parkinson <president@grandrivermetis.ca>
Sent: September 28, 2022 4:09 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: Re: Town of Mapleton Water/Wastewater Master Plan - Notice of PIC

EXTERNAL EMAIL

Hello Adam,

All Lands, Resources and Consultation notices must go through the MNO Lands, Resources and Consultation Branch: consultations@metisnation.org

Please resend your notice to the email address above.

Thank you and enjoy your day
Jennifer

Marsii, Merci, Thank you, Miigwetch
Jennifer Parkinson
President
Grand River Métis Council
www.grandrivermetiscouncil.com

From: Adam Moore <Adam.Moore@cima.ca>
Sent: September 26, 2022 3:12 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: Town of Mapleton Water/Wastewater Master Plan - Notice of PIC

Good afternoon,

The Town of Mapleton is holding an in-person **Public Information Centre** (PIC) for the Water and Wastewater Master Plan Municipal Class Environmental Assessment. The PIC will introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. Further details about the PIC and how to provide comments are included in the attached Notice.

If you have any questions or feedback, please do not hesitate to contact us by responding to this email.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From: Adam Moore
Sent: September 28, 2022 4:13 PM
To: Jennifer Parkinson
Subject: RE: Town of Mapleton Water/Wastewater Master Plan - Notice of PIC

Thanks for the clarification, Jennifer. I have resent the notice to that email.

Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Jennifer Parkinson <president@grandrivermetis.ca>
Sent: September 28, 2022 4:09 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: Re: Town of Mapleton Water/Wastewater Master Plan - Notice of PIC

EXTERNAL EMAIL

Hello Adam,

All Lands, Resources and Consultation notices must go through the MNO Lands, Resources and Consultation Branch: consultations@metisnation.org

Please resend your notice to the email address above.

Thank you and enjoy your day
Jennifer

Marsii, Merci, Thank you, Miigwetch
Jennifer Parkinson
President
Grand River Métis Council

www.grandrivermetiscouncil.com

Confidentiality: This email message (including attachments, if any) is confidential and it is intended only for the addressee. Any unauthorized use or disclosure is strictly prohibited. Disclosure of this email to anyone other than the intended addressee does not constitute waiver or privilege. If you have received this communication in error, please notify us immediately and delete this.
Thank you for your cooperation.
If you would prefer to not receive future emails, please reply to: president@grandrivermetis.ca
with your desire to be removed from this email list.

From: Adam Moore <Adam.Moore@cima.ca>
Sent: September 26, 2022 3:12 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: Town of Mapleton Water/Wastewater Master Plan - Notice of PIC

Good afternoon,

The Town of Mapleton is holding an in-person **Public Information Centre** (PIC) for the Water and Wastewater Master Plan Municipal Class Environmental Assessment. The PIC will introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. Further details about the PIC and how to provide comments are included in the attached Notice.

If you have any questions or feedback, please do not hesitate to contact us by responding to this email.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

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30 YEARS

KINCENTRIC Best Employer CANADA 2019

Adam Moore

From:	Erin Longworth
Sent:	August 13, 2021 9:59 AM
Cc:	Sam Mattina
Subject:	Notice of Study Commencement - Water and Wastewater Master Plan for the Township of Mapleton
Attachments:	Mapleton Water and Wastewater Master Plan -Notice of Commencement-FINAL AODA.pdf

Municipal Class Environmental Assessment Master Plan Study

Hello,

This email is regarding the Municipal Class Environmental Assessment (Class EA) Master Plan Study that the Township of Mapleton is undertaking to plan for water and wastewater servicing within the Township.

Notice of Study Commencement

A Municipal Class EA Master Plan study has been initiated to ensure that drinking water and wastewater services meet the needs of the community now and into the future. Attached is a copy of the Notice of Study Commencement with additional project details.

Thank you and regards,

Erin Longworth

Attachments:

1. Notice of Study Commencement

ERIN LONGWORTH, M.Eng., P.Eng., PMP
Associate Partner / Manager, Wastewater Planning / Infrastructure

T 519-772-2299 ext. 6250 **M** 647-460-9040 **F** 519-772-2298
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From: Consultations <Consultations@metisnation.org>
Sent: August 13, 2021 9:59 AM
To: Erin Longworth
Subject: Automatic reply: Notice of Study Commencement - Water and Wastewater Master Plan for the Township of Mapleton

EXTERNAL EMAIL

This is an automatically generated response from consultations@metisnation.org. Please do no reply to this e-mail address.

The MNO is adjusting standard work practices due to the Covid-19 outbreak and to better enable staff to work remotely. **Please note that the MNO's Lands, Resources and Consultations (LRC) Branch will no longer review hard copy consultation notices mailed to MNO offices.** The LRC Branch will review all electronic notices and process them in accordance with our standard operating procedures. All consultation notices must be sent electronically to consultations@metisnation.org.

The Métis Nation of Ontario's LRC Branch acknowledges your information notice. The MNO reserves the right to request additional information, meetings and consultations in respect of the project should the MNO deem it to be necessary.

For additional information pertaining to consulting with Ontario Métis please visit the MNO web site at: http://www.metisnation.org/programs/lands,-resources--consultations/duty-to-consult.

Adam Moore

From: Adam Moore
Sent: August 19, 2022 2:00 PM
To: Consultation
Subject: RE: Township of Mapleton Water/Wastewater Master Plan Study Update

Hi Fallon,

Thank you for circling back and the information below. Since sending out the notification below, we have completed a request through NationsConnect regarding the Mapleton W/WW Master Plan for the Chippewas of the Thames First Nation to review.

Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Consultation <consultation@cottfn.com>
Sent: August 19, 2022 1:52 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: RE: Township of Mapleton Water/Wastewater Master Plan Study Update

EXTERNAL EMAIL

Good afternoon,

The Chippewas of the Thames First Nation has transitioned to using NationsConnect to receive consultation and engagement requests. **Notifications or requests sent over email, mail or fax are not considered submitted and will not be reviewed.**

To register for NationsConnect, and submit your request, please visit NationsConnect.ca.

Along with the project information, a spatial file in .kml, .kmz, or .zip shapefile formats will be required to submit your request. Once your project has been submitted, you can attach additional files or send updated communication through the Conversations feature on NationsConnect.

If you have any technical questions about NationsConnect, please reach out to support@kwusen.ca.

Regards,

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

COTTFN

Visit us online at cottfn.com

From: Adam Moore <Adam.Moore@cima.ca>
Sent: August 18, 2022 12:23 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: Township of Mapleton Water/Wastewater Master Plan Study Update

> You don't often get email from adam.moore@cima.ca. Learn why this is important

Good afternoon,

The Township of Mapleton is undertaking a Water and Wastewater Master Plan study to ensure that drinking water and wastewater services meet the needs of the community now and into the future. We have updated the project webpage (linked below) to include an information package with important background material and details for next steps.

https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan

Details about a Public Information Centre (PIC) are posted in the webpage update but please note that a separate Notice of the PIC will be advertised in the local newspaper and sent to you in late September.
Please do not hesitate to contact us by responding to this email if you have any questions.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Do you really need to print this email? Let's protect the environment!

Adam Moore

From:	Adam Moore
Sent:	September 26, 2022 3:13 PM
To:	Adam Moore
Subject:	Town of Mapleton Water/Wastewater Master Plan - Notice of PIC
Attachments:	T000974D-090-220926-PN-Notice of PIC-e01.pdf

Good afternoon,

The Town of Mapleton is holding an in-person **Public Information Centre** (PIC) for the Water and Wastewater Master Plan Municipal Class Environmental Assessment. The PIC will introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. Further details about the PIC and how to provide comments are included in the attached Notice.

If you have any questions or feedback, please do not hesitate to contact us by responding to this email.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From: Adam Moore
Sent: September 28, 2022 4:13 PM
To: Adam Moore
Subject: Town of Mapleton Water/Wastewater Master Plan - Notice of PIC
Attachments: T000974D-090-220926-PN-Notice of PIC-e01.pdf

Good afternoon,

The Town of Mapleton is holding an in-person **Public Information Centre** (PIC) for the Water and Wastewater Master Plan Municipal Class Environmental Assessment. The PIC will introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. Further details about the PIC and how to provide comments are included in the attached Notice.

If you have any questions or feedback, please do not hesitate to contact us by responding to this email.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Adam Moore

From: Juanita Meekins <associate.ri@saugeenojibwaynation.ca>
Sent: October 18, 2022 3:52 PM
To: Adam Moore
Subject: Township of Mapleton Water/Wastewater Master Plan Study Update

EXTERNAL EMAIL

Hello and thank you for your email,

At this point, the Saugeen Ojibway Nation's Environment Office does not have the resources to engage in consultation on this project.

We have no further comments on this project. If at any point anything of archeological interest is revealed on site, please contact the SON Environment Office immediately.

You can learn more about the Saugeen Ojibway Nation and SON territory here:
https://www.saugeenojibwaynation.ca/resources

Please do not respond to this email unless you have specific follow up questions.

Miigwech,

Juanita Meekins
Resources & Infrastructure Associate
T: (519)534-5507

10129 Hwy 6 Georgian Bluffs, ON
N0H 2T0
saugeenojibwaynation.ca

Adam Moore

From:	Adam Moore
Sent:	October 31, 2022 7:37 AM
To:	Consultation
Cc:	Manny Baron; Gillian Thompson; Alejandra Boyer
Subject:	RE: Township of Mapleton Water/Wastewater Master Plan Study Update

Hi Rob,

Apologies for the delay. Included below are some links to the virtual presentation of the Mapleton Water/Wastewater Master Plan Public Information Centre.

T000974D-090-221012-PRES-PIC Boards-e01-Recording.mp4

T000974D-090-221012-PRES-PIC Boards-e01-Recording.pptx

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Consultation <consultation@kettlepoint.org>
Sent: October 12, 2022 3:08 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Manny Baron <mbaron@mapleton.ca>; Gillian Thompson <Gillian.Thompson@cima.ca>; Alejandra Boyer <Alejandra.Boyer@cima.ca>
Subject: Re: Township of Mapleton Water/Wastewater Master Plan Study Update

EXTERNAL EMAIL

Hello Adam,

Thank you for including CKSPFN in your contact list for project notifications.

Yes – a virtual presentation of the materials shown at the Public Information Center is of interest to CKSPFN.

I am available the week of October 24, please indicate your availability, and we will schedule accordingly.

Miigwetch,

Rob Lukacs
CKSPFN Consultation

From: Adam Moore <Adam.Moore@cima.ca>
Date: Tuesday, October 11, 2022 at 8:58 AM
To: Consultation <consultation@kettlepoint.org>
Cc: Manny Baron <mbaron@mapleton.ca>, Gillian Thompson <Gillian.Thompson@cima.ca>, Alejandra Boyer <Alejandra.Boyer@cima.ca>
Subject: RE: Township of Mapleton Water/Wastewater Master Plan Study Update

Hi Rob,

Thank you for your interest in the Mapleton Water/Wastewater Master Plan. We have included the Chippewas of Kettle and Stony Point First Nation (CKSPFN) information below in our contact list for notifications.

The Public Information Center taking place Wednesday October 12th will be in person. If a virtual presentation of the material shown at the Public Information Center would be of interest, please let us know.

Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Consultation <consultation@kettlepoint.org>
Sent: September 30, 2022 2:30 PM
To: Adam Moore <Adam.Moore@cima.ca>; Manny Baron <mbaron@mapleton.ca>
Subject: Re: Township of Mapleton Water/Wastewater Master Plan Study Update

EXTERNAL EMAIL

Good afternoon Adam,

Thank you for your e-mail.

Please include the Chippewas of Kettle and Stony Point First Nation (CKSPFN) to the Project Contact List using the following contact information (consultation@kettlepoint.org).

Will the Township of Mapleton broadcast the in-person Master Plan process meeting online on October 12th? If not, would CIMA+ and the Township of Mapleton give CKSPFN a similar presentation virtually?

Finally, in 2017, CKSPFN passed a band council resolution asserting ownership to the lakebeds and waterways within the CKSPFN (see Attached). Specifically, "Declaration to the waterways and lakebeds within its traditional territory for the management, use and enjoyment of the first nation and its peoples." This assertion includes Lake Huron. CKSPFN has a keen interest in the impacts of the Water and Wastewater Master Plan study on the water and the species and communities that rely on the water.

Miigwetch,

Rob Lukacs
CKSPFN Consultation

From: Adam Moore
<Adam.Moore@cima.ca>

Date: Thursday, August 18, 2022 at 12:23 PM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: Township of Mapleton Water/Wastewater Master Plan Study Update

Good afternoon,

The Township of Mapleton is undertaking a Water and Wastewater Master Plan study to ensure that drinking water and wastewater services meet the needs of the community now and into the future. We have updated the project webpage (linked below) to include an information package with important background material and details for next steps.

https://mapleton.ca/services/reports-and-studies/water-and-wastewater-master-plan

Details about a Public Information Centre (PIC) are posted in the webpage update but please note that a separate Notice of the PIC will be advertised in the local newspaper and sent to you in late September.
Please do not hesitate to contact us by responding to this email if you have any questions.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

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D

Appendix D: Evaluation Matrix

Project	Mapleton W/WW Servicing Master Plan
Client:	Township of Mapleton
Project No.	T000974D
Prepared by:	Adam Moore, Emily Snoei
Creation date:	03-Aug-22

Detailed Evaluation for Servicing Alternatives

	Score	Score Representation	Ranking
Drayton Drinking Water System			
Supply Alternatives			
Alternative 1: Increase the Capacity of the Existing Wells	95.8	●	2
Alternative 2: Build a New Well on the Existing Site to Increase Capacity	96.3	●	1
Alternative 3: Build a New Well on another site to Increase Capacity	67.1	◕	3
Moorefield Drinking Water System			
Storage and Distribution Alternatives			
Alternative 1: No Fire Flow Service	95.0	●	1
Alternative 2: Fire Flow Service	65.1	◕	2
Wastewater System			
Phosphorus Removal Alternatives			
Alternative 1: Build a new mechanical treatment plant	74.0	◕	1
Alternative 2: Phosphorus offsetting	73.0	◕	2
Drayton Collection System			
SPS Alternatives			
Alternative 2: New SPS on the North Side of the River	77.1	◕	2
Alternative 3: Maintain exisitng SPS and Construct a New SPS on the North Side of the River	75.6	◕	3
Alternative 4: New SPS with onsite emergency storage	78.0	◕	1
Collection System and Forcemain Alternatives			
Alternative 1: Upgrade Existing Gravity Sewers	92.0	●	1
Alternative 2: Build Local Pumping Station and Forcemain to the Existing Drayton SPS or New SPS	72.7	◕	2
Alternative 3: Build Local Pumping Station and Forcemain to the Mapleton WPCP	65.0	◕	3
Moorefield Collection System			
SPS Alternatives			
Alternative 1: Expand SPS on Existing Site	98.1	●	1
Alternative 2: Build a New SPS on a New or Existing Site	85.8	●	2
Alternative 3: Build a Local SPS and New Forcemain to the Mapleton WPCP	77.5	◕	3
Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, Upgrade the Existing Moorefield SPS and forcemain	71.6	◕	4
Collection System and Forcemain Alternatives			
Alternative 1: Low-pressure Sewers	91.2	●	1
Alternative 2: All Gravity Sewers	71.2	◕	3
Alternative 3: Combination Gravity Sewer and Low-pressure Sewers	87.6	●	2

Matrix 1: Detailed Evaluation of Drayton Water Servicing Alternatives				Supply Alternatives											
Category	Weight	Criteria	Indicators	Alternative 1: Increase the Capacity of the Existing Wells				Alternative 2: Build a New Well on the Existing Site to Increase Capacity				Alternative 3: Build a New Well on another site to Increase Capacity			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	This option does not involve works outside of the existing building footprint, therefore no disturbance to existing vegetation is expected.	5.0	2.5	●	There is available area on site to accommodate the new well without disturbance to the existing wells or the surrounding environment. Vegetation removal is not expected other than existing ornamental grass on site. Construction area will be re-sodded post-construction.	4.5	2.3	●	A site for the new well and WTP would need to be located. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.0	1.5	◑
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	There are no other vulnerable areas within or in the vicinity of the existing site. Minimal or negligible impact would be expected to existing water resources. Use of existing well at current permitted rated capacity of 22.7 L/s is in line with the existing source water protection plan and policies. Existing well is currently permitted for a max. water taking of 22.7 L/s, which represents approx. 50% of total additional supply capacity need of 44.1 L/s. Hydrogeological investigation would be required to confirm yield. Recent testing indicates that water quality from existing well is of high quality with treatment required for disinfection and potentially iron sequestration.	4.5	2.3	●	There are no other vulnerable areas within or in the vicinity of the existing site. Minimal or negligible impact would be expected to existing water resources. Hydrogeological investigation would be required to determine optimal location on site for the new well and to confirm the water quality. It is expected the water quality would be comaprable to the existing wells as they are all on the same site.	4.5	2.3	●	It is unknown if there are areas within or in the vicinity of the new WTP site that would be vulnerable. A source water protection plan would need to be developed for the new WTP site as well as a PTTW. A hydrogeoloigcal investigation would need to be completed to test the water quality from the new well and the required treatment for disinfection and potentially iron sequestration.	3.0	1.5	◑
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the majority of work is contained inside the existing building and will not disrupt any additional habitats.	5.0	2.5	●	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work will is contained on the existing site and will not disrupt any additional habitats and does not have any protected species.	5.0	2.5	●	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new WTP site. An aquatic and species survey would need to be conducted.	4.0	2.0	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding	New equipment is not energy intensive and will follow the same operational practices as existing. Small increase in energy requirements as now 1/2 pumps will be pumping at a higher rate. None of the upgrades are expected to increase GHG emissions. Vegetation or tree removal, other than ornamental grass, is not expected as part of the project, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●	New equipment is not energy intensive and will follow the same operational practices as existing. Small increase in energy requirements as now 2/3 pumps will operate at one time. None of the upgrades are expected to increase GHG emissions. Vegetation or tree removal, other than ornamental grass, is not expected as part of the project, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●	Treatment requirements are yet to be determined, but will likely follow the same operational practices as the existing well house. New equipment is unlikely to be energy intensive. New WTP site is expected to double the total GHG emissions produced by the Drayton Supply System. Vegetation or tree removal, other than ornamental grass, may be required, therefore small effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.0	1.5	◑
Maximum Sub-total Score - Natural Environment						9.5				9.3				6.5	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Special training requirements / certification of staff • Safety requirements	This option uses the existing treatment technologies. Current operator training and safety requirements are sufficient.	5.0	3.3	◕	This option uses the existing treatment technologies. Current operator training and safety requirements are sufficient.	5.0	3.3	●	Treatment requirements must be determined, however significant changes to existing treatment technologies are not expected. Current operator training and safety requirements are likely sufficient.	4.0	2.7	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction trucks will be on site for the delivery of equipment and materials. Most short-term construction impacts from noise and dust will be contained within the WTP. Appropriate standard construction techniques and mitigation measures will be implemented.	4.5	3.0	◑	Construction trucks will be on site for drilling the new well and the delivery of construction materials and equipment to expand the WTP. Medium-term construction impacts from noise and dust are expected during the drilling of third well and WTP expansion. Appropriate standard construction techniques and mitigation measures will be implemented.	4.0	2.7	●	Construction trucks will be on site for drilling the new well and the delivery of construction materials and equipment to build the new WTP. Medium-term construction impacts from noise and dust are expected during the drilling of new well and construction of new WTP. Appropriate construction techniques and mitigatio measures will be implemented.	3.5	2.3	◕
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	Minimal long-term noise and visual effects on sensitive receptors during operation. Maintaining the existing building footprint preserves views of the natural landscape and maintains the existing distance between the proposed infrastructure and the closest sensitive receptors. Minimal to no increase in air emissions anticipated.	4.5	3.0	◑	Minimal long-term noise and visual effects on sensitive receptors during operation. Larger building footprint is a low impact, preserves views of the natural landscape and maintains the existing distance between the proposed infrastructure and the closest sensitive receptors. Minimal to no increase in air emissions anticipated.	4.5	3.0	●	There may be long-term noise and visual effects on sensitive receptors during construction and operation. New site will need to be assessed for closest sensitive receptors.	3.5	2.3	◕
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Retrofitting and upgrading the existing system will be able to maintain some of the existing assets and result in the least interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	5.0	3.3	●	Adding a third well to the existing system will be able to maintain some of the existing assets and result in the least interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	5.0	3.3	●	Building a new system will require new assets and result in some interference with current uses and access to the residential properties in the vicinity; thus, lowering public support.	3.0	2.0	◑
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	Construction will be constrained to the existing site, which is previously disturbed and retains little to no curtural heritage, minimizing potential for impacts.	5.0	3.3	●	Construction will be constrained to the existing site, which is previously disturbed and retains little to no curtural heritage, minimizing potential for impacts.	5.0	3.3	●	Construction will take place at a new WTP site, which is unknown if there is cultural heritage impacts.	4.0	2.7	●
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	Construction will be constrained to the existing site, which is previously disturbed and retains little to no archaeological potential, minimizing potential for impacts.	5.0	3.3	●	Construction will be constrained to the existing site, which is previously disturbed and retains little to no archaeological potential, minimizing potential for impacts.	5.0	3.3	●	Construction will take place at a new WTP site, which is unknown if there is archaeological potential or impacts.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural						19.3				19.0				14.7	

Category	Weight	Criteria	Indicators
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity
		Water Quality Considerations: Ability to meet water quality considerations as per provincial and federal guidelines	• Maximize water stability in distribution system • Flexibility to respond to variable raw water quality • Flexibility for future objectives
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies
Maximum Sub-total Score - Technical / Operational			
Financial / Economic	**30**	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period
Maximum Sub-total Score - Financial / Economic			
Total Overall Maximum Weighted Score		**100**	

Alternative 1: Increase the Capacity of the Existing Wells

Criteria	Rationale	Score 1 to 5	Weighted Score	
Existing and Future Demands	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices	4.5	5.1	●
Reliability and Security	Existing production wells already in place. Wells have been recently tested to confirm yield and are currently permitted for 22.7 L/s. With a few upgrades and modifications to existing facilities, the wells could increase capacity and reduce likelihood of mechanical breakdown / disrupted service. As the existing wells are nearly 40 years old, more frequent well service and maintenance may be required in the short- and long-term unless upgraded. Limited operational redundancy and flexibility.	3.5	3.5	◕
Constructability	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be shortest. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Scalability and future expansion is limited within the existing building footprint. A third well may be required to further increase supply capacity / redundancy. Construction will be staged to minimize process disruption during construction (upgrade one pump while the other is online, and vice versa). This alternative maximizes the existing building footprint with capacity for future expansion in the site.	4.0	4.0	●
Water Quality Considerations	Treated water quality will continue to comply with all regulations. Since this alternative treats a groundwater source, low organics are expected. The system will be programmed to calculate CT and the plant will shutdown in the case that chlorine residual is lower than minimum required in order to maintain disinfection at all times.	5.0	5.0	●
Operational Complexity	This alternative is fully compatible with current operations and will continue existing operational and maintenance practices, reducing overall complexity. However, no additional operational flexibility. This option involves fewer operational or monitoring requirements. The existing wells are nearly 40 years old, unless upgraded more frequent well service and maintenance may be required in the short- and long-term.	4.5	4.5	●
Existing and Planned Infrastructure	Existing WTP structure and wells to be upgraded, optimizing existing infrastructure. Aligns with all other planned infrastructure projects, but does not make use of provision for third well.	4.5	4.5	●
Existing and Planned Land Use	It is expected to reuse significant portions of infrastructure from the existing plant with upgrades to the piping, valves and instrumentation. No new land would need to be acquired.	5.0	5.7	●
Permits and Approvals	Existing PTTW would need to be amended to increase single pump capacity. Time spent is expected to moderate.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational			**36.9**	
Life Cycle Cost	20-year life cycle cost of $3,095,000	5	30.0	●
Maximum Sub-total Score - Financial / Economic			**30.0**	
Total Overall Maximum Weighted Score			**95.8**	●

Alternative 2: Build a New Well on the Existing Site to Increase Capacity

Criteria	Rationale	Score 1 to 5	Weighted Score	
Existing and Future Demands	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. New well will likley be able to supply the Town's water service for the long-term and required less mainteance in the short- to medium-term. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.7	●
Reliability and Security	New production well will increase firm capacity of Drayton supply and provide added operational redundancy flexibility, reducing the likelihood of process upset / disrupted service. However, does not reduce likelihood of mechanical breakdown for existing wells.	4.5	4.5	●
Constructability	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be moderate. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Potential for scalability and future expansion by increasing pump rates of all wells to further increase supply capacity / redundancy. Construction will be staged to minimize process disruption during construction (install third well while existing wells continue operating as usual). This alternative maximizes the existing building footprint and site capacity.	5.0	5.0	●
Water Quality Considerations	Treated water quality will continue to comply with all regulations. Since this alternative treats a groundwater source, low organics are expected. The system will be programmed to calculate CT and the plant will shutdown in the case that chlorine residual is lower than minimum required in order to maintain disinfection at all times.	5.0	5.0	●
Operational Complexity	Proposed supply option is fully compatible with current operations, maintaining existing operational and maintenance practices and reducing overall complexity. Additional operational flexibility for well pumping. This option involves minimal additional operational or monitoring requirements.	5.0	5.0	●
Existing and Planned Infrastructure	Existing WTP structure and wells to be used with third well. Aligns with all other planned infrastructure projects, as provision for third well is currently being installed under a current project.	5.0	5.0	●
Existing and Planned Land Use	It is expected to reuse significant portions of infrastructure from the existing plant with addition of the new well and associated equipment. No new land would need to be purchased.	5.0	5.7	●
Permits and Approvals	Existing PTTW may not need to be amended. Third well will be pumped at same single well capacity as existing, therefore well taking capacity remains the same as existing total well taking capacity. Time spent is expected to be minimal.	5.0	5.7	●
Maximum Sub-total Score - Technical / Operational			**41.6**	
Life Cycle Cost	20-year life cycle cost of $3,660,000	4.41	26.5	●
Maximum Sub-total Score - Financial / Economic			**26.5**	
Total Overall Maximum Weighted Score			**96.3**	●

Alternative 3: Build a New Well on another site to Increase Capacity

Criteria	Rationale	Score 1 to 5	Weighted Score	
Existing and Future Demands	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. New well will likley be able to supply the Town's water service for the long-term and required less mainteance in the short- to medium-term. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.7	●
Reliability and Security	New well site would need to be investigated and confirm its yield. The new site would provide greater water security for the Town, reducing the likelihood to process upset / disrupted service. However, operational redundancy is not provided on new WTP site for ease of maintenance and cleaning.	4.0	4.0	●
Constructability	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be the longest. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are somewhat unknown but expected to be manageable. Potential for scalability and future expansion at new site. Construction will be staged to minimize process disruption during construction. This alternative does not maximize the existing building footprint and site capacity.	3.5	3.5	◕
Water Quality Considerations	Treated water quality will continue to comply with all regulations. Since this alternative will treat a groundwater source, low organics are expected. The system will be programmed to calculate CT and the plant will shutdown in the case that chlorine residual is lower than minimum required in order to maintain disinfection at all times.	5.0	5.0	●
Operational Complexity	Proposed treatment technologies likely to be fully compatible with current operations, maintaining existing operational and maintenance practices and reducing overall complexity. This option doubles the operational or monitoring requirements to service the overall Drayton supply system.	3.0	3.0	◑
Existing and Planned Infrastructure	Existing WTP structure and wells to be used with new WTP and well. Aligns with all other planned infrastructure projects.	4.0	4.0	●
Existing and Planned Land Use	A new WTP site would need to be selected and a treatment system build. New land would need to be purchased.	2.0	2.3	◔
Permits and Approvals	A new PTTW would need to be created for the new site. Time spent is expected to be longer than an amendment.	3.0	3.4	◑
Maximum Sub-total Score - Technical / Operational			**30.9**	
Life Cycle Cost	20-year life cycle cost of $5,485,000	2.5	15.0	◑
Maximum Sub-total Score - Financial / Economic			**15.0**	
Total Overall Maximum Weighted Score			**67.1**	◕

Matrix 2: Detailed Evaluation of Moorefield Water Servicing Alternatives

Storage and Distribution Alternatives

Category	Weight	Criteria	Indicators	Alternative 1: No Fire Flow Service				Alternative 2: Fire Flow Service			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	No change to existing distribution system or natural environment.	5.0	2.5	●	Some vegetation removal would be expected to install fire hydrants throughout the Town. Minimal vegetation removal would be required to upsize watermains as existing utility corridor, predominently below roadways, would be used. Construction area would be re-sodded post-construction. For the elevated tank, there is available area on site to accommodate the new elevated tower without disturbance to the existing contact pipe or the surrounding environment. Some vegetation removal would be expected. Construction area will be re-sodded post-construction.	4.0	2.0	●
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	No change to existing distribution system or source water protection.	5.0	2.5	●	While the distribution system pipes may be upsized and hydrants will be installed, no impact to source water protection is anticipated. For the elevated tank, there are no other vulnerable areas within or in the vicinity of the existing site. Minimal or negligible impact would be expected to existing water resources.	4.5	2.3	●
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	No change to existing distribution system. No impacts to wildlife.	5.0	2.5	●	Some impact to wildlife and habitat is possible as a result of installing fire hydrants throughout the Town. Minimal wildlife impact is expected to upsize watermains as existing utility corridor, predominently below roadways, would be used.	4.0	2.0	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas	No change to existing distribution system or contribution to climate change.	5.0	2.5	●	New equipment increases energy requirements due to added pumping for fire flow. Additional chemical usage for elevated tank may minimally increase GHG emissions due to increased frequency of chemical deliveries. Some vegetation removal would be expected, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.0	2.0	●
Maximum Sub-total Score - Natural Environment						10.0				8.3	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	This alternative does not change the existing distribution system. Current operator training and safety requirements would be sufficient.	5.0	3.3	●	Fire flow is currently provided in Drayton. Operators should be familiar with this hydrants, fire pumps, etc. so current operator training and safety requirements would be sufficient. For the elevated tank, this option uses the same storage technology as Drayton. Current operator training and safety requirements to service the Drayton Elevated Tank would be sufficient for this alternative.	5.0	3.3	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction is not required for this alternative. No short-term impacts.	5.0	3.3	●	Construction trucks will be around Town for the delivery of construction materials and equipment to the various sites for upsized piping and fire hydrants. Medium-term construction impacts from noise and dust. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	Fire protection will continue to be provided from existing source. No long-term visual or noise effects.	5.0	3.3	●	Long-term visual and noise effects on sensitive receptors. All sites will need to be assessed for closest sensitive receptors.	2.5	1.7	◑
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Fire protection must continue to be provided from existing source. No impacts on businesss anticipated.	5.0	3.3	●	Providing fire hydrants and upsizing pipes will result in some interference, particularly on roadways and surrounding area. Construction to be staged to prevent disruptions with current uses. Building a new elevated tank will result in some interference and the current standpipes would be decommissioned in stages to prevent disruptions with current uses but will not interfere with access to the residential properties in the vicinity.	4.0	2.7	●
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	No change to the existing distribution system. No impact to cultural heritage features.	5.0	3.3	●	Construction will take place at a multiple new sites (fire hydrants), which is unknown if there is cultural heritage impacts. For the elevated tank, construction will be constrained to the existing site, which is previously disturbed and retains little to no curtural hertitage, minimizing potential for impacts.	4.5	3.0	●
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	No change to the existing distribution system. No impact to archaeological features.	5.0	3.3	●	Construction will take place at a new WTP site and existing corridors for the watermains, which is unlikely archaeological potential or impacts.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural						20.0				15.3	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	Distribution does not meet long-term fire flow requirements. Fire protection continues to be provided from existing source.	4.0	4.0	●	Meets the long-term fire flow requirements to service the projected population and growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices	5.0	5.0	●
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	Existing fire protection source provides limited security and reliability as fire flow storage reservoir must be replenished before each event. Existing fire protection method (water carried by fire truck to fire) not as robust as distribution system equipped with fire flow.	3.0	3.0	◑	Distribution system equipped with fire flow is a robust, proven solution and provides system security and reliability. A single elevated tank does not provide redundancy. Regularly scheduled assessments of the coatings are recommended. Re-coating of interior and exterior surfaces will be required after approximately 15-20 years. Concrete pedestal is essentially maintenance-free.	5.0	5.0	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	No construction or constructability concerns.	5.0	5.0	●	Fire flow service will require upgrades to the existing system, including additional treated water storage, fire pump, upsized distribution pipes, and fire hydrants throughout Town. Medium- to long-term construction period is anticipated. Construction phasing will be required to maintain servicing through construction. Fire flow service will be scalable for future expansion and upgrades. Fire flow service will maximize the existing system footprint and site capacity. For the elevated tank, Significantly longer construction period than alternatives due to linear construction methodology and progress can be affected by inclement weather. Heavy machinery required to construct. More labour intensive to construct. Cannot accommodate accessories after the tank has been constructed without damage to coatings. More Contractors with expertise in welded steel potable water tanks, and coatings for potable water tanks. Cannot typically accommodate an increase in height of steel tank. Water servicing can be maintained with existing standpipes until the elevated tower is completed. Maximizes site capacity but does not maximize existing infrastructure.	4.0	4.0	●
		Water Quality Considerations: Ability to meet water quality considerations as per provincial and federal guidelines	• Maximize water stability in distribution system • Flexibility to respond to variable raw water quality • Flexibility for future objectives	No impact on water quality.	5.0	5.0	●	Fire flow service is not expected to impact water quality. Shorter operating range means better pressures in the distribution system. Low risk of dead zones developing.	5.0	5.0	●
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	Compatible with the existing system. Operational complexity and flexibility remains the same. Operation and maintenance requirements will increase as the servicing area and likelihood for fires increases.	4.0	4.0	●	Fire flow service will require upgrades to the existing system, including additional treated water storage, fire pump, upsized distribution pipes, and fire hydrants throughout Town. Operational complexity and flexibility is comparable to no fire flow service / existing system. Reduced operation and maintenance requirements compared to no fire flow service / existing system. For the elevated tank, a valve room can be designed in the base of the pedestal. Shorter operating range means better pressures in the distribution system. More Contractors with expertise in welded steel potable water tanks, and coatings for potable water tanks.	4.5	4.5	●
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Uses existing infrastructure and aligns with all other planned infrastructure projects.	4.0	4.0	●	Optimizes existing infrastructure and aligns with all other planned infrastructure projects. Consistent design with the Drayton Elevated Tank but would remove standpipe expansion planned for the current Moorefield Water System Renewal project.	4.0	4.0	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	Land acquisition not required.	5.0	5.0	●	Land acquisition not required, but easements may be needed for fire hydrants.	4.5	4.5	●
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	No permits required.	5.0	5.0	●	Some permits may be required, time spent expected to be minimal. Many permits required to build an elevated tank.	3.5	3.5	◕
Maximum Sub-total Score - Technical / Operational						35.0				35.5	
Financial / Economic	30	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	Not life cycle costs associated	5	30.0	●	20-year life cycle cost of $12,544,000	1	6.0	○
Maximum Sub-total Score - Financial / Economic						30.0				6.0	
Total Overall Maximum Weighted Score		100				95.0	●			65.1	◕

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives				Phosphorus Removal Alternatives							
Category	Weight	Criteria	Indicators	Alternative 1: Build a new mechanical treatment plant				Alternative 2: Phosphorus offsetting			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	There is available area on site to accommodate the additional equipment without disturbance to the existing lagoons or surrounding environment. Some vegetation removal would be expected. Construction area will be re-sodded post-construction.	4.0	2.0	●	Phosphorus offsetting would positively impact natural environmental features. May increase greenspace with the implementation of Low Impact Developments (LIDs) to offset phosphorus and eliminate load that would have gone to the Mapleton WPCP for treatment. Mapleton WPCP to remain as existing, no additional impact on natural environment.	4.0	2.0	●
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	The new mechanical treatment equipment will be located on the existing site. It is possible the source water protection plan would need to be updated for the added infrastructure. Minimal impacts to water resources and source water protection are expected.	4.5	2.3	●	Phosphorus offsetting would positively impact water resources and source water protection. Implementation of LIDs to offset phosphorus could also eliminate load that would have gone to the Mapleton WPCP for treatment. Mapleton WPCP to remain as existing, no additional impact on water resources.	4.5	2.3	●
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work will is contained to the existing locations and will not disrupt any additional habitats and does not have any protected species.	4.5	2.3	●	Potential for positive impacts to wildlife (including species at risk) or identified habitat locations for these species as phosphorus offsetting may improve quality of environment/habitat. Mapleton WPCP to remain as existing, no additional impact on wildlife.	4.5	2.3	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas	Greenhouse gas generation will be limited to the wastewater treatment plant process. The use of additional process equipment would increase energy requirements and GHGs compared to the existing lagoons.	3.0	1.5	◑	It is expected energy requirements would remain the same as the WPCP would remain unaltered. Greenhouse gas generation will be limited to the wastewater treatment plant process. Phosphorus off-setting facilities are aesthetically attractive and provide opportunities for carbon offsetting and climate change mitigation. Additioanlly, provides increased resilience of communities to climate change and LIDs help mitigate climate change impacts.	4.0	2.0	●
Maximum Sub-total Score - Natural Environment						**8.0**				**8.5**	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	Negligible impacts to public. Upgrades will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator. Impacts to operators are based on the final process selection (beyond scope), but are anticipated to require operations staff to be certified to treat either a Class 2 or Class 3 treatment plant.	4.5	3.0	●	Negligible impacts to public and operations. Upgrades to the WPCP would be required regardless of phopsohrus off-setting program implimentationg.	4.5	3.0	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction trucks will be on site for the delivery of construction materials and equipment. Increased traffic through the site and on the plant access road during the construction period. Construction noise and dust is unlikely to impact neighbours as impact will be focused on the existing plant area. Short-term construction impacts from noise and dust will be moderate resulting from installation of the new equipment. Appropriate standard construction techniques and mitigation measures will be implemented.	4.0	2.7	●	Upgrades to the WPCP would be required regardless of phopsohrus off-setting program implimentation. Noise and dust production is possible from non-point sources adapting to phosphorus offsetting.	4.0	2.7	●
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	The construction of a new mechanical plant would consist of some architectural modifications to part of the buildings and exisitng lagoons. All of these changes would be confined to the existing WPCP and are not expected to impact views of natural landscapes. Existing distance between infrastructure and closest sensitive receptor to be maintained. Process upgrades will address current noise concerns and no increase in WPCP noise is anticipated. The upgrades would not be anticipated to cause an increase in plant odours. New headworks facilities would be designed with improved odour control measures.	4.0	2.7	●	Upgrades to the WPCP would be required regardless of phopsohrus off-setting program implimentation, which adds operational complexity. Positive long-term impacts throughout Township due to reduced phosphorus loading from non-point sources and implementation of LIDs.	4.0	2.7	●
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Retrofitting and upgrading the existing system will be able to maintain some of the existing assets and result in the least interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	5.0	3.3	●	Some businesses may be required to modify operational practices to meet phosphorus offsetting requirements, which may reduce public support.	4.0	2.7	●
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	Construction will be constrained to the existing site, which is previously disturbed and retains little to no curtural heritage, minimizing potential for impacts.	5.0	3.3	●	Unknown curtural hertitage impacts.	3.0	2.0	◑
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	Construction will be constrained to the existing site, which is previously disturbed and retains little to no archaeological potential, minimizing potential for impacts.	5.0	3.3	●	Unknown archaeological impacts.	3.0	2.0	◑
Maximum Sub-total Score - Socio-Cultural						**15.0**				**13.0**	

Category	Weight	Criteria	Indicators	Alternative 1: Build a new mechanical treatment plant				Alternative 2: Phosphorus offsetting			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.0	●	Does not meet the long-term capacity requirements to service the projected population and ICI growth in the servicing areas.	1.0	1.0	○
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	Mechanical treatment infrastructure may reduce the likelihood of disrupted service, process upset, and/or mechanical breakdown. Upgrades will provide operational redundancy for maintenance.	5.0	5.0	●	Maintains existing system reliability and security. Phosphorus offsetting provides redundancy in case of an elevated phosphorus load in effluent.	4.0	4.0	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	Upgrades are compatible with the existing system. Long construction period is expected due to the scope of the expansion. Ease of implementation will be based on final process selection; conversion of existing tanks to new processes may require complex construction sequencing. Risks are anticipated to be manageable. Upgrades allow for scalability and future expansion. Construction will be staged to minimize process disruption during construction.	4.0	4.0	●	Phosphorus offsetting does not change the existing system, thus it is compatible. Moderate implementation period for phosphorus offsetting. Implementation based on community engagement is unknown. Unknown scalability for future growth and expansion.	3.0	3.0	◑
		Water Quality Considerations: Ability to meet water quality considerations as per provincial and federal guidelines	• Proven record of phosphorus removal performance • Flexibility to respond to variable raw water quality • Flexibility for future objectives	Mechanical treatment plants across Ontario meet low phosphorus effluent criteria year-round when designed and operated within MOECC design guidelines.	5.0	5.0	●	A monitoring program would need to be established by the Town, GRCA, local area municipalities, or a local field representative (e.g., farmers) to ensure the phopshorus offsetting program is being implimented appropriately. The monitoring program should be developed by the Town, GRCA, and approved by MOECC. OMAFRA and GRCA would be retained for a role in engaging and educating the agricultural community.	3.5	3.5	◕
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	Increased operational complexity and high maintenance requirements. System will require a full-time operator on-site to maintain the biological treatment processes.	3.5	3.5	◕	Added complexity from monitoring both the WPCP and the off-setting program.	3.0	3.0	◑
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Existing lagoon system will be retrofitted to accommodate a conventional activated sludge process, incorporating existing infrastructure. Aligns with the other infastructure projects.	4.5	4.5	●	Changes would be required to the current WPCP regardless of the off-setting program implimentation. Phosphorus offsetting aligns with Township's climate change mitigation, neutrality, and resilience goals.	4.0	4.0	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	Land acquisition is not anticipated. Existing site has adequate space for a new mechanical treatment plant. However, adding the necessary headworks building, aeration tanks, and clarifiers will occupy significant space. Existing storage lagoons will still be required onsite due to seasonal discharge requirements.	4.5	4.5	●	New developments would need to integrate phopshorus offsetting techniques, therefore, it is anticipated additonal land would need to be purchased for the phosphorus offsetting program.	1.0	1.0	○
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	All works occur on the existing WPCP site. MECP approval is required to expand the plant capacity. Time spent expected to be moderate.	4.5	4.5	●	Additional approvals would be required from the MECP for the phosphorus offsetting program, increasing time spent.	2.0	2.0	◔
Maximum Sub-total Score - Technical / Operational						**36.0**				**21.5**	
Financial / Economic	**30**	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	20-year life cycle cost of $30,564,000	2.5	15.0	◑	20-year life cycle cost of $8,647,000	5	30.0	●
Maximum Sub-total Score - Financial / Economic						**15.0**				**30.0**	
Total Overall Maximum Weighted Score		**100**				**74.0**	◕			**73.0**	◕

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives

Category	Weight	Criteria	Indicators
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas
Maximum Sub-total Score - Natural Environment			
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features
Maximum Sub-total Score - Socio-Cultural			
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies
Maximum Sub-total Score - Technical / Operational			
Financial / Economic	30	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period
Maximum Sub-total Score - Financial / Economic			
Total Overall Maximum Weighted Score	100		

SPS Alternatives

Alternative 2: New SPS on the North Side of the River

Criteria	Rationale	Score 1 to 5	Weighted Score	
Natural Environmental Features	Constructing a new SPS will impact the environment. However, measures can be taken to minimize impacts by maintaining the river's flood capacity and minimizing sediment erosion. This alternative will require a new sanitary sewer river crossing which will further impact the environment, but eliminates risk of forcemain river crossing. No other river crossings are anticipated in the future.	2.5	1.3	◑
Water Resources and Source Water Protection	The new SPS site is located in close proximity to the river, but with more buffer than the existing SPS. A source water protection plan would need to be developed for the new SPS site.	3.0	1.5	◑
Wildlife	Little to no impacts to wildlife. Lower risk to fisheries and aquatic health with no forcemain river crossing.	3.0	1.5	◑
Climate Change	New equipment is not energy intensive and will follow the same operational practices as existing. Upgrades are not expected to increase GHG emissions. Some vegetation removal is expected, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.0	2.0	●
Maximum Sub-total Score - Natural Environment			**6.3**	
Health and Safety	Construction of a new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public. New SPS would not be directly adjacent to residences and walkway, reducing risk to public. This site has the potential for more buffer between the SPS and river.	4.5	3.0	●
Nuisance (short-term) Impacts	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while building the SPS. Appropriate standard construction techniques and mitigation measures will be implemented.	3.5	2.3	◕
Aesthetic and Operational (long-term) Impacts	There may be long-term noise and visual effects on sensitive receptors during operation. New SPS site will need to be assessed for closest sensitive receptors.	3.5	2.3	◕
Impacts on Businesses	Disruptions to businesses during construction and operation minimized as existing SPS will be used until new SPS is built.	3.5	2.3	◕
Protects Cultural Heritage Features	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●
Protects Archaeological Features	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural			**15.3**	
Existing and Future Demands	The new SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps). However, wet well volume will not change and hauling is possible during peak hour flows.	3.5	4.0	◕
Reliability and Security	A new SPS would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Potential to increase operational redundancy.	3.5	4.0	◕
Constructability	New SPS is compatible with existing system. Moderate construction duration compared to other alternatives. There are few constructability challenges with adequate setback from the river. The new SPS has potential for scalability. Able to maintain servicing at existing SPS while new SPS is constructed. Does not maximize existing or new site capacity.	3.5	4.0	◕
Operational Complexity	New SPS is compatible with existing system. Reduced operational complexity due to reduced likelihood of hauling or operator intervention. New SPS will decrease operational and maintenance requirements. Eliminates operational and maintenance risk associated with the forcemain river crossing. Ability to use existing forcemain and no additonal costs associated with an upgraded river crossing. Would eliminate the existing operational and maintenance issues with the exisitng SPS.	4.0	4.6	●
Existing and Planned Infrastructure	Aligns with planned infrastructure projects, optimizes some existing infrastructure.	3.5	4.0	◕
Existing and Planned Land Use	May require easement acquisition due to SPS collection system routing may extend onto private property.	4.5	5.1	●
Permits and Approvals	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational			**30.3**	
Life Cycle Cost	20-year life cycle cost of $4,058,000	4.20	25.2	●
Maximum Sub-total Score - Financial / Economic			**25.2**	
Total Overall Maximum Weighted Score			**77.1**	◕

Alternative 3: Maintain exisitng SPS and Construct a New SPS on the North Side of the River

Criteria	Rationale	Score 1 to 5	Weighted Score	
Natural Environmental Features	Constructing a new SPS will impact the environment. However, measures can be taken to minimize impacts by maintaining the river's flood capacity and minimizing sediment erosion. This alternative will require a new sanitary sewer river crossing which will further impact the environment, but eliminates risk of forcemain river crossing. Wet well/dry well requires larger building footprint than Alternative 2. No other river crossings are anticipated in the future. Emergency storage provides overflow protection.	3.0	1.5	◑
Water Resources and Source Water Protection	The new SPS site is located in close proximity to the river, but with more buffer than the existing SPS. A source water protection plan would need to be developed for the new SPS site. Equalization is provided by emergency storage for peak hour flows to prevent overflow and enhance source water protection.	3.0	1.5	◑
Wildlife	Little to no impacts to wildlife. Higher risk to fisheries and aquatic health with the exisitng forcemain river crossing.	3.0	1.5	◑
Climate Change	New equipment is not energy intensive and will follow the same operational practices as existing. Upgrades are not expected to increase GHG emissions, however hauling may still be required occasionally which is associated with emissions. Vegetation or tree removal, other than ornamental grass, is not expected as part of the project, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4	2.0	●
Maximum Sub-total Score - Natural Environment			**6.5**	
Health and Safety	Construction of a new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public. New SPS would not be directly adjacent to residences and walkway, reducing risk to the public. This site has the potential for more buffer between the SPS and river with emergency storage providing additional overflow protection. Upgrade of the exisitng SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public. The SPS is directly adjacent to existing residences and public walkway but all equipment will be located inside fencing with a lock to minimize risk to public. Overflow is an ongoing risk during peak hour flows which may impact operators and the public.	5.0	3.3	●
Nuisance (short-term) Impacts	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while building the SPS and emergency storage. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑
Aesthetic and Operational (long-term) Impacts	Little long-term noise and visual effects on sensitive receptors during operation. Larger building footprint is a low impact, preserves views of the natural landscape and maintains the existing distance between the proposed infrastructure and the closest sensitive receptors.	4.0	2.7	●
Impacts on Businesses	Disruptions to businesses during construction and operation minimized as existing SPS will be used until new SPS is built. Retrofitting and upgrading the existing SPS will be able to maintain some of the existing assets and result in little interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	4.5	3.0	●
Protects Cultural Heritage Features	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site. Upgrade to existing SPS will be constrained to the existing site, which is previously disturbed and retains little to no curtural hertitage, minimizing potential for impacts.	4.0	2.7	●
Protects Archaeological Features	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site. Upgrade to existing SPS will be constrained to the existing site, which is previously disturbed and retains little to no curtural hertitage, minimizing potential for impacts.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural			**16.3**	
Existing and Future Demands	The new SPS will be sized appropriately for a portion of the full buildout (wet well) and 20-year capacity (pumps). The upgrades SPS will be sized appropriately for the 20-year capacity (pumps). However, wet well volume will not change and hauling is possible during peak hour flows.	3.5	4.0	◕
Reliability and Security	An upgraded station would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Having two stations in service provide some redundancy.	4.5	5.1	●
Constructability	The new SPS is compatible with existing system. Construction will have to be stagged with the existing station upgrades. Able to maintain servicing at existing SPS while new SPS is constructed. Does not maximize existing site capacity, but maximizes new site capacity.	4.5	5.1	●
Operational Complexity	New SPS is compatible with existing system. Reduced operational complexity due to reduced likelihood of hauling or operator intervention. New SPS will decrease operational and maintenance requirements. Does not eliminate the existing operational and maintenance issues with the existing SPS. An upgraded station would increase operational reliability and would be able to help surpress peak flows.	4.0	4.6	●
Existing and Planned Infrastructure	Aligns with planned infrastructure projects and goals, optimizes some existing infrastructure.	5.0	5.7	●
Existing and Planned Land Use	May require easement acquisition due to SPS collection system routing may extend onto private property.	4.5	5.1	●
Permits and Approvals	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational			**34.3**	
Life Cycle Cost	20-year life cycle cost of $4,569,000	3.09	18.5	◑
Maximum Sub-total Score - Financial / Economic			**18.5**	
Total Overall Maximum Weighted Score			**75.6**	◕

Alternative 4: New SPS with onsite emergency storage

Criteria	Rationale	Score 1 to 5	Weighted Score	
Natural Environmental Features	Constructing a new SPS will impact the environment. However, measures can be taken to minimize impacts by maintaining the river's flood capacity and minimizing sediment erosion. This alternative will require a new sanitary sewer river crossing which will further impact the environment, but eliminates risk of forcemain river crossing. Wet well/dry well requires larger building footprint than Alternative 2. No other river crossings are anticipated in the future. Emergency storage provides overflow protection.	4.5	2.3	●
Water Resources and Source Water Protection	The new SPS site is located in close proximity to the river, but with more buffer than the existing SPS. A source water protection plan would need to be developed for the new SPS site. Equalization is provided by emergency storage for peak hour flows to prevent overflow and enhance source water protection.	4.5	2.3	●
Wildlife	Little to no impacts to wildlife. Lower risk to fisheries and aquatic health with no forcemain river crossing. Emergency storage provides overflow protection.	4.5	2.3	●
Climate Change	New equipment is not energy intensive and will follow the same operational practices as existing. Upgrades are not expected to increase GHG emissions. Some vegetation removal is expected, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●
Maximum Sub-total Score - Natural Environment			**9.0**	
Health and Safety	Construction of a new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public. New SPS would not be directly adjacent to residences and walkway, reducing risk to the public. This site has the potential for more buffer between the SPS and river with emergency storage providing additional overflow protection.	5.0	3.3	●
Nuisance (short-term) Impacts	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while building the SPS and emergency storage. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑
Aesthetic and Operational (long-term) Impacts	There may be long-term noise and visual effects on sensitive receptors during operation. New SPS site will need to be assessed for closest sensitive receptors. Emergency storage tank may reduce impacts during peak hour flow events by providing equalization. Larger building footprint for wet well/dry well may have greater visual impacts than Alternative 2.	4.0	2.7	●
Impacts on Businesses	Disruptions to businesses during construction and operation minimized as existing SPS will be used until new SPS is built.	4.5	3.0	●
Protects Cultural Heritage Features	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●
Protects Archaeological Features	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural			**16.3**	
Existing and Future Demands	The new SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps) with emergency storage for peak hour flow equalization.	5.0	5.7	●
Reliability and Security	An upgraded station would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Emergency storage provides operational redundancy and peak flow suppression.	5.0	5.7	●
Constructability	The new SPS is compatible with existing system. Longest construction duration compared to other alternatives. Some constructability challenges with emergency storage tank and wet well footrpints, but adequate setback from the river. The new SPS and emergency storage has potential for scalability. Able to maintain servicing at existing SPS while new SPS is constructed. Does not maximize existing site capacity, but maximizes new site capacity.	4.5	5.1	●
Operational Complexity	New SPS is compatible with existing system. Reduced operational complexity due to reduced likelihood of hauling or operator intervention. New SPS will decrease operational and maintenance requirements. Eliminates operational and maintenance risk associated with the forcemain river crossing. Ability to use existing forcemain and no additonal costs associated with an upgraded river crossing. Would eliminate the existing operational and maintenance issues with the existing SPS. An upgraded station would increase operational reliability and would be able to surpress peak flows.	5.0	5.7	●
Existing and Planned Infrastructure	Aligns with planned infrastructure projects and goals, optimizes some existing infrastructure.	5.0	5.7	●
Existing and Planned Land Use	May require easement acquisition due to SPS collection system routing may extend onto private property.	4.5	5.1	●
Permits and Approvals	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational			**37.7**	
Life Cycle Cost	20-year life cycle cost of $6,053,000	2.5	15.0	◑
Maximum Sub-total Score - Financial / Economic			**15.0**	
Total Overall Maximum Weighted Score			**78.0**	◕

Collection System and Forcemain Alternatives

Alternative 1: Upgrade Existing Gravity Sewers

Criteria	Rationale	Score 1 to 5	Weighted Score	
Natural Environmental Features	This option does not involve works at locations beyond the existing sewers. Vegetation removal is not expected other than ornamental grasses. Grass will be re-sodded post-construction.	4.5	2.3	●
Water Resources and Source Water Protection	The gravity sewers have minimal impacts on water resources and source water protection. Replacing the pipe decreases the likelihood of pipe leaking and consequential impacts.	4.5	2.3	●
Wildlife	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work will is contained to the existing locations and will not disrupt any additional habitats and does not have any protected species.	4.5	2.3	●
Climate Change	New equipment follows the same operational practices as existing. Does not require energy or produce GHG emissions. Vegetation removal is not expected other than ornamental grasses, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●
Maximum Sub-total Score - Natural Environment			**9.0**	
Health and Safety	Upsized gravity sewers will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●
Nuisance (short-term) Impacts	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while replacing the pipe. Appropriate standard construction techniques and mitigation measures will be implemented.	3.5	2.3	◕
Aesthetic and Operational (long-term) Impacts	No expected long-term noise or visual effects on sensitive receptors during operation.	5.0	3.3	●
Impacts on Businesses	Some disruption to roadway access is possible while replacing sewer pipes. Construction will be phased to minimize disruptions.	3.0	2.0	◑
Protects Cultural Heritage Features	Construction will be constrained to the existing locations, which is previously disturbed and retains little to no curtural heritage, minimizing potential for impacts.	4.5	3.0	●
Protects Archaeological Features	Construction will be constrained to the existing locations, which is previously disturbed and retains little to no archaeological potential, minimizing potential for impacts.	4.5	3.0	●
Maximum Sub-total Score - Socio-Cultural			**17.0**	
Existing and Future Demands	The new gravity sewers will be sized appropriately for the ultimate buildout.	4.0	4.6	●
Reliability and Security	New upsized gravity sewers would increase operational reliability, reduce inflow/infiltration that may increase flows, and reduce the likelihood or disrupted service, process upset, or mechanical breakdown.	4.0	4.6	●
Constructability	Upsized gravity sewers are compatible with the existing system. Shortest construction duration compared to other alternatives. Few constructability challenges, limited potential for scalability. Construction staging is possible to maintain service. Maximizes existing infrastructure.	4.0	4.6	●
Operational Complexity	Sewer upgrades are compatible with existing system. Upsized gravity sewer will maintain the same low operational and maintenance requirements.	4.5	5.1	●
Existing and Planned Infrastructure	Optimizes existing infrastructure. Aligns with planned infrastructure projects.	5.0	5.7	●
Existing and Planned Land Use	Land acquisition is not anticipated.	5.0	5.7	●
Permits and Approvals	Time spent is expected to be minimal.	5.0	5.7	●
Maximum Sub-total Score - Technical / Operational			**36.0**	
Life Cycle Cost	20-year life cycle cost of $1,508,000	5	30.0	●
Maximum Sub-total Score - Financial / Economic			**30.0**	
Total Overall Maximum Weighted Score			**92.0**	●

Alternative 2: Build Local Pumping Station and Forcemain to the Existing Drayton SPS or New SPS

Criteria	Rationale	Score 1 to 5	Weighted Score	
Natural Environmental Features	A site for the new local SPS would have to be located. If connected to existing SPS, existing forcemain would be required to cross the river. If connected to new SPS, a second forcemain would be required to cross the river, increasing risk of leaking. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.0	1.5	◑
Water Resources and Source Water Protection	It is unknown if there are areas within or in the vicinity of the new SPS site that would be vulnerable. A source water protection plan may need to be developed for the new SPS site.	3.0	1.5	◑
Wildlife	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new local SPS and forcemain. An aquatic and species survey would need to be conducted.	3.5	1.8	◕
Climate Change	New equipment is not energy intensive and will follow the same operational practices as existing. Second SPS will double the total GHG emissions produced by Drayton collection system. Some vegetation removal is possible, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	2.5	1.3	◑
Maximum Sub-total Score - Natural Environment			**6.0**	
Health and Safety	Construction of a new local SPS and forcemain will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●
Nuisance (short-term) Impacts	Construction trucks will be on site for the delivery of construction materials and equipment. Long-term construction impacts from noise and dust are expected while building the new local SPS and forcemain to the Drayton SPS. Appropriate standard construction techniques and mitigation measures will be implemented.	2.5	1.7	◑
Aesthetic and Operational (long-term) Impacts	There may be long-term noise and visual effects on sensitive receptors during construction and operation. New site will need to be assessed for closest sensitive receptors.	3.5	2.3	◕
Impacts on Businesses	Some disruption to roadway access is possible while routing forcemain and building new SPS. Construction will be phased to minimize service disruptions.	3.0	2.0	◑
Protects Cultural Heritage Features	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●
Protects Archaeological Features	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural			**14.7**	
Existing and Future Demands	The new SPS will be sized appropriately for the ultimate buildout (wet well, forcemain) and 20-year capacity (pumps).	5.0	5.7	●
Reliability and Security	A new local SPS and forcemain would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Potential to increase operational redundancy in part of the collection system.	4.0	4.6	●
Constructability	The new local SPS and forcemain is compatible with the existing system. Medium- to long-term construction duration compared to other alternatives. Potential for scalability and future expansion. Able to maintain servicing at existing SPS while new local SPS is constructed. Does not maximize exising infrastructure	3.5	4.0	◕
Operational Complexity	New local SPS increases operational complexity and operational and monitoring requirements.	3.0	3.4	◑
Existing and Planned Infrastructure	Does not optimize existing infrastructure. Does not align with planned infrastructure projects.	3.0	3.4	◑
Existing and Planned Land Use	Land acquisition is anticipated.	3.0	3.4	◑
Permits and Approvals	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational			**29.1**	
Life Cycle Cost	20-year life cycle cost of $3,552,000	3.81	22.9	◕
Maximum Sub-total Score - Financial / Economic			**22.9**	
Total Overall Maximum Weighted Score			**72.7**	◕

Alternative 3: Build Local Pumping Station and Forcemain to the Mapleton WPCP

Criteria	Rationale	Score 1 to 5	Weighted Score	
Natural Environmental Features	A site for the new local SPS would have to be located. A second forcemain would be required to cross the river to the Mapleton WPCP, increasing risk of leaking. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.0	1.5	◑
Water Resources and Source Water Protection	It is unknown if there are areas within or in the vicinity of the new SPS site that would be vulnerable. A source water protection plan may need to be developed for the new SPS site.	3.0	1.5	◑
Wildlife	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new local SPS and forcemain. An aquatic and species survey would need to be conducted.	3.5	1.8	◕
Climate Change	New equipment is not energy intensive and will follow the same operational practices as existing. Second SPS will double the total GHG emissions produced by Drayton collection system. Some vegetation removal is possible, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	2.5	1.3	◑
Maximum Sub-total Score - Natural Environment			**6.0**	
Health and Safety	Construction of a new local SPS and forcemain will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●
Nuisance (short-term) Impacts	Construction trucks will be on site for the delivery of construction materials and equipment. Long-term construction impacts from noise and dust are expected while building the new local SPS and forcemain to the WPCP. Appropriate standard construction techniques and mitigation measures will be implemented.	2.0	1.3	◔
Aesthetic and Operational (long-term) Impacts	There may be long-term noise and visual effects on sensitive receptors during construction and operation. New site will need to be assessed for closest sensitive receptors.	3.5	2.3	◕
Impacts on Businesses	Some disruption to roadway access is possible while routing forcemain and building new SPS. Construction will be phased to minimize service disruptions.	3.0	2.0	◑
Protects Cultural Heritage Features	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●
Protects Archaeological Features	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural			**14.3**	
Existing and Future Demands	The new SPS will be sized appropriately for the ultimate buildout (wet well, forcemain) and 20-year capacity (pumps).	5.0	5.7	●
Reliability and Security	A new local SPS and forcemain would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Second forcemain to WPCP increases operational redundancy and system robustness.	4.5	5.1	●
Constructability	The new local SPS and forcemain is compatible with the existing system. Medium- to long-term construction duration compared to other alternatives. Potential for scalability and future expansion. Able to maintain servicing at existing SPS while new local SPS is constructed. Does not maximize exising infrastructure	3.5	4.0	◕
Operational Complexity	New local SPS increases operational complexity and operational and monitoring requirements.	3.0	3.4	◑
Existing and Planned Infrastructure	Does not optimize existing infrastructure. Does not align with planned infrastructure projects.	3.0	3.4	◑
Existing and Planned Land Use	Land acquisition is anticipated.	3.0	3.4	◑
Permits and Approvals	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational			**29.7**	
Life Cycle Cost	20-year life cycle cost of $5,817,000	2.5	15.0	◑
Maximum Sub-total Score - Financial / Economic			**15.0**	
Total Overall Maximum Weighted Score			**65.0**	◕

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives

SPS Alternatives

Category	Weight	Criteria	Indicators	Alternative 1: Upgrade existing SPS equipment – Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	Construction expected to be constrained to existing SPS site and forcemain corridor. Vegetation removal not expected, other than ornamental grasses. Construction area to be resodded post-construction.	4.5	2.3	●
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	Currently SPS does not impact source water protection areas. Expanded SPS not expected to change source water protection.	5.0	2.5	●
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work will is contained on the existing site and will not disrupt any additional habitats and does not have any protected species.	5.0	2.5	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas	New equipment is not energy intensive and will follow the same operational practices as existing. None of the upgrades are expected to increase GHG emissions. Vegetation or tree removal, other than ornamental grass, is not expected as part of the project, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●
Maximum Sub-total Score - Natural Environment						9.5	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	Upgrade of the existing SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction trucks will be on site for the delivery of construction materials and equipment. Short-term construction impacts from noise and dust are expected while expanding the existing SPS and forcemain. Appropriate standard construction techniques and mitigation measures will be implemented.	4.5	3.0	●
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	Minimal long-term noise and visual effects on sensitive receptors during operation. Maintaining the existing building footprint preserves views of the natural landscape and maintains the existing distance between the proposed infrastructure and the closest sensitive receptors. Minimal to no increase in air emissions anticipated.	5.0	3.3	●
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Retrofitting and upgrading the existing SPS will be able to maintain some of the existing assets and result in little interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	4.5	3.0	●
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	Construction will be constrained to the existing site, which is previously disturbed and retains little to no curtural heritage, minimizing potential for impacts.	5.0	3.3	●
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	Construction will be constrained to the existing site, which is previously disturbed and retains little to no archaeological potential, minimizing potential for impacts.	5.0	3.3	●
Maximum Sub-total Score - Socio-Cultural						19.3	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	The upgraded SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps).	5.0	6.7	●
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	An upgraded SPS would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. No change to operational redundancy.	4.5	5.1	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be shortest. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Scalability and future expansion may become limited on this site. Construction will be staged to minimize process disruption during construction. This alternative maximizes the existing building footprint with capacity for future expansion in the site.	4.5	5.1	●
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	Upgraded SPS will maintain same operational and maintenance requirements.	5.0	5.7	●
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Optimizes existing infrastructure and aligns with planned infrastructure projects.	4.5	5.1	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	Optimizes existing property ownership, does not require land acquistion.	5.0	5.7	●
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	Time spent is expected to be minimal.	5.0	5.7	●
Maximum Sub-total Score - Technical / Operational						39.2	
Financial / Economic	30	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	20-year life cycle cost of $925,000	5	30.0	●
Maximum Sub-total Score - Financial / Economic						30.0	
Total Overall Maximum Weighted	100					98.1	●

Criteria	Alternative 2: Build a New SPS on a New or Existing Site – Rationale	Score 1 to 5	Weighted Score	
Natural Environmental Features	A site for the new local SPS must be located, or the new SPS can be located at the existing site which likely has adequate space. For a new site, a second forcemain to the Mapleton WPCP must be added. For the existing site, the existing forcemain could be upgraded or a second forcemain could be added in the existing utilities corridor. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.5	1.8	◕
Water Resources and Source Water Protection	It is unknown if there are areas within or in the vicinity of the new SPS site that would be vulnerable. A source water protection plan may need to be developed for the new SPS site.	3.0	1.5	◑
Wildlife	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new SPS site. An aquatic and species survey would need to be conducted.	3.5	1.8	◕
Climate Change	New equipment is not energy intensive and will follow the same operational practices as existing. New SPS is expected to double the total GHG emissions produced by the Moorefield Collection System. Vegetation or tree removal other than ornamental grass may be required, therefore small effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.5	1.8	◕
Maximum Sub-total Score - Natural Environment			6.8	
Health and Safety	The upgraded SPS and new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●
Nuisance (short-term) Impacts	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while building the new SPS and forcemain. Appropriate standard construction techniques and mitigation measures will be implemented.	3.5	2.3	◕
Aesthetic and Operational (long-term) Impacts	There may be long-term noise and visual effects on sensitive receptors during construction and operation of new SPS on a new site. If existing site is used, long-term visual effects and minimal noise effects are expected. New SPS site will need to be assessed for closest sensitive receptors.	4.0	2.7	●
Impacts on Businesses	Little disruption to businesses during construction and operation as existing SPS will be used until new SPS is built. Little interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	5.0	3.3	●
Protects Cultural Heritage Features	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●
Protects Archaeological Features	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural			17.0	
Existing and Future Demands	The upgraded SPS and new SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps).	5.0	5.7	●
Reliability and Security	The new SPS would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Use of existing forcemain does not increase operational redundancy.	4.5	5.1	●
Constructability	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be moderate. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Scalability and future expansion may become limited on the existing site, unknown for a new site. Construction will be staged to minimize process disruption during construction. This alternative may maximize the existing site capacity if the existing site is used.	4.0	4.6	●
Operational Complexity	The addition of the new SPS will increase operational and maintenance requirements as two stations will now require maintenance.	4.0	4.6	●
Existing and Planned Infrastructure	Optimizes existing infrastructure and aligns with planned infrastructure projects.	5.0	5.7	●
Existing and Planned Land Use	Optimizes existing property ownership, land acquistion may be required.	4.5	5.1	●
Permits and Approvals	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational			35.4	
Life Cycle Cost	20-year life cycle cost of $3,712,000	4.4	26.6	●
Maximum Sub-total Score - Financial / Economic			26.6	
Total Overall Maximum Weighted			85.8	●

Criteria	Alternative 3: Build a Local SPS and New Forcemain to the Mapleton WPCP – Rationale	Score 1 to 5	Weighted Score	
Natural Environmental Features	A site for the new local SPS must be located and a forcemain routed to the Mapleton WPCP. Vegetation removal may be required. Construction area will be re-sodded post-construction.	3.0	1.5	◑
Water Resources and Source Water Protection	It is unknown if there are areas within or in the vicinity of the new SPS site that would be vulnerable. A source water protection plan may need to be developed for the new SPS site.	3.0	1.5	◑
Wildlife	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new SPS and forcemain sites. An aquatic and species survey would need to be conducted.	3.5	1.8	◕
Climate Change	New equipment is not energy intensive and will follow the same operational practices as existing. New SPS is expected to double the total GHG emissions produced by the Moorefield Collection System. Vegetation or tree removal other than ornamental grass may be required, therefore small effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.5	1.8	◕
Maximum Sub-total Score - Natural Environment			6.5	
Health and Safety	The new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●
Nuisance (short-term) Impacts	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while building the new SPS and forcemain to the Mapleton WPCP. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑
Aesthetic and Operational (long-term) Impacts	There may be long-term noise and visual effects on sensitive receptors during construction and operation of new SPS on a new site. New SPS site will need to be assessed for closest sensitive receptors.	4.0	2.7	●
Impacts on Businesses	Little disruption to businesses during construction and operation as existing SPS will be used until new SPS is built. Little interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	5.0	3.3	●
Protects Cultural Heritage Features	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS and forcemain sites.	4.0	2.7	●
Protects Archaeological Features	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS and forcemain sites.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural			16.7	
Existing and Future Demands	The new SPS will be sized appropriately for the buildout (wet well, forcemain) and 20-year capacity (pumps).	5.0	5.7	●
Reliability and Security	The new SPS and forcemain would increase operational reliability and reduce the likelihood of disrupted service, process upset, or mechanical breakdown. Second forcemain increases operational redundancy.	5.0	5.7	●
Constructability	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be moderate. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Scalability and potential for future expansion is unknown for a new site. Construction will be staged to minimize process disruption during construction. This alternative does not maximize the existing building footprint or site capacity.	3.5	4.0	◕
Operational Complexity	The addition of the new SPS will increase operational and maintenance requirements as two stations will now require maintenance.	4.0	4.6	●
Existing and Planned Infrastructure	Makes use of existing infrastructure and aligns with planned infrastructure projects.	4.5	5.1	●
Existing and Planned Land Use	Land acquisition may be required.	4.0	4.6	●
Permits and Approvals	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational			34.3	
Life Cycle Cost	20-year life cycle cost of $7,718,000	3.34	20.1	◕
Maximum Sub-total Score - Financial / Economic			20.1	
Total Overall Maximum Weighted			77.5	◕

Criteria	Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, – Rationale	Score 1 to 5	Weighted Score	
Natural Environmental Features	A site for the new local SPS must be located and a forcemain routed to the existing SPS. Vegetation removal may be required. Construction area will be re-sodded post-construction.	2.5	1.3	◑
Water Resources and Source Water Protection	It is unknown if there are areas within or in the vicinity of the new SPS site that would be vulnerable. A source water protection plan may need to be developed for the new SPS site.	3.0	1.5	◑
Wildlife	Impacts to wildlife (including species at risk) or identified habitat locations for these species are unknown and would need to be assessed for the new SPS and forcemain sites. An aquatic and species survey would need to be conducted.	3.0	1.5	◑
Climate Change	New equipment is not energy intensive and will follow the same operational practices as existing. New SPS is expected to double the total GHG emissions produced by the Moorefield Collection System. Vegetation or tree removal other than ornamental grass may be required, therefore small effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.5	1.8	◕
Maximum Sub-total Score - Natural Environment			6.0	
Health and Safety	The upgraded SPS and new SPS will implement latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●
Nuisance (short-term) Impacts	Construction trucks will be on site for the delivery of construction materials and equipment. Long-term construction impacts are expected while upgrading the existing SPS and forcemain, and building the new SPS and forcemain. Appropriate standard construction techniques and mitigation measures will be implemented.	2.5	1.7	◑
Aesthetic and Operational (long-term) Impacts	May be long-term noise and visual effects on sensitive receptors during construction and operation of new SPS, minimal effects for upgraded SPS. New SPS site will need to be assessed for closest sensitive receptors.	4.5	3.0	●
Impacts on Businesses	Little disruption to businesses during construction and operation as existing SPS will be used until new SPS is built. Retrofitting and upgrading the existing SPS will be able to maintain some of the existing assets and result in little interference with current uses and access to the residential properties in the vicinity; thus, maximizing public support.	4.5	3.0	●
Protects Cultural Heritage Features	Unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new SPS site.	4.0	2.7	●
Protects Archaeological Features	Unknown impact to archaeologically significant features given these studies have not been completed for the new SPS site.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural			16.3	
Existing and Future Demands	The upgraded SPS and new SPS will be sized appropriately for the buildout (wet well) and 20-year capacity (pumps).	5.0	5.7	●
Reliability and Security	The upgraded SPS and new SPS would increase operational reliability and redundancy, and reduce the likelihood of disrupted service, process upset, or mechanical breakdown.	5.0	5.7	●
Constructability	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be the longest. Ease of implementation will be based on final equipment selection; may require complex construction sequencing. Risks are anticipated to be manageable. Scalability and potential for future expansion is unknown for a new site. Construction will be staged to minimize process disruption during construction. This alternative maximizes the existing building footprint	3.0	3.4	◑
Operational Complexity	The addition of the new SPS will increase operational and maintenance requirements as two stations will now require maintenance.	4.0	4.6	●
Existing and Planned Infrastructure	Makes use of existing infrastructure and aligns with planned infrastructure projects.	4.5	5.1	●
Existing and Planned Land Use	Optimizes existing property ownership, land acquistion may be required.	4.5	5.1	●
Permits and Approvals	Moderate amount of time may be required to obtain permits.	4.0	4.6	●
Maximum Sub-total Score - Technical / Operational			34.3	
Life Cycle Cost	20-year life cycle cost of $10,838,000	2.5	15.0	◑
Maximum Sub-total Score - Financial / Economic			15.0	
Total Overall Maximum Weighted			71.6	◕

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives

Collection System and Forcemain Alternatives

Category	Weight	Criteria	Indicators	Alternative 1: Low-pressure Sewers				Alternative 2: All Gravity Sewers				Alternative 3: Combination Gravity Sewer and Low-pressure Sewers			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	This option does not involve works at locations beyond the existing sewers. Vegetation removal is not expected other than ornamental grasses. Grass will be re-sodded post-construction.	4.5	2.3	●	This alternative involves replacing all existing buried sewers with gravity sewers. Vegetation removal and significant excavation is expected, as some sites may reach depths of 6 m. Grass will be re-sodded post-construction.	2.5	1.3	◑	This alternative involves installing a trunk gravity sewer to which the low-pressure sewer will connect, buried below roadways. Vegetation removal is not expected, other than ornamental grass. Grass will be re-sodded post-construction.	3.5	1.8	◕
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	The low-pressure sewers have minimal impacts on water resources and source water protection. However, an assessment may be required for new sites to determine the impacts.	4.5	2.3	●	The gravity sewers would like be located in the same locations as the existing low pressure sewers as much as possible. Minimal impacts on water resources and source water protection are expected. However, an assessment may be required for new or modified sites to determine the impacts, especially for sites that may reach depths up to 6 m.	3.5	1.8	◕	The low-pressure sewers have minimal impacts on water resources and source water protection. However, an assessment may be required for new low pressure sewer sites and for the trunk gravity sewer site to determine the impacts.	4.0	2.0	●
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	Impact to wildlife (including species at risk) or identified habitat locations for these species is possible for expansions to the system at new sites.	4.5	2.3	●	Some impact to wildlife and habitat is possible as a result of installing new gravity sewers throughout the Town. Minimal wildlife impact is expected to replace sewers in existing utility corridors, but there may be impacts for new corridors.	3.5	1.8	◕	Impact to wildlife (including species at risk) or identified habitat locations for these species is possible for expansions to the system at new sites. Minimal impact is expected for the trunk gravity sewer as it will be installed below roadways.	4.0	2.0	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas	New equipment follows the same operational practices as existing. Does not require energy or produce GHG emissions. Vegetation removal is not expected other than ornamental grasses, therefore neglible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●	New equipment would decrease energy requirements by removing individual pumps and relying on gravity. Minimal GHG emissions during operation, however requirement for significant construction and excavation would increase GHG emissions during construction. Some vegetation removal would be expected, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.0	1.5	◑	New equipment would slightly decrease energy requirements by lowering pump rate required from individual pumps and relying on gravity for the trunk main. Slightly decreased GHG emissions during operation. Vegetation removal is not expected other than ornamental grasses, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●
Maximum Sub-total Score - Natural Environment						9.0				6.3				8.0	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	Any upgrades or expansions to the low pressure sewers will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●	Gravity sewers will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	4.5	3.0	●	Any upgrades or expansions to the low pressure sewers and trunk gravity sewer will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	4.5	3.0	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction trucks will be on site for the delivery of construction materials and equipment. Short-term construction impacts from noise and dust are expected. Appropriate standard construction techniques and mitigation measures will be implemented.	4.5	3.0	●	Construction trucks will be on site for the delivery of construction materials and equipment. Long-term construction impacts from noise and dust are expected while replacing the sewers. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while expanding the sewers and installing the trunk main. Appropriate standard construction techniques and mitigation measures will be implemented.	4.0	2.7	●
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	Minimal expected long-term noise or visual effects on sensitive receptors during operation. Long-term effort from property owners to maintain household pumps for continued servicing.	4.0	2.7	●	Minimal expected long-term noise or visual effects on sensitive receptors during operation.	4.5	3.0	●	No expected long-term noise or visual effects on sensitive receptors during operation. Long-term effort from property owners to maintain household pumps for continued servicing.	3.5	2.3	◕
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Minimal disruption to roadway access is possible while installing new sewer pipes. Construction will be phased to minimize disruptions.	4.5	3.0	●	Significant disruption to roadway access is possible while replacing sewer pipes. Construction will be phased to minimize disruptions.	3.5	2.3	◕	Significant disruption to roadway access for designated roads is possible while installing trunk gravity sewers. Construction will be phased to minimize disruptions.	4.0	2.7	●
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	For new sites (system expansion), unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	●
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	For new sites (system expansion), unknown impact to archaeologically significant features given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to archaeologically significant features given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to archaeologically significant features given these studies have not been completed for the new sites.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural						17.3				15.7				16.0	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.7	●	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.7	●	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	4.5	5.1	●
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	Low pressure sewers are not a widely used technology and as such are less robust and reliable. This alternative would maintain the existing operational reliability and redundancy, as well as the high reliance on mechanical compoents (grinder pumps). Additionally, the number of pumps that can come on at the same time (forcemain sharing) is limited.	3.0	3.4	◑	Gravity sewers are a widely used technology due to their simplicity, reliability, and robustness. This alternative would improve system security and operational reliability.	5.0	5.7	●	Low pressure sewers are not a widely used technology and as such are less robust and reliable. Gravity sewers are a widely used technology due to their simplicity, reliability, and robustness. This alternative would improve system security and operational reliability by adding the trunk gravity sewer.	4.5	5.1	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be the shortest. Ease of implementation is expected to go smoothly, some phasing may be required. Scalability and potential for future expansion is possible, but eventually, past the planning horizon, the population may increase enough that a switch to gravity sewers is required. Construction will be staged to minimize process disruption during construction. This alternative maximizes the existing infrastructure.	4.0	4.6	●	Upgrades are not compatible with the existing system, instead the existing system would be replaced. Construction period for this alternative is expected to be the longest, as the entire system would be replaced and some pipes must be buried up to 6 m. Implementation will invove complex construction sequencing. Scalability and potential for future expansion is possible. Construction will be staged to minimize process disruption during construction. This alternative does not maximize the existing infrastructure.	2.5	2.9	◑	Upgrades are somewhat compatible with the existing system. Construction period for this alternative is expected to be moderate. Implementation will invove complex construction sequencing. Scalability and potential for future expansion is possible. Construction will be staged to minimize process disruption during construction. This alternative maximizes the existing infrastructure.	3.5	4.0	◕
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	Sewer upgrades are compatible with existing system. This alternative will maintain the same moderate operational and maintenance requirements and reliance on power, and the associated issues. Public education is necessary, so property owners are aware of how to avoid blockages, perform maintenance, and how to deal with outages/emergencies.	4.0	4.6	●	Upgrades are not compatible with the existing system, instead the existing system would be replaced. Decreased system complexity and increased operational flexibility due to utilization of gravity. Minimal operation and maintenance requirements.	4.0	4.6	●	Upgrades are somewhat compatible with the existing system. Decreased system complexity and increased operational flexibility due to utilization of trunk gravity sewer. This alternative will maintain most of the same moderate operational and maintenance requirements and reliance on power, and the associated issues. Trunk sewer may reduce requirements.	4.5	5.1	●
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Optimizes existing infrastructure. Aligns with planned infrastructure projects.	5.0	5.7	●	Does not optimize with existing infrastructure or align with planned infrastructure.	4.5	5.1	●	Optimizes existing infrastructure. Aligns with planned infrastructure projects.	5.0	5.7	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	Land acquisition is possible.	4.5	5.1	●	Land acquisition is possible.	4.5	5.1	●	Land acquisition is possible.	4.5	5.1	●
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	Time spent is expected to be minimal.	5.0	5.7	●	Time spent is expected to be moderate.	4.5	5.1	●	Time spent is expected to be moderate.	4.5	5.1	●
Maximum Sub-total Score - Technical / Operational						34.9				34.3				35.4	
Financial / Economic	30	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	20-year life cycle cost of $151,000	5	30.0	●	20-year life cycle cost of $8,079,000	2.5	15.0	◑	20-year life cycle cost of $1,127,000	4.69	28.2	●
Maximum Sub-total Score - Financial / Economic						30.0				15.0				28.2	
Total Overall Maximum Weighted		100				91.2	●			71.2	◕			87.6	●

Matrix 2: Detailed Evaluation of Wastewater Servicing Alternatives

Collection System and Forcemain Alternatives

Category	Weight	Criteria	Indicators	Alternative 1: Low-pressure Sewers				Alternative 2: All Gravity Sewers				Alternative 3: Combination Gravity Sewer and Low-pressure Sewers			
				Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Natural Environment	10	**Natural Environmental Features:** Potential impacts to existing natural environment	• Impacts during construction on environmental features such as terrestrial habitats, vegetation, areas of natural significance, regulated and protected areas, species at risk, etc.	This option does not involve works at locations beyond the existing sewers. Vegetation removal is not expected other than ornamental grasses. Grass will be re-sodded post-construction.	4.5	2.3	●	This alternative involves replacing all existing buried sewers with gravity sewers. Vegetation removal and significant excavation is expected, as some sites may reach depths of 6 m. Grass will be re-sodded post-construction.	2.5	1.3	◑	This alternative involves installing a trunk gravity sewer to which the low-pressure sewer will connect, buried below roadways. Vegetation removal is not expected, other than ornamental grass. Grass will be re-sodded post-construction.	3.5	1.8	◕
		Water Resources and Source Water Protection: Potential temporary and permanent effects of surface water and groundwater quantity/quality	• Potential impact on existing groundwater wells and wellhead protection areas (WHPAs), areas of groundwater recharge and discharge and highly vulnerable aquifers • Conformity with policies and requirements of existing source water protection program • Potential significant drinking water threats • Potential impacts to existing and future land use	The low-pressure sewers have minimal impacts on water resources and source water protection. However, an assessment may be required for new sites to determine the impacts.	4.5	2.3	●	The gravity sewers would like be located in the same locations as the existing low pressure sewers as much as possible. Minimal impacts on water resources and source water protection are expected. However, an assessment may be required for new or modified sites to determine the impacts, especially for sites that may reach depths up to 6 m.	3.5	1.8	◕	The low-pressure sewers have minimal impacts on water resources and source water protection. However, an assessment may be required for new low pressure sewer sites and for the trunk gravity sewer site to determine the impacts.	4.0	2.0	●
		Wildlife: Protects wildlife and species at risk	• Impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health	Impact to wildlife (including species at risk) or identified habitat locations for these species is possible for expansions to the system at new sites.	4.5	2.3	●	Some impact to wildlife and habitat is possible as a result of installing new gravity sewers throughout the Town. Minimal wildlife impact is expected to replace sewers in existing utility corridors, but there may be impacts for new corridors.	3.5	1.8	◕	Impact to wildlife (including species at risk) or identified habitat locations for these species is possible for expansions to the system at new sites. Minimal impact is expected for the trunk gravity sewer as it will be installed below roadways.	4.0	2.0	●
		Climate Change: Maximize resiliency to extreme conditions and minimize greenhouse gas emissions	•Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands •Greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes to site and vicinity plant cover) •Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts •Prioritizes resiliency to extreme weather events and environmental hazards (high and low river levels, precipitation, etc.) •Maintains adaptive capacity and resiliency of surrounding areas	New equipment follows the same operational practices as existing. Does not require energy or produce GHG emissions. Vegetation removal is not expected other than ornamental grasses, therefore neglible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●	New equipment would decrease energy requirements by removing individual pumps and relying on gravity. Minimal GHG emissions during operation, however requirement for significant construction and excavation would increase GHG emissions during construction. Some vegetation removal would be expected, therefore some effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	3.0	1.5	◑	New equipment would slightly decrease energy requirements by lowering pump rate required from individual pumps and relying on gravity for the trunk main. Slightly decreased GHG emissions during operation. Vegetation removal is not expected other than ornamental grasses, therefore negligible effects on existing carbon storage conditions. Grass will be re-sodded post-construction.	4.5	2.3	●
Maximum Sub-total Score - Natural Environment						9.0				6.3				8.0	
Socio-Cultural	20	**Health and Safety:** Minimize potential impact of health and safety of operation staff	• Potential risk to health and safety of operator and maintenance staff • Potential risk to public health and safety, particularly on downstream users (including for recreation and tourism)	Any upgrades or expansions to the low pressure sewers will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	5.0	3.3	●	Gravity sewers will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	4.5	3.0	●	Any upgrades or expansions to the low pressure sewers and trunk gravity sewer will implement the latest health and safety requirements to mitigate the likelihood of health and safety concerns to the operator and the public.	4.5	3.0	●
		Nuisance (short-term) Impacts: Potential short-term disruption during construction (i.e., noise, dust, visual, truck traffic, access to property)	• Noise and dust production from construction • Potential effects on sensitive receptors (adjacent neighbours and area users) during excavation and construction	Construction trucks will be on site for the delivery of construction materials and equipment. Short-term construction impacts from noise and dust are expected. Appropriate standard construction techniques and mitigation measures will be implemented.	4.5	3.0	●	Construction trucks will be on site for the delivery of construction materials and equipment. Long-term construction impacts from noise and dust are expected while replacing the sewers. Appropriate standard construction techniques and mitigation measures will be implemented.	3.0	2.0	◑	Construction trucks will be on site for the delivery of construction materials and equipment. Medium-term construction impacts from noise and dust are expected while expanding the sewers and installing the trunk main. Appropriate standard construction techniques and mitigation measures will be implemented.	4.0	2.7	●
		Aesthetic and Operational (long-term) Impacts: Potential long-term visual, noise and air quality impacts on adjacent residents and local users from new infrastructure and activities related to operation of facilities	• Noise and visual effects on sensitive receptors (adjacent neighbours and land users) during operation • Presence of existing natural or other features around proposed infrastructure that may help reduce visibility • Ability to maintain views of natural landscapes and prominent features (rural settings) and/or implement landscaping features • Distance between proposed infrastructure and the closest sensitive receptor(s) • Air emissions	Minimal expected long-term noise or visual effects on sensitive receptors during operation. Long-term effort from property owners to maintain household pumps for continued servicing.	4.0	2.7	●	Minimal expected long-term noise or visual effects on sensitive receptors during operation.	4.5	3.0	●	No expected long-term noise or visual effects on sensitive receptors during operation. Long-term effort from property owners to maintain household pumps for continued servicing.	3.5	2.3	◕
		Impacts on Businesses: Minimizes short-term and long-term impacts to business sector	• Maintain access for businesses during construction and operation • Potential negative effects on short-term and long-term business vitality, and community growth and development	Minimal disruption to roadway access is possible while installing new sewer pipes. Construction will be phased to minimize disruptions.	4.5	3.0	●	Significant disruption to roadway access is possible while replacing sewer pipes. Construction will be phased to minimize disruptions.	3.5	2.3	◕	Significant disruption to roadway access for designated roads is possible while installing trunk gravity sewers. Construction will be phased to minimize disruptions.	4.0	2.7	●
		Protects Cultural Heritage Features: Minimizes impact to cultural heritage features	• Potential impact to historical, cultural, and architecturally significant features • Potential impact to First Nations communities	For new sites (system expansion), unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to historical, cultural, architecturally significant features or First Nations communities given these studies have not been completed for the new sites.	4.0	2.7	●
		Protects Archaeological Features: Minimizes impact to archaeological features	• Potential impact to archaeologically significant features	For new sites (system expansion), unknown impact to archaeologically significant features given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to archaeologically significant features given these studies have not been completed for the new sites.	4.0	2.7	●	For new sites (system expansion), unknown impact to archaeologically significant features given these studies have not been completed for the new sites.	4.0	2.7	●
Maximum Sub-total Score - Socio-Cultural						17.3				15.7				16.0	
Technical / Operational	40	**Existing and Future Demands:** Able to meet existing and future demands and aligns with existing and planned infrastructure	• Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas • Provides appropriate site access for operations and maintenance per current standards and best practices	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.7	●	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	5.0	5.7	●	Meets the long-term capacity requirements to service the projected population and ICI growth in the servicing areas. Provides appropriate site access for operations and maintenance per current standards and best practices.	4.5	5.1	●
		Reliability and Security: Provides reliability, security, and robustness	• Reduced likelihood of disrupted service, process upset, and/or mechanical breakdown • Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure	Low pressure sewers are not a widely used technology and as such are less robust and reliable. This alternative would maintain the existing operational reliability and redundancy, as well as the high reliance on mechanical compoents (grinder pumps). Additionally, the number of pumps that can come on at the same time (forcemain sharing) is limited.	3.0	3.4	◑	Gravity sewers are a widely used technology due to their simplicity, reliability, and robustness. This alternative would improve system security and operational reliability.	5.0	5.7	●	Low pressure sewers are not a widely used technology and as such are less robust and reliable. Gravity sewers are a widely used technology due to their simplicity, reliability, and robustness. This alternative would improve system security and operational reliability by adding the trunk gravity sewer.	4.5	5.1	●
		Constructability: Maximize ease of construction and facilitate integration with existing system(s)	• Compatibility with existing system • Length of construction period • Ease of implementation (construction schedule and phasing opportunities) • Scalability and ability for future expansion and upgrades • Ability to maintain water servicing during construction • Ability to maximize existing footprint / site capacity	Upgrades are compatible with the existing system. Construction period for this alternative is expected to be the shortest. Ease of implementation is expected to go smoothly, some phasing may be required. Scalability and potential for future expansion is possible, but eventually, past the planning horizon, the population may increase enough that a switch to gravity sewers is required. Construction will be staged to minimize process disruption during construction. This alternative maximizes the existing infrastructure.	4.0	4.6	●	Upgrades are not compatible with the existing system, instead the existing system would be replaced. Construction period for this alternative is expected to be the longest, as the entire system would be replaced and some pipes must be buried up to 6 m. Implementation will invove complex construction sequencing. Scalability and potential for future expansion is possible. Construction will be staged to minimize process disruption during construction. This alternative does not maximize the existing infrastructure.	2.5	2.9	◑	Upgrades are somewhat compatible with the existing system. Construction period for this alternative is expected to be moderate. Implementation will invove complex construction sequencing. Scalability and potential for future expansion is possible. Construction will be staged to minimize process disruption during construction. This alternative maximizes the existing infrastructure.	3.5	4.0	◕
		Operational Complexity: Improve operational efficiencies and minimize operational and monitoring requirements	• Compatibility with existing system • Complexity of treatment processes • Operational flexibility and ability to respond to future treatment objectives • Operation and maintenance requirements	Sewer upgrades are compatible with existing system. This alternative will maintain the same moderate operational and maintenance requirements and reliance on power, and the associated issues. Public education is necessary, so property owners are aware of how to avoid blockages, perform maintenance, and how to deal with outages/emergencies.	4.0	4.6	●	Upgrades are not compatible with the existing system, instead the existing system would be replaced. Decreased system complexity and increased operational flexibility due to utilization of gravity. Minimal operation and maintenance requirements.	4.0	4.6	●	Upgrades are somewhat compatible with the existing system. Decreased system complexity and increased operational flexibility due to utilization of trunk gravity sewer. This alternative will maintain most of the same moderate operational and maintenance requirements and reliance on power, and the associated issues. Trunk sewer may reduce requirements.	4.5	5.1	●
		Existing and Planned Infrastructure: Aligns with existing and planned infrastructure	• Optimize existing infrastructure investment including structures, tanks, and equipment • Aligns with planned infrastructure projects including Drayton Elevated Tank, Drayton Pumphouse Upgrades, Moorefield Water System Renewal, and Mapleton WPCP upgrades	Optimizes existing infrastructure. Aligns with planned infrastructure projects.	5.0	5.7	●	Does not optimize with existing infrastructure or align with planned infrastructure.	4.5	5.1	●	Optimizes existing infrastructure. Aligns with planned infrastructure projects.	5.0	5.7	●
		Existing and Planned Land Use: Aligns with existing and planned land use	• Optimize existing property ownership • Requirement to acquire new land or expand ownership	Land acquisition is possible.	4.5	5.1	●	Land acquisition is possible.	4.5	5.1	●	Land acquisition is possible.	4.5	5.1	●
		Permits and Approvals: Ease of permits and approvals	• Complexity of and time spent to obtain approvals from various regulatory agencies	Time spent is expected to be minimal.	5.0	5.7	●	Time spent is expected to be moderate.	4.5	5.1	●	Time spent is expected to be moderate.	4.5	5.1	●
Maximum Sub-total Score - Technical / Operational						34.9				34.3				35.4	
Financial / Economic	30	**Life Cycle Cost:** 20-year life cycle cost	• Evaluation of the capital costs plus operating and maintenance costs for a 20-year life cycle period	20-year life cycle cost of $151,000	5	30.0	●	20-year life cycle cost of $8,079,000	2.5	15.0	◑	20-year life cycle cost of $1,127,000	4.69	28.2	●
Maximum Sub-total Score - Financial / Economic						30.0				15.0				28.2	
Total Overall Maximum Weighted		100				91.2	●			71.2	◕			87.6	●

E

Appendix E: Cost Estimates

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester		**Date:** 01-Dec-22
Revision No.:	0		**Revision Date:**

Costs for Tech Memo #2			
Water Servicing Alternatives	**Capital Cost Year 2023**	**O&M Costs Year 2023**	**Calculated Life Cycle Costs 20 Years**
Drayton Drinking Water System			
Supply			
Alternative 1: Increase the capacity of the existing wells	$894,000	$64,000	$3,095,000
Alternative 2: Build a new well on the existing site to increase capacity	$1,439,000	$64,000	$3,660,000
Alternative 3: Build a new well on another site to increase capacity	$2,351,000	$90,000	$5,485,000
Distribution			
Water distribution extension at Wellington Street South	$197,000	$14,000	$679,000
Water distribution extension at County Road 8, near Drayton Industrial Drive	$690,000	$14,000	$1,190,000
Water distribution extension at Main Street East	$131,000	$14,000	$611,000
Moorefield Drinking Water System			
Storage			
Alternative 1: Build another standpipe	$1,600,000	$5,000	$1,826,000
Alternative 2: Extend the exisitng standpipes	$1,015,000	$5,000	$1,221,000
Alternative 3: Build an elevated storage tank	$7,559,000	$29,000	$8,811,000
Distribution			
Alternative 1: No fire flow protection for watermains	N/A	N/A	N/A
Alternative 2: Watermains sized for fire flow	$3,343,000	$8,000	$3,733,000
Total			
Alternative 1: No fire flow protection	N/A	N/A	N/A
Alternative 2: Fire flow protection	$10,902,000	$37,000	$12,544,000
Wastewater Servicing Alternatives	**Capital Cost Year 2023**	**O&M Costs Year 2023**	**Calculated Life Cycle Costs 20 Years**
Mapleton WPCP			
Nitrogen Removal Upgrade with MBBR System	$5,800,000	$113,000	$9,837,000
Drayton SPS			
Alternative 2: New SPS on the North side of the river	$3,811,000	$22,000	$4,693,000
Alternative 3: Maintain existing Drayton SPS and construct a new SPS on the North side of the river	$4,640,000	$23,000	$5,585,000
Alternative 4: New SPS with onsite emergency storage	$5,157,580	$21,000	$6,053,000
Drayton Collection System and Forcemain			
Alternative 1a: Upgrade gravity sewers on Wellington Street South	$701,000	$0	$726,000
Alternative 1b: Upgrade gravity sewers on Main Street East near the existing Drayton SPS	$453,000	$0	$470,000
Alternative 1c: Upgrade gravity sewers on Main Street East	$301,000	$0	$312,000
Alternative 1: Upgrade the existing gravity sewers	$1,455,000	$0	$1,508,000
Alternative 2: Build a local pumping station and forcemain to the exisintg Drayton SPS or New SPS	$2,709,000	$22,000	$3,552,000
Alternative 3: Build a local pumping station and forcemain to the Mapleton WPCP	$4,897,000	$22,000	$5,817,000
Moorefield SPS			
Alternative 1: Upgrade existing SPS	$402,000	$15,000	$925,000
Alternative 2: Build a new SPS	$2,897,000	$21,000	$3,712,000
Alternative 3: Build a Local SPS and new forcemain to the Mapleton WPCP	$6,798,000	$20,000	$7,718,000
Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, upgrade the existing Moorefield SPS and forcemain	$9,483,000	$30,000	$10,838,000
Moorefield Collection System and Forcemain			
Alternative 1: Low-pressure sewers	$145,000	$0	$151,000
Alternative 2: All Gravity Sewers	$7,801,000	$0	$8,079,000
Alternative 3: Combination gravity sewer and low-pressure sewers	$1,088,000	$0	$1,127,000

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Increase the capacity of the existing wells

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 138,000	$ 138,000	incl.	$ -	$ 138,000		
Structural / Architectural	1	LS	$ 120,950	$ 120,950	incl.	$ -	$ 121,000		
Mechanical & HVAC	1	LS	$ 14,000	$ 14,000	incl.	$ -	$ 14,000		
Electrical, Instrumentation and Control	1	LS	$ 157,100	$ 157,100	incl.	$ -	$ 158,000		
Civil	1	LS	$ 185,000	$ 185,000	incl.	$ -	$ 185,000		
Sub-total Capital Cost =								**$ 616,000**	
							SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) = $	**616,000**	
							Contingency (30%) = $	**185,000**	
							Engineering and Construction (15%) = $	**93,000**	
							TOTAL CAPITAL COST IN CURRENT YEAR (2023) = $	**894,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		108,916	kWh	$ 0.18	$ 19,605		$0.18/kWh, one 100 kW pump, 4 hr/d
					Sub-Total =	**$ 19,605**	
Chemical Systems		11,033	$/L	$ 0.75	$ 8,275		Average chlorine use for disinfection
		2,991	$/L	$ 0.75	$ 2,243		Average sodium silicate use for iron sequestration
					Sub-Total =	**$ 10,520**	
Miscellaneous O&M		1	LS	$ 1,380	$ 1,380		1% of Equipment Cost
					Sub-Total =	**$ 1,380**	
Labour		416	LS	$ 50	$ 20,800		$50/hr; 8 hr/wk
					Sub-Total =	**$ 20,800**	
					TOTAL O&M COST IN CURRENT YEAR (2023) = $	**53,000**	
					Contingency (20%) = $	**11,000**	
					TOTAL O&M COST IN CURRENT YEAR (2023) = $	**64,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Increase the capacity of the existing wells

LIFE CYCLE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYCLE COST

Alternative 1: Increase the capacity of the existing wells

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$894,000		$64,000		
2024	$962,838	$925,806	$68,928	$66,277	$992,083
2025	$0	$0	$79,952	$73,920	$73,920
2026	$0	$0	$86,108	$76,550	$76,550
2027	$0	$0	$92,738	$79,273	$79,273
2028	$0	$0	$99,879	$82,093	$82,093
2029	$0	$0	$107,570	$85,014	$85,014
2030	$0	$0	$115,853	$88,038	$88,038
2031	$0	$0	$124,773	$91,171	$91,171
2032	$0	$0	$134,381	$94,414	$94,414
2033	$0	$0	$144,728	$97,773	$97,773
2034	$0	$0	$155,872	$101,252	$101,252
2035	$0	$0	$167,874	$104,854	$104,854
2036	$0	$0	$180,801	$108,584	$108,584
2037	$0	$0	$194,722	$112,447	$112,447
2038	$0	$0	$209,716	$116,448	$116,448
2039	$0	$0	$225,864	$120,591	$120,591
2040	$0	$0	$243,255	$124,881	$124,881
2041	$0	$0	$261,986	$129,324	$129,324
2042	$0	$0	$282,159	$133,925	$133,925
2043	$0	$0	$303,885	$138,689	$138,689
2044	$0	$0	$327,285	$143,623	$143,623
	Sub-Total NPV value =	$925,806		$2,169,140	
Total NPV value (20 years) =			**$3,095,000**		**$3,095,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a new well on the existing site to increase capacity

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 142,000	$ 142,000	incl.	$ -	$ 142,000		
Structural / Architectural	1	LS	$ 167,375	$ 167,375	incl.	$ -	$ 168,000		
Mechanical & HVAC	1	LS	$ 21,000	$ 21,000	incl.	$ -	$ 21,000		
Electrical, Instrumentation and Control	1	LS	$ 404,900	$ 404,900	incl.	$ -	$ 405,000		
Civil	1	LS	$ 256,000	$ 256,000	incl.	$ -	$ 256,000		
Sub-total Capital Cost =								**$ 992,000**	
							SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =	**$ 992,000**	
							Contingency (30%) =	**$ 298,000**	
							Engineering and Construction (15%) =	**$ 149,000**	
							TOTAL CAPITAL COST IN CURRENT YEAR (2023) =	**$ 1,439,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		108,916	kWh	$ 0.18	$ 19,605		$0.18/kWh, one 50 kW pump, 8 hr/d
					Sub-Total =	**$ 19,605**	
Chemical Systems		11,033	$/L	$ 0.75	$ 8,275		Average chlorine use for disinfection
		2,991	$/L	$ 0.75	$ 2,243		Average sodium silicate use for iron sequestration
					Sub-Total =	**$ 10,520**	
Miscellaneous O&M		1	LS	$ 1,420	$ 1,420		1% of Equipment Cost
					Sub-Total =	**$ 1,420**	
Labour		416	LS	$ 50	$ 20,800		$50/hr; 8 hr/wk
					Sub-Total =	**$ 20,800**	
					TOTAL O&M COST IN CURRENT YEAR (2023) =	**$ 53,000**	
					Contingency (20%) =	**$ 11,000**	
					TOTAL O&M COST IN CURRENT YEAR (2023) =	**$ 64,000**	

	CAPITAL AND OPERATION & MAINTENANCE COST		
Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a new well on the existing site to increase capacity

	LIFE CYLCE COST		
Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	44775
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 2: Build a new well on the existing site to increase capacity

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$1,439,000		$ 64,000		
2024	$1,549,803	$1,490,195	$68,928	$66,277	$1,556,472
2025	$0	$0	$79,952	$73,920	$73,920
2026	$0	$0	$86,108	$76,550	$76,550
2027	$0	$0	$92,738	$79,273	$79,273
2028	$0	$0	$99,879	$82,093	$82,093
2029	$0	$0	$107,570	$85,014	$85,014
2030	$0	$0	$115,853	$88,038	$88,038
2031	$0	$0	$124,773	$91,171	$91,171
2032	$0	$0	$134,381	$94,414	$94,414
2033	$0	$0	$144,728	$97,773	$97,773
2034	$0	$0	$155,872	$101,252	$101,252
2035	$0	$0	$167,874	$104,854	$104,854
2036	$0	$0	$180,801	$108,584	$108,584
2037	$0	$0	$194,722	$112,447	$112,447
2038	$0	$0	$209,716	$116,448	$116,448
2039	$0	$0	$225,864	$120,591	$120,591
2040	$0	$0	$243,255	$124,881	$124,881
2041	$0	$0	$261,986	$129,324	$129,324
2042	$0	$0	$282,159	$133,925	$133,925
2043	$0	$0	$303,885	$138,689	$138,689
2044	$0	$0	$327,285	$143,623	$143,623
	Sub-Total NPV value =	$1,490,195		$2,169,140	
	Total NPV value (20 years) =		**$3,659,400**		**$3,660,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title: **Mapleton W/WW Servicing Master Plan**
Client: Township of Mapleton
Project No.: T000974D
Task: Capital and O&M Cost
Prepared By: Adam Moore
Reviewed by: Jennifer McDonald, Stuart Winchester **Date:** 1-Dec-22
Revision No.: 0 **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST
Alternative 3: Build a new well on another site to increase capacity

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 313,000	$ 313,000	incl.	$ -	$ 313,000		
Structural / Architectural	1	LS	$ 387,275	$ 387,275	incl.	$ -	$ 388,000		
Mechanical & HVAC	1	LS	$ 75,500	$ 75,500	incl.	$ -	$ 76,000		
Electrical, Instrumentation and Control	1	LS	$ 644,150	$ 644,150	incl.	$ -	$ 645,000		
Civil	1	LS	$ 199,000	$ 199,000	incl.	$ -	$ 199,000		
Sub-total Capital Cost =								**$ 1,621,000**	
							SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =	**$ 1,621,000**	
							Contingency (30%) =	**$ 486,300**	
							Engineering and Construction (15%) =	**$ 243,200**	
							TOTAL CAPITAL COST IN CURRENT YEAR (2023) =	**$ 2,350,500**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		108,916	kWh	$ 0.18	$ 19,605		$0.18/kWh, two 50 kW pumps, 4 hr/d
					Sub-Total =	**$ 19,605**	
Chemical Systems		11,033	$/L	$ 0.75	$ 8,275		Average chlorine use for disinfection
		2,991	$/L	$ 0.75	$ 2,243		Average sodium silicate use for iron sequestration
					Sub-Total =	**$ 10,520**	
Miscellaneous O&M		1	LS	$ 3,130	$ 3,130		1% of Equipment Cost
					Sub-Total =	**$ 3,130**	
Labour		832	LS	$ 50	$ 41,600		$50/hr; 16 hr/wk
					Sub-Total =	**$ 41,600**	
					TOTAL O&M COST IN CURRENT YEAR (2023) =	**$ 75,000**	
					Contingency (20%) =	**$ 15,000**	
					TOTAL O&M COST IN CURRENT YEAR (2023) =	**$ 90,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a new well on another site to increase capacity

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 3: Build a new well on another site to increase capacity

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$2,350,500		$90,000		
2024	$2,531,489	$2,434,124	$96,930	$93,202	$2,527,325
2025	$0	$0	$112,432	$103,950	$103,950
2026	$0	$0	$121,089	$107,648	$107,648
2027	$0	$0	$130,413	$111,478	$111,478
2028	$0	$0	$140,455	$115,444	$115,444
2029	$0	$0	$151,270	$119,551	$119,551
2030	$0	$0	$162,918	$123,804	$123,804
2031	$0	$0	$175,462	$128,209	$128,209
2032	$0	$0	$188,973	$132,770	$132,770
2033	$0	$0	$203,524	$137,493	$137,493
2034	$0	$0	$219,195	$142,385	$142,385
2035	$0	$0	$236,073	$147,451	$147,451
2036	$0	$0	$254,251	$152,696	$152,696
2037	$0	$0	$273,828	$158,129	$158,129
2038	$0	$0	$294,913	$163,755	$163,755
2039	$0	$0	$317,621	$169,581	$169,581
2040	$0	$0	$342,078	$175,614	$175,614
2041	$0	$0	$368,418	$181,861	$181,861
2042	$0	$0	$396,786	$188,332	$188,332
2043	$0	$0	$427,339	$195,032	$195,032
2044	$0	$0	$460,244	$201,970	$201,970
	Sub-Total NPV value =	$2,434,124		$3,050,353	
	Total NPV value (20 years) =		**$5,484,500**		**$5,485,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil		LS	$ 135,000	$ 135,000	incl.	$ -	$ 135,000		*300m of 200mm watermain @ $900 / m*
Sub-total Capital Cost =								**$ 135,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 135,000**	
Contingency (30%) =								**$ 41,000**	
Engineering and Construction (15%) =								**$ 21,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 197,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh		$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L		$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS		$ -		
					Sub-Total =	**$ -**	
Labour		208	hr	$ 50	$ 10,400		$50/hr; 2 hr/wk
					Sub-Total =	**$ 10,400**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 11,000**	
Contingency (20%) =						**$ 3,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 14,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost	`	
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$197,000		$14,000		
2024	$212,169	$204,009	$15,078	$14,498	$218,507
2025	$0	$0	$17,489	$16,170	$16,170
2026	$0	$0	$18,836	$16,745	$16,745
2027	$0	$0	$20,286	$17,341	$17,341
2028	$0	$0	$21,849	$17,958	$17,958
2029	$0	$0	$23,531	$18,597	$18,597
2030	$0	$0	$25,343	$19,258	$19,258
2031	$0	$0	$27,294	$19,944	$19,944
2032	$0	$0	$29,396	$20,653	$20,653
2033	$0	$0	$31,659	$21,388	$21,388
2034	$0	$0	$34,097	$22,149	$22,149
2035	$0	$0	$36,722	$22,937	$22,937
2036	$0	$0	$39,550	$23,753	$23,753
2037	$0	$0	$42,595	$24,598	$24,598
2038	$0	$0	$45,875	$25,473	$25,473
2039	$0	$0	$49,408	$26,379	$26,379
2040	$0	$0	$53,212	$27,318	$27,318
2041	$0	$0	$57,309	$28,290	$28,290
2042	$0	$0	$61,722	$29,296	$29,296
2043	$0	$0	$66,475	$30,338	$30,338
2044	$0	$0	$71,593	$31,418	$31,418
	Sub-Total NPV value =	$204,009		$474,499	
	Total NPV value (20 years) =		**$678,600**		**$679,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil		LS	$ 1	$ 475,000	incl.	$ -	$ 475,000		*500m of 250mm watermain @ $950 / m*
Sub-total Capital Cost =								**$ 475,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 475,000**	
Contingency (30%) =								**$ 143,000**	
Engineering and Construction (15%) =								**$ 72,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 690,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh		$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L		$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS		$ -		
					Sub-Total =	**$ -**	
Labour		208	hr	$ 50	$ 10,400		$50/hr; 2 hr/wk
					Sub-Total =	**$ 10,400**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 11,000**	
Contingency (20%) =						**$ 3,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 14,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$690,000		$14,000		
2024	$743,130	$714,548	$15,078	$14,498	$729,046
2025	$0	$0	$17,489	$16,170	$16,170
2026	$0	$0	$18,836	$16,745	$16,745
2027	$0	$0	$20,286	$17,341	$17,341
2028	$0	$0	$21,849	$17,958	$17,958
2029	$0	$0	$23,531	$18,597	$18,597
2030	$0	$0	$25,343	$19,258	$19,258
2031	$0	$0	$27,294	$19,944	$19,944
2032	$0	$0	$29,396	$20,653	$20,653
2033	$0	$0	$31,659	$21,388	$21,388
2034	$0	$0	$34,097	$22,149	$22,149
2035	$0	$0	$36,722	$22,937	$22,937
2036	$0	$0	$39,550	$23,753	$23,753
2037	$0	$0	$42,595	$24,598	$24,598
2038	$0	$0	$45,875	$25,473	$25,473
2039	$0	$0	$49,408	$26,379	$26,379
2040	$0	$0	$53,212	$27,318	$27,318
2041	$0	$0	$57,309	$28,290	$28,290
2042	$0	$0	$61,722	$29,296	$29,296
2043	$0	$0	$66,475	$30,338	$30,338
2044	$0	$0	$71,593	$31,418	$31,418
	Sub-Total NPV value =	$714,548		$474,499	
	Total NPV value (20 years) =		**$1,189,100**		**$1,190,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil		LS	$ 1	$ 90,000	incl.	$ -	$ 90,000		*100m of 200mm watermain @ $900 / m*
Sub-total Capital Cost =								**$ 90,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 90,000**	
Contingency (30%) =								**$ 27,000**	
Engineering and Construction (15%) =								**$ 14,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 131,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh		$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L		$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS		$ -		
					Sub-Total =	**$ -**	
Labour		208	hr	$ 50	$ 10,400		$50/hr; 2 hr/wk
					Sub-Total =	**$ 10,400**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 11,000**	
Contingency (20%) =						**$ 3,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 14,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1:

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$131,000		$14,000		
2024	$141,087	$135,661	$15,078	$14,498	$150,159
2025	$0	$0	$17,489	$16,170	$16,170
2026	$0	$0	$18,836	$16,745	$16,745
2027	$0	$0	$20,286	$17,341	$17,341
2028	$0	$0	$21,849	$17,958	$17,958
2029	$0	$0	$23,531	$18,597	$18,597
2030	$0	$0	$25,343	$19,258	$19,258
2031	$0	$0	$27,294	$19,944	$19,944
2032	$0	$0	$29,396	$20,653	$20,653
2033	$0	$0	$31,659	$21,388	$21,388
2034	$0	$0	$34,097	$22,149	$22,149
2035	$0	$0	$36,722	$22,937	$22,937
2036	$0	$0	$39,550	$23,753	$23,753
2037	$0	$0	$42,595	$24,598	$24,598
2038	$0	$0	$45,875	$25,473	$25,473
2039	$0	$0	$49,408	$26,379	$26,379
2040	$0	$0	$53,212	$27,318	$27,318
2041	$0	$0	$57,309	$28,290	$28,290
2042	$0	$0	$61,722	$29,296	$29,296
2043	$0	$0	$66,475	$30,338	$30,338
2044	$0	$0	$71,593	$31,418	$31,418
	Sub-Total NPV value =	$135,661		$474,499	
	Total NPV value (20 years) =		**$610,200**		**$611,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Update existing SPS

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 1	$ 706,250	incl.	$ -	$ 706,250		
Structural / Architectural	1	LS	$ 1	$ 423,750	incl.	$ -	$ 423,750		
Mechanical & HVAC	1	LS	$ 1	$ 141,250	incl.	$ -	$ 141,250		
Electrical, Instrumentation and Control	1	LS	$ 1	$ 565,000	incl.	$ -	$ 565,000		
Civil	1	LS	$ 1	$ 988,750	incl.	$ -	$ 988,750		
Sub-total Capital Cost =								**$ 2,825,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 2,825,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 8,000	$ 8,000		1% of Equipment Cost
					Sub-Total =	**$ 8,000**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 17,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 21,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Update existing SPS

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1: Update existing SPS

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$2,825,000		$21,000		
2024	$3,042,525	$2,925,505	$22,617	$21,747	$2,947,252
2025	$0	$0	$26,234	$24,255	$24,255
2026	$0	$0	$28,254	$25,118	$25,118
2027	$0	$0	$30,430	$26,011	$26,011
2028	$0	$0	$32,773	$26,937	$26,937
2029	$0	$0	$35,296	$27,895	$27,895
2030	$0	$0	$38,014	$28,888	$28,888
2031	$0	$0	$40,941	$29,915	$29,915
2032	$0	$0	$44,094	$30,980	$30,980
2033	$0	$0	$47,489	$32,082	$32,082
2034	$0	$0	$51,146	$33,223	$33,223
2035	$0	$0	$55,084	$34,405	$34,405
2036	$0	$0	$59,325	$35,629	$35,629
2037	$0	$0	$63,893	$36,897	$36,897
2038	$0	$0	$68,813	$38,209	$38,209
2039	$0	$0	$74,112	$39,569	$39,569
2040	$0	$0	$79,818	$40,977	$40,977
2041	$0	$0	$85,964	$42,434	$42,434
2042	$0	$0	$92,583	$43,944	$43,944
2043	$0	$0	$99,712	$45,507	$45,507
2044	$0	$0	$107,390	$47,126	$47,126
	Sub-Total NPV value =	$2,925,505		$711,749	
	Total NPV value (20 years) =		**$3,637,300**		**$3,638,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: New SPS on the North side of the river

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 1	$ 656,250	incl.	$ -	$ 657,000		
Structural / Architectural	1	LS	$ 1	$ 393,750	incl.	$ -	$ 394,000		
Mechanical & HVAC	1	LS	$ 1	$ 131,250	incl.	$ -	$ 132,000		
Electrical, Instrumentation and Control	1	LS	$ 1	$ 525,000	incl.	$ -	$ 525,000		
Civil	1	LS	$ 1	$ 918,750	incl.	$ -	$ 919,000		
Sub-total Capital Cost =								**$ 2,627,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 2,627,000**	
Contingency (30%) =								**$ 789,000**	
Engineering and Construction (15%) =								**$ 395,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 3,811,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
	Sub-Total =					**$ 3,784**	
Miscellaneous O&M		1	LS	$ 8,500	$ 8,500		1% of Equipment Cost
	Sub-Total =					**$ 8,500**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
	Sub-Total =					**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 18,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 22,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: New SPS on the North side of the river

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 2: New SPS on the North side of the river

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)
Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$3,811,000		$22,000		
2024	$4,104,447	$3,946,584	$23,694	$22,783	$3,969,366
2025	$0	$0	$27,483	$25,410	$25,410
2026	$0	$0	$29,600	$26,314	$26,314
2027	$0	$0	$31,879	$27,250	$27,250
2028	$0	$0	$34,333	$28,220	$28,220
2029	$0	$0	$36,977	$29,224	$29,224
2030	$0	$0	$39,824	$30,263	$30,263
2031	$0	$0	$42,891	$31,340	$31,340
2032	$0	$0	$46,193	$32,455	$32,455
2033	$0	$0	$49,750	$33,609	$33,609
2034	$0	$0	$53,581	$34,805	$34,805
2035	$0	$0	$57,707	$36,043	$36,043
2036	$0	$0	$62,150	$37,326	$37,326
2037	$0	$0	$66,936	$38,654	$38,654
2038	$0	$0	$72,090	$40,029	$40,029
2039	$0	$0	$77,641	$41,453	$41,453
2040	$0	$0	$83,619	$42,928	$42,928
2041	$0	$0	$90,058	$44,455	$44,455
2042	$0	$0	$96,992	$46,037	$46,037
2043	$0	$0	$104,461	$47,674	$47,674
2044	$0	$0	$112,504	$49,371	$49,371
	Sub-Total NPV value =	$3,946,584		$745,642	
	Total NPV value (20 years) =		**$4,692,300**		**$4,693,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Maintain existing Drayton SPS and construct a new SPS on the North side of the river

System Description	Quantity	Unit	Material: Unit Cost	Material: Total Material Cost	Labour: % of Material	Labour: Total Labour Cost	Total Material & Labour	Sub Total Cost	Comments
Process	1	LS	$ 800,000	$ 800,000	incl.	$ -	$ 800,000		
Structural / Architectural	1	LS	$ 480,000	$ 480,000	incl.	$ -	$ 480,000		
Mechanical & HVAC	1	LS	$ 160,000	$ 160,000	incl.	$ -	$ 160,000		
Electrical, Instrumentation and Control	1	LS	$ 640,000	$ 640,000	incl.	$ -	$ 640,000		
Civil	1	LS	$ 1,120,000	$ 1,120,000	incl.	$ -	$1,120,000		
Sub-total Capital Cost =								**$ 3,200,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 3,200,000**	
Contingency (30%) =								**$ 960,000**	
Engineering and Construction (15%) =								**$ 480,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 4,640,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 9,500	$ 9,500		1% of Equipment Cost
					Sub-Total =	**$ 9,500**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 19,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 23,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Maintain existing Drayton SPS and construct a new SPS on the North side of the river

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 3: Maintain existing Drayton SPS and construct a new SPS on the North side of the river

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$4,640,000		$23,000		
2024	$4,997,280	$4,805,077	$24,771	$23,818	$4,828,895
2025	$0	$0	$28,733	$26,565	$26,565
2026	$0	$0	$30,945	$27,510	$27,510
2027	$0	$0	$33,328	$28,489	$28,489
2028	$0	$0	$35,894	$29,502	$29,502
2029	$0	$0	$38,658	$30,552	$30,552
2030	$0	$0	$41,635	$31,639	$31,639
2031	$0	$0	$44,840	$32,764	$32,764
2032	$0	$0	$48,293	$33,930	$33,930
2033	$0	$0	$52,012	$35,137	$35,137
2034	$0	$0	$56,017	$36,387	$36,387
2035	$0	$0	$60,330	$37,682	$37,682
2036	$0	$0	$64,975	$39,022	$39,022
2037	$0	$0	$69,978	$40,411	$40,411
2038	$0	$0	$75,367	$41,848	$41,848
2039	$0	$0	$81,170	$43,337	$43,337
2040	$0	$0	$87,420	$44,879	$44,879
2041	$0	$0	$94,151	$46,476	$46,476
2042	$0	$0	$101,401	$48,129	$48,129
2043	$0	$0	$109,209	$49,841	$49,841
2044	$0	$0	$117,618	$51,615	$51,615
	Sub-Total NPV value =	$4,805,077		$779,535	
	Total NPV value (20 years) =		**$5,584,700**		**$5,585,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 4: New SPS with onsite emergency storage

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 889,145	$ 889,145	incl.	$ -	$ 889,145		
Structural / Architectural	1	LS	$ 533,487	$ 533,487	incl.	$ -	$ 533,487		
Mechanical & HVAC	1	LS	$ 177,829	$ 177,829	incl.	$ -	$ 177,829		
Electrical, Instrumentation and Control	1	LS	$ 711,316	$ 711,316	incl.	$ -	$ 711,316		
Civil	1	LS	$ 1,244,803	$ 1,244,803	incl.	$ -	$1,244,803		
Sub-total Capital Cost =								**$ 3,556,580**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2022) =								**$ 3,556,580**	
Contingency (30%) =								**$ 1,067,000**	
Engineering and Construction (15%) =								**$ 534,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2022) =								**$ 5,157,580**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 8,000	$ 8,000		1% of Equipment Cost
					Sub-Total =	**$ 8,000**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2022) =						**$ 17,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2022) =						**$ 21,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 4: New SPS with onsite emergency storage

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 4: New SPS with onsite emergency storage

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$5,157,580		$21,000		
2024	$5,554,714	$5,341,071	$22,617	$21,747	$5,362,818
2025	$0	$0	$26,234	$24,255	$24,255
2026	$0	$0	$28,254	$25,118	$25,118
2027	$0	$0	$30,430	$26,011	$26,011
2028	$0	$0	$32,773	$26,937	$26,937
2029	$0	$0	$35,296	$27,895	$27,895
2030	$0	$0	$38,014	$28,888	$28,888
2031	$0	$0	$40,941	$29,915	$29,915
2032	$0	$0	$44,094	$30,980	$30,980
2033	$0	$0	$47,489	$32,082	$32,082
2034	$0	$0	$51,146	$33,223	$33,223
2035	$0	$0	$55,084	$34,405	$34,405
2036	$0	$0	$59,325	$35,629	$35,629
2037	$0	$0	$63,893	$36,897	$36,897
2038	$0	$0	$68,813	$38,209	$38,209
2039	$0	$0	$74,112	$39,569	$39,569
2040	$0	$0	$79,818	$40,977	$40,977
2041	$0	$0	$85,964	$42,434	$42,434
2042	$0	$0	$92,583	$43,944	$43,944
2043	$0	$0	$99,712	$45,507	$45,507
2044	$0	$0	$107,390	$47,126	$47,126
	Sub-Total NPV value =	$5,341,071		$711,749	
	Total NPV value (20 years) =		**$6,052,900**		**$6,053,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1a: Upgrade gravity sewers on Wellington Street South

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 483,000	$ 483,000	incl.	$ -	$ 483,000		*200mm diameter @ 500m*
Sub-total Capital Cost =								**$ 483,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 483,000**	
Contingency (30%) =								**$ 145,000**	
Engineering and Construction (15%) =								**$ 73,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 701,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh		$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L		$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS		$ -		
					Sub-Total =	**$ -**	
Regulatory Requirements			LS		$ -		
					Sub-Total =	**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1a: Upgrade gravity sewers on Wellington Street South

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1a: Upgrade gravity sewers on Wellington Street South

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)
Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$701,000		$0		
2024	$754,977	$725,939	$0	$0	$725,939
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
Sub-Total NPV value =		$725,939		$0	
Total NPV value (20 years) =			**$726,000**		**$726,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1b: Upgrade gravity sewers on Main Street East near the existing Drayton SPS

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 311,850	$ 311,850	incl.	$ -	$ 312,000		
Sub-total Capital Cost =								**$ 312,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 312,000**	
Contingency (30%) =								**$ 94,000**	
Engineering and Construction (15%) =								**$ 47,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 453,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		0	kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L		$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M		0	LS	$ -	$ -		
					Sub-Total =	**$ -**	
Regulatory Requirements			LS		$ -		
					Sub-Total =	**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1b: Upgrade gravity sewers on Main Street East near the existing Drayton SPS

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1b: Upgrade gravity sewers on Main Street East near the existing Drayton SPS

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$453,000		$0		
2024	$487,881	$469,116	$0	$0	$469,116
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$469,116		$0	
	Total NPV value (20 years) =		**$469,200**		**$470,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1c: Upgrade gravity sewers on Main Street East

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 207,000	$ 207,000	incl.	$ -	$ 207,000		
Sub-total Capital Cost =								**$ 207,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 207,000**	
Contingency (30%) =								**$ 62,100**	
Engineering and Construction (15%) =								**$ 31,100**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 301,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh		$ -		
	Sub-Total =					**$ -**	
Chemical Systems			$/L		$ -		
	Sub-Total =					**$ -**	
Miscellaneous O&M			LS		$ -		
	Sub-Total =					**$ -**	
Regulatory Requirements			LS		$ -		
	Sub-Total =					**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1c: Upgrade gravity sewers on Main Street East

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Stuart Winchester — **Date:** 2-Aug-22
Revision No.:	**Revision Date:**

LIFE CYLCE COST

Alternative 1c: Upgrade gravity sewers on Main Street East

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$301,000		$0		
2024	$324,177	$311,709	$0	$0	$311,709
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$311,709		$0	
	Total NPV value (20 years) =		**$311,800**		**$312,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a local pumping station and forcemain to the exisintg Drayton SPS or New SPS

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$466,250	$ 466,250	incl.	$ -	$ 467,000		
Structural / Architectural	1	LS	$279,750	$ 279,750	incl.	$ -	$ 280,000		
Mechanical & HVAC	1	LS	$93,250	$ 93,250	incl.	$ -	$ 94,000		
Electrical, Instrumentation and Control	1	LS	$373,000	$ 373,000	incl.	$ -	$ 373,000		
Civil	1	LS	$652,750	$ 652,750	incl.	$ -	$ 653,000		
Sub-total Capital Cost =								**$ 1,867,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,867,000**	
Contingency (30%) =								**$ 561,000**	
Engineering and Construction (15%) =								**$ 281,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 2,709,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 8,300	$ 8,300		1% of Equipment Cost
					Sub-Total =	**$ 8,300**	
Regulatory Requirements		104	LS	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 18,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 22,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a local pumping station and forcemain to the exisintg Drayton SPS or New SPS

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 2: Build a local pumping station and forcemain to the exisintg Drayton SPS or New SPS

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$2,709,000		$22,000		
2024	$2,917,593	$2,805,378	$23,694	$22,783	$2,828,161
2025	$0	$0	$27,483	$25,410	$25,410
2026	$0	$0	$29,600	$26,314	$26,314
2027	$0	$0	$31,879	$27,250	$27,250
2028	$0	$0	$34,333	$28,220	$28,220
2029	$0	$0	$36,977	$29,224	$29,224
2030	$0	$0	$39,824	$30,263	$30,263
2031	$0	$0	$42,891	$31,340	$31,340
2032	$0	$0	$46,193	$32,455	$32,455
2033	$0	$0	$49,750	$33,609	$33,609
2034	$0	$0	$53,581	$34,805	$34,805
2035	$0	$0	$57,707	$36,043	$36,043
2036	$0	$0	$62,150	$37,326	$37,326
2037	$0	$0	$66,936	$38,654	$38,654
2038	$0	$0	$72,090	$40,029	$40,029
2039	$0	$0	$77,641	$41,453	$41,453
2040	$0	$0	$83,619	$42,928	$42,928
2041	$0	$0	$90,058	$44,455	$44,455
2042	$0	$0	$96,992	$46,037	$46,037
2043	$0	$0	$104,461	$47,674	$47,674
2044	$0	$0	$112,504	$49,371	$49,371
	Sub-Total NPV value =	$2,805,378		$745,642	
	Total NPV value (20 years) =		**$3,551,100**		**$3,552,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a local pumping station and forcemain to the Mapleton WPCP

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 843,750	$ 843,750	incl.	$ -	$ 844,000		
Structural / Architectural	1	LS	$ 506,250	$ 506,250	incl.	$ -	$ 507,000		
Mechanical & HVAC	1	LS	$ 168,750	$ 168,750	incl.	$ -	$ 169,000		
Electrical, Instrumentation and Control	1	LS	$ 675,000	$ 675,000	incl.	$ -	$ 675,000		
Civil	1	LS	$ 1,181,250	$ 1,181,250	incl.	$ -	$1,182,000		
Sub-total Capital Cost =								**$ 3,377,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 3,377,000**	
Contingency (30%) =								**$ 1,013,100**	
Engineering and Construction (15%) =								**$ 506,600**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 4,897,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 8,819	$ 8,819		1% of Equipment Cost
					Sub-Total =	**$ 8,819**	
Regulatory Requirements		104	LS	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 18,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 22,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a local pumping station and forcemain to the Mapleton WPCP

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 3: Build a local pumping station and forcemain to the Mapleton WPCP

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$4,897,000		$22,000		
2024	$5,274,069	$5,071,220	$23,694	$22,783	$5,094,003
2025	$0	$0	$27,483	$25,410	$25,410
2026	$0	$0	$29,600	$26,314	$26,314
2027	$0	$0	$31,879	$27,250	$27,250
2028	$0	$0	$34,333	$28,220	$28,220
2029	$0	$0	$36,977	$29,224	$29,224
2030	$0	$0	$39,824	$30,263	$30,263
2031	$0	$0	$42,891	$31,340	$31,340
2032	$0	$0	$46,193	$32,455	$32,455
2033	$0	$0	$49,750	$33,609	$33,609
2034	$0	$0	$53,581	$34,805	$34,805
2035	$0	$0	$57,707	$36,043	$36,043
2036	$0	$0	$62,150	$37,326	$37,326
2037	$0	$0	$66,936	$38,654	$38,654
2038	$0	$0	$72,090	$40,029	$40,029
2039	$0	$0	$77,641	$41,453	$41,453
2040	$0	$0	$83,619	$42,928	$42,928
2041	$0	$0	$90,058	$44,455	$44,455
2042	$0	$0	$96,992	$46,037	$46,037
2043	$0	$0	$104,461	$47,674	$47,674
2044	$0	$0	$112,504	$49,371	$49,371
	Sub-Total NPV value =	$5,071,220		$745,642	
	Total NPV value (20 years) =		**$5,816,900**		**$5,817,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Build another standpipe

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 400,000	$ 400,000	100%	$ 400,000	$ 800,000		
Structural / Architectural	1	LS	$ 100,000	$ 100,000	incl.	$ -	$ 100,000		
Mechanical & HVAC	1	LS	$ 10,000	$ 10,000	50%	$ 5,000	$ 15,000		
Electrical, Instrumentation and Control	1	LS	$ 25,000	$ 25,000	50%	$ 12,500	$ 38,000		
Civil	1	LS	$ 150,000	$ 150,000	incl.	$ -	$ 150,000		
Sub-total Capital Cost =								**$ 1,103,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,103,000**	
Contingency (30%) =								**$ 330,900**	
Engineering and Construction (15%) =								**$ 165,500**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,599,400**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems		3,253	$/L	$ 0.75	$ 2,440		Chlroine contact for disinfection
					Sub-Total =	**$ 2,440**	
Miscellaneous O&M			LS	$ -	$ -		
					Sub-Total =	**$ -**	
Labour		12	hr	$ 50	$ 600		$50/hr; 1 hr/month
					Sub-Total =	**$ 600**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 4,000**	
Contingency (20%) =						**$ 1,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 5,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Build another standpipe

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1: Build another standpipe

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$1,599,400		$5,000		
2024	$1,722,554	$1,656,302	$5,385	$5,178	$1,661,480
2025	$0	$0	$6,246	$5,775	$5,775
2026	$0	$0	$6,727	$5,980	$5,980
2027	$0	$0	$7,245	$6,193	$6,193
2028	$0	$0	$7,803	$6,414	$6,414
2029	$0	$0	$8,404	$6,642	$6,642
2030	$0	$0	$9,051	$6,878	$6,878
2031	$0	$0	$9,748	$7,123	$7,123
2032	$0	$0	$10,498	$7,376	$7,376
2033	$0	$0	$11,307	$7,639	$7,639
2034	$0	$0	$12,178	$7,910	$7,910
2035	$0	$0	$13,115	$8,192	$8,192
2036	$0	$0	$14,125	$8,483	$8,483
2037	$0	$0	$15,213	$8,785	$8,785
2038	$0	$0	$16,384	$9,097	$9,097
2039	$0	$0	$17,646	$9,421	$9,421
2040	$0	$0	$19,004	$9,756	$9,756
2041	$0	$0	$20,468	$10,103	$10,103
2042	$0	$0	$22,044	$10,463	$10,463
2043	$0	$0	$23,741	$10,835	$10,835
2044	$0	$0	$25,569	$11,221	$11,221
	Sub-Total NPV value =	$1,656,302		$169,464	
	Total NPV value (20 years) =		**$1,825,800**		**$1,826,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester
Date:	1-Dec-22
Revision No.:	0
Revision Date:	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Extend the exisitng standpipes

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 300,000	$ 300,000	100%	$ 300,000	$ 600,000		
Structural / Architectural	1	LS	$ 50,000	$ 50,000	incl.	$ -	$ 50,000		
Mechanical & HVAC	1	LS	$ -	$ -	50%	$ -	$ -		
Electrical, Instrumentation and Control	1	LS	$ -	$ -	50%	$ -	$ -		
Civil	1	LS	$ 50,000	$ 50,000	incl.	$ -	$ 50,000		
Sub-total Capital Cost =								**$ 700,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 700,000**	
Contingency (30%) =								**$ 210,000**	
Engineering and Construction (15%) =								**$ 105,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,015,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems		3,253	$/L	$ 0.75	$ 2,440		Chlroine contact for disinfection
					Sub-Total =	**$ 2,440**	
Miscellaneous O&M			LS	$ -	$ -		
					Sub-Total =	**$ -**	
Labour		12	hr	$ 50	$ 600		$50/hr; 1 hr/month
					Sub-Total =	**$ 600**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 4,000**	
Contingency (20%) =						**$ 1,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 5,000**	

	CAPITAL AND OPERATION & MAINTENANCE COST	
Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Extend the exisitng standpipes

	LIFE CYLCE COST	
Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 2: Extend the exisitng standpipes

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$1,015,000		$5,000		
2024	$1,093,155	$1,051,111	$5,385	$5,178	$1,056,288
2025	$0	$0	$6,246	$5,775	$5,775
2026	$0	$0	$6,727	$5,980	$5,980
2027	$0	$0	$7,245	$6,193	$6,193
2028	$0	$0	$7,803	$6,414	$6,414
2029	$0	$0	$8,404	$6,642	$6,642
2030	$0	$0	$9,051	$6,878	$6,878
2031	$0	$0	$9,748	$7,123	$7,123
2032	$0	$0	$10,498	$7,376	$7,376
2033	$0	$0	$11,307	$7,639	$7,639
2034	$0	$0	$12,178	$7,910	$7,910
2035	$0	$0	$13,115	$8,192	$8,192
2036	$0	$0	$14,125	$8,483	$8,483
2037	$0	$0	$15,213	$8,785	$8,785
2038	$0	$0	$16,384	$9,097	$9,097
2039	$0	$0	$17,646	$9,421	$9,421
2040	$0	$0	$19,004	$9,756	$9,756
2041	$0	$0	$20,468	$10,103	$10,103
2042	$0	$0	$22,044	$10,463	$10,463
2043	$0	$0	$23,741	$10,835	$10,835
2044	$0	$0	$25,569	$11,221	$11,221
	Sub-Total NPV value =	$1,051,111		$169,464	
	Total NPV value (20 years) =		**$1,220,600**		**$1,221,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build an elevated storage tank

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 441,937	$ 441,937	incl.	$ -	$ 442,000		
Structural / Architectural	1	LS	$ 681,423	$ 681,423	incl.	$ -	$ 682,000		
Mechanical & HVAC	1	LS	$ 61,723	$ 61,723	incl.	$ -	$ 62,000		
Electrical, Instrumentation and Control	1	LS	$ 3,439,210	$ 3,439,210	incl.	$ -	$3,440,000		
Civil	1	LS	$ 586,369	$ 586,369	incl.	$ -	$ 587,000		
Sub-total Capital Cost =								**$ 5,213,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 5,213,000**	
Contingency (30%) =								**$ 1,563,900**	
Engineering and Construction (15%) =								**$ 782,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 7,558,900**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		87600	kWh	$ 0.18	$ 15,768		
					Sub-Total =	**$ 15,768**	
Chemical Systems		3,253	$/L	$ 0.75	$ 2,440		Chlroine contact for disinfection
					Sub-Total =	**$ 2,440**	
Miscellaneous O&M			LS	$ -	$ -		
					Sub-Total =	**$ -**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hrs/week
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 24,000**	
Contingency (20%) =						**$ 5,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 29,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build an elevated storage tank

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 3: Build an elevated storage tank

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$7,558,900		$29,000		
2024	$8,140,935	$7,827,822	$31,233	$30,032	$7,857,854
2025	$0	$0	$36,228	$33,495	$33,495
2026	$0	$0	$39,018	$34,687	$34,687
2027	$0	$0	$42,022	$35,921	$35,921
2028	$0	$0	$45,258	$37,199	$37,199
2029	$0	$0	$48,743	$38,522	$38,522
2030	$0	$0	$52,496	$39,892	$39,892
2031	$0	$0	$56,538	$41,312	$41,312
2032	$0	$0	$60,891	$42,781	$42,781
2033	$0	$0	$65,580	$44,303	$44,303
2034	$0	$0	$70,630	$45,880	$45,880
2035	$0	$0	$76,068	$47,512	$47,512
2036	$0	$0	$81,925	$49,202	$49,202
2037	$0	$0	$88,234	$50,953	$50,953
2038	$0	$0	$95,027	$52,765	$52,765
2039	$0	$0	$102,345	$54,643	$54,643
2040	$0	$0	$110,225	$56,587	$56,587
2041	$0	$0	$118,712	$58,600	$58,600
2042	$0	$0	$127,853	$60,685	$60,685
2043	$0	$0	$137,698	$62,844	$62,844
2044	$0	$0	$148,301	$65,079	$65,079
	Sub-Total NPV value =	$7,827,822		$982,891	
	Total NPV value (20 years) =		**$8,810,800**		**$8,811,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Fire flow protection

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process		LS	1	$ 50,000	incl.	$ -	$ 50,000		*Fire pump, instrumentation, valves and accessories*
Civil		LS	1	$ 2,255,000	incl.	$ -	$ 2,255,000		*4,700 m of 200mm watermain @ $900 / m, Class EA Study Schedule A+, fire hydrants @$5,000 / ea with 90-120m intervals*
Sub-total Capital Cost =								**$ 2,305,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 2,305,000**	
Contingency (30%) =								**$ 691,500**	
Engineering and Construction (15%) =								**$ 345,800**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 3,342,300**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems			$/L	$ -	$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS	$ -	$ -		
					Sub-Total =	**$ -**	
Regulatory Requirements		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 6,000**	
Contingency (20%) =						**$ 2,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 8,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Fire flow protection

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 2:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$ 3,342,300		$8,000		
2024	$3,599,657	$3,461,209	$8,616	$8,285	$3,469,493
2025	$0	$0	$9,994	$9,240	$9,240
2026	$0	$0	$10,763	$9,569	$9,569
2027	$0	$0	$11,592	$9,909	$9,909
2028	$0	$0	$12,485	$10,262	$10,262
2029	$0	$0	$13,446	$10,627	$10,627
2030	$0	$0	$14,482	$11,005	$11,005
2031	$0	$0	$15,597	$11,396	$11,396
2032	$0	$0	$16,798	$11,802	$11,802
2033	$0	$0	$18,091	$12,222	$12,222
2034	$0	$0	$19,484	$12,656	$12,656
2035	$0	$0	$20,984	$13,107	$13,107
2036	$0	$0	$22,600	$13,573	$13,573
2037	$0	$0	$24,340	$14,056	$14,056
2038	$0	$0	$26,214	$14,556	$14,556
2039	$0	$0	$28,233	$15,074	$15,074
2040	$0	$0	$30,407	$15,610	$15,610
2041	$0	$0	$32,748	$16,165	$16,165
2042	$0	$0	$35,270	$16,741	$16,741
2043	$0	$0	$37,986	$17,336	$17,336
2044	$0	$0	$40,911	$17,953	$17,953
	Sub-Total NPV value =	$3,461,209		$271,142	
	Total NPV value (20 years) =		**$3,732,400**		**$3,733,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 01-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Upgrade existing SPS

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 68,750	$ 68,750	incl.	$ -	$ 69,000		
Structural / Architectural	1	LS	$ 41,250	$ 41,250	incl.	$ -	$ 42,000		
Mechanical & HVAC	1	LS	$ 13,750	$ 13,750	incl.	$ -	$ 14,000		
Electrical, Instrumentation and Control	1	LS	$ 55,000	$ 55,000	incl.	$ -	$ 55,000		
Civil	1	LS	$ 96,250	$ 96,250	incl.	$ -	$ 97,000		
Sub-total Capital Cost =								**$ 277,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 277,000**	
Contingency (30%) =								**$ 83,100**	
Engineering and Construction (15%) =								**$ 41,600**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 401,700**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual	Subtotal	Comments
Energy		21,024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
	Sub-Total =					**$ 3,784**	
Miscellaneous O&M		1	LS	$ 2,600	$ 2,600		1% of Equipment Cost
	Sub-Total =					**$ 2,600**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
	Sub-Total =					**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 12,000**	
Contingency (20%) =						**$ 3,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 15,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	01-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Upgrade existing SPS

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	02-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1: Upgrade existing SPS

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$401,700		$15,000		
2024	$432,631	$415,991	$16,155	$15,534	$431,525
2025	$0	$0	$18,739	$17,325	$17,325
2026	$0	$0	$20,182	$17,941	$17,941
2027	$0	$0	$21,736	$18,580	$18,580
2028	$0	$0	$23,409	$19,241	$19,241
2029	$0	$0	$25,212	$19,925	$19,925
2030	$0	$0	$27,153	$20,634	$20,634
2031	$0	$0	$29,244	$21,368	$21,368
2032	$0	$0	$31,495	$22,128	$22,128
2033	$0	$0	$33,921	$22,916	$22,916
2034	$0	$0	$36,533	$23,731	$23,731
2035	$0	$0	$39,346	$24,575	$24,575
2036	$0	$0	$42,375	$25,449	$25,449
2037	$0	$0	$45,638	$26,355	$26,355
2038	$0	$0	$49,152	$27,292	$27,292
2039	$0	$0	$52,937	$28,263	$28,263
2040	$0	$0	$57,013	$29,269	$29,269
2041	$0	$0	$61,403	$30,310	$30,310
2042	$0	$0	$66,131	$31,389	$31,389
2043	$0	$0	$71,223	$32,505	$32,505
2044	$0	$0	$76,707	$33,662	$33,662
	Sub-Total NPV value =	$415,991		$508,392	
	Total NPV value (20 years) =			**$924,400**	**$925,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a new SPS

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 498,750	$ 498,750	incl.	$ -	$ 499,000		
Structural / Architectural	1	LS	$ 299,250	$ 299,250	incl.	$ -	$ 300,000		
Mechanical & HVAC	1	LS	$ 99,750	$ 99,750	incl.	$ -	$ 100,000		
Electrical, Instrumentation and Control	1	LS	$ 399,000	$ 399,000	incl.	$ -	$ 399,000		
Civil	1	LS	$ 698,250	$ 698,250	incl.	$ -	$ 699,000		
Sub-total Capital Cost =								**$ 1,997,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,997,000**	
Contingency (30%) =								**$ 600,000**	
Engineering and Construction (15%) =								**$ 300,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 2,897,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		21024	kWh	$ 0.18	$ 3,784		$0.18/kWh, 40 kW pump, 8 hr/d
					Sub-Total =	**$ 3,784**	
Miscellaneous O&M		1	LS	$ 7,600	$ 7,600		1% of Equipment Cost
					Sub-Total =	**$ 7,600**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 17,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 21,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Build a new SPS

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 2: Build a new SPS

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$2,897,000		$21,000		
2024	$3,120,069	$3,000,066	$22,617	$21,747	$3,021,813
2025	$0	$0	$26,234	$24,255	$24,255
2026	$0	$0	$28,254	$25,118	$25,118
2027	$0	$0	$30,430	$26,011	$26,011
2028	$0	$0	$32,773	$26,937	$26,937
2029	$0	$0	$35,296	$27,895	$27,895
2030	$0	$0	$38,014	$28,888	$28,888
2031	$0	$0	$40,941	$29,915	$29,915
2032	$0	$0	$44,094	$30,980	$30,980
2033	$0	$0	$47,489	$32,082	$32,082
2034	$0	$0	$51,146	$33,223	$33,223
2035	$0	$0	$55,084	$34,405	$34,405
2036	$0	$0	$59,325	$35,629	$35,629
2037	$0	$0	$63,893	$36,897	$36,897
2038	$0	$0	$68,813	$38,209	$38,209
2039	$0	$0	$74,112	$39,569	$39,569
2040	$0	$0	$79,818	$40,977	$40,977
2041	$0	$0	$85,964	$42,434	$42,434
2042	$0	$0	$92,583	$43,944	$43,944
2043	$0	$0	$99,712	$45,507	$45,507
2044	$0	$0	$107,390	$47,126	$47,126
	Sub-Total NPV value =	$3,000,066		$711,749	
	Total NPV value (20 years) =		**$3,711,900**		**$3,712,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a Local SPS and new forcemain to the Mapleton WPCP

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 1,171,250	$ 1,171,250	incl.	$ -	$ 1,172,000		
Structural / Architectural	1	LS	$ 702,750	$ 702,750	incl.	$ -	$ 703,000		
Mechanical & HVAC	1	LS	$ 234,250	$ 234,250	incl.	$ -	$ 235,000		
Electrical, Instrumentation and Control	1	LS	$ 937,000	$ 937,000	incl.	$ -	$ 937,000		
Civil	1	LS	$ 1,639,750	$ 1,639,750	incl.	$ -	$ 1,640,000		
Sub-total Capital Cost =								**$ 4,687,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 4,687,000**	
Contingency (30%) =								**$ 1,407,000**	
Engineering and Construction (15%) =								**$ 704,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 6,798,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		31536	kWh	$ 0.18	$ 5,676		$0.18/kWh, two 40 kW pumps, 12 hr/d
					Sub-Total =	**$ 5,676**	
Miscellaneous O&M		1	LS	$ 4,860	$ 4,860		1% of Equipment Cost
					Sub-Total =	**$ 4,860**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
					Sub-Total =	**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 16,000**	
Contingency (20%) =						**$ 4,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 20,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Build a Local SPS and new forcemain to the Mapleton WPCP

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 3: Build a Local SPS and new forcemain to the Mapleton WPCP

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$6,798,000		$20,000		
2024	$7,321,446	$7,039,852	$21,540	$20,712	$7,060,563
2025	$0	$0	$24,985	$23,100	$23,100
2026	$0	$0	$26,909	$23,922	$23,922
2027	$0	$0	$28,981	$24,773	$24,773
2028	$0	$0	$31,212	$25,654	$25,654
2029	$0	$0	$33,616	$26,567	$26,567
2030	$0	$0	$36,204	$27,512	$27,512
2031	$0	$0	$38,992	$28,491	$28,491
2032	$0	$0	$41,994	$29,504	$29,504
2033	$0	$0	$45,228	$30,554	$30,554
2034	$0	$0	$48,710	$31,641	$31,641
2035	$0	$0	$52,461	$32,767	$32,767
2036	$0	$0	$56,500	$33,933	$33,933
2037	$0	$0	$60,851	$35,140	$35,140
2038	$0	$0	$65,536	$36,390	$36,390
2039	$0	$0	$70,582	$37,685	$37,685
2040	$0	$0	$76,017	$39,025	$39,025
2041	$0	$0	$81,871	$40,414	$40,414
2042	$0	$0	$88,175	$41,851	$41,851
2043	$0	$0	$94,964	$43,340	$43,340
2044	$0	$0	$102,276	$44,882	$44,882
	Sub-Total NPV value =	$7,039,852		$677,856	
	Total NPV value (20 years) =		**$7,717,800**		**$7,718,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester
Date:	1-Dec-22
Revision No.:	0
Revision Date:	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, upgrade the existing Moorefield SPS and forcemain

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 1,635,000	$ 1,635,000	incl.	$ -	$1,635,000		
Structural / Architectural	1	LS	$ 981,000	$ 981,000	incl.	$ -	$ 981,000		
Mechanical & HVAC	1	LS	$ 327,000	$ 327,000	incl.	$ -	$ 327,000		
Electrical, Instrumentation and Control	1	LS	$ 1,308,000	$ 1,308,000	incl.	$ -	$1,308,000		
Civil	1	LS	$ 2,289,000	$ 2,289,000	incl.	$ -	$2,289,000		
Sub-total Capital Cost =								**$ 6,540,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 6,540,000**	
Contingency (30%) =								**$ 1,962,000**	
Engineering and Construction (15%) =								**$ 981,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 9,483,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		63,072	kWh	$ 0.18	$ 11,353		$0.18/kWh, 40 kW pump, 24 hr/d
	Sub-Total =					**$ 11,353**	
Miscellaneous O&M		1	LS	$ 7,600	$ 7,600		1% of Equipment Cost
	Sub-Total =					**$ 7,600**	
Labour		104	hr	$ 50	$ 5,200		$50/hr; 2 hr/wk
	Sub-Total =					**$ 5,200**	
TOTAL O&M COST IN CURRENT YEAR (2022) =						**$ 25,000**	
Contingency (20%) =						**$ 5,000**	
TOTAL O&M COST IN CURRENT YEAR (2022) =						**$ 30,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, upgrade the existing Moorefield SPS and forcemain

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 4: Build a Local SPS and new forcemain to the existing Moorefield SPS Site, upgrade the existing Moorefield SPS and forcemain

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$9,483,000		$30,000		
2024	$10,213,191	$9,820,376	$32,310	$31,067	$9,851,443
2025	$0	$0	$37,477	$34,650	$34,650
2026	$0	$0	$40,363	$35,883	$35,883
2027	$0	$0	$43,471	$37,159	$37,159
2028	$0	$0	$46,818	$38,481	$38,481
2029	$0	$0	$50,423	$39,850	$39,850
2030	$0	$0	$54,306	$41,268	$41,268
2031	$0	$0	$58,487	$42,736	$42,736
2032	$0	$0	$62,991	$44,257	$44,257
2033	$0	$0	$67,841	$45,831	$45,831
2034	$0	$0	$73,065	$47,462	$47,462
2035	$0	$0	$78,691	$49,150	$49,150
2036	$0	$0	$84,750	$50,899	$50,899
2037	$0	$0	$91,276	$52,710	$52,710
2038	$0	$0	$98,304	$54,585	$54,585
2039	$0	$0	$105,874	$56,527	$56,527
2040	$0	$0	$114,026	$58,538	$58,538
2041	$0	$0	$122,806	$60,620	$60,620
2042	$0	$0	$132,262	$62,777	$62,777
2043	$0	$0	$142,446	$65,011	$65,011
2044	$0	$0	$153,415	$67,323	$67,323
	Sub-Total NPV value =	$9,820,376		$1,016,784	
	Total NPV value (20 years) =		**$10,837,200**		**$10,838,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Low-pressure sewers

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 100,000	$ 100,000	incl.	$ -	$ 100,000		
Sub-total Capital Cost =								**$ 100,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 100,000**	
Contingency (30%) =								**$ 30,000**	
Engineering and Construction (15%) =								**$ 15,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 145,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy			kWh	$ -	$ -		
					Sub-Total =	**$ -**	
Chemical Systems					$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M			LS	$ -	$ -		
					Sub-Total =	**$ -**	
Regulatory Requirements			LS	$ -	$ -		
					Sub-Total =	**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Low-pressure sewers

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1: Low-pressure sewers

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$145,000		$0		
2024	$156,165	$150,159	$0	$0	$150,159
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$150,159		$0	
	Total NPV value (20 years) =		**$150,200**		**$151,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST
Alternative 2: All Gravity Sewers

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 5,380,000	$ 5,380,000	incl.	$ -	$ 5,380,000		*200mm diameter @ 4,700m, 1,200mm diameter manhole @ X each, reconfigure existing low-pressure sewer to connect to proposed gravity sewer*
Sub-total Capital Cost =								**$ 5,380,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 5,380,000**	
Contingency (30%) =								**$ 1,614,000**	
Engineering and Construction (15%) =								**$ 807,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 7,801,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		0	kWh	$ -	$ -		
	Sub-Total =					**$ -**	
Chemical Systems		0	$/L	$ -	$ -		
	Sub-Total =					**$ -**	
Miscellaneous O&M		0	LS	$ -	$ -		
	Sub-Total =					**$ -**	
Regulatory Requirements		0	LS	$ -	$ -		
	Sub-Total =					**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: All Gravity Sewers

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 2:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$7,801,000		$0		
2024	$8,401,677	$8,078,536	$0	$0	$8,078,536
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$8,078,536		$0	
	Total NPV value (20 years) =		**$8,078,600**		**$8,079,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Combination gravity sewer and low-pressure sewers

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Civil	1	LS	$ 750,000	$ 750,000	incl.	$ -	$ 750,000		*200mm diameter @ 1000m, 1,200mm diameter manhole @ X each, reconfigure existing low-pressure sewer to connect to proposed gravity sewer*
Sub-total Capital Cost =								**$ 750,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 750,000**	
Contingency (30%) =								**$ 225,000**	
Engineering and Construction (15%) =								**$ 113,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 1,088,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		0	kWh	$ -	$ -		
	Sub-Total =					**$ -**	
Chemical Systems		0	$/L	$ -	$ -		
	Sub-Total =					**$ -**	
Miscellaneous O&M		0	LS	$ -	$ -		
	Sub-Total =					**$ -**	
Regulatory Requirements		0	LS	$ -	$ -		
	Sub-Total =					**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	
Contingency (20%) =						**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ -**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 3: Combination gravity sewer and low-pressure sewers

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:		**Revision Date:**	

LIFE CYLCE COST

Alternative 2:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$1,088,000		$0		
2024	$1,171,776	$1,126,708	$0	$0	$1,126,708
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0
2032	$0	$0	$0	$0	$0
2033	$0	$0	$0	$0	$0
2034	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0
2038	$0	$0	$0	$0	$0
2039	$0	$0	$0	$0	$0
2040	$0	$0	$0	$0	$0
2041	$0	$0	$0	$0	$0
2042	$0	$0	$0	$0	$0
2043	$0	$0	$0	$0	$0
2044	$0	$0	$0	$0	$0
	Sub-Total NPV value =	$1,126,708		$0	
	Total NPV value (20 years) =		**$1,126,800**		**$1,127,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester — **Date:** 1-Dec-22
Revision No.:	0 — **Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Nitrification Upgrade with MBBR System

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material	% of Material	Total Labour			
Process	1	LS	$ 800,000	$ 800,000	incl.	$ -	$ 800,000		
Structural / Architectural	1	LS	$ 600,000	$ 600,000	incl.	$ -	$ 600,000		
Mechanical & HVAC	1	LS	$ 400,000	$ 400,000	incl.	$ -	$ 400,000		
Electrical, Instrumentation and Control	1	LS	$ 600,000	$ 600,000	incl.	$ -	$ 600,000		
Civil	1	LS	$ 1,600,000	$ 1,600,000	incl.	$ -	$ 1,600,000		
Sub-total Capital Cost =								**$ 4,000,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 4,000,000**	
Contingency (30%) =								**$ 1,200,000**	
Engineering and Construction (15%) =								**$ 600,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 5,800,000**	

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		200,000	kWh	$ 0.18	$ 36,000		Addition of blowers
					Sub-Total =	**$ 36,000**	
Chemical Systems		0	$/L	$ 1.00	$ -		
					Sub-Total =	**$ -**	
Miscellaneous O&M		1	LS	$ 8,000	$ 8,000		1% of Equipment Cost
					Sub-Total =	**$ 8,000**	
Regulatory Requirements		1	LS	$ 50,000	$ 50,000		EA Amendment
					Sub-Total =	**$ 50,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 94,000**	
Contingency (20%) =						**$ 19,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 113,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Nitrification Upgrade with MBBR System

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Nitrification Upgrade with MBBR System

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$5,800,000		$113,000		
2024	$6,246,600	$6,006,346	$121,701	$117,020	$6,123,366
2025	$0	$0	$141,165	$130,515	$130,515
2026	$0	$0	$152,034	$135,158	$135,158
2027	$0	$0	$163,741	$139,966	$139,966
2028	$0	$0	$176,349	$144,946	$144,946
2029	$0	$0	$189,928	$150,103	$150,103
2030	$0	$0	$204,552	$155,443	$155,443
2031	$0	$0	$220,303	$160,973	$160,973
2032	$0	$0	$237,266	$166,700	$166,700
2033	$0	$0	$255,535	$172,631	$172,631
2034	$0	$0	$275,212	$178,772	$178,772
2035	$0	$0	$296,403	$185,132	$185,132
2036	$0	$0	$319,226	$191,719	$191,719
2037	$0	$0	$343,806	$198,540	$198,540
2038	$0	$0	$370,280	$205,603	$205,603
2039	$0	$0	$398,791	$212,918	$212,918
2040	$0	$0	$429,498	$220,493	$220,493
2041	$0	$0	$462,569	$228,337	$228,337
2042	$0	$0	$498,187	$236,461	$236,461
2043	$0	$0	$536,548	$244,873	$244,873
2044	$0	$0	$577,862	$253,585	$253,585
	Sub-Total NPV value =	$6,006,346		$3,829,887	
	Total NPV value (20 years) =		**$9,836,300**		**$9,837,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Build a new mechanical treatment plant

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Process	1	LS	$ 3,045,366	$ 3,045,366	incl.	$ -	$ 3,046,000		
Structural / Architectural	1	LS	$ 2,284,024	$ 2,284,024	incl.	$ -	$ 2,285,000		
Mechanical & HVAC	1	LS	$ 1,522,683	$ 1,522,683	incl.	$ -	$ 1,523,000		
Electrical, Instrumentation and Control	1	LS	$ 2,284,024	$ 2,284,024	incl.	$ -	$ 2,285,000		
Civil	1	LS	$ 6,090,731	$ 6,090,731	incl.	$ -	$ 6,091,000		
Sub-total Capital Cost =								**$ 15,230,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 15,230,000**	
Contingency (30%) =								**$ 4,569,000**	
Engineering and Construction (15%) =								**$ 2,285,000**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 22,084,000**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy		400,000	kWh	$ 0.18	$ 72,000		Upgrade of blowers, RAS pumps, screens, clarifier mechanisms
	Sub-Total =					**$ 72,000**	
Chemical Systems		36,500	$/L	$ 1.00	$ 36,500		Increase in Alum
	Sub-Total =					**$ 36,500**	
Miscellaneous O&M		1	LS	$ 30,454	$ 30,454		1% of Equipment Cost
	Sub-Total =					**$ 30,454**	
Regulatory Requirements		1	LS	$ 50,000	$ 50,000		EA and Amendment
	Sub-Total =					**$ 50,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 189,000**	
Contingency (20%) =						**$ 38,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 227,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:** 1-Dec-22
Revision No.:	0	**Revision Date:**

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 1: Build a new mechanical treatment plant

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**	
Client:	Township of Mapleton	
Project No.:	T000974D	
Task:	Capital and O&M Cost	
Prepared By:	Adam Moore	
Reviewed by:	Stuart Winchester	**Date:** 2-Aug-22
Revision No.:	0	**Revision Date:**

LIFE CYLCE COST

Alternative 1: Build a new mechanical treatment plant

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$22,084,000		$227,000		
2024	$23,784,468	$22,869,681	$244,479	$235,076	$23,104,757
2025	$0	$0	$283,578	$262,184	$262,184
2026	$0	$0	$305,414	$271,512	$271,512
2027	$0	$0	$328,931	$281,171	$281,171
2028	$0	$0	$354,258	$291,175	$291,175
2029	$0	$0	$381,536	$301,534	$301,534
2030	$0	$0	$410,915	$312,261	$312,261
2031	$0	$0	$442,555	$323,371	$323,371
2032	$0	$0	$476,632	$334,875	$334,875
2033	$0	$0	$513,332	$346,789	$346,789
2034	$0	$0	$552,859	$359,127	$359,127
2035	$0	$0	$595,429	$371,903	$371,903
2036	$0	$0	$641,277	$385,134	$385,134
2037	$0	$0	$690,655	$398,836	$398,836
2038	$0	$0	$743,836	$413,026	$413,026
2039	$0	$0	$801,111	$427,720	$427,720
2040	$0	$0	$862,797	$442,937	$442,937
2041	$0	$0	$929,232	$458,695	$458,695
2042	$0	$0	$1,000,783	$475,014	$475,014
2043	$0	$0	$1,077,843	$491,914	$491,914
2044	$0	$0	$1,160,837	$509,414	$509,414
	Sub-Total NPV value =	$22,869,681		$7,693,667	
	Total NPV value (20 years) =		**$30,563,400**		**$30,564,000**

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Capital and O&M Cost
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester
Date:	1-Dec-22
Revision No.:	0
Revision Date:	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Phosphorus offsetting program

System Description	Quantity	Unit	Material		Labour		Total Material & Labour	Sub Total Cost	Comments
			Unit Cost	Total Material Cost	% of Material	Total Labour Cost			
Allowance for Phosphorus Offsetting Program Implimentation	1	LS	$ 1	$ 341,000	incl.	$ -	$ 341,000		*Administration oversight for program implimentation, Class EA*
Sub-total Capital Cost =								**$ 341,000**	
SUB-TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 341,000**	
Contingency (30%) =								**$ 102,300**	
Engineering and Construction (15%) =								**$ 51,200**	
TOTAL CAPITAL COST IN CURRENT YEAR (2023) =								**$ 494,500**	

OPERATION AND MAINTENANCE COST

Area	Item	QTY	Unit	Unit Cost ($)	Annual Cost	Subtotal	Comments
Energy					$ -		
	Sub-Total =					**$ -**	
Chemical Systems					$ -		
	Sub-Total =					**$ -**	
Miscellaneous O&M		1	LS	$ 200,000	$ 200,000		Administration oversight, monitoring, reporting, stakeholder meetings and ongoing education for developers and farmers.
	Sub-Total =					**$ 200,000**	
Regulatory Requirements					$ -		
	Sub-Total =					**$ -**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 200,000**	
Contingency (20%) =						**$ 40,000**	
TOTAL O&M COST IN CURRENT YEAR (2023) =						**$ 240,000**	

CAPITAL AND OPERATION & MAINTENANCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Jennifer McDonald, Stuart Winchester	**Date:**	1-Dec-22
Revision No.:	0	**Revision Date:**	

CAPITAL AND OPERATION & MAINTENANCE COST

Alternative 2: Phosphorus offsetting program

LIFE CYLCE COST

Project Title:	**Mapleton W/WW Servicing Master Plan**		
Client:	Township of Mapleton		
Project No.:	T000974D		
Task:	Capital and O&M Cost		
Prepared By:	Adam Moore		
Reviewed by:	Stuart Winchester	**Date:**	2-Aug-22
Revision No.:	0	**Revision Date:**	

LIFE CYLCE COST

Alternative 1:

Economic Factors

Interest rate (%)	4%	Assumed based on other projects
Inflation rate (%)	7.7%	Statistics Canada
Project Start Year (Year n)	2024	
Planning Period (yrs)	20	

Cost in Year n = Cost in Current Year x (1+inflation Rate)^(Year n - Current Year)

Present Value = Cost /((1+Interest Rate)^(Year n - Current Year))

20-Year NPV

Year	Capital Cost	NPV Capital Cost	Operating Cost	NPV Operating Cost	Capital and Operating NPV
2023	$494,500		$240,000		
2024	$532,577	$512,093	$258,480	$248,538	$760,631
2025	$0	$0	$299,818	$277,199	$277,199
2026	$0	$0	$322,904	$287,061	$287,061
2027	$0	$0	$347,768	$297,274	$297,274
2028	$0	$0	$374,546	$307,850	$307,850
2029	$0	$0	$403,386	$318,802	$318,802
2030	$0	$0	$434,447	$330,144	$330,144
2031	$0	$0	$467,899	$341,890	$341,890
2032	$0	$0	$503,928	$354,053	$354,053
2033	$0	$0	$542,730	$366,649	$366,649
2034	$0	$0	$584,520	$379,693	$379,693
2035	$0	$0	$629,528	$393,202	$393,202
2036	$0	$0	$678,002	$407,191	$407,191
2037	$0	$0	$730,208	$421,677	$421,677
2038	$0	$0	$786,434	$436,679	$436,679
2039	$0	$0	$846,990	$452,215	$452,215
2040	$0	$0	$912,208	$468,303	$468,303
2041	$0	$0	$982,448	$484,964	$484,964
2042	$0	$0	$1,058,097	$502,218	$502,218
2043	$0	$0	$1,139,570	$520,085	$520,085
2044	$0	$0	$1,227,317	$538,588	$538,588
	Sub-Total NPV value =	$512,093		$8,134,273	
	Total NPV value (20 years) =		**$8,646,400**		**$8,647,000**

F

Appendix F: Reference Data

Project Title: **Mapleton W/WW Servicing Master Plan**
Client: Township of Mapleton
Project No.: T000974D
Task: Drinking Water System Demand
Prepared By: Adam Moore
Reviewed by: Jennifer McDonald, Stuart Winchester **Date:** 01-Dec-22
Revision No.: 0 **Revision Date:**

IH: In-House

Month	Drayton DWS (m^3/d)		Moorefield DWS (m^3/d)	
	Max IH	Mean IH	Max IH	Mean IH
2016-01-01	504.36	320.25	218.85	160.65
2016-02-01	407.69	308.61	231.84	169.7
2016-03-01	748.48	331.80	226.88	169.03
2016-04-01	438.37	324.01	285.15	172.87
2016-05-01	590.93	354.62	242.46	171.86
2016-06-01	580.30	381.97	256.93	178.01
2016-07-01	557.38	383.30	256.03	167.08
2016-08-01	613.85	413.02	237.6	167.67
2016-09-01	700.12	408.58	231.36	171.13
2016-10-01	542.25	346.62	326.78	180.96
2016-11-01	360.67	286.58	226.78	170.5
2016-12-01	417.54	307.54	353.79	194.5
2017-01-01	356.41	295.09	230.4	179.85
2017-02-01	609.10	301.48	293.38	186.93
2017-03-01	354.07	279.49	268.99	189.02
2017-04-01	360.26	286.04	245.31	183.84
2017-05-01	395.89	294.52	256.83	187.72
2017-06-01	562.95	328.29	270.85	189.6
2017-07-01	451.54	292.94	257.22	176.97
2017-08-01	403.27	329.22	244.74	178.32
2017-09-01	947.82	341.07	239.36	180.9
2017-10-01	468.61	314.37	261.7	183.02
2017-11-01	357.11	292.80	271.94	190.07
2017-12-01	1155.60	333.12	259.97	192.35
2018-01-01	383.51	299.36	298.75	207.23
2018-02-01	373.47	294.46	281.09	205.88
2018-03-01	399.63	291.95	313.22	211.64
2018-04-01	1819.51	339.20	258.5	206.64
2018-05-01	481.04	347.19	266.62	191.46
2018-06-01	474.58	350.54	255.1	191.1
2018-07-01	653.53	461.55	264.77	192.58
2018-08-01	478.43	419.81	239.3	180.62
2018-09-01	550.79	430.00	301.12	183.42
2018-10-01	444.34	375.66	278.78	189.25
2018-11-01	514.24	372.22	266.69	199.43
2018-12-01	477.56	382.59	298.05	194.6
2019-01-01	436.39	367.84	257.92	197.46
2019-02-01	406.02	355.28	433.09	208.37
2019-03-01	466.14	388.27	285.06	199.27
2019-04-01	497.48	368.24	268.93	196.36
2019-05-01	470.04	376.08	349.89	200.41
2019-06-01	638.32	451.45	279.3	195.47
2019-07-01	546.42	481.76	251.84	118.85
2019-08-01	521.03	437.97	158.91	98
2019-09-01	534.39	420.60	138.24	94.95
2019-10-01	676.01	411.69	148.29	94.49
2019-11-01	1060.71	463.32	167.81	99.39
2019-12-01	455.22	402.15	152.32	99.57
2020-01-01	433.61	380.51	163.2	103.02
2020-02-01	436.83	382.06	182.46	102.98
2020-03-01	627.24	389.74	160.96	99.8
2020-04-01	477.18	399.19	132.35	99
2020-05-01	648.97	462.16	159.87	104.81
2020-06-01	675.55	509.87	252.99	119.8
2020-07-01	974.91	559.17	166.85	106.49

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Drinking Water System Demand
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester
Revision No.:	0

Date: 01-Dec-22

Revision Date:

IH: In-House

Month	Drayton DWS (m^3/d)		Moorefield DWS (m^3/d)	
	Max IH	Mean IH	Max IH	Mean IH
2020-08-01	770.79	486.40	146.75	102.25
2020-09-01	588.00	458.69	147.97	105.04
2020-10-01	485.81	432.30	142.66	109.56
2020-11-01	507.10	447.62	140.29	105.34
2020-12-01	516.64	438.63	148.61	107.06
2021-01-01	466.77	418.41	117.31	167.87
2021-02-01	482.22	433.30	119.12	168.51
2021-03-01	501.20	416.31	119.3	157.25
2021-04-01	486.83	389.81	119.24	172.93
2021-05-01	654.01	481.55	126.75	175.68
2021-06-01	708.64	513.26	103.76	143.81
2021-07-01	619.26	461.62	97.8	140.29
2021-08-01	616.33	511.84	110.72	156.42
2021-09-01	669.63	472.37	109.11	168.19
2021-10-01	819.98	441.73	102.21	165.44
2021-11-01	488.91	414.75	121.45	263.42
2021-12-01	519.15	451.48	111	148.8

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Drinking Water System Demand
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester **Date:** 01-Dec-22
Revision No.:	0 **Revision Date:**

Raw Flow Data								
Year	Drayton DWS							
	Max IH (m^3/d)			Mean IH (m^3/d)			Max Day Factor	Per Capita (L/cap-d)
	Min	Avg	Max	Min	Avg	Max		
2016	361	538	748	287	347	413	2.2	152
2017	354	535	1156	279	307	341	3.8	128
2018	373	588	1820	292	364	462	5.0	144
2019	406	559	1061	355	410	482	2.6	156
2020	434	595	975	0	411	559	2.4	149
2021	467	586	820	390	451	513	1.8	157
2016-2021	354	567	1820	0	382	559	2.9	148

Raw Flow Data								
Year	Moorefield DWS							
	Max IH (m^3/d)			Mean IH (m^3/d)			Max Day Factor	Per Capita (L/cap-d)
	Min	Avg	Max	Min	Avg	Max		
2016	219	258	354	161	173	195	2.0	393
2017	230	258	293	177	185	192	1.6	390
2018	239	277	313	181	196	212	1.6	387
2019	138	241	433	94	150	208	2.9	278
2020	132	162	253	99	105	120	2.4	184
2021	98	113	127	140	169	263	0.7	278
2016-2021	98	218	433	94	163	263	1.9	318

Billing Records				
Year	Drayton		Moorefield	
	Drayton (m^3/d)	Per Cap (L/cap-d)	Moorefield (m^3/d)	Per Cap (L/cap-d)
2019	365	138	82	151
2020	385	140	83	145
2021	388	135	83	136
Average	379	138	82	144
`	% Difference btw Raw and Billing	-7%		-121%

IH: In-House

Official Reports								
Year	Drayton				Moorefield			
	m^3/d		L/s	Per Cap (L/cap-d)	m^3/d		L/s	Per Cap (L/cap-d)
2018	364	596	4.2	144	196	277	2.3	387
2019	411	1061	4.8	163	150	433	1.7	277
2020	446	975	5.2	177	105	253	1.2	184
2021	451	820	5.2	171	113	263	1.3	186
Average	418	863	4.8	164	141	307	1.6	258

Project Title: **Mapleton W/WW Servicing Master Plan**
Client: Township of Mapleton
Project No.: T000974D
Task: Drinking Water System Demand
Prepared By: Adam Moore
Reviewed by: Jennifer McDonald, Stuart Winchester **Date:** 01-Dec-22
Revision No.: 0 **Revision Date:**

Population Projection (GSP):

	Population			Households			
Year	Urban Settlement Area	Rural Area	Mapleton	Drayton	Moorefield	Rural	Mapleton
2021	2900	8200	11000	850	180	2160	3260
2026		8300	11800	960	270	2240	3540
2031	4100	8300	12400	1110	360	2250	3780
2036		8300	12900	1160	470	2260	3960
2041	5900	8300	14100	1400	660	2270	4380
2046		8300	14600	1510	740	2280	4600
2051	6800	8300	15200	1580	880	2290	4820

Population/Household	Drayton	Moorefield	Rural
3.4	2,868	607	7,288
3.3	3,200	900	7,467
3.3	3,641	1,181	7,381
3.3	3,779	1,531	7,362
3.2	4,507	2,125	7,308
3.2	4,793	2,349	7,237
3.2	4,983	2,775	7,222

	Population			Households		
Year	Drayton	Moorefield	Total	Drayton	Moorefield	Total
2021	2,868	607	11,000	850	180	3,260
2022	2,948	604	11,153	909	275	3,309
2023	3,022	678	11,295	931	294	3,361
2024	3,096	752	11,437	952	313	3,414
2025	3,170	825	11,579	974	332	3,467
2026	3,200	900	11,800	960	270	3,540
2027	3,319	973	11,864	1,017	369	3,573
2028	3,393	1,047	12,006	1,038	388	3,626
2029	3,467	1,121	12,148	1,059	407	3,679
2030	3,542	1,195	12,290	1,081	426	3,731
2031	3,641	1,181	12,400	1,110	360	3,780
2032	3,690	1,343	12,574	1,124	463	3,837
2033	3,764	1,417	12,716	1,145	482	3,890
2034	3,839	1,490	12,859	1,167	501	3,943
2035	3,913	1,564	13,001	1,188	520	3,996
2036	3,779	1,531	12,900	1,160	470	3,960
2037	4,061	1,712	13,285	1,231	557	4,101
2038	4,136	1,786	13,427	1,252	576	4,154
2039	4,210	1,860	13,569	1,274	595	4,207
2040	4,284	1,934	13,711	1,295	614	4,260
2041	4,507	2,125	14,100	1,400	660	4,380
2042	4,433	2,082	13,996	1,338	651	4,366
2043	4,507	2,155	14,138	1,360	670	4,419
2044	4,581	2,229	14,280	1,381	689	4,471
2045	4,655	2,303	14,422	1,403	708	4,524
2046	4,793	2,349	14,600	1,510	740	4,600
2047	4,804	2,451	14,706	1,445	745	4,630
2048	4,878	2,525	14,849	1,467	764	4,683
2049	4,952	2,599	14,991	1,488	783	4,736
2050	5,027	2,673	15,133	1,510	802	4,789
2051	4,983	2,775	15,200	1,580	880	4,820

Population projections linearily interpolated from the above data, taken from the Township of Mapleton Growth Management Summary (January 2022)

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Projection - Calculated

	Population		Residential Average Daily Demand (m^3/d)		ICI Average Daily Demand (m^3/d)		Total Average Daily Demand (m^3/d)		Total Average Daily Demand (L/s)		Max Day Factor (Guidelines)		Max Day Demand (ADD x MDF) (m^3/d)	
Year	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**
2016	2,285	440	686	132	0	0	347	173	4.02	2.00			413	195
2017	2,402	473	721	142	19	0	307	185	3.56	2.14			341	192
2018	2,518	507	755	152	39	0	364	196	4.21	2.27			462	212
2019	2,635	540	791	162	60	0	410	150	4.75	1.74			482	208
2020	2,751	574	825	172	80	0	411	105	4.76	1.22			559	120
2021	2,868	607	860	182	100	0	451	169	5.21	1.96			513	263
2022	2,948	604	884	181	120	0	1,004	181	11.62	2.10	2.25	2.75	2,260	498
2023	3,022	678	907	203	140	0	1,047	203	12.11	2.35	2.00	2.75	2,093	559
2024	3,096	752	929	225	160	0	1,089	225	12.61	2.61	2.00	2.75	2,178	620
2025	3,170	825	951	248	180	0	1,132	248	13.10	2.87	2.00	2.75	2,263	681
2026	3,200	900	960	270	201	0	1,161	270	13.43	3.13	2.00	2.75	2,321	743
2027	3,319	973	996	292	221	0	1,216	292	14.08	3.38	2.00	2.75	2,433	803
2028	3,393	1,047	1,018	314	241	0	1,259	314	14.57	3.64	2.00	2.50	2,518	785
2029	3,467	1,121	1,040	336	261	0	1,301	336	15.06	3.89	2.00	2.50	2,602	841
2030	3,542	1,195	1,063	358	281	0	1,344	358	15.55	4.15	2.00	2.50	2,687	896
2031	3,641	1,181	1,092	354	301	0	1,394	354	16.13	4.10	2.00	2.50	2,787	886
2032	3,690	1,343	1,107	403	321	0	1,428	403	16.53	4.66	2.00	2.50	2,857	1,007
2033	3,764	1,417	1,129	425	341	0	1,471	425	17.02	4.92	2.00	2.50	2,942	1,062
2034	3,839	1,490	1,152	447	362	0	1,513	447	17.51	5.18	2.00	2.50	3,026	1,118
2035	3,913	1,564	1,174	469	382	0	1,556	469	18.01	5.43	2.00	2.50	3,111	1,173
2036	3,779	1,531	1,134	459	402	0	1,536	459	17.77	5.32	2.00	2.50	3,071	1,148
2037	4,061	1,712	1,218	514	422	0	1,640	514	18.99	5.95	2.00	2.50	3,281	1,284
2038	4,136	1,786	1,241	536	442	0	1,683	536	19.48	6.20	2.00	2.50	3,366	1,340
2039	4,210	1,860	1,263	558	462	0	1,725	558	19.97	6.46	2.00	2.50	3,451	1,395
2040	4,284	1,934	1,285	580	482	0	1,768	580	20.46	6.71	2.00	2.50	3,535	1,450
2041	4,507	2,125	1,352	638	503	0	1,855	638	21.47	7.38	2.00	2.25	3,709	1,434
2042	4,433	2,082	1,330	624	503	0	1,832	624	21.21	7.23	2.00	2.25	3,665	1,405
2043	4,507	2,155	1,352	647	503	0	1,855	647	21.47	7.48	2.00	2.25	3,709	1,455
2044	4,581	2,229	1,374	669	503	0	1,877	669	21.72	7.74	2.00	2.25	3,754	1,505
2045	4,655	2,303	1,397	691	503	0	1,899	691	21.98	8.00	2.00	2.25	3,798	1,555
2046	4,793	2,349	1,438	705	503	0	1,940	705	22.46	8.16	2.00	2.25	3,881	1,586
2047	4,804	2,451	1,441	735	503	0	1,944	735	22.50	8.51	2.00	2.25	3,887	1,654
2048	4,878	2,525	1,463	757	503	0	1,966	757	22.75	8.77	2.00	2.25	3,932	1,704
2049	4,952	2,599	1,486	780	503	0	1,988	780	23.01	9.02	2.00	2.25	3,977	1,754
2050	5,027	2,673	1,508	802	503	0	2,011	802	23.27	9.28	2.00	2.25	4,021	1,804
2051	4,983	2,775	1,495	833	503	0	1,997	833	23.12	9.64	2.00	2.25	3,995	1,873

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Task:	Drinking Water System Demand
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester
Revision No.:	0

Date: 01-Dec-22
Revision Date:

Projection - Calculated

	Max Day Demand (ADD x MDF) (L/s)		Peak Hour Factor (Guidelines)		Peak Hour Demand (ADD x PHF) (L/s)		Peak Hour Demand (ADD x PHF) (m^3/d)		Fire Flow (L/s)		Max Day Demand (MDD) + Fire Flow (FF) (m^3/d)		Max Day Demand (MDD) + Fire Flow (FF) (L/s)	
Year	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**	**Drayton**	**Moorefield**
2016	4.78	2.25	3.38	4.40	13.58	8.80	1,174	760	95.00	38.00	8,621	3,478	100	40
2017	3.95	2.23	3.38	4.40	12.02	9.42	1,039	813	95.00	38.00	8,549	3,476	99	40
2018	5.34	2.45	3.38	4.13	14.23	9.38	1,229	810	95.00	38.00	8,670	3,495	100	40
2019	5.58	2.41	3.38	4.13	16.05	7.18	1,387	620	95.00	38.00	8,690	3,492	101	40
2020	6.47	1.39	3.38	4.13	16.09	5.04	1,390	435	95.00	38.00	8,767	3,403	101	39
2021	5.94	3.05	3.38	4.13	17.63	8.08	1,523	698	95.00	38.00	8,721	3,547	101	41
2022	26.15	5.77	3.38	4.13	39.29	8.66	3,395	748	95.00	38.00	10,468	3,781	121	44
2023	24.23	6.47	3.38	4.13	40.95	9.72	3,538	840	95.00	38.00	10,301	3,842	119	44
2024	25.21	7.18	3.38	4.13	42.61	10.78	3,681	931	95.00	38.00	10,386	3,903	120	45
2025	26.19	7.88	3.38	4.13	44.27	11.84	3,825	1,023	95.00	38.00	10,471	3,964	121	46
2026	26.86	8.59	3.38	4.13	45.40	12.91	3,923	1,115	95.00	38.00	10,529	4,026	122	47
2027	28.16	9.29	3.00	4.13	42.24	13.96	3,649	1,206	110.00	38.00	11,937	4,086	138	47
2028	29.14	9.09	3.00	3.75	43.71	13.63	3,776	1,178	110.00	64.00	12,022	6,315	139	73
2029	30.12	9.73	3.00	3.75	45.18	14.60	3,904	1,261	110.00	64.00	12,106	6,370	140	74
2030	31.10	10.37	3.00	3.75	46.65	15.56	4,031	1,344	110.00	64.00	12,191	6,426	141	74
2031	32.26	10.25	3.00	3.75	48.39	15.38	4,181	1,329	110.00	64.00	12,291	6,415	142	74
2032	33.07	11.66	3.00	3.75	49.60	17.48	4,285	1,511	110.00	64.00	12,361	6,537	143	76
2033	34.05	12.30	3.00	3.75	51.07	18.45	4,412	1,594	110.00	64.00	12,446	6,592	144	76
2034	35.03	12.94	3.00	3.75	52.54	19.41	4,540	1,677	110.00	64.00	12,530	6,647	145	77
2035	36.01	13.58	3.00	3.75	54.02	20.37	4,667	1,760	110.00	79.00	12,615	7,999	146	93
2036	35.55	13.29	3.00	3.75	53.32	19.93	4,607	1,722	110.00	79.00	12,575	7,974	146	92
2037	37.97	14.86	3.00	3.75	56.96	22.29	4,921	1,926	110.00	79.00	12,785	8,110	148	94
2038	38.96	15.50	3.00	3.75	58.43	23.26	5,049	2,009	110.00	79.00	12,870	8,165	149	95
2039	39.94	16.15	3.00	3.75	59.91	24.22	5,176	2,092	110.00	79.00	12,955	8,221	150	95
2040	40.92	16.79	3.00	3.75	61.38	25.18	5,303	2,176	110.00	79.00	13,039	8,276	151	96
2041	42.93	16.60	3.00	3.38	64.40	24.94	5,564	2,155	110.00	95.00	13,213	9,642	153	112
2042	42.42	16.26	3.00	3.38	63.62	24.43	5,497	2,111	125.00	95.00	14,465	9,613	167	111
2043	42.93	16.84	3.00	3.38	64.40	25.30	5,564	2,186	125.00	95.00	14,509	9,663	168	112
2044	43.45	17.42	3.00	3.38	65.17	26.16	5,631	2,261	125.00	95.00	14,554	9,713	168	112
2045	43.96	17.99	3.00	3.38	65.94	27.03	5,698	2,336	125.00	95.00	14,598	9,763	169	113
2046	44.92	18.35	3.00	3.38	67.38	27.57	5,821	2,382	125.00	95.00	14,681	9,794	170	113
2047	44.99	19.15	3.00	3.38	67.49	28.77	5,831	2,485	125.00	95.00	14,687	9,862	170	114
2048	45.51	19.73	3.00	3.38	68.26	29.63	5,898	2,560	125.00	95.00	14,732	9,912	171	115
2049	46.03	20.30	3.00	3.38	69.04	30.50	5,965	2,635	125.00	95.00	14,777	9,962	171	115
2050	46.54	20.88	3.00	3.38	69.81	31.37	6,032	2,710	125.00	95.00	14,821	10,012	172	116
2051	46.24	21.68	3.00	3.38	69.36	32.57	5,992	2,814	125.00	95.00	14,795	10,081	171	117

Project Title: **Mapleton W/WW Servicing Master Plan**

Client: Township of Mapleton
Project No.: T000974D
Task: Wastewater System Demand
Prepared By: Adam Moore
Reviewed by: Jennifer McDonald, Stuart Winchester — **Date:** 01-Dec-22
Revision No.: 0 — **Revision Date:**

Wastewater Demand: IH: In-House

Month	Drayton WW (m^3/d)				Drayton WW (L/s)			Moorefield WW (m^3/d)		Moorefield WW (L/s)		Total WW (m^3/d)	
	Max IH	Mean IH	Haul (GAL)	Total Max	Max IH	Mean IH	Total Max	Max IH	Mean IH	Max IH	Mean IH	Total Max IH	Total Mean IH
2016-01-01	1072	569		1072.40	12.41	6.58	12.41	114	81	195.23	0.94	1186	650
2016-02-01	1471	655	11400	1513.95	17.02	7.59	17.52	138	89	1.60	1.04	1609	745
2016-03-01	1907	811	170000	2550.62	22.07	9.38	29.52	125	89	1.45	1.03	2032	899
2016-04-01	1422	664		1422.20	16.46	7.69	16.46	138	84	1.60	0.97	1560	748
2016-05-01	618	448		618.00	7.15	5.19	7.15	90	71	1.04	0.82	708	519
2016-06-01	594	398		594.00	6.88	4.61	6.88	97	71	1.12	0.82	691	469
2016-07-01	806	411		806.10	9.33	4.75	9.33	88	65	1.02	0.75	894	476
2016-08-01	769	457		768.70	8.90	5.29	8.90	88	67	1.02	0.77	857	524
2016-09-01	662	428		662.40	7.67	4.95	7.67	117	70	1.35	0.82	779	498
2016-10-01	642	428		642.00	7.43	4.96	7.43	95	71	1.10	0.82	737	499
2016-11-01	657	472		657.20	7.61	5.46	7.61	106	72	1.23	0.83	763	544
2016-12-01	2160	562	125000	2632.88	25.00	6.51	30.47	120	74	1.39	0.86	2280	636
2017-01-01	1819	885		1818.60	21.05	10.25	21.05	121	89	1.40	1.04	1940	975
2017-02-01	1718	736		1718.20	19.89	8.51	19.89	132	84	1.53	0.97	1850	819
2017-03-01	1320	610	15200	1377.54	15.28	7.06	15.94	129	83	1.49	0.96	1449	693
2017-04-01	1394	726		1394.20	16.14	8.41	16.14	137	81	1.59	0.94	1531	808
2017-05-01	2384	699		2384.40	27.60	8.09	27.60	153	83	1.77	0.97	2537	782
2017-06-01	2675	623	650000	5135.52	30.96	7.21	59.44	237	87	2.74	1.01	2912	710
2017-07-01	914	476		914.00	10.58	5.50	10.58	99	75	1.15	0.87	1013	550
2017-08-01	547	399		547.00	6.33	4.62	6.33	96	70	1.11	0.81	643	469
2017-09-01	732	434		732.00	8.47	5.03	8.47	95	70	1.10	0.82	827	505
2017-10-01	938	472		938.00	10.86	5.47	10.86	94	70	1.09	0.81	1032	543
2017-11-01	1382	634		1382.00	16.00	7.34	16.00	140	83	1.62	0.96	1522	717
2017-12-01	651	481		651.00	7.53	5.57	7.53	96	73	1.11	0.84	747	554
2018-01-01	2294	609		2294.00	26.55	7.05	26.55	170	87	1.97	1.01	2464	696
2018-02-01	2835	658	361000	4201.53	32.81	7.61	48.63	182	88	2.11	1.02	3017	745
2018-03-01	764	485		764.00	8.84	5.61	8.84	101	43	1.17	0.49	865	527
2018-04-01	1619	951		1619.00	18.74	11.00	18.74	163	104	1.89	1.20	1782	1054
2018-05-01	904	563		904.00	10.46	6.52	10.46	102	77	1.18	0.89	1006	640
2018-06-01	801	451		801.00	9.27	5.22	9.27	117	73	1.35	0.85	918	524
2018-07-01	613	416		613.00	7.09	4.82	7.09	100	72	1.16	0.84	713	489
2018-08-01	951	457		951.00	11.01	5.29	11.01	127	73	1.47	0.84	1078	530
2018-09-01	624	409		624.00	7.22	4.74	7.22	118	73	1.37	0.85	742	483
2018-10-01	765	461		765.00	8.85	5.34	8.85	119	72	1.38	0.84	884	533
2018-11-01	1397	655		1397.00	16.17	7.59	16.17	127	88	1.47	1.02	1524	743
2018-12-01	1383	644		1383.00	16.01	7.46	16.01	120	78	1.39	0.90	1503	722
2019-01-01	1046	540	45000	1216.34	12.11	6.25	14.08	98	74	1.13	0.86	1144	614
2019-02-01	1749	610		1749.00	20.24	7.06	20.24	170	77	1.97	0.89	1919	687
2019-03-01	1977	770		1977.00	22.88	8.91	22.88	140	85	1.62	0.99	2117	855
2019-04-01	1442	831		1442.00	16.69	9.61	16.69	122	87	1.41	1.01	1564	918
2019-05-01	1063	655		1063.00	12.30	7.58	12.30	107	75	1.24	0.87	1170	730
2019-06-01	632	474		632.00	7.31	5.49	7.31	98	71	1.13	0.82	730	545
2019-07-01	560	402		560.00	6.48	4.65	6.48	88	66	1.02	0.76	648	468
2019-08-01	777	415		777.00	8.99	4.81	8.99	88	65	1.02	0.75	865	480
2019-09-01	571	431		571.00	6.61	4.99	6.61	103	68	1.19	0.79	674	499
2019-10-01	1619	544		1619.00	18.74	6.29	18.74	105	72	1.22	0.83	1724	616
2019-11-01	1176	615		1176.00	13.61	7.11	13.61	101	73	1.17	0.84	1277	687
2019-12-01	1327	613		1327.00	15.36	7.09	15.36	133	77	1.54	0.89	1460	690
2020-01-01	4083	777	300000	5218.62	47.26	8.99	60.40	289	97	3.34	1.12	4372	873
2020-02-01	659	498		659.00	7.63	5.77	7.63	102	73	1.18	0.84	761	571
2020-03-01	2176	870	71250	2445.71	25.19	10.07	28.31	211	92	2.44	1.07	2387	963
2020-04-01	1122	571		1122.00	12.99	6.61	12.99	100	72	1.16	0.83	1222	642
2020-05-01	976	561		976.00	11.30	6.49	11.30	93	72	1.08	0.83	1069	633
2020-06-01	736	495		736.00	8.52	5.73	8.52	102	71	1.18	0.83	838	567
2020-07-01	521	421		521.00	6.03	4.88	6.03	97	69	1.12	0.80	618	491
2020-08-01	1237	453		1237.00	14.32	5.25	14.32	104	69	1.20	0.80	1341	522
2020-09-01	624	432		624.00	7.22	5.00	7.22	105	69	1.22	0.80	729	501
2020-10-01	956	565		956.00	11.06	6.54	11.06	96	74	1.11	0.85	1052	639
2020-11-01	1381	598		1381.00	15.98	6.92	15.98	138	73	1.60	0.85	1519	671
2020-12-01	1140	613		1140.00	13.19	7.09	13.19	109	76	1.26	0.88	1249	689
2021-01-01	729	520		729.00	8.44	6.01	8.44	117	73	1.35	0.85	846	593
2021-02-01	861	474		861.00	9.97	5.48	9.97	122	76	1.41	0.88	983	550
2021-03-01	1872	779		1872.00	21.67	9.02	21.67	151	91	1.75	1.06	2023	870
2021-04-01	1631	622		1631.00	18.88	7.20	18.88	93	73	1.08	0.85	1724	695
2021-05-01	683	468		683.00	7.91	5.41	7.91	94	69	1.09	0.79	777	536
2021-06-01	1282	493		1282.00	14.84	5.71	14.84	103	66	1.19	0.76	1385	559
2021-07-01	654	444		654.00	7.57	5.14	7.57	86	67	1.00	0.77	740	511
2021-08-01	697	436		697.00	8.07	5.04	8.07	96	71	1.11	0.82	793	507
2021-09-01	1833	654		1833.00	21.22	7.57	21.22	152	78	1.76	0.90	1985	732
2021-10-01	1125	579		1125.00	13.02	6.70	13.02	112	72	1.30	0.84	1237	651
2021-11-01	796	592		796.00	9.21	6.85	9.21	104	78	1.20	0.91	900	670
2021-12-01	1507	712		1507.00	17.44	8.24	17.44	143	81	1.66	0.93	1650	793

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Wastewater System Demand
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester
Revision No.:	0

Date: 01-Dec-22

Revision Date:

Population and Household Projection:

	Population			Households							
Year	**Urban Settlement Area**	**Rural Area**	**Mapleton**	**Drayton**	**Moorefield**	**Rural**	**Mapleton**	**Population/ Household**	**Drayton**	**Moorefield**	**Rural**
2021	2900	8200	11000	850	180	2160	3260	3.4	2,868	607	7,288
2026		8300	11800	960	270	2240	3540	3.3	3,200	900	7,467
2031	4100	8300	12400	1110	360	2250	3780	3.3	3,641	1,181	7,381
2036		8300	12900	1160	470	2260	3960	3.3	3,779	1,531	7,362
2041	5900	8300	14100	1400	660	2270	4380	3.2	4,507	2,125	7,308
2046		8300	14600	1510	740	2280	4600	3.2	4,793	2,349	7,237
2051	6800	8300	15200	1580	880	2290	4820	3.2	4,983	2,775	7,222

	Population			Households		
Year	**Drayton**	**Moorefield**	**Total**	**Drayton**	**Moorefield**	**Total**
2021	2868	607	11000	850	180	3260
2022	2928	604	11153	866	175	3309
2023	3002	678	11295	892	198	3361
2024	3076	752	11437	917	222	3414
2025	3150	825	11579	943	246	3467
2026	3200	900	11800	960	270	3540
2027	3299	973	11864	994	294	3573
2028	3373	1047	12006	1020	318	3626
2029	3447	1121	12148	1045	342	3679
2030	3522	1195	12290	1071	365	3731
2031	3641	1181	12400	1110	360	3780
2032	3670	1343	12574	1122	413	3837
2033	3744	1417	12716	1148	437	3890
2034	3819	1490	12859	1173	461	3943
2035	3893	1564	13001	1199	485	3996
2036	3779	1531	12900	1160	470	3960
2037	4041	1712	13285	1250	532	4101
2038	4116	1786	13427	1275	556	4154
2039	4190	1860	13569	1301	580	4207
2040	4264	1934	13711	1327	604	4260
2041	4507	2125	14100	1400	660	4380
2042	4413	2082	13996	1378	652	4366
2043	4487	2155	14138	1403	676	4419
2044	4561	2229	14280	1429	699	4471
2045	4635	2303	14422	1454	723	4524
2046	4793	2349	14600	1510	740	4600
2047	4784	2451	14706	1506	771	4630
2048	4858	2525	14849	1531	795	4683
2049	4932	2599	14991	1557	819	4736
2050	5007	2673	15133	1582	843	4789
2051	4983	2775	15200	1580	880	4820

Project Title: **Mapleton W/WW Servicing Master Plan**
Client: Township of Mapleton
Project No.: T000974D
Task: Wastewater System Demand
Prepared By: Adam Moore
Reviewed by: Jennifer McDonald, Stuart Winchester
Date: 01-Dec-22
Revision No.: 0
Revision Date:

Projected Generation:

	Population		**Households (GSP)**				**Average Flow (m^3/d)**		**Total Average Daily Flow (m^3/d)**	**ICI Average Flow (m^3/d)**		**Total Average Daily Flow (m^3/d)**
Year	Drayton	Moorefield	Drayton	Additional	Moorefield	Additional	Drayton	Moorefield		Drayton	Moorefield	Drayton
2016	2,285	440					525	75	601	0	0	525
2017	2,402	473					598	79	677	19	0	617
2018	2,518	507					563	77	641	39	0	603
2019	2,635	540					575	74	649	60	0	634
2020	2,751	574					571	76	647	80	0	651
2021	2,868	607	850		180		564	75	639	100	0	664
2022	2,928	604	866	16	175		647	104	751	120	0	767
2023	3,002	678	892	42	198	18	663	117	780	140	0	803
2024	3,076	752	917	67	222	42	679	130	809	160	0	840
2025	3,150	825	943	93	246	66	696	143	838	180	0	876
2026	3,200	900	960	110	270	90	707	155	862	201	0	907
2027	3,299	973	994	144	294	114	729	168	897	221	0	949
2028	3,373	1,047	1,020	170	318	138	745	181	926	241	0	986
2029	3,447	1,121	1,045	195	342	162	761	194	955	261	0	1,022
2030	3,522	1,195	1,071	221	365	185	778	206	984	281	0	1,059
2031	3,641	1,181	1,110	260	360	180	804	204	1,008	301	0	1,105
2032	3,670	1,343	1,122	272	413	233	811	232	1,042	321	0	1,132
2033	3,744	1,417	1,148	298	437	257	827	245	1,072	341	0	1,168
2034	3,819	1,490	1,173	323	461	281	843	257	1,101	362	0	1,205
2035	3,893	1,564	1,199	349	485	305	860	270	1,130	382	0	1,242
2036	3,779	1,531	1,160	310	470	290	835	264	1,099	402	0	1,236
2037	4,041	1,712	1,250	400	532	352	893	296	1,188	422	0	1,315
2038	4,116	1,786	1,275	425	556	376	909	308	1,217	442	0	1,351
2039	4,190	1,860	1,301	451	580	400	925	321	1,247	462	0	1,388
2040	4,264	1,934	1,327	477	604	424	942	334	1,276	482	0	1,424
2041	4,507	2,125	1,400	550	660	480	995	367	1,362	503	0	1,498
2042	4,413	2,082	1,378	528	652	472	975	360	1,334	503	0	1,477
2043	4,487	2,155	1,403	553	676	496	991	372	1,363	503	0	1,494
2044	4,561	2,229	1,429	579	699	519	1,007	385	1,392	503	0	1,510
2045	4,635	2,303	1,454	604	723	543	1,024	398	1,422	503	0	1,526
2046	4,793	2,349	1,510	660	740	560	1,058	406	1,464	503	0	1,561
2047	4,784	2,451	1,506	656	771	591	1,057	423	1,480	503	0	1,559
2048	4,858	2,525	1,531	681	795	615	1,073	436	1,509	503	0	1,575
2049	4,932	2,599	1,557	707	819	639	1,089	449	1,538	503	0	1,592
2050	5,007	2,673	1,582	732	843	663	1,106	462	1,567	503	0	1,608
2051	4,983	2,775	1,580	730	880	700	1,100	479	1,580	503	0	1,603

Project Title: Mapleton W/WW Servicing Master Plan
Client: Township of Mapleton
Project No.: T000974D
Task: Wastewater System Demand
Prepared By: Adam Moore
Reviewed by: Jennifer McDonald, Stuart Winchester **Date:** 01-Dec-22
Revision No.: 0 **Revision Date:**

Projected Generation:

	Average Flow (m^3/d)		Average Flow (L/s)		Total Average Daily Flow (m^3/d)	Total Average Daily Flow (L/s)	Maximum Daily Flow (m^3/d)		Total Maximum Daily Flow (m^3/d)	Maximum Daily Flow (L/s)	
Year	Drayton	Moorefield	Drayton	Moorefield			Drayton	Moorefield		Drayton	Moorefield
2016	525	75	6.1	0.9	601	7.0	811	89	900	9	1.0
2017	598	79	6.9	0.9	677	7.8	885	89	975	10	1.0
2018	563	77	6.5	0.9	641	7.4	951	104	1,054	11	1.2
2019	575	74	6.7	0.9	649	7.5	831	87	918	10	1.0
2020	571	76	6.6	0.9	647	7.5	870	97	967	10	1.1
2021	564	75	6.5	0.9	639	7.4	779	91	870	9	1.1
2022	878	136	10.2	1.6	1,014	11.7	2,955	435	3,390	34	5
2023	901	152	10.4	1.8	1,053	12.2	3,030	488	3,518	35	6
2024	923	169	10.7	2.0	1,092	12.6	3,105	541	3,646	36	6
2025	945	186	10.9	2.1	1,131	13.1	3,180	594	3,774	37	7
2026	960	203	11.1	2.3	1,163	13.5	3,230	648	3,878	37	8
2027	990	219	11.5	2.5	1,209	14.0	3,329	701	4,030	39	8
2028	1,012	236	11.7	2.7	1,248	14.4	3,404	754	4,158	39	9
2029	1,034	252	12.0	2.9	1,286	14.9	3,479	807	4,286	40	9
2030	1,057	269	12.2	3.1	1,325	15.3	3,554	860	4,415	41	10
2031	1,092	266	12.6	3.1	1,358	15.7	3,675	850	4,525	43	10
2032	1,101	302	12.7	3.5	1,403	16.2	3,704	967	4,671	43	11
2033	1,123	319	13.0	3.7	1,442	16.7	3,779	1,020	4,799	44	12
2034	1,146	335	13.3	3.9	1,481	17.1	3,854	1,073	4,927	45	12
2035	1,168	352	13.5	4.1	1,520	17.6	3,929	1,126	5,055	45	13
2036	1,134	344	13.1	4.0	1,478	17.1	3,814	1,102	4,916	44	13
2037	1,212	385	14.0	4.5	1,598	18.5	4,079	1,233	5,312	47	14
2038	1,235	402	14.3	4.7	1,637	18.9	4,154	1,286	5,440	48	15
2039	1,257	418	14.5	4.8	1,675	19.4	4,229	1,339	5,568	49	15
2040	1,279	435	14.8	5.0	1,714	19.8	4,304	1,392	5,696	50	16
2041	1,352	478	15.6	5.5	1,830	21.2	4,548	1,530	6,078	53	18
2042	1,324	468	15.3	5.4	1,792	20.7	4,453	1,499	5,952	52	17
2043	1,346	485	15.6	5.6	1,831	21.2	4,528	1,552	6,080	52	18
2044	1,368	502	15.8	5.8	1,870	21.6	4,603	1,605	6,208	53	19
2045	1,391	518	16.1	6.0	1,909	22.1	4,678	1,658	6,337	54	19
2046	1,438	529	16.6	6.1	1,966	22.8	4,837	1,691	6,528	56	20
2047	1,435	551	16.6	6.4	1,987	23.0	4,828	1,765	6,593	56	20
2048	1,457	568	16.9	6.6	2,026	23.4	4,903	1,818	6,721	57	21
2049	1,480	585	17.1	6.8	2,064	23.9	4,978	1,871	6,849	58	22
2050	1,502	601	17.4	7.0	2,103	24.3	5,053	1,924	6,977	58	22
2051	1,495	624	17.3	7.2	2,119	24.5	5,029	1,998	7,027	58	23

Project Title:	**Mapleton W/WW Servicing Master Plan**
Client:	Township of Mapleton
Project No.:	T000974D
Task:	Wastewater System Demand
Prepared By:	Adam Moore
Reviewed by:	Jennifer McDonald, Stuart Winchester
Revision No.:	0

Date: 01-Dec-22
Revision Date:

Projected Generation:

	Harmon Peak Factor				Maximum Daily Flow using Harmon (m^3/d)		Total Maximum Daily Flow (m^3/d)	Maximum Daily Flow using Harmon (L/s)	
Year	Drayton	Moorefield	Total	Combined	Drayton	Moorefield		Drayton	Moorefield
2016	3.54	4.00	2,725	3.48	1,860	302	2,161	21.5	3.5
2017	3.52	3.99	2,875	3.46	2,106	315	2,422	24.4	3.6
2018	3.51	3.97	3,025	3.44	1,975	307	2,282	22.9	3.6
2019	3.49	3.96	3,175	3.42	2,006	293	2,300	23.2	3.4
2020	3.47	3.94	3,325	3.40	1,984	298	2,282	23.0	3.4
2021	3.46	3.93	3,475	3.39	1,952	293	2,245	22.6	3.4
2022	3.45	3.93	3,532	3.38	3,031	534	3,565	35.1	6.2
2023	3.44	3.90	3,680	3.37	3,100	595	3,695	35.9	6.9
2024	3.43	3.88	3,828	3.35	3,168	656	3,824	36.7	7.6
2025	3.42	3.85	3,976	3.34	3,236	715	3,952	37.5	8.3
2026	3.42	3.83	4,100	3.32	3,282	775	4,057	38.0	9.0
2027	3.41	3.81	4,272	3.31	3,372	834	4,206	39.0	9.7
2028	3.40	3.79	4,420	3.29	3,439	892	4,332	39.8	10.3
2029	3.39	3.77	4,569	3.28	3,506	950	4,457	40.6	11.0
2030	3.38	3.75	4,717	3.27	3,573	1,008	4,581	41.4	11.7
2031	3.37	3.75	4,822	3.26	3,681	997	4,678	42.6	11.5
2032	3.37	3.71	5,013	3.24	3,707	1,122	4,829	42.9	13.0
2033	3.36	3.70	5,161	3.23	3,773	1,178	4,952	43.7	13.6
2034	3.35	3.68	5,309	3.22	3,839	1,235	5,074	44.4	14.3
2035	3.34	3.67	5,457	3.21	3,905	1,290	5,196	45.2	14.9
2036	3.36	3.67	5,310	3.22	3,804	1,265	5,069	44.0	14.6
2037	3.33	3.64	5,754	3.19	4,037	1,401	5,438	46.7	16.2
2038	3.32	3.62	5,902	3.18	4,102	1,456	5,558	47.5	16.9
2039	3.32	3.61	6,050	3.17	4,167	1,511	5,678	48.2	17.5
2040	3.31	3.60	6,198	3.16	4,232	1,565	5,797	49.0	18.1
2041	3.29	3.57	6,632	3.13	4,444	1,705	6,148	51.4	19.7
2042	3.29	3.57	6,494	3.14	4,362	1,673	6,035	50.5	19.4
2043	3.29	3.56	6,642	3.13	4,426	1,727	6,153	51.2	20.0
2044	3.28	3.55	6,790	3.12	4,491	1,780	6,271	52.0	20.6
2045	3.28	3.54	6,939	3.11	4,555	1,833	6,388	52.7	21.2
2046	3.26	3.53	7,142	3.10	4,690	1,866	6,556	54.3	21.6
2047	3.26	3.52	7,235	3.09	4,683	1,939	6,621	54.2	22.4
2048	3.26	3.50	7,383	3.08	4,746	1,991	6,737	54.9	23.0
2049	3.25	3.49	7,531	3.08	4,810	2,043	6,853	55.7	23.7
2050	3.24	3.48	7,679	3.07	4,873	2,095	6,969	56.4	24.3
2051	3.25	3.47	7,758	3.06	4,853	2,167	7,020	56.2	25.1

G

Appendix G: Design Flow Calculations

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald

Date: 2023-02-21

Checked By:

Date:

Project: Drayton Sanitary Collection System - EXISTING

Project Number: T000974D

Municipality: Township of Mapleton

Domestic Flow 300 L/cap/d

Infiltration Allowar 0.2 L/s/ha

Peak Factor: Harmon's Formula

Manning's "n": 0.013

Population Dens 25 ppha

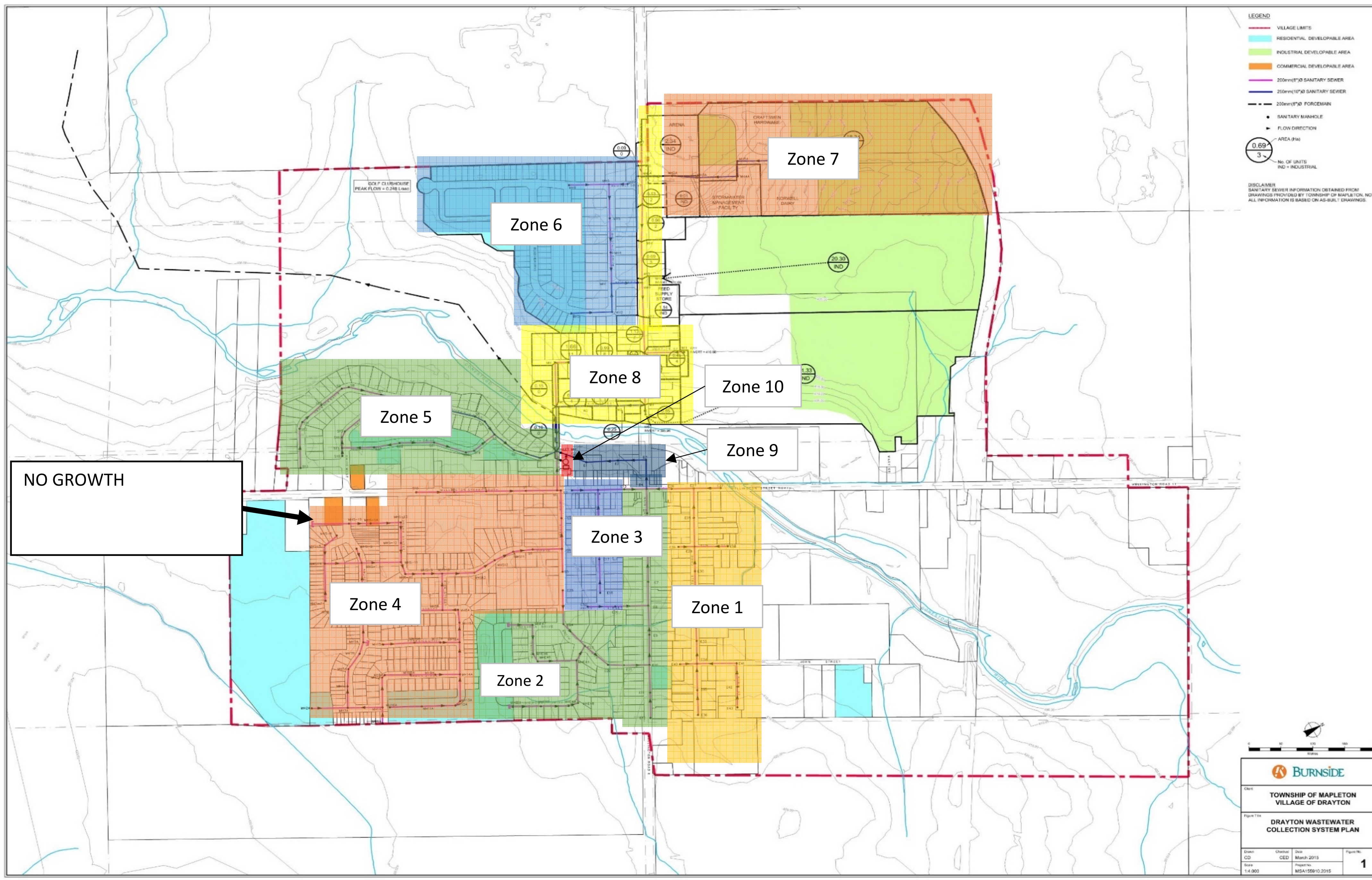
Total SAN Catchment Area

91.37 ha

Total Population

2802.00 ppl

3795.00



SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 1

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Robin St.	E43	E42	0.32	9	0.32	9	4.42	0.1	0.1	0.2	60.0	200	PVC	5.40	76.2	2.43	0.70
Robin St.	E42	E41	0.23	6	0.55	15	4.4	0.2	0.1	0.3	60.0	200	PVC	5.40	76.2	2.43	0.70
John St. (East)	E41	E34	0.43	11	0.98	26	4.36	0.4	0.2	0.6	105.0	200	PVC	0.40	20.7	0.66	0.00
John St. (West)	E40	E34	0.16	5	0.16	5	4.44	0.1	0.0	0.1	50.0	200	PVC	2.40	50.8	1.62	0.50
Elm St. (East)	E38	E29	0.26	7	0.26	7	4.43	0.1	0.1	0.2	95.0	200	PVC	0.40	20.7	0.66	0.20
Elm St. (West)	E39	E29	0.16	4	0.16	4	4.45	0.1	0.0	0.1	60.0	200	PVC	0.40	20.7	0.66	0.20
Wood St.	E36	E35	0.47	12	0.47	12	4.41	0.2	0.1	0.3	78.5	200	PVC	5.67	78.1	2.49	0.00
Wood St.	E35	E34	0.35	9	0.82	21	4.38	0.3	0.2	0.5	70.0	200	PVC	4.14	66.7	2.12	0.60
From John St. (East)		E34			0.98	26											
From John St. (West)		E34			0.16	5											
Wood St.	E34	E33	0.26	7	2.21	59	4.3	0.9	0.4	1.3	64.2	200	PVC	0.40	20.7	0.66	0.00
Wood St.	E33	E32	0.54	14	2.75	73	4.28	1.1	0.5	1.6	60.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E32	E31	0.26	7	3.01	80	4.27	1.2	0.6	1.8	56.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E31	E30	0.37	10	3.38	90	4.26	1.3	0.7	2	66.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E30	E29	0.33	9	3.71	99	4.24	1.5	0.7	2.2	66.0	200	PVC	1.31	37.5	1.19	0.60
From Elm St. (East)		E29			0.26	7											
From Elm St. (West)		E29			0.16	4											
Wood St.	E29	E28	0.50	13	4.62	123	4.22	1.8	0.9	2.7	77.8	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E28	E27	0.42	11	5.04	134	4.21	2	1.0	3	78.0	200	PVC	0.40	20.7	0.66	0.50
Wellington St. N	E37	E27	0.41	11	0.41	11	4.41	0.2	0.1	0.3	70.0	200	PVC	0.40	20.7	0.66	0.20
From Wood St.					5.04	134											
Wellington St. N	E27	E26	0.23	6	5.68	151	4.19	2.2	1.1	3.3	57.0	200	PVC	0.40	20.7	0.66	0.50
Wellington St. N	E26	E4	0.31	8	5.99	159	4.18	2.3	1.2	3.5	64.2	200	PVC	0.40	20.7	0.66	0.50

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 2

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Conestoga Dr.	18A	23A	0.37	10	0.37	10	4.41	0.2	0.1	0.3	66.4	200	PVC	1	32.8	1.04	0.30
Conestoga Dr.	23A	24A	0.16	4	0.53	14	4.4	0.2	0.1	0.3	48.9	200	PVC	0.5	23.2	0.74	0.20
Conestoga Dr.	24A	25A	0.16	5	0.69	19	4.38	0.3	0.1	0.4	11.7	200	PVC	0.50	23.2	0.74	0.30
Conestoga Dr.	25A	E47	0.28	7	0.97	26	4.36	0.4	0.2	0.6	Conestoga d	200	PVC	1.80	44	1.4	0.40
Hillview Dr.	E47	E46	0.38	10	1.35	36	4.34	0.5	0.3	0.8		200	PVC		0	0	#DIV/0!
Hillview Dr.	E46	E45	0.26	7	1.61	43	4.33	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Hillview Dr.	E45	E44	0.27	7	1.88	50	4.31	0.7	0.4	1.1		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	18A	20A	0.33	9	0.33	9	4.42	0.1	0.1	0.2	64	200	PVC	3.5	61.4	1.95	#N/A
Bonniewood Dr.	20A	21A	0.09	3	0.42	12	4.41	0.2	0.1	0.3	12	200	PVC	3	56.8	1.81	0.50
Bonniewood Dr.	21A	22A	0.09	3	0.51	15	4.4	0.2	0.1	0.3	11.4	200	PVC	3	56.8	1.81	0.50
Bonniewood Dr.	22A	E51	0.09	3	0.61	18	4.39	0.3	0.1	0.4	31.5+B.Dr.	200	PVC	4.00	65.6	2.09	0.60
Bonniewood Dr.	E51	E50	0.41	11	1.02	29	4.36	0.4	0.2	0.6		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E50	E49	0.29	8	1.31	37	4.34	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E49	E48	0.17	5	1.48	42	4.33	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E48	E44	0.43	11	1.92	53	4.31	0.8	0.4	1.2		200	PVC		0	0	#DIV/0!
From Conestoga/Hillview		E44			1.88	50											
Bonniewood Dr.	E44	E23	0.19	5	3.99	108	4.23	1.6	0.8	2.4		200	PVC		0	0	#DIV/0!
High St./Smith Dr.	E25	E24	0.97	25	0.97	25	4.37	0.4	0.2	0.6	82.5	200	PVC	4.48	69.4	2.21	0.70
Smith Dr.	E24	E23	0.47	12	1.44	37	4.34	0.6	0.3	0.9	35.5	200	PVC	5.98	80.2	2.55	0.80
From Bonniewood					3.99	108.00											
Smith Dr.	E23	E22	0.38	10	5.80	155.00	4.19	2.3	1.2	3.5	35	200	PVC	3.53	61.6	1.96	1.00
Smith Dr.	E22	E21	0.28	7	6.08	162	4.18	2.4	1.2	3.6	87	200	PVC	0.4	20.7	0.66	0.50
Smith Dr.	E21	E10	0.17	5	6.25	167	4.18	2.4	1.3	3.7	105	200	PVC	0.4	20.7	0.66	0.50
Union St.	E52	E20	0.34	9	0.34	9	4.42	0.1	0.1	0.2	60	200	PVC	4.15	66.8	2.13	0.60

Union St.	E20	E8	0.38	10	0.72	19	4.38	0.3	0.1	0.4	90	200	PVC	6.50	83.6	2.66	0.80
Edward St.	E19	E6	0.28	7	0.28	7.00	4.43	0.1	0.1	0.2	75	200	PVC	0.40	20.7	0.66	0.20
Main St. E.	E12	E11	1.33	34	1.33	34	4.35	0.5	0.3	0.8	66	200	PVC	4.37	68.6	2.18	0.70
Main St. E.	E11	E10	0.35	9	1.69	43	4.33	0.6	0.3	0.9	75	200	PVC	5.25	75.2	2.39	0.70
From Smith Dr.					6.25	167.00											
Main St. E.	E10	E9	0.53	14	8.47	224.00	4.13	3.2	1.7	4.9	78.9	200	PVC	1.40	38.8	1.24	0.80
Main St. E.	E9	E8	0.49	13	8.95	237	4.12	3.4	1.8	5.2	77	200	PVC	0.40	20.7	0.66	0.50
From Union St.					0.72	19.00											
Main St. E.	E8	E7	0.34	9	10.00	265.00	4.1	3.8	2.0	5.8	64.3	200	PVC	0.40	20.7	0.66	0.60
Main St. E.	E7	E6	0.54	14	10.54	279	4.09	4	2.1	6.1	92	200	PVC	0.40	20.7	0.66	0.60
From Edward St.					0.28	7.00											
Main St. E.	E6	E5	0.50	13	11.32	299.00	4.08	4.2	2.3	6.5	73	200	PVC	3.97	65.4	2.08	1.30
Main St. E.	E5	E4	0.33	9	11.65	308	4.07	4.4	2.3	6.7	83	200	PVC	0.50	23.2	0.74	0.60

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 3

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Spring St.	E18	E17	0.54	14	0.54	14	4.4	0.2	0.1	0.3	63	200	PVC	6.73	85.1	2.71	0.80
Spring St.	E17	E16	0.47	12	1.01	26	4.36	0.4	0.2	0.6	102.5	200	PVC	3.91	64.9	2.06	0.60
Spring St.	E16	E14	0.35	9	1.36	35	4.34	0.5	0.3	0.8	102.5	200	PVC	1.56	41	1.3	0.50
Wellington St.	E15	E14	0.30	8	0.30	8	4.42	0.1	0.1	0.2	65	200	PVC	4.39	68.7	2.19	0.70
from Spring St.					1.36	35											
Wellington St.	E14	E13	0.32	8	1.98	51	4.31	0.8	0.4	1.2	58.3	200	PVC	1.41	38.9	1.24	0.50
Wellington St.	E13	E4	0.21	6	2.19	57	4.3	0.9	0.4	1.3	60	200	PVC	0.4	20.7	0.66	0.30

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - EXISTING	Domestic Flow:	300 L/cap/d
Date:	2023-02-21			Infiltration Allowanc	0.2 L/s/ha
Checked By:		Project Number:	T000974B	Peak Factor:	Harmon's Formula
Date:		Municipality:	Township of Mapleton	Manning's "n":	0.013
				Population Densit	25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Green St.	MH6A	MH1A	0.08	2	0.08	2	4.46	0	0.0	0	42.2	200	PVC	0.45	22	0.7	0.20
Maple St.	MH2A	MH3A	0.14	4	0.14	4	4.45	0.1	0.0	0.1	41.1	200	PVC	0.46	22.2	0.71	0.20
From Green St.					0.08	2											
Maple St.	MH1A	MH3A	0.21	6	0.29	8	4.42	0.1	0.1	0.2	87.1	200	PVC	0.5	23.2	0.74	0.20
Dales Dr.	MH4A	MH1A	0.37	10	0.37	10	4.41	0.2	0.1	0.3	75.5	200	PVC	0.5	23.2	0.74	0.20
Dales Dr.	MHS-6	MHS-5	0.18	5	0.18	5	4.44	0.1	0.0	0.1		200	PVC		0	0	#DIV/0!
Dales Dr.	MHS-5	MHS-4	0.21	6	0.39	11	4.41	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
	MHS-7	MHS-4	0.48	12	0.48	12	4.41	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
Dales Dr.	MHS-4	MHS-1	0.19	5	1.06	28	4.36	0.4	0.2	0.6		200	PVC		0	0	#DIV/0!
Andrew Dr.	MHS-2	MHS-1	0.27	7	0.27	7	4.43	0.1	0.1	0.2		200	PVC		0	0	#DIV/0!
From Maple St./Green St.		MH3A			0.29	8											
From Maple St. (2A-3A)		MH3A			0.14	4											
Andrew Dr.	MH3A	MH4A	0.26	7	0.69	19	4.38	0.3	0.1	0.4	57.9	200	PVC	0.46	22.2	0.71	0.30
Andrew Dr.	MH4A	MH5A	0.23	6	0.92	25	4.37	0.4	0.2	0.6		200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH5A	MH7B	0.24	6	1.16	31	4.35	0.5	0.2	0.7	25+	200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH7B	MH7A	0.16	4	1.32	35	4.34	0.5	0.3	0.8	31	200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH7A	MH1A	0.30	8	1.62	43	4.33	0.6	0.3	0.9	82	200	PVC	0.5	23.2	0.74	0.40
From Dales Dr.		MH1A			0.37	10											
Andrew Dr.	MH1A	MHS-3	0.16	4	2.15	57	4.3	0.9	0.4	1.3		200	PVC		0	0	#DIV/0!
Andrew Dr.	MHS-3	MHS-1	0.33	9	2.48	66	4.29	1	0.5	1.5		200	PVC		0	0	#DIV/0!
From Dales Dr.		MHS-1			1.06	28											

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
from Andrew Dr.		MHS-1			0.27	7											
Andrew Dr./Edward St.	MHS-1	MHS-11	0.22	6	4.03	107	4.24	1.6	0.8	2.4		200	PVC		0	0	#DIV/0!
Green St.	MH1A	MH7A	0.20	5	0.20	5	4.44	0.1	0.0	0.1	79.7	200	PVC	0.5	23.2	0.74	0.20
Green St.	MH7A	MH8A	0.09	3	0.29	8	4.42	0.1	0.1	0.2	8.9	200	PVC	0.44	21.8	0.69	0.20
Green St.	MH8A	MH9BA	0.34	9	0.63	17	4.39	0.3	0.1	0.4	64.8	200	PVC	0.48	22.7	0.72	0.30
Green St.	MH9BA	MH9A	0.33	9	0.96	26	4.36	0.4	0.2	0.6	62	200	PVC	0.49	23	0.73	0.30
Green St.	MH9A	MH14A	0.25	7	1.21	33	4.35	0.5	0.2	0.7	61.6	200	PVC	0.46	22.2	0.71	0.30

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Parkside Dr.	MH15A	MH16A	0.49	13	0.49	13	4.4	0.2	0.1	0.3	78.3	200	PVC	0.5	23.2	0.74	0.20
Parkside Dr.	MH16A	MH17A	0.31	8	0.80	21	4.38	0.3	0.2	0.5	65	200	PVC	0.48	22.7	0.72	0.30
Parkside Dr.	MH17A	MH18A	0.15	4	0.95	25	4.37	0.4	0.2	0.6	48.6	200	PVC	0.54	24.1	0.77	0.30
Maple St.	MH8A	MH7A	0.31	8	0.31	8	4.42	0.1	0.1	0.2	40	200	PVC	0.5	23.2	0.74	0.20
Maple St.	MH7A	MH5A	0.43	11	0.74	19	4.38	0.3	0.1	0.4	110	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH10A	MH11A	0.39	10	0.39	10	4.41	0.2	0.1	0.3	80	200	PVC	0.5	23.2	0.74	0.20
Maple St.	MH11A	MH12A	0.39	10	0.78	20	4.38	0.3	0.2	0.5	85	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH12A	MH13A	0.10	3	0.88	23	4.37	0.3	0.2	0.5	16.1	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH13A	MH14A	0.33	9	1.21	32	4.35	0.5	0.2	0.7	71.2	200	PVC	0.5	23.2	0.74	0.30
From Green St.					1.21	33											
Maple St.	MH14A	MH18A	0.29	8	2.71	73	4.28	1.1	0.5	1.6	85.1	200	PVC	0.5	23.2	0.74	0.40
From Parkside Dr.					0.95	25											
Maple St.	MH18A	MH19A	0.23	6	3.89	104	4.24	1.5	0.8	2.3	52.1	200	PVC	0.52	23.7	0.75	0.50
Maple St.	MH19A	MH6A	0.46	12	4.35	116	4.23	1.7	0.9	2.6	32.5+	200	PVC	0.5	23.2	0.74	0.50
Maple St.	MH6A	MH5A	0.10	3	4.45	119	4.22	1.7	0.9	2.6	42	200	PVC	0.5	23.2	0.74	0.50
From Maple St.					0.74	19											
Pine St.	MH5A	MHS-8	0.22	6	5.41	144	4.2	2.1	1.1	3.2	86	200	PVC	0.4	20.7	0.66	0.50
From 20-year flow	Future MH	MHs-15			0.00	0											
Easement S of Wellington	MHS-15	MHS-14	0.86	22	0.86	22.00	4.37	0.3	0.2	0.5		200	PVC		0	0	#DIV/0!
Easement S of Wellington	MHS-14	MHS-13	0.41	11	1.27	33	4.35	0.5	0.3	0.8		200	PVC		0	0	#DIV/0!
Edward St.	MHS-13	MHS-12	0.53	14	1.80	47	4.32	0.7	0.4	1.1	43.6	200	PVC	0.4	20.7	0.66	0.30
Edward St.	MHS-12	MHS-11	0.26	7	2.06	54	4.31	0.8	0.4	1.2	67.5	200	PVC	0.45	22	0.7	0.40
From Andrew Dr./Edward St.					4.03	107											

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Edward St.	MHS-11	MHS-10	0.37	10	6.46	171	4.17	2.5	1.3	3.8	22.6	200	PVC	0.4	20.7	0.66	0.50
Edward St.	MHS-10	MHS-9	0.24	6	6.70	177	4.17	2.6	1.3	3.9	42.5	200	PVC	0.4	20.7	0.66	0.50
Edward St.	MHS-9	MHS-8	0.27	7	6.97	184	4.16	2.7	1.4	4.1	45.2	200	PVC	0.38	20.2	0.64	0.50
From Pine St.					5.41	144											
Edward St.	MHS-8	MHS13	0.74	19	13.11	347	4.05	4.9	2.6	7.5	80.1	200	PVC	0.4	20.7	0.66	0.60
Edward St.	MHS13	MHS12	0.41	11	13.52	358	4.04	5	2.7	7.7	40.3	200	PVC	0.5	23.2	0.74	0.70
Edward St.	MHS12	MHS11	0.64	17	14.16	375	4.04	5.3	2.8	8.1	52.4	200	PVC	0.31	18.3	0.58	0.60
Edward St.	MHS11	S6	0.33	9	14.49	384	4.03	5.4	2.9	8.3	69.2	200	PVC	0.4	20.7	0.66	0.60
Edward St.	S6	S4	0.32	8	14.81	392	4.03	5.5	3.0	8.5	80	200	PVC	1.93	45.6	1.45	1.10

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
High St.	S5	S4	0.35	9	0.35	9	4.42	0.1	0.1	0.2	70	200	PVC	3.06	57.4	1.83	0.50
From Edward St.					14.81	392											
High St.	S4	S3	0.49	13	15.66	414	4.02	5.8	3.1	8.9	78.6	200	PVC	5.22	74.9	2.39	1.60
High St.	S3	S2	0.39	10	16.05	424	4.01	5.9	3.2	9.1	77	250	PVC	2.71	97.9	1.99	1.20
Wellington St.	S2	S1	0.03	1	16.08	425	4.01	5.9	3.2	9.1	9.5	200	PVC	5.58	77.5	2.47	1.70
Wellington St.	S10	S9	1.18	30	1.18	30	4.35	0.5	0.2	0.7	73	200	PVC	0.4	20.7	0.66	0.30
Wellington St.	S9	S8	0.71	18	1.89	48	4.32	0.7	0.4	1.1	83	200	PVC	0.4	20.7	0.66	0.30
Wellington St.	S8	S7	0.76	19	2.64	67	4.29	1	0.5	1.5	100	200	PVC	6.88	86	2.74	1.10
Wellington St.	S7	S1	0.36	9	3.00	76	4.27	1.1	0.6	1.7	80	200	PVC	2.86	55.5	1.77	0.80
From Wellington St.					16.08	425											
Mill St.	S1	Inlet MH	0.25	7	19.33	508	3.97	7	3.9	10.9	129	200	PVC	7.5	89.8	2.86	1.90

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan: 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit: 25 ppha

Zone 5

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Faith Dr.	S22	S21	0.50	13	0.50	13	4.4	0.2	0.1	0.3	85.5	200	PVC	1.03	33.3	1.06	0.30
Faith Dr.	S21	S20	0.41	11	0.91	24	4.37	0.4	0.2	0.6	82.8	200	PVC	1.91	45.3	1.44	0.40
Faith Dr.	S20	S19	0.01	1	0.91	25	4.37	0.4	0.2	0.6	21	200	PVC	5.46	76.6	2.44	0.70
Faith Dr.		S3	0.26	7	1.17	32	4.35	0.5	0.2	0.7	69	200	PVC	2.67	53.6	1.71	0.50
Faith Dr.	S22	S23	0.38	10	0.38	10	4.41	0.2	0.1	0.3	64	200	PVC	0.92	31.5	1	0.30
Faith Dr.	S23	S17	0.29	8	0.67	18	4.39	0.3	0.1	0.4	78.9	200	PVC	1.67	42.4	1.35	0.40
Andrews Dr. W	S18	S17	0.75	19	0.75	19	4.38	0.3	0.1	0.4	20.5	200	PVC	5.56	77.3	2.46	0.70
From Faith Dr.		S17			0.67	18											
Andrews Dr. W	S17	S16	0.10	3	1.52	40	4.33	0.6	0.3	0.9	28	200	PVC	5.61	77.7	2.47	0.70
Andrews Dr. W	S16	S15	0.10	3	1.62	43	4.33	0.6	0.3	0.9	17.8	200	PVC	4.83	72.1	2.29	0.70
Andrews Dr. W	S15	S14	0.52	13	2.13	56	4.3	0.8	0.4	1.2	100	200	PVC	6.31	82.4	2.62	0.80
Andrews Dr. W	S14	S7	0.09	3	2.22	59	4.3	0.9	0.4	1.3	32.3	200	PVC	2.25	49.2	1.57	0.70
River Run Rd.	S13	S12	1.00	26	1.00	26	4.36	0.4	0.2	0.6	103	200	PVC	1.08	34.1	1.08	0.40
River Run Rd.	S12	S11	0.10	3	1.10	29	4.36	0.4	0.2	0.6	18	200	PVC	0.8	29.3	0.93	0.40
River Run Rd.	S11	S10	0.39	10	1.49	39	4.34	0.6	0.3	0.9	67.9	200	PVC	8.13	93.5	2.98	0.90
River Run Rd.	S10	S9	0.37	10	1.86	49	4.32	0.7	0.4	1.1	65.8	200	PVC	6.33	82.5	2.63	0.80
River Run Rd.	S9	S8	0.14	4	2.00	53	4.31	0.8	0.4	1.2	17.4	200	PVC	5.58	77.5	2.47	1.00
River Run Rd.	S8	S7	0.38	10	2.38	63	4.29	0.9	0.5	1.4	81.8	200	PVC	2.41	50.9	1.62	0.70
From Andrews Dr. W		S7			2.22	59			0.4								
River Run Rd.	S7	S6	0.73	19	5.33	141	4.2	2.1	1.1	3.2	120	250	PVC	0.25	29.7	0.61	0.40
River Run Rd.	S6	S5	0.74	19	6.08	160	4.18	2.3	1.2	3.5	120	250	PVC	0.26	30.3	0.62	0.40
River Run Rd.	S5	S4	0.17	5	6.25	165	4.18	2.4	1.2	3.6	28	250	PVC	1.24	66.2	1.35	0.70
River Run Rd.	S4	S3	0.15	4	6.39	169	4.17	2.4	1.3	3.7	41.5	250	PVC	0.19	25.9	0.53	0.40

From Faith Dr.		S3			1.17	32											
River Run Rd.	S3	S2	0.27	7	7.82	208	4.14	3	1.6	4.6	63.8	250	PVC	0.2	26.6	0.54	0.40
River Run Rd.	S2	S1	0.30	8	8.13	216	4.14	3.1	1.6	4.7	67.5	250	PVC	0.45	39.9	0.81	0.50
River Run Rd.	S1	Inlet MH	0.08	2	8.21	218	4.13	3.1	1.6	4.7	58.5	250	PVC	0.74	51.2	1.04	0.60

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 6

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
"Block 45"	MH 927A	MH 322A	1.87	47	1.87	47	4.32	0.7	0.4	1.1	10.0	200	PVC	1.00	32.8	1.04	0.50
Unnamed Inner Easement	MH 931A	MH 320A	0.45	12	0.45	12	4.41	0.2	0.1	0.3	10.0	200	PVC	1.00	32.8	1.04	0.30
Street "A"	MH 308A	MH 307A	0.69	18	0.69	18	4.39	0.3	0.1	0.4	96.4	200	PVC	1.00	32.8	1.04	0.30
Bedell Dr.	MH 307A	MH 306A	0.52	13	1.21	31	4.35	0.5	0.2	0.7	86.6	200	PVC	0.50	23.2	0.74	0.30
Unnamed Inner Easement	MH 921A	MH 304A	0.62	16	0.62	16	4.39	0.2	0.1	0.3	10.0	200	PVC	1.00	32.8	1.04	0.30
Street "A"	MH 308A	MH 331A	0.81	21	0.81	21	4.38	0.3	0.2	0.5	95.0	200	PVC	2.10	47.5	1.51	0.50
Street "A"	MH 331A	MH 330A	0.80	20	1.61	41	4.33	0.6	0.3	0.9	95.0	200	PVC	4.80	71.9	2.29	0.70
Street "A"	MH 330A	MH 300A	0.16	4	1.77	45	4.32	0.7	0.4	1.1	25.6	200	PVC	0.60	25.4	0.81	0.40
					4.58	183											
Bedell Dr. (West)	MH8	MH6	0.81	21	5.39	204	4.14	2.9	1.1	4	100.0	200	PVC	0.46	22.2	0.71	0.50
Bedell Dr. (East)	MH7	MH6	0.38	10	0.38	10	4.41	0.2	0.1	0.3	47.0	200	PVC	2.40	50.8	1.62	0.50
Ridgeview Dr.																	
From Bedell Dr. (West))		MH6			5.39	204											
From Bedell Dr. (East))		MH6			0.38	10											
Ridgeview Dr.	MH6	MH5	0.98	25	6.75	239	4.12	3.4	1.4	4.8	90.0	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH5	MH4	1.12	28	7.87	267	4.1	3.8	1.6	5.4	90.0	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH4	MH1	0.56	14	8.43	281	4.09	4	1.7	5.7	82.0	200	PVC	8.10	93.3	2.97	1.60
Bedell Dr.	MH 324A	MH 322A	0.23	6	0.23	6	4.43	0.1	0.0	0.1	55.1	200	PVC	0.50	23.2	0.74	0.20
From "Block 45"		MH 322A			1.87	47											
Bedell Dr.	MH 322A	MH 321A	0.59	15	2.69	68	4.29	1	0.5	1.5	69.4	200	PVC	0.50	23.2	0.74	0.40
Bedell Dr.	MH 321A	MH 320A	0.60	15	3.29	83	4.26	1.2	0.7	1.9	70.2	200	PVC	0.50	23.2	0.74	0.40
From Easement		MH 320A			0.45	12											

Bedell Dr.	MH 320A	MH 306A	0.49	13	4.23	108	4.23	1.6	0.8	2.4	88.7	200	PVC	0.50	23.2	0.74	0.50
From Bedell Dr./ Street "A"		MH 306A			1.21	31											
Ridgeview Dr.	MH 306A	MH 305A	0.50	13	5.94	152	4.19	2.2	1.2	3.4	69.1	200	PVC	0.50	23.2	0.74	0.50
Ridgeview Dr.	MH 305A	MH 304A	0.60	15	6.54	167	4.18	2.4	1.3	3.7	71.3	200	PVC	0.50	23.2	0.74	0.50
From Unnamed Inner Easement		MH 304A			0.62	16											
Ridgeview Dr.	MH 304A	MH 303A	0.50	13	7.66	196	4.15	2.8	1.5	4.3	64.4	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH 303A	MH 302A	0.43	11	8.09	207	4.14	3	1.6	4.6	58.0	200	PVC	1.80	44.0	1.4	0.90
Ridgeview Dr.	MH 302A	MH 301A	0.57	15	8.66	222	4.13	3.2	1.7	4.9	38.2	200	PVC	1.00	32.8	1.04	0.70
Ridgeview Dr.	MH 301A	MH 300A	0.41	11	9.07	233	4.12	3.3	1.8	5.1	58.5	200	PVC	0.50	23.2	0.74	0.60
From Street "A"		MH 300A			1.77	45											
Ridgeview Dr.	MH 300A	MH 3	0.47	12	11.31	290	4.08	4.1	2.3	6.4	34.8	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH 3	MH 2	0.71	18	12.02	308	4.07	4.4	2.4	6.8	100.0	250	PVC	0.50	42.0	0.86	0.60
Ridgeview Dr.	MH 2	MH 1	0.95	24	12.97	332	4.06	4.7	2.6	7.3	75.0	250	PVC	0.50	42.0	0.86	0.60
From Ridgeview Dr.		MH 1			8.43	281											
Pioneer Dr.	MH 1	MH 9	0.20	6	21.60	619	3.92	8.4	4.3	12.7	78.0	250	PVC	0.50	42.0	0.86	0.70

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowance: 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Density: 50 ppha

Zone 7

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Drayton Industrial Dr.	MH7A	MH6A	9.05	453	9.05	453	4	6.3	1.8	8.1	100	250	PVC	0.3	32.6	0.66	0.50
Drayton Industrial Dr.	MH6A	MH5A	1.17	59	10.22	512	3.97	7.1	2.0	9.1	88	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH5A	MH4A	1.19	60	11.41	572	3.94	7.8	2.3	10.1	54	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH4A	MH3A	0.91	46	12.31	618	3.93	8.4	2.5	10.9	100	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH3A	MH2A	1.17	59	13.48	677	3.9	9.2	2.7	11.9	61	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH2A	MH1A	0.70	36	14.18	713	3.89	9.6	2.8	12.4	80	250	PVC	0.3	32.6	0.66	0.60

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowan 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 8

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Wortley St.	W11	W10	0.29	8	0.29	8	4.42	0.1	0.1	0.2	105	200	PVC	7.24	88.3	2.81	0.80
Queen St.	W9	W8	0.58	15	0.58	15	4.4	0.2	0.1	0.3	65	200	PVC	1.07	33.9	1.08	0.30
Queen St.	W8	W7	0.13	4	0.71	19	4.38	0.3	0.1	0.4	55	200	PVC	4	65.6	2.09	0.60
Main St. W	W5	W4	0.35	9	0.35	9	4.42	0.1	0.1	0.2	40	250	PVC	0.31	33.1	0.67	0.20
Queen St.	W9	MH	0.53	14	0.53	14	4.4	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
Mill St.	MH	W1	0.66	17	1.18	31	4.35	0.5	0.2	0.7		200	PVC		0	0	#DIV/0!
Main St. W	W17	W16	0.16	4	0.16	4	4.45	0.1	0.0	0.1	85	200	PVC	0.4	20.7	0.66	0.20
Main St. W	W16	MH1A	0.05	2	0.21	6	4.43	0.1	0.0	0.1	26	200	PVC	1.46	39.6	1.26	0.40
From Mapleton Industrial Park (Zone 7)		MH1A			14.18	713											
Main St. W	MH1A	W15	0.30	8	14.69	727	3.89	9.8	2.9	12.7	74	200	PVC	1.46	39.6	1.26	1.10
Main St. W	W15	W14	0.53	14	15.22	741	3.88	10	3.0	13	82.8	200	PVC	2.72	54.1	1.72	1.40
Main St. W	W14	W13	0.46	12	15.68	753	3.88	10.1	3.1	13.2	100	200	PVC	4.14	66.7	2.12	1.60
Main St. W	W13	MH9	0.02	1	15.71	754	3.88	10.2	3.1	13.3	7.3	200	PVC	4.25	67.6	2.15	1.70
From Pioneer Dr. (Zone 6)		MH9			21.60	619											
Main St. W	MH9	W12	0.60	16	37.91	1,389	3.7	17.8	7.6	25.4	92.7	200	PVC	4.25	67.6	2.15	2.00
Main St. W	W12	W10	0.62	16	38.53	1,405	3.7	18.1	7.7	25.8	100	200	PVC	2.7	53.9	1.72	1.70
From Wortley St.		W10			0.29	8											
Main St. W	W10	W7	0.06	2	38.88	1,415	3.7	18.2	7.8	26	16.77	200	PVC	1.67	42.4	1.35	1.40
From Queen St.		W7			0.71	19.00											
Main St. W	W7	W6	0.33	9	39.92	1,443	3.69	18.5	8.0	26.5	55.33	200	PVC	1.67	42.4	1.35	1.40
Main St. W	W6	W4	0.58	15	40.51	1,458	3.69	18.7	8.1	26.8	60.7	200	PVC	2.35	50.3	1.6	1.60
From Main St. W		W4			0.35	9											
King St.	W4	W3	0.14	4	41.00	1,471	3.69	18.8	8.2	27	70	250	PVC	0.31	33.1	0.67	0.70

King St.	W3	W2	0.40	11	41.40	1,482	3.68	18.9	8.3	27.2	80	250	PVC	0.31	33.1	0.67	0.70
King St.	W2	W1	0.41	11	41.81	1,493	3.68	19.1	8.4	27.5	74.5	250	PVC	0.31	33.1	0.67	0.70
From Mill St.		W1			1.18	31											
Mill St.	W1	Inlet MH	0.10	3	43.09	1,527	3.67	19.5	8.6	28.1	101.5	250	PVC	0.38	36.7	0.75	0.80

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - EXISTING
Date:	2023-02-21		
Checked By:		Project Number:	T000974B
Date:		Municipality:	Township of Mapleton

Domestic Flow:	300	L/cap/d
Infiltration Allowan	0.2	L/s/ha
Peak Factor:	Harmon's Formula	
Manning's "n":	0.013	
Population Densit	25	ppha

Zone 9

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Main St. W.																	
From Wellington St. (Zone 1)		E4			5.99	159											
From Wellington St. (Zone 2)		E4			11.65	308											
From Wellington St. (Zone 3)		E4			2.19	57											
Main St. W	E4	E3	0.31	8	20.14	532	3.96	7.3	4.0	11.3	111.5	250	PVC	0.37	36.2	0.74	0.70
Easement S. of Conestogo River	E3	E2	0.19	5	20.33	537	3.96	7.4	4.1	11.5	70	250	PVC	0.37	36.2	0.74	0.70
Easement S. of Conestogo River	E2	E1	0.25	7	20.57	544	3.96	7.5	4.1	11.6	70	250	PVC	0.37	36.2	0.74	0.70
Easement S. of Conestogo River	E1	MH PS1	0.15	4	20.72	548	3.95	7.5	4.1	11.6	74	250	PVC	0.37	36.2	0.74	0.70

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - EXISTING
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 10

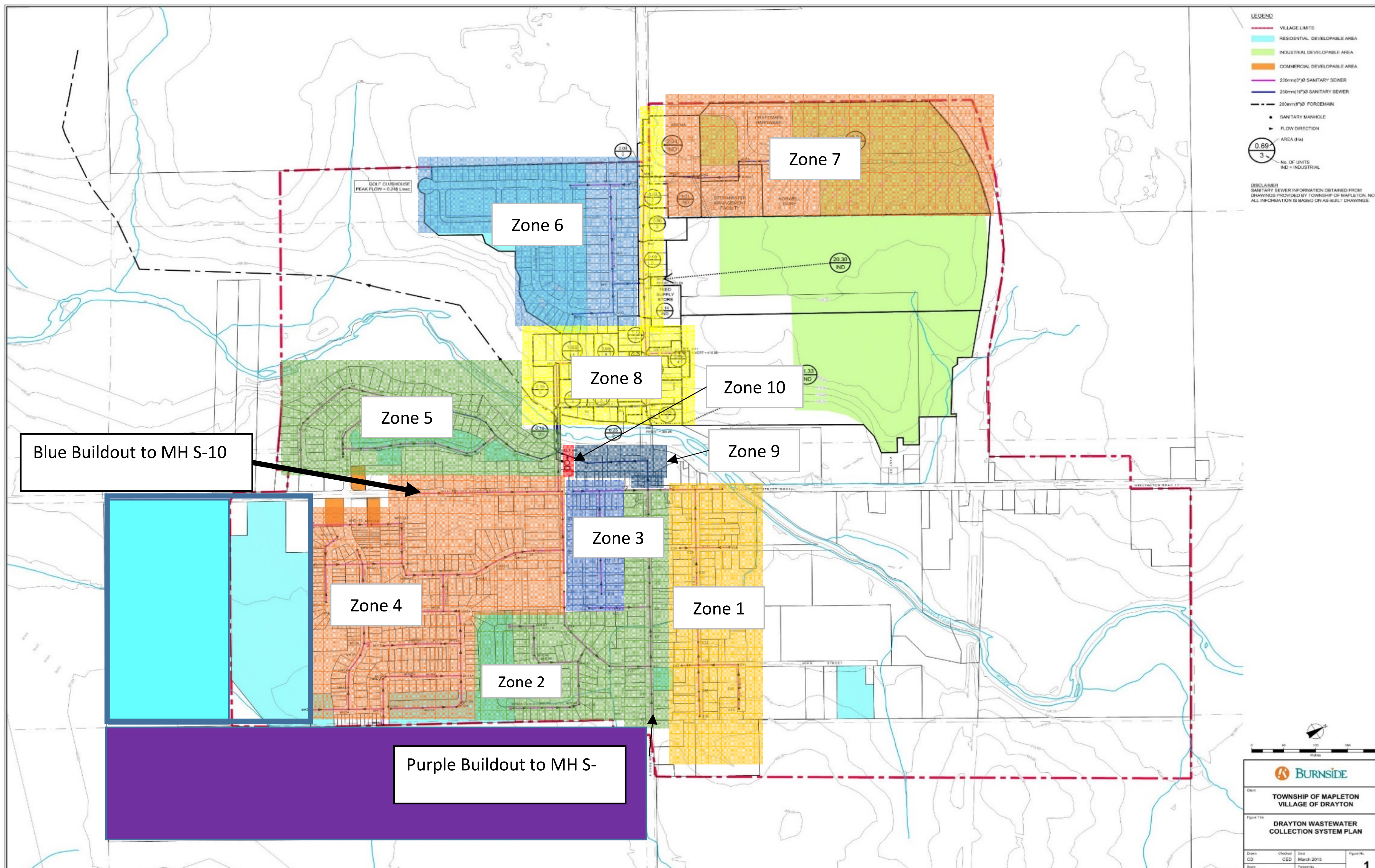
LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
From Mill St. (Zone 4)		Inlet MH			19.33	508											
From Mill St. (Zone 8)		Inlet MH			43.09	1,527											
From River Run Dr. (Zone 5)		Inlet MH			8.21	218											
Inlet MH - PS1	Inlet MH	PS1	0.03	1	70.64	2,254	3.54	27.7	14.1	41.8	13.5	375	PVC	0.31	97.6	0.88	0.80
From Zone 9		PS-1			20.72	548											
Pumping Station Inlet Pipe	PS1	Wet Well	0.00	0	91.37	2,802	3.47	33.8	18.3	52.1	6.5	350	PVC	0.4	92.3	0.96	1.00

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout	Domestic Flow	300 L/cap/d
			All growth occurs south-west of the Conestogo River, with all sewage directed to MH S-15 located within the easement south of Wellington Street.	Infiltration Allowar	0.2 L/s/ha
Date:	2023-02-21				
Checked By:		Project Number:	T000974B	Peak Factor:	Harmon's Formula
Date:		Municipality:	Township of Mapleton	Manning's "n":	0.013
				Population Dens	25 ppha

Total SAN Catchment Area
161.24 ha
Total Population
5597.00 ppl

3795.00



SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 1

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Robin St.	E43	E42	0.32	9	0.32	9	4.42	0.1	0.1	0.2	60.0	200	PVC	5.40	76.2	2.43	0.70
Robin St.	E42	E41	0.23	6	0.55	15	4.4	0.2	0.1	0.3	60.0	200	PVC	5.40	76.2	2.43	0.70
John St. (East)	E41	E34	0.43	11	0.98	26	4.36	0.4	0.2	0.6	105.0	200	PVC	0.40	20.7	0.66	0.00
John St. (West)	E40	E34	0.16	5	0.16	5	4.44	0.1	0.0	0.1	50.0	200	PVC	2.40	50.8	1.62	0.50
Elm St. (East)	E38	E29	0.26	7	0.26	7	4.43	0.1	0.1	0.2	95.0	200	PVC	0.40	20.7	0.66	0.20
Elm St. (West)	E39	E29	0.16	4	0.16	4	4.45	0.1	0.0	0.1	60.0	200	PVC	0.40	20.7	0.66	0.20
Wood St.	E36	E35	0.47	12	0.47	12	4.41	0.2	0.1	0.3	78.5	200	PVC	5.67	78.1	2.49	0.00
Wood St.	E35	E34	0.35	9	0.82	21	4.38	0.3	0.2	0.5	70.0	200	PVC	4.14	66.7	2.12	0.60
From John St. (East)		E34			0.98	26											
From John St. (West)		E34			0.16	5											
Wood St.	E34	E33	0.26	7	2.21	59	4.3	0.9	0.4	1.3	64.2	200	PVC	0.40	20.7	0.66	0.00
Wood St.	E33	E32	0.54	14	2.75	73	4.28	1.1	0.5	1.6	60.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E32	E31	0.26	7	3.01	80	4.27	1.2	0.6	1.8	56.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E31	E30	0.37	10	3.38	90	4.26	1.3	0.7	2	66.0	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E30	E29	0.33	9	3.71	99	4.24	1.5	0.7	2.2	66.0	200	PVC	1.31	37.5	1.19	0.60
From Elm St. (East)		E29			0.26	7											
From Elm St. (West)		E29			0.16	4											
Wood St.	E29	E28	0.50	13	4.62	123	4.22	1.8	0.9	2.7	77.8	200	PVC	0.40	20.7	0.66	0.40
Wood St.	E28	E27	0.42	11	5.04	134	4.21	2	1.0	3	78.0	200	PVC	0.40	20.7	0.66	0.50
Wellington St. N	E37	E27	0.41	11	0.41	11	4.41	0.2	0.1	0.3	70.0	200	PVC	0.40	20.7	0.66	0.20
From Wood St.					5.04	134											
Wellington St. N	E27	E26	0.23	6	5.68	151	4.19	2.2	1.1	3.3	57.0	200	PVC	0.40	20.7	0.66	0.50
Wellington St. N	E26	E4	0.31	8	5.99	159	4.18	2.3	1.2	3.5	64.2	200	PVC	0.40	20.7	0.66	0.50

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 2

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW (L/s)	INFILT. (L/s)	DESIGN FLOW (L/s)	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)					LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Conestoga Dr.	18A	23A	0.37	10	0.37	10	4.41	0.2	0.1	0.3	66.4	200	PVC	1	32.8	1.04	0.30
Conestoga Dr.	23A	24A	0.16	4	0.53	14	4.4	0.2	0.1	0.3	48.9	200	PVC	0.5	23.2	0.74	0.20
Conestoga Dr.	24A	25A	0.16	5	0.69	19	4.38	0.3	0.1	0.4	11.7	200	PVC	0.50	23.2	0.74	0.30
Conestoga Dr.	25A	E47	0.28	7	0.97	26	4.36	0.4	0.2	0.6	Conestoga d	200	PVC	1.80	44	1.4	0.40
Hillview Dr.	E47	E46	0.38	10	1.35	36	4.34	0.5	0.3	0.8		200	PVC		0	0	#DIV/0!
Hillview Dr.	E46	E45	0.26	7	1.61	43	4.33	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Hillview Dr.	E45	E44	0.27	7	1.88	50	4.31	0.7	0.4	1.1		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	18A	20A	0.33	9	0.33	9	4.42	0.1	0.1	0.2	64	200	PVC	3.5	61.4	1.95	#N/A
Bonniewood Dr.	20A	21A	0.09	3	0.42	12	4.41	0.2	0.1	0.3	12	200	PVC	3	56.8	1.81	0.50
Bonniewood Dr.	21A	22A	0.09	3	0.51	15	4.4	0.2	0.1	0.3	11.4	200	PVC	3	56.8	1.81	0.50
Bonniewood Dr.	22A	E51	0.09	3	0.61	18	4.39	0.3	0.1	0.4	31.5+B.Dr.	200	PVC	4.00	65.6	2.09	0.60
Bonniewood Dr.	E51	E50	0.41	11	1.02	29	4.36	0.4	0.2	0.6		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E50	E49	0.29	8	1.31	37	4.34	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E49	E48	0.17	5	1.48	42	4.33	0.6	0.3	0.9		200	PVC		0	0	#DIV/0!
Bonniewood Dr.	E48	E44	0.43	11	1.92	53	4.31	0.8	0.4	1.2		200	PVC		0	0	#DIV/0!
From Conestoga/Hillview		E44			1.88	50											
Bonniewood Dr.	E44	E23	0.19	5	3.99	108	4.23	1.6	0.8	2.4		200	PVC		0	0	#DIV/0!
High St./Smith Dr.	E25	E24	0.97	25	0.97	25	4.37	0.4	0.2	0.6	82.5	200	PVC	4.48	69.4	2.21	0.70
Smith Dr.	E24	E23	0.47	12	1.44	37	4.34	0.6	0.3	0.9	35.5	200	PVC	5.98	80.2	2.55	0.80
From Bonniewood					3.99	108.00											
Smith Dr.	E23	E22	0.38	10	5.80	155.00	4.19	2.3	1.2	3.5	35	200	PVC	3.53	61.6	1.96	1.00
Smith Dr.	E22	E21	0.28	7	6.08	162	4.18	2.4	1.2	3.6	87	200	PVC	0.4	20.7	0.66	0.50
Smith Dr.	E21	E10	0.17	5	6.25	167	4.18	2.4	1.3	3.7	105	200	PVC	0.4	20.7	0.66	0.50
Union St.	E52	E20	0.34	9	0.34	9	4.42	0.1	0.1	0.2	60	200	PVC	4.15	66.8	2.13	0.60

Union St.	E20	E8	0.38	10	0.72	19	4.38	0.3	0.1	0.4	90	200	PVC	6.50	83.6	2.66	0.80
Edward St.	E19	E6	0.28	7	0.28	7.00	4.43	0.1	0.1	0.2	75	200	PVC	0.40	20.7	0.66	0.20
			40.50	1620													
Main St. E.	E12	E11	1.33	34	41.83	1654	3.65	21	8.4	29.4	66	200	PVC	4.37	68.6	2.18	2.10
Main St. E.	E11	E10	0.35	9	42.19	1663	3.65	21.1	8.4	29.5	75	200	PVC	5.25	75.2	2.39	2.20
From Smith Dr.					6.25	167.00											
Main St. E.	E10	E9	0.53	14	48.97	1844.00	3.61	23.1	9.8	32.9	78.9	200	PVC	1.40	38.8	1.24	1.40
Main St. E.	E9	E8	0.49	13	49.45	1857	3.61	23.3	9.9	33.2	77	200	PVC	0.40	20.7	0.66	0.70
From Union St.					0.72	19.00											
Main St. E.	E8	E7	0.34	9	50.50	1885.00	3.61	23.6	10.1	33.7	64.3	200	PVC	0.40	20.7	0.66	0.70
Main St. E.	E7	E6	0.54	14	51.04	1899	3.6	23.7	10.2	33.9	92	200	PVC	0.40	20.7	0.66	0.70
From Edward St.					0.28	7.00											
Main St. E.	E6	E5	0.50	13	51.82	1919.00	3.6	24	10.4	34.4	73	200	PVC	3.97	65.4	2.08	2.10
Main St. E.	E5	E4	0.33	9	52.15	1928	3.6	24.1	10.4	34.5	83	200	PVC	0.50	23.2	0.74	0.80

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 3

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Spring St.	E18	E17	0.54	14	0.54	14	4.4	0.2	0.1	0.3	63	200	PVC	6.73	85.1	2.71	0.80
Spring St.	E17	E16	0.47	12	1.01	26	4.36	0.4	0.2	0.6	102.5	200	PVC	3.91	64.9	2.06	0.60
Spring St.	E16	E14	0.35	9	1.36	35	4.34	0.5	0.3	0.8	102.5	200	PVC	1.56	41	1.3	0.50
Wellington St.	E15	E14	0.30	8	0.30	8	4.42	0.1	0.1	0.2	65	200	PVC	4.39	68.7	2.19	0.70
from Spring St.					1.36	35											
Wellington St.	E14	E13	0.32	8	1.98	51	4.31	0.8	0.4	1.2	58.3	200	PVC	1.41	38.9	1.24	0.50
Wellington St.	E13	E4	0.21	6	2.19	57	4.3	0.9	0.4	1.3	60	200	PVC	0.4	20.7	0.66	0.30

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout
Date:	2023-02-21		
Checked By:		Project Number:	T000974B
Date:		Municipality:	Township of Mapleton

Domestic Flow:	300	L/cap/d
Infiltration Allowanc	0.2	L/s/ha
Peak Factor:	Harmon's Formula	
Manning's "n":	0.013	
Population Densit	25	ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Green St.	MH6A	MH1A	0.08	2	0.08	2	4.46	0	0.0	0	42.2	200	PVC	0.45	22	0.7	0.20
Maple St.	MH2A	MH3A	0.14	4	0.14	4	4.45	0.1	0.0	0.1	41.1	200	PVC	0.46	22.2	0.71	0.20
From Green St.					0.08	2											
Maple St.	MH1A	MH3A	0.21	6	0.29	8	4.42	0.1	0.1	0.2	87.1	200	PVC	0.5	23.2	0.74	0.20
Dales Dr.	MH4A	MH1A	0.37	10	0.37	10	4.41	0.2	0.1	0.3	75.5	200	PVC	0.5	23.2	0.74	0.20
Dales Dr.	MHS-6	MHS-5	0.18	5	0.18	5	4.44	0.1	0.0	0.1		200	PVC		0	0	#DIV/0!
Dales Dr.	MHS-5	MHS-4	0.21	6	0.39	11	4.41	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
	MHS-7	MHS-4	0.48	12	0.48	12	4.41	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
Dales Dr.	MHS-4	MHS-1	0.19	5	1.06	28	4.36	0.4	0.2	0.6		200	PVC		0	0	#DIV/0!
Andrew Dr.	MHS-2	MHS-1	0.27	7	0.27	7	4.43	0.1	0.1	0.2		200	PVC		0	0	#DIV/0!
From Maple St./Green St.		MH3A			0.29	8											
From Maple St. (2A-3A)		MH3A			0.14	4											
Andrew Dr.	MH3A	MH4A	0.26	7	0.69	19	4.38	0.3	0.1	0.4	57.9	200	PVC	0.46	22.2	0.71	0.30
Andrew Dr.	MH4A	MH5A	0.23	6	0.92	25	4.37	0.4	0.2	0.6		200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH5A	MH7B	0.24	6	1.16	31	4.35	0.5	0.2	0.7	25+	200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH7B	MH7A	0.16	4	1.32	35	4.34	0.5	0.3	0.8	31	200	PVC	0.5	23.2	0.74	0.30
Andrew Dr.	MH7A	MH1A	0.30	8	1.62	43	4.33	0.6	0.3	0.9	82	200	PVC	0.5	23.2	0.74	0.40
From Dales Dr.		MH1A			0.37	10											
Andrew Dr.	MH1A	MHS-3	0.16	4	2.15	57	4.3	0.9	0.4	1.3		200	PVC		0	0	#DIV/0!
Andrew Dr.	MHS-3	MHS-1	0.33	9	2.48	66	4.29	1	0.5	1.5		200	PVC		0	0	#DIV/0!
From Dales Dr.		MHS-1			1.06	28											

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
from Andrew Dr.		MHS-1			0.27	7											
Andrew Dr./Edward St.	MHS-1	MHS-11	0.22	6	4.03	107	4.24	1.6	0.8	2.4		200	PVC		0	0	#DIV/0!
Green St.	MH1A	MH7A	0.20	5	0.20	5	4.44	0.1	0.0	0.1	79.7	200	PVC	0.5	23.2	0.74	0.20
Green St.	MH7A	MH8A	0.09	3	0.29	8	4.42	0.1	0.1	0.2	8.9	200	PVC	0.44	21.8	0.69	0.20
Green St.	MH8A	MH9BA	0.34	9	0.63	17	4.39	0.3	0.1	0.4	64.8	200	PVC	0.48	22.7	0.72	0.30
Green St.	MH9BA	MH9A	0.33	9	0.96	26	4.36	0.4	0.2	0.6	62	200	PVC	0.49	23	0.73	0.30
Green St.	MH9A	MH14A	0.25	7	1.21	33	4.35	0.5	0.2	0.7	61.6	200	PVC	0.46	22.2	0.71	0.30

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Parkside Dr.	MH15A	MH16A	0.49	13	0.49	13	4.4	0.2	0.1	0.3	78.3	200	PVC	0.5	23.2	0.74	0.20
Parkside Dr.	MH16A	MH17A	0.31	8	0.80	21	4.38	0.3	0.2	0.5	65	200	PVC	0.48	22.7	0.72	0.30
Parkside Dr.	MH17A	MH18A	0.15	4	0.95	25	4.37	0.4	0.2	0.6	48.6	200	PVC	0.54	24.1	0.77	0.30
Maple St.	MH8A	MH7A	0.31	8	0.31	8	4.42	0.1	0.1	0.2	40	200	PVC	0.5	23.2	0.74	0.20
Maple St.	MH7A	MH5A	0.43	11	0.74	19	4.38	0.3	0.1	0.4	110	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH10A	MH11A	0.39	10	0.39	10	4.41	0.2	0.1	0.3	80	200	PVC	0.5	23.2	0.74	0.20
Maple St.	MH11A	MH12A	0.39	10	0.78	20	4.38	0.3	0.2	0.5	85	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH12A	MH13A	0.10	3	0.88	23	4.37	0.3	0.2	0.5	16.1	200	PVC	0.5	23.2	0.74	0.30
Maple St.	MH13A	MH14A	0.33	9	1.21	32	4.35	0.5	0.2	0.7	71.2	200	PVC	0.5	23.2	0.74	0.30
From Green St.					1.21	33											
Maple St.	MH14A	MH18A	0.29	8	2.71	73	4.28	1.1	0.5	1.6	85.1	200	PVC	0.5	23.2	0.74	0.40
From Parkside Dr.					0.95	25											
Maple St.	MH18A	MH19A	0.23	6	3.89	104	4.24	1.5	0.8	2.3	52.1	200	PVC	0.52	23.7	0.75	0.50
Maple St.	MH19A	MH6A	0.46	12	4.35	116	4.23	1.7	0.9	2.6	32.5+	200	PVC	0.5	23.2	0.74	0.50
Maple St.	MH6A	MH5A	0.10	3	4.45	119	4.22	1.7	0.9	2.6	42	200	PVC	0.5	23.2	0.74	0.50
From Maple St.					0.74	19											
Pine St.	MH5A	MHS-8	0.22	6	5.41	144	4.2	2.1	1.1	3.2	86	200	PVC	0.4	20.7	0.66	0.50
From 20-year flow	Future MH	MHs-15			0.00	0											
Easement S of Wellington	MHS-15	MHS-14	0.86	22	0.86	22.00	4.37	0.3	0.2	0.5		200	PVC		0	0	#DIV/0!
Easement S of Wellington	MHS-14	MHS-13	0.41	11	1.27	33	4.35	0.5	0.3	0.8		200	PVC		0	0	#DIV/0!
Edward St.	MHS-13	MHS-12	0.53	14	1.80	47	4.32	0.7	0.4	1.1	43.6	200	PVC	0.4	20.7	0.66	0.30
Edward St.	MHS-12	MHS-11	0.26	7	2.06	54	4.31	0.8	0.4	1.2	67.5	200	PVC	0.45	22	0.7	0.40
From Andrew Dr./Edward St.					4.03	107											

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Edward St.	MHS-11	MHS-10	0.37	10	6.46	171	4.17	2.5	1.3	3.8	22.6	200	PVC	0.4	20.7	0.66	0.50
Edward St.	MHS-10	MHS-9	0.24	6	6.70	177	4.17	2.6	1.3	3.9	42.5	200	PVC	0.4	20.7	0.66	0.50
Edward St.	MHS-9	MHS-8	0.27	7	6.97	184	4.16	2.7	1.4	4.1	45.2	200	PVC	0.38	20.2	0.64	0.50
From Pine St.					5.41	144											
Edward St.	MHS-8	MHS13	0.74	19	13.11	347	4.05	4.9	2.6	7.5	80.1	200	PVC	0.4	20.7	0.66	0.60
Edward St.	MHS13	MHS12	0.41	11	13.52	358	4.04	5	2.7	7.7	40.3	200	PVC	0.5	23.2	0.74	0.70
Edward St.	MHS12	MHS11	0.64	17	14.16	375	4.04	5.3	2.8	8.1	52.4	200	PVC	0.31	18.3	0.58	0.60
Edward St.	MHS11	S6	0.33	9	14.49	384	4.03	5.4	2.9	8.3	69.2	200	PVC	0.4	20.7	0.66	0.60
Edward St.	S6	S4	0.32	8	14.81	392	4.03	5.5	3.0	8.5	80	200	PVC	1.93	45.6	1.45	1.10

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 4

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
High St.	S5	S4	0.35	9	0.35	9	4.42	0.1	0.1	0.2	70	200	PVC	3.06	57.4	1.83	0.50
From Edward St.					14.81	392											
High St.	S4	S3	0.49	13	15.66	414	4.02	5.8	3.1	8.9	78.6	200	PVC	5.22	74.9	2.39	1.60
High St.	S3	S2	0.39	10	16.05	424	4.01	5.9	3.2	9.1	77	250	PVC	2.71	97.9	1.99	1.20
Wellington St.	S2	S1	0.03	1	16.08	425	4.01	5.9	3.2	9.1	9.5	200	PVC	5.58	77.5	2.47	1.70
			29.37	1175													
Wellington St.	S10	S9	1.18	30	30.55	1205	3.75	15.7	6.1	21.8	73	200	PVC	0.4	20.7	0.66	0.70
Wellington St.	S9	S8	0.71	18	31.26	1223	3.74	15.9	6.3	22.2	83	200	PVC	0.4	20.7	0.66	0.70
Wellington St.	S8	S7	0.76	19	32.01	1242	3.74	16.1	6.4	22.5	100	200	PVC	6.88	86	2.74	2.30
Wellington St.	S7	S1	0.36	9	32.37	1251	3.74	16.2	6.5	22.7	80	200	PVC	2.86	55.5	1.77	1.70
From Wellington St.					16.08	425											
Mill St.	S1	Inlet MH	0.25	7	48.70	1683	3.64	21.3	9.7	31	129	200	PVC	7.5	89.8	2.86	2.60

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout	Domestic Flow:	300 L/cap/d
Date:	2023-02-21			Infiltration Allowan	0.2 L/s/ha
Checked By:		Project Number:	T000974B	Peak Factor:	Harmon's Formula
Date:		Municipality:	Township of Mapleton	Manning's "n":	0.013
				Population Densit	25 ppha

Zone 5

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Faith Dr.	S22	S21	0.50	13	0.50	13	4.4	0.2	0.1	0.3	85.5	200	PVC	1.03	33.3	1.06	0.30
Faith Dr.	S21	S20	0.41	11	0.91	24	4.37	0.4	0.2	0.6	82.8	200	PVC	1.91	45.3	1.44	0.40
Faith Dr.	S20	S19	0.01	1	0.91	25	4.37	0.4	0.2	0.6	21	200	PVC	5.46	76.6	2.44	0.70
Faith Dr.		S3	0.26	7	1.17	32	4.35	0.5	0.2	0.7	69	200	PVC	2.67	53.6	1.71	0.50
Faith Dr.	S22	S23	0.38	10	0.38	10	4.41	0.2	0.1	0.3	64	200	PVC	0.92	31.5	1	0.30
Faith Dr.	S23	S17	0.29	8	0.67	18	4.39	0.3	0.1	0.4	78.9	200	PVC	1.67	42.4	1.35	0.40
Andrews Dr. W	S18	S17	0.75	19	0.75	19	4.38	0.3	0.1	0.4	20.5	200	PVC	5.56	77.3	2.46	0.70
From Faith Dr.		S17			0.67	18											
Andrews Dr. W	S17	S16	0.10	3	1.52	40	4.33	0.6	0.3	0.9	28	200	PVC	5.61	77.7	2.47	0.70
Andrews Dr. W	S16	S15	0.10	3	1.62	43	4.33	0.6	0.3	0.9	17.8	200	PVC	4.83	72.1	2.29	0.70
Andrews Dr. W	S15	S14	0.52	13	2.13	56	4.3	0.8	0.4	1.2	100	200	PVC	6.31	82.4	2.62	0.80
Andrews Dr. W	S14	S7	0.09	3	2.22	59	4.3	0.9	0.4	1.3	32.3	200	PVC	2.25	49.2	1.57	0.70
River Run Rd.	S13	S12	1.00	26	1.00	26	4.36	0.4	0.2	0.6	103	200	PVC	1.08	34.1	1.08	0.40
River Run Rd.	S12	S11	0.10	3	1.10	29	4.36	0.4	0.2	0.6	18	200	PVC	0.8	29.3	0.93	0.40
River Run Rd.	S11	S10	0.39	10	1.49	39	4.34	0.6	0.3	0.9	67.9	200	PVC	8.13	93.5	2.98	0.90
River Run Rd.	S10	S9	0.37	10	1.86	49	4.32	0.7	0.4	1.1	65.8	200	PVC	6.33	82.5	2.63	0.80
River Run Rd.	S9	S8	0.14	4	2.00	53	4.31	0.8	0.4	1.2	17.4	200	PVC	5.58	77.5	2.47	1.00
River Run Rd.	S8	S7	0.38	10	2.38	63	4.29	0.9	0.5	1.4	81.8	200	PVC	2.41	50.9	1.62	0.70
From Andrews Dr. W		S7			2.22	59			0.4								
River Run Rd.	S7	S6	0.73	19	5.33	141	4.2	2.1	1.1	3.2	120	250	PVC	0.25	29.7	0.61	0.40
River Run Rd.	S6	S5	0.74	19	6.08	160	4.18	2.3	1.2	3.5	120	250	PVC	0.26	30.3	0.62	0.40
River Run Rd.	S5	S4	0.17	5	6.25	165	4.18	2.4	1.2	3.6	28	250	PVC	1.24	66.2	1.35	0.70
River Run Rd.	S4	S3	0.15	4	6.39	169	4.17	2.4	1.3	3.7	41.5	250	PVC	0.19	25.9	0.53	0.40

From Faith Dr.		S3			1.17	32											
River Run Rd.	S3	S2	0.27	7	7.82	208	4.14	3	1.6	4.6	63.8	250	PVC	0.2	26.6	0.54	0.40
River Run Rd.	S2	S1	0.30	8	8.13	216	4.14	3.1	1.6	4.7	67.5	250	PVC	0.45	39.9	0.81	0.50
River Run Rd.	S1	Inlet MH	0.08	2	8.21	218	4.13	3.1	1.6	4.7	58.5	250	PVC	0.74	51.2	1.04	0.60

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout
Date:	2023-02-21		
Checked By:		Project Number:	T000974B
Date:		Municipality:	Township of Mapleton

Domestic Flow:	300	L/cap/d
Infiltration Allowanc	0.2	L/s/ha
Peak Factor:	Harmon's Formula	
Manning's "n":	0.013	
Population Densit	25	ppha

Zone 6

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
"Block 45"	MH 927A	MH 322A	1.87	47	1.87	47	4.32	0.7	0.4	1.1	10.0	200	PVC	1.00	32.8	1.04	0.50
Unnamed Inner Easement	MH 931A	MH 320A	0.45	12	0.45	12	4.41	0.2	0.1	0.3	10.0	200	PVC	1.00	32.8	1.04	0.30
Street "A"	MH 308A	MH 307A	0.69	18	0.69	18	4.39	0.3	0.1	0.4	96.4	200	PVC	1.00	32.8	1.04	0.30
Bedell Dr.	MH 307A	MH 306A	0.52	13	1.21	31	4.35	0.5	0.2	0.7	86.6	200	PVC	0.50	23.2	0.74	0.30
Unnamed Inner Easement	MH 921A	MH 304A	0.62	16	0.62	16	4.39	0.2	0.1	0.3	10.0	200	PVC	1.00	32.8	1.04	0.30
Street "A"	MH 308A	MH 331A	0.81	21	0.81	21	4.38	0.3	0.2	0.5	95.0	200	PVC	2.10	47.5	1.51	0.50
Street "A"	MH 331A	MH 330A	0.80	20	1.61	41	4.33	0.6	0.3	0.9	95.0	200	PVC	4.80	71.9	2.29	0.70
Street "A"	MH 330A	MH 300A	0.16	4	1.77	45	4.32	0.7	0.4	1.1	25.6	200	PVC	0.60	25.4	0.81	0.40
					4.58	183											
Bedell Dr. (West)	MH8	MH6	0.81	21	5.39	204	4.14	2.9	1.1	4	100.0	200	PVC	0.46	22.2	0.71	0.50
Bedell Dr. (East)	MH7	MH6	0.38	10	0.38	10	4.41	0.2	0.1	0.3	47.0	200	PVC	2.40	50.8	1.62	0.50
Ridgeview Dr.																	
From Bedell Dr. (West))		MH6			5.39	204											
From Bedell Dr. (East))		MH6			0.38	10											
Ridgeview Dr.	MH6	MH5	0.98	25	6.75	239	4.12	3.4	1.4	4.8	90.0	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH5	MH4	1.12	28	7.87	267	4.1	3.8	1.6	5.4	90.0	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH4	MH1	0.56	14	8.43	281	4.09	4	1.7	5.7	82.0	200	PVC	8.10	93.3	2.97	1.60
Bedell Dr.	MH 324A	MH 322A	0.23	6	0.23	6	4.43	0.1	0.0	0.1	55.1	200	PVC	0.50	23.2	0.74	0.20
From "Block 45"		MH 322A			1.87	47											
Bedell Dr.	MH 322A	MH 321A	0.59	15	2.69	68	4.29	1	0.5	1.5	69.4	200	PVC	0.50	23.2	0.74	0.40
Bedell Dr.	MH 321A	MH 320A	0.60	15	3.29	83	4.26	1.2	0.7	1.9	70.2	200	PVC	0.50	23.2	0.74	0.40
From Easement		MH 320A			0.45	12											

Bedell Dr.	MH 320A	MH 306A	0.49	13	4.23	108	4.23	1.6	0.8	2.4	88.7	200	PVC	0.50	23.2	0.74	0.50
From Bedell Dr./ Street "A"		MH 306A			1.21	31											
Ridgeview Dr.	MH 306A	MH 305A	0.50	13	5.94	152	4.19	2.2	1.2	3.4	69.1	200	PVC	0.50	23.2	0.74	0.50
Ridgeview Dr.	MH 305A	MH 304A	0.60	15	6.54	167	4.18	2.4	1.3	3.7	71.3	200	PVC	0.50	23.2	0.74	0.50
From Unnamed Inner Easement		MH 304A			0.62	16											
Ridgeview Dr.	MH 304A	MH 303A	0.50	13	7.66	196	4.15	2.8	1.5	4.3	64.4	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH 303A	MH 302A	0.43	11	8.09	207	4.14	3	1.6	4.6	58.0	200	PVC	1.80	44.0	1.4	0.90
Ridgeview Dr.	MH 302A	MH 301A	0.57	15	8.66	222	4.13	3.2	1.7	4.9	38.2	200	PVC	1.00	32.8	1.04	0.70
Ridgeview Dr.	MH 301A	MH 300A	0.41	11	9.07	233	4.12	3.3	1.8	5.1	58.5	200	PVC	0.50	23.2	0.74	0.60
From Street "A"		MH 300A			1.77	45											
Ridgeview Dr.	MH 300A	MH 3	0.47	12	11.31	290	4.08	4.1	2.3	6.4	34.8	200	PVC	0.50	23.2	0.74	0.60
Ridgeview Dr.	MH 3	MH 2	0.71	18	12.02	308	4.07	4.4	2.4	6.8	100.0	250	PVC	0.50	42.0	0.86	0.60
Ridgeview Dr.	MH 2	MH 1	0.95	24	12.97	332	4.06	4.7	2.6	7.3	75.0	250	PVC	0.50	42.0	0.86	0.60
From Ridgeview Dr.		MH 1			8.43	281											
Pioneer Dr.	MH 1	MH 9	0.20	6	21.60	619	3.92	8.4	4.3	12.7	78.0	250	PVC	0.50	42.0	0.86	0.70

SANITARY SEWER DESIGN SHEET

Designed By:
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowance: 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Density: 50 ppha

Zone 7

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Drayton Industrial Dr.	MH7A	MH6A	9.05	453	9.05	453	4	6.3	1.8	8.1	100	250	PVC	0.3	32.6	0.66	0.50
Drayton Industrial Dr.	MH6A	MH5A	1.17	59	10.22	512	3.97	7.1	2.0	9.1	88	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH5A	MH4A	1.19	60	11.41	572	3.94	7.8	2.3	10.1	54	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH4A	MH3A	0.91	46	12.31	618	3.93	8.4	2.5	10.9	100	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH3A	MH2A	1.17	59	13.48	677	3.9	9.2	2.7	11.9	61	250	PVC	0.3	32.6	0.66	0.60
Drayton Industrial Dr.	MH2A	MH1A	0.70	36	14.18	713	3.89	9.6	2.8	12.4	80	250	PVC	0.3	32.6	0.66	0.60

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout
Date:	2023-02-21		
Checked By:		Project Number:	T000974B
Date:		Municipality:	Township of Mapleton

Domestic Flow:	300	L/cap/d
Infiltration Allowan	0.2	L/s/ha
Peak Factor:	Harmon's Formula	
Manning's "n":	0.013	
Population Densit	25	ppha

Zone 8

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Wortley St.	W11	W10	0.29	8	0.29	8	4.42	0.1	0.1	0.2	105	200	PVC	7.24	88.3	2.81	0.80
Queen St.	W9	W8	0.58	15	0.58	15	4.4	0.2	0.1	0.3	65	200	PVC	1.07	33.9	1.08	0.30
Queen St.	W8	W7	0.13	4	0.71	19	4.38	0.3	0.1	0.4	55	200	PVC	4	65.6	2.09	0.60
Main St. W	W5	W4	0.35	9	0.35	9	4.42	0.1	0.1	0.2	40	250	PVC	0.31	33.1	0.67	0.20
Queen St.	W9	MH	0.53	14	0.53	14	4.4	0.2	0.1	0.3		200	PVC		0	0	#DIV/0!
Mill St.	MH	W1	0.66	17	1.18	31	4.35	0.5	0.2	0.7		200	PVC		0	0	#DIV/0!
Main St. W	W17	W16	0.16	4	0.16	4	4.45	0.1	0.0	0.1	85	200	PVC	0.4	20.7	0.66	0.20
Main St. W	W16	MH1A	0.05	2	0.21	6	4.43	0.1	0.0	0.1	26	200	PVC	1.46	39.6	1.26	0.40
From Mapleton Industrial Park (Zone 7)		MH1A			14.18	713											
Main St. W	MH1A	W15	0.30	8	14.69	727	3.89	9.8	2.9	12.7	74	200	PVC	1.46	39.6	1.26	1.10
Main St. W	W15	W14	0.53	14	15.22	741	3.88	10	3.0	13	82.8	200	PVC	2.72	54.1	1.72	1.40
Main St. W	W14	W13	0.46	12	15.68	753	3.88	10.1	3.1	13.2	100	200	PVC	4.14	66.7	2.12	1.60
Main St. W	W13	MH9	0.02	1	15.71	754	3.88	10.2	3.1	13.3	7.3	200	PVC	4.25	67.6	2.15	1.70
From Pioneer Dr. (Zone 6)		MH9			21.60	619											
Main St. W	MH9	W12	0.60	16	37.91	1,389	3.7	17.8	7.6	25.4	92.7	200	PVC	4.25	67.6	2.15	2.00
Main St. W	W12	W10	0.62	16	38.53	1,405	3.7	18.1	7.7	25.8	100	200	PVC	2.7	53.9	1.72	1.70
From Wortley St.		W10			0.29	8											
Main St. W	W10	W7	0.06	2	38.88	1,415	3.7	18.2	7.8	26	16.77	200	PVC	1.67	42.4	1.35	1.40
From Queen St.		W7			0.71	19.00											
Main St. W	W7	W6	0.33	9	39.92	1,443	3.69	18.5	8.0	26.5	55.33	200	PVC	1.67	42.4	1.35	1.40
Main St. W	W6	W4	0.58	15	40.51	1,458	3.69	18.7	8.1	26.8	60.7	200	PVC	2.35	50.3	1.6	1.60
From Main St. W		W4			0.35	9											
King St.	W4	W3	0.14	4	41.00	1,471	3.69	18.8	8.2	27	70	250	PVC	0.31	33.1	0.67	0.70

King St.	W3	W2	0.40	11	41.40	1,482	3.68	18.9	8.3	27.2	80	250	PVC	0.31	33.1	0.67	0.70
King St.	W2	W1	0.41	11	41.81	1,493	3.68	19.1	8.4	27.5	74.5	250	PVC	0.31	33.1	0.67	0.70
From Mill St.		W1			1.18	31											
Mill St.	W1	Inlet MH	0.10	3	43.09	1,527	3.67	19.5	8.6	28.1	101.5	250	PVC	0.38	36.7	0.75	0.80

SANITARY SEWER DESIGN SHEET

Designed By: Jennifer McDonald
Date: 2023-02-21
Checked By:
Date:

Project: Drayton Sanitary Collection System - 20-Year Buildout
Project Number: T000974B
Municipality: Township of Mapleton

Domestic Flow: 300 L/cap/d
Infiltration Allowanc 0.2 L/s/ha
Peak Factor: Harmon's Formula
Manning's "n": 0.013
Population Densit 25 ppha

Zone 9

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
Main St. W.																	
From Wellington St. (Zone 1)		E4			5.99	159											
From Wellington St. (Zone 2)		E4			52.15	1928											
From Wellington St. (Zone 3)		E4			2.19	57											
Main St. W	E4	E3	0.31	8	60.64	2152	3.56	26.6	12.1	38.7	111.5	250	PVC	0.37	36.2	0.74	0.80
Easement S. of Conestogo River	E3	E2	0.19	5	60.83	2157	3.56	26.7	12.2	38.9	70	250	PVC	0.37	36.2	0.74	0.80
Easement S. of Conestogo River	E2	E1	0.25	7	61.07	2164	3.56	26.7	12.2	38.9	70	250	PVC	0.37	36.2	0.74	0.80
Easement S. of Conestogo River	E1	MH PS1	0.15	4	61.22	2168	3.56	26.8	12.2	39	74	250	PVC	0.37	36.2	0.74	0.80

SANITARY SEWER DESIGN SHEET

Designed By:	Jennifer McDonald	Project:	Drayton Sanitary Collection System - 20-Year Buildout	Domestic Flow:	300 L/cap/d
Date:	2023-02-21			Infiltration Allowanc	0.2 L/s/ha
Checked By:		Project Number:	T000974B	Peak Factor:	Harmon's Formula
Date:		Municipality:	Township of Mapleton	Manning's "n":	0.013
				Population Densit	25 ppha

Zone 10

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING FACTOR	DOM. FLOW	INFILT.	DESIGN FLOW	PROPOSED SEWER DESIGN						
STREET	FROM	TO	Area (ha)	Pop (cap)	Area (ha)	Pop (cap)		(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA. (mm)	TYPE	SLOPE (%)	CAP (L/s)	VEL. (m/s)	ACT. VEL. (m/s)
From Mill St. (Zone 4)		Inlet MH			48.70	1,683											
From Mill St. (Zone 8)		Inlet MH			43.09	1,527											
From River Run Dr. (Zone 5)		Inlet MH			8.21	218											
Inlet MH - PS1	Inlet MH	PS1	0.03	1	100.01	3,429	3.39	40.4	20.0	60.4	13.5	375	PVC	0.31	97.6	0.88	0.90
From Zone 9		PS-1			61.22	2,168											
Pumping Station Inlet Pipe	PS1	Wet Well	0.00	0	161.24	5,597	3.2	62.2	32.2	94.4	6.5	350	PVC	0.4	92.3	0.96	1.10

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